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(54) Title: ELECTRONIC AIR DISPENSING AND PRESSURE BALANCING SYSTEM FOR TYRES

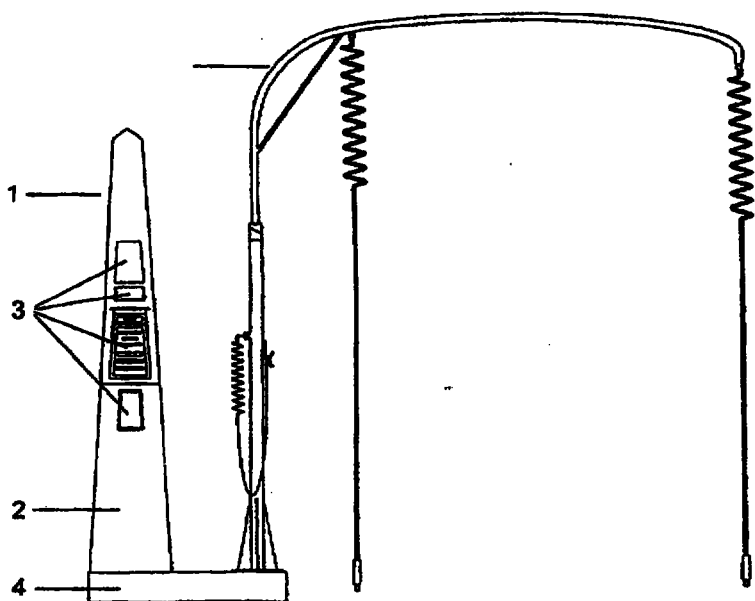
(54) Título: SISTEMA DISPENSADOR DE AIRE Y EQUILBRADOR DE PRESIONES ELECTRONICO PARA NEUMATICOS

(57) Abstract

Electronic air dispensing and pressure balancing system for tyres to be installed preferably in petrol stations, service areas, mechanical assistance stations on roads or the like, of the type comprising a compression unit which, either through a tank or directly, supplies a gas, preferably compressed air, to an inflation unit which has a plurality of inflation conduits provided at their free ends with means for coupling said inflation conduits to the tyre valve, as well as a supporting structure for said conduits, having an actuation unit or a machine (1) comprised of a case (2), a metal frame (11), an electronic measuring instrument, a pneumatic equipment (35), a propulsor or compressor equipment, with an external or internal compression unit, a base or support unit and an air supplying unit (5).

(57) Resumen

Sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos, a instalar preferentemente en gasolineras, áreas de servicio, puestos de asistencia mecánica en carretera o similares, del tipo de los que constan de una unidad de compresión que, bien a través de un depósito, o bien directamente, entrega un gas, preferentemente aire comprimido, a una unidad de inflado, que dispone de varios conductos de inflado, que disponen en sus extremos libres de los medios de acoplamiento de dichos conductos de inflado a la válvula del neumático, así como una estructura de soporte de dichos conductos, que dispone de una unidad de accionamiento o máquina (1), que consta de una carcasa (2), un armazón metálico (11), un instrumento de medida electrónico, y un equipo neumático (35), un equipo propulsor o compresor, que dispone de una unidad compresora externa o interna, una unidad de soporte o base y una unidad dispensadora (5) de aire.



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SISTEMA DISPENSADOR DE AIRE Y EQUILBRADOR DE PRESIONES ELECTRÓNICO PARA NEUMÁTICOS

Descripción.

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El objeto de la presente invención se refiere, como su título indica, a un sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos, a instalar preferentemente en gasolineras, áreas de servicio, puestos de asistencia mecánica en carretera o similares, que presenta unas ventajas importantes sobre las instalaciones existentes en la actualidad.

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El correcto inflado de los neumáticos de los vehículos de motor en circulación es un factor determinante para la seguridad vial, así como otros factores económicos tales como la durabilidad de los neumáticos o el consumo de carburante.

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Actualmente, la mayor parte de los puntos de asistencia localizados en gasolineras, áreas de servicio, puestos de asistencia mecánica en carretera o similares disponen de diferentes instalaciones que permiten al usuario controlar o chequear el estado de presión de los neumáticos de su vehículo, que, sin embargo, presentan ciertas carencias que se traducen en importantes inconvenientes para el usuario de dichas instalaciones.

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La mayor parte de las instalaciones de inflado existentes en la actualidad constan de una unidad de compresión que, bien a través de un depósito, o bien directamente, entrega un gas, preferentemente aire comprimido, a una unidad de inflado, constituida, generalmente, por un único conducto o manguera, en cuyo extremo libre se dispone la válvula de inflado que se acopla a la válvula del neumático del vehículo que se desea inflar o cuya presión se desea comprobar. El control de la presión de cada uno de los neumáticos se realiza a través de una unidad de control central. Asimismo, el usuario dispone de unas tablas de calibración de la presión, para determinar la presión adecuada de los neumáticos de cada vehículo y condiciones de circulación.

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Sin embargo, esta estructura de la instalación de inflado presenta una serie de inconvenientes. Así, la disposición de un único conducto o manguera de inflado exige

- 2 -

que el usuario estacione adecuadamente su vehículo para, de esta forma, poder proceder al inflado de los neumáticos del mismo sin tener que reposicionar el vehículo durante la operación de chequeo de la presión de diferentes neumáticos. Aun así, en la mayoría de los casos, para alcanzar los neumáticos más alejados de la instalación, el usuario se ve obligado a reubicar el vehículo adecuadamente, o, en el mejor de los casos, a realizar malabarismos con la manguera de inflado, para hacer pasar ésta por la parte inferior o superior del vehículo, como única forma de alcanzar dichos neumáticos.

Asimismo, la mayor parte de las instalaciones de inflado no disponen de medios de recogida automáticos de la manguera de inflado, lo que hace que en la mayor parte de este tipo de instalaciones, dicha manguera se encuentre tirada en el suelo, o, incluso, en la zona de rodaje de los vehículos, lo que provoca su suciedad, así como el deterioro y posterior rotura de la goma, con los importantes inconvenientes y gastos que ello conlleva.

Por otro lado, las tablas de calibración instaladas junto a los sistemas de inflado existentes en la actualidad, suelen ser poco prácticas y a menudo se encuentran incompletas.

Finalmente, estudios del sector del automóvil demuestran que la mayor parte de las máquinas dispensadoras de aire, por razón de su uso, están estropeadas y no son fiables, y que su señalización es, en muchas ocasiones, deficiente, pasando en numerosas ocasiones totalmente desapercibidas por el usuario.

Con el objeto de subsanar eficazmente las carencias que presentan los sistemas de inflado existentes en la actualidad, se ha desarrollado el sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos, objeto de la presente invención.

La presente invención se refiere a un sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos, a instalar preferentemente en gasolineras, áreas de servicio, puestos de asistencia mecánica en carretera o similares, que consta preferentemente de una unidad de accionamiento o máquina, que se constituye como el elemento fundamental del sistema, desde donde se controla y realiza la operación de

- 3 -

5 inflado de los neumáticos del vehículo, constituida dicha unidad de accionamiento por una carcasa, un armazón metálico, un instrumento de medida electrónico, un equipo neumático y medios de visualización y control, un equipo propulsor o compresor, que proporciona aire seco desde una unidad compresora externa o interna, una unidad de soporte o base y una unidad dispensadora de aire, que conduce el aire desde la unidad de accionamiento o máquina hasta los neumáticos del vehículo y que, para el caso de vehículos de ejes de dos ruedas, permite el equilibrado de las presiones de neumáticos de un mismo eje.

10 Más concretamente, la unidad de accionamiento o máquina permite el suministro de cualquier presión a los neumáticos del vehículo así como el equilibrado de las presiones de las ruedas de un mismo eje para vehículos con dos ruedas por eje.

15 Dicha unidad de accionamiento o máquina dispone de una carcasa, constituida como la envolvente exterior y, por lo tanto, como la cubierta que da forma a dicha máquina, apta para proteger los elementos interiores, fabricada por una de sus caras preferentemente de chapa metálica de hierro con protección anticorrosión superficial de zinc, cromatizado en baño electrolítico y un recubrimiento con pintura de poliuretano bicomponente, y por las caras restantes preferentemente de materiales resistentes a los
20 agentes atmosféricos, como, preferentemente, resina poliuretánica rígida expandida en alta densidad preferentemente autoextinguible, con un recubrimiento exterior preferentemente de esmalte de poliuretano bicomponente. En dicha cara preferentemente metálica se dispone de una o más puertas con bisagras, aptas para permitir el acceso a los elementos interiores de la máquina, que disponen de un marco con canal de desagüe y junta de goma, así como de una cerradura de seguridad. La carcasa
25 dispone adicionalmente de medios de ventilación para que exista una corriente de aire interior que evite la condensación de humedad en los componentes electrónicos, tales como, preferentemente, unas rejillas de ventilación situadas preferentemente en la parte superior e inferior de la carcasa.

30 El armazón metálico de la unidad de accionamiento o máquina consiste en una estructura metálica construida preferentemente a base de perfiles de sección en L doblados preferentemente en ángulos rectos y soldados entre sí, con el objeto de dar rigidez a la máquina y soportar los esfuerzos laterales, que por la acción de agentes
35 externos tales como el viento, puedan producirse. Dicho armazón metálico dispone de

- 4 -

una capa protectora anticorrosiva, constituida preferentemente mediante un baño electrolítico de zinc, cromatizado y pintura de epoxy-poliuretano. Dicho armazón metálico dispone adicionalmente de medios de fijación de la carcasa, constituidos preferentemente mediante tornillos.

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El instrumento de medida de la unidad de accionamiento o máquina está constituido por un conjunto electrónico formado por tres módulos inteligentes, como son un módulo visualizador-supervisor, un módulo de teclado y un módulo de ajuste, con funcionalidades independientes, disponiendo cada uno de ellos de un microcontrolador para la realización del proceso encomendado a cada uno de los módulos, comunicados, preferentemente, mediante dos hilos de acuerdo con las especificaciones del bus de comunicaciones correspondiente, así como un módulo de alimentación y control neumático, que proporciona la energía necesaria para el funcionamiento de los módulos restantes, gobernando al mismo tiempo el equipo neumático.

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Más concretamente, dicho módulo visualizador-supervisor del instrumento de medida está constituido por un microcontrolador, una interface serie-paralelo para el gobierno del visualizador, un visualizador, una memoria de escritura protegida, un circuito de control de alimentación, un circuito de recepción de infrarrojos, una batería y un circuito de carga. Dicho módulo es el encargado de presentar hacia el exterior la medida de la presión de forma inteligible, almacenar la información introducida desde el exterior a través del módulo de teclado, así como de supervisar todo el funcionamiento del equipo, gestionando la información recibida de los módulos restantes, decidiendo la operación a realizar, y enviando las órdenes oportunas a través del bus de comunicaciones a los módulos restantes.

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El módulo de teclado es el encargado de recibir las órdenes del exterior y comunicarlas al módulo supervisor para que las interprete y proceda según el criterio establecido por el programa, y que dispone de un microcontrolador, una interface entre el elemento inteligente y el teclado, constituida preferentemente mediante transistores, indicadores luminosos y, opcionalmente, medios de cobro, bien mediante monedas o tarjetas de crédito. La detección de la activación de una tecla, conformidad de una transacción de tarjeta o aceptación de una moneda, se comunica mediante el bus de comunicaciones al módulo supervisor, determinando dicho módulo supervisor la(s) acción(es) a realizar, entre las que se incluyen las órdenes al módulo de teclado para

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- 5 -

activar o desactivar tanto los indicadores luminosos como el aceptador de tarjetas o el monedero.

5 El módulo de ajuste es el encargado de recoger la información de la presión y convertir dicha información a información digital, disponiendo de un microcontrolador, un conversor analógico-digital con entrada diferencial, un amplificador lineal de bajo ruido y un transductor de presión. Dicho módulo de ajuste convierte la información relativa a la presión barométrica a un valor digital numérico, acciona las electroválvulas y realiza las operaciones necesarias de ajuste de presión hasta alcanzar la presión deseada, manual o automáticamente.

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Finalmente, la fuente de alimentación consiste en el circuito encargado de suministrar la energía necesaria a cada uno de los módulos anteriores para su correcto funcionamiento, disponiendo de estabilizadores de tensión como, preferentemente un

15 circuito con un transistor y medios de protección, tales como un filtro situado a la entrada de la red para evitar la producción de interferencias de radiofrecuencia. Adicionalmente dispone de un sistema de monitorización de la alimentación, apto para detectar caídas de tensión por debajo de un valor de seguridad, y suministrando la señal de inicialización de los módulos. Finalmente integra un control de potencia para el

20 gobierno del equipo neumático mediante, preferentemente, triacs optoacopladores indicativos de la presencia o no de tensión en los elementos constitutivos de dicho equipo neumático, así como una monitorización del correcto funcionamiento de dicho equipo neumático.

25 Opcionalmente, el sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos dispone de un telemando para la selección de la presión de inflado a alcanzar por dicho sistema. Dicho telemando dispondrá de un teclado, un conversor de la señal eléctrica generada por el teclado a, preferentemente, rayos

30 infrarrojos, y un emisor de dichas ondas, apto para emitir la señal correspondiente al valor introducido por dicho teclado del telemando, al circuito receptor de infrarrojos instalado en la unidad de accionamiento, preferentemente en su carcasa. Dicho circuito receptor de señal dispone de un transductor de señal que convierte la señal de infrarrojos recibida en señal eléctrica, que se envía directamente al módulo visualizador-supervisor del instrumento de medida, cuyo microcontrolador genera las órdenes

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- 6 -

correspondientes.

5 Dicho teclado instalado en el telemando puede ser bien un teclado numérico, del tipo del instalado en la unidad de accionamiento y conectado al módulo de teclado, apto para introducir cualquier valor, o bien una única tecla que contenga el registro del valor asociado a la presión de los neumáticos ideal del vehículo, en cuyo caso el telemando sería de carácter personal asociado al vehículo.

10 El equipo neumático de la unidad de accionamiento o máquina es el elemento encargado de dirigir el flujo de aire que permitirá llenar o vaciar los neumáticos hasta conseguir la presión deseada. Dicho equipo neumático consta de cuatro electroválvulas que comunican las ruedas con la fuente de presión o compresor, el propio instrumento de medida y con la atmósfera. Dichas electroválvulas se unen en un nodo común o nodo caliente, al cual se une también dicho instrumento de medida.

15 Dos de dichas electroválvulas son de acción simultánea y se encargan de conectar los medios de distribución y conexión, tales como mangueras, que provienen de los neumáticos del vehículo, con dicho nodo caliente, logrando un doble efecto. Por un lado se igualan las presiones en los dos neumáticos en base a la ley de vasos comunicantes, y al mismo tiempo es posible medir la presión del lazo entre las ruedas. La utilización de dos electroválvulas no permite el equilibrado cruzado de ruedas al cambiar las mangueras de un eje a otro.

20 Una de las dos electroválvulas restantes une, una vez abierto el grupo de electroválvulas de los neumáticos anterior, el nodo caliente con el compresor, para de este modo aumentar la presión.

30 La segunda de las dos electroválvulas restantes, une, una vez abierto el grupo de electroválvulas de los neumáticos anterior, el nodo caliente con la atmósfera, para de este modo disminuir la presión.

35 Asimismo, dicho equipo neumático dispone de una válvula antiretorno situada a la entrada de presión del conjunto neumático, con el objeto de evitar que, en ausencia de presión en el compresor, se puedan deshinchar los neumáticos.

- 7 -

El equipo neumático se complementa con unos medios de protección del instrumento de medida frente al agua y a la suciedad existente en la instalación y/o en el compresor, así como a presiones superiores que pueda soportar dicho instrumento de medida, tales como, preferentemente, un filtro y un regulador.

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El equipo propulsor o compresor del sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos proporciona aire seco a una presión mínima preestablecida. Dicho compresor puede ser tanto interior, dimensionando la carcasa exterior adecuadamente para alojar a dicho compresor, como exterior, en cuyo caso se puede disponer de un compresor de mayor tamaño y, por lo tanto, de una mayor potencia, favoreciendo de esta forma el tiempo de respuesta del sistema.

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La unidad de soporte o base consiste en un zócalo o peana, apta para soportar la unidad de accionamiento o máquina y la unidad dispensadora de aire, fabricada preferentemente de forma paralelepédica, abierta por la cara inferior, de, preferentemente, chapa de acero, con protección anticorrosión por baño electrolítico de zinc, cromatizado y pintura bicomponente epoxy-poliuretano, que dispone de medios de fijación al suelo mediante tornillos y tacos de sujeción. Dicha base puede opcionalmente disponer de una pequeña puerta de acceso a la caja de monedas existente en el interior de la máquina.

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La unidad dispensadora de aire es la unidad encargada de conducir el aire desde la unidad de accionamiento o máquina hasta los neumáticos del vehículo a través de unas gomas o mangueras, disponiendo de una estructura de soporte de dichos conductos o mangueras, medios de ubicación aptos para adaptar la posición de dichos conductos o mangueras a los neumáticos del vehículo que se desean inflar o cuya presión se desea comprobar, y medios de retorno y/o recogida automática de dichos conductos o mangueras desde su posición de operación hasta su posición de reposo. La configuración de dicha unidad dispensadora de aire es por lo tanto apta para evitar que ni dichas gomas o mangueras, ni sus racords de conexión terminales se arrastren por el suelo, evitando el consiguiente deterioro y suciedad.

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Los medios de soporte de los conductos o mangueras de la unidad dispensadora de aire se constituyen preferentemente con una rigidez estructural apta para resistir factores tales como la utilización por parte de los usuarios, las inclemencias climatológicas.

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- 8 -

cas y, en instalaciones de inflado que sitúan dichos medios de soporte en el suelo, el peso de un vehículo que circule por encima de los mismos.

5 Los medios de ubicación de los conductos o mangueras de inflado a los neumáticos del vehículo dependen fundamentalmente de la realización práctica del sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos, pudiendo ser tanto estáticos, en los que es el vehículo el que se adapta a la instalación de inflado, como móviles, en los que el usuario actúa sobre los medios de ubicación para acoplar los conductos o mangueras de inflado a los neumáticos del vehículo. En
10 cualquier caso, dichos medios de ubicación son aptos para facilitar al usuario la adaptación de los conductos o mangueras de inflado a los neumáticos del vehículo.

La unidad dispensadora de aire del sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos objeto de la presente invención dispone de
15 medios de retorno y/o recogida automática de dichos conductos o mangueras desde su posición de operación hasta su posición de reposo, constituidos preferentemente mediante mecanismos automáticos de retorno, recogida y/o enrollamiento de los conductos o mangueras de inflado así como de los medios de ubicación de dichos conductos o mangueras, especialmente cuando se trate de medios de ubicación
20 móviles.

Con el objeto de facilitar y lograr una mejor disposición de los conductos o mangueras de inflado de la instalación al vehículo cuyos neumáticos se desean inflar o cuya presión se desea comprobar, resulta adecuado ofrecer varios conductos o
25 mangueras que se sitúen, preferentemente, a ambos lados del vehículo cuando se estacione en la instalación de inflado para proceder a la operación correspondiente. De esta forma, el sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos consta, preferentemente, de dos o cuatro conductos o mangueras de inflado.

30 Opcionalmente, el sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos puede disponer de un conducto o manguera de inflado específico para su utilización para vehículos de dos ruedas, tales como bicicletas, motocicletas o similares.

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- 9 -

Adicionalmente, los conductos o mangueras de inflado, disponen en sus extremos libres de medios de acoplamiento adecuados para acoplar dichos conductos o mangueras de inflado a la válvula del neumático, y proceder, de esta forma, al inflado o chequeo de la presión del neumático correspondiente.

5

Dichos medios de acoplamiento aptos para acoplar dichos conductos o mangueras de inflado a la válvula del neumático consisten preferentemente en una boquilla de acoplamiento, apta para su sencilla y rápida conexión y desconexión de las mangueras (provenientes de la unidad suministradora de aire) a las válvulas de las
10 ruedas, definida por una configuración cilíndrica de diámetro reducido y longitud apta para acceder a la válvula, en el caso de que ésta se aloje en una cavidad, que dispone de unos medios de cierre automáticos aptos para impedir la salida del aire cuando la boquilla no se encuentra conectada a la válvula.

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Más concretamente, dicha boquilla de acoplamiento comprende una pieza externa o corredera, de forma cilíndrica y cerrada por su parte posterior mediante un tapón roscado, en cuyo extremo opuesto dispone de una abertura circular apta para introducirse en la válvula. En el interior de dicha pieza externa o corredera se alojan dos piezas que deslizan respecto de la primera, engarzadas entre sí, preferentemente
20 mediante una unión roscada. En el interior de una de dichas piezas, la más próxima a la válvula del neumático, se aloja una pieza tubular hueca escalonada interiormente que desliza respecto de dicha pieza que la aloja, y que, a su vez, aloja en su interior un percutor, consistente en una varilla cilíndrica que dispone de un ensanchamiento de sección poligonal, preferentemente hexagonal, apto para impedir el retroceso en el
25 interior de dicha pieza tubular así como para permitir el paso del aire entre los intersticios resultantes entre las cuerdas del polígono y la sección circular de la pieza tubular. Dicha pieza tubular dispone en su extremo más próxima a la válvula del neumático de una junta cónica de goma, apta para taponar el orificio de paso de aire. Finalmente, dicha pieza tubular dispone de dos resortes terminados en "L" sujetos
30 mediante un casquillo cilíndrico exterior. El extremo en "L" de dichos resortes se introduce en unas ranuras practicadas en la boquilla de dicha pieza tubular. Por su parte, la segunda de dichas piezas alojada en la pieza exterior o corredera, la más próxima a la entrada de aire a través del conducto exterior o manguera, presenta un interior hueco cilíndrico, y dispone de un obús enroscado en su extremo anterior, del tipo
35 de los alojados en las válvulas de los vehículos, en cuyo extremo libre dispone de un

- 10 -

pequeño resorte o muelle, y su parte posterior termina exteriormente en una serie de resaltes, preferentemente en forma de cola de milano, apta para un acoplamiento estanco con la goma del conducto exterior de aire o manguera, por la que circula el aire proveniente de la máquina. Dicha pieza presenta asimismo un ensanchamiento interior en forma de corona circular, que dispone de cuatro bolas diametral y normalmente opuestas dos a dos, empotradas y presionadas por unos medios elásticos como, preferentemente, unos muelles, encarándose dichas bolas en una ranura interior practicada en dicha pieza exterior o corredera. En la proximidad de su ensanchamiento y hacia el interior de la boquilla de acoplamiento, se dispone un muelle interior rodeando al exterior tubular de dicha pieza, apto para desplazar solidariamente ambas piezas alojadas en dicha pieza exterior o corredera, y sacar de esta forma dichas bolas de las ranuras correspondientes. Finalmente, la pieza exterior o corredera dispone en su interior de un casquillo troncocónico apto para presionar dichos resortes terminados en "L" cuando el conjunto solidario formado por las piezas se ha desplazado hasta el tope que le produce el tapón roscado que cierra dicha pieza externa o corredera.

El sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos objeto de la presente invención cuya configuración se ha descrito anteriormente, dispone de diferentes modos de funcionamiento seleccionables por el usuario.

Así, los tres modos de funcionamiento que presenta el sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos son modo chequeo-equilibrado, modo de inflado-equilibrado manual y modo de inflado-equilibrado automático.

El modo chequeo-equilibrado se selecciona pulsando una tecla dispuesta al efecto en el teclado que forma parte del módulo de teclado, provocando la apertura de las electroválvulas del módulo de ajuste, y es utilizado por el usuario para comprobar la presión de los neumáticos así como para equilibrar la presión de los neumáticos de un mismo eje del vehículo, en el caso de que dicho eje disponga de al menos dos neumáticos, presentando la presión existente en los neumáticos, una vez determinada mediante el instrumento de medida electrónico, en el visualizador del módulo visualizador-supervisor del instrumento de medida.

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El modo de inflado-equilibrado manual permite ajustar la presión a voluntad por el usuario, haciendo uso de una(s) tecla(s) de inflado y desinflado dispuesta(s) en el teclado que forma parte del módulo de teclado, provocando la apertura y/o cerrado de las electroválvulas del módulo de ajuste, accionando la electroválvula correspondiente, a la vez que en el visualizador del módulo visualizador-supervisor del instrumento de medida se presenta la presión existente en los neumáticos del vehículo y medida a través de dicho instrumento de medida. La comparación de la información que se presenta en dicho visualizador relativa a la presión existente en los neumáticos con la presión que el usuario desea alcanzar en los neumáticos del vehículo determina la acción de inflado o desinflado. El equilibrado de las presiones de neumáticos pertenecientes a un mismo eje se realiza automáticamente mediante la configuración del sistema y, particularmente, de las electroválvulas, anteriormente descrita.

El modo de inflado-equilibrado automático permite ajustar la presión a voluntad por el usuario a un valor preestablecido por éste mediante la introducción del valor correspondiente a través del teclado que forma parte del módulo de teclado, bien sea mediante la introducción explícita numérica pulsando unas teclas numéricas correspondientes dispuestas al efecto, bien sea seleccionando algún valor predeterminado pulsando una única tecla dispuesta al efecto. Una vez seleccionado dicho valor preestablecido, la máquina actúa automáticamente accionando las electroválvulas adecuadamente hasta alcanzar el valor preseleccionado, comparando en cada instante la presión de los neumáticos con el valor predeterminado, y actuando en consecuencia.

Opcional o adicionalmente, el sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos, en función de sus modos de funcionamiento, puede disponer de un avisador acústico indicador mediante una señal acústica de que el sistema ha finalizado la operación de inflado-equilibrado, alcanzando el valor predeterminado, cuando dicho sistema funciona en el modo de inflado-equilibrado automático.

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Finalmente, el sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos objeto de la presente invención, dispone de diferentes modos de cobro seleccionables como son modo gratuito o modo de pago, seleccionable por el explotador del sistema, y, en caso de optar por modo de pago, se dispone de las opciones de modo de cobro por monedero o modo de cobro por tarjeta, ya sea tarjeta

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- 12 -

propia con un número determinado de servicios o tarjeta monedero de cualquier entidad bancaria, seleccionable por el usuario. Dicho monedero consta de una ranura por donde se deberá introducir la(s) moneda(s) necesaria(s) para poner en funcionamiento el sistema. En caso de que la moneda introducida fuera defectuosa y quedase atascada, se podrá recuperar pulsando el botón de devolución situado debajo de dicha ranura con lo que la pieza aparecerá en un cajetín situado bajo dicho pulsador. De igual modo, si la moneda fuese inadecuada o el sistema se hallara desconectado de la red o trabajando, el retorno de dicha moneda sería automático.

10 Opcionalmente, el sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos objeto de la presente invención puede disponer de medios de control remoto desde una estación central para el chequeo del estado del sistema así como, en su caso, para el recuento periódico de las cantidades recogidas en dicho sistema. Dichos medios de control remoto se establecen preferentemente mediante la comunicación vía modem que actúa sobre una unidad de chequeo y/o recuento situada en el interior del sistema objeto de la presente invención.

20 Adicionalmente, el sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos objeto de la presente invención puede disponer opcionalmente de un sistema emisor-receptor para tener en cuenta durante el proceso de ajuste de la presión parámetros tales como, particularmente, la temperatura. Para ello se dispone una válvula de neumático equipada con un sensor de temperatura, un transductor que convierte dicha señal de temperatura en señal eléctrica, y un emisor, preferentemente de radiofrecuencia o de rayos infrarrojos, que envía dicha señal eléctrica convertida en ondas de radiofrecuencia o de radiaciones infrarrojas, a un receptor dispuesto en el sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos, preferentemente en su carcasa. La señal recibida es convertida a señal eléctrica y enviada al módulo visualizador-supervisor, cuyo microcontrolador calculará adecuadamente el factor de ponderación de la temperatura del neumático respecto de la presión seleccionada, generando el factor corrector correspondiente.

35 Asimismo, el sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos objeto de la presente invención dispone de medios de indicación de funcionamiento y final de operación tales como, preferentemente, un sistema decorativo

- 13 -

a modo de, por ejemplo, molinillo de aire conectado eléctricamente al módulo visualizador-supervisor para accionar su movimiento de giro durante el funcionamiento de la máquina, así como un avisador sonoro apto para emitir una señal acústica una vez finalizada la operación de inflado del neumático y/o equilibrado de las presiones de los neumáticos de un mismo eje.

El sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos objeto de la presente invención puede consistir en una única unidad, tal y como se ha descrito anteriormente, o bien adoptar un diseño modular para convertirse en un sistema multipuesto, multiusuario y multifunción. En este caso, el sistema constará de un centro gestor de múltiples puntos terminales de servicio, así como un conjunto de terminales autónomos de uso, supeditados a dicho centro gestor. Los diferentes elementos descritos anteriormente, se encontrarán distribuidos entre los diferentes componentes de dicho sistema multipuesto. Así, el centro gestor comprenderá un compresor, propio del centro donde se instale, un circuito de control general, apto para realizar la aceptación de los medios de pago, almacenar las transacciones, controlar los tiempos de servicio, y gestionar las comunicaciones, así como un módulo de comunicaciones, preferentemente vía modem. Por su parte, los terminales autónomos de uso, dispondrán de un dispositivo de visualización, un control de presión, un control de teclado, un control de pago, que incluye un monedero y un lector de tarjetas, así como un transductor de presión. La disposición particular así como las características de cada uno de los terminales autónomos podrá adoptar cualquier forma de realización a las que se hace referencia más adelante para el sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos objeto de la presente invención. Asimismo, conviene destacar que el compresor ubicado en dicho centro gestor estará dimensionado adecuadamente para dar servicio a los diferentes terminales autónomos simultáneamente, o al menos a un número determinado de ellos simultáneamente.

De todo lo anteriormente descrito se deducen fácilmente las ventajas aportadas por el sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos objeto de la presente invención como son la comodidad y facilidad de utilización de dicho sistema por parte del usuario, así como su limpieza, derivada del hecho de que el sistema dispone de una unidad dispensadora de aire que consta de un soporte y de un brazo giratorio, cuya configuración impide que las mangueras o

- 14 -

conductos encargados de llevar el aire desde el sistema hasta los neumáticos queden tirados por el suelo desgastándose o rompiéndose, al disponer de medios de recogida automáticos de las mangueras de inflado, y su fiabilidad, al disponer de medios de chequeo remotos adecuados.

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Para comprender mejor el objeto de la presente invención se describe a continuación una realización práctica preferencial del sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos, en base a las figuras adjuntas. En dichas figuras se muestra:

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La figura 1 muestra una vista frontal de una primera realización del sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos objeto de la presente invención.

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Las figuras 2a, 2b, 2c y 2d muestran las vistas laterales de la carcasa de la unidad de accionamiento de la presente realización práctica del sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos objeto de la presente invención.

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La figura 3 muestra la sección transversal de la carcasa y del armazón metálico de la unidad de accionamiento del sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos objeto de la presente invención.

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Las figuras 4a y 4b muestran, respectivamente, la vista en alzado y en planta de la unidad dispensadora de aire que consta de un soporte y de un brazo giratorio.

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Las figuras 5a y 5b muestran dos vistas seccionadas de la boquilla de acoplamiento de los conductos o mangueras de inflado a la válvula del neumático, que representan, respectivamente, su estado en reposo y cargado, esto es, abiertos todos los pasos de aire.

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Las figuras 6a, 6b, 6c, 6d y 6e muestran, respectivamente, una vista en alzado, una vista lateral, una vista en planta y dos secciones, transversal y longitudinal, de la unidad de soporte o base.

- 15 -

La figura 7 muestra el esquema eléctrico de la presente realización práctica del sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos objeto de la presente invención.

5 La figura 8 muestra el esquema neumático de la presente realización práctica del sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos objeto de la presente invención.

10 La figura 9 muestra esquemáticamente una vista de una segunda realización práctica preferencial del sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos, que consta de dos dispositivos o módulos de inflado.

15 La figura 10a muestra el interior seccionado del dispositivo o módulo de inflado correspondiente a la segunda realización práctica representada en la figura 9.

 La figura 10b muestra una vista del alzado del exterior del dispositivo o módulo de inflado correspondiente a la segunda realización práctica representada en la figura 9.

20 La figura 11 muestra esquemáticamente una vista de una tercera realización práctica preferencial del sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos, que consta de cuatro dispositivos o módulos de inflado.

25 La figura 12 muestra esquemáticamente una vista de una cuarta realización práctica preferencial del sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos, que consta de dos dispositivos o módulos de inflado.

30 La figura 13 muestra un esquema de realización de un sistema multiusuario del sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos.

35 La figura 1 muestra una realización práctica del sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos, que consta de una unidad de accionamiento o máquina (1), que se constituye como el elemento fundamental del sistema, desde donde se controla y realiza la operación de inflado de los neumáticos del vehículo, que permite el suministro de cualquier presión a los neumáticos del vehículo

- 16 -

así como el equilibrado de las presiones de las ruedas de un mismo eje para vehículos con dos ruedas por eje, pudiendo observarse de dicha unidad de accionamiento la carcasa (2) y los medios de visualización y control (3). Asimismo, el sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos consta de un equipo propulsor o compresor (no mostrado en la figura), que proporciona aire seco desde una unidad compresora externa o interna, una unidad de soporte o base (4) y una unidad dispensadora (5) de aire, que conduce el aire desde la unidad de accionamiento o máquina (1) hasta los neumáticos del vehículo y que, para el caso de vehículos de ejes de dos ruedas, permite el equilibrado de las presiones de neumáticos de un mismo eje.

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Las figuras 2a, 2b, 2c y 2d muestran la carcasa (2) de la unidad de accionamiento, constituida como la envolvente exterior que presenta forma de tronco de pirámide de base cuadrada. Para facilitar su construcción, la carcasa (2) está dividida en dos partes superior (2a) e inferior (2b), que se ensamblan estancamente. De esta forma, dicha carcasa (2), es la cubierta que da forma a dicha máquina, apta para proteger los elementos interiores. La carcasa (2) está fabricada por una de sus caras (6d) (figura 2d) de chapa metálica de hierro con protección anticorrosión superficial de zinc, cromatizado en baño electrolítico y un recubrimiento con pintura de poliuretano bicomponente. Por las caras restantes (6a, 6b, 6c) (figuras 2a, 2b, 2c) dicha carcasa (2) está fabricada de materiales resistentes a los agentes atmosféricos, como resina poliuretánica rígida expandida en alta densidad preferentemente autoextinguible, con un recubrimiento exterior preferentemente de esmalte de poliuretano bicomponente. En dicha cara metálica (6d) se disponen dos puertas (7a, 7b) con bisagras, para permitir el acceso a los elementos interiores de la máquina, que disponen de un marco con canal de desagüe y junta de goma, así como de una cerradura de seguridad (8a, 8b). La carcasa (2) también dispone, preferentemente situadas en dicha cara metálica (6d), de unas rejillas de ventilación situadas en la parte superior (9) e inferior (10) de dicha carcasa (2), para que exista una corriente de aire interior que evite la condensación de humedad en los componentes electrónicos.

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Por la cara delantera (6c), la carcasa dispone de los medios para acoplar los medios de visualización y control (3) del sistema, tales como, preferentemente, una pantalla de visualización, un teclado y diferentes medios de cobro (figura 2c).

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La figura 3 muestra una sección transversal de la carcasa (2) y del armazón

- 17 -

metálico (11). Tal y como se puede observar en dicha figura, el armazón metálico consiste en una estructura metálica construida a base de perfiles de sección en L (12) doblados preferentemente en ángulos rectos y soldados entre sí, con el objeto de dar rigidez a la máquina y soportar los esfuerzos laterales, que por la acción de agentes externos tales como el viento, pueden producirse. Dicho armazón metálico (11) dispone de una capa protectora anticorrosiva, constituida mediante un baño electrolítico de zinc, cromatizado y pintura de epoxy-poliuretano. Dicho armazón metálico (11) dispone adicionalmente de medios de fijación de la carcasa, constituidos preferentemente mediante tornillos (no mostrados en la figura).

La unidad dispensadora (5) de aire del sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos objeto de la presente invención es la unidad encargada de conducir el aire desde la unidad de accionamiento (1) o máquina hasta los neumáticos del vehículo. Dicha unidad dispensadora (5) de aire dispone de una estructura de soporte de dichos conductos o mangueras, medios de ubicación aptos para adaptar la posición de dichos conductos o mangueras a los neumáticos del vehículo que se desean inflar o cuya presión se desea comprobar, y medios de retorno y/o recogida automática de dichos conductos o mangueras desde su posición de operación hasta su posición de reposo.

Las figuras 4a y 4b muestran una realización práctica de dicha unidad dispensadora (5) de aire, que consta de un soporte (13) y de un brazo giratorio (14). El soporte (13) consiste en un tubo hueco fabricado de acero pintado, en cuyo extremo inferior dispone de medios de fijación a la base (4) del sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos, consistente preferentemente en una placa de anclaje (15) para atomillar a la base (4). El brazo giratorio (14) consta de un primer tramo tubular vertical (14a) de cuyo extremo superior se extiende un segundo tramo tubular (14b) que describe una curva de 90° hasta situarse en horizontal, es decir, paralelo al suelo, y una barra diagonal (16) de soporte y refuerzo de dicho tramo tubular horizontal (14b). La altura a la que se sitúa dicho tramo tubular horizontal (14b) es, preferentemente, superior a 1,70 m, y, en cualquier caso, acorde con la altura de los vehículos a operar con la presente instalación de inflado.

La unidad dispensadora (5) de aire dispone de unos medios de ubicación, que permiten un giro de preferentemente entre 90° y 180° del tramo tubular superior del

- 18 -

brazo (14) alrededor del tramo tubular inferior o soporte (13), desde su posición de reposo, entendida como aquella en la que el tramo tubular horizontal superior (14b) se sitúa sustancialmente paralelo al eje longitudinal de un vehículo que estaciona junto al sistema de inflado, hasta su posición de operación, entendida como aquella en la que el tramo tubular horizontal superior (14b) se sitúa sustancialmente perpendicular al eje longitudinal de un vehículo que estaciona junto al sistema de inflado, para proceder al inflado o comprobación de la presión de los neumáticos situados a cada uno de los lados del vehículo estacionado. Dichos medios de ubicación consisten en medios de giro de dicho brazo (14) dispuestos en el extremo superior, tales como, preferentemente, un rodamiento de nylon (17) compuesto de dos cilindros acoplados (17a, 17b), cortados oblicuamente, de forma que al producirse el giro del brazo (14), el rodamiento (17) le fuerza a retornar a su posición natural.

Por el interior de dicho soporte (13) y brazo (14) discurren los tubos (18), que entran por la base de dicho soporte (13), y por los que circula el aire, proveniente de la unidad de accionamiento (1) o máquina. Dicho brazo (14) dispone de dos orificios de salida (19, 20) para conducir las mangueras (21) hasta el neumático del vehículo. La distancia de separación entre dichos orificios de salida (19, 20) es de, preferentemente, entre 1,75 m y 2,80 m, más preferentemente entre 1,90 m y 2,50 m, y, en cualquier caso, acorde con la anchura de los vehículos a operar con la presente instalación de inflado. Asimismo, el soporte (13) de la unidad dispensadora (5) de aire dispone de un orificio lateral (22) para la salida de un conducto o manguera (23) de inflado específico para su utilización para vehículos de dos ruedas, tales como bicicletas, motocicletas o similares.

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Asimismo, la unidad dispensadora (5) de aire dispone de medios de retorno y/o recogida automática de los conductos o mangueras de inflado (21) desde su posición de operación hasta su posición de reposo consisten en primer lugar en sendos arrollamientos verticales (25a, 25b) de sustentación, retorno y/o recogida de los conductos o mangueras de inflado (21) dispuestos en el tramo tubular horizontal superior (14b) del brazo giratorio (14) anteriormente descrito, que recojan las mangueras o conductos de inflado (21) desde su posición estirada para alcanzar las válvulas de inflado de los neumáticos, hasta su posición recogida, en la que cuelgan del tramo horizontal superior sin tocar el suelo, con el objeto de evitar su deterioro, y, en segundo lugar, el dispositivo de giro anteriormente descrito, de, preferentemente, entre 90° y

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180°, con retorno automático por gravedad, que realiza el movimiento de giro automático por gravedad del tramo horizontal tubular superior alrededor del punto de acoplamiento entre el soporte (13) y el brazo giratorio (14), desde la posición de operación hasta la posición de reposo.

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El conducto o manguera (23) para la operación de vehículos de dos ruedas, tales como bicicletas, motocicletas, motos o similares, dispone de medios de soporte para su posición de reposo, por ejemplo, a modo de gancho (26), y medios de retorno y/o recogida manuales u, opcionalmente, automáticos (no mostrados en la figura).

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Adicionalmente, los conductos o mangueras de inflado (21), disponen en sus extremos libres de medios de acoplamiento (24a, 24b, 24c) adecuados para acoplar dichos conductos o mangueras (21, 23) de inflado a la válvula del neumático, y proceder, de esta forma, al inflado o chequeo de la presión del neumático correspondiente. Según se puede observar, el medio de acoplamiento (24c) para vehículos de dos ruedas presenta una forma acodada a 90° para facilitar su acoplamiento a los neumáticos de dichos vehículos.

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Las figuras 5a y 5b representan detalladamente y en sección, dichos medios de acoplamiento aptos para acoplar dichos conductos o mangueras de inflado a la válvula (78) del neumático, constituidos por una boquilla de acoplamiento, apta para su sencilla y rápida conexión y desconexión de las mangueras (provenientes de la unidad suministradora de aire) a las válvulas (78) de las ruedas, definida por una configuración cilíndrica de diámetro reducido y longitud apta para acceder a la válvula (78), en el caso de que ésta se aloje en una cavidad, que dispone de unos medios de cierre automáticos aptos para impedir la salida del aire cuando la boquilla no se encuentra conectada a la válvula (78).

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Más concretamente, dicha boquilla de acoplamiento comprende una pieza externa o corredera (61), de forma cilíndrica y cerrada por su parte posterior mediante un tapón roscado (62), en cuyo extremo opuesto dispone de una abertura circular (63) apta para introducirse en la válvula (78). En el interior de dicha pieza externa o corredera (61) se alojan dos piezas (64, 65) que deslizan respecto de la pieza externa o corredera (61), engarzadas entre sí, preferentemente mediante una unión roscada (66). En el interior de una de dichas piezas (64), la más próxima a la válvula (78) del

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- 20 -

neumático, se aloja una pieza tubular (67) hueca escalonada interiormente, que desliza respecto de dicha pieza (64) que la aloja, y que, a su vez, aloja en su interior un percutor (68), consistente en una varilla cilíndrica que dispone de un ensanchamiento de sección hexagonal, apto para impedir el retroceso en el interior de dicha pieza tubular (67) así como para permitir el paso del aire entre los intersticios resultantes entre las cuerdas del hexágono y la sección circular de la pieza tubular (67). Dicha pieza tubular (67) dispone en su extremo más próximo a la válvula (78) del neumático de una junta cónica de goma (79), apta para taponar el orificio de paso de aire. Finalmente, dicha pieza tubular (67) dispone de dos resortes terminados en "L" (74a, 74b) sujetos mediante un casquillo cilíndrico exterior (75). El extremo en "L" de dichos resortes (74a, 74b) se introduce en unas ranuras (76a, 76b) practicadas en la boquilla de dicha pieza tubular (67). Por su parte, la segunda de dichas piezas (65) alojada en la pieza exterior o corredera (61), la más próxima a la entrada de aire a través del conducto exterior o manguera, presenta un interior hueco cilíndrico, y dispone de un obús (69) enroscado en su extremo anterior, del tipo de los alojados en las válvulas de los vehículos, en cuyo extremo libre dispone de un pequeño resorte o muelle (77), y su parte posterior termina exteriormente en una serie de resaltes en forma de cola de milano (70), apta para un acoplamiento estanco con la goma del conducto exterior de aire o manguera, por la que circula el aire proveniente de la máquina. Dicha pieza (65) presenta asimismo un ensanchamiento interior en forma de corona circular (71), que dispone de cuatro bolas (72) diametral y normalmente opuestas dos a dos, empotradas y presionadas por unos muelles (73), encarándose dichas bolas (72) en una ranura interior (84) practicada en dicha pieza exterior o corredera (61). En la proximidad de dicho ensanchamiento interior en forma de corona circular (71) y hacia el interior de la boquilla de acoplamiento, se dispone un muelle interior (80) rodeando al exterior tubular de dicha pieza (65), apto para desplazar solidariamente ambas piezas (64, 65) alojadas en dicha pieza exterior o corredera (61), y sacar de esta forma dichas bolas (72) de las ranuras (84) correspondientes. Finalmente, la pieza exterior o corredera (61) dispone en su interior de un casquillo troncocónico (83) apto para presionar dichos resortes (74a, 74b) terminados en "L" cuando el conjunto solidario formado por las piezas (64, 65) se ha desplazado hasta el tope que le produce el tapón roscado (62) que cierra dicha pieza externa o corredera (61).

La figura 5b muestra una vista seccionada de la boquilla de acoplamiento de los conductos o mangueras de inflado a la válvula (78) del neumático en su estado de

- 21 -

carga, esto es, abiertos todos los pasos de aire, que facilitará la comprensión del funcionamiento de dicha boquilla de acoplamiento.

La válvula (78) del vehículo se introduce por el extremo anterior de la boquilla de acoplamiento, a través del interior de la pieza (64) alojada en la pieza exterior o corredera (61), empujando al percutor (68), que desliza interiormente por la pieza tubular (67) alojada en dicha pieza (64). El percutor (68), en su desplazamiento, empuja a su vez al émbolo interior del obús (69), venciendo la resistencia de su muelle interior (77), y abriendo el orificio (82) de paso de aire, inicialmente taponado por la junta cónica de goma (79), comenzando a desplazar dicha pieza tubular (67), la cual a su vez ha de vencer la resistencia del muelle (80) que rodea al exterior tubular de la segunda pieza (65) alojada en la pieza exterior o corredera (61), hasta que comience a desplazar el conjunto solidario de piezas (64, 65), sacando las bolas (72) de las ranuras (84) correspondientes.

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Las resistencias de dichos muelles (77, 80) son transmitidas en sentido contrario al vástago (81) del obús de la válvula (78) del neumático, la cual queda abierta permitiendo el paso del aire.

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Cuando el conjunto solidario formado por las piezas (64, 65) alojadas en la pieza externa o corredera (61) se ha desplazado hasta el tope que le produce el tapón roscado (62) que cierra dicha pieza externa o corredera (61), los resortes (74a, 74b), solidarios con la pieza (64), son presionados por un casquillo troncocónico (83) situado en el interior de la pieza corredera (61), con lo que el extremo en forma de "L" de dichos resortes (74a, 74b) sobresale por las ranuras (76a, 76b) correspondientes abrazando, en forma de mordazas, a la válvula (78), introduciéndose en las estrías de la misma e impidiendo su retroceso.

25

En esta posición, representada en la figura 5b, con la válvula (78) trabada, el paso del aire está abierto en todo el recorrido, y a su vez la boquilla de acoplamiento está en una posición estable, que solamente se puede desbloquear tirando de la pieza externa o corredera (61), destrabando dichos resortes (74a, 74b) terminados en "L", introduciéndose nuevamente las bolas (72) en sus ranuras (84) correspondientes, volviendo a cerrarse los conductos de paso de aire por la acción de los muelles, quedando todo el conjunto en la posición de reposo y la válvula (78) del vehículo suelta.

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- 22 -

Las figuras 6a, 6b, 6c, 6d y 6e muestran diferentes vistas de la unidad de soporte o base (4), que consiste en un zócalo o peana, apta para soportar la unidad de accionamiento (1) o máquina y la unidad dispensadora (5) de aire. Dicho soporte o base (4) está fabricado de forma paralelepédica, abierta por la cara inferior, de chapa de acero, con protección anticorrosión por baño electrolítico de zinc, cromatizado y pintura bicomponente epoxy-poliuretano. Asimismo, dispone de medios de fijación al suelo mediante tornillos (27) y tacos de sujeción (no mostrados en la figura).

Dicha base (4) dispone adicionalmente de una pequeña puerta (28) de acceso a la caja de monedas existente en el interior de la máquina.

La figura 7 muestra un esquema electrónico del instrumento de medida de la unidad de accionamiento (1) o máquina. Dicha unidad de accionamiento (1) está constituida por un conjunto electrónico formado por tres módulos inteligentes, como son un módulo visualizador-supervisor (29), un módulo de teclado (30) y un módulo de ajuste (31), con funcionalidades independientes, disponiendo cada uno de ellos de un microcontrolador para la realización del proceso encomendado a cada uno de los módulos, comunicados, preferentemente, mediante dos hilos de acuerdo con las especificaciones del bus de comunicaciones (32) correspondiente, así como un módulo de alimentación (33) y control neumático, que proporciona la energía necesaria para el funcionamiento de los módulos restantes a través de los correspondientes buses de alimentación (34), gobernando al mismo tiempo el equipo neumático (35).

Dicho módulo visualizador-supervisor (29) del instrumento de medida está constituido por un microcontrolador, una interface serie-paralelo para el gobierno del visualizador, un visualizador (36), una memoria de escritura protegida, un circuito de control de alimentación, un circuito de recepción de infrarrojos, una batería y un circuito de carga. Dicho módulo es el encargado de presentar hacia el exterior la medida de la presión de forma inteligible, almacenar la información introducida desde el exterior a través del módulo de teclado (30), así como de supervisar todo el funcionamiento del sistema, gestionando la información recibida de los módulos restantes, decidiendo la operación a realizar, y enviando las órdenes oportunas a través del bus de comunicaciones (32) a los módulos restantes.

El módulo de teclado (30) es el encargado de recibir las órdenes del exterior y

comunicarlas al módulo supervisor (29) para que las interprete y proceda según el criterio establecido por el programa, y que dispone de un microcontrolador, una interface entre dicho microcontrolador y el teclado (37), constituida preferentemente mediante transistores, indicadores luminosos (38) y, opcionalmente, medios de cobro, bien
5 mediante monedas (39) o tarjetas de crédito, tarjetas monedero o similares (40). La detección de la activación de una tecla, conformidad de una transacción de tarjeta o aceptación de una moneda, se comunica mediante el bus de comunicaciones (32) al módulo supervisor (29), determinando dicho módulo supervisor (29) la(s) acción(es) a realizar, entre las que se incluyen las órdenes al módulo de teclado (30) para activar o
10 desactivar tanto los indicadores luminosos (38) como el aceptador de tarjetas (40) o el monedero (39).

El módulo de ajuste (31) es el encargado de recoger la información de la presión y convertir dicha información a información digital, disponiendo de un microcontrolador,
15 un conversor analógico-digital con entrada diferencial, un amplificador lineal de bajo ruido y un transductor de presión (41). Dicho módulo de ajuste (31) convierte la información relativa a la presión barométrica a un valor digital numérico, acciona las electroválvulas del sistema neumático (35) y realiza las operaciones necesarias de ajuste de presión hasta alcanzar la presión deseada, manual o automáticamente.

20 Finalmente, la fuente de alimentación (33) consiste en el circuito encargado de suministrar la energía necesaria a cada uno de los módulos anteriores para su correcto funcionamiento, disponiendo de estabilizadores de tensión como, preferentemente un circuito con un transistor y medios de protección, tales como un filtro (42) situado a la
25 entrada de la red para evitar la producción de interferencias de radiofrecuencia. Adicionalmente dispone de un sistema de monitorización de la alimentación, apto para detectar caídas de tensión por debajo de un valor de seguridad, y suministrando la señal de inicialización de los módulos. Finalmente integra un control de potencia para el gobierno del equipo neumático mediante, preferentemente, triacs optoacopladores
30 indicativos de la presencia o no de tensión en los elementos constitutivos de dicho equipo neumático (35), así como una monitorización del correcto funcionamiento de dicho equipo neumático (35).

35 La figura 8 muestra el esquema neumático de la presente realización práctica del sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos

- 24 -

objeto de la presente invención. Dicho equipo neumático (35) de la unidad de accionamiento (1) o máquina es el elemento encargado de dirigir el flujo de aire que permitirá llenar o vaciar los neumáticos hasta conseguir la presión deseada. El equipo neumático (35) consta de cuatro electroválvulas (43, 44, 45, 46) que comunican las
5 ruedas con la fuente de presión o compresor (47), el propio instrumento de medida a través de un transductor (48) y con la atmósfera (49). Dichas electroválvulas se unen en un nodo común o nodo caliente (50), al cual se une también dicho instrumento de medida.

10 Dos de dichas electroválvulas (43, 44) son de acción simultánea y se encargan de conectar los medios de distribución y conexión, tales como mangueras (21), que provienen de los neumáticos del vehículo, con dicho nodo caliente (50), logrando un doble efecto. Por un lado se igualan las presiones en los dos neumáticos en base a la ley de vasos comunicantes, y al mismo tiempo es posible medir la presión del lazo entre
15 las ruedas. La utilización de dos electroválvulas (43, 44) no permite el equilibrado cruzado de ruedas al cambiar las mangueras (21) de un eje a otro.

Una de las dos electroválvulas restantes (45) une, una vez abierto el grupo de electroválvulas de los neumáticos anterior, el nodo caliente (50) con el compresor, para
20 de este modo aumentar la presión.

La segunda de las dos electroválvulas restantes (46), une, una vez abierto el grupo de electroválvulas de los neumáticos anterior, el nodo caliente (50) con la atmósfera, para de este modo disminuir la presión.

25 Asimismo, dicho equipo neumático (35) dispone de una válvula antiretorno (51) situada a la entrada de presión del conjunto neumático, con el objeto de evitar que, en ausencia de presión en el compresor, se puedan deshinchar los neumáticos.

30 El equipo neumático (35) se complementa con unos medios de protección del instrumento de medida frente al agua y a la suciedad existente en la instalación y/o en el compresor, así como a presiones superiores que pueda soportar dicho instrumento de medida, tales como, preferentemente, un filtro (52) y un regulador (53).

35 El equipo propulsor o compresor (no mostrado en las figuras) del sistema

- 25 -

dispensador de aire y equilibrador de presiones electrónico para neumáticos proporciona aire seco a una presión mínima preestablecida. Dicho compresor puede ser tanto interior, dimensionando la carcasa exterior adecuadamente para alojar a dicho compresor, como exterior, en cuyo caso se puede disponer de un compresor de mayor tamaño y, por lo tanto, de una mayor potencia, favoreciendo de esta forma el tiempo de respuesta del sistema.

El sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos objeto de la presente invención cuya configuración se ha descrito anteriormente, dispone de diferentes modos de funcionamiento seleccionables por el usuario. Los tres modos de funcionamiento que presenta el sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos son modo chequeo-equilibrado, modo de inflado-equilibrado manual y modo de inflado-equilibrado automático.

La operación por parte del usuario del sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos comienza con la conexión de las mangueras (21) a los neumáticos del vehículo a través de las boquillas introduciendo éstas en las válvulas de los neumáticos. Una vez realizada esta operación de conexión, será preciso esperar unos instantes a que se estabilice la lectura. Este tiempo es el que se necesita para que se igualen las presiones en ambas ruedas, en caso de que se trate de dos ruedas por eje. A continuación se deberá decidir entre aumentar la presión o disminuirla en función de la presión que se esté visualizando y de la que se pretenda alcanzar. Una vez tomada la decisión sólo cabe accionar la electroválvula adecuada en cada caso. El tiempo que deberá durar esta acción dependerá de varios factores, siendo los más destacables la diferencia entre la presión actual y la que se pretende alcanzar, la dificultad de paso del aire a través del sistema neumático y la presión del compresor que proporciona el aire necesario en caso de querer aumentar el valor barométrico. Puesto que parece difícil alcanzar la presión deseada activando una única vez la electroválvula adecuada durante un tiempo determinado. Generalmente, se actuará sobre una electroválvula, se esperará a que la presión se estabilice y se tome una nueva decisión sobre la acción a realizar, la cual, al igual que antes, dependerá de la presión leída y de la que se pretenda alcanzar. Una vez tomada la decisión, deberá procederse a actuar sobre la electroválvula adecuada, repitiéndose dicho proceso tantas veces como sea necesario, hasta alcanzar la presión deseada.

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- 26 -

De cara al manejo por parte del usuario, éste puede decidir entre ser él mismo quien compare, tome la decisión y actúe de forma repetida sobre la máquina (modo manual) o bien dejar a la máquina que sea ella quien realice el proceso (modo automático), prefijando, a través del teclado (37) el valor de presión que se desea alcanzar en los neumáticos, bien a través de la introducción directa del valor, bien preseleccionando uno de los valores preestablecidos puestos a su disposición en el teclado (37). Asimismo, el usuario dispone de la posibilidad de chequear e igualar las presiones de los neumáticos de un mismo eje de su vehículo.

El sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos, dispone de un avisador acústico indicador mediante una señal acústica de que el sistema ha finalizado la operación de inflado-equilibrado, alcanzando el valor predeterminado, cuando dicho sistema funciona en el modo de inflado-equilibrado automático.

Finalmente, el sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos objeto de la presente invención, dispone de diferentes modos de cobro seleccionables como son modo gratuito o modo de pago, seleccionable por el explotador del sistema, y, en caso de optar por modo de pago, se dispone de las opciones de modo de cobro por monedero (39) o modo de cobro por tarjeta (40), ya sea tarjeta propia con un número determinado de servicios o tarjeta monedero de cualquier entidad bancaria, seleccionable por el usuario. Dicho monedero (39) consta de una ranura por donde se deberá introducir la(s) moneda(s) necesaria(s) para poner en funcionamiento el sistema. En caso de que la moneda introducida fuera defectuosa y quedase atascada, se podrá recuperar pulsando el botón de devolución situado debajo de dicha ranura con lo que la pieza aparecerá en un cajetín situado bajo dicho pulsador. De igual modo, si la moneda fuese inadecuada o el sistema se hallara desconectado de la red o trabajando, el retorno de dicha moneda sería automático.

Las figuras 9 a 12 muestran realizaciones alternativas de la unidad de distribución del el sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos objeto de la presente invención.

La figura 9 muestra esquemáticamente una segunda realización preferencial del sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos,

- 27 -

que dispone de una serie de conductos o mangueras de inflado (121), que transportan el gas de inflado, preferentemente aire comprimido, proveniente de la unidad de accionamiento (101) del tipo de la descrita anteriormente.

5 Dicha segunda realización práctica consta de dos dispositivos o módulos de inflado (102) que realizan las funciones de soporte de dichos conductos o mangueras (121), de ubicación y acoplamiento de dichos conductos o mangueras a los neumáticos del vehículo que se desean inflar o cuya presión se desea comprobar, y de retorno y/o recogida automática de dichos conductos o mangueras (121) desde su situación de
10 operación hasta su posición de reposo. El control de la presión de cada uno de los neumáticos se realiza a través de la unidad de control central, del mismo tipo que la descrita en las figuras 1 a 8. Los dos dispositivos o módulos de inflado (102) se sitúan en posiciones diametralmente opuestas, de tal modo que el usuario que desee hacer uso del sistema dispensador de aire y equilibrador de presiones electrónico para
15 neumáticos deberá estacionar su vehículo entre ambos dispositivos o módulos de inflado (102), aproximadamente equidistante cada uno de los dispositivos o módulos de inflado de los neumáticos delanteros y traseros de cada uno de los lados correspondientes del vehículo. Dichos dispositivos o módulos de inflado (102) se sitúan a una distancia de separación entre ellos de, preferentemente, entre 1,75 m y 2,80 m, más
20 preferentemente entre 1,90 m y 2,50 m, y, en cualquier caso, acorde con la anchura de los vehículos a operar con la presente instalación de inflado.

 Los conductos o mangueras de inflado (121) se extienden desde la unidad de compresión o depósito hasta los módulos de inflado a través de canalizaciones
25 subterráneas, atravesando una unidad de accionamiento y control (101).

 Las figuras 10a y 10b muestran esquemáticamente diferentes vistas de los dispositivos o módulos de inflado (102), que presentan una carcasa (104) de un material resistente, preferentemente metálico o similar, en forma de semicasquete esférico, en
30 cuyo interior se aloja un conducto o manguera de inflado (121) extensible, constituyéndose de esta forma dicha carcasa (104) como el medio de soporte de dicho conducto o manguera de inflado (121). Dicha carcasa (104) presenta en su cara inferior de medios de anclaje y de fijación al suelo, constituidos preferentemente mediante tornillos roscados (105) introducidos en el suelo, fijados mediante tuercas convencionales (106).
35 Asimismo, dicha carcasa (104) presenta en su superficie superior un orificio de salida

- 28 -

(107) para extraer el conducto o manguera de inflado (121) y acoplar así la válvula de inflado (108) dispuesta en su extremo libre a la válvula del neumático.

5 Asimismo, en el interior de dicha carcasa (104) se dispone de los medios de retorno y/o recogida automáticos del conducto o manguera de inflado que aloja en su interior, constituidos mediante una rueda acanalada (109) dispuesta horizontalmente con un mecanismo de resortes que la hace girar automáticamente en un sentido, de tal modo que la recogida de un conducto o manguera (121) utilizado, que se encuentra estirada y extraída de la carcasa (104), se recoge hasta su posición de reposo por
10 dichos medios de arrollamiento automáticos.

 La figura 11 muestra una tercera realización preferencial del sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos, similar a la representada en la figura 9, que dispone de cuatro dispositivos o módulos de inflado
15 (202) idénticos a los descritos anteriormente repartidos en un rectángulo imaginario, con el objeto de operar desde cada una de ellas un neumático del vehículo, de tal modo que el usuario que desee hacer uso de la instalación de inflado deberá estacionar su vehículo en el interior de dicho rectángulo imaginario, situando cada uno de los neumáticos de su vehículo aproximadamente equidistantes del correspondiente
20 dispositivo o módulo de inflado. Nuevamente, el control de la presión de cada uno de los neumáticos se realiza a través de una unidad de accionamiento y control central (201). Al igual que en los casos anteriores, las distancias de separación deben de ser adecuadas para estacionar el vehículo en el interior de dicho rectángulo imaginario, ofreciendo un margen de maniobrabilidad adecuado.

25 Finalmente, la figura 12 representa una cuarta realización práctica del sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos similar a la representada en las figuras 9 y 11, en las que los dispositivos o módulos de inflado presentan una forma de cilindro (302) o cuerpo emergente del suelo hasta cierta altura,
30 que permite su manejo por parte del usuario sin agacharse, contando en su interior con cada uno de los elementos descritos en el dispositivo o módulo de inflado de la realización anterior, con referencia a las figuras 10a y 10b. Al igual que en realizaciones anteriores, las mangueras de inflado (321) se extienden subterráneamente desde la unidad de accionamiento y control central (301) hasta los dispositivos o módulos de
35 inflado (302).

Tal y como se representa en la figura 13, el sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos puede consistir en un sistema multipuesto, multiusuario y multifunción. En este caso, el sistema comprende un centro gestor central (54), así como un conjunto de terminales autónomos de uso (55.1, 55.2, ..., 55.n), supeditados a dicho centro gestor (54). Los diferentes elementos descritos anteriormente para los sistemas individuales, se encontrarán distribuidos entre los diferentes componentes de dicho sistema multipuesto. Así, el centro gestor (54) comprenderá un compresor, propio del centro donde se instale, un circuito de control general, apto para realizar la aceptación de los medios de pago, almacenar las transacciones, controlar los tiempos de servicio, y gestionar las comunicaciones, así como un módulo de comunicaciones, preferentemente vía modem. Por su parte, los terminales autónomos de uso (55.1, 55.2, ..., 55.n), dispondrán de un dispositivo de visualización, un control de presión, un control de teclado, un control de pago, que incluye un monedero y un lector de tarjetas, así como un transductor de presión. La disposición particular así como las características de cada uno de los terminales autónomos (55.1, 55.2, ..., 55.n) podrá adoptar cualquier forma de realización de las que se han indicado anteriormente. La configuración multipuesto así propuesta puede complementar las funciones de inflado y control de presiones de cada uno de los terminales autónomos (55.1, 55.2, ..., 55.n) con funciones de lavado, aspirado, limpieza de alfombrillas, etc., típicas de un centro de lavado de vehículos.

Una vez descrita suficientemente la naturaleza de la presente invención, así como varias formas de llevarlo a la práctica, sólo nos queda por añadir que en su conjunto y partes que lo componen es posible introducir cambios de forma, materiales y de disposición, siempre y cuando dichas alteraciones no varíen sustancialmente las características de la invención que se reivindican a continuación.

Reivindicaciones.

- 1.- Sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos, a instalar preferentemente en gasolineras, áreas de servicio, puestos de asistencia mecánica en carretera o similares, del tipo de los que constan de una unidad de compresión que, bien a través de un depósito, o bien directamente, entrega un gas, preferentemente aire comprimido, a una unidad de inflado, que dispone de varios conductos o mangueras de inflado, de, preferentemente, plástico, goma o similares, que disponen en sus extremos libres de los medios de acoplamiento de dichos conductos o mangueras de inflado a la válvula del neumático, así como una estructura de soporte de dichos conductos o mangueras, caracterizado porque dispone de:
- a) unidad de accionamiento o máquina (1), que dispone de:
- una carcasa (2), fabricada por una de sus caras (6d) preferentemente de chapa metálica de hierro con protección anticorrosión superficial, y por las caras restantes (6a, 6b, 6c) preferentemente de materiales resistentes a los agentes atmosféricos, como, preferentemente, resina poliuretánica rígida expandida en alta densidad preferentemente autoextinguible, disponiendo en dicha cara metálica (6d) de una o más puertas (7a, 7b), aptas para permitir el acceso a elementos interiores, disponiendo dicha carcasa (2) adicionalmente de medios de ventilación constituidos preferentemente por unas rejillas de ventilación (9, 10) situadas preferentemente en la parte superior e inferior de la carcasa (2);
- un armazón metálico (11), consistente en una estructura metálica construida preferentemente a base de perfiles de sección en L (12) doblados preferentemente en ángulos rectos y soldados entre sí, y dispone de una capa protectora anticorrosiva, así como de medios de fijación de la carcasa, constituidos preferentemente mediante tornillos;
- un instrumento de medida electrónico, constituido por un conjunto electrónico formado por tres módulos inteligentes, como son un módulo visualizador-supervisor (29), un módulo de teclado (30) y un módulo de ajuste (31), y un módulo de fuente de alimentación (33) y control neumático, así como los buses de alimentación (34) y comunicación (32) entre módulos; y
- un equipo neumático (35) que consta de cuatro electroválvulas (43, 44, 45, 46) aptas para comunicar los neumáticos con la fuente de presión o compresor (47), con el propio instrumento de medida a través de un transductor (48) y con la



- 31 -

atmósfera (49), encontrándose unidas dichas electroválvulas y dicho instrumento de medida en un nodo común o nodo caliente (50), y dispone de una válvula antiretorno (51) situada a la entrada de presión de dicho conjunto neumático (35);

- 5 b) un equipo propulsor o compresor, que dispone de una unidad compresora externa o interna;
- c) una unidad de soporte o base (4), que consiste en un zócalo o peana fabricada preferentemente de forma paralelepípedica, abierta por la cara inferior, de, preferentemente, chapa de acero, con protección anticorrosión, y que dispone de medios de fijación
- 10 al suelo mediante tornillos (27) y tacos de sujeción; y
- d) una unidad dispensadora (5) de aire.

2.- Sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos, acorde con la primera reivindicación, caracterizado porque el módulo

15 visualizador-supervisor (29) del instrumento de medida está constituido por un microcontrolador, un visualizador (36), una interface serie-paralelo para el gobierno del visualizador (36), una memoria de escritura protegida, un circuito de control de alimentación, un circuito de recepción de infrarrojos, una batería y un circuito de carga, apto para realizar las funciones de presentación hacia el exterior de la medida de la

20 presión de forma inteligible, almacenamiento de la información introducida desde el exterior a través del módulo de teclado (30), y supervisión del funcionamiento del sistema, apto para la gestión de la información recibida de los módulos restantes, decisión de la operación a realizar, y envío de las órdenes oportunas a través del bus de comunicaciones (32) a los módulos restantes.

25 3.- Sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos, acorde con la primera reivindicación, caracterizado porque el módulo de teclado (30) del instrumento de medida dispone de un microcontrolador, una interface entre el elemento inteligente y el teclado (37), constituida preferentemente mediante

30 transistores, indicadores luminosos (38) y medios de cobro, bien mediante monedas (39) o tarjetas de crédito, tarjetas monedero o similares (40), apto para recibir las órdenes del exterior y comunicarlás al módulo supervisor (29) para su interpretación y ejecución, así como para la detección de la activación de una tecla y conformidad de una transacción de tarjeta o aceptación de una moneda.

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- 32 -

- 4.- Sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos, acorde con la primera reivindicación, caracterizado porque el módulo de ajuste (31) del instrumento de medida dispone de un microcontrolador, un conversor analógico-digital con entrada diferencial, un amplificador lineal de bajo ruido y un transductor de presión (41), apto para convertir la información relativa a la presión barométrica a un valor digital numérico, accionar las electroválvulas (43, 44, 45, 46) y realizar las operaciones necesarias de ajuste de presión hasta alcanzar la presión deseada, manual o automáticamente.
- 5.- Sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos, acorde con la primera reivindicación, caracterizado porque la fuente de alimentación (33) del instrumento de medida dispone de estabilizadores de tensión como, preferentemente un circuito con un transistor y medios de protección, tales como un filtro (42) situado a la entrada de la red apto para evitar la producción de interferencias de radiofrecuencia, de un sistema de monitorización de la alimentación, apto para detectar caídas de tensión por debajo de un valor de seguridad y suministro de la señal de inicialización de los módulos y de un sistema de control de potencia para el gobierno del sistema neumático mediante, preferentemente, triacs optoacopladores indicativos de la presencia o no de tensión en los elementos constitutivos de dicho equipo neumático, así como una monitorización del correcto funcionamiento de dicho equipo neumático (35).
- 6.- Sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos, acorde con las reivindicaciones anteriores, caracterizado porque dispone de un telemando apto para la selección de la presión de inflado, que consta de un teclado, bien un teclado numérico apto para introducir cualquier valor, bien una única tecla que contenga el registro del valor asociado a la presión de los neumáticos ideal del vehículo, un conversor de la señal eléctrica generada por dicho teclado a, preferentemente, rayos infrarrojos, y un emisor de dichas ondas, apto para emitir la señal correspondiente al valor introducido por dicho teclado de dicho telemando, al circuito receptor de infrarrojos instalado en la unidad de accionamiento, preferentemente en su carcasa, disponiendo dicho circuito receptor de señal de un transductor de señal apto para convertir la señal de infrarrojos recibida en señal eléctrica, y de medios de transmisión al módulo visualizador-supervisor del instrumento de medida.



- 33 -

7.- Sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos, acorde con la primera reivindicación, caracterizado porque:

- dos de dichas electroválvulas (43, 44) de dicho equipo neumático (35) son de acción simultánea, aptas para conectar los medios de distribución y conexión, tales como mangueras (21), que provienen de los neumáticos del vehículo, con dicho nodo caliente (50);
- una de las dos electroválvulas restantes (45) de dicho equipo neumático (35) es apta para unir, una vez abierto el grupo de electroválvulas de los neumáticos anterior, el nodo caliente (50) con el compresor;
- la segunda de las dos electroválvulas (46) restantes de dicho equipo neumático (35) es apta para unir, una vez abierto el grupo de electroválvulas de los neumáticos anterior, el nodo caliente (50) con la atmósfera.

8.- Sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos, acorde con la primera reivindicación, caracterizado porque dicho equipo neumático (35) dispone de medios de protección del instrumento de medida frente al agua y a la suciedad existente en la instalación y/o en el compresor, así como frente a presiones superiores que pueda soportar dicho instrumento de medida, tales como, preferentemente, un filtro (52) y un regulador (53).

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9.- Sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos, acorde con la primera reivindicación, caracterizado porque la unidad dispensadora (5) de aire dispone de:

- a) medios de ubicación estáticos, entendidos como aquellos en los que el vehículo se adapta a la instalación de inflado;
- b) y/o medios de ubicación móviles, entendidos como aquellos en los que el usuario actúa sobre los mismos para acoplar los conductos o mangueras de inflado a los neumáticos del vehículo, aptos para adaptar la posición de dichos conductos o mangueras a los neumáticos del vehículo;
- c) y/o medios de retorno y/o recogida automática de dichos conductos o mangueras desde su posición de operación hasta su posición de reposo, constituidos preferentemente mediante mecanismos automáticos de retorno, recogida y/o enrollamiento de los conductos o mangueras de inflado, así como de dichos medios de ubicación de dichos conductos o mangueras de inflado.

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- 34 -

- 10.- Sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos, acorde con las reivindicaciones 1 y 9, caracterizado porque dicha estructura de soporte (13) de dicha unidad dispensadora (5) de aire consiste en una pieza tubular en forma de L, preferentemente de material metálico o similar, sustentada en su extremo inferior por una base (4) o pie, que consta de un primer tramo tubular vertical (14a) de cuyo extremo superior se extiende un segundo tramo tubular (14b) que describe una curva de 90° hasta situarse en horizontal, es decir, paralelo al suelo, de menor sección que el tramo anterior, y una barra diagonal (16) de soporte y refuerzo de dicho tramo tubular horizontal (14b), y porque los conductos o mangueras de inflado discurren por el interior de dicha estructura de soporte (13), entrando por su base y saliendo el conducto o manguera de inflado (23) para vehículos de dos ruedas por un orificio lateral dispuesto en el tramo vertical (22), y los conductos o mangueras de inflado (21) para vehículos de tres o más ruedas por sendos orificios (19, 20) situados inferiormente a ambos extremos del tramo horizontal tubular superior (14b), presentando dichos conductos o mangueras de inflado (21) una distancia de separación de, preferentemente, entre 1,75 m y 2,80 m, más preferentemente entre 1,90 m y 2,50 m, y presentando una altura del tramo tubular horizontal respecto de la horizontal preferentemente superior a 1,70 m.
- 11.- Sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos, acorde con las reivindicaciones 1, 9 y 10, caracterizado porque dichos medios de ubicación consisten en medios de giro alrededor del punto de acoplamiento entre ambos tramos tubulares de la estructura de soporte, constituidos preferentemente por un rodamiento de nylon (17) compuesto de dos cilindros (17a, 17b) acoplados y cortados oblicuamente, que permiten un giro de preferentemente entre 90° y 180° del tramo tubular superior (14b) alrededor del tramo tubular inferior (14a), desde su posición de reposo, entendida como aquella en la que el tramo tubular horizontal superior (14b) se sitúa sustancialmente paralelo al eje longitudinal de un vehículo que estaciona junto al sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos, hasta su posición de operación, entendida como aquella en la que el tramo tubular horizontal superior (14b) se sitúa sustancialmente perpendicular al eje longitudinal de un vehículo que estaciona junto al sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos.
- 12.- Sistema dispensador de aire y equilibrador de presiones electrónico para



* C L M S *

- 35 -

5 neumáticos, acorde con las reivindicaciones 1, 9, 10 y 11, caracterizado porque dichos medios de retorno y/o recogida automática de los conductos o mangueras de inflado desde su posición de operación hasta su posición de reposo consisten en sendos arrollamientos verticales (25a, 25b) de sustentación, retorno y/o recogida de los conductos o mangueras (21) de inflado dispuestos en el tramo tubular horizontal superior (14b) de la estructura de soporte (13), así como de un dispositivo de giro del tramo horizontal tubular superior (14b) de, preferentemente, entre 90° y 180°, con retorno automático por gravedad, desde la posición de operación hasta la posición de reposo.

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13.- Sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos, acorde con las reivindicaciones 1 y 12, caracterizado porque la unidad dispensadora (5) de aire dispone de dos dispositivos o módulos de inflado (102) fijados al suelo situados en posiciones diametralmente opuestas, a una distancia de separación entre ellos de, preferentemente, entre 1,75 m y 2,80 m, más preferentemente entre 1,90 m y 2,50 m, y porque los conductos o mangueras de inflado (121) correspondientes se extienden desde la unidad de accionamiento y control (101) hasta los módulos de inflado (102) a través de canalizaciones subterráneas.

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20 14.- Sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos, acorde con las reivindicaciones 1 y 9, caracterizado porque la unidad dispensadora (5) de aire dispone de cuatro dispositivos o módulos de inflado (202) situados en los vértices de un rectángulo imaginario de dimensiones aptas para estacionar un vehículo automóvil sobre su superficie, y porque los conductos o mangueras de inflado correspondientes se extienden desde la unidad de accionamiento y control (201) hasta los módulos de inflado (202) a través de canalizaciones subterráneas.

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30 15.- Sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos, acorde con las reivindicaciones 13 y 14, caracterizado porque los dispositivos o módulos de inflado (102; 202) disponen de una carcasa (104) de un material resistente, preferentemente metálico o similar, en forma de semicasquete esférico, en cuyo interior se aloja un conducto o manguera de inflado extensible (121), constituyéndose de esta forma dicha carcasa (104) como el medio de soporte de dicho conducto o manguera de inflado (121), disponiendo dicha carcasa en su cara inferior de

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- 36 -

medios de anclaje y de fijación al suelo, constituidos preferentemente mediante tornillos roscados (105) introducidos en el suelo, fijados mediante tuercas convencionales (106), así como en su superficie exterior de un orificio de salida (107) apto para extraer el conducto o manguera de inflado (121), y porque en el interior de dicha carcasa (104) se dispone de los medios de retorno y/o recogida automáticos del conducto o manguera de inflado que aloja en su interior, constituidos, preferentemente, mediante una rueda acanalada (109) dispuesta horizontalmente con un mecanismo de resortes.

16.- Sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos, acorde con las reivindicaciones 13 y 14, caracterizado porque los dispositivos o módulos de inflado disponen de una carcasa en forma de cilindro (302) emergente desde el suelo.

17.- Sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos, acorde con la primera reivindicación, caracterizado porque es apto para funcionar con tres modos de funcionamiento, seleccionables por el usuario, consistentes en:

- a) modo chequeo-equilibrado, seleccionable mediante la pulsación de una tecla dispuesta al efecto en el teclado (37) que forma parte del módulo de teclado (30), provocando la apertura de las electroválvulas (43, 44, 45, 46) del módulo de ajuste (31), apto para realizar la comprobación de la presión de los neumáticos así como para equilibrar la presión de los neumáticos de un mismo eje del vehículo, en el caso de que dicho eje disponga de al menos dos neumáticos, presentando la presión existente en los neumáticos, una vez determinada mediante el instrumento de medida electrónico, en el visualizador (36) del módulo visualizador-supervisor del instrumento de medida;
- b) modo de inflado-equilibrado manual, para la realización del ajuste de la presión a voluntad por el usuario, haciendo uso de una(s) tecla(s) de inflado y desinflado dispuesta(s) en el teclado (37) que forma parte del módulo de teclado (30), provocando la apertura y/o cerrado de las electroválvulas (43, 44, 45, 46) del módulo de ajuste (31), accionando la electroválvula correspondiente, a la vez que en el visualizador (36) del módulo visualizador-supervisor (29) del instrumento de medida se presenta la presión existente en los neumáticos del vehículo y medida a través de dicho instrumento de medida, se realiza el equilibrado de las presiones de neumáticos pertenecientes a un mismo eje;
- c) modo de inflado-equilibrado automático, para el ajuste de la presión a voluntad



- 37 -

- por el usuario a un valor preestablecido por éste mediante la introducción del valor correspondiente a través del teclado (37) que forma parte del módulo de teclado (30), bien sea mediante la introducción explícita numérica pulsando unas teclas numéricas correspondientes dispuestas al efecto, bien sea seleccionando algún valor predeterminado pulsando una única tecla dispuesta al efecto, para a partir de ahí actuar la máquina automáticamente accionando las electroválvulas (43, 44, 45, 46) adecuadamente hasta alcanzar el valor preseleccionado, comparando en cada instante la presión de los neumáticos con el valor predeterminado, y actuando en consecuencia.
- 10 18.- Sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos, acorde con las reivindicaciones 1 y 17, caracterizado porque dispone de un avisador acústico indicador mediante una señal acústica de que el sistema ha finalizado la operación de inflado-equilibrado, alcanzando el valor predeterminado, cuando dicho sistema funciona en el modo de inflado-equilibrado automático.
- 15 19.- Sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos, acorde con la primera reivindicación, caracterizado porque es apto para funcionar con diferentes modos de cobro seleccionables, consistentes en:
- 20 a) modo gratuito; y
- b) modo de pago, que dispone de las opciones seleccionables por el usuario de modo de cobro por monedero (39) o modo de cobro por tarjeta (40), ya sea tarjeta propia con un número determinado de servicios o tarjeta monedero de cualquier entidad bancaria.
- 25 20.- Sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos, acorde con la primera reivindicación, caracterizado porque dispone de medios de control remoto establecidos preferentemente mediante la comunicación vía modem desde una estación central aptos para el chequeo del estado del sistema así como para el recuento periódico de las cantidades recogidas en dicho sistema.
- 30 21.- Sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos, acorde con la primera reivindicación, caracterizado porque dispone de un sistema emisor-receptor de, preferentemente, rayos infrarrojos u otro tipo de ondas electromagnéticas, un transductor para la conversión de la señal infrarroja en señal eléctrica y medios de transmisión al módulo visualizador-supervisor, apto para funcionar
- 35



- 38 -

conjuntamente con fuentes de señal externas cuantificadoras de parámetros de los que depende la presión de inflado, tales como, preferentemente, la temperatura.

5 22.- Sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos, acorde con la primera reivindicación, caracterizado porque los medios de acoplamiento de dichos conductos o mangueras de inflado a la válvula del neumático consisten en una boquilla de acoplamiento que comprende una pieza externa o
10 corredera (61), de forma cilíndrica y cerrada por su parte posterior mediante un tapón roscado (62), en cuyo extremo opuesto dispone de una abertura circular (63) apta para introducirse en la válvula (78) del neumático, en cuyo interior de dicha pieza externa o
corredera (61) se alojan dos piezas (64, 65) que deslizan respecto de la pieza externa o corredera (61), engarzadas entre sí, preferentemente mediante una unión roscada (66).

15 23.- Sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos, acorde con la reivindicación anterior, caracterizado porque en el interior de una de dichas piezas (64) alojadas en la pieza externa o corredera (61), la más próxima a la válvula (78) del neumático, se aloja una pieza tubular (67) hueca escalonada
20 interiormente, que desliza respecto de dicha pieza (64) que la aloja, y que, a su vez, aloja en su interior un percutor (68), consistente en una varilla cilíndrica que dispone de un ensanchamiento de sección poligonal, preferentemente hexagonal, apto para impedir el retroceso en el interior de dicha pieza tubular (67) así como para permitir el paso del
25 aire entre los intersticios resultantes entre las cuerdas del polígono y la sección circular de la pieza tubular (67), disponiendo dicha pieza tubular (67) en su extremo más próximo a la válvula (78) del neumático de una junta cónica de goma (79), apta para
taponar el orificio de paso de aire, así como de dos resortes terminados en "L" (74a, 74b) sujetos mediante un casquillo cilíndrico exterior (75), y unas ranuras (76a, 76b)
30 practicadas en la boquilla de dicha pieza tubular (67) aptas para alojar el extremo en "L" de dichos resortes (74a, 74b).

24.- Sistema dispensador de aire y equilibrador de presiones electrónico para
35 neumáticos, acorde con las reivindicaciones 22 y 23, caracterizado porque la segunda de dichas piezas (65) alojada en la pieza exterior o corredera (61), la más próxima a la entrada de aire a través del conducto exterior o manguera, presenta un interior hueco cilíndrico, y dispone de un obús (69) enroscado en su extremo anterior, del tipo de los



* C L M S *

- 39 -

alojados en las válvulas de los vehículos, en cuyo extremo libre dispone de un pequeño resorte o muelle (77), y su parte posterior termina exteriormente en una serie de resaltes, preferentemente en forma de cola de milano (70), apta para un acoplamiento estanco con la goma del conducto exterior de aire o manguera, por la que circula el aire

5 proveniente de la máquina, presentando dicha pieza (65) asimismo un ensanchamiento interior en forma de corona circular (71), que dispone de cuatro bolas (72) diametral y normalmente opuestas dos a dos, empotradas y presionadas por unos muelles (73), encarándose dichas bolas (72) en una ranura interior (84) practicada en dicha pieza exterior o corredera (61), disponiéndose en la proximidad de dicho ensanchamiento

10 interior en forma de corona circular (71) y hacia el interior de la boquilla de acoplamiento, un muelle interior (80) rodeando al exterior tubular de dicha pieza (65), apto para desplazar solidariamente ambas piezas (64, 65) alojadas en dicha pieza exterior o corredera (61), y sacar de esta forma dichas bolas (72) de las ranuras (84) correspondientes.

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25.- Sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos, acorde con las reivindicaciones 22, 23 y 24, caracterizado porque dicha pieza exterior o corredera (61) dispone en su interior de un casquillo troncocónico (83) apto para presionar dichos resortes (74a, 74b) terminados en "L" cuando el conjunto

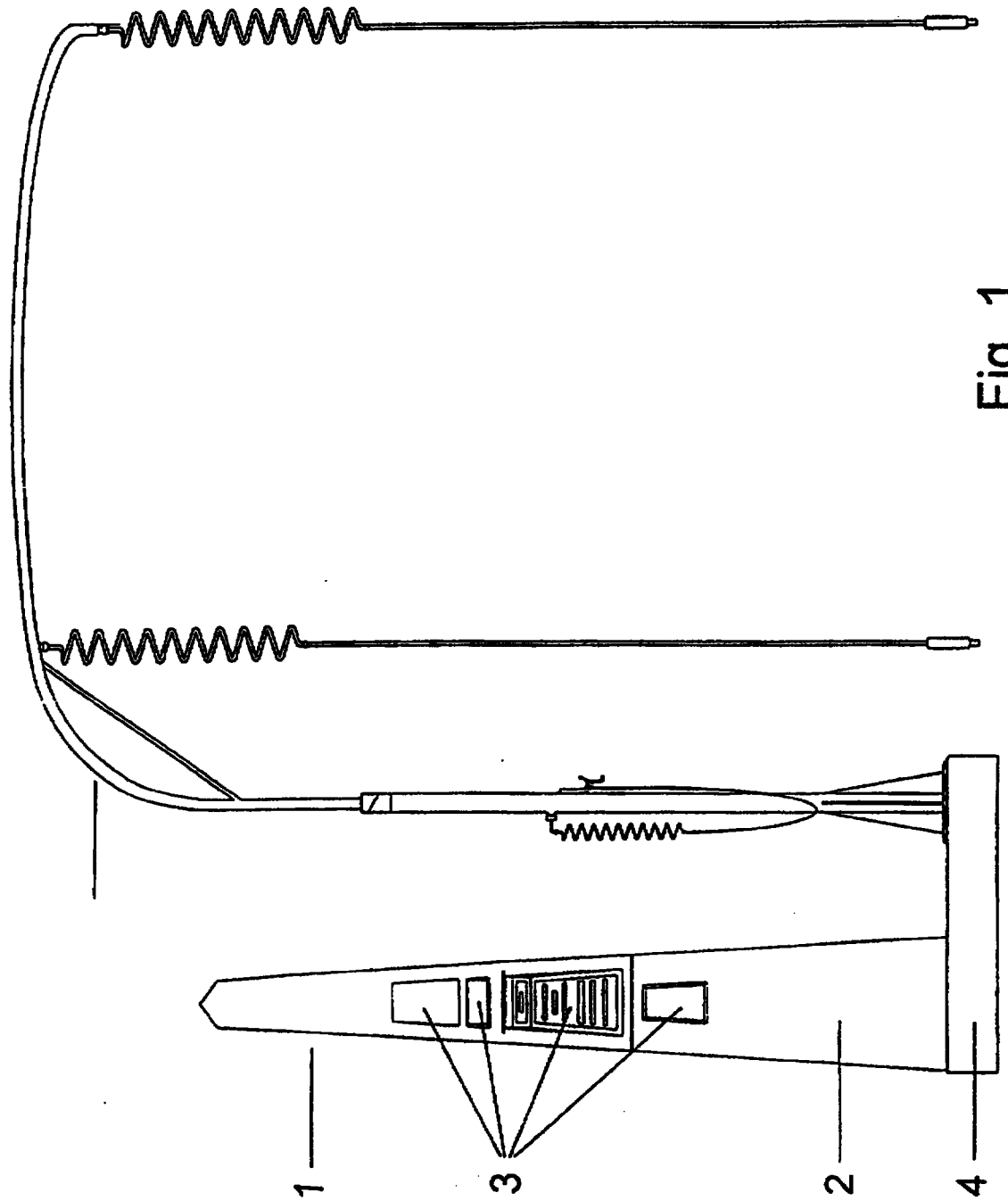
20 solidario formado por las piezas (64, 65) se ha desplazado hasta el tope que le produce el tapón roscado (62) que cierra dicha pieza externa o corredera (61).

26.- Sistema dispensador de aire y equilibrador de presiones electrónico para neumáticos, acorde con alguna de las reivindicaciones anteriores, caracterizado porque

25 presenta una configuración distribuida multipuesto constituido por un centro gestor (54) central y por un conjunto de terminales autónomos de uso (55.1, 55.2, ..., 55.n), supeditados a dicho centro gestor (54), comprendiendo dicho centro gestor (54) un compresor, un circuito de control general, apto para realizar la aceptación de los medios de pago, almacenar las transacciones, controlar los tiempos de servicio, y

30 gestionar las comunicaciones, así como un módulo de comunicaciones con los terminales autónomos de uso (55.1, 55.2, ..., 55.n), preferentemente vía modem, y comprendiendo dichos terminales autónomos de uso (55.1, 55.2, ..., 55.n) un dispositivo de visualización, un control de presión, un control de teclado, un control de pago, que incluye un monedero y un lector de tarjetas, así como un transductor de presión.





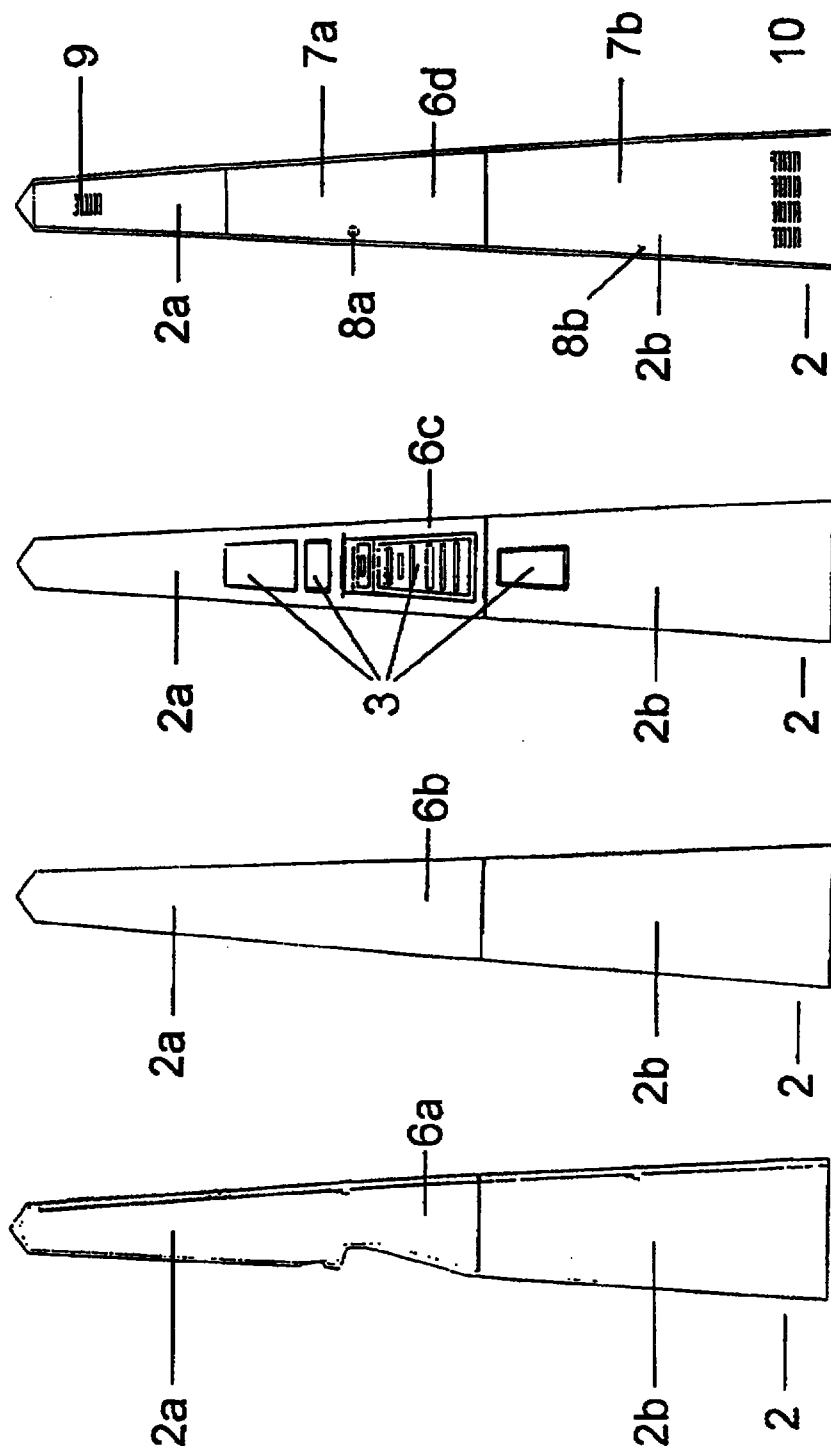


Fig. 2a Fig. 2b Fig. 2c Fig. 2d

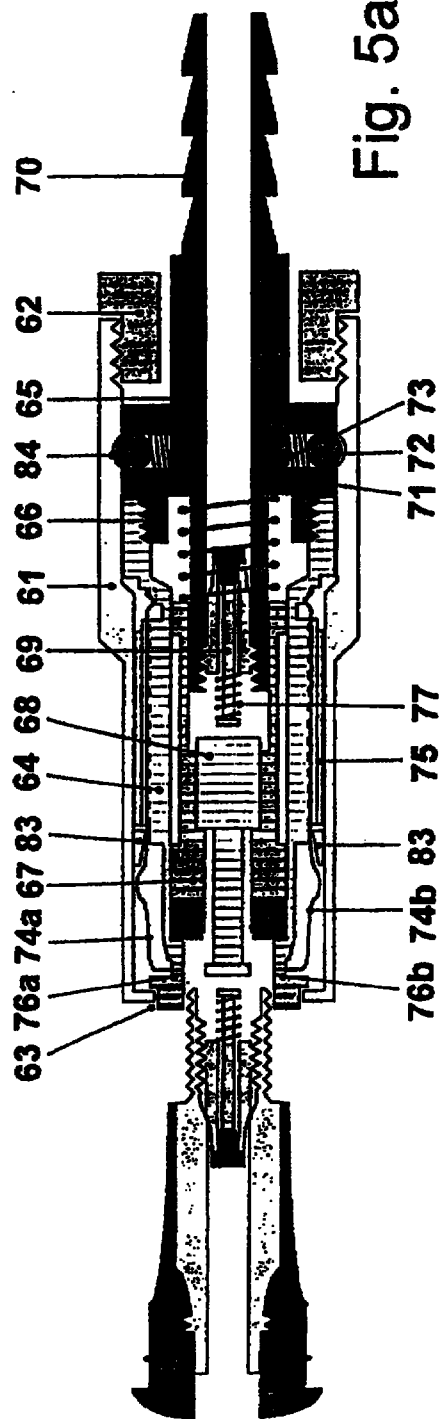


Fig. 5a

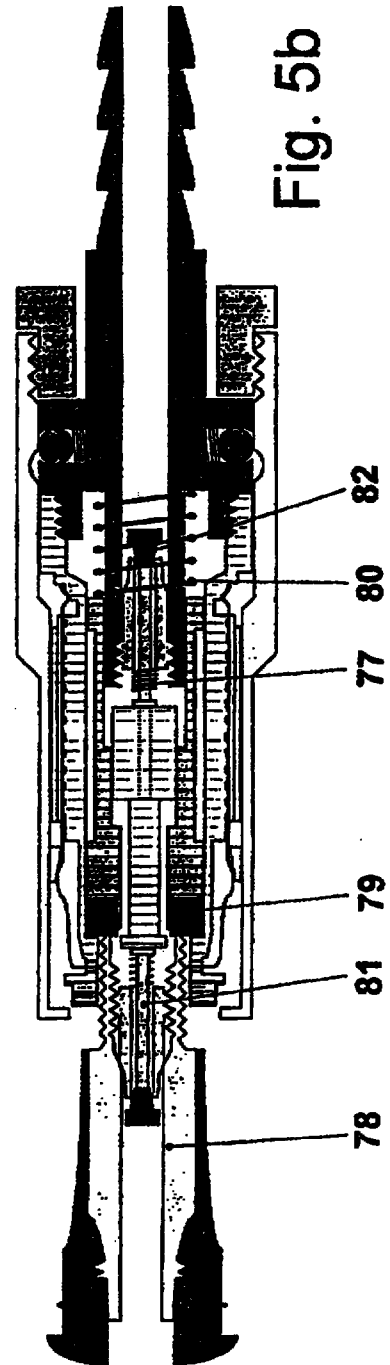


Fig. 5b

Fig. 6a



Fig. 6b

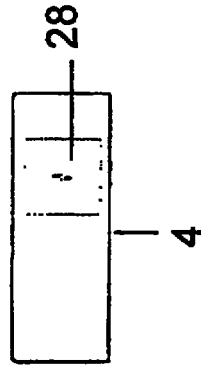
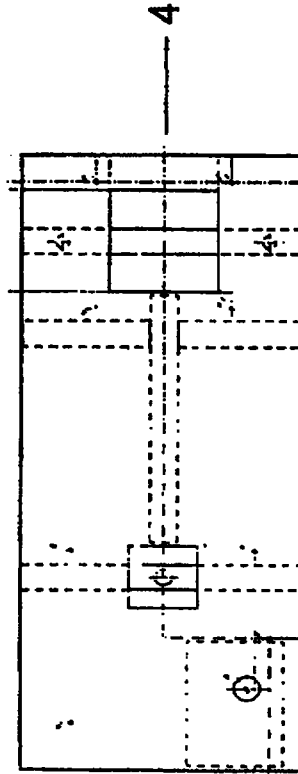


Fig. 6c



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Fig. 6d

27



Fig. 6e

- 7 / 13 -

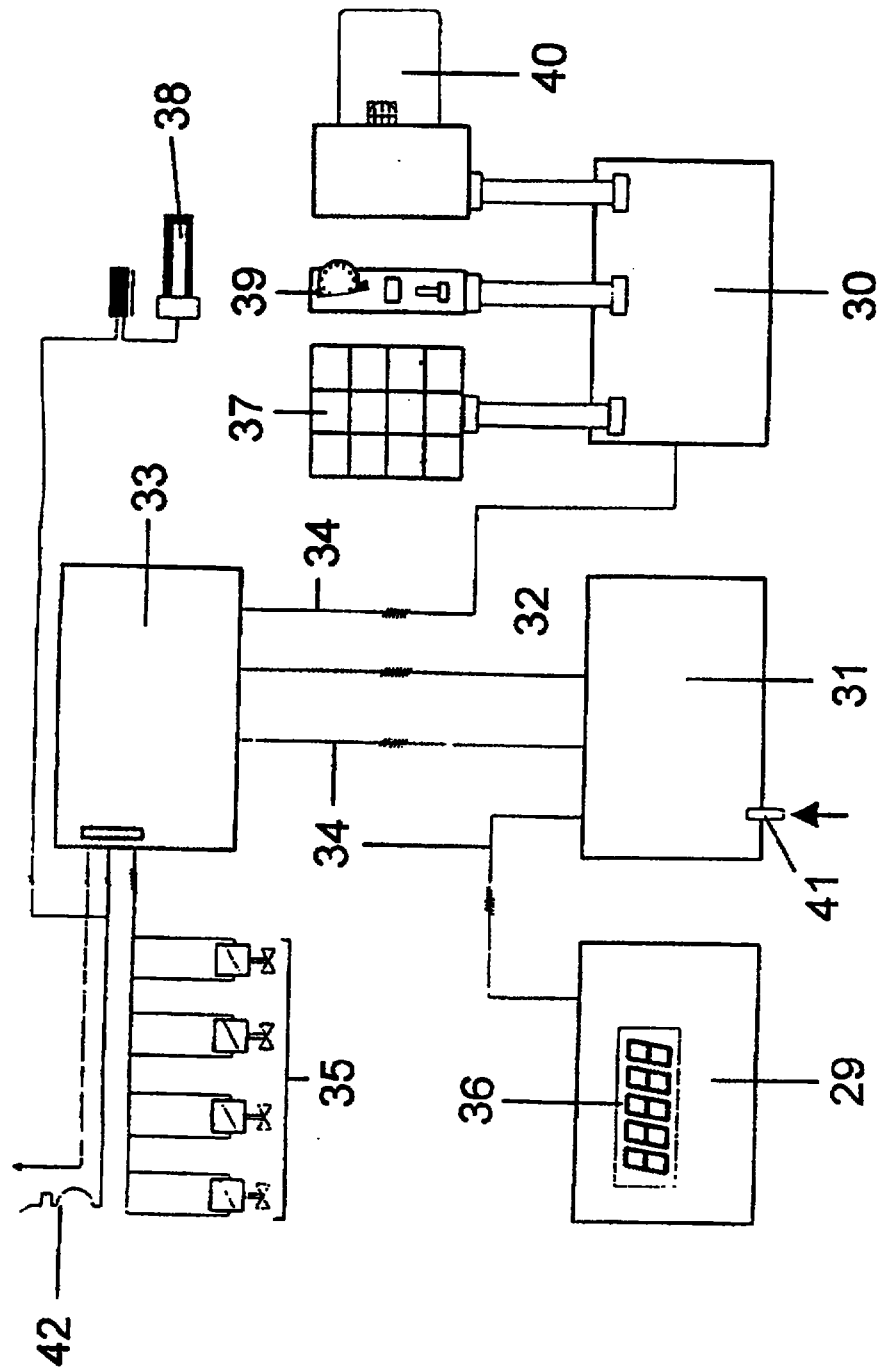


Fig. 7

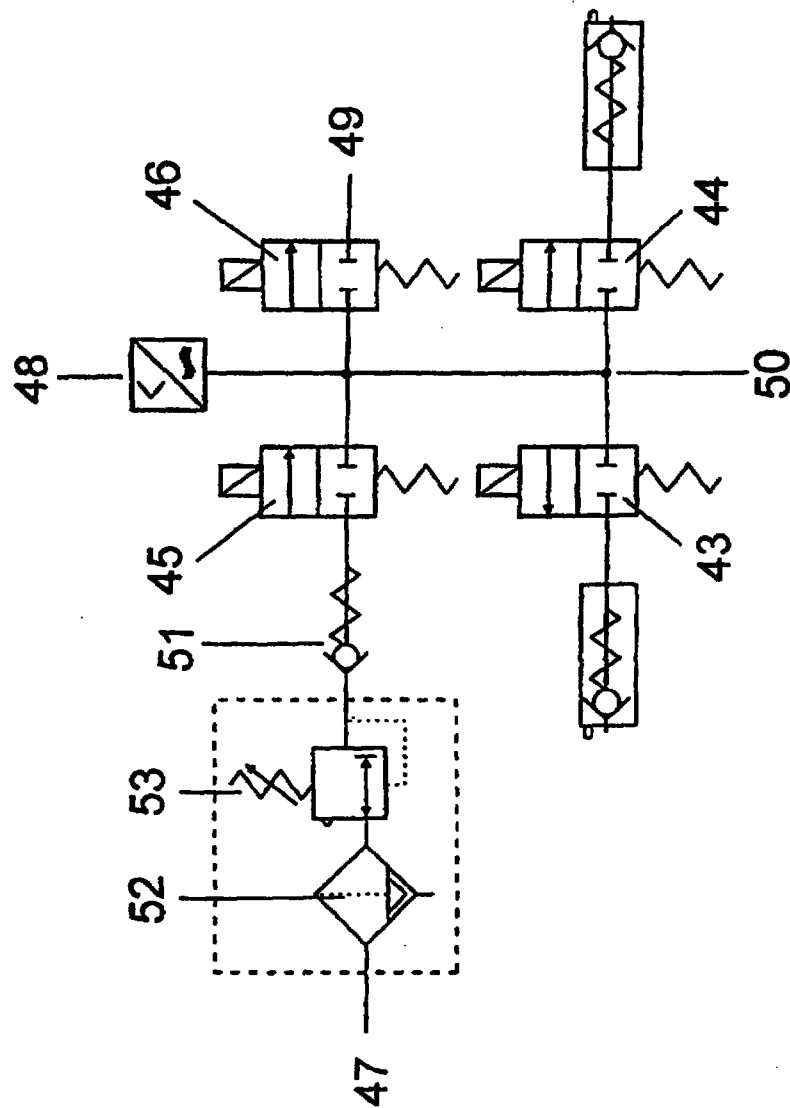


Fig. 8

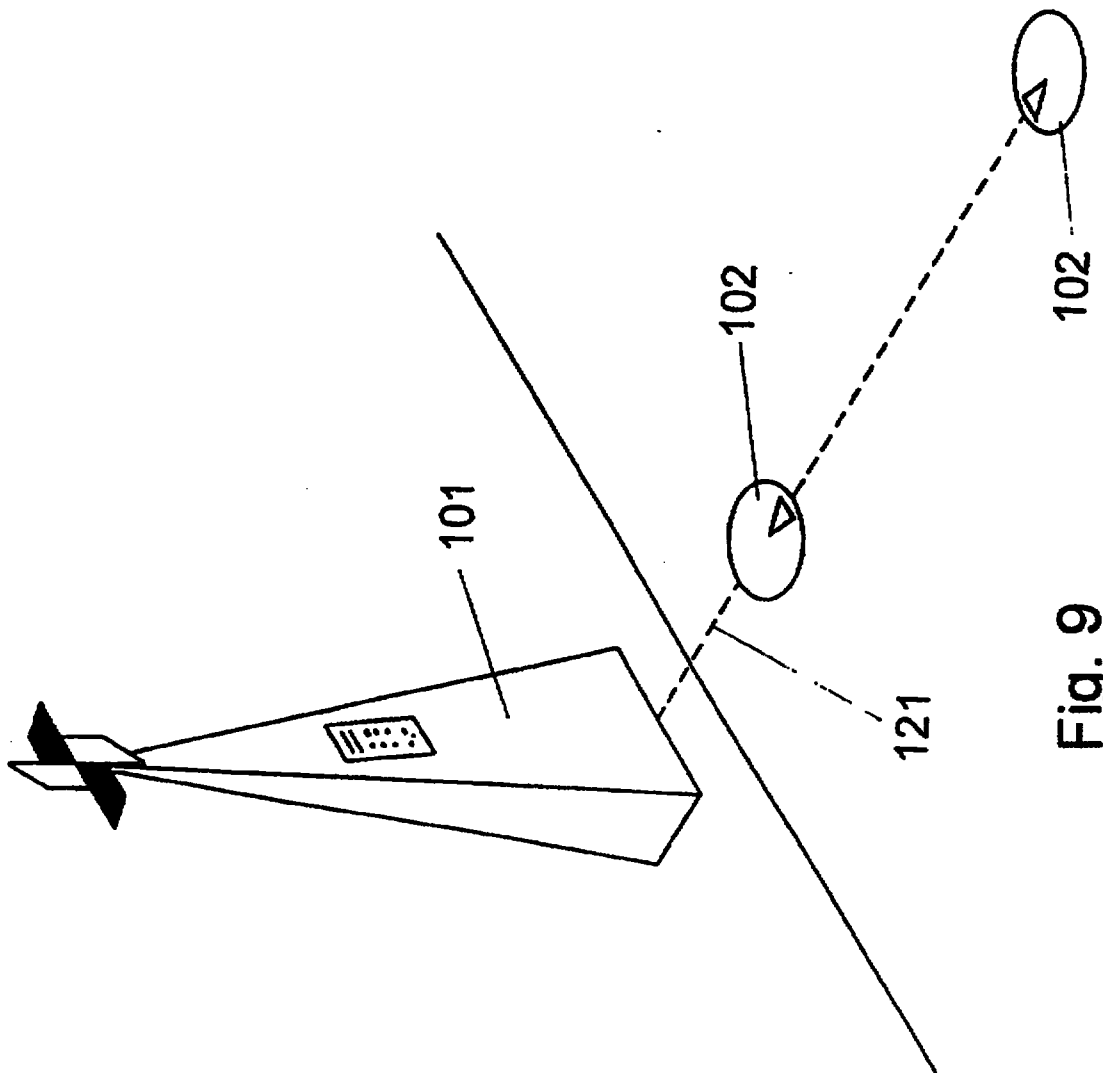
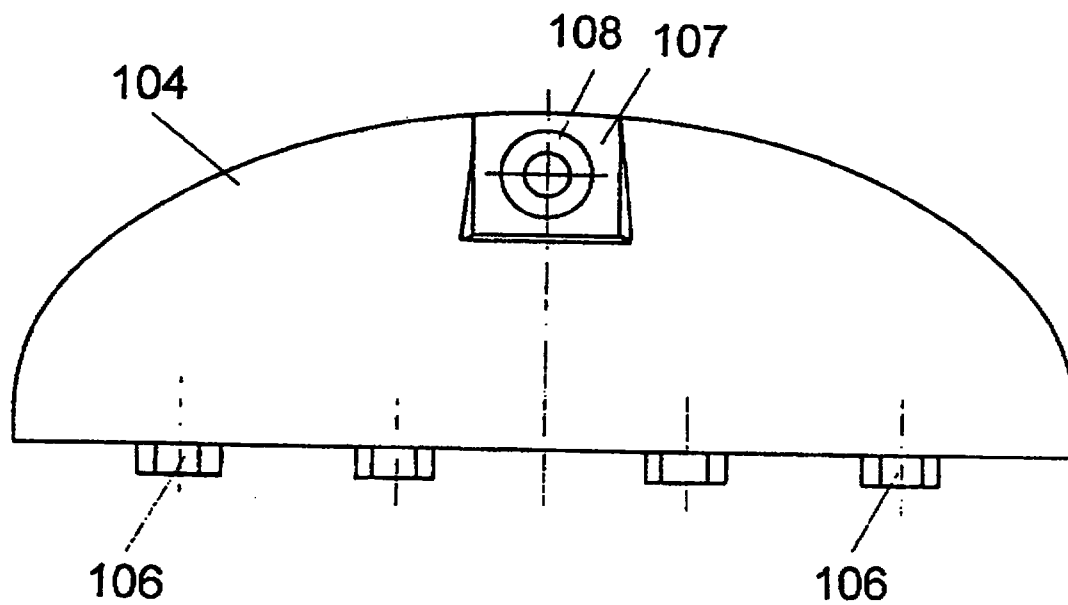
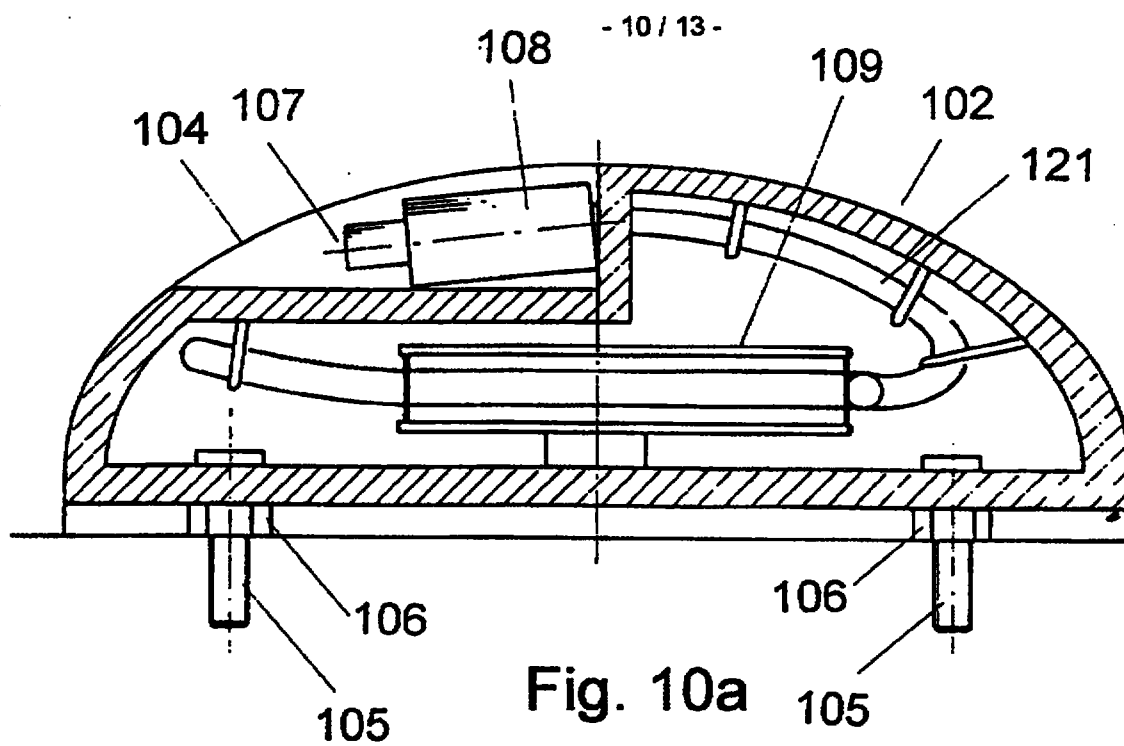


Fig. 9



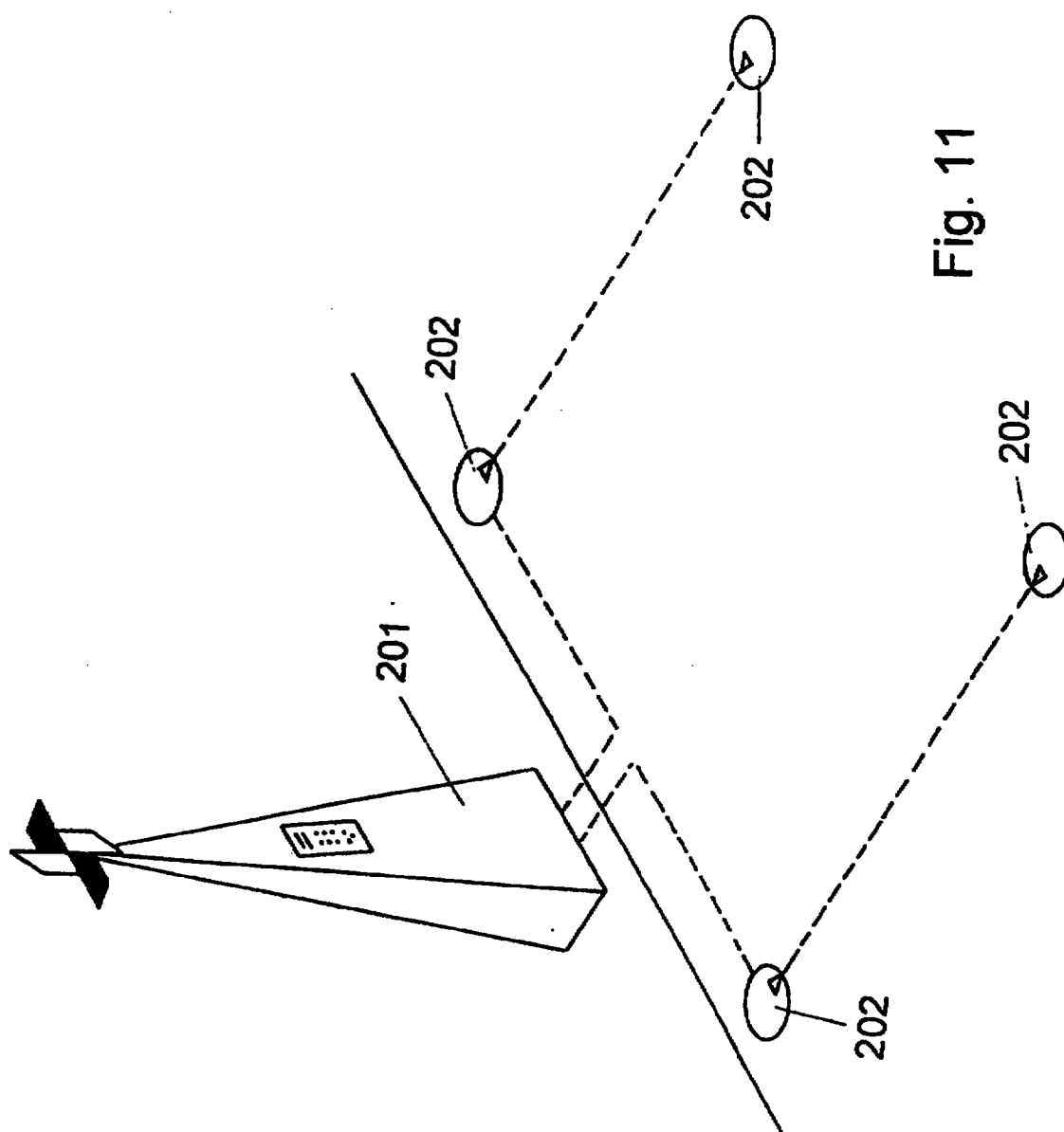


Fig. 11

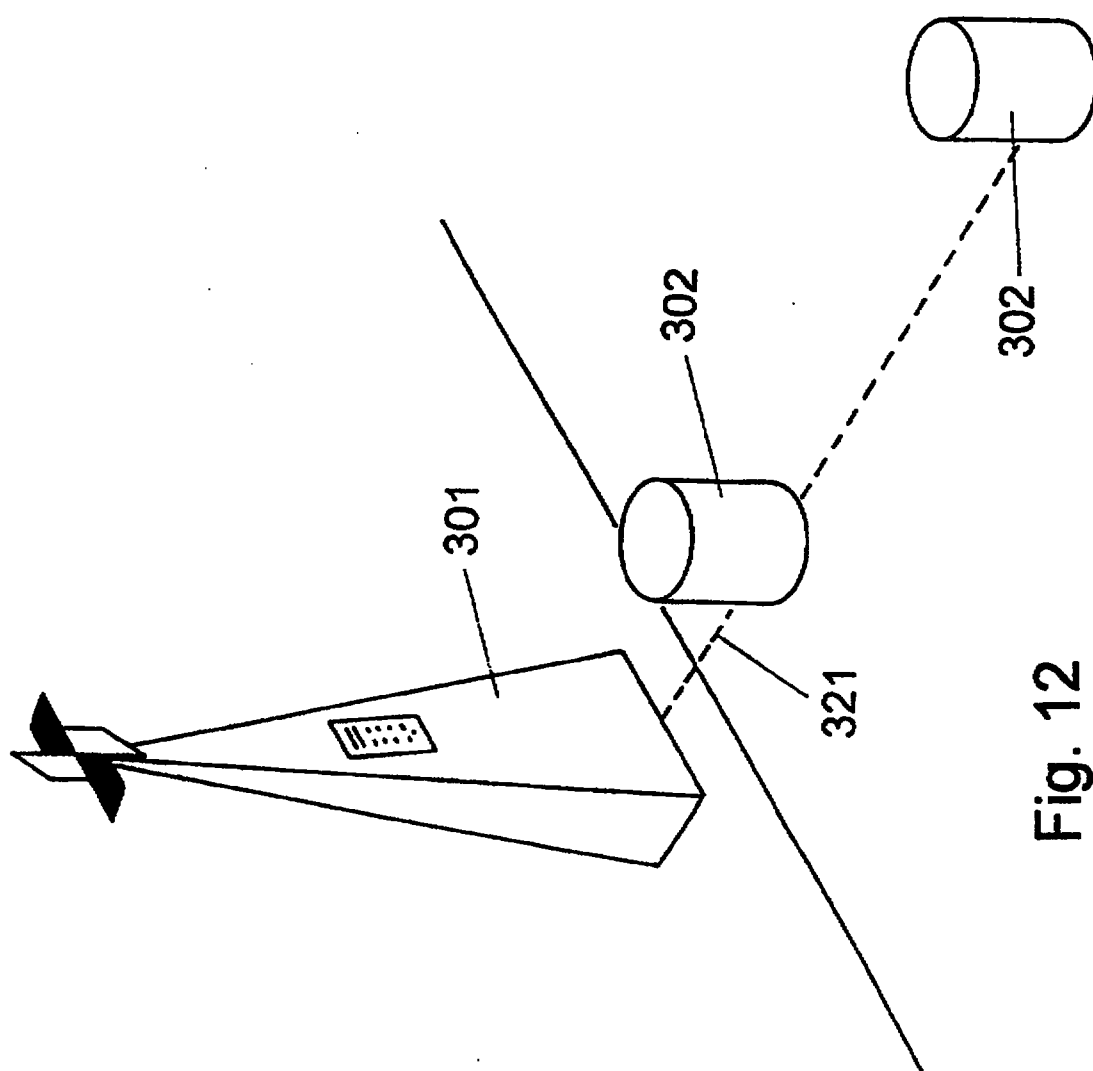


Fig. 12

- 13 / 13 -

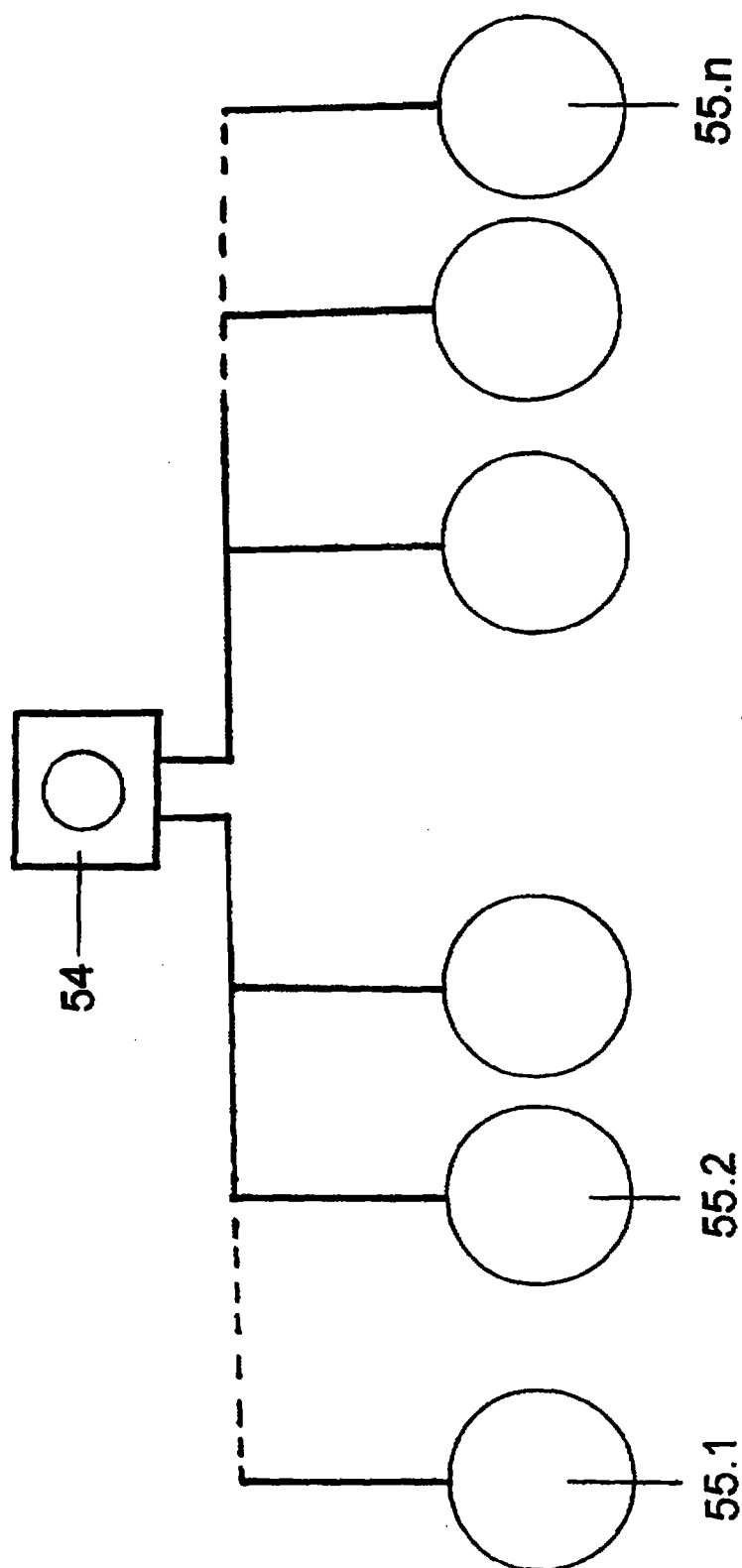


Fig. 13

☐ Description : paged 1..... to paged 36.....
☒ Claim(s) : paged 39..... to paged 49.....
☐ Drawing(s) : paged to paged
☒ Abstract : paged to paged 50.....

ELECTRONIC, AIR-SUPPLYING AND PRESSURE-EQUALIZER SYSTEM FOR TYRES

5

Description

10 The object of the present invention relates, as its
title indicates, to an electronic air supplying and
pressure equalizer system for tyres, to be preferably
installed at petrol stations, service areas, mechanical
assistance points on roads or the like, which has important
15 advantages over installations nowadays existing.

 Correct tyre-inflating of vehicles in circulation is
a determinant factor for road safety, as well as further
economic factors such as tyre durability or fuel
20 consumption.

 Nowadays, most assistance points located in petrol
stations, service areas, mechanic assistance points on
roads or the like have a variety of installations allowing
25 user to control or check up the pressure condition of
vehicle tyres, which however have some lacks resulting in
important drawbacks for the user of said installations.

 Most inflating installations nowadays existing consist
30 of a compression unit which either through a deposit or
directly supplies a gas, preferably compressed air, to a
inflating unit generally constituted by one only conduit or
hose, in whose free end there is located the inflating
valve which is coupled to the valve of vehicle tyre to be
35 inflated or whose pressure is to be checked. Pressure



control of each tyre is carried out through a central control unit. Likewise, user has tables for pressure calibration, in order to determine the suitable tyre pressure in each vehicle and under each driving condition.

5

However, this inflating installation structure has a series of drawbacks. Arrangement of one only inflating conduit or hose demands user to suitably park the vehicle in order to thereby achieve the inflating of tyres thereof without needing vehicle re-location during the operation of pressure checking in different tyres. Even so, in most cases, in order to reach those tyres faraway from the installation, user has to suitably park the vehicle again or, in the best condition, to juggle with inflating hose, to pass it below or above the vehicle, as the unique manner to reach said tyres.

15

Likewise, most inflating installations are not provided with automatic means for inflating hose withdrawal, therefore, in most installations of this kind, said hose is thrown to the ground or even in the zone where vehicles run in, which provokes its dirtiness, as well as rubber deterioration and subsequent breaking, with the important drawbacks and expenses that it bears.

25

On the other hand, calibration tables installed next to inflating systems nowadays existing are often not very useful and they are frequently incomplete.

30

Finally, studies carried out by the motor world demonstrate that most air supplying machines, due to their use, are damaged and they are not feasible, and that their signposting is deficient many times, then being totally unnoticed by user.

35

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In order to efficiently overcome the lacks of inflating systems nowadays existing, the electronic air-supplying and pressure-equalizer system for tyres, object of the present invention has been developed.

5

The present invention relates to an air supplying and pressure-equalizer system for tyres, to be preferably installed at petrol stations, service areas, mechanical assistance points on roads or the like, preferably comprising a working unit or machine, which is constituted as the main element of the system, from where operation of inflating vehicle tyres is controlled and effected, said working unit being constituted by a housing, a metal framework, an electronic measuring instrument, a pneumatic equipment and means for visualization and control, a propeller or compressor equipment providing dry air from an inner or outer compression unit, a basis or supporting unit and an air delivering unit which conveys air from working unit or machine to vehicle tyres and which permits, in the case of vehicles having two wheel in each axis, pressure balancing of tyres belonging to the same axis.

15
20

More concretely, working unit or machine allows the supply of any pressure to vehicle tyres as well as pressure balancing in wheels of the same axis for vehicles with two wheels in each axis.

25

Said working unit or machine is provided with a housing, constituted as the outside envelope and therefore as the cover which shapes said machine, suitable to protect inner elements, preferably made, at one side, of metal terne plate with surface corrosion proofing made of zinc, chromatized in electrolytic bath and a bicomponent polyurethane paint coating and, at the remaining sides, preferably made of materials resisting atmospheric agents,

30

35



such as, preferably, a preferably self-quenching, high density expanded stiff polyurethane resin, with a, preferably bicomponent polyurethane enamel external coating. At said preferably metal side, one or more gates
5 with joint hinges are provided, suitable to allow the access to inner elements in the machine, which are provided with a boxing with a drain and a rubber seal, as well as with a safety lock. Housing is further provided with ventilation means to obtain an air current inside which
10 avoids moisture condensation on electronic components, such as, preferably, several ventilation screens preferably located at the upper and the lower portion of the housing.

Metal framework in the working unit or machine
15 consists of a metal structure preferably built of L-shaped section profiles preferably bent forming right angles and burnt together, in order to provide machine with rigidity and to support lateral stresses which may appear due to external agents such as wind. Said metal framework is
20 provided with a corrosion proofing coating, preferably constituted by a zinc electrolytic bath chromitized and epoxy-poliurethane paint. Said metal framework is further provided with means for fixing the housing, preferably constituted by screws.

25 Measuring instrument in the working unit or machine consists of an electronic set comprising three intelligent modules, such as a visualizer-supervisory module, a keyboard module and an adjustment module, independently
30 operated, each one having a microcontroller for the execution of that process commended to each module, preferably communicated by two wires in accordance with the specifications of the corresponding communication bus, as well as a pneumatic control and power supply module
35 providing the necessary energy for the operation of the



remaining modules, simultaneously managing the pneumatic equipment.

5 More concretely, said visualizer-supervisory module of the measuring instrument is constituted by a microcontroller, a series-parallel interface for managing the visualizer, a visualizer, a protected writing memory, a supply control circuit, a infrared receiving circuit, a
10 battery and a load circuit. Said module is in charge of presenting the pressure measure, in an intelligible manner, outside, storing the information introduced from outside through the keyboard module, as well as supervising the complete equipment operation, managing the information
15 received from the remaining modules, deciding the process to be effected, and sending the appropriate orders through the communication bus to the remaining modules.

 Keyboard module is in charge of receiving orders from
20 outside and communicating them to the supervisory module for their interpretation and for acting in accordance with the criterion established by the program, and it is provided with a microcontroller, an interface between the intelligent element and the keyboard, preferably
25 constituted by transistors, light indicators and, optionally, with cashing means, either by coins or by credit cards. Detection of the activation of a key, approval of a card-transaction or coin-acceptance are communicated by the communication bus to the supervisory module, said
30 supervisory module determining the process(es) to be effected, including the orders to the keyboard module for activating or deactivating either the light indicators or the card (or coin) acceptor.



Adjustment module is in charge of recovering information about pressure and converting said information into digital information; it has a microcontroller, an analogical-digital converter with differential input, a low noise linear amplifier and a pressure transducer. Said adjustment module converts information regarding to barometric pressure into a numerical digital value, operates the electrovalves and manually or automatically realize those necessary pressure-adjustment processes to achieve the desired pressure.

Finally, power supply consists of the circuit in charge of supplying the necessary energy to each one of the forementioned modules for the correct operation thereof; it has voltage stabilizers such as, preferably, a circuit with a transistor and protection means, such as a filter located at the network input in order to avoid the production of radiofrequency interferences. Additionally, it is provided with a power supply monitoring system, suitable to detect voltage drops below a safety value, and it supplies the initialization signal of modules. Finally, it includes an efficiency control for managing the pneumatic equipment by, preferably, optocoupling triacs indicating whether voltage is in those elements constituting said pneumatic equipment or not, as well as a monitoring of the correct operation of said pneumatic equipment.

Optionally, the electronic air supplying and pressure equalizer system for tyres has a remote control for selecting the inflating pressure to be reached by said system. Said remote control will have a keyboard, a converter of the electric signal generated by the keyboard to, preferably, infrared waves, and a transmitter for said waves, suitable to emit the signal corresponding to the



value introduced by said remote control keyboard to the infrared receiving circuit installed in the working unit, preferably in its housing. Said signal receiving circuit has a signal transducer converting the infrared signal received into an electric signal, which is directly sent to the visualizer-supervisory module of the measuring instrument, whose microcontroller generates the corresponding orders.

Said keyboard installed in the remote control may be either a numerical keyboard, similar to those installed in the working unit and connected to the keyboard module, suitable for introducing any value, or one only key containing the entry of the value associated with the optimum pressure of vehicle tyre, in which case remote control would be personal, associated with the vehicle.

Pneumatic equipment of working unit or machine is the element in charge of managing the air flow which will permit to fill up or to empty tyres until achieving the pressure desired. Said pneumatic equipment consists of four electrovalves communicating wheels with the pressure source or compressor, with the very measuring instrument and with the atmosphere. Said electrovalves join together in a common node or hot node, to which said measuring instrument joins too.

Two from said electrovalves work simultaneously and are in charge of connecting distribution and connection means, such as hoses, coming from vehicle tyres, to said hot node, so achieving a double effect. On the one hand, pressures into both tyres get equal in accordance with the communicating vessels principle, and at the same time, it is possible to measure the pressure of the grip between the wheels. The use of two electrovalves does not permit the



cross balancing of wheels as hoses change between one axis and the other.

5 Once the above set of tyre electrovalves is open, one of the two remaining electrovalves joins the hot node with the compressor in order to thereby increase pressure.

10 Once the above set of tyre electrovalves is open, the second of the two remaining electrovalves joins the hot node with the atmosphere in order to thereby decrease pressure.

15 Likewise, said pneumatic equipment has a non return valve located at the pneumatic set pressure inlet, in order to avoid that, in the absence of pressure inside the compressor, tyres could deflate.

20 Pneumatic set is complemented with several means for protecting the measuring instrument against water and dirtiness existing in the installation and/or in the compressor, as well as against pressures higher than those which said measuring instrument can support, such as, preferably, a filter and a regulator.

25 The propeller or compressor equipment of the electronic air-supplying and pressure-equalizer system for tyres provides dry air at a pre-established minimum pressure. Said compressor can be either interior, so suitably sizing the outer housing in order to lodge said
30 compressor, or external, in which case, a larger and therefore more powerful compressor can be used, thereby favouring the response time of the system.

35 The basis or supporting unit consists of a socle or pedestal, appropriate to support the working unit or



machine and the air delivering unit, preferably parallelipedic-wise shaped, open at its lower face, preferably made of steel plate, with corrosion proofing by electrolytic zinc bath, chromitized and bicomponent epoxy-polyurethane paint, which is provided with means for fixing to the ground by screws and retaining billets. Said basis may optionally have a small gate for having access to the coin box existing inside the machine.

Air delivering unit is the unit in charge of managing the air from the working unit or machine to vehicle tyres through several conduits or hoses; it has a structure for supporting said conduits or hoses, location means suitable to adapt the position of said conduits or hoses to vehicle tyres to be inflated or whose pressure will be checked, and means for the return and/or automatic withdrawal of said conduits or hoses from their working position to their rest position. Said air delivering unit configuration is therefore suitable to avoid that neither said conduits or hoses or their terminal connection mouthpieces drag on the ground, thereby avoiding the resulting deterioration and dirtiness.

Means for supporting conduits or hoses of the air delivering unit are preferably constituted with a structural rigidity capable of resisting such factors as the use by the users, climate conditions and, in inflating installations which place said supporting means on the ground, the weight of vehicles driving on the same.

The means for location of inflating conduits or hoses in vehicle tyres basically depend on the practical embodiment of the electronic air-supplying and pressure-equalizer system for tyres; they can be either static, where vehicle is which fits to the inflating installation,



or movable, where the user manage the location means for coupling inflating conduits or hoses to venicle tyres. In any case, said location means are capable of making easier for the user the fitting of inflating conduits or hoses to
5 vehicle tyres.

Air delivering unit of the electronic air-supplying and pressure-equalizer system for tyres object of the present invention is provided with means for the return
10 and/or automatic withdrawal of said conduits or hoses from their working position to their rest position, preferably constituted by automatic mechanisms for the return, withdrawal and/or rolling up of the inflating conduits or hoses as well as means for the location of said conduits or
15 hoses, especially in the case of moveable location means.

In order to facilitate and achieve a better disposal of inflating conduits or hoses of the installation to the vehicle whose tyres will be inflated or whose pressure will
20 be checked, it becomes appropriate to provide different conduits or hoses preferably placed at both sides of the vehicle when it stops in the inflating installation to get on the corresponding process. Thereby, electronic air-supplying and pressure-equalizer system for tyres
25 preferably comprises two or four inflating conduits or hoses.

Optionally, electronic air-supplying and pressure-equalizer system for tyres may be provided with a inflating
30 conduit or hose specific for use in vehicles with two-wheels, such as bicycles, motorcycles or the like.

Additionally, inflating conduits or hoses have at their free ends, coupling means capable of coupling said
35 inflating conduits or hoses to tyre valve and thereby



getting on with the inflating or pressure checking in the corresponding tyre.

5 Said coupling means capable of coupling said inflating
conduits or hoses to tyre valve preferably consist of a
coupling nozzle, suitable for its easy and fast connection
and disconnection of hoses (from the air supplying unit)
with wheel valves, defined by a small diameter cylindrical
10 configuration with a length suitable to reach the valve, in
the case of this latter is lodged in a cavity, which is
provided with automatic lockage means suitable to avoid air
escape when nozzle is not connected to the valve.

15 More concretely, said coupling nozzle comprises a
cylindrical shaped external piece or slide closed at its
rear side by a screw cap, in whose opposite end it is
provided with a circular opening suitable to get into the
valve. Inside said external piece or slide, two pieces are
20 lodged sliding in relation to the first one and mounted one
with the other preferably by a screwed joint. Inside one of
said pieces, the nearest to tyre valve, a hollow,
internally stepped tubular piece is lodged sliding in
relation to said piece which lodges it, and lodging a
25 hammer consisting of a cylindrical rod which has a widening
with a polygonal, preferably hexagonal cross-section
suitable to avoid the return inside said tubular piece as
well as to allow an air current between the interstices
existing between polygon chords and circular section of the
30 tubular piece. Said tubular piece has, in its end nearest
to tyre valve, a rubber conical seal, suitable to plug the
air inlet hole. Finally, said tubular piece has two "L"-
ended springs fastened by an external cylindrical collar.
The "L"-end of said springs is introduced in several
35 grooves made on said tubular piece nozzle. On the other



hand, the second of said pieces lodged in the external piece or slide, that nearest to the air inlet through the external conduit or hose, has a cylindrical hollow inside, and it has a howitzer screwed in its fore end, similar to those lodged in vehicle valves, at whose free end it has a little spring and its rear portion externally ends in a series of, preferably culvertail shaped, projections, appropriate for a leakproof-coupling to the rubber of the external air conduit or hose, through which air from machine flows. Likewise, said piece has a circular crown-shaped internal widening which has four balls diametrically and normally opposite two by two, built in and pressed by elastic means such as, preferably, springs, said balls being faced to an inner groove made in said external piece or slide. Next to its internal widening and faced to the inside of the coupling nozzle, an inner spring is arranged surrounding the tubular outside of said piece, suitable to integrally move both pieces lodged in said external piece or slide, and thereby draw said balls out from the corresponding grooves. Finally, the external piece or slide is inside provided with a collar shaped like a truncated cone, suitable to press said "L"-ended springs when the integral set formed by the pieces has moved to the stop resulting from the screw cap closing said external piece or slide.

The electronic air-supplying and pressure-equalizer system for tyres object of the present invention whose configuration has been disclosed above, is provided with different modes of working which the user can select.

Therefore, the three modes of working which the electronic air-supplying and pressure-equalizer system for



tyres has are: checking-balancing mode, manual inflating-balancing mode and automatic inflating-balancing mode.

5 Checking-balancing mode is selected by pressing a key
arranged for that purpose in the keyboard forming a part of
the keyboard module, so provoking the opening of the
adjustment module electrovalves, and it is used by the user
in order to check tyre pressure as well as to balance the
10 pressure of tyres belonging to the same axis in a vehicle,
in the case of said axis has at least two tyres, presenting
the pressure existing inside the tyre, once it has been
determined by the electronic measuring instrument, on the
visualizer of the visualizer-supervisory module of the
measuring instrument.

15

Manual inflating-balancing mode allows to adjust the
pressure as user wishes, by using inflating and deflating
key(s) arranged on the keyboard forming a part of the
keyboard module, therefore provoking the opening and/or
20 closing of adjustment module electrovalves, by operating
the corresponding electrovalve, at the same time that
pressure existing inside vehicle tyres measured through
said measuring instrument is displayed on the visualizer of
the visualizer-supervisory module. Comparison of the
25 information displayed on said visualizer regarding to
pressure existing inside the tyres, with the pressure
desired by the user to reach inside vehicle tyres
determines the inflating or the deflating action. Pressure
balancing between tyres belonging to the same axis is
30 automatically carried out by the configuration of the system
and; in particular, that of the electrovalves described
above.

Automatic inflating-balancing mode allows to adjust
35 the pressure, as the user wishes, up to a value pre-



established by him/her by introducing the corresponding value through the keyboard forming a part of the keyboard module, either by the explicit numerical introduction by pressing the corresponding numerical keys arranged for that purpose, or by selecting any pre-determined value by pressing the only key arranged for that purpose. Once said pre-established value is selected, the machine automatically acts by suitably working the electrovalves untill the preselected value is achieved, tyre pressure being compared at every moment with the pre-determined value, and the machine acting consequently.

Optionally or additionally, the electronic air-supplying and pressure-equalizer system for tyres, in terms of its working modes, can be provided with an acoustic warning device which indicates by an acoustic signal that system has finished the inflating-balancing process, so the pre-determined value being reached, when said system works at the automatic inflating-balancing mode.

Finally, the electronic air-supplying and pressure-equalizer system for tyres object of the present invention is provided with different selectable cashing modes such as free mode or payment mode as selected by system's operator and, when choosing the payment mode, it is provided with various options: coin payment or card payment, either with the own card comprising a determined number of services or with a money-card of any bank, eligible by the user. Said coin-box comprises a groove through which the necessary coin(s) should be introduced in order to switch the system on. In the case of a defective coin were introduced and blocked up, it will be recovered by pressing the return button located below said groove, thereby coin will appear in a box located below said button. Likewise, if coin were



unappropriate or system were either unplugged from the network or on working, said coin would be automatically returned.

5 Optionally, the electronic air-supplying and pressure-equalizer system for tyres object of the present invention can be provided with means for remote control from a central station in order to test the condition of the system, as well as, when necessary, to periodically count
10 up the money collected in said system. Said remote control means are preferably established by communication via modem acting on the checking and/or counting unit located inside the system object of the present invention.

15 Additionally, the electronic air-supplying and pressure-equalizer system for tyres object of the present invention can be optionally provided with a transmitter-receiver system in order to consider, along the pressure
20 adjustment process, some parameters such as, in particular, temperature. For that, a tyre valve is arranged, provided with a temperature measurer, a transducer converting said temperature signal into an electric signal, and a transmitter, preferably operated by radiofrecuence or
25 infrared waves, sending said electrical signal converted into radiofrecuence waves or infrared radiation, up to a receiver arranged in the electronic air-supplying and pressure-equalizer system for tyres, preferably on its housing. Signal received is converted into an electric
30 signal and sent to the visualizer-supervisory module, whose microcontroller will suitably estimate the tyre temperature pondering factor regarding to the selected pressure, therefore generating the corresponding correction factor.



Likewise, the electronic air-supplying and pressure-equalizer system for tyres object of the present invention is provided with means for indicating the working and the end of operating such as, preferably, a decorative system, such as, for example, a windmill electrically connected to the visualizer-supervisory module to work its spin movement while machine is working, as well as a sound warning capable of emitting an acoustic signal once the process of tyre inflating and/or pressure balancing between tyres of the same axis has finished.

The electronic air-supplying and pressure-equalizer system for tyres object of the present invention may consist of one only unit, as disclosed above or adopt a modular design so becoming a multi-station, multi-user and multi-function system. In this case, system will comprise a centre for managing the plurality of terminal service stations, as well as a set of autonomous use terminals, subjected to said managing centre. Different elements disclosed above will be distributed among different components of said multi-station system. Therefore, managing centre will include a compressor, owing to the centre where it is installed, a general control circuit, suitable to carry out the acceptance of cashing means, store transactions, control service times, and manage communications, as well as a communication module, preferably via modem. On the other hand, autonomous use terminals will be provided with a visualization device, a pressure control, a keyboard control, a cashing control, including a coin box and a card reader, as well as a pressure transducer. Particular disposal as well as features of each autonomous terminal will be able to adopt any embodiment to which reference is made below for the electronic air-supplying and pressure-equalizer system for tyres object of the present invention. Likewise, it is



appropriate to underline that compressor placed in said managing centre will be suitably sized to do a service to the different autonomous terminals simultaneously, or at least to a determined number of them, simultaneously.

5

From all that has been disclosed above, many advantages provided by the electronic air-supplying and pressure-equalizer system for tyres object of the present invention are apparent, such as the convenience and easiness for using the system by the user, as well as the cleaning derived from the fact that system has a air delivering unit comprising a support and a gyratory arm, whose configuration avoids that hoses or conduits in charge of bringing air from system up to tyres would get thrown to the ground being spoilt or broken, thanks to having automatic means for the withdrawal of inflating hoses, and its feasibility, thanks to having suitable remote checking means.

10

15

20

In order to better understand the object of the present invention, a preferred practical embodiment of the electronic air-supplying and pressure-equalizer system for tyres, is next disclosed based on figures herein attached. In said figures, the following is shown:

25

Figure 1 shows a frontal view of a first embodiment of the electronic air-supplying and pressure-equalizer system for tyres object of the present invention.

30

Figures 2a, 2b, 2c and 2d show lateral views of the housing of the working unit of the present practical embodiment of the electronic air-supplying and pressure-equalizer system for tyres object of the present invention.



Figure 3 shows the transversal cross-section of the housing and metal framework of the working unit of the electronic air-supplying and pressure-equalizer system for tyres object of the present invention.

5

Figures 4a and 4b show, respectively, a front view and a plan view of the air delivering unit consisting of a support and a gyratory arm.

10

Figures 5a and 5b show two cross-section views of the nozzle for coupling the inflating conduits or hoses to tyre valve, standing for, respectively, the rest and load conditions, i.e., when all air inlets are open.

15

Figures 6a, 6b, 6c, 6d and 6e show, respectively, a front view, a lateral view, a plan view and two transversal and longitudinal, cross-section-views of the basis or supporting unit.

20

Figure 7 shows the electric sketch of the present practical embodiment of the electronic air-supplying and pressure-equalizer system for tyres object of the present invention.

25

Figure 8 shows the pneumatic sketch of the present practical embodiment of the electronic air-supplying and pressure-equalizer system for tyres object of the present invention.

30

Figure 9 diagrammatically shows a view of a second preferred practical embodiment of the electronic air-supplying and pressure-equalizer system for tyres, comprising two inflating modules or devices.



Figure 10a shows the cross-sectioned inside of the inflating module or device corresponding to the second practical embodiment represented in figure 9.

5 Figure 10b shows a front view of the outside of the inflating module or device corresponding to the second practical embodiment represented in figure 9.

10 Figure 11 diagrammatically shows a view of a thirth preferred practical embodiment of the electronic air-supplying and pressure-equalizer system for tyres, comprising four inflating modules or devices.

15 Figure 12 diagrammatically shows a view of a fourth preferred practical embodiment of the electronic air-supplying and pressure-equalizer system for tyres, comprising two inflating modules or devices.

20 Figure 13 shows the sketch of an embodiment of a multi-user system of the electronic air-supplying and pressure-equalizer system for tyres.

25 Figure 1 shows a practical embodiment of the electronic air-supplying and pressure-equalizer system for tyres consisting of a working unit or machine (1), which is constituted as the main element of the system, from where the process of inflating vehicle tyres is controled and carried out, which allows the supply of any pressure to the vehicle tyres as well as the pressure balancing between
30 wheels of the same axis, in the case of vehicles having two wheels at each axis, wherein there are shown the housing (2) and the visualization and control means (3) from said working unit. Likewise, the electronic air-supplying and pressure-equalizer system for tyres consists of a propeller
35 or compressor equipment (not shown in figure), which



provides dry air from an internal or external compressor unit, a basis or supporting unit (4) and an air delivering unit (5) conveying air from the working unit or machine (1) up to vehicle tyres and which, in the case of vehicles with two wheels at each axis, allows pressure balancing between tyres of the same axis.

Figures 2a, 2b, 2c and 2d show the housing (2) of the working unit constituted as the external envelope shaped as a square-base truncated pyramid. In order to make its construction easier, housing (2) is divided into two, upper (2a) and lower (2b) portions, leakproof linked together. So that, said housing (2) is the coating which shapes said machine, suitable to protect internal elements. Housing (2) is made, at one of its sides (6d) (figure 2d), of metal terne plate with surface corrosion proofing made of zinc, chromatized in electrolytic bath and a bicomponent polyurethane paint coating. At the remaining sides (6a, 6b, 6c) (figures 2a, 2b, 2c), said housing (2) is made of materials resisting atmospheric agents, such as a preferably self-quenching, high density expanded stiff polyurethane resin, with a, preferably bicomponent polyurethane enamel external coating. At said metal side (6d) two gates (7a, 7b) with joint hinges are provided, to allow the access to inner elements in the machine, which are provided with a boxing with a drain and a rubber seal, as well as with a safety lock (8a, 8b). Housing (2) is further provided, preferably located at said metal side (6d), with air inlet screens located at the upside (9) and downside (10) of said housing (2), in order to allow an inner air current which avoids moisture condensation on electronic components.

At the fore side (6c), housing is provided with means for coupling visualization and control means (3) of the



system. such as, preferably, a visualization display, a keyboard and various cashing means (figura 2c).

Figure 3 shows a transversal cross-section of housing (2) and metal framework (11). As it is noticeable from said figure, metal framework consists of a metal structure made of L-shaped cross-section profiles (12) preferably bent forming right angles and burnt together, in order to provide the machine with rigidity and to support lateral stresses which may occur due to external agents such as wind. Said metal framework (11) is provided with a corrosion proofing coating, preferably constituted by a zinc electrolytic bath, chromated and epoxy-poliurethan-paint. Said metal framework (11) is further provided with means for fixing the housing, preferably constituted by screws (not shown in figure).

Air delivering unit (5) of the electronic air supplying and pressure-equalizer system for tyres object of the present invention is the unit in charge of conveying air from the working unit or machine (1) up to vehicle tyres. Said air delivering unit (5) is provided with structure for supporting said conduits or hoses, with location means suitable to adapt the location of said conduits or hoses up to vehicle tyres to be inflated or whose pressure is to be checked, and with means for automatic return or withdrawal of said conduits or hose from their working position up to their rest position.

Figure 4a and 4b show a practical embodiment of said air delivering unit (5) comprising a support (13) and gyratory arm (14). Support (13) consists of a hollow tube made of painted steel, at whose lower end it has means for fixing to the basis (4) of the electronic air-supplying and pressure-equalizer system for tyres, preferably consisting



of an anchorage plate (15) to screw on the basis (4).
Gyratory arm (14) comprises a first vertical tubular
stretch (14a) from whose end, a second tubular stretch
(14b) extends describing a 90° curve untill getting
5 horizontal, i.e., parallel to the ground, and a diagonal
bar (16) for supporting and reinforcing said horizontal
tubular stretch (14b). The height at which said horizontal
tubular stretch (14b) is placed is preferably of more than
1.70 m, and, in any case, in accordance with the height of
10 vehicles to operate with the present inflating
installation.

Air delivering unit (5) is provided with location
means, which allow a 90°-180° rotation of the upper tubular
15 stretch of the arm (14) arround the lower tubular stretch
or support (13), from its rest position considered as that
in which the upper horizontal tubular stretch (14b) is
substantially placed parallel to the longitudinal axis of
a vehicle parked next to the inflating system, up to its
20 working position, considered as that in which the upper
horizontal tubular stretch (14b) is substantially placed
perpendicular to the longitudinal axis of a vehicle parked
next to the inflating system, in order to proceed to
inflate the tyres located at each side of the vehicle
25 parked or to check the pressure thereof. Said location
means consist of said arm (14) rotation means arranged at
the upper end, such as, preferably, a nylon bearing (17)
composed of two coupled cylinders (17a, 17b), slant wise
cross-sectioned, so that when arm (14) rotation is
30 effected, the bearing (17) forces it to return to its
natural position.

Through the inside of said support (13) and arm (14),
tubes (18) run, entering by said support (13) basis, and
35 through which air from working unit (1) or machine flows



Said arm (14) has two outlet holes (19, 20) to lead hoses (21) out to vehicle tyre. The gap between said outlet holes (19, 20) is preferably between 1.75 m and 2.80 m; more preferably between 1.90 m and 2.50 m and, in any case, in accordance with the width of vehicles to be operated with the present inflating installation. Likewise, support (13) of the air delivering unit (5) has a lateral hole (22) for the outlet of a inflating conduit or hose (23) specific for being used in vehicles with two wheels, such as bicycles, motorcycles or the like.

Likewise, air delivering unit (5) is provided with means for automatic return or withdrawal of said conduits or hoses (21) from their working position up to their rest position, each consisting of, firstly, vertical coilings (25a, 25b) for lifting, return and/or withdrawal of inflating conduits or hoses (21) arranged on the upper horizontal tubular stretch (14b) of the gyratory arm (14) described above, to withdraw inflating conduits or hoses (21) from their stretched position to reach inflating valves of tyres, up to their withdrawn position, in which they hang from the upper horizontal stretch without touching the ground, in order to avoid spoiling thereof and, secondly, the preferably 90° to 180° gyratory device with automatic gravitatory return disclosed above, which effects the automatic gravitatory return movement of the upper tubular horizontal stretch around the point of coupling between support (13) and the gyratory arm (14), from the working position up to the rest position.

Conduit or hose (23) for operating vehicles with two wheels, such as bicycles, motorcycles, motor bikes or the like, is provided with supporting means for its rest position, for example, shaped as a hook (26), and manual



or, optionally automatic means for return and/or withdrawal (not shown in the figure).

5 Additionally, inflating conduits or hoses (21), at their free ends, are provided with coupling means (24a, 24b, 24c) suitable to couple said inflating conduits or hoses (21, 23) to tyre valve and thereby proceed to the inflating or pressure checking of the corresponding tyre. As it may be shown, the coupling means (24c) for vehicles
10 with two wheels has a 90°-bended shape in order to facilitate its coupling to the tyres of said vehicles.

15 Figures 5a and 5b represent, in detail, the cross-section of said coupling means suitable to couple said inflating conduits or hoses to tyre valve (78), constituted by a coupling nozzle, suitable to its easy and fast connection and disconnection of hoses (from the air delivering unit) with valves (78) in wheels, defined by a small diameter cylindrical configuration with a length
20 suitable to reach the valve (78), in the case of the latter is lodged in a cavity, which is provided with automatic lockage means suitable to avoid air escape when nozzle is not connected to the valve (78):

25 More concretely, said coupling nozzle comprises a cylindrical shaped external piece or slide (61) closed at its rear side by a screw cap (62), in whose opposite end it is provided with a circular opening (63) suitable to get into the valve (78). Inside said external piece or slide
30 (61), two pieces (64, 65) are lodged sliding in relation to the first (61) and mounted one with the other preferably by a screwed joint (66). Inside one of said pieces (64), the nearest to tyre valve (78), a hollow, internally stepped tubular piece (67) is lodged sliding in relation to said
35 piece (64) which lodges it, and lodging a hammer (68).



consisting of a cylindrical rod which has a widening with a polygonal, preferably hexagonal, cross-section, suitable to avoid the return inside said tubular piece (67) as well as to allow an air current between interstices existing between polygon chords and circular section of the tubular piece (67). Said tubular piece (67) has, in its end nearest to tyre valve (78), a rubber conical seal (79), suitable to plug the air inlet hole. Finally, said tubular piece (67) has two "L"-ended springs (74a, 74b) fastened by an external cylindrical collar (75). The "L"-end of said springs (74a, 74b) is introduced in several grooves (76a, 76b) made on said tubular piece (67) nozzle. On the other hand, the second (65) of said pieces lodged in the external piece or slide (61), that nearest to the air inlet through the external conduit or hose, has a cylindrical hollow inside, and it has a howitzer (69) screwed in its fore end, similar to those lodged in vehicle valves, at whose free end it has a little spring (77) and its rear portion externally ends in a series of, preferably culvertail shaped, projections (70), which is suitable for a leakproof coupling to the rubber of the external air conduit or hose, through which air from machine flows. Likewise, said piece (65) has a circular crown-shaped internal widening (71) which has four balls (72) diametrically and normally opposite two by two, built in and pressed by springs (73), said balls (72) being faced to an inner groove (84) made in said external piece or slide (61). Next to said circular crown-shaped internal widening (71) and faced to the inside of the coupling nozzle, an inner spring (80) is arranged surrounding the tubular outside of said piece (65), suitable to integrally move both pieces (64, 65) lodged in said external piece or slide (61), and thereby draw said balls (72) out from the corresponding grooves (84). Finally, the external piece or slide (61) is inside provided with a collar (83) shaped like a truncated cone, suitable to press



said "L"-ended springs (74a, 74b) when the integral set formed by the pieces (64, 65) has moved to the stop resulting from the screw cap (62) closing said external piece or slide (61).

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Figure 5b shows a cross-sectioned view of the nozzle for coupling the inflating conduits or hoses to tyre valve (78) at its loading condition, i.e., when all air inlets are open, which will facilitate the understanding of said coupling nozzle operation.

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Vehicle valve (78) is introduced by the fore end of coupling nozzle, through the inside of the piece (64) lodged into the external piece or slide (61), pushing the hammer (68), which internally slides along the tubular piece (67) lodged into said piece (64). Hammer (68), along its movement, pushes the internal piston of howitzer (69), thereby overcoming the resistance of its internal spring (77), and opening the air inlet hole (82), originally closed by the rubber conical seal (79), so beginning to move said tubular piece (67), which has to overcome the resistance of spring (80) surrounding the tubular outside of the second piece (65) lodged into the external piece or slide (61), untill it begins to move the integral set of pieces (64, 65), thereby drawing balls (72) out from the corresponding grooves (84).

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Resistances of said springs (77, 80) are transmitted in the opposite sense to the rod (81) of howitzer in tyre valve (78), which results opened, thereby allowing air to flow.

35

When the integral set formed by pieces (64, 65) lodged into the external piece or slide (61) has moved up to the stop resulting from the screw cap (62) closing said



external piece or slide (61), springs (74a, 74b) integral with the piece (64) are pressed by a collar (83) shaped like a truncated cone located into the external piece or slide (61), so that the "L"-shaped end of said springs
5 (74a, 74b) juts out the corresponding grooves (76a, 76b) clamp-wise embracing the valve (78), entering into the strias of the same and avoiding it to return.

In this position, shown in figure 5b, with the valve
10 (78) clogged, air flow is free all along the run, and on the other hand, coupling nozzle is in a stable position, which can be unblocked only by pulling the external piece or slide (61), disconnecting said "L"-ended springs (74a, 74b), balls (72) entering again into their corresponding
15 grooves (84), the air flow conduits being closed back again by means of springs, the whole set becoming to the rest position and vehicle valve (78) being loose.

Figures 6a, 6b, 6c, 6d and 6e show different views of
20 the basis or supporting unit (4), consisting of a socle or pedestal, appropriate to support the working unit or machine (1) and the air delivering unit (5). Said support or basis is parallelopipedic-wise shaped, open at its lower face, made of steel plate, with corrosion proofing by
25 electrolytic zinc bath, chromitized and bicomponent epoxy-polyurethane paint. Likewise, it is provided with means for fixing to the ground by screws (27) and retaining billets (not shown in figure).

30 Said basis may optionally have a small gate (28) for having access to the coin box existing inside the machine.

Figure 7 shows an electronic sketch of the measuring
instrument of the working unit or machine (1). Said working
35 unit (1) is constituted by an electronic set formed by



three intelligent modules, such as a visualizer-supervisory module (29), a keyboard module (30) and an adjustment module (31), independently operated, each one having a microcontroller for the execution of that process commended to each module, preferably communicated by two wires in accordance with the specifications of the corresponding communication bus (32), as well as a pneumatic control and power supply module (33) providing the necessary energy for the operation of the remaining modules through the corresponding supply buses (34), simultaneously managing the pneumatic equipment (35).

Said visualizer-supervisory module (29) of the measuring instrument is constituted by a microcontroller, a series-parallel interface for the managing of the visualizer, a visualizer (36), a protected writing memory, a supply control circuit, an infrared receiving circuit, a battery and a load circuit. Said module is in charge of presenting the pressure measure, in an intelligible manner, outside, storing the information introduced from outside through the keyboard module (30), as well as supervising the complete equipment operation, managing the information received from the remaining modules, deciding the process to be effected, and sending the appropriate orders through the communication bus (32) to the remaining modules.

Keyboard module (30) is in charge of receiving orders from outside and communicating them to the supervisory module (29) for their interpretation and for acting in accordance with the criterion established by the program, and it is provided with a microcontroller, an interface between the intelligent element and the keyboard (37), preferably constituted by transistors, light indicators (38) and, optionally, with cashing means, either by coins (39) or by credit cards, money cards or the like (40).



Detection of the activation of a key, approval of a card-transaction or coin-acceptance are communicated by the communication bus (32) to the supervisory module (29), said supervisory module (29) determining the process(es) to be effected, including the orders to the keyboard module (30) for activating or deactivating either the light indicators (38) or the card (40) [or coin (39)] acceptor.

Adjustment module (31) is in charge of recovering information about pressure and converting said information into digital information; it has a microcontroller, an analogical-digital converter with differential input, a low noise linear amplifier and a pressure transducer (41). Said adjustment module (31) converts information regarding to barometric pressure into a numerical digital value, operates the pneumatic system (35) electrovalves and manually or automatically realizes those necessary pressure-adjustment processes to achieve the desired pressure.

Finally, power supply (33) consists of the circuit in charged of supplying the necessary energy to each one of the fore-mentioned modules for the correct operation thereof; it has voltage stabilizers such as, preferably, a circuit with a transistor and protection means, such as a filter (42) located at the network input in order to avoid the production of radiofrecuence interferences. Additionally, it is provided with a power supply monitoring system, suitable to detect voltage drops below a safety value, and it supplies the initialization signal to modules. Finally, it includes an efficiency control for managing the pneumatic equipment by, preferably, optocoupling triacs indicating whether power is in those elements constituting said pneumatic equipment (35) or not, as well as a monitoring of the correct operation of said pneumatic equipment (35).



Figure 8 shows the pneumatic sketch of the present practical embodiment of the electronic air-supplying and pressure-equalizer system for tyres object of the present invention. Said pneumatic equipment (35) of the working unit or machine (1) is the element in charge of managing the air flow which will permit to fill up or to empty tyres untill achieving the pressure desired. The pneumatic equipment (35) consists of four electrovalves (43, 44, 45, 46) communicating wheels with the pressure source or compressor (47), with the very measuring instrument through a transducer (48) and with the atmosphere (49). Said electrovalves join together in a common node or hot node (50), to which said measuring instrument joins too.

Two of said electrovalves (43, 44) work simultaneously and are in charge of connecting distribution and connection means, such as hoses (21), coming from vehicle tyres, to said hot node (50), so achieving a double effect. On the one hand, pressures into both tyres get equal in accordance with the principle of communicating vessels, and at the same time, it is possible to measure the pressure of the grip between the wheels. The use of two electrovalves (43, 44) does not permit the cross balancing of wheels as hoses (21) change between one axis and the other.

Once the above set of tyre electrovalves is open, one of the two remaining electrovalves (45) joins the hot node (50) with the compressor in order to thereby increase pressure.

Once the above set of tyre electrovalves is open, the second of the two remaining electrovalves (46) joins the hot node (50) with the atmosphere in order to thereby decrease pressure.



Likewise, said pneumatic equipment (35) has a non return valve (51) located at the pneumatic set pressure inlet, in order to avoid that, in the absence of pressure inside the compressor, tyres could deflate.

5

Pneumatic set (35) is complemented with several means for protecting the measuring instrument against water and dirtiness existing in the installation and/or in the compressor, as well as against pressures higher than those said measuring instrument can support, such as, preferably, a filter (52) and a regulator (53).

10

The propeller or compressor equipment (not shown in figures) of the electronic air-supplying and pressure-equalizer system for tyres provides dry air at a pre-established minimum pressure. Said compressor can be either interior, so suitably sizing the outer housing in order to lodge said compressor, or external, in which case, a larger and therefore more powerful compressor can be used, thereby favouring the response time of the system.

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The electronic air-supplying and pressure-equalizer system for tyres object of the present invention whose configuration has been disclosed above, is provided with different modes of working which user can choose. The three modes of working which the electronic air-supplying and pressure-equalizer system for tyres has are: checking-balancing mode, manual inflating-balancing mode and automatic inflating-balancing mode.

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The user begins the working of the electronic air-supplying and pressure-equalizer system for tyres by connecting hoses (21) to vehicle tyres through nozzles introducing these into the valves in tyres. Once this connection process is effected, it will be necessary to

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wait for a moment untill reading becomes stabilized. This time is the required for pressure values inside both wheels to become equal, in the case of two wheels at each axis. Next, it should be selected whether to increase or decrease pressure based on the pressure being visualized and pressure that is aimed to reach. Once decision has been taken, it is possible to work the appropriate valve in each case. Time that this action should take will depend on various factors, the most remarkable being the difference between current pressure and pressure to be reached, the difficulty for air to pass through the pneumatic system, and the pressure of compressor supplying the air necessary in case of desiring to increase the barometric value. Since it seems to be difficult to achieve the desired pressure by activating only once the appropriate electrovalve for a determinate time, generally, an electrovalve should be worked, then it should be waited untill pressure becomes stabilized and a new decision is taken about the action to do, which will depend, as before, on the pressure value read and that to be reached. Once decision is taken, the appropriate electrovalve should be worked, said process being repeated so many times as it were necessary, untill desired pressure is achieved.

In relation to the handling by the user, this can decide between being him/her-self who compares, takes the decision and repeatedly acts on the machine (manual mode) or letting the machine to be itself which carries out the process (automatic mode), the pressure value desired to be achieved being previously fixed through the keyboard (37) either by directly introducing the value, or by preselecting one of the pre-established values arranged on the keyboard (37). Likewise, user has the possibility to check and equalize pressures inside the tyres of the same vehicle axis.



The electronic air-supplying and pressure-equalizer system for tyres is provided with an acoustic warning device which indicates by an acoustic signal that system has finished the inflating-balancing process, so the pre-determined value being reached, when said system works at the automatic inflating-balancing mode.

Finally, the electronic air-supplying and pressure-equalizer system for tyres object of the present invention is provided with different selectable cashing means such as free mode or payment mode as selected by system's operator and, when choosing the payment mode, it is provided with various options: coin payment (39) or card payment (40), either with the own card comprising a determined number of services or with a money-card of any bank, eligible by the user. Said coin-box (39) comprises a groove through which the necessary coin(s) should be introduced in order to switch the system on. In the case of a defective coin were introduced and blocked up, it will be recovered by pressing the return button located below said groove, thereby coin will appear in a box located below said button. Likewise, if coin were inappropriate or system were either unplugged from the network or on working, said coin would be automatically returned.

Figures 9 to 12 show alternative embodiments of the unit of distribution of the electronic air-supplying and pressure-equalizer system for tyres object of the present invention.

Figure 9 diagrammatically shows a second preferred embodiment of the electronic air-supplying and pressure-equalizer system for tyres, having a series of inflating conduits or hoses (121) carrying the inflating gas, preferably compressed air, coming from the working unit



(101) of the kind disclosed above.

Said second practical embodiment consists of two inflating modules or devices (102) doing the following functions: support of said conduits or hoses (121), location of said conduits or hoses and coupling thereof to vehicle tyres to be inflated or whose pressure is desired to check, and automatic withdrawal and/or return of said conduits or hoses (121) from their working position up to their rest position. Pressure control of each tyre is carried out through the central control unit, similar to that disclosed in figures 1 to 8. The two inflating modules or devices (102) are located in diametrically opposite positions, so that the user who desires to use the electronic air-supplying and pressure-equalizer system for tyres should park the vehicle between both inflating modules or devices (102), each one of the inflating modules or devices of rear and fore tyres being approximately equidistant to each corresponding side of the vehicle. Said inflating modules or devices (102) are placed at a gap of, preferably, between 1.75 m and 2.80 m, more preferably between 1.90 m and 2.50 m between themselves, and, in any case, according to the width of vehicles to operate with the present inflating installation.

Inflating conduits or hoses (121) extend from the deposit or compression unit to inflating modules through underground pipes, going through a working and control unit (101).

Figures 10a and 10b diagrammatically show different views of inflating modules or devices (102), which have a housing made of a resistant material, preferably metal or the like, shaped as a semi-spherical cap, in whose inside an extensible inflating conduit or hose (121) is lodged,



said housing (104) being thereby constituted as the means for supporting said inflating conduit or hose (121). Said housing (104) has, at its lower side, means for the anchorage and fixing to the ground, preferably constituted by threaded screws (105) introduced into the ground, secured by conventional nuts (106). Likewise, said housing (104) has, on its upper surface, an outlet hole (107) to extract the inflating conduit or hose (121) and to thereby couple the inflating valve (108), arranged at its free end, to tyre valve.

Likewise, inside said housing (104), there are automatic means for the returning and withdrawal of the inflating conduit or hose lodged therein, constituted by a channeled wheel (109) horizontally arranged with a device of springs which makes it to automatically revolve in a sense, so that the conduit or hose (121) used, which is stretched and extracted from the housing (104), is withdrawn up to its rest position by said automatic coiling means.

Figure 11 shows a thirth preferred embodiment of the electronic air-supplying and pressure-equalizer system for tyres, similar to that shown in Figure 9, which is provided with four inflating modules or devices (202) identical to those disclosed above distributed on an imaginary rectangle, in order to work one vehicle tyre from each one so that the user who wants to use the inflating installation should park the vehicle on said imaginary rectangle, placing each one of the vehicle tyre approximately equidistant to the corresponding inflating module or device. Again, pressure control of each tyre is carried out through a central control and working unit (201). As in foregoing cases, gaps have to be suitable to



park the vehicle on said imaginary rectangle, allowing an appropriate manoeuvrability margin.

5 Finally, figure 12 shows a fourth practical embodiment of the electronic air-supplying and pressure-equalizer system for tyres similar to that shown in figures 9 and 11, in which inflating modules or devices have a cylindrical shape (302) as a body emerging from the ground up to certain height, allowing the handling thereof by user
10 without crouching, being inside provided with each one of the elements disclosed for the inflating module or device of the latter embodiment, regarding to figures 10a and 10b. As in foregoing embodiments, inflating hoses extend underground from the central control and working unit (301)
15 to the inflating modules or devices (302).

As represented in figure 13, the electronic air-supplying and pressure-equalizer system for tyres can consist of a multi-station, multi-user and multi-function
20 system. In this case, system comprises a central managing centre (54), as well as a set of autonomous use terminals (55.1, 55.2, ... 55.n), subjected to said managing centre (54). The various elements disclosed above for individual systems will be distributed among the various components of
25 said multi-station system. Therefore, managing centre (54) will comprise a compressor, owing to the centre where it is installed on, an overall control circuit suitable to carry out the acceptance of cashing means, store transactions, control service times, and manage
30 communications, as well as a communication module, preferably via modem. Autonomous use terminals (55.1, 55.2, ... 55.n), will be provided with a visualization device, a pressure control, a keyboard control, a payment control including a money box and a card reader, as well as
35 a pressure transducer. The particular disposal as well as



the features of each one of the autonomous terminals (55.1, 55.2, ... 55.n) may adopt any one of the embodiments mentioned above. The so suggested multi-station configuration may complement the inflating and pressure control functions of each autonomous terminal (55.1, 55.2, ... 55.n) with further functions, typical of a car-washing centre such as washing, vacuum cleaning, rug cleaning, etc.

Once the nature of the present invention, as well as several ways for putting it into practice have been sufficiently disclosed, it only remains to add that it is possible to introduce, in its whole or parts, variations in shape, materials and disposal, provided that said variations would not substantially those features of the invention which are claimed below.

Claims

1.- Electronic air-supplying and pressure-equalizer system for tyres, to be preferably installed at petrol stations, service areas, mechanical assistance points on roads or the like, similar to those comprising a compression unit, which, either through a deposit or directly, supplies a gas, preferably compressed air, to a inflating unit, which has several inflating conduits or hoses preferably made of plastic, rubber or the like, having, at their free ends, means for coupling said inflating conduits to tyre valve, as well as a structure for supporting said conduits, characterized in that it is provided with:

- a) a working unit or machine (1), having:
 - a housing (2) preferably made, at one of its sides (6d), of metal terne plate with surface corrosion proofing and, at the remaining sides (6a, 6b, 6c), preferably made of materials resisting atmospheric agents, such as, preferably, a preferably self-





the features of each one of the autonomous terminals (55.1, 55.2,... 55.n) may adopt any one of the embodiments mentioned above. The so suggested multi-station configuration may complement the inflating and pressure control functions of each autonomous terminal (55.1, 55.2,... 55.n) with further functions, typical of a car-washing centre such as washing, vacuum cleaning, rug cleaning, etc.

Once the nature of the present invention, as well as several ways for putting it into practice have been sufficiently disclosed, it only remains to add that it is possible to introduce, in its whole or parts, variations in shape, materials and disposal, provided that said variations would not substantially those features of the invention which are claimed below.

Claims

- 1.- Electronic air-supplying and pressure-equalizer system for tyres, to be preferably installed at petrol stations, service areas, mechanical assistance points on roads or the like, similar to those comprising a compression unit, which, either through a deposit or directly, supplies a gas, preferably compressed air, to a inflating unit, which has several inflating conduits or hoses preferably made of plastic, rubber or the like, having, at their free ends, means for coupling said inflating conduits to tyre valve, as well as a structure for supporting said conduits, characterized in that it is provided with:
- a) a working unit or machine (1), having:
- a housing (2) preferably made, at one of its sides (6d), of metal terne plate with surface corrosion proofing and, at the remaining sides (6a, 6b, 6c), preferably made of materials resisting atmospheric agents, such as, preferably, a preferably self-





- 5 quenching, high density expanded stiff polyurethane resin, being provided at said metal side (6d) with one or more gates (7a, 7b), suitable to allow the access to inner elements, the housing (2) being further provided with ventilation means preferably constituted by air inlet screens (9, 10) preferably located at the upside and downside of said housing (2); a metal framework (11), consisting of a metal structure preferably made of L-shaped cross-section profiles
- 10 (12) preferably bent forming right angles and burnt together, and it is provided with a corrosion-proofing coating, as well as means for fixing the housing, preferably constituted by screws;
- 15 an electronic measuring instrument, constituted by an electronic set formed by three intelligent modules, such as a visualizer-supervisory module (29), a keyboard module (30) and an adjustment module (31), and a pneumatic control and power supply module (33), as well as the buses for supply (34) and communication
- 20 (32) between modules; and
- a pneumatic equipment (35) consisting of four electrovalves (43, 44, 45, 46) suitable to communicate tyres with pressure source or compressor (47), with the very measuring instrument through a transducer
- 25 (48) and with the atmosphere (49), said electrovalves and said measuring instrument being joined at a common node or hot node (50), and it is provided with a non return valve (51) located at the pressure inlet in said pneumatic set (35);
- 30 b) a propeller or compressor equipment, having an internal or external compressing unit;
- c) a basis or supporting unit (4), consisting of a parallelopipedic-wise shaped, open at its lower face, preferably made of steel plate, with corrosion proofing,





and provided with means for fixing to the ground by screws (27, and retaining billets; and
d) an air delivering unit.

5 2.- Electronic air-supplying and pressure-equalizer system
for tyres, according to the first claim, characterized in
that the visualizer-supervisory module (29) of the
measuring instrument is constituted by a microcontroller,
a visualizer (36), a series-parallel interface for managing
10 the visualizer (36), a protected writing memory, a supply
control circuit, an infrared receiving circuit, a battery
and a load circuit capable of presenting the pressure
measure, in an intelligible manner, outside, storing the
information introduced from outside through the keyboard
15 module (30), and supervising the system operation, capable
of managing the information received from the remaining
modules, deciding the process to be effected, and sending
the appropriate orders through the communication bus (32)
to the remaining modules.

20 3.- Electronic air-supplying and pressure-equalizer system
for tyres, according to the first claim, characterized in
that the keyboard module (30) in the measuring instrument
is provided with a microcontroller, an interface between
25 the intelligent element and the keyboard (37), preferably
constituted by transistors, light indicators (38) and with
cashing means, either by coins (39) or by credit cards
money cards or the like (40), suitable to receive orders
coming from the outside and to communicate them to the
30 supervisory module (29) for their interpretation and
execution, as well as for the detection of the activation
of a key.

4.- Electronic air-supplying and pressure-equalizer system
35 for tyres, according to the first claim, characterized in





that the adjustment module (31) in the measuring instrument is provided with a microcontroller, an analogical-digital converter with differential input, a low noise linear amplifier and a pressure transducer (41), suitable to convert information regarding to barometric pressure into a numerical digital value, operate the electrovalves (43, 44, 45, 46) and manually or automatically realize those necessary pressure-adjustment processes to achieve the desired pressure.

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5.- Electronic air-supplying and pressure-equalizer system for tyres, according to the first claim, characterized in that the power supply source (33) in the measuring instrument is provided with voltage stabilizers, such as for example, preferably, a circuit with a transistor and protection means, such as a filter (42) located at the network input suitable to avoid the production of radiofrequency interferences, a power supply monitoring system, suitable to detect voltage drops below a safety value and the supply of the initialization signal of modules, and with an efficiency control system for managing the pneumatic equipment by, preferably, optocoupling triac indicating whether voltage is in those elements constituting said pneumatic equipment or not, as well as monitoring of the correct operation of said pneumatic equipment (35).

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6.- Electronic air-supplying and pressure-equalizer system for tyres, according to the fore claims, characterized in that it is provided with a remote control suitable to select the inflating pressure, comprising a keyboard either a numerical keyboard, suitable for introducing a value, or one only key containing the entry of the value associated with the optimum pressure of vehicle tyre, converter of the electrical signal generated by said

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keyboard into, preferably, infrared waves, and a transmitter of said waves, capable of emitting the signal corresponding to the value introduced by said keyboard of said remote control, to the infrared receiving circuit installed in the working unit, preferably on its housing, said signal receiving circuit being provided with a signal transducer capable of converting the infrared signal received, into an electric signal, and with means for transmission to the visualizer-supervisory module of the measuring instrument.

7.- Electronic air-supplying and pressure-equalizer system for tyres, according to the first claim, characterized in that:

- two of said electrovalves (43, 44) of said pneumatic equipment (35) work simultaneously and are capable of connecting distribution and connection means, such as hose (21), coming from vehicle tyres, to said hot node (50);
- one of the remaining electrovalves (45) is capable of, once the above set of tyre electrovalves is opened, joining the hot node (50) with the compressor.
- the second of the remaining electrovalves (46) is capable of, once the above set of tyre electrovalves is opened, joining the hot node (50) with the atmosphere.

8- Electronic air-supplying and pressure-equalizer system for tyres, according to the first claim, characterized in that said pneumatic equipment (35) is provided with means for protecting the measuring instrument against water and dirtiness existing in the installation and/or in the compressor, as well as against pressures higher than those said measuring instrument can support, such as, preferably a filter (52) and a regulator (53).





infrared signal into an electric signal and means for transmitting to the display-supervisor module, suitable for working together with external signal sources measuring the parameters on which inflating pressure depends, such as, preferably, temperature.

22.- Electronic air-supplying and pressure-equalizer system for tyres, according to the first claim, characterized in that the means for coupling said inflating conduits or hoses to tyre valves consist of a coupling mouthpiece comprising a cylindrical shaped slidable external piece (61) closed at its rear side by a threaded cap (62), in the opposite end of which it is provided with a circular opening (63) suitable for being inserted into tyre valve (78); inside said slidable external piece (61) there are two pieces (64, 65) slidable in relation to said slidable external piece (61) and connected to each other preferably by a threaded attachment (66).

23.- Electronic air-supplying and pressure-equalizer system for tyres, according to the previous claim, characterized in that inside one of said pieces (64) located inside the slidable external piece (61), the one nearest to tyre valve (78), a hollow, internally stepped tubular piece (67) is lodged which is slidable in relation to said piece (64) in which it is located, and has inside a percussor (68) consisting of a cylindrical rod which has a widening with a polygonal, preferably hexagonal, cross-section, suitable for avoiding its return inside said tubular piece (67) as well as for allowing air flow among the interstices existing between polygon chords and circular section of the tubular piece (67), said tubular piece (67) having, at its end nearest to tyre valve (78), a rubber conical joint (79), suitable for closing a hole for the passage of air, as well as two springs (74a, 74b) ended in the shape of an "L", held by an external cylindrical collar (75), and several grooves (76a, 76b) made on the mouth of said tubular piece (67), suitable for placing the "L"-shaped end of said springs (74a, 74b) therein.





horizontal tubular stretch (14b), said inflating conduits or hoses (21) having a gap of, preferably between 1.75 m and 2.80 m; more preferably between 1.90 m and 2.50 m, and the horizontal tubular stretch having a height of, preferably, more than 1,70 m from the floor plan.

11.- Electronic air-supplying and pressure-equalizer system for tyres, according to claims 1, 9 and 10, characterized in that said location means consist of means for rotating around the point of coupling between both tubular stretches of the supporting structure, preferably constituted by a nylon bearing (17) composed of two coupled cylinders (17a, 17b), slant wise cross-sectioned, which allow a preferably 90°-180° gyration of the upper tubular stretch (14b) around the lower tubular stretch (14a), from its rest position considered as that in which the upper horizontal tubular stretch (14b) is substantially placed parallel to the longitudinal axis of a vehicle parked next to the electronic air-supplying and pressure-equalizer system for tyres, up to its working position, considered as that in which the upper horizontal tubular stretch (14b) is substantially placed perpendicular to the longitudinal axis of a vehicle parked next to the electronic air-supplying and pressure-equalizer system for tyres.

12.- Electronic air-supplying and pressure-equalizer system for tyres, according to claims 1, 9, 10 and 11, characterized in that said means for the return and/or automatic withdrawal of the inflating conduits or hoses from their working position to their rest position each consist of vertical coilings (25a, 25b) for sustenance return and/or withdrawal of inflating conduits or hoses (21) arranged on the upper horizontal tubular stretch (14b) of the supporting structure (13), as well as a device for the, preferably 90°-180°, gyration of the upper tubular





horizontal stretch (14b), with automatic gravitatory return from their working position to their rest position.

5 13.- Electronic air-supplying and pressure-equalizer system for tyres, according to claims 1 and 12, characterized in that the air delivering unit (5) is provided with inflating modules or devices (102) fixed to the ground placed at a gap of, preferably, between 1.75 m and 2.80 m, more preferably between 1.90 m and 2.50 m, and in that the
10 corresponding inflating conduits or hoses (121) extend from the control and working unit (101) to the inflating modules (102) through underground pipes.

15 14.- Electronic air-supplying and pressure-equalizer system for tyres, according to claims 1 and 9, characterized in that the air delivering unit (5) is provided with four inflating modules or devices (202) located on the vertices of an imaginary rectangle suitably sized to allow to park a vehicle on its area, and in that the corresponding
20 inflating conduits or hoses extend from the control and working unit (201) to the inflating modules (202) through underground pipes.

25 15.- Electronic air-supplying and pressure-equalizer system for tyres, according to claims 13 and 14, characterized in that inflating modules or devices (102, 202) are provided with a housing (104) made of a resistant material, preferably metal or the like, shaped as a semi-spherical cap, in whose inside an extensible inflating conduit or
30 hose (121) is lodged, said housing (104) being thereby constituted as the means for supporting said inflating conduit or hose (121), said housing being provided, at its lower side, with means for the anchorage and fixing to the ground, preferably constituted by threaded screws (105)
35 introduced into the ground, secured by conventional nuts





(106), as well as, at its upper side, with an outlet hole (107) suitable to extract the inflating conduit or hose (121), and in that, inside said housing (104), there are automatic means for the returning and withdrawal of the inflating conduit or hose lodged therein, preferably constituted by a channeled wheel (109) horizontally arranged with a device of springs.

16.- Electronic air-supplying and pressure-equalizer system for tyres, according to claims 13 and 14, characterized in that inflating modules or devices have a cylindrical shaped housing (302) emerging from the ground.

17.- Electronic air-supplying and pressure-equalizer system for tyres, according to the first claim, characterized in that it is capable of working with three modes of working, eligible by the user, consisting of:

a) checking-balancing mode, eligible by pressing a key arranged for that purpose in the keyboard (37) forming a part of the keyboard module (30), so provoking the opening of the electrovalves (43, 44, 45, 46) of the adjustment module (31), suitable to carry out the checking of tyre pressure as well as to balance pressure inside tyres belonging to the same axis of the vehicle, in the case of said axis has at least two tyres, by presenting, once determined by the electronic measuring instrument, the pressure existing inside the tyres, on the visualizer (36) of the visualizer-supervisory module of the measuring instrument;

b) manual inflating-balancing mode, for effecting the pressure adjustment as user wishes, by using inflating and deflating key(s) arranged on the keyboard (37) forming a part of the keyboard module (30), provoking the opening and/or closing of the electrovalves (43, 44, 45, 46) of the adjustment module (31), by operating the corresponding





electrovalve; at the same time that pressure existing inside vehicle tyres measured through the measuring instrument is displayed on the visualizer (36) of the visualizer-supervisory module (29) of said measuring instrument, pressure-balancing of tyres belonging to the same axis is carried out;

5 c) automatic inflating-balancing mode, for effecting the pressure adjustment as user wishes, up to a value pre-established by him/her by introducing the corresponding value through the keyboard (37) forming a part of the
10 keyboard module (30), either by the explicit numerical introduction by pressing the corresponding numerical keys arranged for that purpose, or by selecting any pre-determined value by pressing the only key arranged for that
15 purpose, in order to let the machine to automatically act, by suitably working the electrovalves (43, 44, 45, 46) up to achieve the preselected value, tyre pressure being compared at every moment with the pre-determined value, and the machine acting consequently.

20 18.- Electronic air-supplying and pressure-equalizer system for tyres, according to claims 1 and 17, characterized in that it is provided with an acoustic warning device which indicates by an acoustic signal that
25 system has finished the inflating-balancing process, so the pre-determined value being reached, when said system works at the automatic inflating-balancing mode.

30 19.- Electronic air-supplying and pressure-equalizer system for tyres, according to the first claim, characterized in that it is capable of working with different eligible cashing modes, consisting of:

a) free mode; and
b) payment mode, provided with the following options
35 eligible by the user: coin payment mode (39) or card





payment mode (40), either with the own card comprising a determined number of services or with a money-card of any bank.

5 20.- Electronic air-supplying and pressure-equalizer system for tyres, according to the first claim, characterized in that it is provided with remote control means preferably established by communication via modem from a central station suitable to test the condition of the system, as
10 well as to periodically count up the money collected in said system.

21.- Electronic air-supplying and pressure-equalizer system for tyres, according to the first claim, characterized in
15 that it is provided with a transmitter-receiver system preferably operated by infrared or other kind of electromagnetic waves, a transducer for converting the infrared signal into an electric signal and means for transmitting to the visualizer-supervisory module, suitable
20 to work together with external signal sources measuring those parameters on which inflating pressure depends, such as, preferably, temperature.

22.- Electronic air-supplying and pressure-equalizer system
25 for tyres, according to the first claim, characterized in that those means for coupling said inflating conduits or hoses to tyre valve consist of a coupling nozzle comprising a cylindrical shaped external piece or slide (61) closed at its rear side by a screw cap (62), in whose opposite end it
30 is provided with a circular opening (63) suitable to get into tyre valve (78); Inside said external piece or slide (61), two pieces (64, 65) are lodged sliding in relation to the first (61) and mounted one with the other preferably by a screwed joint (66).

35





23.- Electronic air-supplying and pressure-equalizer system for tyres, according to the fore claim, characterized in that inside one of said pieces (64) lodged into the external piece or slide (61), the nearest to tyre valve (78), a hollow, internally stepped tubular piece (67) is lodged sliding in relation to said piece (64) which lodges it, and lodging a hammer (68) consisting of a cylindrical rod which has a widening with a polygonal, preferably hexagonal, cross-section, suitable to avoid the return inside said tubular piece (67) as well as to allow an air current among the interstices existing between polygonal chords and circular section of the tubular piece (67), said tubular piece (67) having, in its end nearest to tyre valve (78), a rubber conical seal (79), suitable to plug the air inlet hole, as well as two "L"-ended springs (74a, 74b) fastened by an external cylindrical collar (75) and several grooves (76a, 76b) made on the nozzle of the tubular piece (67), suitable to lodge the "L"-shaped end of said springs (74a, 74b).

24. Electronic air-supplying and pressure-equalizer system for tyres, according to claims 22 and 23, characterized in that the second of said pieces (65) lodged into the external piece or slide (61), the nearest to the air inlet through the external conduit or hose, has a cylindrical hollow inside, and it has a howitzer (69) screwed in its fore end, similar to those lodged in vehicle valves, and whose free end it has a little spring (77) and its rear portion externally ends in a series of, preferably culvertail shaped, projections (70), which is suitable for a leakproof-coupling to the rubber of the external air conduit or hose, through which air from machine flows, said piece (65) further having a circular crown-shaped internal widening (71) which has four balls (72) diametrically arranged normally opposite two by two, built in and pressed in





5 springs (73), said balls (72) being faced to an inner groove (84) made in said external piece or slide (61), inner spring (80) being arranged, next to said circular crown-shaped internal widening (71) and faced to the inside of the coupling nozzle, surrounding the tubular outside said piece (65), suitable to integrally move both pieces (64, 65) lodged in said external piece or slide (61), and thereby draw said balls (72) out from the corresponding grooves (84).

10

25.- Electronic air-supplying and pressure-equalizer system for tyres, according to claims 22, 23 and 24, characterized in that said external piece or slide (61) is inside provided with a collar (83) shaped like a truncated cone suitable to press said "L"-ended springs (74a, 74b) when the integral set formed by the pieces (64, 65) has moved the stop resulting from the screw cap (62) closing said external piece or slide (61).

20

26.- Electronic air-supplying and pressure-equalizer system for tyres, according to one of the foregoing claims, characterized in that it has a distributed multi-station configuration comprising a set of autonomous use terminals (55.1, 55.2, ... 55.n), subjected to said managing centre (54), said managing centre (54) comprising a compressor, an overall control circuit suitable to carry out the acceptance of cashing means, store transactions, control service times, and manage communications, as well as a communication module, preferably via modem with the autonomous use terminals (55.1, 55.2, ... 55.n), and said autonomous use terminals (55.1, 55.2, ... 55.n) comprising a visualization device, a pressure control, a keyboard control, a payment control including a money box and a card reader, as well as a pressure transducer.

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ELECTRONIC, AIR-SUPPLYING AND PRESSURE-EQUALIZER
SYSTEM FOR TYRES

5

10

Abstract

Electronic air-supplying and pressure-equalizer
system for tyres, to be preferably installed at petrol
stations, service areas, mechanical assistance points on
roads or the like, similar to those comprising a
compression unit, which, either through a deposit or
directly, supplies a gas, preferably compressed air, to an
inflating unit, which has several inflating conduits
having, at their free ends, means for coupling said
inflating conduits to tyre valve, as well as a structure
for supporting said conduits, which is provided with a
working unit or machine (1), comprising a housing (2), a
metal framework (11), an electronic measuring instrument,
and a pneumatic equipment (35), a propeller or compressor
equipment, having an inner or outer compressing unit, a
basis or supporting unit and an air-delivering unit (5).

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35

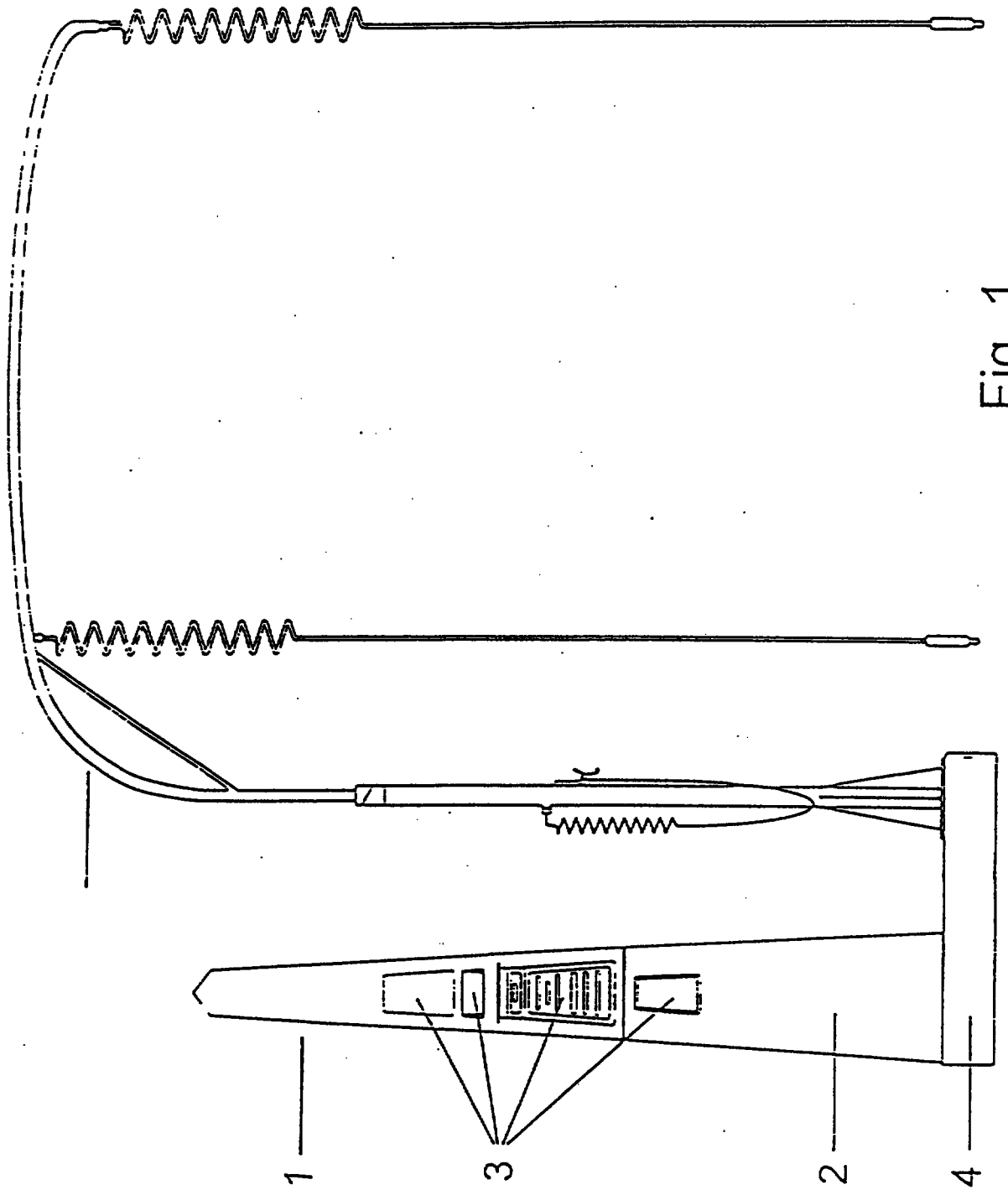


Fig. 1

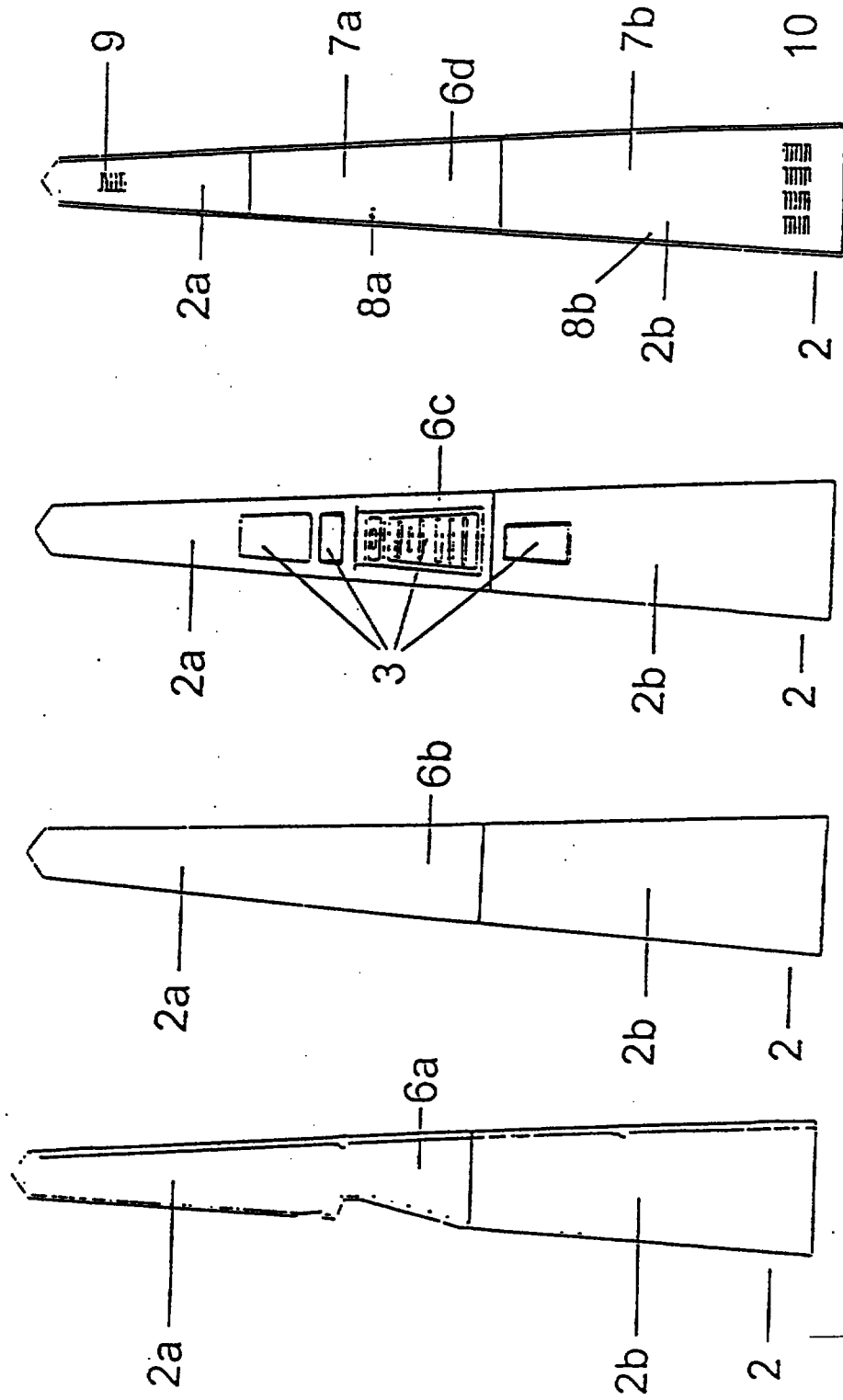


Fig. 2a Fig. 2b Fig. 2c Fig. 2d

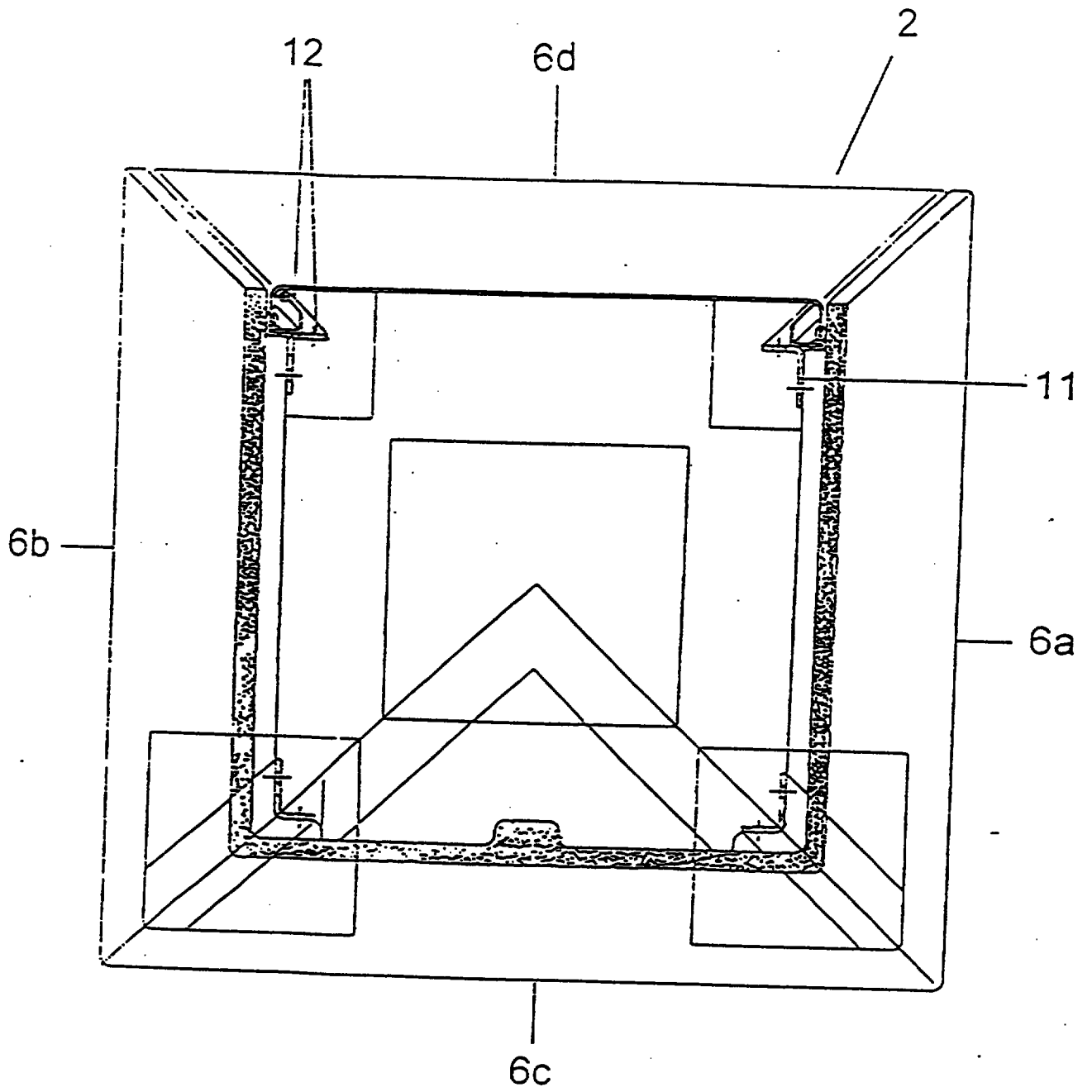


Fig. 3

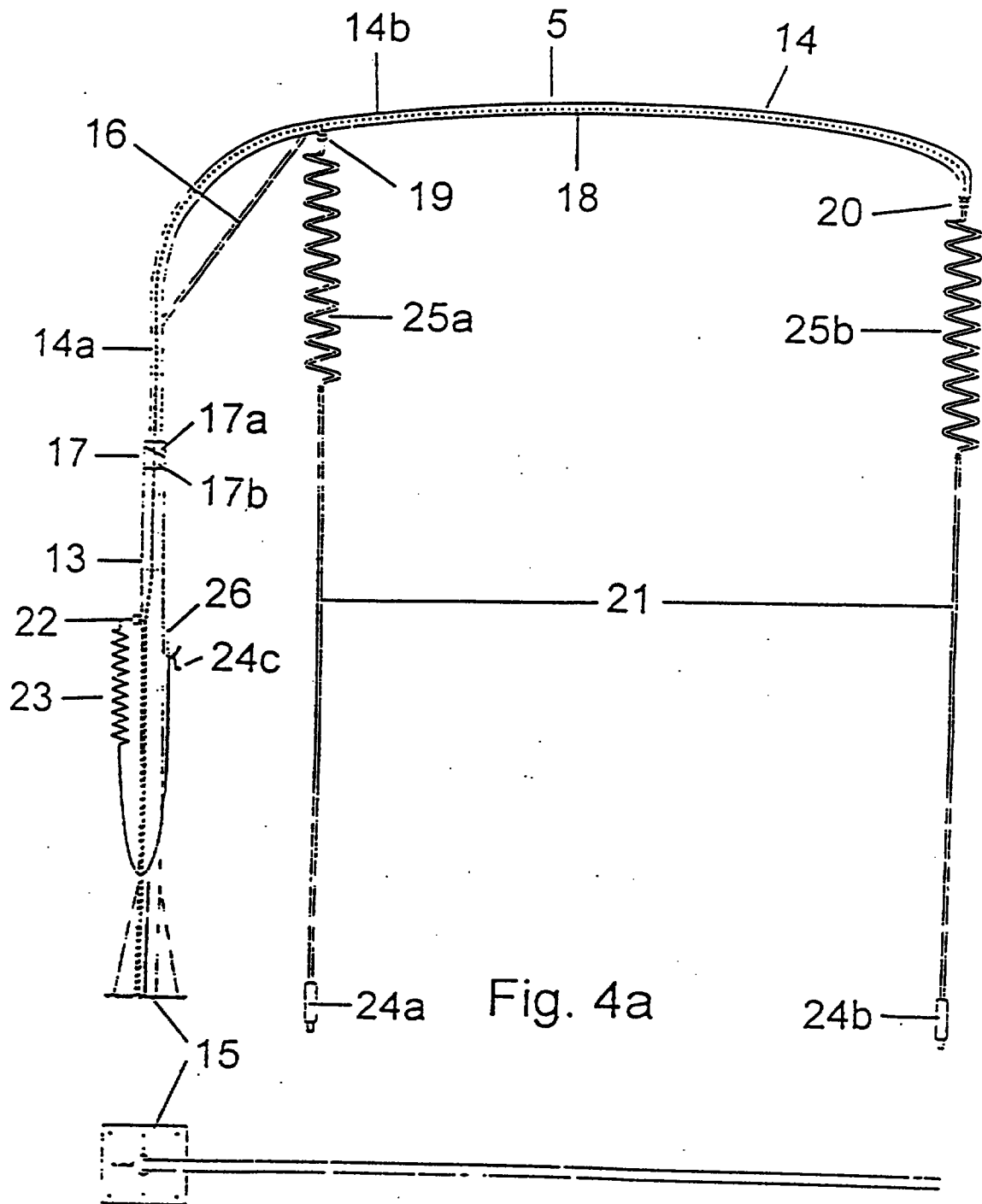


Fig. 4b

Fig. 6a

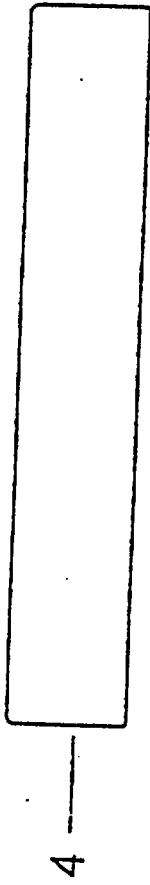


Fig. 6b

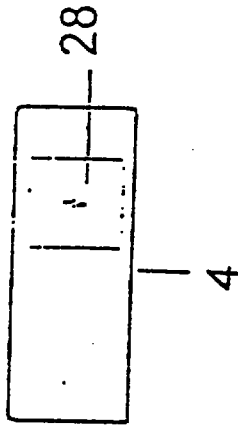
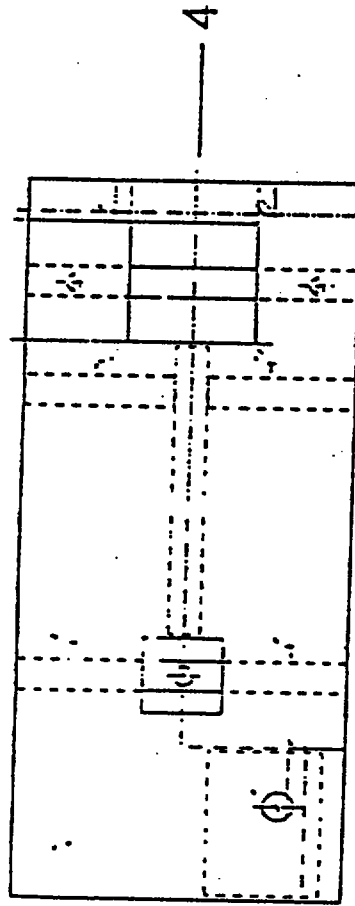


Fig. 6c



4

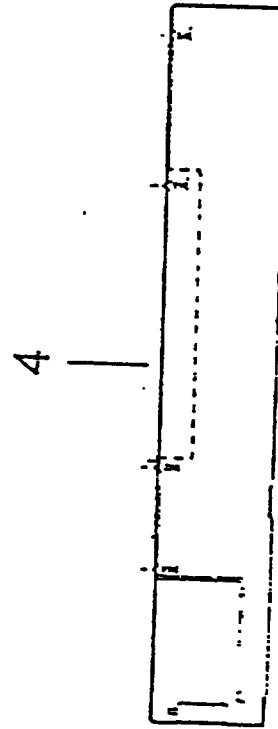


Fig. 6d

27

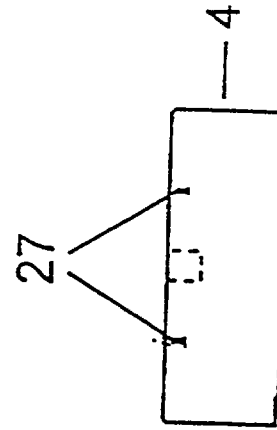


Fig. 6e

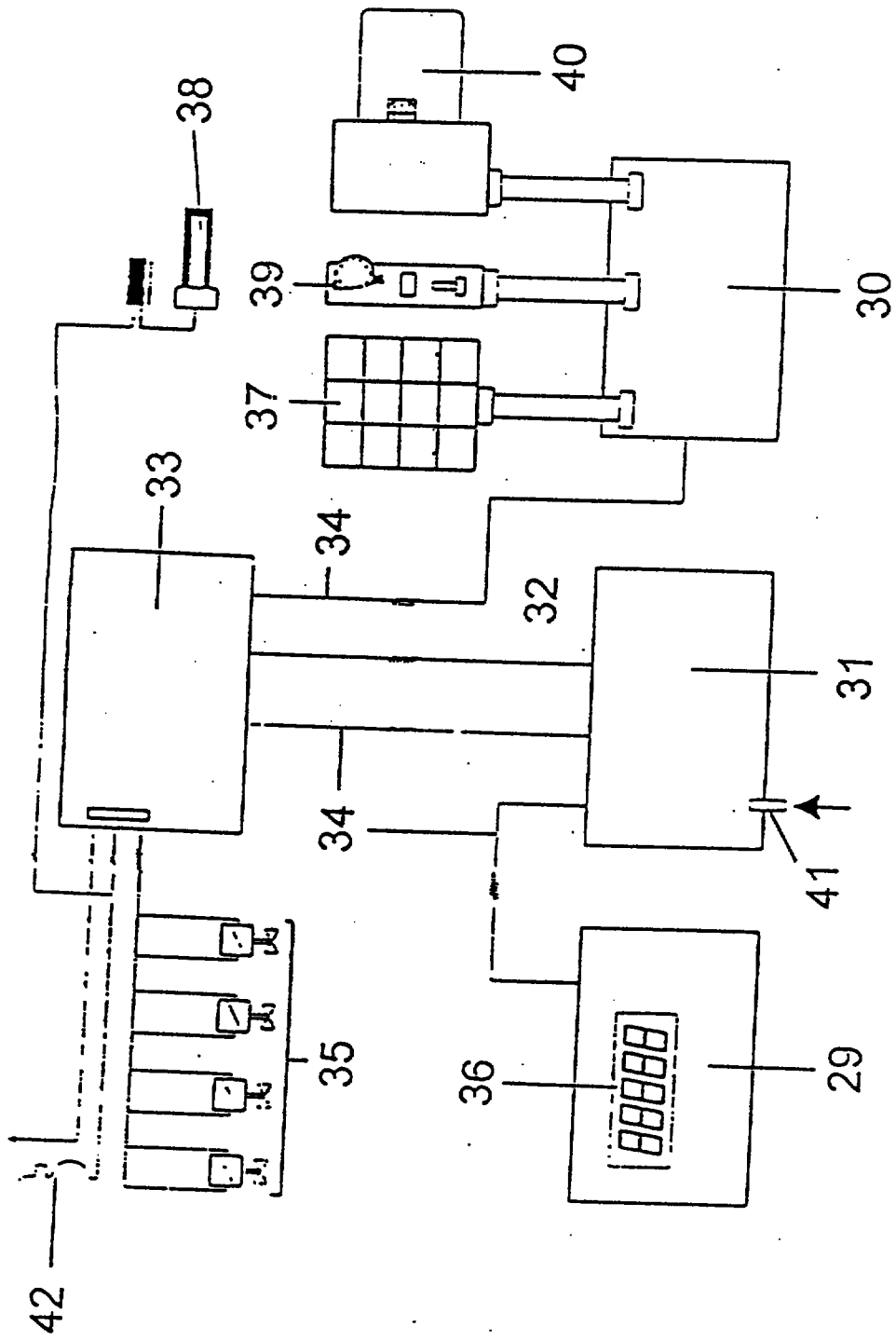


Fig. 7

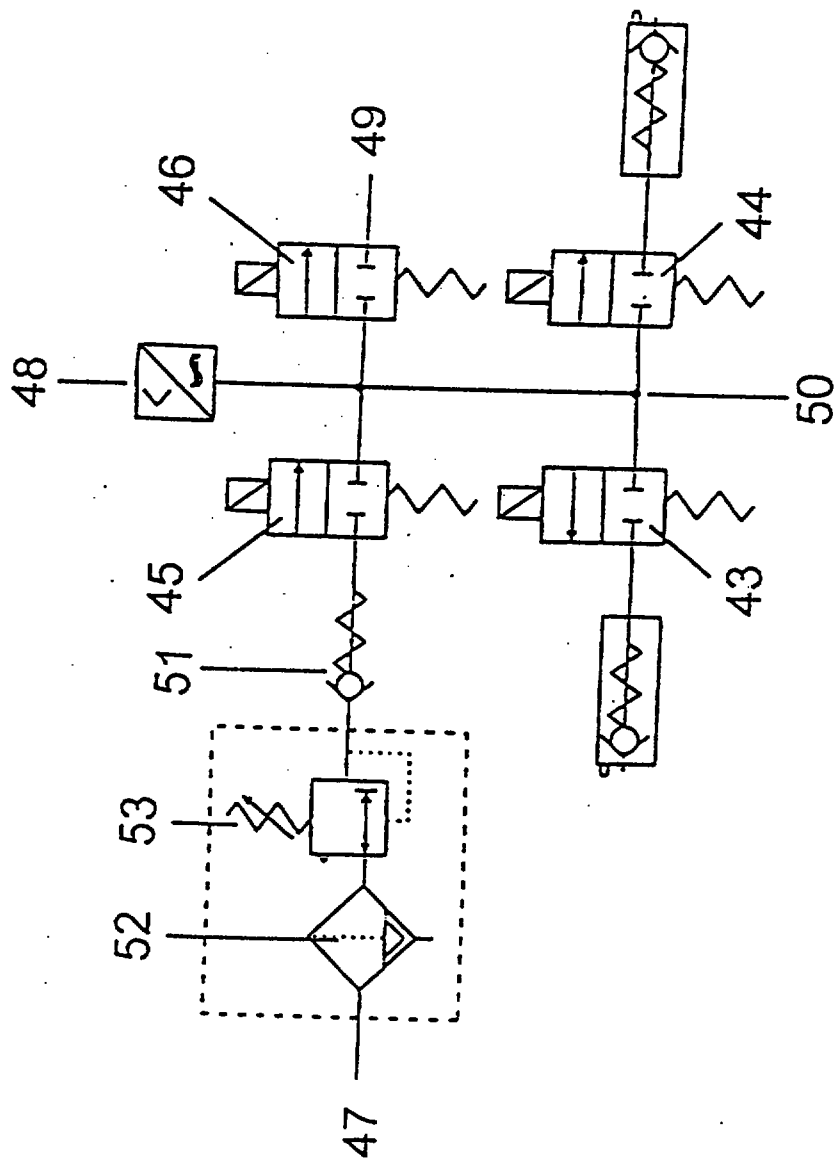


Fig. 8

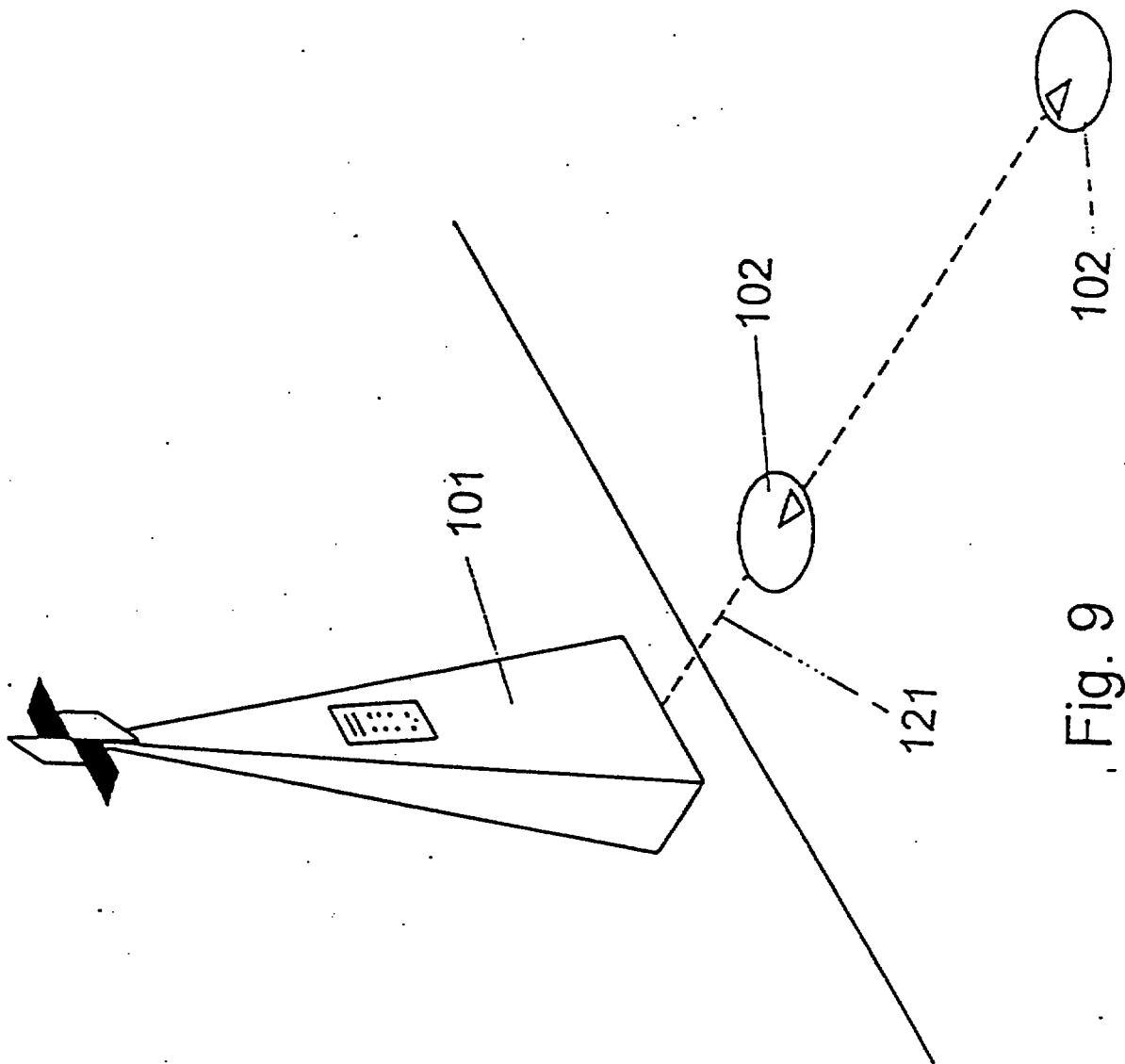
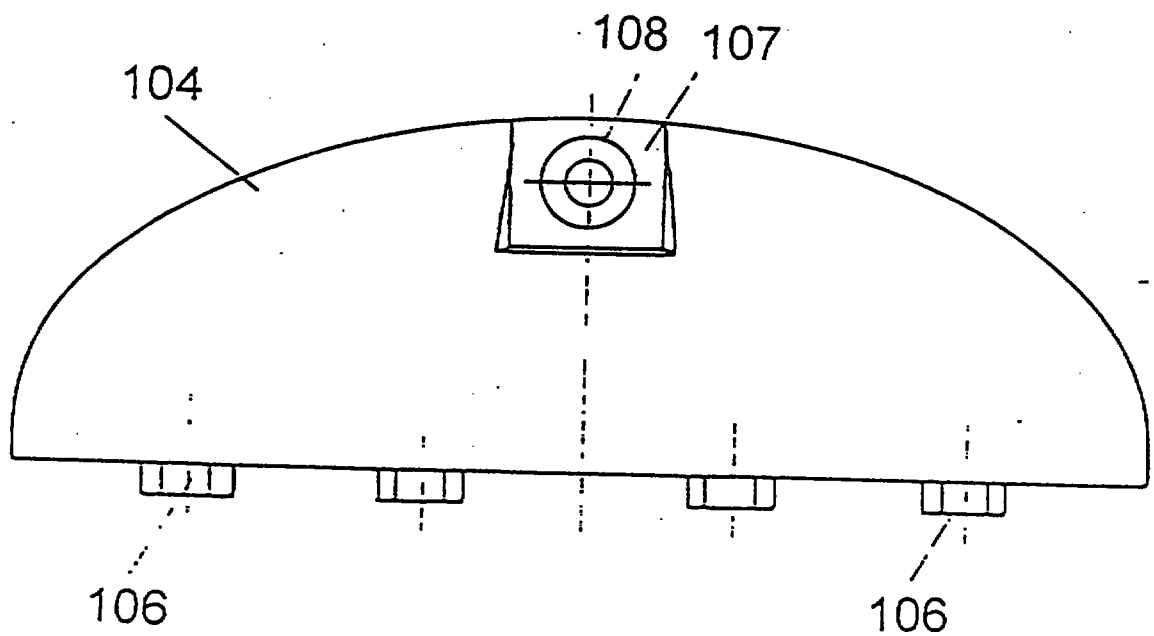
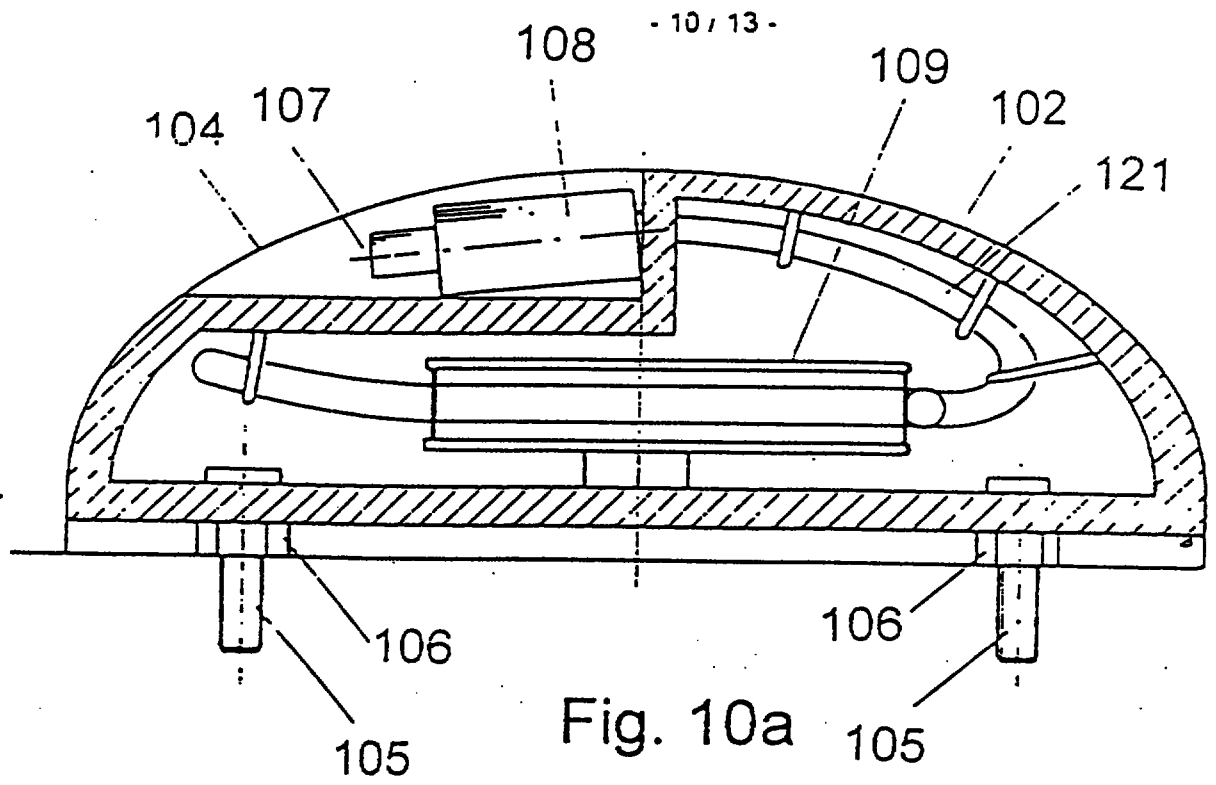


Fig. 9



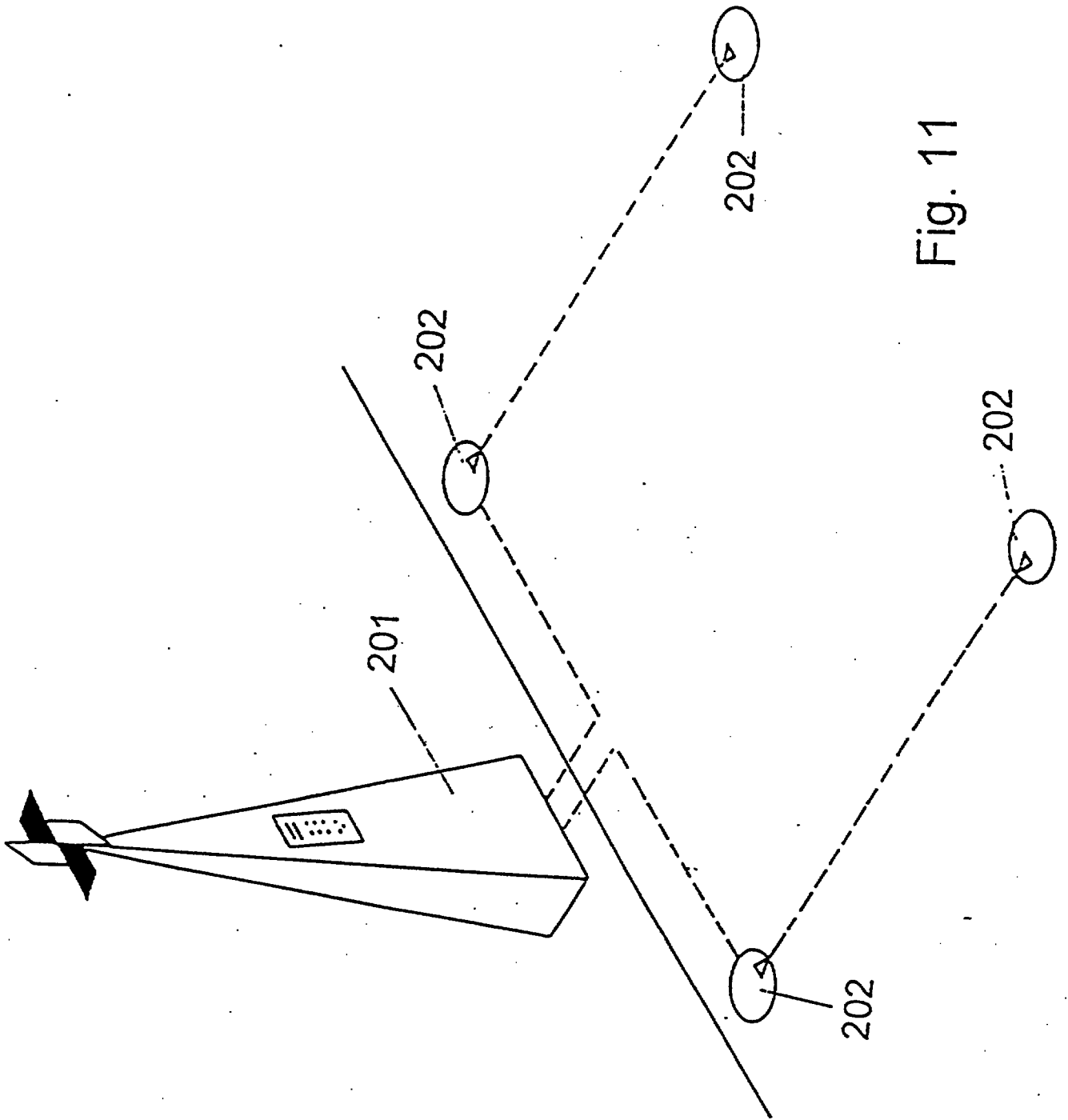


Fig. 11

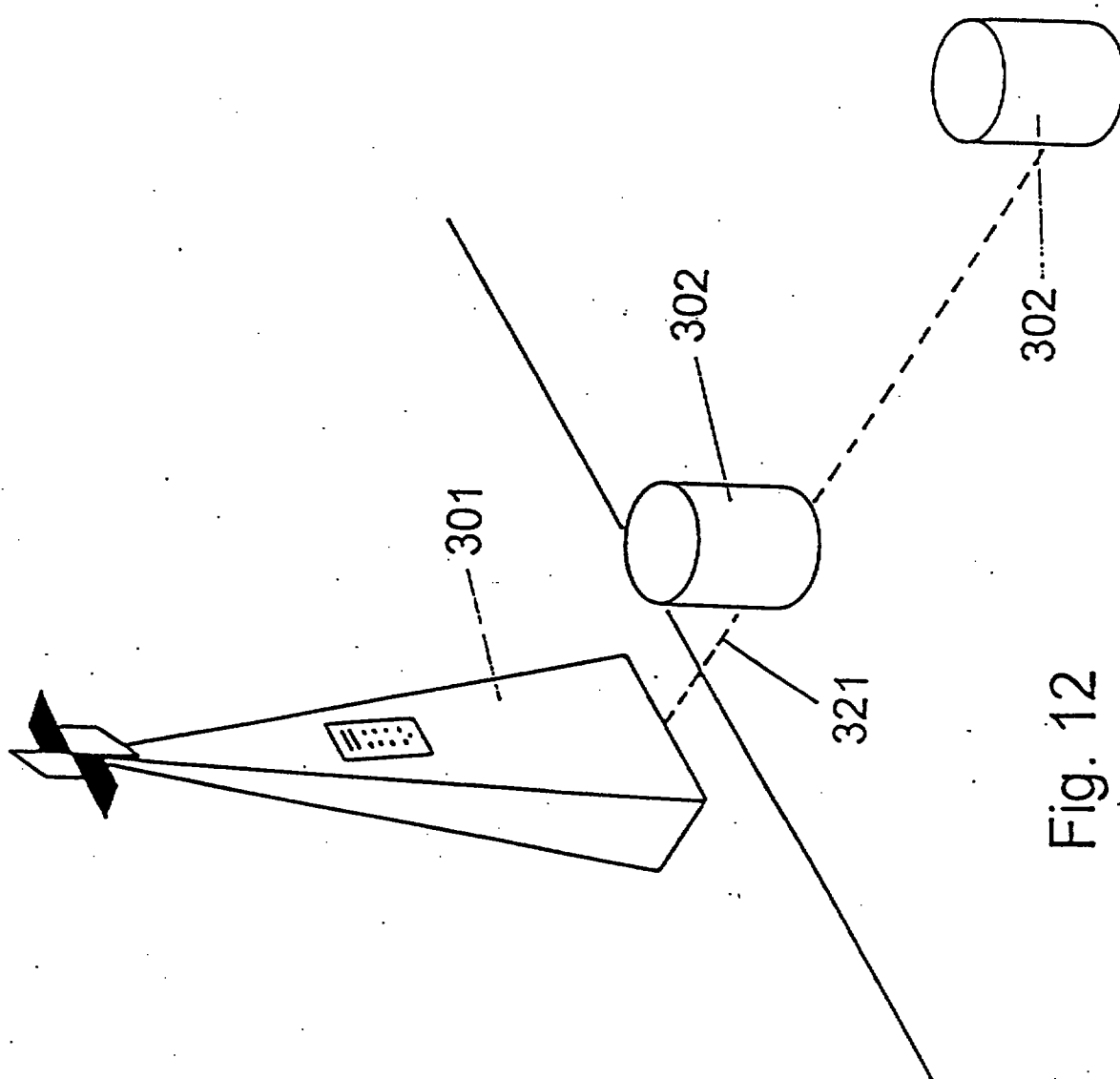


Fig. 12

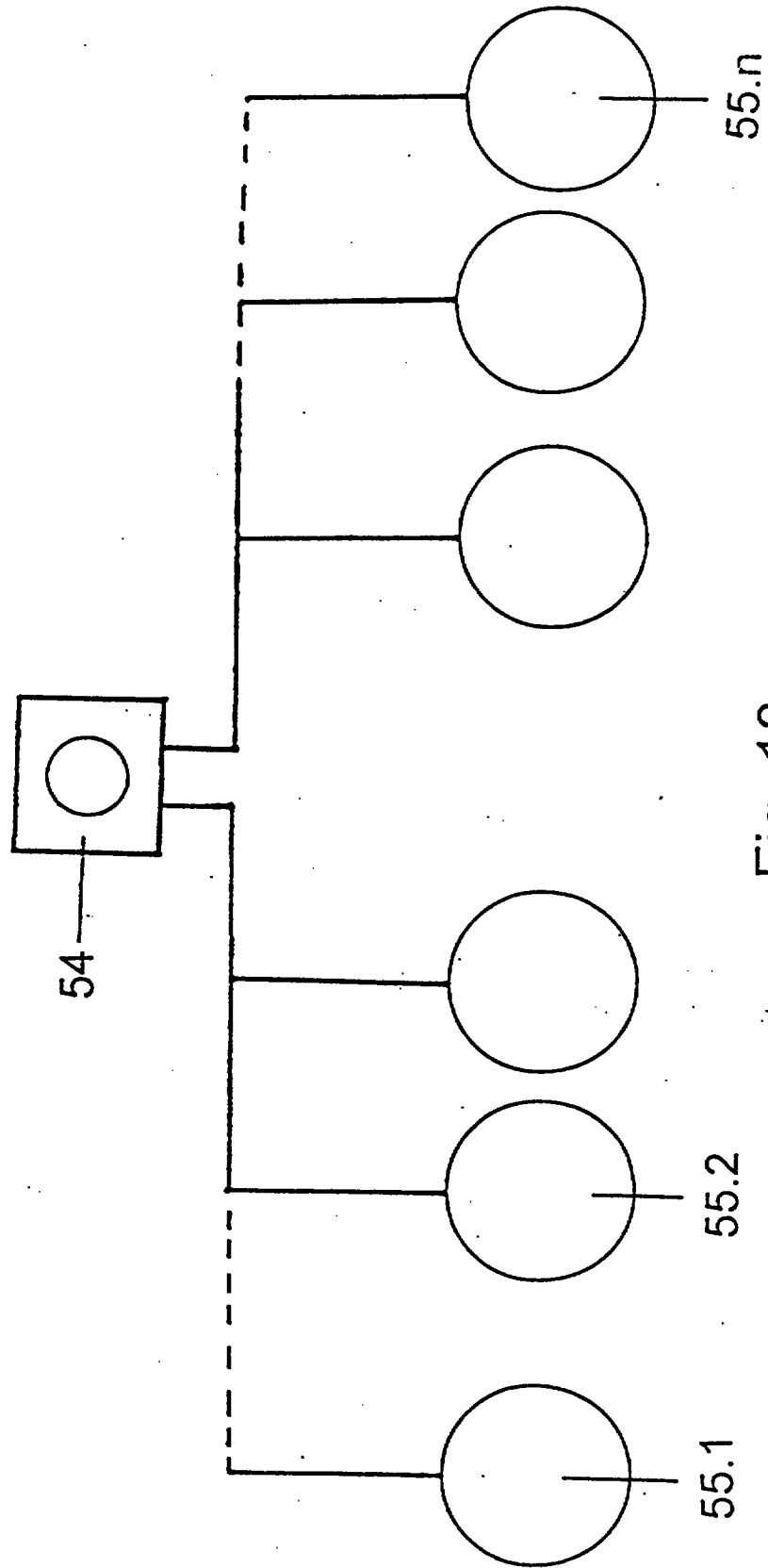


Fig. 13

REPLACEMENT SHEET

1

ELECTRONIC, AIR-SUPPLYING AND PRESSURE-EQUALIZER SYSTEM
FOR TYRES5 Description

10 The object of the present invention relates, as its title indicates, to an electronic air supplying and pressure equalizer system for tyres, to be preferably installed at petrol stations, service areas, mechanical assistance points on roads or the like, which has important advantages over installations nowadays existing.

15 Correct tyre-inflating of vehicles in circulation is a determinant factor for road safety, as well as further economic factors such as tyre durability or fuel consumption.

20 Nowadays, most assistance points located in petrol stations, service areas, mechanic assistance points on roads or the like have a variety of installations allowing user to control or check up the pressure condition of vehicle tyres, which however have some lacks resulting in important drawbacks for the user of said installations.

25 Most inflating installations nowadays existing consist of a compression unit which either through a reservoir or directly supplies a gas, preferably compressed air, to a inflating unit generally constituted by only one conduit or hose, in whose free end there is located the inflating valve which is coupled to the valve of vehicle tyre to be inflated or whose pressure is to be checked. Pressure

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REPLACEMENT SHEETS		SG
☒	Description	: paged 1... to paged 36.
☒	Claim(s)	: paged 37 to paged 49.
☐	Drawing(s)	: paged to paged
☒	Abstract	: paged to paged 50.
DATE OF RECEIPT 27/07/99		

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control of each tyre is carried out through a central control unit. Likewise, user has tables for pressure calibration, in order to determine the suitable tyre pressure in each vehicle and under each driving condition.

5

However, this inflating installation structure has a series of drawbacks. Arrangement of one only inflating conduit or hose demands user to suitably park the vehicle in order to thereby achieve the inflating of tyres thereof without needing vehicle re-location during the operation of pressure checking in different tyres. Even so, in most cases, in order to reach those tyres faraway from the installation, user has to suitably park the vehicle again or, in the best condition, to juggle with inflating hose, to pass it below or above the vehicle, as the unique manner to reach said tyres.

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Likewise, most inflating installations are not provided with automatic means for inflating hose withdrawal, therefore, in most installations of this kind, said hose is thrown to the ground or even in the zone where vehicles run in, which provokes its dirtiness, as well as rubber deterioration and subsequent breaking, with the important drawbacks and expenses that it bears.

30

On the other hand, calibration tables installed next to inflating systems nowadays existing are often not very useful and they are frequently incomplete.

35

Finally, studies carried out by the motor world demonstrate that most air supplying machines, due to their use, are damaged and they are not feasible, and that their signposting is deficient many times, then being totally unnoticed by user.

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Date: 27 III 1999

In order to efficiently overcome the lacks of inflating systems nowadays existing, the electronic air-supplying and pressure-equalizer system for tyres, object of the present invention has been developed.

5

The present invention relates to an air supplying and pressure-equalizer system for tyres, to be preferably installed at petrol stations, service areas, mechanical assistance points on roads or the like, preferably comprising a operating unit or machine, which is constituted as the main element of the system, from where operation of inflating vehicle tyres is controlled and effected, said operating unit being constituted by a housing, a metal framework, an electronic measuring display and control, a drive engine or compressor equipment providing dry air from an inner or outer compression unit, a basis or supporting unit and an air delivering unit which conveys air from operating unit or machine to vehicle tyres and which permits, in the case of vehicles having two wheel in each axle, pressure balancing of tyres belonging to the same axle.

15
20

More concretely, operating unit or machine allows the supply of any pressure to vehicle tyres as well as pressure balancing in wheels of the same axle for vehicles with two wheels in each axle.

25

Said operating unit or machine is provided with a housing, constituted as the outside envelope and therefore as the cover which shapes said machine, suitable to protect inner elements, preferably made, at one side, of metal iron plate with surface corrosion proofing made of zinc, chromatized in electrolytic bath and a bicomponent polyurethane paint coating and, at the remaining sides, preferably made of materials resisting atmospheric agents,

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Date: 27 JUL 1999

such as, preferably, a preferably self-quenching, high density expanded stiff polyurethane resin, with a, preferably bicomponent polyurethane enamel external coating. At said preferably metal side, one or more doors with joint hinges are provided, suitable to allow the access to inner elements in the machine, which are provided with a boxing with a drain and a rubber seal, as well as with a safety lock. Housing is further provided with ventilation means to obtain an air current inside which avoids moisture condensation on electronic components, such as, preferably, several ventilation screens preferably located at the upper and the lower portion of the housing.

Metal framework in the operating unit or machine consists of a metal structure preferably built of L-shaped section profiles preferably bent forming right angles and welded together, in order to provide machine with rigidity and to support lateral stresses which may appear due to external agents such as wind. Said metal framework is provided with a corrosion proofing coating, preferably constituted by a zinc electrolytic bath chromitized and epoxy-poliurethane paint. Said metal framework is further provided with means for fixing the housing, preferably constituted by screws.

Measuring instrument in the operating unit or machine consists of an electronic set comprising three expert modules, such as a display supervisory module, a keyboard module and an adjustment module, independently operated, each one having a microcontroller for the execution of that process commended to each module, preferably communicated by two wires in accordance with the specifications of the corresponding communication bus, as well as a pneumatic control and power supply module providing the necessary

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Date: 27 JUL 1999

energy for the operation of the remaining modules, simultaneously managing the pneumatic equipment.

5 More concretely, said display supervisory module of the measuring instrument is constituted by a microcontroller, a series-parallel interface for managing the display, a display, a protected writing memory, a supply control circuit, an infrared receiving circuit, a battery and a load circuit. Said module is in charge of
10 presenting the pressure measure, in an intelligible manner, outside, storing the information introduced from outside through the keyboard module, as well as supervising the complete equipment operation, managing the information
15 received from the remaining modules, deciding the process to be effected, and sending the appropriate orders through the communication bus to the remaining modules.

 Keyboard module is in charge of receiving orders from
20 outside and communicating them to the supervisory module for their interpretation and for acting in accordance with the criterion established by the program, and it is provided with a microcontroller, an interface between the expert element and the keyboard, preferably constituted by
25 transistors, light indicators and, optionally, with payment means, either by coins or by credit cards. Detection of the activation of a key, approval of a card-transaction or coin-acceptance are communicated by the communication bus to the supervisory module, said supervisory module
30 determining the process(es) to be effected, including the orders to the keyboard module for activating or deactivating either the light indicators or the card (or coin) acceptor.

This is the replacement sheet

Date: 27 JUL 1999

Adjustment module is in charge of recovering information about pressure and converting said information into digital information; it has a microcontroller, an analogical-digital converter with differential input, a low noise linear amplifier and a pressure transducer. Said adjustment module converts information regarding to barometric pressure into a numerical digital value, operates the electric valves and manually or automatically realize those necessary pressure-adjustment processes to achieve the desired pressure.

Finally, power supply consists of the circuit in charge of supplying the necessary energy to each one of the forementioned modules for the correct operation thereof; it has voltage stabilizers such as, preferably, a circuit with a transistor and protection means, such as a filter located at the network input in order to avoid the production of radiofrequency interferences. Additionally, it is provided with a power supply monitoring system, suitable to detect voltage drops below a safety value, and it supplies the initialization signal of modules. Finally, it includes a power control for managing the pneumatic equipment by, preferably, optocoupling triacs indicating whether voltage is in those elements constituting said pneumatic equipment or not, as well as a monitoring of the correct operation of said pneumatic equipment.

Optionally, the electronic air supplying and pressure equalizer system for tyres has a remote control for selecting the inflating pressure to be reached by said system. Said remote control will have a keyboard, a converter of the electric signal generated by the keyboard to, preferably, infrared rays, and a emitter for said rays, suitable to emit the signal corresponding to the value introduced by said remote control keyboard to the infrared

This is the replacement sheet

Date: 27 JUL 1999

receving circuit installed in the operating unit, preferably in its housing. Said signal receiving circuit has a signal transducer converting the infrared signal received into an electric signal, which is directly sent to
5 the display supervisory module of the measuring instrument, whose microcontroller generates the corresponding orders.

Said keyboard installed in the remote control may be either a numerical keyboard, similar to those installed in
10 the operating unit and connected to the keyboard module, suitable for introducing any value, or one only key containing the entry of the value associated with the optimum pressure of vehicle tyre, in which case remote control would be personal, associated with the vehicle.

15 Pneumatic equipment of operating unit or machine is the element in charge of managing the air flow which will permit to fill up or to empty tyres untill achieving the pressure desired. Said pneumatic equipment consists of four
20 electric valves communicating wheels with the pressure source or compressor, with said measuring instrument and with the atmosphere. Said electric valves link together in a common node or service node, to which said measuring instrument links too.

25 Two from said electric valves operates simultaneously and are in charge of activating distribution and connection means, such as hoses, coming from vehicle tyres, to said service node, so achieving a double effect. On the one
30 hand, pressures into both tyres get equal in accordance with the communicating vessels principle, and at the same time, it is possible to measure the pressure of the loop between the wheels. The use of two electric valves does not permit the cross balancing of wheels as hoses change
35 between one axle and the other.

This is the replacement sheet

Date: 27 JUL 1999

Once the above set of tyre electric valves is open, one of the two remaining electric valves links the service node with the compressor in order to thereby increase pressure.

5

Once the above set of tyre electric valves is open, the second of the two remaining electric valves links the service node with the atmosphere in order to thereby decrease pressure.

10

Likewise, said pneumatic equipment has a non return valve located at the pneumatic set pressure inlet, in order to avoid that, in the absence of pressure inside the compressor, tyres could deflate.

15

Pneumatic set is complemented with several means for protecting the measuring instrument against water and dirtiness existing in the installation and/or in the compressor, as well as against pressures higher than those which said measuring instrument can support, such as, preferably, a filter and a regulator.

20

The drive engine or compressor equipment of the electronic air-supplying and pressure-equalizer system for tyres provides dry air at a pre-determined minimum pressure. Said compressor can be either interior, so suitably sizing the outer housing in order to lodge said compressor, or external, in which case, a larger and therefore more powerful compressor can be used, thereby favouring the response time of the system.

25

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The basis or supporting unit consists of a base or pedestal, appropriate to support the operating unit or machine and the air delivering unit, preferably parallelepipedic-wise shaped, open at its lower face,

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This is the replacement sheet

Date: 27 JUL 1999

preferably made of steel plate, with corrosion proofing by electrolytic zinc bath, chromatized and bicomponent epoxy-polyurethane paint, which is provided with means for fixing to the ground by screws and retaining billets. Said basis
5 may optionally have a small door for having access to the coin box existing inside the machine.

Air delivering unit is the unit in charge of managing the air from the operating unit or machine to vehicle tyres
10 through several conduits or hoses; it has a structure for supporting said conduits or hoses, location means suitable to adapt the position of said conduits or hoses to vehicle tyres to be inflated or whose pressure will be checked, and means for the return and/or automatic withdrawal of said
15 conduits or hoses from their operating position to their rest position. Said air delivering unit configuration is therefore suitable to avoid that neither said conduits or hoses or their terminal connection mouthpieces drag on the ground, thereby avoiding the resulting deterioration and
20 dirtiness.

Means for supporting conduits or hoses of the air delivering unit are preferably constituted with a structural rigidity capable of resisting such factors as
25 the use by the users, climate conditions and, in inflating installations which place said supporting means on the ground, the weight of vehicles driving on said means.

The means for location of inflating conduits or hoses
30 in vehicle tyres basically depend on the practical embodiment of the electronic air-supplying and pressure-equalizer system for tyres; they can be either static, where vehicle is which fits to the inflating installation, or movable, where the user manage the location means for
35 coupling inflating conduits or hoses to vehicle tyres. In

This is the replacement sheet

Date: 27 JUL 1999

any case, said location means are capable of making easier for the user the fitting of inflating conduits or hoses to vehicle tyres.

5 Air delivering unit of the electronic air-supplying⁴ and pressure-equalizer system for tyres, object of the present invention, is provided with means for the return and/or automatic withdrawal of said conduits or hoses from their operating position to their rest position, preferably
10 constituted by automatic mechanisms for the return, withdrawal and/or rolling up of the inflating conduits or hoses as well as means for the location of said conduits or hoses, especially in the case of moveable location means.

15 In order to facilitate and achieve a better disposal of inflating conduits or hoses of the installation to the vehicle whose tyres will be inflated or whose pressure will be checked, it becomes appropriate to provide several conduits or hoses preferably placed at both sides of the
20 vehicle when it parks at the inflating installation to proceed with the corresponding operation. Thereby, electronic air-supplying and pressure-equalizer system for tyres preferably comprises two or four inflating conduits or hoses.

25 Optionally, electronic air-supplying and pressure-equalizer system for tyres may be provided with an inflating conduit or hose specific for use in vehicles with two-wheels, such as bicycles, moto or the like.

30 Additionally, inflating conduits or hoses have at their free ends, coupling means capable of coupling said inflating conduits or hoses to tyre valve and thereby
35 proceeding with the inflating or pressure checking in the corresponding tyre.

This is the replacement sheet

Date: 27 JUL 1999

Said coupling means capable of coupling said inflating conduits or hoses to tyre valve preferably consist of a coupling nozzle, suitable for easy and fast connection and
5 disconnection of hoses (coming from the air supplying unit) to wheel valves, characterized by a small diameter cylindrical configuration with a length suitable to reach the valve, in the case of said valve is lodged in a cavity, said nozzle is provided with automatic lockage means
10 suitable to avoid air escape when it is not connected to the valve.

More specifically, said coupling nozzle comprises a cylindrical shaped external piece or slide closed at its
15 rear side by a screw-cap, in whose opposite end it is provided with a circular opening suitable to get into the valve. Inside said external piece or slide, two pieces are lodged sliding in relation to the first one and mounted one into the other preferably by a screwed joint. Inside one of
20 said pieces, the nearest to tyre valve, a hollow, internally stepped tubular piece is lodged sliding in relation to said piece which lodges it, and said tubular piece lodging a hammer consisting of a cylindrical rod which has a widening with a polygonal, preferably hexagonal
25 cross-section suitable to avoid the return inside said tubular piece as well as to allow an air current between the interstices existing between polygon chords and circular section of the tubular piece. Said tubular piece has, in its end nearest to tyre valve, a rubber conical
30 seal, suitable to plug the air inlet hole. Finally, said tubular piece has two "L"-ended springs fastened by an external cylindrical collar. The "L"-end of said springs is introduced in several grooves made on said tubular piece nozzle. On the other hand, the second of said pieces lodged
35 in the external piece or slide, that nearest to the air

This is the replacement sheet

Date: 27 JUL 1999

inlet through the external conduit or hose, has a cylindrical hollow inside and a core screwed in its fore end, similar to those lodged in vehicle valves, and at said core free end is fixed a little spring, and said second piece rear portion externally ends in a series of, preferably dovetail shaped, projections, appropriate for a leakproof-coupling to the rubber of the external air conduit or hose, through which air from machine flows. Likewise, said piece has a circular crown-shaped internal widening which has four balls diametrically and normally opposite two by two, built in and pressed by elastic means such as, preferably, springs, said balls being faced to an inner groove made in said external piece or slide. Next to its internal widening and faced to the inside of the coupling nozzle, an inner spring is arranged surrounding the tubular outside of said piece, suitable to integrally move both pieces lodged in said external piece or slide, and thereby draw said balls out from the corresponding grooves. Finally, the external piece or slide is inside provided with a trunco-conical shaped collar, suitable to press said "L"-ended springs when the integral set formed by the pieces has moved to the stop resulting from the screw cap closing said external piece or slide.

The electronic air-supplying and pressure-equalizer system for tyres, object of the present invention, whose configuration has been disclosed above, is provided with different operating modes which the user can select.

Therefore, the three operating modes which the electronic air-supplying and pressure-equalizer system for tyres has are: checking-balancing mode, manual inflating-balancing mode and automatic inflating-balancing mode.

This is the replacement sheet

Date: 27 JUL 1999

Checking-balancing mode is selected by pressing a key arranged for that purpose in the keyboard forming a part of the keyboard module, so provoking the opening of the adjustment module electric valves, and it is used by the user in order to check tyre pressure as well as to balance the pressure of tyres belonging to the same axle in a vehicle, in the case of said axle has at least two tyres, presenting the pressure existing inside the tyre, once it has been determined by the electronic measuring instrument, on the display of the display supervisory module of the measuring instrument.

Manual inflating-balancing mode allows to adjust the pressure as user wishes, by using inflating and deflating key(s) arranged on the keyboard at the keyboard module, therefore provoking the opening and/or closing of adjustment module electric valves, by operating the corresponding electric valve, at the same time that pressure existing inside vehicle tyres measured through said measuring instrument is presented on the display of the display supervisory module. Comparison of the information presented on said display regarding to pressure existing inside the tyres, with the pressure desired by the user to reach inside vehicle tyres determines the inflating or deflating action. Pressure balancing between tyres belonging to the same axle is automatically carried out by the configuration of the system and, in particular, that of the electric valves described above.

Automatic inflating-balancing mode allows to adjust the pressure, as the user wishes, up to a value programmed by him/her by introducing the corresponding value through the keyboard at the keyboard module, either by the explicit numerical introduction by pressing the corresponding numerical keys arranged for that purpose, or by selecting

This is the replacement sheet

Date: 27 JUL 1999

any pre-determined value by pressing the only key arranged for that purpose. Once said programmed value is selected, the machine automatically acts by suitably operating the electric valves untill the selected value is achieved, tyre
5 pressure being compared at every moment with the pre-determined value, and the machine acting consequently.

Optionally or additionally, the electronic air-supplying and pressure-equalizer system for tyres, in terms
10 of its working modes, can be provided with an acoustic warning device which indicates by an acoustic signal that system has finished the inflating-balancing process, so the pre-determined value being reached, when said system operates at the automatic inflating-balancing mode.

15

Finally, the electronic air-supplying and pressure-equalizer system for tyres, object of the present invention, is provided with different selectable payment
20 modes such as free charge mode or payment mode as selected by system's operator and, when choosing the payment mode, it is provided with various options: coin cash payment or card payment, either with user own card comprising a determined number of services or with a money-card of any
25 bank, eligible by the user. Said coin-box comprises a groove through which the necessary coin(s) should be introduced in order to switch the system on. In the case of a defective coin was introduced and blocked up, it will be recovered by pressing the return button located below said
30 groove, thereby coin will appear in a small box located below said button. Likewise, if coin were inappropriate or system were either unplugged from the network or on operation, said coin would be automatically returned.

This is the replacement sheet

Date: 27 JUL 1999

Optionally, the electronic air-supplying and pressure-equalizer system for tyres, object of the present invention, can be provided with means for remote control from a central station in order to test the condition of the system, as well as, when necessary, to periodically count up the money collected in said system. Said remote control means are preferably established by communication via modem acting on the checking and/or counting unit located inside the system object of the present invention.

10

Additionally, the electronic air-supplying and pressure-equalizer system for tyres, object of the present invention, can be optionally provided with a emitter-receiver system in order to consider, along the pressure adjustment process, some parameters such as, in particular, temperature. For that, a tyre valve is arranged, provided with a temperature measurer, a transducer converting said temperature signal into an electric signal, and a transmitter, preferably operated by radiofrequency or infrared rays, sending said electrical signal converted into radiofrequency waves or infrared radiation, up to a receiver arranged in the electronic air-supplying and pressure-equalizer system for tyres, preferably on its housing. Signal received is converted into an electric signal and sent to the display supervisory module, whose microcontroller will suitably estimate the tyre temperature dependence factor regarding to the selected pressure, therefore introducing the corresponding correction factor.

20
25
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Likewise, the electronic air-supplying and pressure-equalizer system for tyres, object of the present invention, is provided with means for indicating the operating status and the end of operating such as, preferably, a decorative system, such as, for example, a

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This is the replacement sheet

Date: 27 III 1999

windmill electrically connected to the display supervisory module to actuate its spin movement while machine is working, as well as a sound warning capable of emitting an acoustic signal once the process of tyre inflating and/or
5 pressure balancing between tyres of the same axle has finished.

The electronic air-supplying and pressure-equalizer system for tyres, object of the present invention, may
10 consist of one only unit, as disclosed above or adopt a modular design so becoming a multi-station, multi-user and multi-function system. In this case, said system will comprise a centre for managing the plurality of terminal service stations, as well as a set of autonomous use
15 terminals, subordinated to said managing centre. The different elements disclosed above will be distributed among different components of said multi-station system. Therefore, managing centre will include a compressor, owing to the centre where it is installed, a general
20 control circuit, suitable to carry out the acceptance of payment means, store transactions, control service times, and manage communications, as well as a communication module, preferably via modem. On the other hand, autonomous use terminals will be provided with a display device, a
25 pressure control, a keyboard control, a payment control, including a coin box and a card reader, as well as a pressure transducer. Particular arrangement as well as features of each autonomous terminal will be able to adopt any embodiment to which reference is made below for the
30 electronic air-supplying and pressure-equalizer system for tyres object of the present invention. Likewise, it is appropriate to underline that compressor placed in said managing centre will be suitably sized to service the different autonomous terminals simultaneously, or at least
35 to a determined number of them, simultaneously.

This is the replacement sheet

Date: 27 JUL 1999

From all that has been disclosed above, many advantages provided by the electronic air-supplying and pressure-equalizer system for tyres object of the present invention are apparent, such as the convenience and easiness for using the system by the user, as well as the cleaning derived from the fact that said system has an air delivering unit comprising a support and a rotatable arm, whose configuration avoids that hoses or conduits in charge of delivering air from system up to tyres would get thrown to the ground being spoilt or broken, thanks to having automatic means for the withdrawal of inflating hoses, and its reliability, thanks to having suitable remote checking means.

In order to better understand the object of the present invention, a preferred practical embodiment of the electronic air-supplying and pressure-equalizer system for tyres, is next disclosed based on figures herein attached. In said figures, the following is shown:

Figure 1 shows a frontal view of a first embodiment of the electronic air-supplying and pressure-equalizer system for tyres object of the present invention.

Figures 2a, 2b, 2c and 2d show lateral views of the housing of the operating unit of the present practical embodiment of the electronic air-supplying and pressure-equalizer system for tyres object of the present invention.

Figure 3 shows the transversal cross-section of the housing and metal framework of the operating unit of the electronic air-supplying and pressure-equalizer system for tyres object of the present invention.

Figures 4a and 4b show, respectively, a front view and a plan view of the air delivering unit consisting of a support and a rotatable arm.

5 Figures 5a and 5b show two cross-section views of the nozzle for coupling the inflating conduits or hoses to tyre valve, standing for, respectively, the rest and load conditions, i.e., when all air inlets are opened.

10 Figures 6a, 6b, 6c, 6d and 6e show, respectively, a front view, a lateral view, a plan view and two transversal and longitudinal, cross-section-views of the basis or supporting unit.

15 Figure 7 shows the electric diagram of the present practical embodiment of the electronic air-supplying and pressure-equalizer system for tyres object of the present invention.

20 Figure 8 shows the pneumatic diagram of the present practical embodiment of the electronic air-supplying and pressure-equalizer system for tyres object of the present invention.

25 Figure 9 shows a general basic view of a second preferred practical embodiment of the electronic air-supplying and pressure-equalizer system for tyres, comprising two inflating modules or devices.

30 Figure 10a shows the cross-sectioned inside of the inflating module or device corresponding to the second practical embodiment represented in figure 9.

This is the replacement sheet

Date: 27 JUL 1999

Figure 10b shows a front view of the outside of the inflating module or device corresponding to the second practical embodiment represented in figure 9.

5 Figure 11 shows a general basic view of a third preferred practical embodiment of the electronic air-supplying and pressure-equalizer system for tyres, comprising four inflating modules or devices.

10 Figure 12 shows a general basic view of a fourth preferred practical embodiment of the electronic air-supplying and pressure-equalizer system for tyres, comprising two inflating modules or devices.

15 Figure 13 shows the layout of an embodiment of a multi-user system of the electronic air-supplying and pressure-equalizer system for tyres.

20 Figure 1 shows a practical embodiment of the electronic air-supplying and pressure-equalizer system for tyres consisting of an operating unit or machine (1), which is constituted as the main element of the system, from where the process of inflating vehicle tyres is controlled and carried out, which allows the supply of any pressure to
25 the vehicle tyres as well as the pressure balancing between wheels of the same axle, in the case of vehicles having two wheels at each axle, wherein there are shown the housing (2) and the display and control means (3) from said operating unit. Likewise, the electronic air-supplying and
30 pressure-equalizer system for tyres consists of a drive engine or compressor equipment (not shown in figure), which provides dry air from an internal or external compressor unit, a basis or supporting unit (4) and an air delivering unit (5) supplying air from the operating unit or machine
35 (1) up to vehicle tyres and which, in the case of vehicles

with two wheels at each axle, allows pressure balancing between tyres of the same axle.

5 Figures 2a, 2b, 2c and 2d show the housing (2) of the
operating unit constituted as the external envelope shaped
as a square-base truncated pyramid. In order to make its
construction easier, housing (2) is divided into two, upper
(2a) and lower (2b) portions, leakproof assembled together.
So that, said housing (2) is the hood which shapes said
10 machine, suitable to protect internal elements. Housing (2)
is made, at one of its sides (6d) (figure 2d), of metal iron
plate with surface corrosion proofing made of zinc,
chromatized in electrolytic bath and a bicomponent
polyurethane paint coating. At the remaining sides (6a, 6b,
15 6c) (figures 2a, 2b, 2c), said housing (2) is made of
materials resisting atmospheric agents, such as a
preferably self-quenching, high density expanded stiff
polyurethane resin, and with a, preferably bicomponent
polyurethane enamel external coating. At said metal side
20 (6d) two doors (7a, 7b) with joint hinges are provided, to
allow the access to inner elements in the machine, said
doors are provided with a boxing with a drain and a rubber
seal, as well as with a safety lock (8a, 8b). Housing (2)
is further provided, preferably located at said metal side
25 (6d), with air inlet screens located at the top (9) and
bottom (10) of said housing (2), in order to allow an inner
air current which avoids moisture condensation on
electronic components.

30 At the fore side (6c), housing is provided with means
for coupling display and control means (3) of the system,
such as, preferably, a screen display, a keyboard and
various payment means (figura 2c).

This is the replacement sheet

Date: 27 JUL 1999

Figure 3 shows a transversal cross-section of housing (2) and metal framework (11). As it is noticeable from said figure, metal framework consists of a metal structure made of L-shaped cross-section profiles (12) preferably bent forming right angles and welded together, in order to provide the machine with rigidity and to support lateral stresses which may occur due to external agents such as wind. Said metal framework (11) is provided with a corrosion proofing coating, preferably constituted by a zinc electrolytic bath, chromatized and epoxy-poliurethane paint. Said metal framework (11) is further provided with means for fixing the housing, preferably constituted by screws (not shown in figure).

Air delivering unit (5) of the electronic air-supplying and pressure-equalizer system for tyres, object of the present invention, is the unit in charge of supplying air from the operating unit or machine (1) up to vehicle tyres. Said air delivering unit (5) is provided with a structure for supporting said conduits or hoses, with location means suitable to adapt the location of said conduits or hoses up to vehicle tyres to be inflated or whose pressure is to be checked, and with means for automatic return or withdrawal of said conduits or hoses from their operating position up to their rest position.

Figure 4a and 4b show a practical embodiment of said air delivering unit (5) comprising a support (13) and a rotatable arm (14). Support (13) consists of a hollow tube made of painted steel, at whose lower end it has means for fixing to the basis (4) of the electronic air-supplying and pressure-equalizer system for tyres, preferably consisting of an anchorage plate (15) to screw on the basis (4). Rotatable arm (14) comprises a first vertical tubular stretch (14a) from whose end, a second tubular stretch

(14b) extends describing a 90° curve untill getting horizontal, i.e., parallel to the ground, and a diagonal bar (16) for supporting and reinforcing said horizontal tubular stretch (14b). The height at which said horizontal tubular stretch (14b) is placed is preferably of more than 1.70 m, and, in any case, in accordance with the height of vehicles to operate with the present inflating installation.

Air delivering unit (5) is provided with location means, which allow a 90°-180° rotation of the upper tubular stretch of the arm (14) around the lower tubular stretch or support (13), from its rest position considered as that in which the upper horizontal tubular stretch (14b) is substantially placed parallel to the longitudinal axis of a vehicle parked next to the inflating system, up to its working position, considered as that in which the upper horizontal tubular stretch (14b) is substantially placed perpendicular to the longitudinal axis of a vehicle parked next to the inflating system, in order to proceed to inflate the tyres located at each side of the vehicle parked or to check the pressure thereof. Said location means consist of said arm (14) rotation means arranged at the upper end, such as, preferably, a nylon bearing (17) composed of two coupled cylinders (17a, 17b), slant wise cross-sectioned, so that when arm (14) rotation is effected, the bearing (17) forces it to return to its natural position.

Through the inside of said support (13) and arm (14), tubes (18) run, entering by said support (13) basis, and through which air from operating unit (1) or machine flows. Said arm (14) has two outlet holes (19, 20) to lead hoses (21) out to vehicle tyre. The gap between said outlet holes (19, 20) is preferably between 1.75 m and 2.80 m; more

This is the replacement sheet

Date: 27 JUL 1999

preferably between 1.90 m and 2.50 m and, in any case, in accordance with the width of vehicles to be operated with the present inflating installation. Likewise, support (13) of the air delivering unit (5) has a lateral hole (22) for the outlet of a inflating conduit or hose (23) specific for being used in vehicles with two wheels, such as bicycles, moto or the like.

Likewise, air delivering unit (5) is provided with means for automatic return or withdrawal of said conduits or hoses (21) from their operating position up to their rest position, each consisting of, firstly, vertical coilings (25a, 25b) for lifting, return and/or withdrawal of inflating conduits or hoses (21) arranged on the upper horizontal tubular stretch (14b) of the rotatable arm (14) described above, to withdraw inflating conduits or hoses (21) from their stretched position to reach inflating valves of tyres, up to their withdrawn position, in which they hang from the upper horizontal stretch without touching the ground, in order to avoid spoiling thereof and, secondly, the preferably 90° to 180° rotatable device with automatic gravitatory return disclosed above, which effects the automatic gravitatory return movement of the upper tubular horizontal stretch around the point of coupling between support (13) and the rotatable arm (14), from the operating position up to the rest position.

Conduit or hose (23) for operating vehicles with two wheels, such as bicycles, moto, motor bikes or the like, is provided with supporting means for its rest position, for example, shaped as a hook (26), and manual or, optionally, automatic means for return and/or withdrawal (not shown in the figure).

This is the replacement sheet

Date: 27 JUL 1999

Additionally, inflating conduits or hoses (21), at their free ends, are provided with coupling means (24a, 24b, 24c) suitable to couple said inflating conduits or hoses (21, 23) to tyre valve and thereby proceed to the inflating or pressure checking of the corresponding tyre. As it may be shown, the coupling means (24c) for vehicles with two wheels has a 90°-bended shape in order to facilitate its coupling to the tyres of said vehicles.

Figures 5a and 5b represent, in detail, the cross-section of said coupling means suitable to couple said inflating conduits or hoses to tyre valve (78), constituted by a coupling nozzle, suitable to its easy and fast connection and disconnection of hoses (coming from the air delivering unit) with valves (78) in wheels, defined by a small diameter cylindrical configuration with a length suitable to reach the valve (78), in the case of the latter is lodged in a cavity, said nozzle is provided with automatic lockage means suitable to avoid air escape when nozzle is not connected to the valve (78).

More specifically, said coupling nozzle comprises a cylindrical shaped external piece or slide (61) closed at its rear side by a screw cap (62), in whose opposite end it is provided with a circular opening (63) suitable to get into the valve (78). Inside said external piece or slide (61), two pieces (64, 65) are lodged sliding in relation to the first (61) and mounted one into the other preferably by a screwed joint (66). Inside one of said pieces (64), the nearest to tyre valve (78), a hollow, internally stepped tubular piece (67) is lodged sliding in relation to said piece (64) which lodges it, and lodging a hammer (68) consisting of a cylindrical rod which has a widening with a polygonal, preferably hexagonal, cross-section, suitable to avoid the return inside said tubular piece (67) as well

This is the replacement sheet

Date: 27 JUL 1999

as to allow an air current between interstices existing between polygon chords and circular section of the tubular piece (67). Said tubular piece (67) has, in its end nearest to tyre valve (78), a rubber conical seal (79), suitable to plug the air inlet hole. Finally, said tubular piece (67) has two "L"-ended springs (74a, 74b) fastened by an external cylindrical collar (75). The "L"-end of said springs (74a, 74b) is introduced in several grooves (76a, 76b) made on said tubular piece (67) nozzle. On the other hand, the second (65) of said pieces lodged in the external piece or slide (61), that nearest to the air inlet through the external conduit or hose, has a cylindrical hollow inside, and it has a core (69) screwed in its fore end, similar to those lodged in vehicle valves, at whose free end it has a little spring (77), and said second piece rear portion externally ends in a series of, preferably dovetail shaped, projections (70), which is suitable for a leakproof coupling to the rubber of the external air conduit or hose, through which air from machine flows. Likewise, said piece (65) has a circular crown-shaped internal widening (71) which has four balls (72) diametrically and normally opposite two by two, built in and pressed by springs (73), said balls (72) being faced to an inner groove (84) made in said external piece or slide (61). Next to said circular crown-shaped internal widening (71) and faced to the inside of the coupling nozzle, an inner spring (80) is arranged surrounding the tubular outside of said piece (65), suitable to integrally move both pieces (64, 65) lodged in said external piece or slide (61), and thereby draw said balls (72) out from the corresponding grooves (84). Finally, the external piece or slide (61) is inside provided with a trunco-conical shaped collar (83), suitable to press said "L"-ended springs (74a, 74b) when the integral set formed by the pieces (64, 65) has moved to the stop resulting from

This is the replacement sheet

Date: 27 JUL 1999

the screw cap (62) closing said external piece or slide (61).

5 Figure 5b shows a cross-sectioned view of the nozzle for coupling the inflating conduits or hoses to tyre valve (78) at its loading condition, i.e., when all air inlets are open, which will facilitate the understanding of said coupling nozzle operation.

10 Vehicle valve (78) is introduced by the fore end of coupling nozzle, through the inside of the piece (64) lodged into the external piece or slide (61), pushing the hammer (68), which internally slides along the tubular piece (67) lodged into said piece (64). Hammer (68), along
15 its movement, pushes the internal piston of the core (69), thereby overcoming the resistance of its internal spring (77), and opening the air inlet hole (82), originally closed by the rubber conical seal (79), so beginning to move said tubular piece (67), which has to overcome the
20 resistance of spring (80) surrounding the tubular outside of the second piece (65) lodged into the external piece or slide (61), untill it begins to move the integral set of pieces (64, 65), thereby drawing balls (72) out from the corresponding grooves (84).

25 Resistances of said springs (77, 80) are transmitted in the opposite sense to the rod (81) of the core in tyre valve (78), which results opened, thereby allowing air to flow.

30 When the integral set formed by pieces (64, 65) lodged into the external piece or slide (61) has moved up to the stop resulting from the screw cap (62) closing said external piece or slide (61), springs (74a, 74b) integral
35 with the piece (64) are pressed by a trunco-conical shaped

collar (83) located into the external piece or slide (61), so that the "L"-shaped end of said springs (74a, 74b) juts out the corresponding grooves (76a, 76b) clamp-wise embracing the valve (78), entering into the strias of the same and avoiding it to return.

In this position, shown in figure 5b, with the valve (78) locked, air flow is free all along the run, and on the other hand, coupling nozzle is in a stable position, which can be unlocked only by pulling the external piece or slide (61), disconnecting said "L"-ended springs (74a, 74b), balls (72) entering again into their corresponding grooves (84), the air flow conduits being closed back again by means of springs, the whole set becoming to the rest position and vehicle valve (78) being loose.

Figures 6a, 6b, 6c, 6d and 6e show different views of the basis or supporting unit (4), consisting of a base or pedestal, appropriate to support the operating unit or machine (1) and the air delivering unit (5). Said support or basis is parallelepipedic-wise shaped, open at its lower face, made of steel plate, with corrosion proofing by electrolytic zinc bath, chromitized and bicomponent epoxy-polyurethane paint. Likewise, it is provided with means for fixing to the ground by screws (27) and retaining billets (not shown in figure).

Said basis may optionally have a small door (28) for having access to the coin box existing inside the machine.

Figure 7 shows an electronic diagram of the measuring instrument of the operating unit or machine (1). Said operating unit (1) is constituted by an electronic set formed by three expert modules, such as a display supervisory module (29), a keyboard module (30) and an

This is the replacement sheet

Date: 27 JUL 1999

adjustment module (31), independently operated, each one having a microcontroller for the execution of that process commended to each module, preferably communicated by two wires in accordance with the specifications of the
5 corresponding communication bus (32), as well as a pneumatic control and power supply module (33) providing the necessary energy for the operation of the remaining modules through the corresponding supply buses (34), simultaneously managing the pneumatic equipment (35).

10

Said display supervisory module (29) of the measuring instrument is constituted by a microcontroller, a series-parallel interface for the managing of the display, a display (36), a protected writing memory, a supply control
15 circuit, an infrared receiving circuit, a battery and a load circuit. Said module is in charge of presenting the pressure measure, in an intelligible manner, outside, storing the information introduced from outside through the keyboard module (30), as well as supervising the complete
20 equipment operation, managing the information received from the remaining modules, deciding the process to be effected, and sending the appropriate orders through the communication bus (32) to the remaining modules.

25

Keyboard module (30) is in charge of receiving orders from outside and communicating them to the supervisory module (29) for their interpretation and for acting in accordance with the criterion established by the program, and it is provided with a microcontroller, an interface
30 between said microcontroller and the keyboard (37), preferably constituted by transistors, light indicators (38) and, optionally, with payment means, either by accepting coins (39) or by credit cards, money cards or the like (40). Detection of the activation of a key, approval
35 of a card-transaction or coin-acceptance are communicated

This is the replacement sheet

Date: 27 JUL 1999

by the communication bus (32) to the supervisory module (29), said supervisory module (29) determining the process(es) to be effected, including the orders to the keyboard module (30) for activating or deactivating either
5 the light indicators (38) or the card (40) [or coins (39)] acceptor.

Adjustment module (31) is in charge of recovering information about pressure and converting said information
10 into digital information; it has a microcontroller, an analogical-digital converter with differential input, a low noise linear amplifier and a pressure transducer (41). Said adjustment module (31) converts information regarding to barometric pressure into a numerical digital value,
15 operates the pneumatic system (35) electric valves and manually or automatically realizes those necessary pressure-adjustment processes to achieve the desired pressure.

Finally, power supply (33) consists of the circuit in
20 charged of supplying the necessary energy to each one of the fore-mentioned modules for the correct operation thereof; it has voltage stabilizers such as, preferably, a circuit with a transistor and protection means, such as a filter (42) located at the network input in order to
25 avoid the production of radiofrequency interferences. Additionally, it is provided with a power supply monitoring system, suitable to detect voltage drops below a safety value, and it supplies the initialization signal to modules. Finally, it includes a power control for managing
30 the pneumatic equipment by, preferably, optocoupling triacs indicating whether power is in those elements constituting said pneumatic equipment (35) or not, as well as a monitoring of the correct operation of said pneumatic equipment (35).

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This is the replacement sheet

Date: 2 / JUL 1999

Figure 8 shows the pneumatic diagram of the present practical embodiment of the electronic air-supplying and pressure-equalizer system for tyres object of the present invention. Said pneumatic equipment (35) of the operating
5 unit or machine (1) is the element in charge of managing the air flow which will permit to fill up or to empty tyres untill achieving the pressure desired. The pneumatic equipment (35) consists of four electric valves (43, 44, 45, 46) communicating wheels with the pressure source or
10 compressor (47), with the very measuring instrument through a transducer (48) and with the atmosphere (49). Said electric valves link together in a common node or service node (50), to which said measuring instrument links too.

15 Two of said electric valves (43, 44) work simultaneously and are in charge of connecting distribution and connetion means, such as hoses (21), coming from vehicle tyres, to said service node (50), so achieving a double effect. On the one hand, pressures into both tyres
20 get equal in accordance with the principle of communicating vessels, and at the same time, it is possible to measure the pressure of the loop between the wheels. The use of two electric valves (43, 44) does not permit the cross balancing of wheels as hoses (21) change between one axle
25 and the other.

Once the above set of tyre electric valves is opened, one of the two remaining electric valves (45) links the service node (50) with the compressor in order to thereby
30 increase pressure.

Once the above set of tyre electric valves is opened, the second of the two remaining electric valves (46) links the service node (50) with the atmosphere in order to
35 thereby decrease pressure.

This is the replacement sheet

Date: 27 JUL 1999

Likewise, said pneumatic equipment (35) has a non return valve (51) located at the pneumatic set pressure inlet, in order to avoid that, in the absence of pressure inside the compressor, tyres could deflate.

5

Pneumatic set (35) is complemented with several means for protecting the measuring instrument against water and dirtiness existing in the installation and/or in the compressor, as well as against pressures higher than those said measuring instrument can support, such as, preferably, a filter (52) and a regulator (53).

10

The drive engine or compressor equipment (not shown in figures) of the electronic air-supplying and pressure-equalizer system for tyres provides dry air at a pre-established minimum pressure. Said compressor can be either interior, so suitably sizing the outer housing in order to lodge said compressor, or external, in which case, a larger and therefore more powerful compressor can be used, thereby favouring the response time of the system.

15

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The electronic air-supplying and pressure-equalizer system for tyres object of the present invention whose configuration has been disclosed above, is provided with different modes of operating which user can choose. The three modes of operating which the electronic air-supplying and pressure-equalizer system for tyres has are: checking-balancing mode, manual inflating-balancing mode and automatic inflating-balancing mode.

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The user begins the operating of the electronic air-supplying and pressure-equalizer system for tyres by connecting hoses (21) to vehicle tyres through nozzles, introducing these into the valves in tyres. Once this connection process is effected, it will be necessary to

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This is the replacement sheet

Date: 27 JUL 1999

wait for a moment untill reading becomes stabilized. This time is the required for pressure values inside both wheels to become equal, in the case of two wheels at each axle. Next, it should be selected whether to increase or decrease pressure based on the pressure being displayed and pressure that is aimed to reach. Once decision has been taken, it is possible to activate the appropriate valve in each case. Time that this action should take will depend on various factors, the most remarkable being the difference between current pressure and pressure to be reached, the difficulty for air to pass through the pneumatic system, and the pressure of compressor supplying the necessary air in case of desiring to increase the barometric value. Since it seems to be difficult to achieve the desired pressure by activating only once the appropriate electric valve for a determinate time, generally, an electric valve should be activated, then it should be waited untill pressure becomes stabilized and a new decision is taken about the action to do, which will depend, as before, on the pressure value read and that to be reached. Once decision is taken, the appropriate electric valve should be activated, said process being repeated so many times as it were necessary, untill desired pressure is achieved.

In relation to the handling by the user, this can decide between being him/her-self who compares, takes the decision and repeatedly acts on the machine (manual mode) or letting the machine to be itself which carries out the process (automatic mode), the pressure value desired to be achieved being previously programmed through the keyboard (37), either by directly introducing the value, or by selecting one of the programmed values arranged on the keyboard (37). Operating in this way, user has the possibility to check and equalize pressures inside the tyres of the same vehicle axle.

This is the replacement sheet

Date: 27 JUL 1999

The electronic air-supplying and pressure-equalizer system for tyres is provided with an acoustic warning device which indicates by an acoustic signal that system has finished the inflating-balancing process, so the
5 programmed value being reached, when said system operates at the automatic inflating-balancing mode.

Finally, the electronic air-supplying and pressure-equalizer system for tyres object of the present invention
10 is provided with different selectable payment means such as free mode or payment mode as selected by system's operator and, when choosing the payment mode, it is provided with various options: coin payment (39) or card payment (40),
15 either with the own user card comprising a determined number of services or with a money-card of any bank, eligible by the user. Said coin-box (39) comprises a groove through which the necessary coin(s) should be introduced in order to switch the system on. In the case of a defective
20 coin were introduced and blocked up, it will be recovered by pressing the return button located below said groove, thereby coin will appear in a small box located below said button. Likewise, if coin were inappropriate or system were either unplugged from the network or on working, said coin would be automatically returned.

25

Figures 9 to 12 show alternative embodiments of the distribution unit of the electronic air-supplying and pressure-equalizer system for tyres object of the present invention.

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Figure 9 diagrammatically shows a second preferred embodiment of the electronic air-supplying and pressure-equalizer system for tyres, having a series of inflating conduits or hoses (121) carrying the inflating gas,

This is the replacement sheet

Date: 27 JUL 1999

preferably compressed air, coming from the operating unit (101) of the type disclosed above.

5 Said second practical embodiment consists of two inflating modules or devices (102) performing the following functions: support of said conduits or hoses (121), location of said conduits or hoses and coupling thereof to vehicle tyres to be inflated or whose pressure is desired to check, and automatic withdrawal and/or return of said
10 conduits or hoses (121) from their operating position up to their rest position. Pressure control of each tyre is carried out through the central control unit, similar to that disclosed in figures 1 to 8. The two inflating modules or devices (102) are located in diametrically opposite
15 positions, so that the user who desires to use the electronic air-supplying and pressure-equalizer system for tyres should park the vehicle between both inflating modules or devices (102), each one of the inflating modules or devices of rear and fore tyres being approximately
20 equidistant to each corresponding side of the vehicle. Said inflating modules or devices (102) are placed at a gap of, preferably, between 1.75 m and 2.80 m, more preferably between 1.90 m and 2.50 m between themselves, and, in any case, according to the width of vehicles to operate with
25 the present inflating installation.

Inflating conduits or hoses (121) extend from the gas reservoir or compression unit to inflating modules through underground pipes, going through an operating and control
30 unit (101).

Figures 10a and 10b diagrammatically show different views of inflating modules or devices (102), which have a housing made of a resistant material, preferably metal or
35 the like, shaped as a spherical semi-cap, in whose inside

This is the replacement sheet

Date: 27 JUL 1999

an extensible inflating conduit or hose (121) is lodged, said housing (104) being thereby constituted as the means for supporting said inflating conduit or hose (121). Said housing (104) has, at its lower side, means for the anchorage and fixing to the ground, preferably constituted by threaded screws (105) introduced into the ground, secured by conventional nuts (106). Likewise, said housing (104) has, on its upper surface, an outlet hole (107) to extract the inflating conduit or hose (121) and to thereby couple the inflating valve (108), arranged at its free end, to tyre valve.

Likewise, inside said housing (104), there are automatic means for the returning and withdrawal of the inflating conduit or hose lodged therein, constituted by a channeled wheel (109) horizontally arranged with a device of springs which makes it to automatically revolve in a sense, so that the conduit or hose (121) used, which is stretched and extracted from the housing (104), is withdrawn up to its rest position by said automatic coiling means.

Figure 11 shows a thirth preferred embodiment of the electronic air-supplying and pressure-equalizer system for tyres, similar to that shown in Figure 9, which is provided with four inflating modules or devices (202) identical to those disclosed above distributed on an imaginary rectangle, in order to work one vehicle tyre from each one, so that the user who wants to use the inflating installation should park the vehicle on said imaginary rectangle, placing each one of the vehicle tyres approximately equidistant to the corresponding inflating module or device. Again, pressure control of each tyre is carried out through a central control and operating unit (201). As in foregoing cases, gaps have to be suitable to

This is the replacement sheet

Date: 27 JUL 1999

park the vehicle on said imaginary rectangle, allowing an appropriate manoeuvrability margin.

Finally, figure 12 shows a fourth practical embodiment of the electronic air-supplying and pressure-equalizer system for tyres similar to that shown in figures 9 and 11, in which inflating modules or devices have a cylindrical shape (302) as a body emerging from the ground up to certain height, allowing the handling thereof by user without crouching, being inside provided with each one of the elements disclosed for the inflating module or device of the latter embodiment, regarding to figures 10a and 10b. As in foregoing embodiments, inflating hoses extend underground from the central control and operating unit (301) to the inflating modules or devices (302).

As represented in figure 13, the electronic air-supplying and pressure-equalizer system for tyres can consist of a multi-station, multi-user and multi-function system. In this case, system comprises a main managing centre (54), as well as a set of autonomous use terminals (55.1, 55.2, ... 55.n), subordinated to said managing centre (54). The various elements disclosed above for individual systems will be distributed among the various components of said multi-station system. Therefore, managing centre (54) will comprise a compressor, owning to the centre where it is installed on, an overall control circuit suitable to carry out the acceptance of payment means, store transactions, control service times, and manage communications, as well as a communication module, preferably via modem. Autonomous use terminals (55.1, 55.2, ... 55.n), will be provided with a display device, a pressure control, a keyboard control, a payment control including a money box and a card reader, as well as a pressure transducer. The particular disposal as well as the

This is the replacement sheet

Date: 27 JUL 1999

features of each one of the autonomous terminals (55.1, 55.2,... 55.n) may adopt any one of the embodiments mentioned above. The so suggested multi-station configuration may complement the inflating and pressure control fuctions of each autonomous terminal (55.1, 55.2,... 55.n) with further functions, typical of a car-washing centre such as washing, vacuum cleaning, rug cleaning, etc.

Once the nature of the present invention, as well as several ways for implementing it on practice have been sufficiently disclosed, it only remains to add that it is possible to introduce, in its whole or parts, variations in shape, materials and arrangement, provided that said variations would not substantially change those features of the invention which are claimed below.

Claims

1.- Electronic air-supplying and pressure-equalizer system for tyres, to be preferably installed at petrol stations, service areas, mechanical assistance points on roads or similar to those comprising a compression unit, which, either from a reservoir or directly, supplies a gas, preferably compressed air, to an inflating unit, which has several inflating conduits or hoses made of plastic, rubber, etc., having, at their free ends, means for coupling said inflating conduits to tyre valve, as well as a structure for supporting said conduits, characterized in that it is provided with:

a) an operating unit or machine (1), having:
a housing (2) made, at one of its sides (6d), for example, of metal iron plate with surface corrosion proofing and, at the remaining sides (6a, 6b, 6c), made of materials resisting atmospheric agents, such as a self-quenching, high density expanded stiff

This is the replacement sheet

Date: 27 JUL 1999

features of each one of the autonomous terminals (55.1, 55.2,... 55.n) may adopt any one of the embodiments mentioned above. The so suggested multi-station configuration may complement the inflating and pressure control fuctions of each autonomous terminal (55.1, 55.2,... 55.n) with further functions, typical of a car-washing centre such as washing, vacuum cleaning, rug cleaning, etc.

Once the nature of the present invention, as well as several ways for implementing it on practice have been sufficiently disclosed, it only remains to add that it is possible to introduce, in its whole or parts, variations in shape, materials and arrangement, provided that said variations would not substantially change those features of the invention which are claimed below.

Claims

1.- Electronic air-supplying and pressure-equalizer system for tyres, to be preferably installed at petrol stations, service areas, mechanical assistance points on roads or similar to those comprising a compression unit, which, either from a reservoir or directly, supplies a gas, preferably compressed air, to an inflating unit, which has several inflating conduits or hoses made of plastic, rubber, etc., having, at their free ends, means for coupling said inflating conduits to tyre valve, as well as a structure for supporting said conduits, characterized in that it is provided with:

- a) an operating unit or machine (1), having:
a housing (2) made, at one of its sides (6d), for example, of metal iron plate with surface corrosion proofing and, at the remaining sides (6a, 6b, 6c), made of materials resisting atmospheric agents, such as a self-quenching, high density expanded stiff



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This is the replacement sheet

Date: 27 JUL 1999

polyurethane resin, being provided at said metal iron plate side (6d) with one or more doors (7a, 7b), suitable to allow the access to inner elements, the housing (2) being further provided with ventilation means constituted by air inlet screens (9, 10) located, for example, at the top and bottom of said housing (2); a metal framework (11), consisting of a metal structure, for instance, made of L-shaped cross-section profiles (12) bent forming right angles and welded together, and it is corrosion-proof coated, as well as means for fixing the housing, for instance, constituted by screws;

an electronic measuring instrument, constituted by an electronic set formed by the three following expert modules, comprising: a display supervisory module (29), a keyboard module (30) and an adjustment module (31); and additionally said electronic measuring instrument is provided with a pneumatic control and power supply module (33), as well as buses for supply (34) and communication (32) between modules; and a pneumatic equipment (35) consisting of four electrically operated valves (43, 44, 45, 46) suitable to communicate tyres with pressure source or compressor (47), with said electronic measuring instrument through a transducer (48) and with the atmosphere (49), said electric valves and said measuring instrument being linked at a common node or service node (50), and it is provided with a non return valve (51) located at a pressure inlet to this pneumatic equipment (35);

b) a drive or compressor engine, having an internal or external compressing unit;

c) a basis or supporting unit (4), consisting of a parallelepipedic-wise shaped, open at its lower face, for example, made of steel plate with corrosion proofing, and



This is the replacement sheet

Date: 27 JUL 1999

provided with means for fixing to the ground, as by screws (27) and retaining billets; and
d) an air delivering unit (5).

5 2.- Electronic air-supplying and pressure-equalizer system' for tyres, according to the first claim, characterized in that the display supervisory module (29) of the measuring instrument is constituted by a microcontroller, a display (36), a series-parallel interface for managing the
10 display(36), a protected writing memory, a supply control circuit, an infrared rays receiving circuit, a battery and a load circuit, said system capable of presenting the pressure measure, in an intelligible manner, outside, storing the information introduced from outside through the
15 keyboard module (30), and supervising the system operation, capable of managing the information received from said adjustment and keyboard modules, deciding the process to be effected, and sending the appropriate orders through the communication bus (32) to said adjustment and keyboard
20 modules.

3.- Electronic air-supplying and pressure-equalizer system for tyres, according to the first claim, characterized in that the keyboard module (30) in the measuring instrument
25 is provided with a microcontroller, an interface between said keyboard module and the keyboard (37), for example, constituted by transistors, light indicators (38), and with payment means, either by coins (39) or by credit cards, money cards or the like (40), suitable to receive orders
30 coming from the outside and to communicate them to the supervisory module (29) for their interpretation and execution, as well as for the detection of the activation of a key and acceptance a card or cash operation.



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This is the replacement sheet

Date: 27 JUL 1999

4.- Electronic air-supplying and pressure-equalizer system for tyres, according to the first claim, characterized in that the adjustment module (31) in the measuring instrument is provided with a microcontroller, an analogical-digital converter with differential input, a low noise linear amplifier and a pressure transducer (41), suitable to convert information regarding to barometric pressure into a numerical digital value; said adjustment module in a manual or automatical mode operates the electric valves (43, 44, 45, 46) and performs the appropriate pressure-adjustment processes to achieve the desired pressure.

5.- Electronic air-supplying and pressure-equalizer system for tyres, according to the first claim, characterized in that said power supply source of claim 1 (33) in the measuring instrument is provided with voltage stabilizers, such as, a circuit with a transistor and protection means, for example, a filter (42) located at the network input suitable to avoid the production of radiofrequency interferences, a power supply monitoring system suitable to detect voltage drops below a safety value and supply of initialization signals to modules, and with a power control system for managing the pneumatic equipment using, for instance, optoelectronic coupling triacs indicating whether voltage is present in those elements constituting said pneumatic equipment or not, as well as for monitoring the correct operation of said pneumatic equipment (35).

6.- Electronic air-supplying and pressure-equalizer system for tyres, according to the fore claims, characterized in that it is provided with a remote control suitable to select an inflating pressure value, comprising a keyboard, either a numerical keyboard, suitable for introducing any value, or one only key containing the entry of the value associated with the optimum pressure of vehicle tyre, a



This is the replacement sheet

Date: 27 JUL 1999

converter of the electrical signal generated by said keyboard into, for instance, infrared rays, and a emitter of said rays, capable of emitting the signal corresponding to the value introduced by said keyboard of said remote control, to the infrared receiving circuit installed in the
5 operating unit, for exemple, on its housing, said signal receiving circuit being provided with a signal transducer capable of converting the received infrared signal into an electric signal, and with means for transmission to the
10 display supervisory module of the measuring instrument.

7.- Electronic air-supplying and pressure-equalizer system for tyres, according to the first claim, characterized in that:

- 15 - two of said electric valves (43, 44) of said pneumatic equipment (35) operate simultaneously and are capable of activating distribution and connection means, such as hoses (21), coming from vehicle tyres, to said service node (50);
- one of the remaining electric valves (45) is capable of,
20 of, once the above set of tyre electric valves is opened, linking the service node (50) with the compressor.
- the second of the remaining electric valves (46) is capable of, once the above set of tyre electric valves is opened, linking the service node (50) with the atmosphere.

25 8- Electronic air-supplying and pressure-equalizer system for tyres, according to the first claim, characterized in that said pneumatic equipment (35) is provided with means for protecting the measuring instrument against water and
30 dirtiness existing in the installation and/or in the compressor, as well as against pressures higher than those said measuring instrument can support, such as, a filter (52) and a regulator (53).



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This is the replacement sheet

Date: 27 JUL 1999

9- Electronic air-supplying and pressure-equalizer system for tyres, according to the first claim, characterized in that the air delivering unit (5) is provided with:

- 5 a) static location means, considered as those where vehicle is which fits to the inflating installation;
- b) and/or movable location means, considered as those managed by the user for coupling inflating conduits or hoses to vehicle tyres, capable of fitting the position of said inflating conduits or hoses to vehicle tyres;
- 10 c) and/or means for the return and/or automatic withdrawal of said conduits or hoses from their operating position to their rest position, for exemple, constituted by automatic mechanisms for the return, withdrawal and/or coiling of the inflating conduits or hoses as well as means
- 15 for said conduits or hoses location.

- 10- Electronic air-supplying and pressure-equalizer system for tyres, according to claims 1 and 9, characterized in that said supporting structure (13) of said air delivering
- 20 unit (5) consists of a L-shaped tubular piece made, for example, of a metal material or the like, supported, at its lower end, by a basis (4) or stand comprising a first vertical tubular stretch (14a) from whose upper end a second tubular stretch (14b) extends describing a 90° curve
- 25 untill getting horizontal, i.e., parallel to the ground, having a section narrower than that of the fore stretch, and a diagonal bar (16) for supporting and reinforcing said horizontal tubular stretch (14b), and in that inflating conduits or hoses go through the inside of said supporting
- 30 structure (13), entering through its basis and the inflating conduit or hose (23) for vehicles with two wheels going out through a lateral hole arranged on the vertical stretch (22), and the inflating conduits or hoses (21) for vehicles with three or more wheels each going out through
- 35 holes (19, 20) arranged below on both ends of the upper



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This is the replacement sheet

Date: 27 JUL 1999

horizontal tubular stretch (14b), said inflating conduits or hoses (21) having a gap length such as, between 1.75 m and 2.80 m; or even less, between 1.90 m and 2.50 m, and the horizontal tubular stretch having a height of, usually,
5 more than 1,70 m from the floor plan.

11.- Electronic air-supplying and pressure-equalizer system for tyres, according to claims 1, 9 and 10, characterized in that said location means of claim 9 consist of means for
10 rotating around the point of coupling between both tubular stretches of the supporting structure, such as constituted by a nylon bearing (17) composed of two coupled cylinders (17a, 17b), slant wise cross-sectioned, which allow, for instance, a 90°-180° gyration of the upper tubular stretch
15 (14b) around the lower tubular stretch (14a), from its rest position considered as that in which the upper horizontal tubular stretch (14b) is substantially placed parallel to the longitudinal axis of a vehicle parked next to the electronic air-supplying and pressure-equalizer system for
20 tyres, up to its operating position, considered as that in which the upper horizontal tubular stretch (14b) is substantially placed perpendicular to the longitudinal axis of a vehicle parked next to the electronic air-supplying and pressure-equalizer system for tyres.

25 12.- Electronic air-supplying and pressure-equalizer system for tyres, according to claims 1, 9, 10 and 11, characterized in that said means of claim 9 used for the return and/or automatic withdrawal of the inflating
30 conduits or hoses from their operating position to their rest position each consist of vertical coilings (25a, 25b) for support, return and/or withdrawal of inflating conduits or hoses (21) arranged on the upper horizontal tubular stretch (14b) of the supporting structure (13), as well as
35 a device for the, usually 90°-180°, gyration of the upper



This is the replacement sheet

Date: 27 JUL 1999

tubular horizontal stretch (14b), with automatic gravitatory return from their operating position to their rest position.

5 13.- Electronic air-supplying and pressure-equalizer system for tyres, according to claims 1 and 12, characterized in that the air delivering unit (5) is provided with two inflating modules or devices (102) fixed to the ground, located at diametrically opposed to each other positions,
10 and placed at a gap length such as, between 1.75 m and 2.80 m, or even less, between 1.90 m and 2.50 m, and in that the corresponding inflating conduits or hoses (121) extend from the control and operating unit (101) to the inflating modules (102) through underground pipes.

15 14.- Electronic air-supplying and pressure-equalizer system for tyres, according to claims 1 and 9, characterized in that the air delivering unit (5) is provided with four inflating modules or devices (202) located on the vertices
20 of an imaginary rectangle suitably sized to allow to park a vehicle on its area, and in that the corresponding inflating conduits or hoses extend from the control and operating unit (201) to the inflating modules (202) through underground pipes.

25 15.- Electronic air-supplying and pressure-equalizer system for tyres, according to claims 13 and 14, characterized in that inflating modules or devices (102, 202) are provided with a housing (104) made of a resistant material, metal or
30 the like, shaped as a spherical semi-cap, in whose inside an extensible inflating conduit or hose (121) is lodged, said housing (104) being thereby constituted as the means for supporting said inflating conduit or hose (121), said housing being provided, at its lower side, with means for
35 the anchorage and fixing to the ground, such as,



This is the replacement sheet

Date: 27 JUL 1993

constituted by threaded screws (105) introduced into the ground, secured by conventional nuts (106), as well as, at its upper side, with an outlet hole (107) suitable to extract the inflating conduit or hose (121), and in that, inside said housing (104), there are automatic means for the returning and withdrawal of the inflating conduit or hose lodged therein, for example, constituted by a channeled wheel (109) horizontally arranged with a device of springs.

16.- Electronic air-supplying and pressure-equalizer system for tyres, according to claims 13 and 14, characterized in that inflating modules or devices have a cylindrical shaped housing (302) emerging from the ground.

17.- Electronic air-supplying and pressure-equalizer system for tyres, according to the first claim, characterized in that it is capable of operating with three modes of operating, eligible by the user, consisting of:

a) checking-balancing mode, eligible by pressing a key arranged for that purpose in the keyboard (37) at the keyboard module (30), so provoking the opening of the electric valves (43, 44, 45, 46) of the adjustment module (31), suitable to carry out the checking of tyre pressure as well as to balance pressure inside tyres belonging to the same axle of the vehicle, in the case of said axle has at least two tyres, by presenting, once determined by the electronic measuring instrument, the pressure existing inside the tyres, on the display (36) of the display supervisory module of the measuring instrument;

b) manual inflating-balancing mode, for effecting the pressure adjustment as user wishes, by using inflating and deflating key(s) arranged on the keyboard (37) forming a part of the keyboard module (30), provoking the opening and/or closing of the electric valves (43, 44, 45, 46) of



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This is the replacement sheet

Date: 27 JUL 1999

the adjustment module (31), by operating the corresponding electric valve; at the same time that pressure existing inside vehicle tyres measured through the measuring instrument is presented on the display (36) of the display
 5 supervisory module (29) of said measuring instrument, pressure-balancing of tyres belonging to the same axle is carried out;

c) automatic inflating-balancing mode, for effecting the pressure adjustment as user wishes, up to a value
 10 programmed by him/her by introducing the corresponding value through the keyboard (37) at the keyboard module (30), either by an explicit numerical introduction by pressing the corresponding numerical keys arranged for that purpose, or by a selection of any pre-determined value by
 15 pressing the only key arranged for that purpose, in order to let the machine to automatically act, by suitably operating the electric valves (43, 44, 45, 46) up to achieve the programmed value, tyre pressure being compared at every moment with the programmed value, and the machine
 20 acting consequently.

18.- Electronic air-supplying and pressure-equalizer system for tyres, according to claims 1 and 17, characterized in that it is provided with an acoustic
 25 warning device which indicates by an acoustic signal that system has finished the inflating-balancing process, so the programmed value being reached, when said system operates at the automatic inflating-balancing mode.

30 19.- Electronic air-supplying and pressure-equalizer system for tyres, according to the first claim, characterized in that it is capable of operating with different selectable payment modes, consisting of:

a) free pay mode; and



This is the replacement sheet

Date: 27 JUL 1999

b) payment mode, provided with the following options selectable by the user: cash mode (39) or card mode (40), either with user own card comprising a determined number of services or with a money-card of any bank.

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20.- Electronic air-supplying and pressure-equalizer system for tyres, according to the first claim, characterized in that it is provided with remote control means, for instance, established by communication via modem from a central station suitable to test the condition of the system, as well as to periodically count up the money collected in said system.

10

21.- Electronic air-supplying and pressure-equalizer system for tyres, according to the first claim, characterized in that it is provided with a emitter-receiver system operating with infrared or other electromagnetic waves types, a transducer for converting the infrared signal into an electric signal and means for transmitting to the display supervisory module, suitable to operate together with external signal sources measuring those parameters on which inflating pressure depends, such as, temperature.

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22.- Electronic air-supplying and pressure-equalizer system for tyres, according to the first claim, characterized in that those means for coupling said inflating conduits or hoses to tyre valve consist of a coupling nozzle comprising a cylindrical shaped external piece or slide (61) closed at its rear side by a screw cap (62), in whose opposite end it is provided with a circular opening (63) suitable to get into tyre valve (78); Inside said external piece or slide (61), two pieces (64, 65) are lodged sliding in relation to said external piece or slide (61) and mounted one into the other by a screwed joint (66).

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This is the replacement sheet

Date: 27 JUL 1999

23.- Electronic air-supplying and pressure-equalizer system for tyres, according to the fore claim, characterized in that inside one of said pieces (64) lodged into the external piece or slide (61), the nearest to tyre valve (78), a hollow, internally stepped tubular piece (67) is lodged sliding in relation to said piece (64) which lodges it, and lodging a hammer (68) consisting of a cylindrical rod which has a widening with a polygonal, more exactly, hexagonal, cross-section, suitable to avoid the return inside said tubular piece (67) as well as to allow an air current among the interstices existing between polygon chords and circular section of the tubular piece (67), said tubular piece (67) having, in its end nearest to tyre valve (78), a rubber conical seal (79), suitable to plug the air inlet hole, as well as two "L"-ended springs (74a, 74b) fastened by an external cylindrical collar (75) and several grooves (76a, 76b) made on the nozzle of the tubular piece (67), suitable to lodge the "L"-shaped end of said springs (74a, 74b).

24. Electronic air-supplying and pressure-equalizer system for tyres, according to claims 22 and 23, characterized in that the second of said pieces (65) lodged into the external piece or slide (61), the nearest to the air inlet through the external conduit or hose, has a cylindrical hollow inside, and it has a core (69) screwed in its fore end, similar to those lodged in vehicle valves, at whose free end it has a little spring (77) and its rear portion externally ends in a series of, usually dovetail shaped, projections (70), which is suitable for a leakproof-coupling to the rubber of the external air conduit or hose, through which air from said operating unit or machine flows, said second piece (65) further having a circular crown-shaped internal widening (71) which has four balls (72) diametrally and normally opposite two by two, built in



This is the replacement sheet

Date: 27 JUL 1999

and pressed by springs (73), said balls (72) being faced to an inner groove (84) made in said external piece or slide (61), an inner spring (80) being arranged, next to said circular crown-shaped internal widening (71) and faced to the inside of the coupling nozzle, surrounding the tubular outside of said second piece (65), suitable to integrally move both pieces (64, 65) lodged in said external piece or slide (61), and thereby draw said balls (72) out from the corresponding grooves (84).

10

25.- Electronic air-supplying and pressure-equalizer system for tyres, according to claims 22, 23 and 24, characterized in that said external piece or slide (61) is inside provided with a trunco-conical shaped collar (83), suitable to press said "L"-ended springs (74a, 74b) when an integral set formed by the pieces (64, 65) has moved to a stop resulting from said screw cap (62) of claim 22 closing said external piece or slide (61).

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26.- Electronic air-supplying and pressure-equalizer system for tyres, according to one of the fore claims, characterized in that it has a distributed multi-station configuration comprising a main managing centre (54) and a set of autonomous use terminals (55.1, 55.2,... 55.n), subordinated to said managing centre (54), said managing centre (54) comprising a compressor, an overall control circuit suitable to carry out the acceptance of payment means, store transactions, control service times, and manage communications, as well as a communication module, for instance, via modem with the autonomous use terminals (55.1, 55.2,... 55.n), and said autonomous use terminals (55.1, 55.2,... 55.n) comprising a display device, a pressure control, a keyboard control, a payment control including a cash box and a card reader, as well as a pressure transducer.

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ELECTRONIC, AIR-SUPPLYING AND PRESSURE-EQUALIZER
SYSTEM FOR TYRES

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Abstract

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Electronic air-supplying and pressure-equalizer system for tyres, to be usually installed at petrol stations, service areas, mechanical assistance points on roads or similar to those comprising a compression unit, which, either from a reservoir or directly, supplies a gas, such as, compressed air, to an inflating unit, which has several inflating conduits having, at their free ends, means for coupling said inflating conduits to tyre valve, as well as a structure for supporting said conduits, which is provided with an operating unit or machine (1), comprising a housing (2), a metal framework (11), an electronic measuring instrument, and a pneumatic equipment (35), a drive engine or compressor equipment, having an inner or outer compressing unit, a basis or supporting unit and an air-delivering unit (5).

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