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COMPRESSING DEVICE FOR PNEUMATIC MASSAGER

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates to a compressing device for a pneumatic massager, which is provided with a plurality of airtight cells adapted to be inflated and contracted by the supply and discharge of compressed air.

Description of the Prior Art

The conventional compressing device for a pneumatic massager generally has a plurality of airtight cells arranged parallelly so as to form a compressing bag with a sheetlike wall and permits the massager to be used by having the compressing bag wrapped fast around an arm or a leg.

In this case, the compressing bag to which compressed air inlets and outlets and compressed air sources disposed in the airtight cells are connected via air hoses produces a massaging action by inflating and contracting the airtight cells sequentially in the direction from the peripheral to the central side by effecting the supply and discharge of compressed air in the relevant airtight cells.

The massager of this construction, therefore, requires as many air hoses as airtight cells and, at the same time, requires distributors for supplying compressed air from such a compressed air supply source as a compressor to the plurality of airtight cells and discharging compressed air from the interior of the airtight cells. Particularly, the distributors tend to boost the cost of the massager because of their complicated structure.

Further, the conventional compressing bag, when attached to a leg or an arm, inevitably covers the joints of the leg

or arm and compels the user to incur difficulty in bending the joints. As a measure to abate this difficulty, it has been proposed to form separate bags and attach the bags separately to the thigh and the lower leg. In this case, the number of sites of attachment is increased, the time spent for the attachment is elongated, and the number of component parts is increased possibly to cause addition to the cost of the massager itself.

A distributing valve intended to handle compressed air costs dearly as mentioned above because of its complicated structure and poses the problem of inevitably boosting the cost of the pneumatic massager. In the circumstance, the desirability of developing a compressing device for a pneumatic massager using inexpensive distributing valves simple in structure or requiring no distributing valve, that produces the same effect as the conventional compressing device, has been finding recognition.

This invention has been perfected in consequence of a diligent study continued with a view to solving the problems encountered by the conventional compressing device for the pneumatic massager as described above. It has for an object thereof the provision of a compressing device for a pneumatic massager, which is capable of sequentially inflating airtight cells in the direction from the peripheral to the central side along the venous stream without using a distributing valve and, even when the user wearing this compressing device operates the massager while keeping the joints in a bent state, ensuring a satisfactory course of flow for compressed air in spite of the presence of bends in the communicating paths of the bags body, and enabling the compressed air to be supplied

sequentially from the airtight cells on the peripheral side onward and consequently causing the airtight cells to be inflated sequentially in the direction from the peripheral to the central side.

SUMMARY OF THE INVENTION

To accomplish the object mentioned above, this invention provides a compressing device for a pneumatic massager, comprising a bag body formed of a plurality of airtight cells with sealed portions for separating the airtight cells and adapted to inflate and contract the airtight cells by supplying and discharging compressed air to and from the bag body, wherein at least one of the airtight cells is provided with a port for supplying and discharging compressed air, and the bag body is provided with a communicating path allowing communication between the at least one airtight cell and the airtight cells lacking the port. In this construction, when an air hose communicating with a compressed air supply source is connected to the port provided in the airtight cell and compressed air is supplied to the airtight cell, the compressed air is subsequently supplied from the airtight cell via the communicating path to the airtight cells not having a port until all the airtight cells are inflated.

The communicating path may be provided with a flow course retaining member. The flow course retaining member comprises a copiously porous retaining piece or a meshed retaining piece inserted in the communicating path so as to ensure constant flow of air through the communicating path.

The flow course retaining member is produced by forming a plurality of punching holes in a thin sheet such as of soft urethane resin. This thin sheet may be inserted in the

communicating path.

The communicating path is formed by imparting a state devoid of airtightness to part of the sealed portion of a relevant airtight cell. The communicating path is adapted to permit supply of compressed air sequentially through the airtight cells from the airtight cell on the peripheral side onward and enable the airtight cells to be inflated sequentially in the direction from the peripheral to the central side.

Further, the communicating path has its width and length properly set so as to confer necessary deviation upon the times to start inflating the airtight cells, with the result that the circulation of blood is promoted and the effect of massaging is further exalted.

This invention is also directed to a compressing device for a pneumatic massager, comprising a bag body formed of a plurality of airtight cells and adapted to inflate and contract the airtight cells by supplying and discharging compressed air to and from the bag body and characterized by forming a notch at a suitable position of the bag body such that when the bag body is attached to a leg or an arm, the knee portion or the elbow portion will be exposed to sight. Even after the user has set this bag body on his person, he can easily bend or stretch the knee or the elbow.

Further this invention is directed to a compressing device for a pneumatic massager, comprising a bag body formed of a plurality of airtight cells and provided with communicating paths differing in cross-sectional area of opening, length and shape, and allowing communication between the adjacent airtight cells and characterized by sequentially

inflating and contracting the airtight cells by supplying compressed air through an airtight cell on the peripheral side and discharging the compressed air through an airtight cell on the central side. When a compressed air supply source is made to communicate with the airtight cell on the peripheral side, and operated to supply compressed air to the particular airtight cell, the compressed air is dispensed and supplied first to the particular airtight cell and sequentially through the rest of airtight cells in the direction toward the central side through the communicating paths and the airtight cells are sequentially inflated in the direction from the peripheral to the central side. When the compressed air is discharged from the airtight cell on the central side, the airtight cells are sequentially contracted in the direction to the peripheral side from this particular airtight cell onward. The massage aimed at is effected by inflating and contracting the airtight cells in the manner described above. The massaging effect can be improved by adjusting the lag between the time to start inflating and contracting the airtight cells on the upstream side and the time to start inflating and contracting the airtight cells on the downstream side through the cross-sectional areas of opening, lengths and shapes of the communicating paths.

Then, by causing the cross-sectional areas of opening of the communicating paths on the peripheral side to be larger than those of the communicating paths on the central side, the addition to the inflation of the airtight cells on the peripheral side is enlarged and the massaging effect further improved when the compressed air is supplied from the peripheral side. Further, by forming the communicating paths

by imparting a state devoid of airtightness to part of the sealed portions separating the adjacent airtight cells, the cost of the compressing device is lowered.

By providing the airtight cell on the peripheral side with a supply port for supplying compressed air and providing the airtight cell on the central side with a discharge port for discharging the compressed air, part of the compressed air supplied to the airtight cell on the peripheral side is supplied sequentially to the other airtight cells on the central side to inflate the airtight cells sequentially in the direction from the peripheral to the central side and, at the same time, the compressed air is discharged smoothly from the airtight cell on the central side onward to contract the airtight cells sequentially in the direction from the central to the peripheral side, with the result that the blood liable to stagnate in the periphery will be circulated perfectly and the massage will be effected with high efficiency.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view illustrating one preferred embodiment of compressing device for a pneumatic massager according to this invention in a state of use.

Fig. 2 is a plan view of the compressing device of Fig. 1.

Fig. 3 is a development illustrating one example of the compressing device.

Fig. 4 is a partially magnified view of Fig. 3.

Fig. 5 is a partially magnified development illustrating another example of the compressing device.

Fig. 6 is a plan view illustrating a retaining piece shown in Fig. 5.

Fig. 7 is a magnified cross section taken through Fig. 4 along the line A-A.

Fig. 8 is a magnified cross section taken through Fig. 5 along the line B-B.

Fig. 9 is a magnified cross section taken through Fig. 3 along the line C-C.

Fig. 10 is a plan view illustrating another preferred embodiment of compressing device for a pneumatic massager according to this invention.

Fig. 11 is a development of the compressing device of Fig. 10.

Fig. 12 is a magnified terminal cross section taken through Fig. 11 along the line D-D.

Fig. 13 is a cross section taken through Fig. 11 along the line E-E.

Fig. 14 is a schematic perspective view illustrating the state of use of still another preferred embodiment of compressing device for a pneumatic massager according to this invention.

Fig. 15 is a plan view illustrating the compressing device of Fig. 14.

Fig. 16 is a plan view illustrating the compressing device of Fig. 15 in a developed state.

Fig. 17 is a terminal cross section taken through Fig. 16 along the line H-H.

Fig. 18 is a magnified partial cross section taken through Fig. 16 along the line I-I.

DESCRIPTION OF PREFERRED EMBODIMENT OF THE INVENTION

Preferred embodiments of the compressing device for a pneumatic massager according to this invention will be

described below with reference to the accompanying diagrams.

A bag body 1 is produced by forming an outer air-impervious resin sheet 1a of small elasticity and an inner air-impervious resin sheet 1b of large elasticity in such a shape as illustrated in Fig. 3 and Fig. 9 and fusing the matched peripheries as by a high-frequency heating means.

As the raw material for these sheets 1a and 1b, a synthetic resin such as urethane resin or polyvinyl chloride resin is used.

Two sheet members formed roughly in the shape of a leg and containing notches 8 in the approximate shape of the letter U at the knee position as illustrated in Figs. 1 through 3 are superposed and the matched peripheries of the sheet members are fused at 1c by the use of a high-frequency heating means, for example, to obtain one bag body 1. The sheet members are then fused in a short width direction to form a sealed portion 5 that divides and sealed part of this bag body extending from the terminal edge to the lower edges of the notches 8 into two parts and give rise to airtight cells 2 and 3 of the shape of a flat bag.

The bag body 1 is further provided in the partitioning area of the airtight cell 3 and an airtight cell 4 with a second sealed portion 6 of a prescribed length. The sealed portion 6 and the fused portion 1c jointly form communicating paths 7.

These communicating paths 7 have their widths and lengths formed at suitable distances so as to impart a lag to the times at which the airtight cell 3 and the airtight cell 4 start inflating and contracting.

The bag body 1 has formed therein a combination of the

notches 8 for exposing the user's knee or elbow when it is set on the leg or the arm.

The bag body 1 is further provided with a sealed partition portion 9 for defining the upper part of foot and the sole part of foot in the foot area. The airtight cell 2 and the airtight cell 3 are provided with ports 10a and 10b, respectively, destined to serve as supply and discharge openings for compressed air. Air hoses 12 connected to a compressed air supply source 11 such as a compressor are connected to the ports 10a and 10b.

The reference numeral 13 shown in Fig. 3 and Fig. 4 denotes a retaining piece intended as a flow course retaining member for the communicating path 7. As shown in Fig. 4, this retaining piece 13 is provided with a plurality of punched holes serving as ventilating holes 14. This retaining piece 13 is formed of thin sheet material (about 0.2 mm in the present case) of soft urethane resin. During the fusion of the sheets 1a and 1b, this retaining piece 13 is interposed in a tacked state. It is eventually interposed and superposed at the position of the communicating path 7 as illustrated in Fig. 7.

The ventilating holes 14 formed in the retaining piece 13 are formed in one equal diameter and arrayed as illustrated in Fig. 4. They do not need to be limited to this arrangement.

The reference numeral 15 shown in Fig. 5 and Fig. 6 denotes a flow course retaining member as another embodiment of the communicating path 7. This flow course retaining member 15 is a meshed retaining piece of thin sheet formed of soft synthetic resin. This retaining piece 15 is provided at the opposite ends thereof with engaging projections 15a and

interposed in, tacked on and attached to the communicating path 7 prior to the fusion of the sheets 1a and 1b.

Two retaining pieces 15 may be interposed between the sheets 1a and 1b respectively at two communicating paths 7 or may be interposed between the sheets 1a and 1b as joined to each other with connecting pieces 15b and 15b into one integral retaining peace as illustrated in Fig. 5 and Fig. 8. The mesh does not need to be limited to what is illustrated in Fig. 6.

The retaining pieces 13 and 15 are preferred to have a thickness enough to avoid inflicting a feeling of uncomfortableness on the skin of the user being massaged.

This bag body 1 is doubled up as illustrated in Fig. 2 and the matched edges are fused or sewn in the direction of length to complete an approximately cylindrical boot shaped like a leg. Optionally, the bag body 1 may be provided along the opposite edges in the direction of width of the developed bag body of Fig. 3 with fasteners which are utilized for attaching the bag body fast to the leg during the attachment.

The communicating paths 7 are formed in suitable widths and lengths such that the times to start inflating the airtight cells 3 and 4 will deviate properly. This deviation of the times to start inflating the airtight cells 3 and 4 is essential for exalting the massaging effect. Actually, the widths and lengths are so selected as to ensure manifestation of the massaging effect to the best advantage.

Incidentally, the present embodiment is provided with three airtight cells 2, 3 and 4 as illustrated in Fig. 2 and 3. For the invention, this number is not critical. The sheet members, though not illustrated, may be formed in a shape fit for the body portion to be massaged, specifically in such a

shape that the bag body will assume the approximate shape of an arm, for example. Again in this case, the notch capable of exposing the elbow part may be properly formed.

Now, the operation of the embodiment described above will be explained below.

In preparation for use, the bag body 1 of the compressing device for a massager is attached to the leg as though a boot is put on as illustrated in Fig. 1 and the air hose 12 connected on one side to the compressed air supply source 11 such as a compressor is connected on the other side to the port 10a. At this time, the notch 8 formed in the bag body 1 of the compressing device exposes the knee. The bag body 1 of this compressing device, though not illustrated, may be attached to each of the legs to be massaged.

When the compressed air supply source 11 is set operating, the compressed air is supplied from the compressed air supply source 11 first to the airtight cell 2 via the air hose 12 to start inflating the airtight cell 2. After the inner pressure of this airtight cell 2 has reached the upper limit, the pressure inside the airtight cell 2 is retained for a prescribed length of time.

After the elapse of the prescribed length of time following the arrival of the inner pressure of the airtight cell 2 at the upper limit and while the inner pressure of the airtight cell 2 is still being retained, the compressed air emanating from the compressed air supply source 11 is supplied via the air hose 12 to the airtight cell 3 to start inflating the airtight cell 3. While the inner pressure of this airtight cell 3 is in the course of reaching the upper limit, part of the compressed air already supplied to the interior

of the airtight cell 3 is supplied via the communicating paths 7 to the airtight cell 4 to start inflating the airtight cell 4 with a lag from the airtight cell 3.

In this case, since the communicating paths 7 are provided with the flow course retaining member 13 or 15, the compressed air in the communicating paths 7 is enabled by the retaining piece 13 provided with a multiplicity of ventilating holes 14 (Fig. 4) or the retaining piece 15 provided with a reticular texture (Fig. 6) to pass freely between the obverse side and the reverse side of the retaining piece 13 or 15 as indicated by arrow marks in Fig. 7 and Fig. 8 and expand the communicating paths 7 and secure ample flow courses for air. Thus, the possibility of the communicating paths 7 being bent to obstruct the flow course is totally nil.

Then, after the retention of the inner pressure of the airtight cell 2 has lasted for a prescribed length of time following the start of inflation of the airtight cells 3 and 4, the compressed air in the airtight cell 2 is discharged via the air hose 12 and the airtight cell 2 begins to contract. At this time, the inner pressure of the airtight cell 3 has reached the upper limit and begun to remain at this upper limit and the inner pressure of the airtight cell 4 is in the course of reaching the upper limit.

Then, the inner pressure of the airtight cell 2 reaches the atmospheric pressure to terminate the contraction of the airtight cell 2. Meanwhile, the inner pressure of the airtight cell 4 reaches the upper limit with a lag from the airtight cell 3. As a result, the airtight cells 3 and 4 both are allowed to retain their inner pressure intact. The blood stagnating at the terminal periphery can be circulated back

to the central side because time lags occur among the times at which the airtight cells 2, 3 and 4 begin to inflate.

While the airtight cells 3 and 4 are retaining their inner pressure and after the elapse of a prescribed length of time following the start of supply of compressed air to the airtight cell 2 in the preceding cycle, the compressed air supply source 11 again supplies the compressed air via the air hose 12 to the airtight cell 2 to start inflating the airtight cell 2 again. After the start of this inflation of the airtight cell 2 and after the elapse of a prescribed length of time following the arrival of the inner pressure of the airtight cell 4 at the upper limit, the compressed air flows into the airtight cell 3 through the communicating paths 7 and then reaches the ambient air through the airtight cell 3 via the air hose 12. Consequently, the airtight cell 3 begins contracting and, with a lag therefrom, the airtight cell 4 begins contracting. Then, the airtight cells 3 and 4 complete contraction after the inner pressure of the airtight cell 2 has reached the upper limit and meanwhile the inner pressures of the airtight cells 3 and 4 have reached the atmospheric pressure substantially simultaneously.

In this case, since the communicating paths 7 are provided with the flow course retaining member 13 or 15, the air is freely passed between the obverse side and the reverse side of the flow course retaining member 13 or 15 even when the communicating paths 7 are bent and the air is then enabled to expand the communicating paths 7 to secure a flow course for air and permit the air to be discharged from the airtight cell 4 to the airtight cell 3.

Thereafter, the process which comprises termination of

the inflation of the airtight cell 2, start of the inflation of the airtight cell 3, and start of the inflation of the airtight cell 4 is repeated to inflate and contract the airtight cells 2, 3 and 4 sequentially in the order mentioned. Thus, the massage for promoting the blood circulation is carried out efficiently.

For the purpose of simultaneously supplying the compressed air to the airtight cells 2 and 3, necessary time lags preceding the start of inflation can be adjusted by suitably varying the inner volumes of the airtight cells 2 and 3.

Though the embodiment, as illustrated above, has the ventilating holes 14 provided in the retaining piece 13 of the flow course retaining member, one or both sides of the retaining piece 13 may be provided with protuberances capable of forming gaps enough to preclude tight adhesion between the retaining piece 13 and the resin sheets 1a and 1b instead of being provided with the ventilating holes 14.

Fig. 10 and Fig. 13 represent compressing devices for a pneumatic massager, depicting other embodiments of this invention. In these diagrams, like component parts found in the preceding embodiment are denoted by like reference numerals.

Though the first illustrated embodiment forms the sealed portion 5 in an airtight state and provides the airtight cells 2 and 3 respectively with the ports 10a and 10b each destined to serve as an opening for supplying and discharging the compressed air, the embodiment shown in Fig. 10 contemplates forming two parallel fused lines 5b as extended from the substantially central part of the sealed portion 5 separating

the airtight cells 2 and 3 toward the interiors of the airtight cells 2 and 3 thereby imparting a state devoid of airtightness to the substantially central part of the sealed portion 5 and giving rise to a slender communicating path 5a for allowing communication between the airtight cells 2 and 3. Further, as illustrated in Fig. 11, the area intervening between the notches 8 is fused to form a second sealed portion 16 and give rise to the airtight cell 4 shaped like a flat bag on the central side from the notches 8 and, at the same time, the substantial center of the second sealed portion 16 is formed in a state devoid of airtightness and allowed to form a slender communicating paths 7 for allowing communication between the airtight cells 3 and 4.

The communicating paths 5a and 7 are formed in suitable widths and lengths so as to impart proper lags among the times at which the airtight cells 2, 3 and 4 begin to inflate. Particularly, the lags among the times for starting inflation of the airtight cells 2, 3 and 4 are essential for the purpose of improving the massaging effect. Actually, the widths and lengths are so selected as to ensure manifestation of the massaging effect to the best advantage. In a bag body which, as illustrated in Fig. 11, has an overall length of about 860 mm and an overall width of about 650 mm and has the ratio of sizes of the airtight cells 2, 3 and 4 in the direction of length set at about 35 : 20 : 18, for example, the communicating paths 5a and 7 are preferred to measure 20 - 30 mm in width and 130 mm in length.

When the compressed air supply source 11 is set operating, the compressed air is supplied first into the airtight cell 2 having the air hose 12 connected thereto to start inflating

the airtight cell 2. While the inner pressure of the airtight cell 2 is in the process of reaching the upper limit, part of the compressed air already supplied to the airtight cell 2 is passed through the communicating path 5a in the airtight cell 3 to start inflating the airtight cell 3. Further, while the inner pressure of the airtight cell 3 is in the course of reaching the upper limit, part of the compressed air already supplied to the airtight cell 3 is passed through the communicating path 7 in the airtight cell 4 to start inflating the airtight cell 4, with the result that first the inner pressure of the airtight cell 2 will reach the upper limit, then the inner pressure of the airtight cell 3 will reach the upper limit, and finally the inner pressure of the airtight cell 4 will reach the upper limit to cause sequential inflation of the airtight cells 2, 3 and 4 in the order mentioned. The blood stagnating at the terminal periphery can be circulated back to the central side because time lags occur among the times at which the airtight cells 2, 3 and 4 begin to inflate.

After the inner pressures of the airtight cells 2, 3 and 4 have retained their upper limits for prescribed lengths of time, the compressed air supply source 11 assumes an evacuated state and the compressed air in the airtight cell 2 is discharged via the air hose 12, with the result that first the airtight cell 2 will begin contraction, the airtight cell 3 will begin to contract with a lag therefrom, and the airtight cell 4 will begin to contract with a further lag therefrom. All the airtight cells 2, 3 and 4 terminate their contraction after the inner pressures of the airtight cells 2, 3 and 4 have reached the atmospheric pressure substantially at the same time. Thereafter, the process mentioned above is repeated to

repeat the sequential inflation and contraction of the airtight cells 2, 3 and 4 in the order mentioned. Thus, the massage for promoting the blood circulation is carried out efficiently.

Fig. 14 is a schematic perspective view illustrating yet another embodiment of this invention.

One flat bag body is produced by superposing two sheet members F and G formed in the shape of a leg in a developed state and fusing the matched edges by the use of a high-frequency heating means, for example. Further, linear sealed portions 25, 26 and 27 are formed by fusing the sheet members F and G in the direction of a short distance. These sealed portions 25, 26 and 27 divide the interior of the bag body into four sections and give rise to airtight cells 21, 22, 23 and 24 each of the shape of a flat bag.

In the sealed portions 25, 26 and 27, communicating paths 28, 29 and 30 each of the shape of a flat cylinder adapted to allow communication between the adjacent airtight cells 21 and 22, 22 and 23, and 23 and 24 are formed.

These communicating paths 28, 29 and 30 are formed of sealed parts 25a, 26a and 27a which have been formed by imparting a state devoid of airtightness to parts of the sealed portions 25, 26 and 27 and fusing the sheet members F and G in the opposite directions in the direction of length extending from the end at which the state of airtightness terminates. Further, they are so formed that their opening cross sections decrease from the communicating path 28 on the peripheral side to the communicating path 29 on the central side and further to the communicating path 30 on the central side. Thus, proper lags are allowed to occur among the times

to start the inflation of the airtight cells 21, 22, 23 and 24 because the entrances to the communicating paths 28, 29 and 30 are respectively thrust into the airtight cells 21, 22 and 23 and the opening cross sections of the communicating paths 28, 29 and 30 are caused to decrease gradually from the peripheral to the central side.

A compressing device which, as illustrated in Fig. 16, has a length L of about 750 mm and a width W of about 600 mm, for example, is preferred to have all the lengths of the communicating paths 28, 29 and 30 set at 130 mm, the width of the communicating path 28 at 30 mm, the width of the communicating path 29 at 25 mm, and the width of the communicating path 30 at 20 mm.

While the communicating paths 28, 29 and 30, as illustrated above, are respectively formed with two parallel sealed parts 25a, 26a and 27a, the sealed parts 25a, 26a and 27a may be slanted in a pattern converging toward the central side or part of the sealed portions 25, 26 and 27 may be provided with a hole formed in a state devoid of airtightness or with a tube interconnecting the adjacent airtight cells 21 and 22, 22 and 23, and 23 and 24. When the tubes are elected, they are varied in diameter and length so as to produce proper lags among the times to start the inflation of the airtight cells 21, 22, 23 and 24.

The airtight cell 21 is provided with a supply port 31 for supplying compressed air and the airtight cell 24 is provided with a discharge port 32 for discharging the compressed air. The airtight cell 21, when necessary, may be made to take sole charge of supplying and discharging the compressed air by providing it with a supply -and- discharge

opening.

Though the present embodiment, as illustrated in Fig. 16 , is provided with four airtight cells 21, 22, 23 and 24, this number is not critical. The sheet members F and G, though not illustrated, may be formed in a shape fit for the body portion to be massaged, specifically in such a shape that they will assume the approximate shape of an arm, for example. It is also permissible to form notches for exposing the knee or the elbow at suitable positions so as to allow the joints to be easily bent or stretched.

The concept of gradually decreasing the opening cross sections of the communicating paths and adjusting the lags among the times for starting the inflation of the airtight cells can be applied not only to the compressing device for a pneumatic massager but also to the pneumatic mattress intended to prevent a patient from suffering a bedsore.

The invention described in detail above allows provision of an inexpensive compressing device for a pneumatic massager which is prepared easily for use because it permits a decrease in the number of inlets and outlets and air hoses which are used for connecting the compressed air supply source and the airtight cells and which, therefore, have been heretofore used in the same numbers as the airtight cells and, at the same time, permits a decrease in the amount of work for connecting the airtight cells to the compressed air supply source. It further allows provision of an inexpensive pneumatic massager capable of efficient massage because the airtight cells can be inflated sequentially in the direction from the peripheral to the central side without necessitating use of a distributing device of complicated structure.

Since the times to start inflating the airtight cells are caused to deviate, the blood circulation can be efficiently promoted by applying pressure sequentially in the direction from the peripheral to the central side of the leg or the arm. Thus, the massaging effect can be further exalted.

The flow course retaining members interposed in the communicating paths of the bag body prevent the flow courses from being blocked even when the communicating paths are bent during the use of the massager and consequently secure ample flow courses for the compressed air in the communicating paths. Thus, the effective massage is attained by sequentially supplying the compressed air from the airtight cell on the peripheral side onward and consequently enabling the airtight cells to be sequentially inflated and contracted from the peripheral to the central side.

Further, by adjusting the timing of inflation and contraction, it is made possible to inflate and contract the airtight cells sequentially along the venous stream and produce a highly effective massage with better sensation of pressure. By discriminating between the airtight cells for supplying the compressed air and the airtight cells for discharging the compressed and enabling the compressed air to be supplied through the airtight cells on the peripheral side and discharged through the airtight cells on the central side, the inflation and contraction can be carried out smoothly even when there are provided a plurality of communicating paths.

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CLAIMES:

1. A compressing device for a pneumatic massager, comprising a bag body (1) formed of a plurality of airtight cells (2, 3, 4) with sealed portions (5, 6) for separating said airtight cells and adapted to inflate and contract the airtight cells by supplying and discharging compressed air to and from the bag body,

said compressing device being characterised in that at least one of said airtight cells (2) is provided with a port (10a) for supplying and discharging compressed air, and that said bag body is provided with a communicating path (7) allowing communication between said at lest one airtight cell and the airtight cells lacking said port.

2. A compressing device according to claim 1, characterised in that said communicating path (7) is provided with a flow course retaining member (13, 15).

3. A compressing device according to claim 2, characterised in that said flow course retaining member is a thin plate of meshed retaining piece (15) of soft synthetic resin inserted in the communicating path.

4. A compressing device according to claim 2, characterised in that said flow course retaining member is a thin sheet of soft synthetic resin (13) containing a plurality of punched holes (14) and inserted in the communicating path.

5. A compressing device according to any one of claim 1 and claim 2, characterised in that said communicating path is formed by imparting a state devoid of airtightness to part of said sealed portions of said airtight cells and is utilized for sequentially supplying compressed air from said airtight cell on a peripheral side onward.

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6. A compressing device according to any one of claim 1 to claim 4, characterised in that said communicating path has a width and a length suitable for imparting a lag between times at which the airtight cells communicating with each other via said communicating path begin to inflate.

7. A compressing device for a pneumatic massager, comprising a bag body (1) formed of a plurality of airtight cells (2, 3, 4) with sealed portions (5, 6) for separating said airtight cells and adapted to inflate and contract said airtight cells by supplying and discharging compressed air to and from said bag body.

said compressing device being characterised in that said bag body is provided with a notch (8) so that the leg or elbow of a user is exposed to sight when said bag body has been attached to the leg or elbow.

8. A compressing device for a pneumatic massager, comprising a bag body (1) formed of a plurality of airtight cells (2, 3, 4, 21, 22, 23, 24) with sealed portions (5, 16, 25, 26, 27,) for separating said airtight cells and adapted to inflate and contract said airtight cells by supplying and discharging compressed air to and from said bag body,

said compressing device being characterised in that said bag body is provided with a plurality of communicating paths (7, 5a, 28, 29, 30) differing in cross-sectional area of opening, length and shape and each allowing communication between adjacent ones of said airtight cells, that the airtight cell (21) on a peripheral side is provided with a supply port (31) for supplying compressed air, and that the airtight cell (24) on a central side is provided with a discharge port (32) for discharging said compressed air to

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sequentially inflate and contract said airtight cells by supplying compressed air through said airtight cell (21) on the peripheral side and discharging the compressed air through said airtight cell (24) on the central side.

9. A compressing device according to claim 8, characterised in that the opening cross section of the communicating path on the peripheral side is larger than that of the communicating path on the central side.

10. A compressing device according to any one of claim 8 and claim 9, characterised in that said communicating paths are formed by imparting a state devoid of airtightness to part of said sealed portions.

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ABSTRACT

COMPRESSING DEVICE FOR PNEUMATIC MASSAGER

A compressing device for a pneumatic massager includes a bag body (1) formed of a plurality of airtight cells (2, 3, 4) with sealed portions (5, 6) for separating the airtight cells and adapted to inflate and contract the airtight cells by supplying and discharging compressed air to and from the bag body. At least one of the airtight cells is provide with a port (10a) for supplying and discharging compressed air. The bag body is provided with a communicating path (7) allowing communication between the at least one airtight cell and the airtight cells lacking the port.

FIG.1

FIG.1

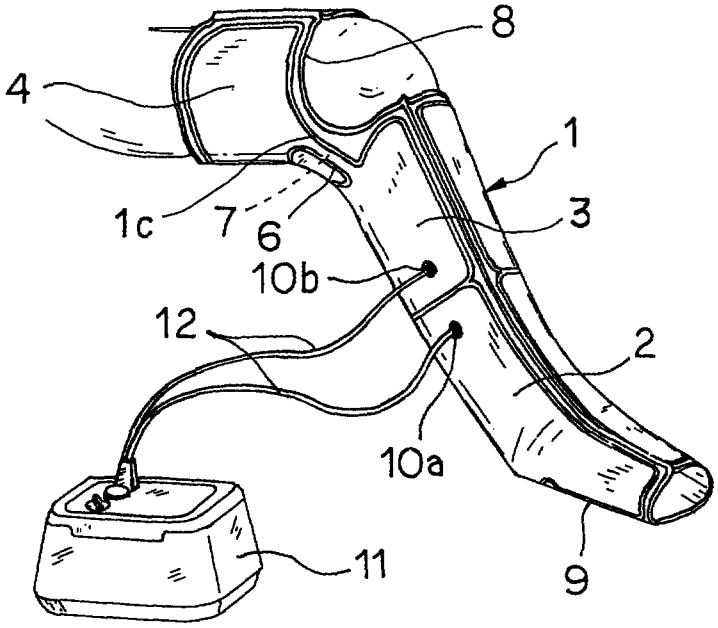


FIG.2

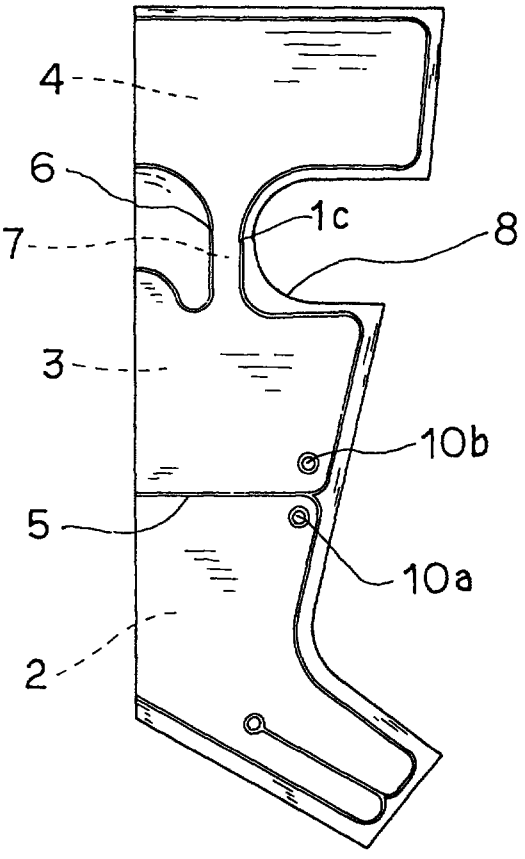


FIG.3

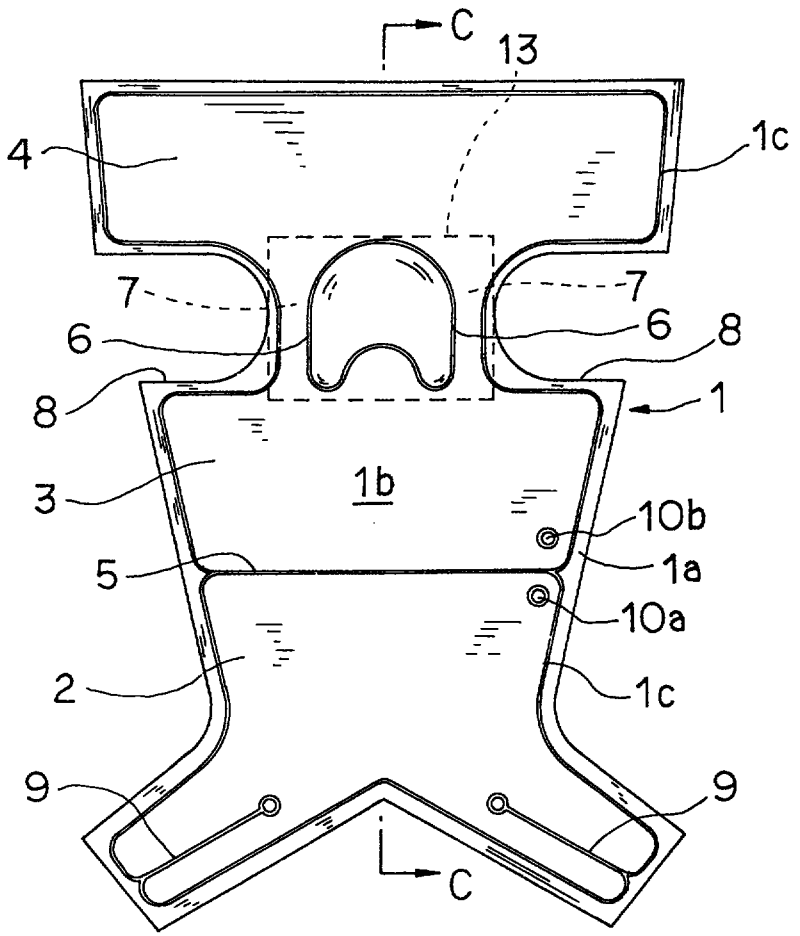

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FIG.4

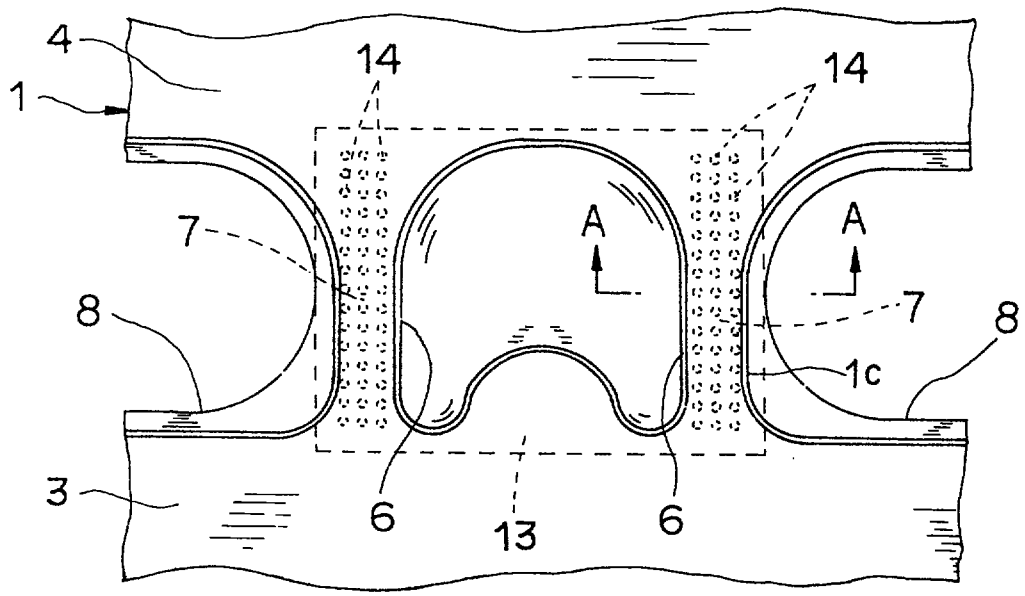

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FIG.5

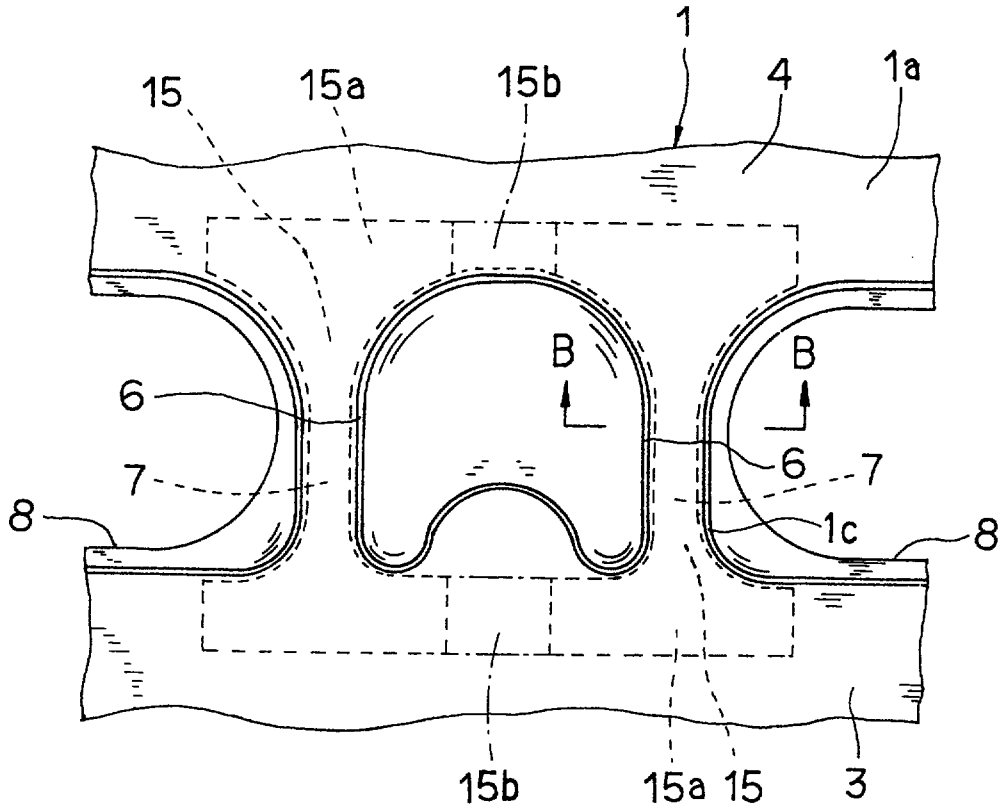


FIG.6

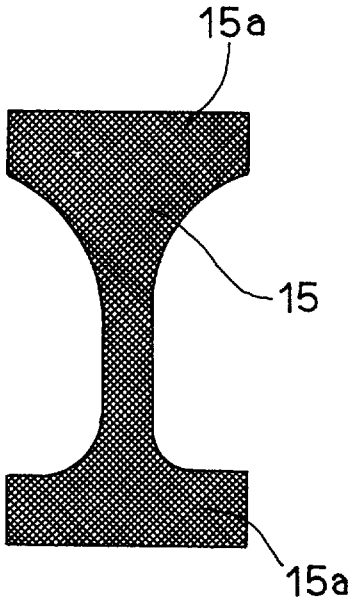


FIG.7

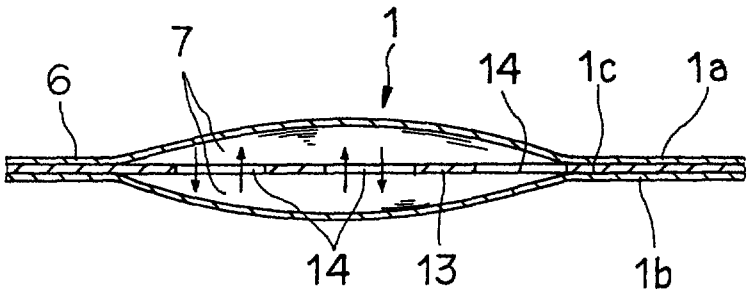


FIG.8

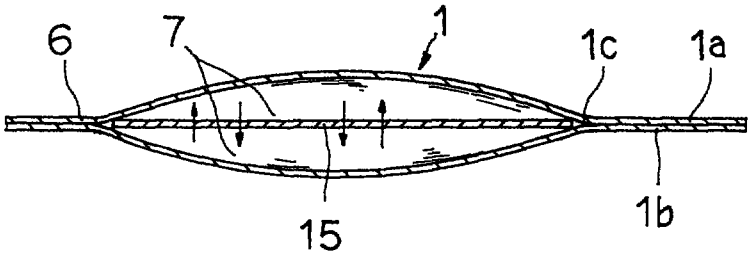


FIG.9

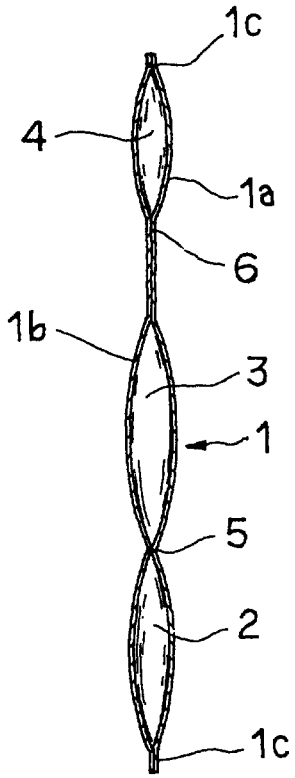


FIG.10

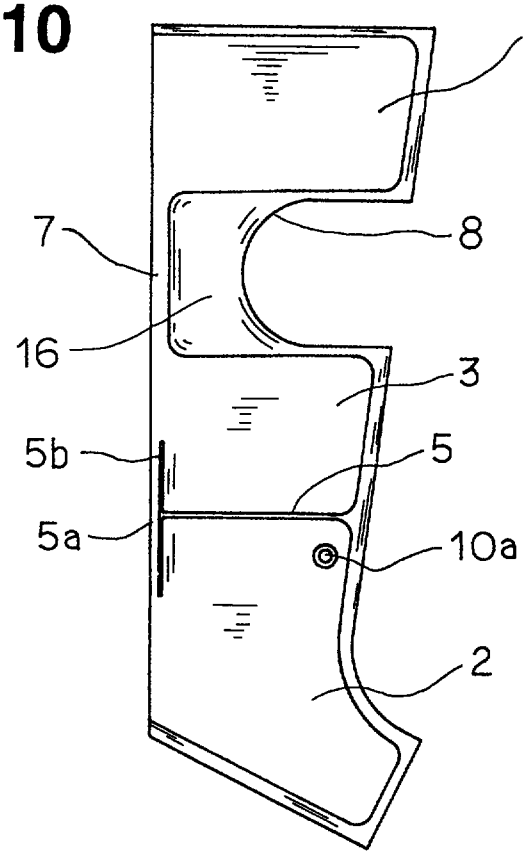


FIG.11

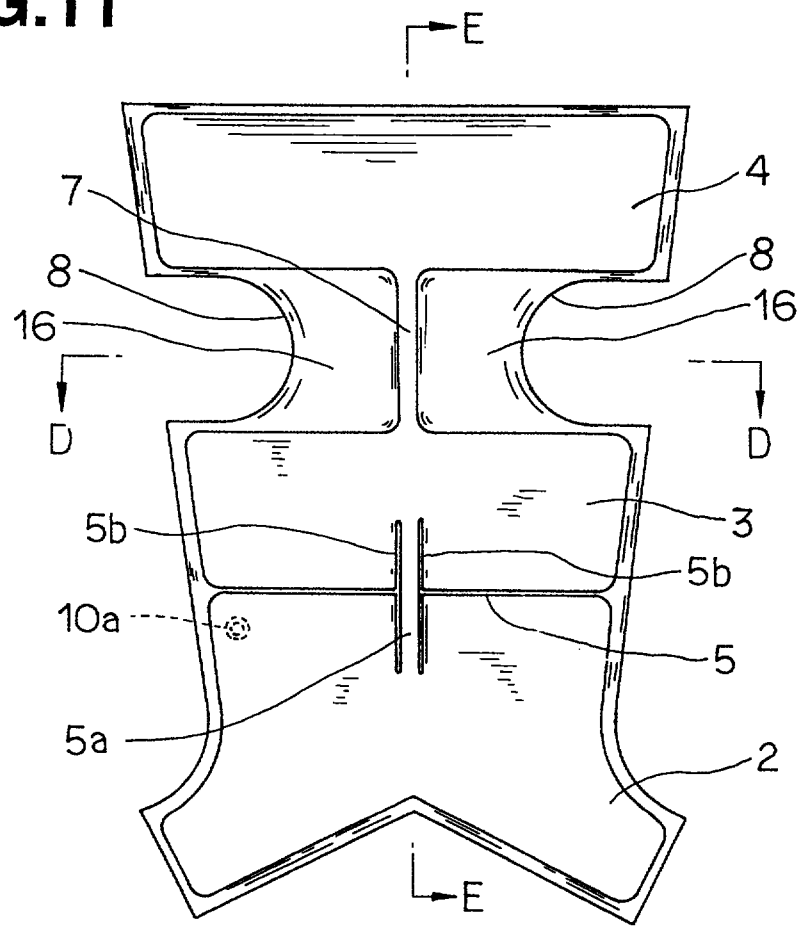


FIG.12

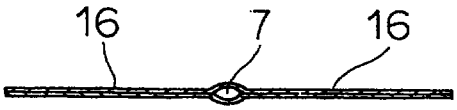


FIG.13

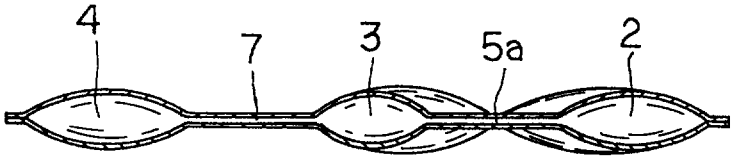


FIG.14

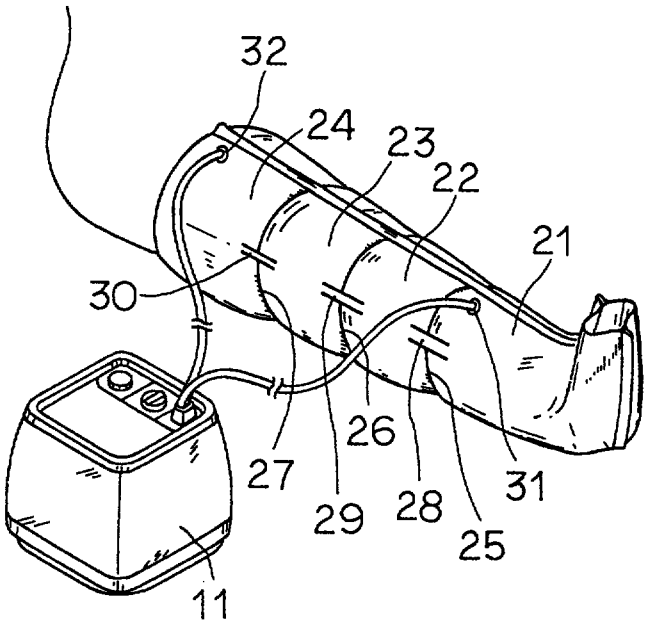

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FIG.15

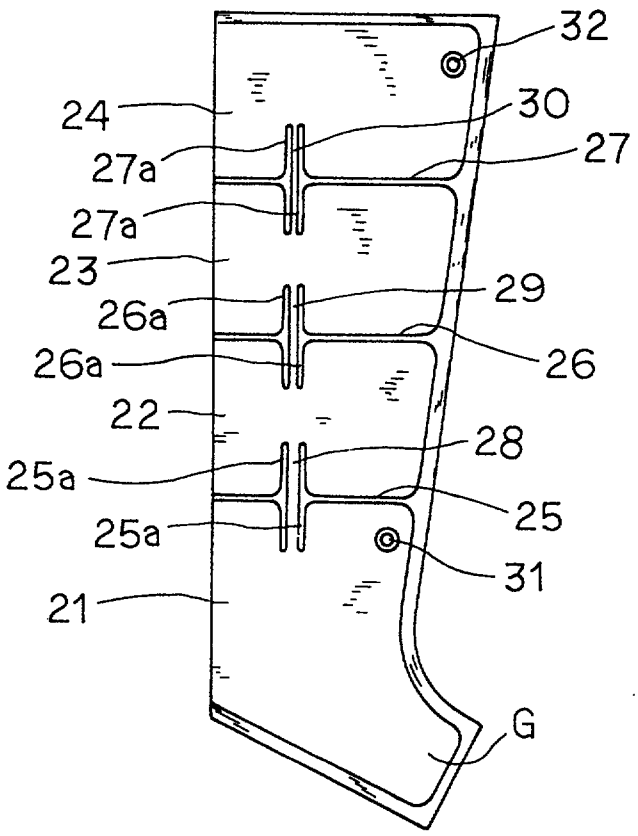

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FIG.16

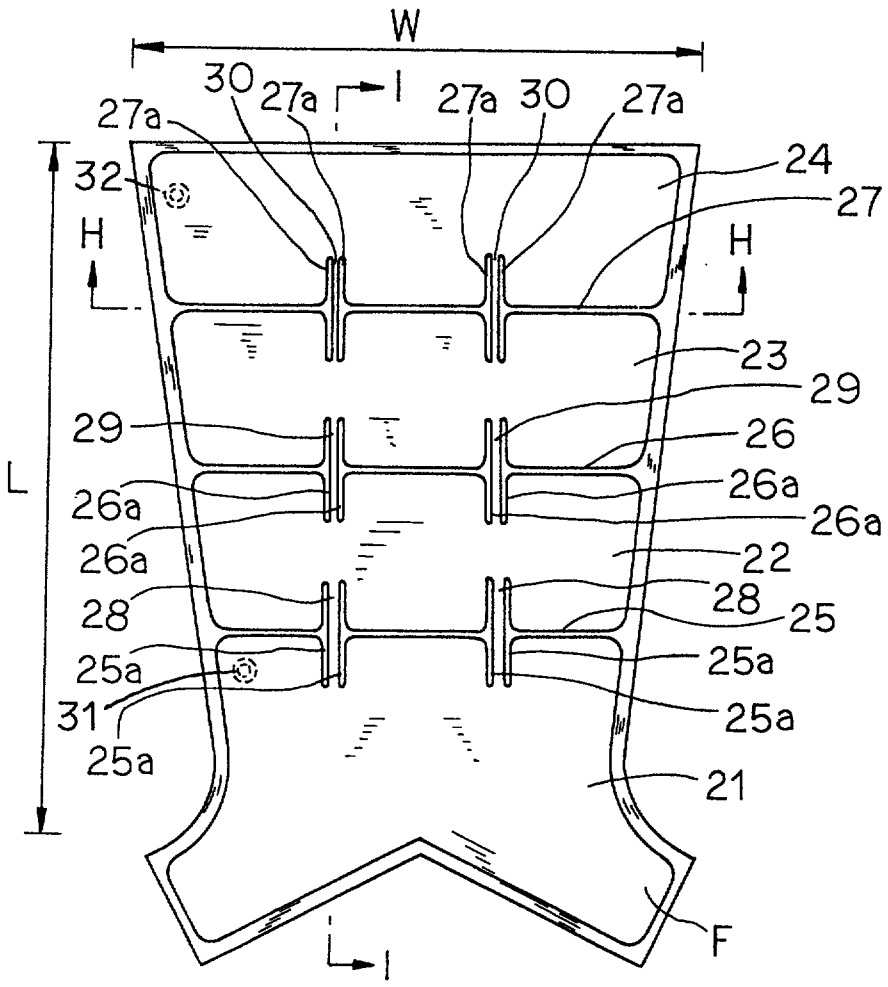

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FIG.17

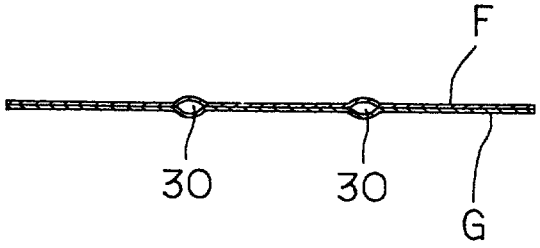
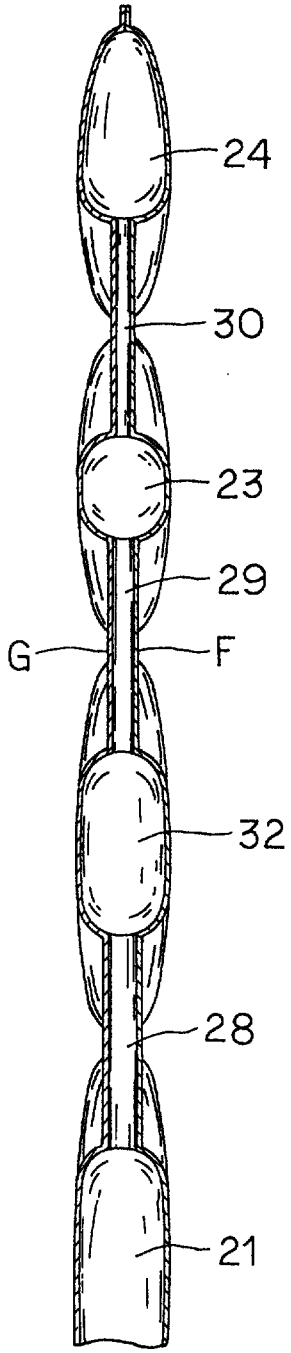

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FIG.18



REPLACEMENT SHEET
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CLAIMS:

1. A compressing device for a pneumatic massager, comprising:

a bag body formed of a plurality of airtight cells, said airtight cells having sealed portions separating said airtight cells from each other;

at least one port for supplying and discharging compressed air to said airtight cells, said at least one port being provided in at least one of said airtight cells and such that said airtight cells include at least one airtight cell without said at least one port;

at least one communicating path fluidly communicating said at least one airtight cell without said at least one port with said at least one of said airtight cells provided with said at least one port; and

a thin, flat and flexible flow-course-retaining sheet having a plurality of holes, provided in said at least one communicating path;

whereby the supply and discharge of compressed air to and from said bag body through said at least one port will inflate and contracts said airtight cells.

2. A compressed device according to claim 1, characterised in that said communicating path (7) is provided with a flow course retaining member (13, 15).

3. A compressing device according to claim 2, characterised in that said flow course retaining member is a thin plate of meshed retaining piece (15) of soft synthetic resin inserted in the communicating path.

4. A compressing device according to claim 2, characterised in that said flow course retaining member is a thin sheet of soft synthetic resin

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REPLACEMENT SHEET
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(13) containing a plurality of punched holes (14) and inserted in the communicating path.

5. A compressing device according to any one of claim 1 and claim 2, characterised in that said communicating path is formed by imparting a state devoid of airtightness to part of said sealed portions of said airtight cells and is utilized for sequentially supplying compressed air from said airtight cell on a peripheral side onward.

6. A compressing device according to any one of claim 1 to claim 4, characterised in that said communicating path has a width and a length suitable for imparting a lag between times at which the airtight cells communicating with each other via said communicating path begin to inflate.

7. A compressing device for a pneumatic massager, comprising a bag body (1) formed of a plurality of airtight cells (2, 3, 4) with sealed portions (5, 6) for separating said airtight cells and adapted to inflate and contract said airtight cells by supplying and discharging compressed air to and from said bag body.

said compressing device being characterised in that said bag body is provided with a notch (8) so that the leg or elbow of a user is exposed to sight when said bag body has been attached to the leg or elbow.

8. A compressing device for a pneumatic massager, comprising:

a bag body formed of a plurality of airtight cells, said airtight cells having sealed portions separating said airtight cells from each other,

said bag body having a peripheral side and a central side, and said airtight cells including a peripheral side airtight cell and a central side airtight cell;

a supply port in said peripheral side airtight cell for supplying compressed air;

a discharge port in said central side airtight cell for discharge port for discharging compressed air;

a plurality of communicating paths that differ from each other in at least one of cross-sectional area of opening, length and shape, each of said plurality of communicating paths fluidly communicating adjacent ones of said airtight cells, whereby the supply of compressed air to said supply port and discharge of air from said discharge port causes sequential inflation and contraction of said airtight cells; and

a thin, flat and flexible flow-course-retaining sheet having a plurality of holes, provided in at least one of said communicating paths.

9. A compressing device according to claim 8, characterised in that the opening cross section of the communicating path on the peripheral side is larger than that of the communicating path on the central side.

10. A compressing device according to any one of claim 8 and claim 9, characterised in that said communicating paths are formed by imparting a state devoid of airtightness to part of said sealed portions.

REPLACEMENT SHEET

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