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"CONVERSION OF MOTOR VEHICLE WHEELS".

This invention relates to methods and means for the modification of one or more driving wheels of a motor vehicle by the addition of elements to them. In one example, a wheel is converted to act as a windlass; in another, to give additional traction by the addition of a further wheel.

In most ordinary motor vehicles wheel discs are held to respective hubs by a number of screw-threaded connections arranged regularly angularly disposed about the axis of rotation of the wheel and hub.

These screw-threaded connections may be screw-threaded studs projecting from the hub, with nuts screwed down on them to entrap the disc, or may be bolts through the wheel screw-threadedly engaged in holes in the hub.

Proposals have been made in the past to use a vehicle's engine power to drive a windlass bolted to the hub. In these - see for example UK Patents 508763, 644257 and 1065690 - a cylindrical winding drum is bolted to the wheel hub using the screw-threaded connections, generally with the wheel still in place. In each case the drum is a three-dimensionally bulky component with obviously limited applicability; it would be desirable to provide more convenient means for extending the functionality of a vehicle wheel.

Instead of a single bolt-on unit the present invention uses a plurality of separate elongate members which screw-threadedly engage the hub - holding the wheel disc if this is left in place - together

providing means for retaining and/or defining a further functional part or parts.

Such elongate members may be bundled together compactly when not in use, and may be extremely versatile.

5 In one aspect of the invention a kit for forming a functional structure e.g. a windlass on a wheel hub comprises a plurality of separate elongate members each having a first end with means for screwing the member onto the wheel or wheel hub to extend axially therefrom, a central portion over which a line of the windlass is to be
10 wound, and a second end with larger radial dimensions than the central portion, comprising a substantially circular radially outwardly extending flange, to provide an array of said flanges for retaining wound line on the windlass.

In another aspect the kit comprises a plurality of separate
15 elongate members each having a central portion over which a line is to be wound, the central portion extending between first and second ends of the member, each of which ends comprises means for securing the member onto the wheel or hub to extent axially therefrom and a radially outwardly extending flange for retaining wound line on the windlass.

20 In a preferred form of this second aspect the members have a male screw-thread at one end and a female screw-thread (both of the same diameter and threading) at the other: then, the same members may be used whether the vehicle has a hub with studs or with apertures; and the normal screwing means of the wheel disc (nuts or bolts respectively)
25 are shifted to engage the screw-threaded hub of the member remote

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from the hub and entrap the additional element on them. The members may have a body which is a hexagonal column, that is in section the same as a hexagon nut or bolt-head, so that it may be driven by a spanner which fits also the normal screwing nuts or bolts of the wheel disc.

As has been stated, in the invention each elongate member has a radial end flange, e.g. a circular radial flange, so that the members can form a windlass without the need for a separate end member.

In another aspect the invention provides a method of extending the functionality of a vehicle wheel and/or wheel hub by screwing thereto a plurality of elongate members of the type described, and as appropriate attaching a line to one or more of the members to form a windlass, or an additional wheel to form a double wheel assembly.

In the latter case using elongate members having matching male and female threads at opposite ends, it is preferred that threaded nuts or bolts normally used to retain the wheel are removed, the members screwed on in their stead, and the removed nuts or bolts used to secure further members to the projecting ends of the elongate members.

It can be seen that the conversion of a wheel into a windlass can easily be done, so that the power of the motor vehicle may be applied to the line for lifting, haulage or any other purpose. When the vehicle is on a road or surface in the normal way, it will be necessary to jack it up to free the wheel for revolution for that purpose; but an important use envisaged is the rescuing of the vehicle itself from a

position where it is stuck or even overturned. The wheel is converted into a windlass, a line from the windlass attached to an anchor such as a tree or pole, and the vehicle may extricate or right itself by driving the converted wheel in rotation.

5 Particular embodiments of the invention will now be described with reference to the accompanying drawings.

Figs. 1 to 6 do not show embodiments of the invention, however, but rather explain the use of separate elongate members in a wheel conversion kit.

10 Figure 1 is a perspective view of a conversion member;

Figures 2a and 2b show in partial section a converted and normal wheel respectively of one type;

Figures 3a and 3b show in partial section a converted and normal wheel respectively of another type;

15 Figures 4a and 4b show stages in the conversion of a wheel on a motor vehicle;

Figures 5 and 6 show in diametrical section and face view respectively a converted wheel in use as a windlass;

20 Figure 7 shows in partial section forms of conversion member embodying the invention, and

Figure 8 shows how a converted vehicle wheel may be used in recovery of the vehicle itself.

25 Figure 1 shows a conversion member 1 having a hexagonal-section body 2 with a male screw-threaded projecting portion 3 at one end and a female screw-threaded portion 4 at the other. It is made of

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strong metal such as high-tensile steel. The diameters and threadings of the two portions 3, 4 are the same, and the cross-sectional dimensions of the hexagonal-section body 2 are those of standard hexagon nut or bolts used for securing the wheels of motor vehicles. The transition between the body 2 and the portion 3 may be formed as a conventional centering cone (14, Figure 2). The body 2 is axially elongate being for example 7.5 cm long at least - very substantially longer than the usual nuts or bolts used in this context.

Figure 2 shows the members in use on a wheel hub 5 of the aperture type, where a wheel disc 13 is usually secured by bolts 6 screw-threadedly engaging apertures 7.

For converting this wheel the bolts 6 (Figure 2b) are removed and the male portions 3 are screwed one by one into the vacated apertures 7 (Figure 2a). When they are all positioned, there is an array of female portions 4 mimicking the disposition and size of the apertures 7. Previously, a looped end of a line may have been slipped over one of the members 1, as will be explained.

Figure 3 shows how the same members 1 may be used for the conversion of a wheel where the hub 9 has screw-threaded projecting studs 11. A wheel disc 13 is usually secured by cap nuts 12 on these studs (Figure 3b). For conversion these are removed and replaced one by one by members 1, this time with the portion 4 being screwed onto the stud 11.

Figures 4a and 4b show, in self-explanatory fashion, the sequence of assembly of the conversion onto a front wheel of a front-

wheel-drive motor vehicle.

Figures 5 and 6 show the conversion of a tyred wheel 20 to a windlass with a line 21 coiled onto the cage formed by the five bodies 2 of members 1, around one of which was passed during assembly a loop 22 at one end of the line. Of course, the line may be clipped or tied onto a member 1 after assembly. The wheel disc 13 and a dished end disc 8 form the end flanges of the windlass of which the "drum" is the cage of bodies 2.

Rotation of the wheel by the usual engine drive of the vehicle will cause line 21 to be paid out or hauled in, so as to provide motive power to haul or lift objects or to move the vehicle itself.

The kit described above with reference to Figs. 1-6 uses a separate end disc 8 secured to the members 1 using bolts 6 or nuts 12 as appropriate. Use of such a disc is known e.g. from US Patent 3,820,734 of Selliken.

Figure 7 shows modifications embodying the present invention. An end flange for a windlass need not be formed by an integral, additional, end disc such as 8 but by the total effect of an array of end flanges 25 on each of the members 1'. If end flanges 26 are provided also on the other ends of the bodies of the members 1', so that they are bobbin-like, the members may be used interchangeably on the wheel hub type of Figure 2 (flanges 25 being outermost) or that of Figure 3 (flanges 26 then being outermost).

Other elements may be secured to the wheel. One such is a second wheel to provide additional traction in soft or wet places. The

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second wheel has holes disposed similarly to those on the first wheel disc 13. Nuts 12 or bolts 6 holding on the first wheel 13 are removed and elongate members 1 screwed on in their stead, as shown in the lower halves of Figs. 2a or 3a. Then the holes of the additional wheel 31 are located on the projecting ends of the members 1 and the removed nuts 12 or bolts 6 are screwed on to secure the wheel 31 as the disc 8 is secured in the windlass example. To support the assembly a short cylindrical steel tube (not shown) may be positioned coaxially and encircling the elongate members between the wheels, with its circular end edges abutting the respective wheel discs.

Figure 8 shows various ways in which the present invention may be used in vehicle recovery. This will be especially valuable in wild remote areas when help is not readily at hand, or for emergency or military vehicles. Car 27 has gone off the road and overturned. Provided its engine is still functional, by conversion of an appropriate one of its wheels to a windlass and securing its line to an anchor such as tree 28 the car may be righted. Car 29 has got stuck in a ravine; it may pull itself clear by conversion of a wheel to a windlass and attachment of the line to the convenient tree 28. Car 30 has become bogged down in soft ground. Conversion kits have enabled four (or it could be two) extra wheels 31 to be fitted to radically increase its ground-engaging wheel surface.

Car 32 is using a line from a converted wheel to pull itself up a steep slope 33.

By the addition to the basic conversion kit (an appropriate

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number of members 1, line and spanner) of one or more additional elements such as pulleys, couplings and the like for the line, the versatility of the conversion is greatly increased.

CLAIMS.

1. A kit for converting a motor vehicle wheel and/or wheel hub to a windlass, comprising a plurality of separate elongate members each having a first end with means for screwing the member onto the wheel or wheel hub to extend axially therefrom, a central portion over which a line of the windlass is to be wound, and a second end with larger radial dimensions than the central portion, comprising a substantially circular radially outwardly extending flange, whereby said plural members are adapted to provide an array of said flanges for retaining wound line on the windlass.
2. A kit according to claim 1 wherein each flange is substantially flat.
3. A kit according to claim 1 or claim 2 wherein the first end of each member also has a substantially circular radial flange.
4. A kit for converting a motor vehicle wheel and/or wheel hub to a windlass, comprising a plurality of separate elongate members each having a central portion on which a line of the windlass is to be wound, the central portion extending between first and second ends of the member each of which ends comprises means for screwing the member onto the wheel or hub to extend axially therefrom and a radially outwardly extending flange for retaining wound line on the windlass.
5. A kit according to any one of the preceding claims wherein each elongate member has a male screw thread at one end and a female screw thread at the other end, the male and female threads being substantially coaxial.



6. A kit according to any one of the preceding claims wherein the central portions of the elongate members have surface flats.

7. A kit according to claim 6 wherein each elongate member has a hexagonal cross-section along at least part of its length for

5 engagement by a spanner.

8. A vehicle wheel and/or wheel hub adapted to wind or pay out a line, including a plurality of elongate members according to any one of claims 1 - 8 with ends thereof screwed to the wheel or wheel hub,

10 extending axially away from the wheel to define a drum about which the line is to be wound, and an array of said flanges to retain line on the drum.

9. An adapted wheel and/or hub according to claim 8 wherein the elongate members are similar and evenly spaced around a circle centred on the wheel or hub axis.

15 10. A double vehicle wheel assembly comprising inner and outer coaxial wheels fixed to a wheel hub by a plurality of separate elongate members of a kit according to any one of claims 1 - 7, the members having their first ends screwed to the hub through holes in the inner wheel, and extending axially outwardly to the outer wheel which is

20 secured to their second ends.

11. A method of adapting a vehicle wheel or wheel hub for additional functionality, including the step of removing at least some nuts or bolts for retaining the wheel on the hub and screwing a plurality of elongate members according to any one of claims 1 - 7 onto the hub in

25 place thereof.



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12. A method according to claim 11, further comprising attaching a line to at least one of the members to form a windlass.

13. A method according to claim 11, further comprising using the removed nuts or bolts to secure an additional wheel to the ends of the
5 elongate members remote from the hub, to form a double wheel assembly.

14. A kit for converting a motor vehicle wheel and/or hub substantially as herein described and shown with reference to Figure ⁷~~8~~ of the drawings.

10 15. A vehicle wheel and/or hub adapted to wind in or pay out a line, substantially as herein described and shown with reference to Figure 8 of the drawings.

16. A method of adapting or converting a vehicle wheel and/or wheel hub substantially as herein described with reference to Figure ⁷~~8~~ of the drawings.

