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(54) Manhole cover with torsion spring hinge to facilitate opening

(57) A manhole cover comprises a frame and a cover (2) hinged to the frame. A pair of torsion springs (14) are mounted in respective boxes (8) removably secured to the inside of the frame (1). The upper end (17) of each spring (14) bears against the underside of the cover (2) and supports at least part of its weight. A locking lever (18) is provided for keeping the cover in its open position after it has been opened.

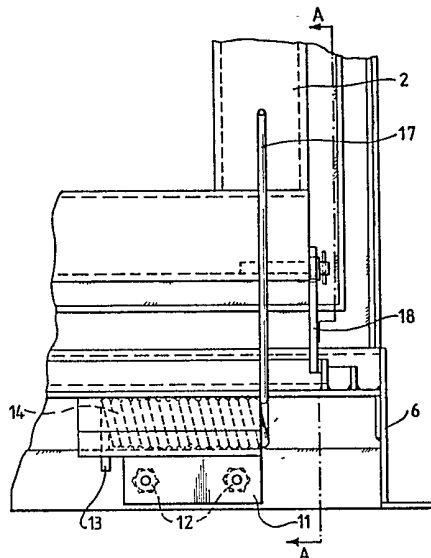
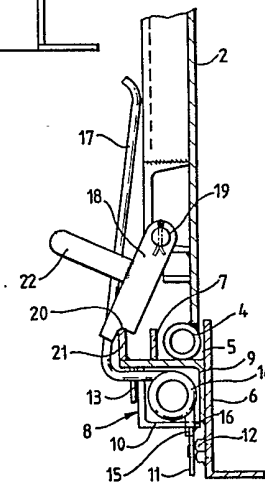


Fig. 2.

Fig. 3.



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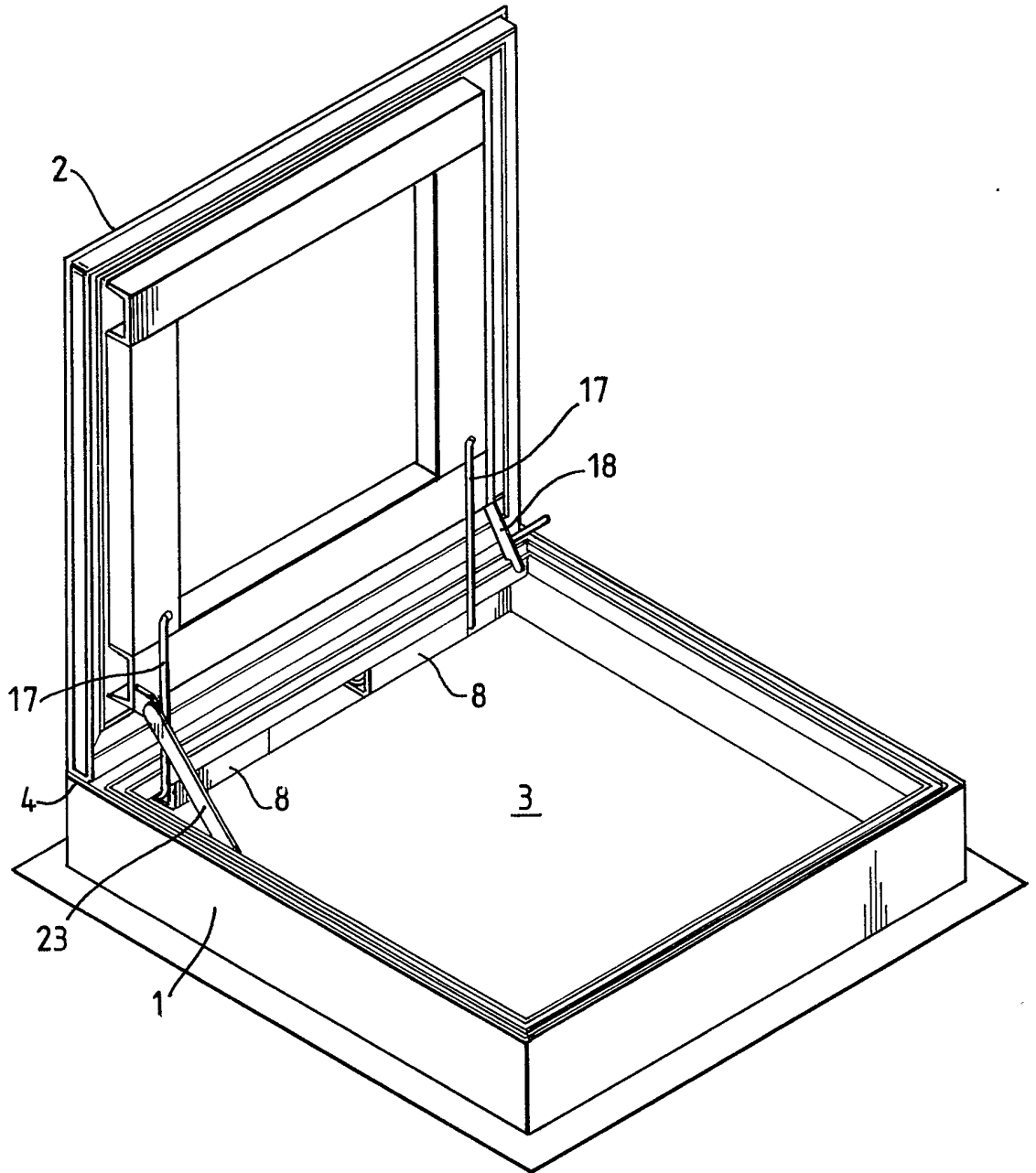


Fig.1.

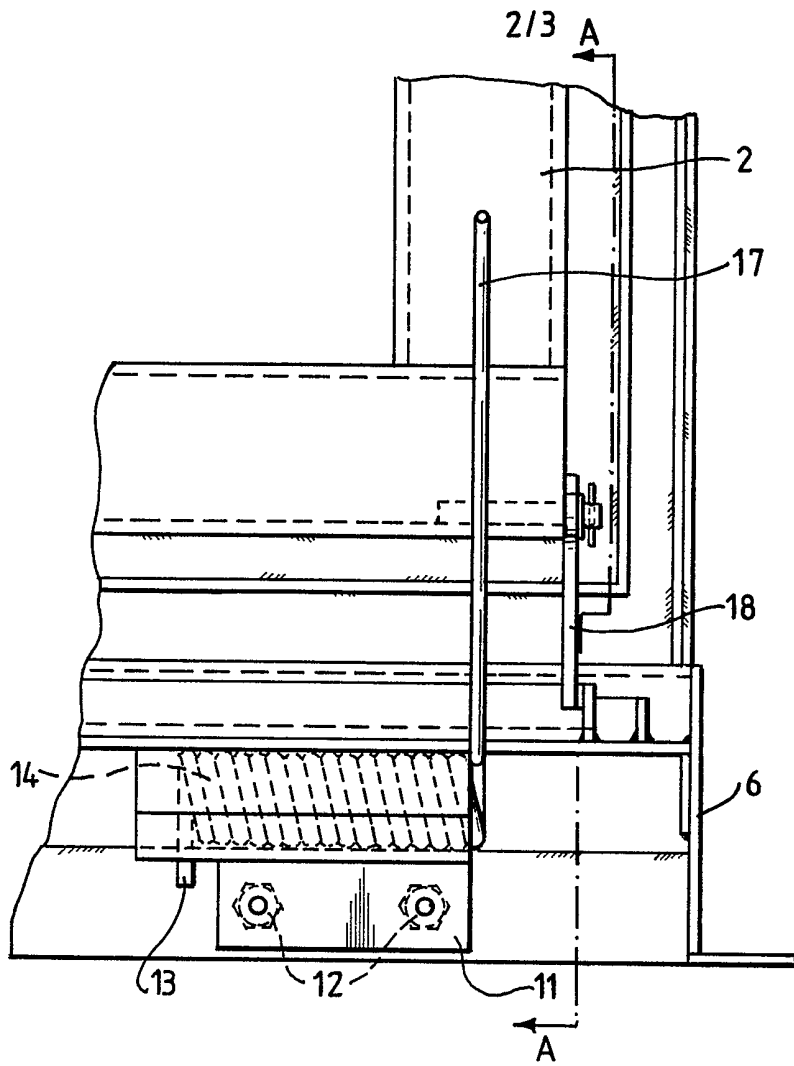
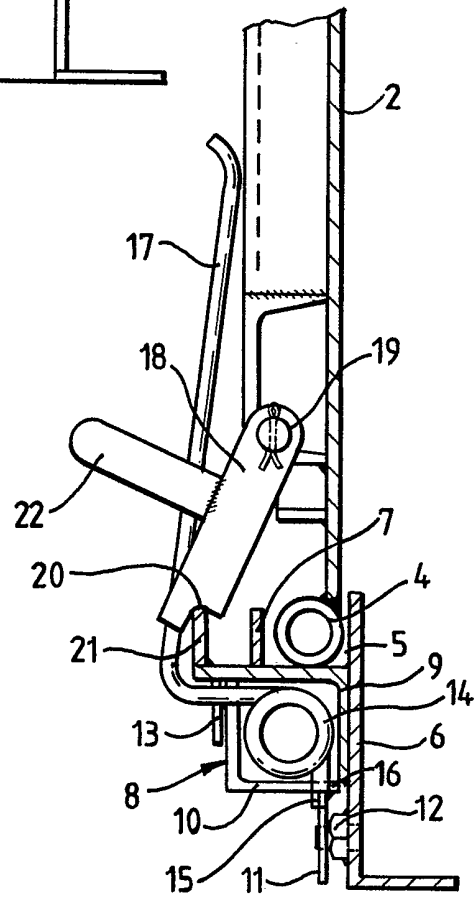
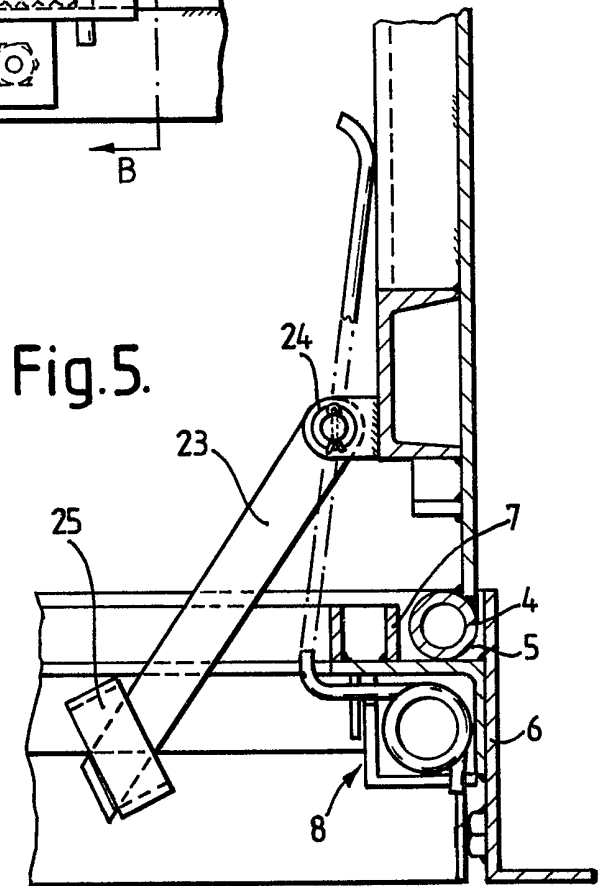
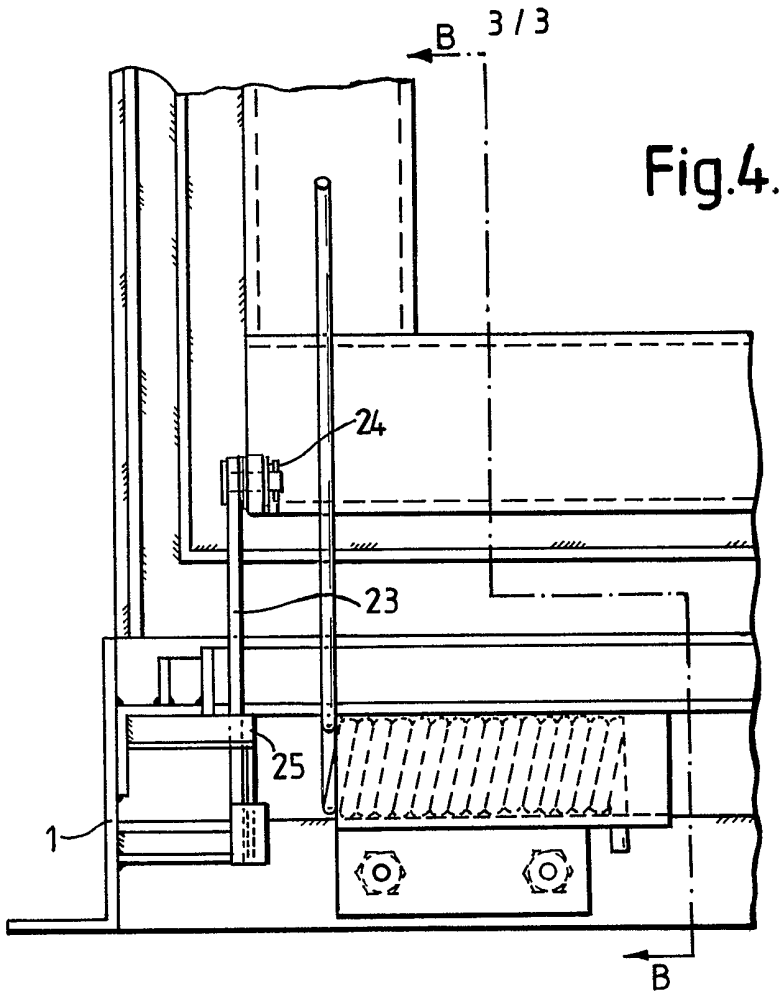


Fig. 2.

Fig. 3.





SPECIFICATION

Manhole cover

5 This invention relates to a manhole cover. The invention is particularly, though not exclusively, concerned with heavy duty manhole covers, such as are found, for example, on the forecourts of petrol stations. In these situations the heavy duty manhole covers have to be lifted in order that petrol tanker drivers may have access to petrol tanks for the purpose of filling them. Because of the need for the manhole covers to withstand exceptionally heavy loads, they are conventionally made of thick sheet metal and are therefore very heavy to lift. There is consequently some risk of injury to a person seeking to lift the manhole cover, and tankers drivers are therefore generally unwilling to lift the covers unaided. It is an object of the present invention to provide a manhole cover which is easier to lift and, advantageously, a heavy duty manhole cover which can be lifted by a single individual.

According to the present invention there is provided a manhole cover comprising means defining an opening, a cover member hinged to the said means and movable between a closed position and an open position, and at least one spring arranged to support at least part of the weight of the cover member.

An embodiment of the present invention will now be described with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of the manhole cover with the cover member in the open position;

Figure 2 is a front elevational view, on a larger scale than *Figure 1*, showing part of the rear portion of the manhole cover;

Figure 3 is an end elevation taken on line A-A in *Figure 2*;

Figure 4 is a front elevation of the opposite end of the rear portion of the manhole cover to that shown in *Figure 2*; and

Figure 5 is an end elevation taken on line B-B in *Figure 4*.

As shown in *Figure 1*, the manhole cover comprises basically a frame 1 and a cover member 2 ordinarily, the top edge of the frame 1 will be flush with the surrounding surface, for example, the surface of a petrol station forecourt. The frame 1 defines an access opening 3, which gives access to one or more petrol storage tanks beneath the forecourt surface. As can be seen in *Figure 1*, the upper edge of the frame 1 and the lower edge of the periphery of the cover member 2 have inter-engaging lips which define a labyrinth seal to prevent the ingress of dirt and other contaminants. The labyrinth seal is intended in use to be filled with a grease. The form of such a seal is conventional in the industry, and will therefore not be described further in detail here.

The cover member 2 is hinged to the frame 1 by means of a tube 4. As can be seen in *Figure 3*, the tube 4 is welded to one edge of the cover member 2, and extends along a channel 5 defined between a rear wall 6 of the frame 1 and one of the above-

mentioned lips 7. The ends of the tube 4 are received in apertures in the side walls of the frame 1, as can be seen in *Figure 1*.

Two boxes 8 are mounted on the inside of the rear wall 6 of the frame 1. As can be seen in *Figures 3* and *5*, each of these boxes comprises a rolled steel angle 9 which is welded to the rear wall 6. A further angle 10 completes the box. The angle 10 has a flat 11 welded thereto and depending downwardly therefrom. A pair of nuts 12 are welded to the rear wall 6 behind the flat 11, and the flat 11 and rear wall 6 each have a pair of apertures aligned respectively with the threaded aperture in one of the nuts 12. A pair of bolts (not shown) pass through the apertures and are received by the nuts 12, so as to hold the angle 10 in place. The upper edge of the angle 10 is prevented from tilting forward by a flat 13 which is welded to the underside of the horizontal portion of the angle 9.

Within each box 8 is mounted a respective torsion spring 14. One end 15 of each spring is received in an aperture 16 in the lower portion of the angle 10. The upper end portion 17 of each torsion spring passes around the end of the upright wall of the angle 10 and bears against the underside of the cover member 2.

The manhole cover is provided with a safety lock to retain the cover member 2 in its fully open position. This lock takes the form of a flat 18 which is pivotally connected to the cover member 2 by a pivot 19. The lower end of the flat 18 has a notch 20 which engages an upwardly extending lip 21. When the cover member 2 is moved to its open position the notch 20 automatically engages the lip 21. The lock can only be released by pivoting the flat 18 upwardly, either by foot or by hand, and for ease of operation a further flat 22 is welded to the flat 18 for engagement by the user.

The extent to which the cover member can be opened is limited by a guide member 23 which is pivotally connected at one end to the cover member 2 by means of a pivot 24, and which is slidably received in a guide 25 defined by a U-shaped member welded to the frame 1. The lower end of the guide member 23 is turned at right-angles to the main portion thereof so as to prevent pivotal movement of the cover member 2 beyond the position shown in *Figure 5*. It should be mentioned, however, that although, for ease of illustration the cover member has been shown as reaching its fully open position when at an angle of 90° to the plane of the frame, in practice it is desirable that the cover member should open somewhat further, say to an angle of 95°, so as to provide for easier access.

As will be understood, the springs 14 serve to support part of the weight of the cover member 2. This means that the cover member can be opened much more easily, and typically it can be opened safely by one person. By way of example, in a typical manhole cover according to the invention, with an access opening of 600 mm × 600 mm, the vertical lift required to lift the cover member 2 varies from approximately 8 kg when lifting commences

up to a value of 14 kg shortly before the cover member reaches an angle of 90°. It would be possible, by using stronger springs, to reduce the required forces still further, but if the initial opening force is reduced too much there will be a danger of the cover member springing open unintentionally. This disadvantage could be avoided by providing the manhole cover with a lock, but this in turn would give rise to further drawbacks, for example the risk of the lock being rendered inoperative by dirt, freezing, loss of keys, or the like.

The presence of two springs gives a measure of safety protection, since in the event of one spring failing the other spring will provide at least some support. Attention is also drawn particularly to the fact that the springs are readily accessible by virtue of the fact that the angles 10 can be easily removed from the frame by undoing the bolts which hold the angles 10 in position. It may be noted that the springs are desirably coated with an appropriate grease, for example, a calcium soap extreme pressure grease.

Various modifications may be made to the embodiment described above. For example, the angles 10 and 11 may be replaced by single member of Z-shape. Also, it may be more convenient to weld the nut 12 to the outside of the rear wall 6 (rather than the inside as shown in Figures 3 and 5), with a bolt extending into the nut from the inside. Another modification is to replace the U-shaped member 25 by a pair of members, namely an angle piece of right-angled cross section secured to the side walls of the frame 1 and to the underside of the upper edge of the frame, and a U-shaped member secured to the said angle piece and defining the opening through which the guide member 23 passes.

CLAIMS

1. A manhole cover comprising means defining an opening, a cover member hinged to the said means and movable between a closed position and an open position, and at least one spring arranged to support at least part of the weight of the cover member.

2. A manhole cover according to claim 1, wherein the or each spring is a torsion spring extending parallel to the hinge axis of the cover member and adjacent to said axis, a free end of the said spring extending into contact with the cover member at a location spaced from the said axis to effect support of at least part of the weight of the cover member.

3. A manhole cover according to claim 2, wherein the or each spring is mounted in a box removably secured to the means which defining the said opening.

4. A manhole cover according to any preceding claim, comprising at least two of said springs.

5. A manhole cover according to any preceding claim, comprising a locking lever arranged to move automatically to a locking position when the cover member is moved to its open position to prevent the cover member returning to its closed

position until the locking lever is moved from its locking position.

6. A manhole cover according to any preceding claim, wherein the means which define the said opening and the cover member define between them a labyrinth seal which, in use, may be filled with a grease.

7. A manhole cover substantially as herein described with reference to the accompanying drawings.

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