Feb. 26, 1935. J. D. COLEMAN 1,992,354

SAFETY HINGE FOR MANHOLE COVERS

Filed June 8, 1933

Fig. 1.

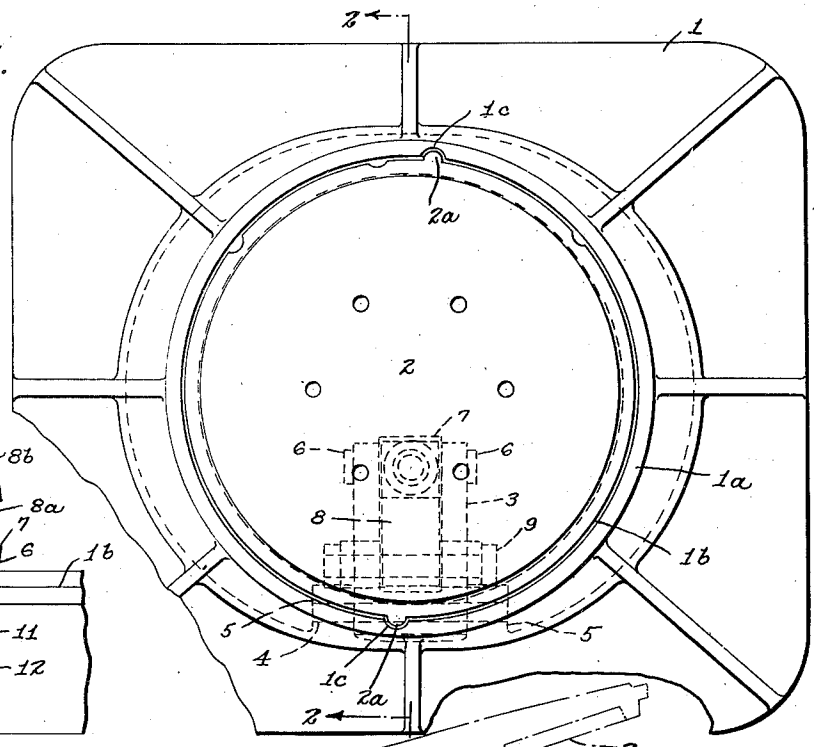


Fig. 3.

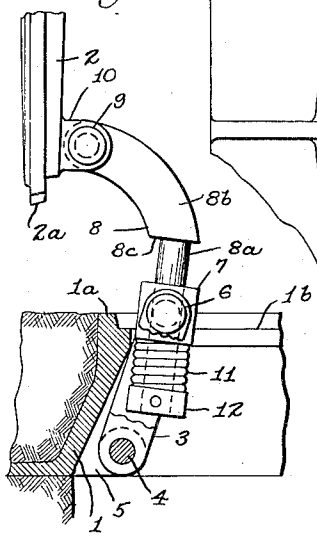


Fig. 2.

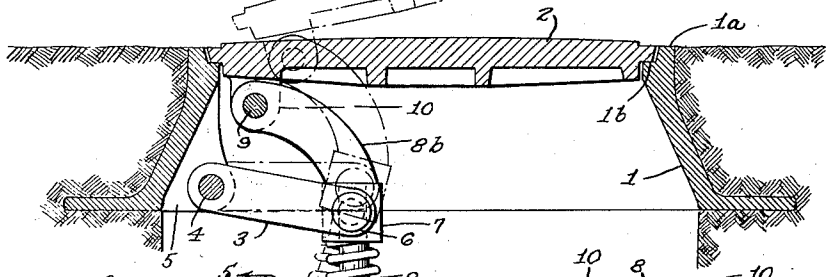


Fig. 4.

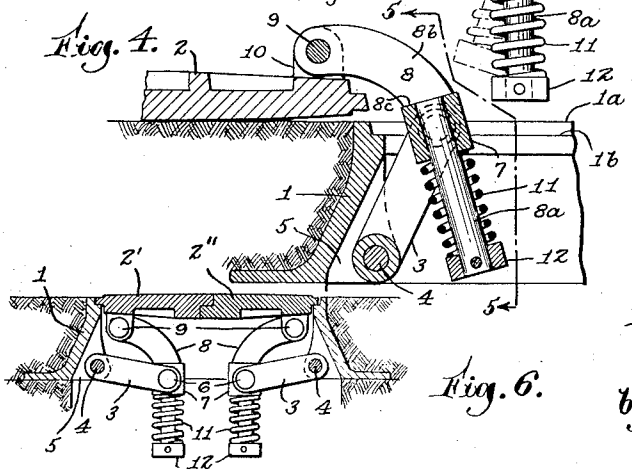


Fig. 6.

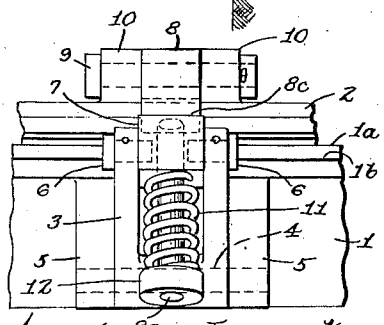


Fig. 5.

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Patented Feb. 26, 1935

1,992,354

UNITED STATES PATENT OFFICE

1,992,354

SAFETY HINGE FOR MANHOLE COVERS

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Application June 8, 1933, Serial No. 674,815

6 Claims. (Cl. 16—179)

This invention relates to improvements in a safety hinge for manhole covers.

Manhole covers, so far as I am aware, are merely placed over the entrance to a manhole and are free to be removed or displaced. It is not uncommon for gases to collect in the manholes and if these are of an ignitible nature there is danger of a rather violent explosion. Such explosions occur with sometimes fatal results. In most cases the greatest damage outside of the manhole is caused by the cover. If the explosion is a comparatively mild one, the cover may be only blown a few feet away but if this occurs after dark and is not promptly discovered, the open manhole becomes a serious menace. Where the explosions are more violent the cover is thrown from the hole with considerable force and in such cases not only has considerable property damage been effected by the projectile but, as already stated, severe personal injuries and even death have resulted. To the prevention of such "flying" manhole covers the present invention is directed.

It is a principal object of the invention to provide a safety hinge for a manhole cover whereby the latter will be prevented from hurtling through the air in the case of a violent explosion and will be only slightly displaced from its normal setting after a mild explosion has taken place.

The particular hinge shown in the accompanying drawings is the preferred form in which I have contemplated embodying my invention but this is nevertheless to be taken as primarily illustrative and it is intended that the patent shall cover by suitable expression in the appended claims whatever features of patentable novelty exist in the invention disclosed.

In the drawing:

Figure 1 is a plan of the cover and its base support with the improved hinge shown in dotted outline;

Figure 2 is a section in elevation as on line 2—2 of Figure 1, showing in full lines the normal positions of the parts when the cover is closed, and showing in dot-and-dash outline a possible position of the parts when a mild explosion occurs;

Figure 3 is a similar view, with portions cut off, showing the relation of parts at the height of a violent explosion;

Figure 4 is a similar view showing the position of the parts after a violent explosion has occurred or when the cover is opened manually;

Figure 5 is an elevation taken as on line 5—5 of Figure 4; and

Figure 6 is a view like Figure 2, showing a modification.

Referring more particularly to the drawing, the manhole shell comprises a base 1 which is secured in the ground or street with its upper edge 1*a* flush with the surface. This edge has a recessed shoulder 1*b* upon which the cover 2 normally rests. In this upper edge there is provided one or more recesses 1*c* to receive lugs 2*a* outstanding on the peripheral edge of the cover. This engagement of lug and recess prevents any rotation or displacement of the cover when a heavy truck or other power driven vehicle passes over it.

At one side of the base opening is located the safety hinge of the invention. The preferred form of hinge shown has a U-shaped link member 3 which is pivotally secured to a shaft or base pin 4 extending between ears 5 attached to or integral with the base itself. Each leg of the U-link carries a cylindrical pin 6 which engages a corresponding hole on the side of a block 7, thus pivotally mounting the block on the U-link.

Extending through a hole in this block is the cylindrical shaft 8*a* of another link 8 having a curved end 8*b* pivotally secured to a pin 9 which extends between ears 10 attached to or integral with the cover. This curved end of the link is larger than its cylindrical shaft to provide a shoulder 8*c* which seats on the upper face of the block 7. Against the lower face thereof is seated a compression spring 11 which is coiled about the shaft and held thereon by a suitable collar 12 pinned to the shaft at its lower end.

When the cover is closed, as seen in full lines in Figure 2, the hinge parts assume the positions shown, very little, if any, compression being exerted on the spring. If now a mild explosion occurs in the manhole, the cover will be lifted from its seat to some such position as is indicated in dot-and-dash outline in Figure 2. The U-link 3 will swing upward around the base pin 4, the curved link 8 and block 7 will rotate with respect thereto and also with respect to the cover pin 9 and possibly the shaft 8*a* may move slightly through the block 7 and impose minor compression on the spring 11. Ordinarily, however, the weight of the cover itself will be sufficient to resist the force of the explosion so that practically all the hinge parts have to do in the case of a mild explosion is to guide the cover in its return after the lifting force on it has been expended. Thus in the case of a relatively small explosion, the safety hinge insures that the cover will return to substantially its normally closed position and in any event will guide it sufficiently

close to such normal position as to eliminate the danger of an "open" manhole.

But the more important function of the hinge is to prevent the flying away of the cover when a violent explosion occurs. When this happens there is of course a terrific force imposed upon the under surface of the cover which tends to lift the latter bodily and throw it into the air. The cover starts to so lift but the hinge at once acts with an appreciable resistance on one side of the cover. The latter in consequence begins to turn about the cover pin 9 and thus places its under surface at an angle to the line of force of the gas bursting out through the neck of the manhole. Accordingly, this mere tilting of the cover lessens the effective force on it and places the cover in position when the gaseous forces acting on it are expanded in swinging the cover around to one side of the manhole opening. But in addition to thus guiding the travel of the cover, the safety hinge is also absorbing the force of the blow because as the cover lifts the U-link 3 swings upward and the curved link 8 is pulled upward through the block 7 against the compressive resistance of the spring 11. As the compression of the latter increases, its resistance becomes greater and this occurs simultaneously with the tilting of the cover and the lessening of the effective force acting upon it. As a result the most upward extreme position reached by the cover in the case of a violent explosion is shown in Figure 3 when the cover 2 is vertical, the U-link 3 is at the end of its swing, and the spring 11 is under substantially maximum compression.

The momentum of the cover will carry it past the vertical and it will fall upside down beside the manhole opening as seen in Figure 4 where, it is to be noted, the spring 11 has returned the curved link 8 to its normal position with respect to the block 7. This position of the cover is also that to which it can be swung manually when workmen desire to enter the manhole at any time. It is to be noted that in lifting the manhole cover manually, the latter may be swung about its edge nearest the pin 9 without causing any appreciable compression in the spring 11.

In Figure 6 is shown a modification illustrative of how the cover could be made in sections and each section provided with a separate safety hinge. Here only two sections 2', 2'' are shown but it is evident that more sections could be provided if desired. With such a sectioned cover the sections would fly outward divergently and be distributed about the opening in accordance with the restraining or cushioning action, as well as the guiding influence, of the several hinges.

The safety hinge is simple and economical to construct and may be incorporated as a part of the entire cover assembly or may be readily attached to already installed shells of the conventional type. It is to be noted that the curved link, block and spring are so disposed when the cover is closed that any drainage around the edge of the cover will not reach them. Thus there is slight danger of corrosion and where this may be increased by the nature of the vapors in the manhole, the movable hinge parts can be made of corrosion-resisting material at only slightly greater cost.

The safety hinge of the invention in no wise interferes with the manual removal of the cover proper, but does effectively prevent its undue displacement when minor explosions occur and its destructive projection into space when a violent explosion happens.

I claim:

1. A safety hinge for a manhole cover comprising a link pivotally connected to the manhole base, a link pivotally connected to the cover, and means connecting said links including a spring whereby a force acting on the cover in direction to lift it from the base is cushioned by the resistance offered by the spring.

2. A safety hinge for a manhole cover comprising a U-shaped link; a block journaled thereon; a link pivotally connected to the cover having a portion extending through the block, and having a shoulder near its end; a spring interposed between said block and said shoulder capable of resisting the movement of the link through said block consequent upon the lifting of the cover by an explosion occurring in the manhole, whereby the cover is restrained in its displacement.

3. A safety hinge for a manhole cover comprising a link pivotally connected to the manhole base; a block pivotally connected to said link; a second link pivotally connected to the cover having a portion extending through the said block and terminating in a shoulder; and a spring coiled about said portion between said block and said shoulder and capable of resisting the movement of the second link upward through said block.

4. A safety hinge for a manhole cover comprising a member associated with the manhole base; and linkage pivotally connected to the cover and arranged to move therewith upon the occurrence of an explosion in the manhole; said linkage having a movable connection with the said member and there being a spring associated with said linkage and adapted to resist the said movement and thereby limit the displacement of said cover from the hole.

5. A safety hinge for a manhole cover comprising a member connected with the manhole base, a member pivotally connected to the cover and movably connected to the first said member; a spring interposed between said members, capable of resisting relative movement between the said members to thereby yieldingly limit the displacement of the cover relative to the base.

6. A safety hinge for a manhole cover comprising linkage connected to the manhole base and to the cover arranged and adapted to permit the cover to be manually swung to a position beside the manhole opening and capable of guiding the cover to said position in the event of an explosion in the manhole; said linkage having associated therewith a spring capable of cushioning the force exerted upon the cover by the explosion.

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