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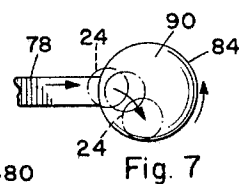
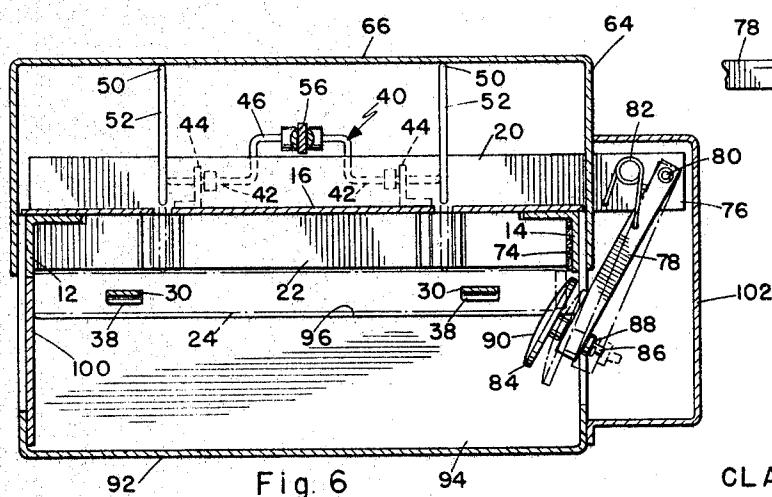
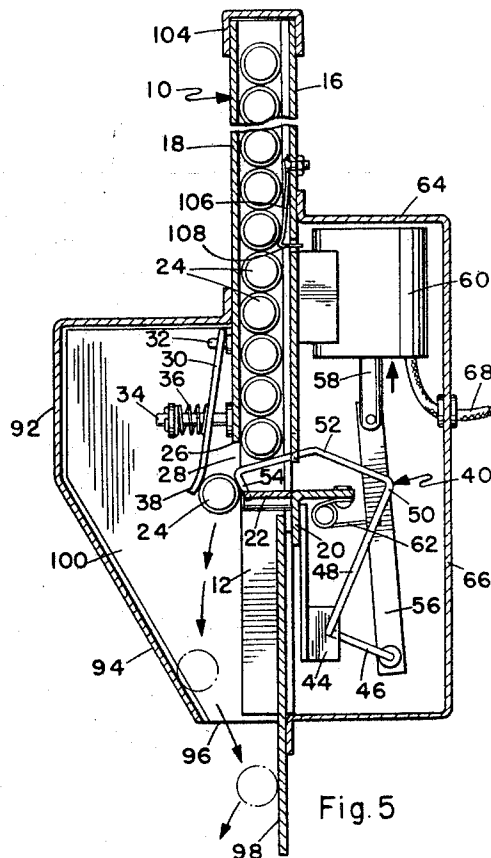
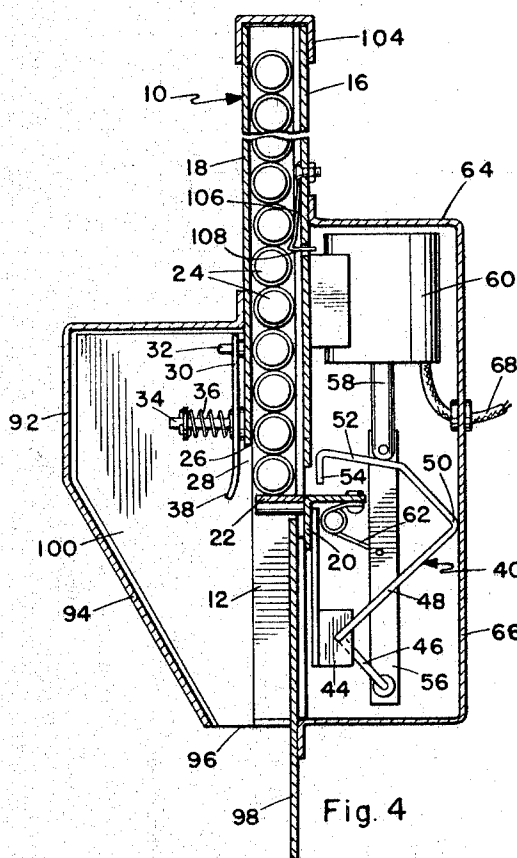
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REMOTELY CONTROLLED HIGHWAY FLARE EJECTOR

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2 Sheets-Sheet 2



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3,298,307 REMOTELY CONTROLLED HIGHWAY FLARE EJECTOR

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1 Claim. (Cl. 102—37.4)

The present invention relates to emergency equipment and more specifically to a remotely controlled highway flare ejector.

In highway emergencies the area is usually marked by pyrotechnic flares to warn approaching traffic. The most common type of flare is ignited by a special chemical striker incorporated in a removable cap, which is the only means by which the flare can be ignited, making it safe to carry and handle. The flares are carried in vehicles and, when needed, are ignited manually and dropped at intervals along the highway. This is time consuming and can be very dangerous on a busy highway, since the flares must usually be placed in an active traffic lane. Some automatic igniters have been developed, but usually use special flares which are readily ignited and are dangerous to carry. Flare ejecting means using springs or similar means have also been used. However, these ejectors throw the flares for some distance and the flares which are usually cylindrical, tend to roll away from their intended positions, often starting fires in brush or hedges at the side of the road.

The primary object of this invention, therefore, is to provide a flare ejector which will carry conventional safety type flares in a magazine and will eject the flares one at a time, igniting each as it is ejected, the flares being fully protected against pre-ignition and enclosed in a weather-proof container.

Another object of this invention is to provide a flare ejector which is adapted for mounting on the rear of a police car or other emergency vehicle in such a manner that the flares are dropped directly down onto the road surface and any rolling of the flares will be in the direction of vehicle travel instead of to the side of the road. Since the vehicle will normally be travelling slowly in the final approach to the scene of an emergency, rolling will be reduced to a minimum.

A further object of this invention is to provide a flare ejector which can be operated from inside the vehicle, as by a push button, to drop flares in rapid succession while the vehicle is moving.

In the drawings:

FIGURE 1 is a side elevation view of the ejector unit mounted on the rear of a vehicle;

FIGURE 2 is a rear elevation view thereof;

FIGURE 3 is an enlarged sectional view taken on line 3—3 of FIGURE 1;

FIGURE 4 is a sectional view taken on line 4—4 of FIGURE 3;

FIGURE 5 is a view similar to FIGURE 4, showing the flare ejecting action;

FIGURE 6 is a sectional view taken on line 6—6 of FIGURE 3; and

FIGURE 7 is a detail of the striker, showing the striking action.

Similar characters of reference indicate similar or identical elements and portions throughout the specification and throughout the views of the drawing.

STRUCTURE OF UNIT

The unit is constructed around a flare magazine 10, comprising a pair of spaced parallel guide rails 12 and 14 which are enclosed into a rectangular box-like structure by a front panel 16 and a back panel 18, said guide rails

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extending well below the panels. The front and back designations relate to the unit as mounted on the rear of a vehicle, with the flares being ejected to the rear. At the lower end of front panel 16 is a transverse cross bar 20 secured between guide rails 12 and 14 on the forward side thereof, and extending rearwardly from the cross bar is a horizontal shelf 22 extending across the lower end of magazine 10. The width and thickness of the magazine 10 are such that flares 24 are held horizontally, one above the other in a single stack and can slide down easily between the guide rails when the magazine is in its normal vertical position. The bottom flare of the stack rests on shelf 22, the lower edge 26 of back panel 18 being spaced above the shelf to leave an elongated transverse opening 28, through which a single flare can pass in a direction perpendicular to its length. The flare on shelf 22 is held against unintentional displacement by a pair of retaining fingers 30 mounted on the back panel 18, the fingers being pivotally attached at their upper ends on pins 32 and being slidable on posts 34 to swing rearwardly. Fingers 30 are biased by springs 36 to rest against back panel 18 and have rearwardly curved lower ends 38 extending across the opening 28.

Each flare is ejected by an ejector yoke 40 which can be formed from a single piece of rod or wire. The ejector yoke 40 has coaxial shaft portions 42 parallel to shelf 22 and journaled in bearings 44 mounted below cross bar 20, with a downwardly and forwardly extending crank portion 46 between the bearings. Extending upwardly and forwardly from opposite ends of the shaft portions 42 are arms 48 having bent elbows 50, the upper portions 52 of said arms extending rearwardly and having downwardly projecting pusher bars 54 spaced to engage a flare simultaneously near the opposite ends. In the static or inoperative position the pusher bars 54 are slightly forward of front panel 16 and just above the cross bar 20, as in FIGURE 4. The ejector yoke 40 is operated by an actuating bar 56 attached at one end to crank portion 46, the other end of the actuating bar being connected to the plunger 58 of a solenoid 60 mounted on front panel 16. The mechanism is biased to the inoperative position by a spring 62 connected between actuating bar 56 and the cross bar 20, forcing the actuating bar down and the elbows 50 forwardly. The solenoid and ejector mechanism are fully enclosed by a front cover box 64 secured to the magazine 10 to protect the mechanism from rain and damage. In the forward position the elbows 50 rest against the front wall 66 of cover box 64, as indicated in FIGURE 4, so providing a stop to limit downward movement of plunger 58. An electrical cable 68 extends from solenoid 60 through a push switch 70 to the vehicle battery 72, the switch being installed in any suitable position in the vehicle, such as on the driver's instrument panel.

The flares 24 are stored in the magazine 10 with their exposed igniter ends all at the same side, the guide rail 14 on that side being lined with a protective pad 74, of felt or the like, to prevent damage to the igniters and improve the safety of the mechanism. Cross bar 20 extends beyond the guide rail 14 to provide a bracket portion 76 which carries a striker unit. A striker arm 78 is attached at one end to the bracket portion 76 by a hinge pin 80 to swing horizontally, and is biased by a spring 82 to extend rearwardly and inwardly across the guide rail 14. On the other end of arm 78 is a striker disc 84 rotatably mounted on an axial pin 86 through said arm, which is retained by a cotter key 88, or similar means, to facilitate replacement. Striker disc 84 is disposed in a substantially vertical plane and has a striking face 90 coated with the chemical composition known as "phosphoric scratch mix" which reacts with the igniter end of the flare to cause ignition. For safety reasons this particular composition is the only means by which the conventional

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flare can be ignited easily and is the material used on the usual striker cap which is removed from a flare prior to use. When the present ejector is used, the striker caps are removed and discarded since these are for manual striking only. Due to the angular position of arm 78, the striking face 90 is inclined across the end of opening 28 through which the igniter end of each flare is ejected, so ensuring positive striking contact. The spring 32 allows the arm 78 to swing back, while maintaining the striker disc 84 in firm contact with the flare.

The lower rear portion of the unit is enclosed and protected by a rear cover box 92, having a downwardly and forwardly inclined rear wall 94 terminating at a bottom drop opening 96. Extending between guide rails 12 and 14 below the shelf 22 is a deflector plate 98 which extends well below drop opening 96. On the side of the rear cover box 92 remote from the striker mechanism is a side wall comprising a back-up plate 100, which is coplanar and flush with the guide rail 12, as in FIGURE 6, to form a smooth continuous face against which the inert end of each flare slides during ejection. This ensures a smooth exit and positive striker action. The striker mechanism is enclosed by a suitable cover 102 to complete the protection of the movable parts of the unit. The upper end of magazine 10 has a cap 104 which is removable for loading of flares and may be held on by any suitable fasteners, if necessary.

To prevent the flares from being displaced or even turned over in the magazine by the vehicle bouncing over rough ground, especially when the magazine is only partially full, detents 106 may be used, as in FIGURES 4 and 5. These are merely resilient wire elements secured at one end to the front panel 16 and extending downwardly and rearwardly into the magazine, the lower end of each element having a transverse shoulder 108 acting as a stop to prevent upward travel of the flares. Several vertically spaced detents may be used if necessary. Other types of spring clips, or even a follower spring below cap 104 are equally suitable.

The unit can be mounted on a vehicle in various ways, one suitable arrangement being illustrated in FIGURES 1 and 2. Brackets 110 are fixed to the front cover box 64 and extend down in front of the vehicle rear bumper 112, to which the brackets are secured by clamps 114. The unit is thus supported on the bumper and is disposed behind the vehicle trunk or body, with deflector plate 98 hanging behind the bumper.

OPERATION

As the vehicle is approaching the scene of an emergency, the push switch 70 is pressed at suitable intervals to drop flares at spaced positions leading to the scene. Each time solenoid 60 is energized the plunger 58 is pulled up and ejector yoke 40 swings forward, the pusher bars 54 pushing the bottom flare 24 out against the fingers 30, as in FIGURE 5. In this position the remainder of the flares are held up by the upper portions 52 of the ejector yoke, the igniter ends being protected against pre-ignition by the guide rail 14. As the ejected flare is pushed out through opening 28, it is deflected down by the curved ends 38 of fingers 30. This outward and then downward motion results in the end of the flare moving over the striker disc 84 in a somewhat arcuate path, as indicated in FIGURE 7. The friction ignites the flare and the change of direction imparts a slight rotation to the igniter disc 84, bringing a fresh area of striking face 90 into position for the next flare. It has been found that one striker disc will satisfactorily ignite several magazines of flares, after which it is easily replaced by a fresh disc.

The ignited flare drops onto the inclined wall 94 and down through drop opening 96, the inclined wall throwing the flare against deflector plate 98 which throws the flare to the rear against the motion of the vehicle. This lessens the forward roll of the flare and the vehicle would

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normally be travelling slowly at the time of release. The flare is ejected in a transverse position relative to the direction of travel, the alignment being maintained effectively by the inclined wall 94 and deflector plate 98. Thus any rolling of the flare will be along the road in the direction of vehicle travel and not to the side of the road where a fire hazard may exist. When the solenoid 60 is de-energized the spring 62 retracts the ejector yoke 40, allowing the stack of flares to drop and position the next flare for ejection. The weight of the flares in gravity feed is ample to displace the detents 106 for the flares to pass, but the shoulders 108 hold the flares from bouncing upwardly.

The solenoid operated mechanism operates very rapidly with a powerful snap action and ensures a sharp striking action to ignite the flare. Flares can be ejected at any speed to obtain suitable spacing, the mechanism being capable of operating at least twice a second.

The most common safety flares are well standardized in length and diameter, but the magazine is readily adaptable to shorter flares by inserting an inset auxiliary guide and back-up plate along the guide rail 12.

While primarily intended for road vehicles, the unit is also adaptable to light aircraft for use in emergency landings at night. The aircraft could make an initial pass over a chosen landing area, dropping flares successively to provide a temporary flare path. Since the conventional flares burn for about 20 minutes there would be ample time for the pilot to examine the illuminated area and make a landing. In this connection also, a ground vehicle could rapidly lay a flare path along a prepared but normally unlighted landing strip in an emergency.

It is understood that minor variation from the form of the invention disclosed herein may be made without departure from the spirit and scope of the invention, and that the specification and drawings are to be considered as merely illustrative rather than limiting.

I claim:

1. A remotely controlled highway flare ejector, comprising:
 - a magazine for holding a plurality of flares one above the other in a single stack and having a transverse opening to pass one flare at a time in a direction perpendicular to the length of the flare;
 - ejection means mounted on said magazine and including pusher means engageable with the flare adjacent said opening;
 - actuating means operatively connected to said ejection means; and
 - striker means comprising an arm pivotally mounted adjacent one end of said opening and having a striker element positioned to brush transversely across the igniter end of a flare ejected from the opening, said element being shiftably mounted on said arm to present successive new portions thereof against succeeding flares, said striker element including a disc rotatably mounted on an axis offset from the path of motion of an ejected flare, whereby the frictional contact of a flare imparts a rotation to the disc to bring a new area of the disc into striking position for each successive flare.

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