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DISCHARGERS FOR PYROTECHNIC DEVICES

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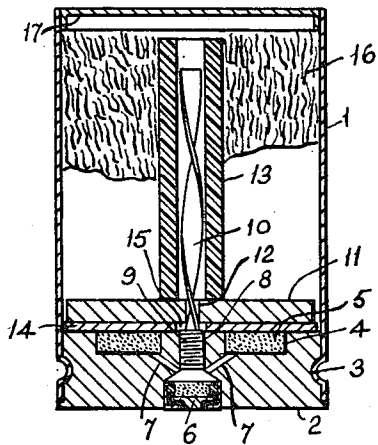


FIG. 1

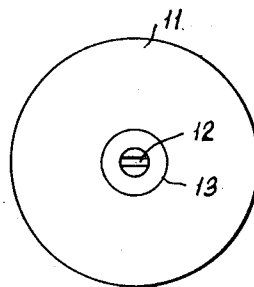


FIG. 3

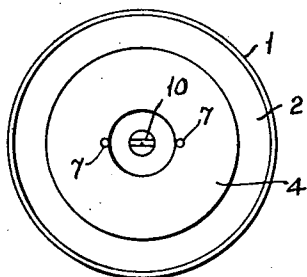


FIG. 2

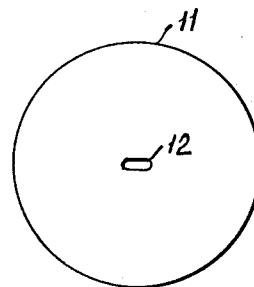


FIG. 4

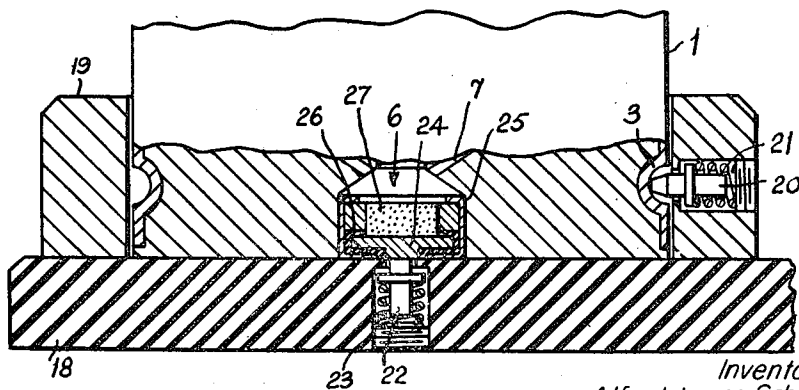


FIG. 5

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DISCHARGERS FOR PYROTECHNIC DEVICES
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The present invention relates to a pyrotechnic device and discharger for scattering units such as smoke, signal and illuminating flares and other ignitable or non-ignitable material which it may be necessary to project through the air.

In the use of pyrotechnic devices, whether they are to be discharged from aircraft or from ground level, the need often arises for a pyrotechnic device which is capable of scattering its contents over a wide area. For example, in the case of a flare containing a number of flare candles or smoke canisters it may be desired to discharge the entire flare to a particular point and then to cause the flare to scatter its flare candles or smoke canisters over a wide area. In the same way, aerially propelled canisters containing leaflets for propaganda purposes, or sheets of metal foil for anti-radar purposes, may be required to scatter their contents.

It is, of course, known to employ centrifugal force for the purpose of scattering the contents of a device and in such cases the device is discharged from a rifled barrel in order to impart the necessary rotary motion to the device. Rifled barrels, however, have several disadvantages. In the first place the device to be fired from the barrel has to be provided with a driving band which co-operates with the rifling of the barrel. This increases the cost of the device and considerably increases the force of the explosive charge required to eject the device from the discharger at the desired velocity. This in turn means that the discharger barrel and the device have to be considerably stronger to withstand the pressure of the explosive charge than if the device were discharged from a smooth bore barrel. This in turn increases the weight of the device, which is a material consideration where it is desired to eject the device to as high an altitude as possible. Finally, rifled barrels are expensive to manufacture.

The object of the present invention is the provision of a simple and inexpensive pyrotechnic device which results in a rotary motion being imparted to items ejected therefrom.

A pyrotechnic device in accordance with the invention and a stand adapted to receive the pyrotechnic device will now be described by way of example with reference to the accompanying drawing, in which

FIGURE 1 is a sectional side elevation of the pyrotechnic device,

FIGURE 2 is a plan of the plug and barrel of the device of FIGURE 1 from above, with the ejecting charge omitted,

FIGURES 3 and 4 are a plan from above and a plan from below, respectively, of part of the pyrotechnic device shown in FIGURE 1, and

FIGURE 5 is a section side elevation of a part of the device of FIGURE 1, on an enlarged scale, showing the device mounted in a stand.

Referring to FIGURES 1 to 4, the device illustrated comprises a cylindrical metallic barrel 1 closed at its lower end by a metallic plug 2. The plug 2 is cannelured at 3 into the lower end of the barrel 1 and has an annular recess 4 in its upper surface which receives an ejecting charge 5 of explosive powder. A conventional electric igniter 6 is mounted in the centre of the lower surface of the plug 2 and the flash from the igniter

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is conveyed to the charge 5 through two channels 7 in the plug 2. The igniter 6 is shown on a larger scale in FIGURE 5 and will be described in greater detail with reference to that figure.

The plug 2 has a centrally disposed threaded aperture 8 which receives a short screw-threaded member 9. A straight rod 10 of rectangular cross-section is brazed at one end to the member 9 and extends from the plug 2 up through the barrel 1 with the rod arranged coaxially with the barrel. This rod is twisted uniformly about its longitudinal axis throughout its length.

A flat circular plate 11 of synthetic resin material has a diameter slightly less than the internal diameter of the barrel 1, and has a centrally disposed aperture 12 therein, which aperture has a shape similar to, but slightly larger than the cross-sectional shape of the rod 10. A tube 13 of synthetic resin material, having an internal diameter slightly greater than the maximum dimension of the cross-section of the rod 10, is secured at one end to the centre of the plate 11 with its longitudinal axis perpendicular to the plate. The combined plate 11 and tube 13 are mounted on the rod 10 as shown in FIGURE 1 with a washer 14 interposed between the plate 11 and the plug 2. This washer 14 is a sliding fit in the barrel 1 and comprises a central circular aperture 15 having a diameter slightly greater than the maximum dimension of the cross-section of the rod 10. The annular space between the barrel 1 and the tube 13 is packed loosely with strips 16 of metal foil. Only part of the annular space is shown filled with the strips 16 in FIGURE 1. The upper end of the barrel 1 is closed by a waterproof closure member 17.

When the igniter 6 is fired the explosive charge 5 ignites and the washer 14 is forced away from the plug 2 by the high pressure gases generated. The washer 14 forces the plate 11 away from the plug 2 and the upper end of the tube 13 forces the waterproof closure member 17 off the barrel 1. As the plate 11 and tube 13 are forced out of the barrel the plate 11 rotates due to interaction between the twisted rod 10 and the aperture 12 in the plate 11. Consequently as the tube 13 and plate 11 leave the barrel 1 the metal foil strips 16 are flung outwardly by centrifugal force and are scattered over a large area to form an efficient anti-radar screen.

A large number of such pyrotechnic devices may be fired simultaneously by mounting them in a suitable stand and joining their electrical igniters 6 to a common electric supply source. A part of such a stand is shown in FIGURE 5. Referring to this figure, the stand comprises a flat plate 18 of electrically insulating material having a number of circular collars 19 secured to its upper surface. Each collar (only one of which is shown in FIGURE 5) has an internal diameter slightly greater than the external diameter of the barrel 1. A plunger 20 loaded by a spring 21 is arranged to enter a suitable recess in the side of a discharger placed in the collar. In the case illustrated the plunger 20 enters the cannellure 3 in the barrel. The object of this plunger is to hold the device in the collar and to make electrical contact therewith. A further plunger 22 loaded by a spring 23 is mounted in the plate 18 at the centre of each collar 19. The spring 23 urges the plunger 22 into contact with the contact 24 of the igniter 6. The contact 24 is mounted in a metallic ferrule 25 and is electrically insulated from the latter by a sleeve 26 of insulating material. The ferrule 25 is pressed into the base of the plug 2 so that it makes efficient electrical contact with the barrel 1 through the plug 2. If a suitable potential difference is applied across the contact 24 and the collar 19 an electric spark is produced from the ferrule 25 to the contact 24 which ignites a small explosive charge 27 within the ferrule 25. In order to effect the simultaneous firing of a number

pyrotechnic devices from the stand described above e collars 19 are connected in series to one pole of a itable electric supply source (not shown) and the plung- s 22 are connected in series with a switch (not shown) the other pole of the electric supply source.

Closing of the switch causes simultaneous initiation the igniters 6 of all the devices mounted on the stand. Although the plate 18 of the above described stand made of electrically insulating material, it will be ap- eciated that if each of the plungers 22 is mounted in sleeve of electrically insulating material, the plate 18 ay be made of metal.

It will, of course, be appreciated that the invention is t limited to the particular apparatus described above th reference to the drawing. Thus the rod 10 of the scharger may be of any cross-section demonstrating a lient portion from the inscribed circle thereof, rather an the rectangular section specified above. For exam- e the rod 10 may have a square, triangular or elliptical ction. Furthermore, the portion of the rod 10 nearest e plug 2 need not be twisted. Again, the washer 14 ay be dispensed with if the plate 11 is made a sliding in the barrel 1.

The annular space between the tube 13 and the barrel 1 ay of course be filled with material other than the foil ips 16 to provide pyrotechnic devices other than the ti-radar device described above. For example the space ay be occupied by a plurality of flare candles or smoke nisters. In these cases the plate 11 (and the washer if provided) would be suitably apertured to enable a sh to pass from the charge 5 to ignite the flare candles smoke canisters prior to their ejection from the barrel. Although I have described the device as comprising an etrical igniter it will be appreciated that any other form igniter, for example a percussion igniter, may be em- yed.

What I claim is:

1. A pyrotechnic device for the explosive scattering of plurality of items, comprising a discharger barrel of cir- lar cross-section and having a substantially straight gitudinal axis, a plug closing one end of said barrel th a surface internal of said barrel, a removable closure mber closing the other end of the barrel, a rod hav- g a substantially straight longitudinal axis non-rotatably ured at one end to said plug and extending internally said barrel from the plug toward said removable clo- re member, the longitudinal axis of said rod being sub- ntially coincident with the longitudinal axis of the rrel, the rod having a uniform cross-sectional shape monstrating a salient portion from the inscribed circle said cross-section in every plane perpendicular to the ngitudinal axis of the rod, said rod being twisted con- uously in one direction about its longitudinal axis at at least at its end lying remote from said plug with the lient portions in said every plane lying on a substan- ally helicoidal path, a circular plate slidably disposed on id rod to lie adjacent said surface of said plug and hav- g a diameter slightly less than the internal diameter of id barrel, a tube secured to said plate on the side remote

from said plug, which tube surrounds said rod and ex- tends substantially to said removable closure member to form an annular chamber between itself and said barrel, a plurality of items for scattering disposed within said chamber, there being a hole in said circular plate through which said rod passes, which hole is defined in said plate by a surface which slidably but not rotatably engages the salient portion of said rod, an explosive charge located in said plug and communicating with said surface for explosively driving said plate, said tube and the items con- tained within said chamber toward said removable closure to forcibly remove the same and to eject said plate and said tube from said barrel and rotationally scatter said items, and an igniter mounted in said plug for initiating said explosive charge.

2. A pyrotechnic device for the explosive scattering of a plurality of radar reflecting strips, comprising a dis- charger barrel of circular cross-section and having a sub- stantially straight longitudinal axis, a plug closing one end of said barrel with a surface internal of said barrel, a removable closure member closing the other end of the barrel, a rod having a substantially straight longitudinal axis non-rotatably secured at one end to said plug and extending internally of said barrel from the plug toward said removable closure member, the longitudinal axis of said rod being substantially coincident with the longi- tudinal axis of the barrel, the rod having a constant rectangular cross-sectional shape in planes perpendicular to the longitudinal axis of the rod, said rod being twisted continuously in one direction about its longitudinal axis at least at its end lying remote from said plug, a circular plate slidably disposed on said rod to lie adjacent said surface of said plug and having a diameter slightly less than the internal diameter of said barrel, a tube secured to said plate on the side remote from said plug, which tube surrounds said rod and extends substantially to said removable closure member to form an annular chamber between itself and said barrel, a plurality of radar re- flecting strips disposed within said chamber, in a hole in said circular plate through which said rod slidably passes which engages opposite sides of the rectangular cross- sectional shape of said rod, an explosive charge located in said plug and communicating with said surface for explosively driving said plate, said tube and said radar reflecting strips toward said removable closure to forcibly remove the same and to eject said plate and said tube from said barrel and rotationally scatter said strips, and an electrical igniter mounted in said plug for initiating said explosive charge.

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