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3,087,428

EXPLOSIVE PROPELLING DEVICE

Filed June 30, 1961

FIG - 3

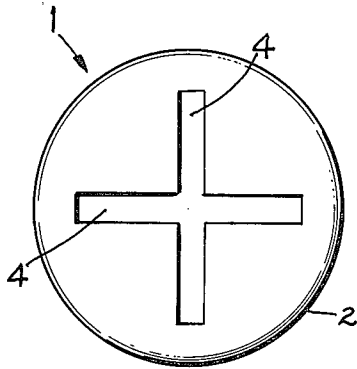
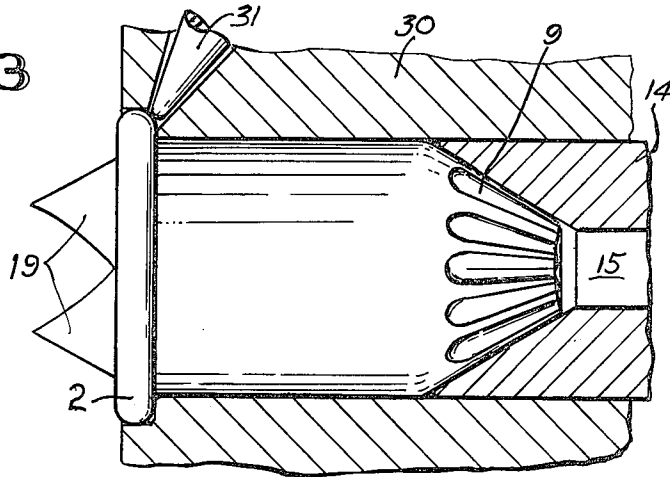


FIG - 2

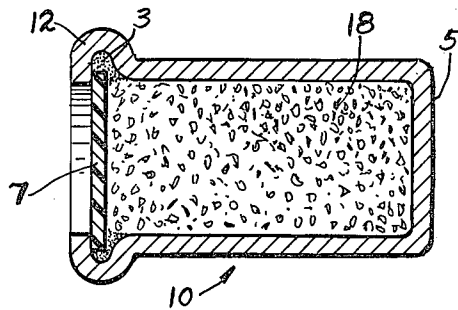


FIG - 4

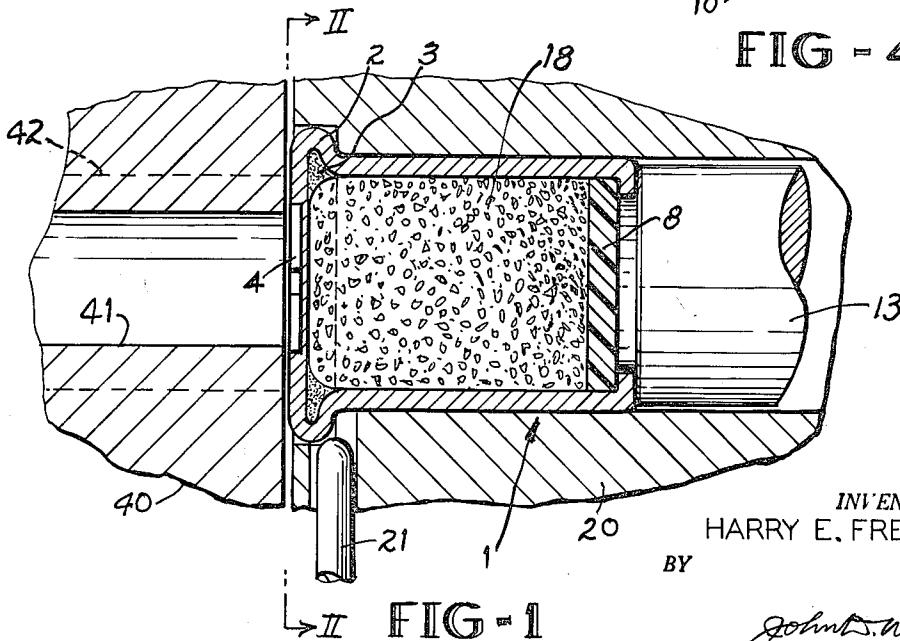


FIG - 1

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EXPLOSIVE PROPELLING DEVICE

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5 Claims. (Cl. 102-39)

This invention relates broadly to explosive propellant cartridges and is particularly useful in powder actuated tools.

Tools of this type, powered by a charge of explosive are used to propel fasteners, for example; the propellant usually is contained in a conventional rim-fire or occasionally in a center fire cartridge, seated in a chamber formed in the barrel of the device; and in breech loading barrels the cartridge case has the important function of obturating the chamber as well as sealing in the propellant while readily permitting opening for release. Especially in slide-action type of tools, whether of the spring driven firing pin type or of the hand hammer driven striker type, it has been found important that the case reliably accomplish sealing to prevent any substantial escape of propellant gas between the barrel breech and the breech block. It is also desirable that the cartridge open readily without producing undesirable fragments of closure wads or the cartridge. At the same time, a cartridge of relatively simple and economical construction is desired.

For this purpose, conventional rim-fire cartridge cases heretofore have been preferred but the art suffers from the disadvantages that come from the high powder loads used, which occasionally cause rupturing of the case, and from the manner in which these cases have had to be inserted, ignited and extracted.

One of the objects of this invention, therefore, is to provide a propellant cartridge for powering tools not only at low cost, but also providing improved performance. Another object is the provision of such a tool and the cartridge eliminating the need for the conventional firing pin action for ignition, or for special sealing constructions and special releasable closures. Still another object is to provide such a cartridge which opens upon ignition to release the gas without at the same time releasing wads and the like objectionable debris into the operating mechanism of the tool, particularly of the slide action type. Other objects and advantages will become apparent from a description of several preferred embodiments and the accompanying illustration thereof shown in the drawing in which:

FIG. 1 is a sectional view of one embodiment of the cartridge of this invention shown mounted in the chamber portion of a suitable device;

FIG. 2 is a transverse sectional view on II-II of FIGURE 1 showing the end of this cartridge;

FIG. 3 is a side view showing another embodiment of the cartridge mounted in the breech block of a fastener driving device shown in section; and

FIG. 4 is a longitudinal view in section of still another embodiment.

In accordance with this invention, there is provided a rim-fire type of cartridge 1 (FIG. 1), the rimmed end of which is provided not only with rim 2 and priming 3, but also with suitable lines 4 of rupturability preferably or frangibility as by thinning or grooving thereby to have a suitably evanescent closure portion while the opposite end is made to either remain closed in sealed relationship normally or to provide a relief vent.

Instead of grooves 4, or the like, the weakened portion may take the form of a wad 7 of frangible and combustible material similar in characteristics to the powder charge 18 of the cartridge; and this wad like the grooves 4 is dis-

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posed adjacent the priming material 3 both supported in the annular groove of the rim 12 as shown in the drawing, FIGURE 4. The closed end 5, in this instance (FIG. 4) is made integral with the side walls of the case 10. With the rimmed end weakened with thinning grooves 4, as in FIGURES 1-3, and integral with the rim and side walls, the opposite end may be closed by means of a suitable fragmentation resisting wad 8 such as one made of a suitable flexible plastic material, preferably the plasticizer-free olefinic including polymers such as polyethylene, or polyurethane, a flexible copolymer of polyvinyl chloride, pliant cellulose acetate, a silicone elastomer or the like, or this end may be closed by a ventable conical end-pleating 9 following a pie-cut crimp with indentations at uniform intervals about the circumference. In any event, the closed end is shaped to correspond to the mating surface of the member such as ejector pin 13 (FIG. 1) or ejector pin 14 having bleed-off passage 15, which is adapted to abut this end of the cartridge case adjacent the breech structure. Passage 15 gives control by valve or by adjustable surge chamber as shown in U.S. Patent No. 2,931,039. Grooving occurs preferably by an X-indentation or a cut in the form of a cross as shown in FIGURE 2. Rupturing occurs as shown in FIGURE 3 without fragments or a blown-off disc.

This invention, therefore, provides a cartridge which differs from the conventional cartridge in that it can be inserted rearwardly into the breech block 20, or 30, FIGURE 3, thereby avoiding need for insertion forwardly into the breech of the barrel 40 and which may be loaded in a reverse way so that the base containing the priming composition faces forwardly toward the barrel bore in the direction of the muzzle of the barrel of the cartridge firing device, i.e. opposite to the normal way. The extractor can thus be associated with the block as ejectors 13 or 14 or as an ejector acting on the rim. This obviates the need for providing a chamber in the barrel for the size of cartridge used for each caliber of fastener and barrel bore needed. This cartridge is adaptable for seating on and sealing any caliber such as that of 41 or 42 not in excess of the lateral expanse of the rim.

In the cartridge of FIGURE 4, the rim 12 is turned in over not only the annular charge 3 of priming but also over the frangible wad 7 to seal the case 10 without cracking the wad, made of a material such as disclosed, for example, in U.S. Patent No. 2,599,943 adapted to break up into many tiny particles, i.e. to a powder on firing. The case is adapted for ignition by a transverse pin such as 21 (FIG. 1) or a side angled pin 31 (FIG. 3) each designed to act on the back side of the rim.

The tool may be so designed that the countersink for the cartridge rims 2 and 12 is advantageously in the breech of barrel 40 instead of being in block 20 or 30 for excellent gas sealing at the junction of the chamber and the barrel as the propellant comes out of the base end of the case instead of the mouth which in this invention is provided with a closure designed to remain closed or give limited bleeding at the most. In any event, the rim of the case is adapted for being placed at said junction while the base is stamped partially through to promote rupturing as at 19 (FIG. 3) on firing without any metal-pieces flying off.

The cartridge of this invention is especially adapted for loading into the cartridge bearing recess of a ram in the piston type of tool because the rim is left out for extraction while the propellant acts out in the cylinder instead of in the bottom of the recess. The cartridge is also adapted for ignition by its intervention between two parts as these parts are driven together either by push down, or a triggered spring, or by a hammer.

While the foregoing embodiments have been described

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as preferred, it is to be understood that those skilled in the art may make changes and modifications therein and still other embodiments will readily occur without departing from the spirit and scope of this invention as set forth in the appended claims.

What is claimed is:

1. A propellant cartridge comprising a rim-fire case having a longitudinally extending tubular wall, a closed end integral with the case wall, a charge of propellant and a charge of priming composition in said case, a base opposite said end with a rim adjacent said base, said rim having spaced transverse walls extending outwardly as an integral folded enlargement of said case defining an annular space containing said composition, carrying a ring of said primer composition at said space, and a closure of frangible composition seated in said rim to close said case upon said charge and primer and to disintegrate upon firing.

2. A propellant cartridge comprising a case having a longitudinally extending tubular wall, a closed end, a closed base opposite said end, a charge of explosive propellant enclosed in said case, an annular primer composition enclosed in said case, said case having adjacent the base a circumferentially extending rim defined by spaced transverse walls extending outwardly as a folded enlargement of said case integral at least with said wall to provide an annular space containing said composition, said base being weakened to adapt it to rupture without dangerously large fragmentation.

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3. The cartridge of claim 2 wherein the closed end is shut by a wad of elastomeric material and an inwardly overlapping part of the wall in contiguity with the outside of said wad, thereby adapting said case for extraction by thrust acting on said part toward the base.

4. The cartridge of claim 2 wherein the wall, rim, and base are integral and weakening occurs by intersecting indentations partially through the base where the base is thinned to form tear lines.

5. The cartridge of claim 2 where the closed end is integral with the wall and includes a pie-cut crimp coned in centrally.

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