

Sept. 18, 1951

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2,568,079

REFIRE ADAPTER FOR CARTRIDGES

Filed Oct. 25, 1946

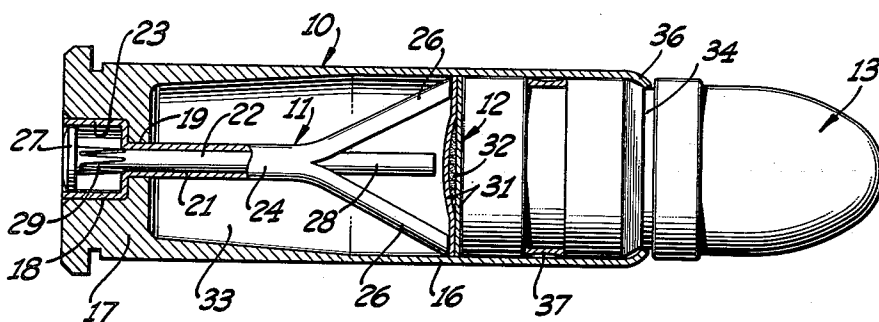


FIG. 1.

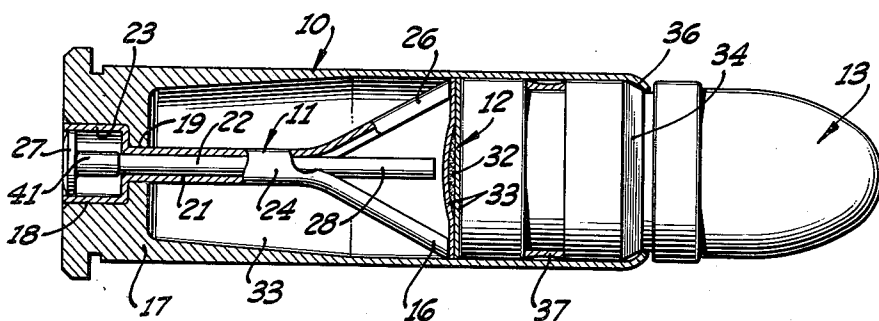


FIG. 2.

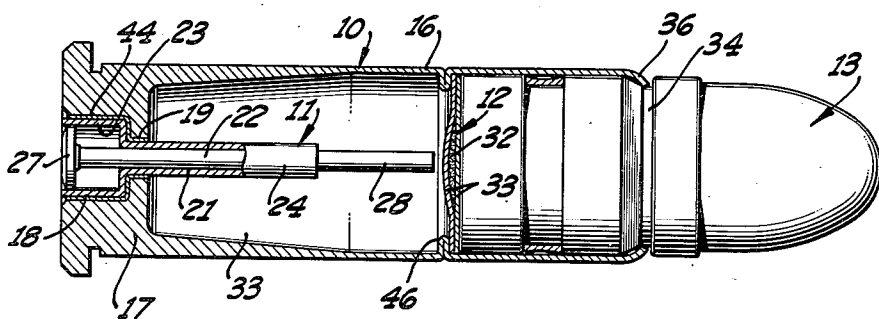


FIG. 3.

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2,568,079

REFIRE ADAPTER FOR CARTRIDGES

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Application October 25, 1946, Serial No. 705,759

5 Claims. (Cl. 102—38)

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The present invention relates to a new and useful refire adapter for use with a standard type cartridge case to enable it to be reused repeatedly.

After the firing of a cartridge it has been found that the case can be used again by the replacement of the primer, the powder and the projectile. Under previous methods, it has been the practice to clean the case and in particular the pocket for the primer cap, insert a new primer cap in the recessed primer pocket in the base of the case, thereafter to pour in the powder charge, press home the projectile, and then crimp the end of the case to secure it to the projectile. This operation, while effecting a considerable saving in that it permits the reuse of the old casing, is relatively expensive. Additionally the explosion may have burned the primer pocket and at times the replacement primer does not make a sufficiently tight seal therewith, resulting in a potential danger to the user. In this old method the same case may be reused several times, the reloading operation being the same in each instance.

In the use of the refire adapter constructed in accordance with the present invention, after the new cartridge has been fired the initial primer is displaced, the case cleaned and the refire adapter unit positioned at the time of the initial refill operation. The unit remains in the case and need not be replaced in subsequent reloadings, it being only necessary to repeat the operations of filling the case with the required charge of powder, positioning a frontal primer immediately in the rear of the projectile, forcing the projectile home in the case, and crimping the case to secure the projectile in place.

In the reuse of any exploded cartridge, it is first necessary to clean and prepare the case. The used standard primer, which was an integral part of the cartridge as sold, is first punched from its pocket which comprises a cylindrical recess in the flat base of the case. This pocket is connected by means of a smaller diameter flash hole with the interior of the case which contains the powder. The primer pocket and flash hole should be thoroughly cleaned and inspected to make certain that they are ready for the reloading operation.

In the refire adapter unit constructed in accordance with the present invention, use is made of frontal ignition which has been found to be most effective in that it gives a shorter, faster and hotter flash for the ignition of the powder charge. With frontal ignition the forward part

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of the powder charge burns first, the explosion progressing rearwardly. This insures complete combustion whereas in the standard construction in which the powder at the rear of the case burns first, an appreciable quantity of unburned powder is blown from the muzzle of the weapon with the projectile.

Because of the natural advantage inherent in a frontal primer fully open to the powder charge, it is not necessary in order to have complete combustion that the primer be as potent and powerful as is required in the standard cartridge. It is possible to use a primer economically made of paper discs between which the explosive is positioned, a suitable preserving coating or covering being provided preferably. The paper of the disc is relatively soft and the primer can be exploded by a lighter blow than is required when use is made of a metal jacket as in the standard primer. Misfires frequently encountered and due to variations in primer characteristics or in firing pin constructions are greatly reduced. The greatest advantage, however, lies in the more complete combustion with the resulting greater explosive power which imparts higher velocity to the projectile.

It is an object of the present invention to provide a refire adapter unit for cartridges which eliminates the use of the standard primer positioned at the rear of the cartridge case and which makes use of a frontal primer.

It is another object of the invention to provide a refire adapter unit which is itself reusable in the successive reloadings of the cartridge case.

A further object of the invention is to provide a refire adapter unit for cartridges which makes use of frontal ignition to effect greater explosive power.

These and other more specific objects will become apparent from a reading of the following specification and claims and upon a consideration thereof in connection with the attached drawings.

Referring now to the drawings in which preferred embodiments of the invention are described:

Figure 1 is a longitudinal section through a cartridge constructed in accordance with a first preferred embodiment of the invention;

Figure 2 is a section similar to Figure 1 through a second preferred embodiment of the invention; and

Figure 3 is a view similar to Figures 1 and 2 through a third preferred embodiment of the invention.

A reloaded cartridge constructed in accordance

with the present invention comprises five primary components. They are identified in the drawings as a case 10, which is a standard type of cartridge case; a refire adapter unit, indicated generally by the reference character 11; a frontal ignition primer, indicated generally by the reference character 12; and a projectile, indicated generally by the reference character 13.

The case 10, as stated, comprises a standard cartridge case which has been used previously and which includes a cylindrical wall 16 and a thickened base 17 formed centrally with a recessed cylindrical primer pocket 18. Pocket 18 connects through a small circular flash hole 19 with the interior of the case 16. The standard primer, found in the primer pocket 18 when the cartridge was new, has been removed and the pocket and flash hole cleaned and inspected before being assembled as a part of the reload cartridge.

The refire adapter unit 11 comprises two main parts of metal, a tube 21, and a pin 22. The adapter tube 21 is so constructed as to have an enlarged cylindrical head 23 which seats frictionally within the primer pocket 18. An integral round hollow stem 24 extends from the head 23 and has its opposite end split to form two semi-cylindrical struts 26, the outer ends of which abut the inner surface of the cylindrical wall 16 of casing 10. The base of the adapter tube head 23 is flat and lies in close contact with the base of primer pocket 18, a relationship which also characterizes the contact of the cylindrical walls of the head 23 with the pocket.

The adapter pin 22 bears a resemblance to a small finishing nail, being constructed with a round head 27 from which extends an integral stem 28. Head 27 closely fits and slides within the head 23 of adapter tube 21 and the stem 28 is enclosed slidably within the hollow tube 24. Inwardly from the head 27 for a distance equal substantially to the distance by which it is spaced from the tube 24, or for about $\frac{1}{8}$ " in the usual cartridge, the adapter pin is formed with a plurality of tapered wedges or vanes 29 which at their forward ends merge into the stem 28.

The adapter unit 11 is positioned within the case 10 through the base thereof, the struts or prongs 26 being closed at the time to enable them to pass through the flash hole 19. After the unit is inserted, the struts 26 are spread on the inside of the case until their ends contact the internal surface of cylindrical wall 16. The pin 28 can be positioned in the tube at the time it is seated or, if preferred, it can be positioned therein after the tube has been seated.

The tube stem 24 has a thickness and strength as to be compressible by the pressure of the explosion within the case upon the pin stem 28 to provide a gas-tight seal to prevent the escape of gas therebetween. Also, the tapered wedges 29 are adapted to expand the tube stem 24 as the pin 22 is forced inwardly in the firing operation to cause it to seal against the flash hole 19 in the web or base of the case. The seals between the pin stem and the tube stem, and between the tube stem and the casing web, effect a complete closure at the base of the case so that the gases formed by the explosion can only escape forwardly. Immediately forward of the refire unit 11, and held between the base of the projectile 13 and the struts 26, is the primer 12 which comprises spaced paper discs 31 between which is positioned an igniting charge 32. The primer is spaced from the forward end of the

pin 22 with the latter in its normal or ready-to-fire position, as shown in Figure 1, but is adapted to be contacted by the pin when the latter is driven forwardly, the base of the projectile 13 serving as an anvil. The chamber formed within the case 10 between the base 17 and the primer 12, and in which the tube and pin stems of the adapter unit are positioned, is filled with an explosive powder charge 33.

The projectile 13 is seated in the forward end of case 10 and is provided centrally with a circumferential groove 34 into which the forward edge of the case 10 is crimped at 36 for securing purposes. In the preferred construction a lube band 37, which may include grease if desired, is positioned within the normal dimensions of the projectile within the case 10. In forcing the projectile 13 to its seat in the case in the assembly operation, care should of course be taken not to force it too far inwardly. Should this occur, however, the primer 12 will not be exploded by contact with the forward end of the pin 22. The tube struts 26 contact the non-explosive paper margins of the primer 12 and with the base of the projectile serve to position it, as described. An undue advance of the projectile, however, would force the struts 26 rearwardly, to move the tube 21 from the case and with it the pin 22 and so prevent contact of primer and pin.

In the firing operation with this first embodiment of the invention positioned within any standard weapon the forward movement of the firing pin 22 under the actuation of a force received from the firing pin of the gun functions to drive the stem 28 of the pin 22 against the primer 12. That element performs its function of igniting the powder charge 33, the gases generated forcing the projectile 13 forwardly from the case at high velocity and in the usual manner. The forward movement of the pin 22 moves the vanes or wedges 29 into the tube stem 24 to expand it into tight-fitting, gas-sealing relationship with the surrounding flash hole 19 in the case base or web. Additionally, the explosive force of the charge functions to compress the tube stem 24 about the pin stem 28. The gases generated can escape from the case only through the forward end thereof and after the ejection of the projectile 13. As the pressure within the case dissipates the compressive holding force of the tube 24 on the pin stem 28 finally reaches a point at which the thrust acting upon the pin is sufficient to overcome the holding force and the pin is driven back to its original prefired position. Its movement is limited by striking the face of the gun bolt or the back plate in the case of a revolver.

Referring now to the second embodiment of the invention, shown in Figure 2, that construction is similar to the embodiment illustrated in Figure 1 with the exception that the tapered wedges 29 of the first embodiment have been eliminated and in their place the pin stem 28 is enlarged at 41 for that portion of its length normally positioned within the tube head 23. This increase in size is in the range of .004 to .008 of an inch. The inward movement of the pin 22 brings this enlarged portion into the tube stem 24 and effects the expansion thereof against the flash hole 19 performing the sealing operation performed by the wedges 29 in the first embodiment. In other respects this second embodiment is identical to that first described.

Referring now to the third embodiment of the invention, illustrated in Figure 3, it is to be noted

that both the pin tube 21 and the pin 22 are slightly modified. The tube stem 24 is cut off as to eliminate the struts 26 of embodiments 1 and 2 and the tube head 23 is made sufficiently smaller in diameter than the firing pocket 18 as to permit a cement 44, which may be of the metallic type, to be placed therebetween to make a permanent fixed seal. The firing pin 22 differs slightly from the embodiments of Figures 1 and 2 in that the stem 28 thereof is of the same diameter for its entire length and is unprovided with an enlargement or with expanding wedges adjacent its head 27.

In embodiments 1 and 2 the primer 12 was positioned by its contact with the struts 26 of the adapter unit. The struts 26 being eliminated in this third embodiment, their function is performed by an internal circumferential flange or shelf 46 which is formed in the case 10 as a step in its preparation for the initial reloading operation. The primer is again backed by the projectile as in the previous constructions.

In this third embodiment of the invention, reliance is placed upon the adhesive 44 to maintain the seal between the tube head and stem and the primer pocket 18 and flash hole 19. In operation, as in the previous embodiments, the escape of gases between the pin stem 28 and the tube stem 21 is prevented by the compression of the tube stem on the pin stem. Also, the firing pin is returned to its initial position after the initial surge of maximum pressure, as in the previous embodiments.

In the manufacture of the refire adapter 11, it is important that the dimensions be sufficiently accurate as to insure gas-tight seals as described; that the tube stem 21 be sufficiently compressible as to be compressed about the pin stem 28; and lastly that the struts 26 have sufficient strength that, should the projectile 13 be forced too deeply in the case in the assembly operation, they will be able to force the frictionally held tube head from the primer pocket. This last requirement, of course, relates only to the first two embodiments. In the third embodiment the provision of the inner flange 46 limits the inward movement of the projectile. The adapter pin should be formed with a head of sufficient strength and hardness as to sustain repeated blows from the firing mechanism of a gun in the successive uses of a cartridge and yet should not be so hard as to damage the firing pin of the weapon. The thickness of the pin head should, of course, be such as to permit the pin to travel the necessary distance into the tube head as to enable its inner end to effect the ignition of the primer. The adapter pin stem 28 also should be relatively hard and accurately sized so as to fit slidably within tube stem 21 to insure the formation of a gas-tight joint upon slight compression upon the stem 21. Because of the presence of the pressure-tight joints the explosion is contained and no leakage of burning gases takes place. Accordingly it is not necessary to reclean the cartridge before a second reloading.

While the particular apparatus herein shown and described in detail is fully capable of attaining the objects and providing the advantages hereinbefore stated, it is to be understood that it is merely illustrative of the presently preferred embodiments of the invention and that no limitations are intended to the details of construction or design herein shown other than as defined in the appended claims.

I claim:

1. In a cartridge, a cylindrical case formed with a base in which is centrally positioned a recess connected by a reduced opening with the interior of the case, a refire adapter unit mounted in said case comprising a tube and a pin slidable therein, said tube comprising an enlarged head seated in said recess and a stem extended therefrom through said opening into said case and spread at its forward end into struts abutting the interior wall surface of said case, said pin comprising an enlarged head positioned in the enlarged head of said tube and a stem positioned in the stem of said tube, a primer positioned forwardly of said pin in its normal position and in contact with the ends of said struts, a projectile positioned in said case forwardly of said primer and serving as an abutting anvil therefore upon the contact therewith of said pin under a moving force received from its head, and a charge of powder between said primer and said base.

2. In a cartridge of the type having a case with a primer pocket in its base connected through a flash hole to the interior of said case, a projectile positioned in the forward end of said case, a primer adjacent said projectile, and a charge of powder between said projectile and said base, a tube formed with a head seated within the pocket of said case and from which an integral stem extends through the flash hole into said case, a slidable pin including a head positioned within the tube head and a stem positioned within the tube stem and adapted to contact said primer upon being driven forwardly by a force exerted upon its head, characterized in that said tube stem closely seats in said flash hole and in that said pin includes means to expand said tube stem into sealing engagement with said hole upon being driven forwardly.

3. In a cartridge of the type having a case with a primer pocket in its base connected through a flash hole to the interior of said case, a projectile positioned in the forward end of said case, a primer abutting said projectile, and a charge of powder between said projectile and said base, a tube formed with a head seated within the pocket of said case and from which an integral stem extends through the flash hole into said case, a slidable pin including a head positioned within the tube head and a stem positioned within the tube stem and adapted to contact said primer upon being driven forwardly by a force exerted upon its head, characterized in that said tube stem is compressible about said pin stem upon the explosion of said charge of powder and in that said pin includes means to expand said tube stem into sealing engagement with said hole upon being driven forwardly.

4. A cartridge refire adapter unit comprising: a tube formed at one end with an enlarged head and from which extends an open-ended stem, and a pin slidable in said tube and formed with a head positioned in the head of said tube and with a stem positioned in the stem of said tube and of sufficient length to project therefrom in certain positions, said head being of a diameter greater than the diameter of the bore of the stem of said tube, said pin being adapted to be driven into said tube by a force exerted upon its head to project the end of its stem into firing contact with an adjacent primer, the end of said tube stem being divided and spread to form struts for the support of said primer.

5. A cartridge refire adapter unit comprising: a tube formed at one end with an enlarged head

and from which extends an open-ended stem; and a pin slidable in said tube and formed with a head positioned in the head of said tube and with a stem positioned in the stem of said tube and of sufficient length to project therefrom in certain positions, said head being of a diameter greater than the diameter of the bore of the stem of said tube, said pin being adapted to be driven into said tube by a force exerted upon its head to project the end of its stem into firing contact with an adjacent primer, said stem of said pin being formed with means to expand said tube stem upon being moved by a force exerted on the pin head.

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