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R. G. DAVENPORT
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A MOVABLE SUB-CALIBER BARREL
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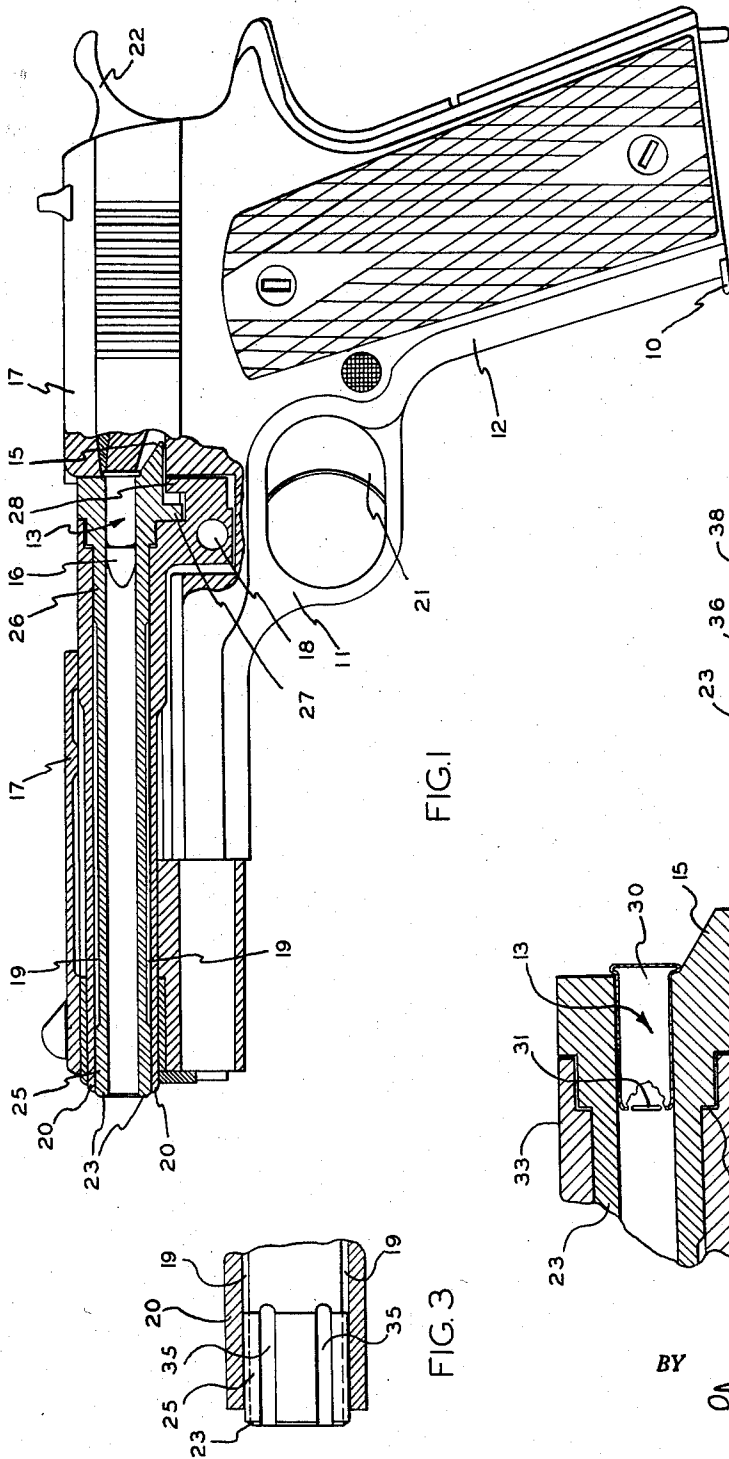
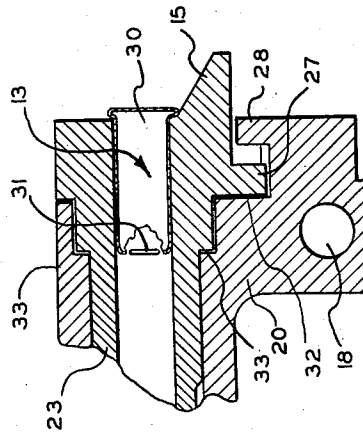
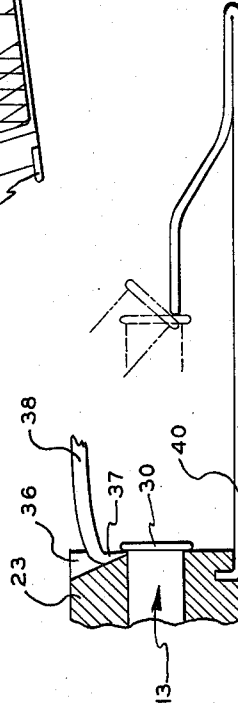


FIG. 4

INVENTOR.
ROSS G. DAVENPORT

BY

Stanley J. Cole
ATTORNEY

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SUB-CALIBER MECHANISM INCLUDING A MOVABLE SUB-CALIBER BARREL

Ross G. Davenport, Rochester, N. Y.

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2 Claims. (Cl. 89—159)

This invention relates in general to self-reloading firearms and in particular to sub-caliber mechanism therefor.

There is described in United States Letters Patent 2,090,657 issued to Williams on August 24, 1937, a conversion unit to adapt firearms to cartridges of a smaller caliber than the gun was originally intended for. A number of elements make up the Williams' sub-caliber mechanism including a barrel and a vibrating member which fits in telescopic engagement into the rear portion of the barrel. The vibrator and the barrel although fitted together are spaced apart from one another, at least after the cartridge is fired. This gap gradually fills with hot lead from fired bullets and the lead often welds itself into position between the vibrator and the barrel. When sufficient lead is welded into the gap proper recoil of the firearm using the sub-caliber mechanism is prevented, and lacking proper recoil the firearm will not expel the fired cartridge casing and will not reload with a new cartridge following the firing of a cartridge. Further, the engagement of the vibrator and the barrel, if not extremely accurate, will tend to cause interference in the delivery of the bullet from the vibrator into the barrel and will thereby distort the bullet's normal trajectory.

To overcome some of these difficulties a choke has been used at the front end of the vibrator. The choke will not do away with the engagement problem and although the use of a choke results in an undersized bullet which will not freeze the mechanism in that it swells from a smaller size, the undersized bullet must swell to properly travel through the barrel. If, as is likely, the choke is not concentric with the axis of the barrel, the path of travel through the barrel is upset; i. e., the bullet is not delivered from the vibrator along the axis of the barrel and the bullet on leaving the weapon does not follow the predicted path of travel.

It has now been found that these various problems may be overcome by my invention which involves an improved conversion or sub-caliber unit including a barrel and cartridge chamber in a single member. To bring about recoil while using a sub-caliber cartridge in a larger cartridge firearm, I float the barrel and cartridge member within a sleeve which is fixed to the gun frame, and the gas of explosion is utilized to trigger the recoil action.

It is therefore an object of this invention to devise a new and improved sub-caliber unit.

It is a further object of this invention to devise a sub-caliber unit including a cartridge chamber and a barrel in a single member.

For purposes of understanding this invention it will be described in terms of the Colt Automatic Pistol, caliber .45 Government Model. Such description however, is not included for purposes of limitation, but it is instead intended for illustrative purposes only, and it is intended that the unit described may be modified along

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principles described for use in connection with making larger caliber firearms usable with smaller caliber ammunition, or the unit may be adapted as such as part of an automatic pistol.

For a better understanding of this invention, and for further objects and advantages thereof, reference is had to the following description taken in connection with the accompanying drawings, wherein:

Fig. 1 is a side view partially in cross section of a self-reloading or automatic pistol including my novel sub-caliber mechanism;

Fig. 2 is an enlarged view partially in cross section and partially diagrammatic of the areas surrounding the cartridge chamber of my sub-caliber mechanism;

Fig. 3 is a detailed diagrammatic view of one embodiment of the muzzle area of my sub-caliber mechanism; and

Fig. 4 is a top diagrammatic view of one embodiment of an extractor and an ejector which may be used with my sub-caliber mechanism.

Referring now to the drawing, in Fig. 1 there is shown a self-loading firearm. The area including my improved mechanism is shown in cross section. The automatic pistol of this figure comprises a frame 11 having a handle 12 carrying therein a magazine 10 adapted to hold sub-caliber cartridges. The magazine may be the type described in the Williams' patent and cartridges may be fed into cartridge chamber 13 along ramp 15. There is no desire to be limited in this invention to any particular magazine or means of feed but instead the various mechanism which will occur to those skilled in the art are intended to be encompassed herein. There is shown in position in cartridge chamber 13 a cartridge 16. Mounted on frame 11 is a breech bolt or slide 17. Sleeve 20 is mounted by means of joint 18 to frame 11 and is positioned within slide 17. Joint 18 is actually a pivot point. However, while the slide 17 is in position on frame 11, sleeve 20 is rigidly held in a fixed position. It is to be realized, of course, that a fixed mounting of the sleeve 20 may be used and is intended to be included within the scope of this invention. Sleeve 20 may comprise the sleeve used with the sub-caliber mechanism described in the Williams' patent or alternatively may comprise a sleeve adapted to be mounted on frame 11 and adapted to house and operate with the sub-caliber mechanism of this invention.

Since the firing mechanism does not constitute any part of this invention only the trigger 21 and the hammer 22 are shown. Any firing mechanism which will fire the cartridge in chamber 13, as for example the firing mechanism described in the Williams' sub-caliber unit, or other mechanism obvious to those skilled in the art may be used.

The barrel 23 which includes cartridge chamber 13 is positioned within sleeve 20 and bearings 25 and 26 act to align the barrel 23 within sleeve 20. In this figure there is shown a recessed area 19 formed in barrel 23 between bearings 25 and 26. Recessed area 19 optionally may be omitted; however, when included it provides an improved escape path between barrel 23 and sleeve 20 for the exploded gas. Revisions to further facilitate gas movement out the front or muzzle area may also be made, as for example, as is illustrated in Fig. 3. Extended downward in Figure 2 from barrel 23 is lug 27 which fits into a recessed area in sleeve 20. The rear wall 28 of this recessed area of fixed sleeve 20 serves to stop rearward movement of lug 27, and thus, rearward movement of barrel 23 following firing of a cartridge. The recessed area of the sleeve however, provides a sufficient area of travel for the barrel 23 to trigger the recoil action of the pistol.

Recoil is brought on by providing the slide with sufficient impetus to go through its cycle. The impetus is provided by the sudden and forceful rearward movement of barrel 23. Although there is no intention to be limited to any particular distance, I have found that rearward movement of $\frac{3}{32}$ " is sufficient when using .22 caliber cartridges in a colt .45 with my sub-caliber mechanism. Although in this figure the lug is shown extended downward, there is no intent to be limited to any specific direction. The intent is to illustrate one means of construction, and it is to be realized that other means of functionally accomplishing triggering of the recoil mechanism are intended to be included herein.

Reference is now had to Fig. 2 wherein is shown in greater detail, partially in cross section and partially diagrammatically, the cartridge chamber and the surrounding area. As in Fig. 1 the cartridge chamber is designated 13, the joint 18, the sleeve 20, the barrel including the cartridge chamber 23, the lug extending downward from the barrel is 27, the rear wall of the recessed area is 28, and the ramp is designated 15. Shown in position in cartridge chamber 13 is a cartridge casing 30. As appears more clearly in this figure a slot 31 is formed in the side of the barrel. A similar slot is also formed on the opposite side at the same position. The barrel 23 at this rear area surrounding cartridge chamber 13 although larger than the forward end continues to be cylindrical in shape. The barrel is shown positioned forward; that is, it has been driven forward by the recoil spring which may be the type described in the Williams' patent, to the point where lug 27 is stopped by the forward wall 32 of the recessed area. When in the forward position as shown, a spacing 33 exists cylindrically about barrel 23 separating a portion of barrel 23 from a portion of sleeve 20. Spacing 33, which may vary from flat surfaces in normal surface contact to a slight gap, is in alignment with slot 31. Preferably spacing 33 is an actual but slight gap.

In operation after a cartridge has been fired the gas created by the explosion expands through slot 31 and into spacing 33. The expanding gas in spacing 33 can only press against that portion of barrel 23 which defines spacing 33, and thus the gas drives the floating barrel 23 backwards a sufficient amount and with sufficient thrust to operate the reload action of the firearm.

When using cartridges with the usual casing having a crimped front edge, the slot 31 should be positioned from a point at which the rear end of the slot is flush with the front of the casing to a point where the front end is slightly behind the front of the casing. Exact positioning is dependent on such elements as the width of the slot, the tightness of fit of the cartridge in the chamber, and the like. For example, when using a slot of .020 of an inch in an average fitting chamber it has been found that the slot is best positioned with its leading edge about .005 of an inch behind the leading edge of a casing in the chamber. However, it is desirable to avoid positioning the slot too far forward of the front edge of the casing in that it may fill with lead. Provisions may be made, as for example, curving the slot back and the like when using a forward positioned slot to avoid clogging. However, even before it becomes filled with lead, although it is probably filling, it is presently believed it will not efficiently trap the gas to bring about proper recoil. One explanation is that the resistance of the slot and gap is greater than the resistance to movement of the gas behind the bullet, and thus the gas will tend to travel down the barrel with the bullet rather than act through a forward positioned slot to operate the reload mechanism. Another factor explaining the disadvantage of positioning the slot too far forward is that the most forceful expansion of gas has already taken place and expansion of gas at a forward point lacks the needed thrust and pressure to bring on recoil. However, when

slot 31 is in position as indicated above the gas is trapped or is flowed through the slot and does provide sufficient thrust and sufficient barrel movement to cause recoil. It is presently believed that the slot may be formed at any point along the casing from about its mid-point to just forward of the casing edge. However, when further back than about the center or mid-point, the gas of explosion does not effectively bring about the reload cycle of the firearm.

Preferably slot 31 should be formed on the sides of barrel 23. When formed at the top and bottom there is a tendency for that portion of the barrel behind the slots to bend and thus to freeze the barrel in position. It is presently believed that solidness in the upper and lower portions of the barrel is desirable. This is accomplished with slots formed along the sides. However, it is to be realized that paths other than slots may be used, as for example, fine holes or the like, and that this invention is not limited to two slots as discussed but is intended to include within its scope slots positioned other than as shown, holes, holes and slots combined, more than two slots, and the like.

Referring now to Fig. 3 there is diagrammatically illustrated one possible embodiment of bearing 25 of barrel 23. As has been previously illustrated barrel 23 is positioned or rides within sleeve 20. As is illustrated in this figure there are provided a number of grooves 35 formed in and spaced around barrel bearing 25. After the firing of a cartridge some of the escaping gas is found between the barrel 23 and sleeve 20. The gas reaches this area by passing through slot 31 (shown in Fig. 2). It then moves along recess 19 (also shown in Fig. 1) to bearing 25. The grooves 35 in bearing 25 allow the gas between barrel 23 and sleeve 20 to pass through the bearing area.

A bearing 25 formed with grooves 35 also has the additional advantage of passing exploded powder easily and thus also acts to prevent the gun from fouling. Often when a cartridge is fired exploded powder will travel with the gas of the explosion to the area between sleeve 20 and barrel 23. If the powder remained in this area it would eventually clog and lock the barrel 23 and sleeve 20 to one another. Such clogging would eventually foul the mechanism and thus prevent recoil. By providing grooves 35 in bearing 25 the travel of gas is somewhat assisted at that point where assistance is helpful. That is, by the time the gas reaches the forward end of sleeve 20 much of its force has been spent and the path provided by grooves 35 aids in continuing its flow out the front end of the gun. The gas flow carries within itself exploded powder and grooves 35 facilitate the passage of the powder from between barrel 23 and sleeve 20.

Although similar grooves could be provided in bearing 26 it has been found that generally they are not necessary. Bearing 26 is positioned at a point where the force of the exploding gas has not as yet been spent and the gas finds its way easily through bearing 26 and carries exploded powder along.

In Fig. 4 there is shown an embodiment of extraction and ejection mechanism according to this invention. A cartridge shell 30 is in position in cartridge chamber 13. Surrounding chamber 13 is a portion of barrel 23. The coverage of chamber 13 by barrel 23 is also shown in Fig. 1 and Fig. 2 and reference should be had to these figures for further clarification of the various other elements found in the vicinity of chamber 13. A slotted area 36 is the extractor slot. The extractor slot provides room for the extractor head 37 of extractor 38. The extractor head 37 rides within the barrel area and engages with the cartridge casing 30 as is illustrated. Engagement between the cartridge casing 30 and the extractor head 37 takes place at the time a new cartridge is fed from the magazine into cartridge chamber 13 and engagement between the two continues until the casing 30 is ejected. The extractor 38 is formed as a part of and

moves with the slide. Thus, after a cartridge has been fired the slide is driven backward and extractor 38 moves with it. There is no intent in this invention to devise a new extractor, and thus no further examination of this element is believed to be necessary. Various extractors will work with my sub-caliber mechanism, as for example, the extractor of the Williams' Patent U. S. 2,090,657. Other extractors which will occur to those skilled in the art may be used herein.

In this figure I have also shown an embodiment of my novel ejector. The ejector 40 is fitted into barrel 23 and floats with the barrel. That is, when the barrel moves rearward following firing so too does the ejector, and when the barrel is stopped because of lug 27 so too is the ejector, and when the barrel moves forward into position again the ejector moves along. A track is desirably provided in the slide in which ejector 40 may ride. Such a track assures that the ejector will at all times be in proper alignment to strike the casing as illustrated when the casing is carried back by extractor 38 during recoil. Such a track also assures sufficient support for ejector 40, so that on striking, ejection of the casing out the ejection port of the gun will take place. To facilitate expulsion out the ejection port the extractor head 37 and the ejector 40 strike or engage casing 30 at substantially opposite points. The ejector 40 in this embodiment is mounted on the floating barrel 23, in that area of the sleeve near the cartridge chamber which would provide a stationary rather than a moving mounting following firing of the cartridge are rather thin, and a greater likelihood of bending or breaking the sleeve would exist. On the other hand, the barrel is substantially thicker in this area and damage to the barrel is highly unlikely. However, it is to be realized that the ejector 40 could be mounted to be stationary by reinforcing the sleeve, by mounting it further forward on the sleeve, by mounting it on the magazine, or the like, and that a fixed ejector is also intended to be encompassed by this invention.

Inasmuch as the movement of the floating barrel is slight, the barrel remains at all times forward of the supply of cartridges in the magazine and thus the chamber is always in position to be loaded.

When recoil takes place, the slide moves rearward and recocks the firearm. The slide is returned in the forward direction by means of a spring and during return a portion of the slide engages the topmost cartridge in the magazine and pushes it forward along the ramp and into the cartridge chamber of the floating barrel. When the cartridge is in position, cocking and reloading have been effected and the firearm is in condition to be fired again.

It is intended to cover this invention within the scope and spirit of the appended claims.

What is claimed is:

1. A sub-caliber mechanism for a self-reloading fire-

arm comprising a replacement sleeve for rigid attachment to the frame of the firearm and adapted to be housed within the frame, a sub-caliber barrel and sub-caliber cartridge chamber as a single unit positioned to float in the sleeve, said unit having an enlarged surrounding shoulder at the cartridge chamber end substantially co-extensive with the cartridge casing of a bullet in the chamber, said replacement sleeve being substantially co-extensive and extending about said unit and being spaced slightly from said enlarged shoulder providing a slight gap between said sleeve and said enlarged shoulder, gas escape means in the walls of said unit in registration with said gap between said sleeve and said enlarged shoulder, said unit being adapted to move backward to impart sufficient impetus to actuate a recoil cycle of the firearm when actuated by gas passing to said gap through said gas escape means on firing of a bullet in said unit, and means to stop rearward movement of the barrel chamber unit.

2. A sub-caliber mechanism for a self-reloading firearm comprising a replacement sleeve for rigid attachment to the frame of the firearm and adapted to be housed within the frame a sub-caliber barrel and sub-caliber cartridge chamber as a single unit positioned to float in the sleeve, said unit having enlarged surrounding shoulder at the cartridge chamber end substantially co-extensive with the cartridge casing of a bullet in the chamber, said replacement sleeve being substantially co-extensive and extending about said unit and being spaced slightly from said enlarged shoulder providing a slight gap between said sleeve and said enlarged shoulder, gas escape means comprising a plurality of gas escape ports in the walls of said unit in registration with said gap between said sleeve and said enlarged shoulder, said unit being adapted to move backward to impart sufficient impetus to actuate a recoil cycle of the firearm when actuated by gas passing to said gap through said gas escape means on firing of a bullet in said unit, a projection extending from the cartridge chamber section of said unit into a recessed area in the sleeve, and a stop wall at the rear of the recessed area to allow sufficient rearward movement of the barrel chamber unit to operate the reload mechanism.

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