Jan. 22, 1957 A. K. MELIN 2,778,138

CAP GUN CONSTRUCTION

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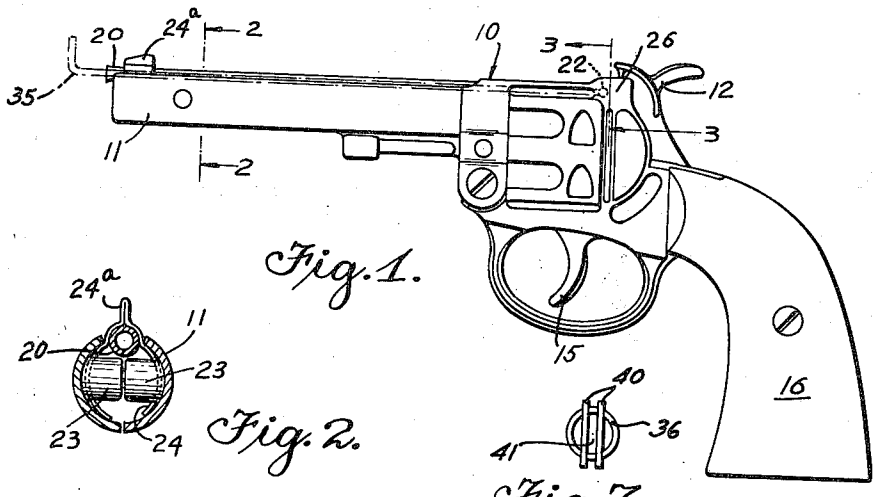


Fig. 1.

Fig. 2.

Fig. 7.

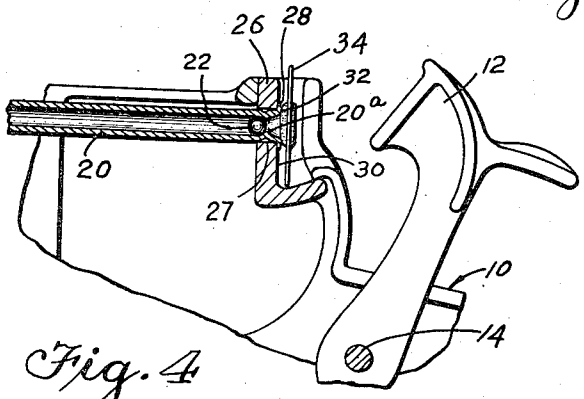


Fig. 4.

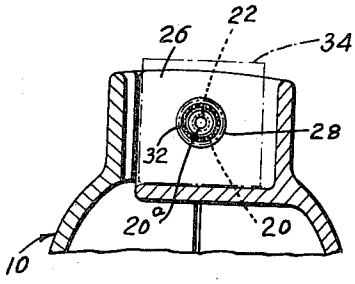


Fig. 3.

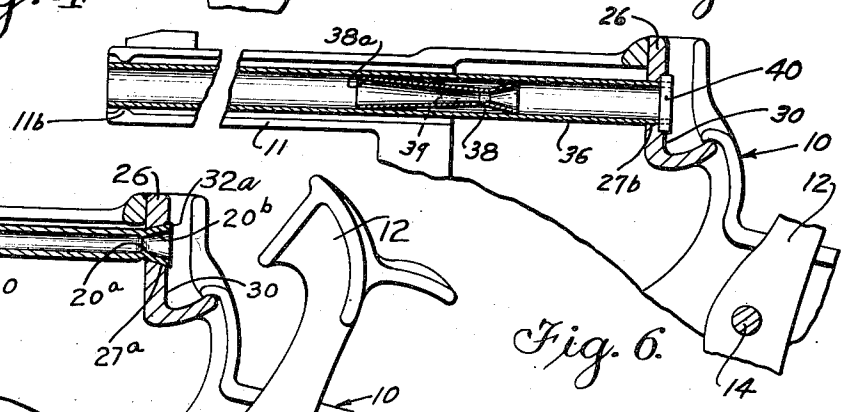


Fig. 6.

Fig. 5.

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CAP GUN CONSTRUCTION

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9 Claims. (Cl. 42—54)

The present invention relates generally to cap guns, either rifles or pistols, and more particularly to a cap gun, such as a cap pistol for target shooting or the like, using a conventional type of paper cap as a charge for propelling a projectile.

The familiar cap pistol is a light, inexpensive toy built to the approximate size and representation of a regular revolver. A cap pistol of this character can be made the basis of a useful target pistol which is able to give worthwhile practice and entertainment while at the same time being inexpensive to purchase, use, and maintain.

The principal change from the conventional style of cap pistol is the addition of a tube of smaller diameter than the ordinary barrel. This tube not only serves as a barrel for holding a shot used as the projectile fired but also provides a chamber for confining the explosion from the cap. This is somewhat similar to the conversion of regular firearms for use with subcaliber ammunition except that here the installation is a permanent one. A single shot which is but slightly smaller in diameter than the diameter of the tube is used as a projectile and a paper percussion cap of the ordinary variety is used as the propelling charge.

Since the present invention is well typified by applying it to a conventional cap pistol it is described in detail in this aspect, but it is not necessarily limited thereto as it may be applied equally well to a cap pistol made from the beginning to use this invention. Likewise the invention is not limited to a short barrel gun but may be applied as well to a gun with a longer barrel like a rifle.

It is the general object of my invention to provide a small diameter tube in a cap pistol of this character in such a manner that it is positioned in place to propel and to direct the flight of a small projectile, using means for fastening the tube in place that is simple and inexpensive. Cost is of primary consideration since the cap pistol which is the basic part of the final product is itself comparatively inexpensive and only a minimum amount of work in modifying it for target shooting can be justified from an economic standpoint.

It is also an object of my invention to fasten a shot tube in place in a cap pistol in such a manner that the tube gathers and directs explosive force from a paper cap into the tube in order to obtain an adequate propelling force from the explosion of an ordinary paper percussion cap.

It is a further object of my invention to provide an anvil for firing the paper cap which has a surface engaging the cap of such character as to obtain the consistent and uniform performance necessary in order to provide a desirable degree of accuracy to the finished product.

The above and other objects of my invention have been attained in a cap pistol having a frame and a hammer pivotally mounted on the frame to strike a percussion cap to fire it, by providing a tube for holding and directing a projectile which is typically a small spherical shot. This tube is mounted on the frame with the rear end of the tube positioned in the path of the hammer and carrying anvil means against which the cap rests in position to be struck by the hammer. For a tube of small diameter, the surface on the anvil against which the cap rests is preferably an annular surface which is relatively narrow and generally flat, although it may be slightly rounded. For a tube of relatively larger diameter, a different type of anvil means may be employed on the rear end of the tube. It is preferable to pass the tube through a hole in an element of the frame to hold the rear end of the tube in position. The tube is flanged or otherwise provided with a forwardly facing shoulder engaging the frame element to hold the tube against relative longitudinal movement. The bore of the tube may be increased adjacent the rear end, by reaming or by flaring the end of the tube, so that a larger end opening is presented into which the explosive force from the cap is directed.

How the above objects and advantages of my invention, as well as others not specifically referred to herein, are attained will be better understood by reference to the following description and to the annexed drawings, in which:

Fig. 1 is a side elevation of a cap pistol embodying a preferred form of my invention;

Fig. 2 is a transverse section through the barrel on line 2—2 of Fig. 1;

Fig. 3 is an enlarged fragmentary section showing in elevation the rear end of the tube and the anvil for the cap, taken on line 3—3 of Fig. 1;

Fig. 4 is an enlarged fragmentary longitudinal median section at the rear end of the tube showing a cap in place against the end of the tube, ready for firing;

Fig. 5 is a view similar to Fig. 4 showing a modified form of my invention;

Fig. 6 is a view similar to Fig. 4 showing another modification of my invention; and

Fig. 7 is a view of the rear end of the shot tube only of the modification of Fig. 6.

Referring now to the drawings, the frame of the pistol is indicated generally at **10** and includes barrel **11**. The frame and barrel are customarily made of two separate castings that are closely similar but of opposite hand, and are so shown here. The castings are joined over a vertical median plane but do not engage each other closely. Hammer **12** is pivotally mounted at **14** on the frame to move between the lowered or firing position shown in Fig. 1 and the retracted or cocked position shown in Fig. 4. The hammer is released by manually applied force on trigger **15** in the usual manner. The rear part of the frame carries a pair of wooden grips **16** that provide a handle by which the pistol is held.

The construction so far described is entirely conventional and is described to indicate a typical cap pistol to which my invention may be applied; but the invention is not necessarily limited thereto. In order to adapt this cap pistol to target practice, it is provided with shot tube **20** which is disposed with its axis parallel to and immediately above the axis of barrel **11**. Tube **20** is a smooth-bore tube and is mounted on frame **10** for the purpose of holding and directing a projectile which is preferably a pellet or a small spherical lead shot shown at **22** in Fig. 4. Since tube **20** directs the flight of projectile **22**, it functions in a manner similar to the barrel of an ordinary firearm but is here referred to as a tube in order to distinguish it from barrel **11**. The inside diameter of tube **20** is only slightly in excess of the diameter of the projectile used. For example, when No. 6 lead shot are used, the inside diameter of the tube is preferably about .11 inch; but of course a larger or smaller projectile may be used and the tube diameter changed accordingly.

Tube **20** is preferably located inside barrel **11** and the frame of the pistol, or at least substantially so, in order to avoid altering the general external appearance of the

pistol. The exact position of the tube may be chiefly determined by two things, convenience, in order to avoid extensive alterations of the existing design of a pistol frame, and the path of falling hammer **12**. The rear end of tube **20** is located in the path of the hammer in order properly to position the cap for firing, as will be explained later. Here, the upper portion of the barrel has been cut away as shown in Fig. 2 to allow tube **20** to pass between the two halves of the barrel wall and above bosses **23** inside barrel **11**. The tube is held in place at the forward end by bent metal strip **24** which also projects above the tube in order to provide a front sight **24***a*, as shown clearly in Fig. 2. The ends of strip **24** are fastened inside the barrel in any suitable manner.

The rear end of tube **20** is properly positioned in the path of hammer **12** by frame element **26** which is a transversely extending wall member forming the conventional imperforate anvil against which the percussion caps rest when struck by hammer **12**. Frame element **26** is provided with an opening **27** through which tube **20** passes.

In a preferred embodiment of my invention, tube **20** projects rearwardly beyond rear surface **30** of frame element **26** and the projecting portion of the tube is bent over outwardly to form a narrow flange **28** which, being larger in diameter than hole **27**, rests against the rear face of frame element **26**. Flange **28** may be formed in any suitable manner, as by hammering or spinning the end of the tube. The flange provides a forwardly facing shoulder that engages rear face **30** of the frame element in order to hold the tube in place against forward longitudinal movement with respect to the frame. It is preferable to provide tube **20** with a slight constriction as at **20***a* for the purpose of limiting the rearward travel of shot **22**. This constriction is close to but spaced inwardly a short distance from the extreme end of the tube. If the constriction is formed so that it tapers the bore of the tube slightly, it may frictionally engage the shot and hold it from rolling out the muzzle end of the tube when the pistol is tilted forwardly and down.

To the rear of constriction **20***a*, the tube is reamed with a tapered reamer so that the bore of the tube increases in diameter toward the rear end of the tube. The thickness of the tube walls is correspondingly diminished. The thinner wall adjacent the end of the tube makes it easier to bend over the tube wall to form flange **28** and at the same time obtain a tight engagement with frame element **26**. It will be noted that in this case the external diameter of the tube forward of flange **28** is uniform.

The outer or rearward face of flange **28** is so shaped that, when viewed from the rear as in Fig. 3, it has a narrow, annular surface **32** which is generally flat, although it is not necessary that it be exactly flat. Ordinarily, this surface may be slightly rounded when viewed in profile; but it is described as being generally flat in order to distinguish it from a surface having a sharp edge or points which would cut or dent a paper cap. Annular surface **32** is located in a plane transverse to the axis of tube **20** and in the path of hammer **12**; and it provides an anvil against which paper cap **34** rests, as shown in Fig. 4, preparatory to firing the pistol.

It has been found advantageous to provide an annular surface of this character on the anvil supporting the cap. Being narrow and approximately flat, it seals well with the cap all the way around the end of the shot tube and the explosive force of the powder charge is confined by the tube and directed into the tube against the projectile. If surface **32** is too narrow or sharp it is much more difficult to obtain a satisfactory seal against the cap. The parts at this point are subject to a certain amount of corrosion as well as accumulation of powder residue and a surface on the anvil of the character described has been found to minimize any ill effects from these sources. The paper cap, when fired, acts to some extent like a gasket between the anvil and hammer **12** that assists in confining the explosive force from the cap within the open end of tube **20**.

The space within tube **20** between projectile **22** and the end of the tube where cap **34** is located, acts much like the chamber of a rifle to confine the propelling force. The conventional cap pistol has so many cracks and openings that without tube **20** the propelling force would be dissipated, much escaping to the atmosphere. The entire construction is simplified by mounting the anvil means rigidly on the end of the tube, as by using an integral portion of the tube. Because the open end of the tube is inside the annular anvil, the anvil may be termed a perforate anvil in distinction to the usual imperforate plate used when the cap is exploded for sound effects only.

The effectiveness of the seal provided by a narrow surface on anvil **32** is important in that a closely uniform force is thus given to each projectile. This is because the entire explosive force from a definite area of the cap is used each time to propel the shot; whereas if the seal is poor at any point around the periphery of the anvil a variable amount of the explosive force is lost each time wherever the seal is not effective. Then the result is that the projectile is given a different velocity or trajectory each time the pistol is fired. A good contact between the anvil and the cap, or between the anvil and the hammer with the cap acting like a gasket between them to improve the seal, is important in a cap gun since the cap pistol is of no value for target shooting if it does not possess at least a reasonable degree of accuracy within its shorter ranges.

The high quality of the seal at this point is promoted by the narrow radial width of the anvil, which also has the advantage of producing a relatively high unit pressure upon the cap as the hammer falls, thus assuring that each and every cap is fired. At the same time, the anvil surface is wide enough to be free from sharp edges or points that would merely cut or indent the cap and produce a misfire.

By taper reaming the terminal section of tube **20**, the diameter of the opening at the end of the tube is increased relative to the internal diameter of the major portion of the tube which is of uniform diameter in order properly to guide the projectile. Enlarging the end of the tube when it is of comparatively small diameter has the advantage that a greater explosive force is gathered from a larger portion of the cap than would be the case without reaming the tube. This effect can be increased by further increasing the area of the end opening of the tube with respect to the area of the main portion of the tube which guides the projectile.

A shot **22** can be rammed home or the powder deposits cleaned out by a ram rod as indicated at **35** in Fig. 1.

There is shown in Fig. 5 a variational form of my invention which includes essentially the same features of construction as already described except for a change in the shape of the terminal section of the tube. In this construction, hole **27***a* is of rearwardly increasing diameter, being preferably tapered. The terminal section **20***b* of tube **20**, rearwardly of constriction **20***a*, is flared outwardly and preferably conforms to the shape of hole **27***a*. The external surface of this tapered section of the tube provides the forwardly facing shoulder which, by engagement with the sides of hole **27***a*, holds the tube against forward displacement relative to frame element **26**.

Flared terminal section **20***b* of the tube may be formed in any suitable manner, as by a spinning operation. In this way it is possible to enlarge the end opening of the tube to a diameter typically between two and three times the diameter of the major portion of the tube. The resultant area of the opening at the end of the tube may then be at least four or more times the cross sectional area of the main portion of the tube. This is a greater enlargement of the end of the tube than attained with the construction shown in Fig. 4 and it is thus possible to apply a correspondingly greater propelling force from the cap since either a larger area on a given cap is en-

compassed by the anvil surface **32** or a larger cap may be used.

It is preferable that tube **20** project rearwardly slightly beyond surface **30** of frame element **26** as shown in Fig. 5 in order that the annular anvil be well defined. In this construction anvil **32***a* is provided by the annular end surface of the tube and retains its perforate characteristic and is rigidly mounted on tube **20** at the rear end of the tube, as before. It may be desirable to grind or otherwise finish this end surface in order to give it a suitable degree of flatness.

Another variational form of my invention is shown in Fig. 6 in which the smooth bore tube **36** is comparatively of much larger diameter than tube **20**. Tube **20** is designed to take a particular lead shot or similar projectile **22** with close clearance. Tube **36** is much larger in diameter in order to take a variety of projectiles, such as lead shot, beans, or other similar objects. In order to adapt the tube to articles of different sizes, it is provided with a double frusto-conical insert **38**. The outside diameter of insert **38** is substantially the same as the internal diameter of tube **36** so that the insert is a snug sliding fit inside the tube and when pushed into place it is held firmly by frictional engagement with the tube. The seal between the insert and tube can thus be made sufficiently tight without gaskets or the like to prevent leakage of the gases from the explosion of the cap.

The forward conical portion **38***a* of the insert tapers down gradually to a small diameter at its rear end, typically about 1/16 inch. The gradual taper enables objects of different sizes to be seated at some position along the cone with a sufficiently close fit to be shot from the tube when a cap is exploded. Of course the position of the projectile in the cone depends upon its diameter. A shot, as indicated at **39**, may seat itself near the rearward end of gradually tapering portion **38***a*, while an object of larger diameter would become seated at some point forwardly of the position shown.

The taper given to the rearward conical portion of insert **38** is not critical. It is preferably a more rapid taper as shown in order to reduce the overall length of the insert. This rearward taper serves to gather the explosive force from a chamber of larger diameter or cross-section and direct it through the constricted part of insert **38** against the rear side of the object to be propelled.

In the forms of my invention shown in Figs. 4 and 5, the constriction inside tube **20** is made by working the tube to reduce both the inside and outside diameters; but here the change in diameter required is so great that it is easier to provide tube **36** with an insert, which becomes in effect a part of the tube, than it is to work the tube to produce the desired reduction in diameter of the tube wall.

As before, the tube passes through an opening **27***b* in frame element **26** to position the rear end of the tube. The forward end may be held within barrel **11** in any suitable way, as by providing small bosses **11***b* inside the barrel.

The diameter of tube **36** may be such that it is larger than the powder charge of cap **34** and therefore a different type of anvil means is mounted on the rear end of the tube. Here the anvil means takes the form of two spaced bars **40**, shown particularly in Fig. 7. It will be seen that the bars are longer than the outside diameter of the tube so that the ends of the bars provide forwardly facing shoulders that engage the pistol frame to hold the tube against forward movement under the impact of hammer **12**. The opening **41** between the two bars, as well as the openings and around them but within the wall of tube **36**, permits the force of the explosion to enter the end of the tube. Thus the anvil means still has its perforate characteristic. The hammer hits against the end of the tube and causes the force of the explosion to be directed into the tube. The paper portion of cap **34** around the powder charge acts as a gasket between the anvil and hammer **12** to contain the force of the explosion. The rear end of tube **36** and the rear faces of the two bars **40** are preferably in a common plane which is located slightly to the rear of the rearward face **30** of frame element **26**. This construction is shown in Fig. 6 and corresponds with instructions previously described. Alternatively, the central portion of bars **40** may be slightly dished or concave to improve the sealing effect of the paper portion of the cap around the powder charge, but the rear faces of the bars are still substantially flush with the rear end of the tube.

Having described a preferred embodiment of my invention and certain modifications thereof, it will be apparent that various changes may occur to persons skilled in the art without departing from the spirit and scope of my invention. Consequently, it is to be understood that the foregoing description is considered as being illustrative of, rather than limitative upon, the appended claims.

I claim:

1. In a cap gun having a frame and a hammer pivotally mounted on the frame for firing a percussion cap, a tube having a flared terminal section and for holding and directing a projectile mounted on the frame with the rear end of the tube positioned in the path of the hammer, the tube having at its rear end a forwardly facing annular shoulder projecting outwardly beyond the tube and engaging an element of said frame to hold the tube against forward displacement, and anvil means rigidly mounted on the rear end of the tube, said anvil having a narrow, approximately flat, annular surface in a plane transverse to the axis of the tube against which a cap rests in position to be struck by the hammer.

2. In a cap gun having a frame and a hammer pivotally mounted on the frame for firing a percussion cap, the combination comprising: a tube mounted on the frame for holding and directing a projectile; a frame element having a hole of rearwardly increasing diameter through which the terminal section of the tube passes, engaging the sides of the hole to position the rear end of the tube in the path of the hammer, the rear end of the tube projecting slightly beyond the rear face of said frame element; and perforate anvil means mounted on the rear end of the tube and spaced slightly rearwardly of the rear face of the frame member and against which a cap may rest in position to be struck by the hammer, said anvil means providing a narrow, annular cap engaging surface that has a central opening of a diameter substantially equal to the internal diameter of the tube.

3. In a cap gun having a frame and a hammer pivotally mounted on the frame for firing a percussion cap, the combination comprising: a tube mounted on the frame for holding and directing the flight of a projectile and an element of the frame having a hole through which the tube passes to position the rear end of the tube in the path of the hammer, the tube having a forwardly facing annular shoulder adjacent the rear end engaging the frame element to hold the tube against longitudinal movement forwardly relative to the frame.

4. A cap gun as in claim 3 in which the forwardly facing shoulder is provided by a flared terminal section of the tube, the outer surface of the flared section engaging the sides of the hole through the frame element.

5. A cap gun as in claim 3 in which the forwardly facing shoulder is provided by an integral flange at the end of the tube engaging the rear surface of the frame element.

6. In a cap gun having a frame and a hammer pivotally mounted on the frame for firing a percussion cap, the combination comprising: a cylindrical tube mounted on the frame for holding and directing the flight of a projectile; a double frusto-conical insert inside the tube

providing a constriction in the bore of said tube of smaller diameter than the diameter either side of the insert; and anvil means rigidly mounted on the rear open end of the tube against which a cap rests in position to be struck by the hammer.

7. In a toy cap pistol having a frame with a barrel and a cap firing member movably mounted on the frame at a position rearwardly of the barrel for firing a percussion cap, the combination comprising: a cylindrical tube substantially within the barrel and extending rearwardly therefrom into the path of the firing member, said tube being parallel to and smaller in diameter than the barrel and adapted to direct the flight of a projectile; and a stationary frame element having a hole through which the tube passes; said tube having annular shoulder means that engages the frame element to hold the tube against forward displacement and the rear end of the tube forming an annular anvil against which a percussion cap can rest in the path of the hammer.

8. In a toy pistol having a frame with a barrel and a cap firing hammer movably mounted on the frame at a position rearwardly of the barrel for firing a percussion cap, the combination comprising: a thin-wall cylindrical tube of ductile metal located within the barrel and adapted to direct expanding gases from an exploded cap against a projectile to shoot the projectile from the pistol,

said tube being smaller in diameter than the barrel; and a stationary metal frame member located at the rear end of the tube and having a hole through which the tube passes; said tube having at its rear end an enlarged portion to form a forwardly facing shoulder engaging the rear face of the frame member to hold the tube in place, said enlarged portion also forming on the rear end of the tube an annular anvil spaced slightly from the rear surface of the frame member against which a percussion cap can be exploded.

9. A toy cap pistol as in claim 8 in which the anvil has a central opening having a diameter substantially equal to the diameter of the tube and the hammer is large enough to completely cover the anvil.

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