

Dec. 21, 1937.

R. E. BISHOP

2,102,939

CALKING GUN

Filed July 10, 1936

2 Sheets-Sheet 1

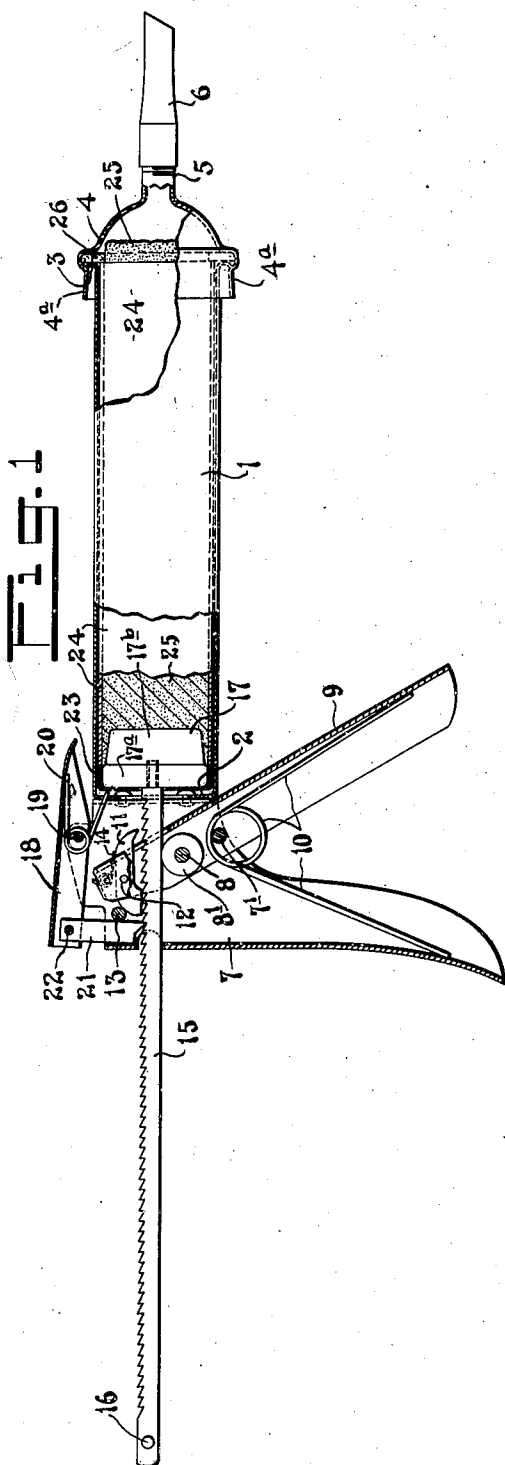
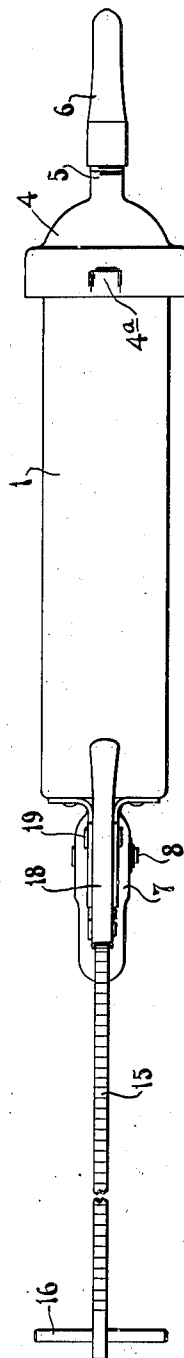


Fig. 2



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Fig. 3

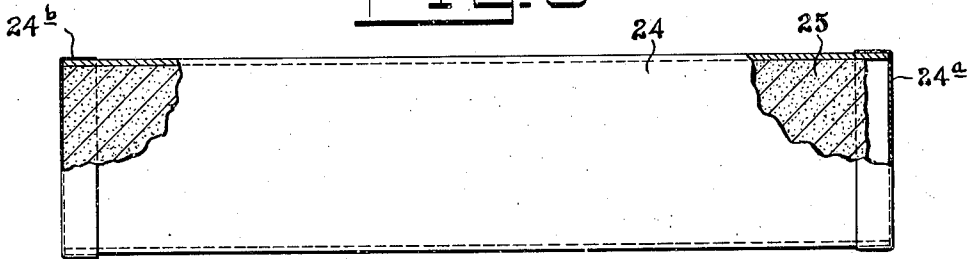


Fig. 4

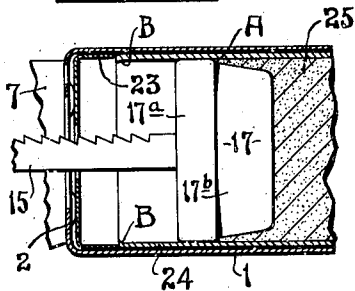


Fig. 5

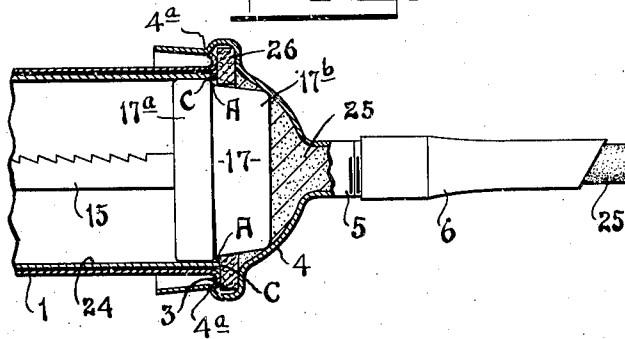


Fig. 6

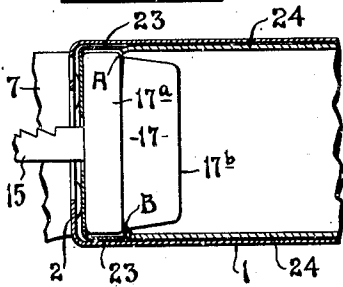
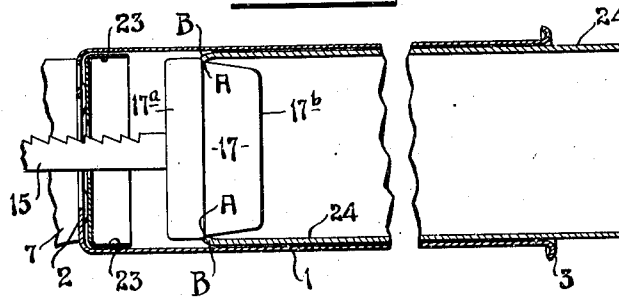


Fig. 7



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CALKING GUN

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12 Claims. (Cl. 221-78)

This invention relates to improvements in calking guns involving a construction whereby a calking compound may be introduced into the gun in cartridge form, and the cartridge ejected from and by the gun after the calking compound has been ejected from and by the gun.

The many detailed objects successfully secured by means of this invention will become apparent from the following description when taken in connection with the attached drawing.

This invention resides substantially in the combination, construction, arrangement and relative location of parts all as described below.

In the accompanying drawings in which the same or similar parts are referred to by the same reference numeral,

Figure 1 is a side elevational view with some parts broken away to show sections of the structure comprising this invention;

Fig. 2 is a top plan view of the device;

Fig. 3 is a side view with parts broken away of one of the cartridges containing the plastic calking compound;

Fig. 4 is a cross sectional view of a portion of the barrel or cylinder of the gun at the left hand end showing the piston ejecting the compound;

Fig. 5 is a similar view of the other end of the gun after the piston has completed its stroke for ejecting the compound;

Fig. 6 is a view similar to Fig. 4 after the piston has been completely withdrawn into the cylinder of the gun;

Fig. 7 is a similar view showing the piston after it has begun its cartridge ejecting movement.

Hand operated calking guns are commonly employed to-day for ejecting or discharging plastic calking compounds, which are known in many forms, from a nozzle or spout in the form of a ribbon or rod which is applied by the nozzle directly to the opening to be closed. There are different methods of charging the gun with a calking compound, all of which are open to one kind of objection or another. In arriving at the invention herein disclosed, the calking compound was put up in cartridge form where the container comprises a tube 24, such as that disclosed in Fig. 3. This tube is preferably made of waxed cardboard, preferably in cylindrical form although it may be made in any suitable cross sectional form. The tube is provided with metal caps 24A and 24B which snugly fit over the ends of the tube to provide a closed container. These tubes are substantially filled with the plastic calking compound. They are sold in commerce in this form.

Prior to the development of the calking gun in

accordance with this disclosure, these cartridges were placed in a gun having a tubular barrel of a size to just snugly receive the cartridge after the caps have been removed from both ends. The gun was provided with a piston which passed through the tube 24 of the cartridge, forcing the material ahead of it. The barrel of the gun was closed at the end into which the cartridge was charged by a removable cap having a discharge spout. When the tube or cartridge was emptied, the piston was withdrawn and the tube removed from the gun after the nozzle cap was taken off. This form of structure was quickly found to be impracticable because the calking compounds commonly used are notoriously sticky, plastic, troublesome materials which adhere to everything they touch. The result was that the compound inevitably, as the gun was used, smeared the inner wall of the barrel so that when a new cartridge was forced into it, it would adhere so firmly to the barrel that it became an exceedingly difficult and time consuming operation to remove the empty tube.

This invention is concerned with a gun to be charged as before with a cartridge of plastic material of the same form, and as illustrated in Fig. 3 but modified so that the same piston which ejects the compound, is employed to eject the empty tubes.

The gun is shown comprising a barrel 1 closed at one end by a wall 2, and open at the other end. This barrel is of suitable dimensions and preferably circular in cross sections to receive cartridges of the same form. The free end of the barrel is provided with an interrupted bead, and the nozzle cap 4 is formed with lugs to engage the interrupted bead 3, thus providing the usual bayonet connection between the tube and the cap. The sealing washer 26, preferably, but not necessarily of leather, is mounted in the cap in a position to form a tight seal between the cap and the end of the barrel. The cap is formed with a tubular projection 4 externally threaded to receive the nozzle tube 6 of any suitable form.

Secured to the closed end of the barrel in any suitable manner, and properly shaped to form a handle and support, is the metal piece 7 which has pivotally mounted thereon by the pivot pin 7', a grip or trigger member 9. A suitably shaped spring 10 is mounted between the hand piece 7 and the trigger handle 9 to hold the parts in the position shown in Figure 1.

The trigger handle 9 is of channel form and has pivotally mounted between the sides thereof on a pivot pin 12, a pawl 11 which is engaged

by spring 14 which tends to urge one end of the pawl downwardly. The pawl is positioned to engage the teeth on the piston rod 15 which passes through an opening in the hand piece 7 and the end wall 2 of the barrel. However, the pawl is held out of engagement with the teeth of the piston rod when the trigger 9 is in the position shown in Figure 1 by a camming action between the pawl and a stop pin 13 mounted in the hand piece 7. Thus, the pawl is out of engagement with the piston rod in the normal position of the parts as shown in Figure 1. Pivotaly mounted on the hand piece 7 by means of the pivot pin 19, is a lever 18 which has pivotally mounted thereon at 22, a latch 21 positioned to engage the teeth of the piston rod. A spring 19 is provided to urge a lever 18 so that the latch normally engages the teeth on the piston rod in normal position as shown in Figure 1. As is clear from Figure 1, the piston rod is guided and centered by the left hand end of pawl 11, by roller 8 and by the opening in the hand piece 7.

The outer end of the piston rod is provided with a handle 16 and is provided on the other end within the barrel with a piston 17. This piston as shown, consists of a cylindrical portion 17A of uniform diameter and a short truncated, conical portion 17B. The base of the portion 17B, that is the part of larger diameter, is contiguous with the cylindrical portion 17A but is of slightly less diameter. The shoulder A thus formed, as is clear in Fig. 6, is rounded. The external diameter of the portion 17A of the piston is such as to form a tight, sliding fit with the interior of the cartridge tube 24.

Freely mounted in the barrel is a cup shape member 23 of metal or some suitable material of an internal diameter so that the portion 17A of the piston may easily fit therein as is clear in Figure 1. The cup 23 is preferably, but not necessarily, free in the barrel. If desired, it can be secured to the end wall 2. The thickness of the walls of the cup are preferably less than the thickness of the cartridge tube. The external diameter of the cup is substantially the same as the external diameter of the cartridge tube so that internally of the cup the cartridge tube projects radially inwardly a slight amount, as is clear for example in Figure 1.

The operation of the mechanism and the function of the parts will now be described.

The end caps 24A and 24B are removed from the end of the cartridge tube 24 which is filled with a plastic composition 25. The nozzle cap 4 of the gun is removed. The right hand end, Figure 1, of lever 18, is depressed so that the latch 21 disengages the teeth on the piston rod 15. The piston 17 is then pulled all the way back to the closed end of the barrel by means of the handle 16. This operation is possible because the pawl 11 is in the position shown in Figure 1, as is the trigger 9 so that the piston rod is free to move. This pulls the piston back into the cup 23 as shown in Figure 1. The filled cartridge is then pushed down into the barrel until its end engages the rim of the cup 23. It is preferable but not necessary, as indicated in Fig. 3, to leave a little space in the end of the cartridge so that when the cartridge is forced down over the piston, as shown in Figure 1, very little of the plastic compound will be forced out of the end of the tube. The nozzle is then applied to the gun and locked thereon by the bayonet connection. The parts are so proportioned

that the tube 24 seats at one end against the sealing ring 26 to form a seal at the annular seat, see Fig. 5, and is forced firmly against the rim of the cup 23.

The gun is then operated by repeatedly pulling the trigger 9 at suitable intervals by holding the gun in the hand so that it encircles the hand piece 7 and the trigger lever 9. The trigger is operated at such intervals as to cause a uniform, steady discharge of the plastic compound from the nozzle tube 6 at the desired rate. The piston is advanced by the movement of the trigger 9 by reason of the fact that as the upper end thereof swings over Figure 1, the pawl 11 is freed from the stop 13 and its spring 14 causes it to engage the teeth of the piston rod advancing the piston a short distance to the right. The spring operated latch 21 prevents the return of the piston, and the piston rod when the trigger 9 is released to return to normal position under the action of spring 10. As it reaches normal position, stop 13 disengages the pawl from the teeth of the piston rod.

The rounded shoulder A of the piston, as it starts to move from the position shown in Figure 1, is forced to pass the end B of the tube, Fig. 4 so that the portion 17A notwithstanding its tight fit with the tube 24, passes thereinto. In so doing the rounded bead A somewhat crushes or mutilates the end of the tube 24 as illustrated at B, in Figure 4. Repeated operation of the trigger 9 causes the piston to gradually advance to the position shown in Fig. 5. By this time all of the plastic composition 25 has been forced from the tube 4 and from the nozzle 6. The portion 17B of the piston is proportioned so that it may pass through the central opening in the sealing ring 26 to a point where the shoulder A reaches, or substantially reaches it. This insures the complete removal of the plastic composition from the tube 24, and the removal of much of it from the nozzle cap 4.

Latch 21 is again released and the piston entirely withdrawn back to the position shown in Fig. 6. This completely withdraws the portion 17A of the piston from the tube 24 and into cup 23. The nozzle cap 4 is then removed from the gun. The tube 24 is then ejected from the gun by repeated operation of the trigger 9 which starts the piston 17 back toward the open end of the barrel. This time the nozzle cap 4 is not in place to hold the tube 24 against longitudinal movement. Thus the tight fitting portion 17A of the piston meets so much resistance to again entering tube 24 that the tube is caused to move endwise as is clear from Fig. 7 and be ejected from the barrel of the gun. The resistance to the entry of the piston into the tube 24 is enhanced by the rounded bead A formed thereon, the tight fit which the portion 17A naturally has with the tube 24, and the fact that the end of the tube was somewhat crushed and mutilated upon the first entry of the piston thereinto. It has been found therefore, that the empty tube 24 will be ejected by the piston even if the entire interior of the barrel is smeared with a sticky, plastic composition. In other words the resistance to entry of the portion 17A of the piston into the tube 24 is greater than any possible resistance to movement of the tube 24 endwise offered by the adhesive action between the exterior of the tube 24 and the interior of the barrel 1. This has been found to be so by a multitude of actual tests. While the tube offers substantial resistance to the entry of the piston

the first time thereby crushing the tube 24 at the end B, this does not interfere with the actual entry of the piston into the tube because the tube abuts against the sealing ring 26. The second entry of the piston meets with even greater resistance because of the crushing at B as previously noted. When the empty tube is being ejected, it is ordinarily only necessary to project it from the barrel enough so that it can be firmly gripped in the hand when it can be withdrawn.

It has only been found from experience that the piston removes practically every particle of the composition from the tube which action is believed is aided by reason of the fact that the tube is heavily waxed. This wax reduces the resistance to movement of the tight fitting piston through the tube and facilitates the scraping or removal of the composition from the inner wall of the tube. It has been found that none of the plastic composition escapes to the rear of the piston because of its tight fit through the tube 24, and that after many uses practically none of the compound gets on the surface of the portion 17A of the piston by reason of the entry of the plastic compound between the tube and that portion of the piston. The tube 24 is thus tightly sealed by the piston and by the sealing ring 26. The entire gun tends to keep clean so that the gun may be used many more times before the compound gets on the interior of the barrel as has been the case with prior structures. Thus the arrangement minimizes but does not eliminate the desirability of the tube ejecting feature. As previously stated, the nature of the plastic compound is such that it will ultimately, because of handling of the gun and fresh cartridges, become smeared making the ejecting feature highly desirable.

I am well aware that the principles of this invention and the physical structure embodying them, may be readily varied by those skilled in the art without departure from the true scope of the invention. I do not, therefore, desire to be strictly limited to the disclosure as given for purposes of illustration, but rather to the scope of the appended claims.

What I seek to secure by United States Letters Patent is:

1. In a calking gun for use with a tubular cartridge, the combination comprising a cylinder open at one end, means forming an annular shoulder adjacent the closed end of the cylinder against which the cartridge seats, said cartridge being exposed at its end inwardly of said shoulder, means including a discharge cap detachably secured to the open end of the cylinder and engaging the other end of the cartridge, and a movable piston reciprocally mounted in the cylinder, said piston having a forced fit with the cartridge whereby initial entry of the piston into the cartridge mutilates the exposed end of the cartridge preventing a second entry of the piston when the cap is removed so that the cartridge is ejected.

2. In a calking gun for use with a tubular cartridge, the combination comprising a cylinder open at one end, means forming an annular shoulder against which the cartridge seats, said cartridge being of less internal diameter than said shoulder, means including a discharge cap detachably secured to the open end of the cylinder and engaging the other end of the cartridge, and a movable piston reciprocally mounted in the cylinder, said piston having a maximum diameter slightly greater than the internal diam-

eter of the cartridge whereby initial entry of the piston into the cartridge mutilates the exposed end of the cartridge preventing a second entry of the piston when the cap is removed so that the cartridge is ejected.

3. In a calking gun for use with a tubular cartridge, the combination comprising a cylinder open at one end, means forming an annular shoulder against which the cartridge seats, said cartridge being exposed at its end inwardly of said shoulder, means including a discharge cap detachably secured to the open end of the cylinder and engaging the other end of the cartridge, and a movable piston reciprocally mounted in the cylinder, said piston having a shoulder forming a tight fit with the cartridge whereby initial entry of the piston into the cartridge mutilates the exposed end of the cartridge preventing a second entry of the piston when the cap is removed so that the cartridge is ejected.

4. In a device as described, the combination with a tubular cartridge of a cylinder adapted to receive said cartridge, a piston reciprocally mounted in the cylinder, means forming an annular seat against which one end of the tubular cartridge rests exposing its inner periphery, said piston when fully retracted nesting with said means and said piston having a portion forming a tight sliding fit with the interior of the tubular cartridge and a discharge cap detachably secured to the opposite end of the cylinder and sealing the adjacent end of the tubular cartridge when in place, said portion on the piston engaging the inner periphery of the cartridge to eject said cartridge when the cap is removed.

5. In a calking gun for use with tubular cartridges of material, the combination including a cylinder to receive the cartridge, a seating ring mounted in one end of the cylinder against which the outside portion of one end of the cartridge seats to expose the inside portion, a movable piston in the cylinder capable of nesting within the ring, a detachable nozzle cap secured to the charging end of the cylinder and means for moving the piston to discharge the material from the cartridge, said piston having a peripheral bead forming a tight fit with the cartridge whereby the cartridge will be ejected when the cap is removed from the cylinder by reason of the engagement of the bead with the exposed portion of the cartridge.

6. In a calking gun for use with a cartridge of material, the combination comprising a cylinder substantially closed at one end and open at the other, means adjacent the closed end of the cylinder against which the cartridge seats, said means spacing the cartridge from the closed end of the cylinder and exposing the inner peripheral edge of the cartridge, a movable piston in the cylinder adapted to lie in said space when retracted, and a discharge nozzle cap detachably secured to the open end of the cylinder, the piston diameter being slightly larger than the internal diameter of the cartridge and having a shoulder curved in cross-section and engageable with said inner peripheral edge of the cartridge.

7. In a calking gun for use with a cartridge of material the combination comprising a cylinder substantially closed at one end and open at the other, ring means adjacent the closed end of the cylinder against which the cartridge seats, said means spacing the cartridge from the closed end of the cylinder, the internal diameter of said ring means being greater than the internal diameter of the cartridge, so as to expose the inner periph-

- eral edge of the cartridge, a movable piston in the cylinder adapted to lie in said space when retracted, a discharge nozzle cap detachably secured to the open end of the cylinder, and a sealing member mounted between the cylinder and the nozzle cap and positioned to engage the adjacent end of the cartridge, the piston engaging the exposed edge of the cartridge to eject it when the cap is removed.
8. In a calking gun for use with a cartridge of material the combination comprising a cylinder substantially closed at one end and open at the other, a cylindrical abutment member adjacent the closed end of the cylinder against which the cartridge seats, the internal diameter of the cartridge being less than that of the cylindrical abutment member so that the inner end edge of the cartridge is exposed, a movable material and cartridge ejecting piston in the cylinder adapted to lie in said space when retracted, a discharge nozzle cap detachably secured in the open end of the cylinder, a sealing member mounted between the cylinder and the nozzle cap and positioned to engage the adjacent end of the cartridge, and means for progressing the piston towards the nozzle cap to eject the material from the cartridge, the piston abutting the exposed edges of the cartridge to eject it upon attempted entry with the nozzle cap removed.
9. In a calking gun for use with a cartridge of material the combination comprising a tubular barrel, a cap at one end of the barrel against which the cartridge seats, the inner diameter of the cartridge being less than that of the cap so as to expose the inner peripheral edge of the cartridge, a movable piston in the barrel adapted to be retracted into the cap, a discharge nozzle cap detachably secured to the other end of the barrel, means for progressing the piston towards the nozzle cap to eject the material from the cartridge, and means on said piston for engaging the exposed edge of said cartridge to eject it when the nozzle cap is removed.

10. In a calking gun for use with a cartridge of material the combination comprising a tubular cartridge, a cylinder enclosing the cartridge, abutment means engaging the cartridge at one end to expose the inner peripheral edge of the cartridge, a detachable nozzle cap secured to the cylinder adjacent the other end of the cartridge, a piston in the cylinder, and means for moving the piston towards the nozzle cap, said piston being formed to eject the material from the cartridge when the nozzle cap is in place and to engage the exposed inner peripheral edge of the cartridge to eject it when the nozzle cap is removed.

11. In a calking gun for use with a tubular cartridge the combination including a cylinder open at one end, a nozzle cap detachably secured to the open end, a stop ring mounted on the other end of the cylinder, and a movable piston mounted in said cylinder, the tubular cartridge abutting against the stop ring and said piston being completely retractable from the cartridge so as to lie in the ring, and means cooperating with the cartridge to crimp over and mutilate its end to eject the cartridge when the cap is removed.

12. A calking gun of the type described comprising a barrel having an open end closed by a removable nozzle cap, a seating member at the other end of the barrel, a cartridge in the barrel locked between the seating member and the nozzle cap, the seating means engaging the cartridge and exposing a portion of the end thereof, and said piston having a peripheral bead engageable with the exposed end of the cartridge whereby initial entry of the piston into the cartridge mutilates the end of the cartridge, said mutilated end of the cartridge cooperating with the piston re-entering into the cartridge to create sufficient force to eject the cartridge from the barrel when the cap is removed.

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