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E. J. SHOFFNER.
PNEUMATIC TOOL RETAINER.
APPLICATION FILED DEC. 27, 1907.

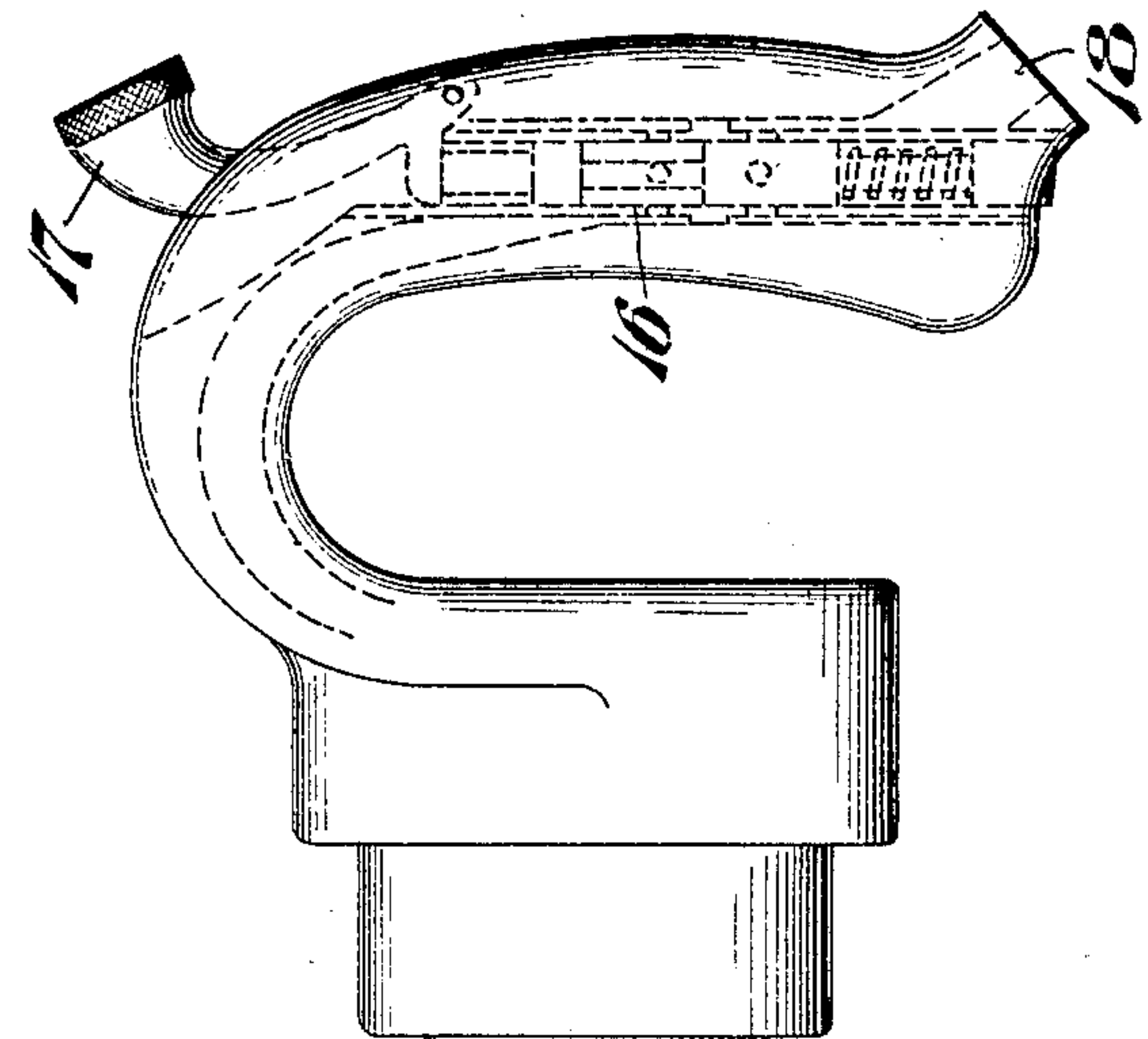


Fig. 1.

Fig. 4.

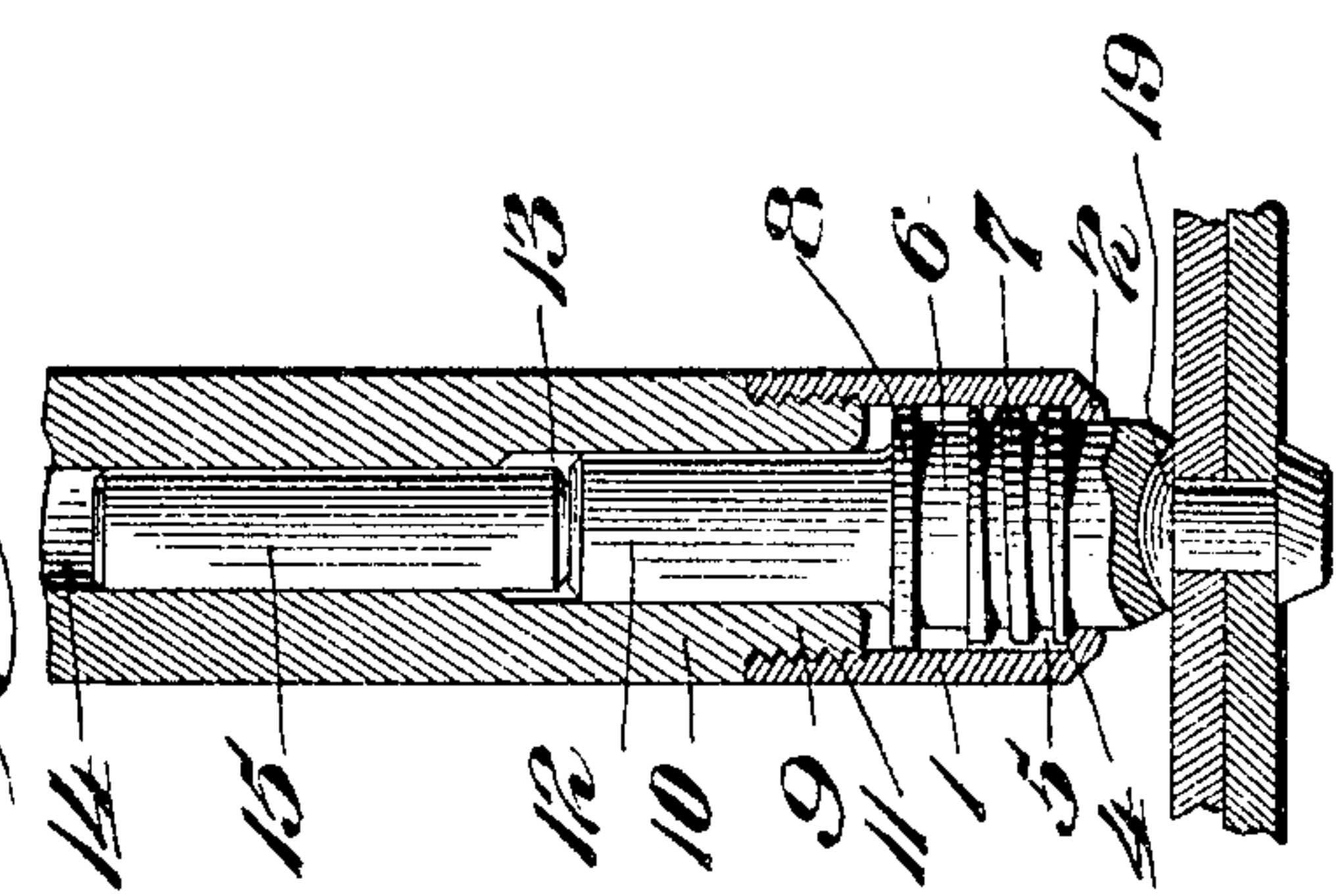
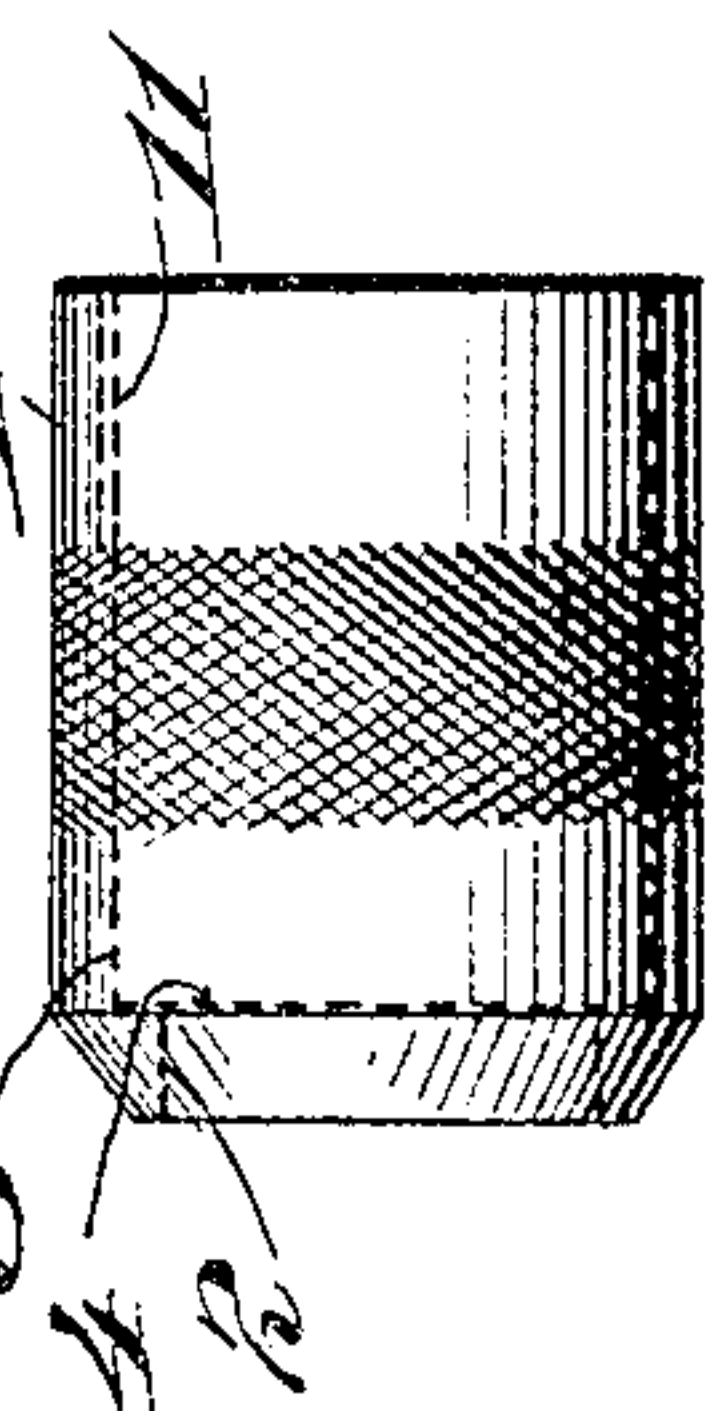


Fig. 3.



Fig. 2.



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UNITED STATES PATENT OFFICE.

EDWARD J. SHOFFNER, OF ROANOKE, VIRGINIA, ASSIGNOR OF FIFTY-ONE ONE-HUNDREDTHS TO GURDON W. MERRELL, OF ROANOKE, VIRGINIA.

PNEUMATIC-TOOL RETAINER.

No. 885,537.

Specification of Letters Patent.

Patented April 21, 1908.

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To all whom it may concern:

Be it known that I, EDWARD J. SHOFFNER, a citizen of the United States, residing in the city and county of Roanoke, State of Virginia, have invented a new and useful Pneumatic-Tool Retainer, of which the following is a specification.

In the use of pneumatic hammering tools and more particularly in the use of "long stroke" pneumatic riveters, or riveting hammers wherein the piston has a length of stroke greater than its own length and reciprocates from six to eight hundred times a minute, there has heretofore, unless special provision was made, been danger of the accidental shooting out of the plunger or of the rivet set or button set employed, with consequent liability of the loss of these parts and of injury to persons or objects who may be struck thereby, since the piston in tools of this character is usually reciprocated under a high pressure of motive fluid of approximately one hundred pounds or over to the square inch.

The object of the present invention is to provide a novel construction and assemblage of devices for preventing the accidental shooting out of the plunger and of the rivet set, button set or other tool, that may be operated upon by the plunger and to the above ends I employ in carrying out my invention, a retainer or retaining sleeve of the same or lesser outer diameter than the outer diameter of the cylinder, said sleeve being preferably in threaded engagement with a reduced end of the riveter cylinder and having an outer inwardly turned flange through which the end or head of the button set or other working tool projects, whereby a chamber is formed within said retainer for the button set shoulder and within said chamber is contained a spring which is of lesser length or area than the longitudinal distance between the shoulder of the button set and the inner wall of the inwardly turned flange of the retainer, said button set being provided with a rearwardly extending shank of lesser diameter than said shoulder or head proper, which latter is encircled by said spring, said shank extending into the bore of the riveting cylinder, and being adapted to be hammered upon by the reciprocating piston, the foregoing parts being so constructed and collocated that the impact of the hammering piston is imparted directly to the shank of

the button set and thence directly upon the rivet or other point without the force of the blow being impaired or diminished in any particular.

For the purpose of explaining my invention, the accompanying drawing illustrates a satisfactory reduction of the same to practice, but the important instrumentalities thereof may be varied, and so it is to be understood that the invention is not limited to the specific arrangement and organization shown and described.

Figure 1 represents a longitudinal sectional view of a tool retainer and its adjuncts, embodying my invention, the cylinder and rear of the hammer being shown in elevation. Fig. 2 represents a side elevation of the tool retainer in detached position. Fig. 3 represents a side elevation of the spring employed. Fig. 4 represents a vertical sectional view, partly in elevation, showing the position the parts assume in driving a rivet.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings:—1 designates a pneumatic tool retainer, the same consisting of a sleeve having the opening 2 through its forward end, which is of lesser diameter than the inner bore 3 of the retainer, the forward portion of said bore terminating in the wall 4, whereby a chamber 5 is formed between said bore 3 and the head or body of the button set 6, around which is the spring 7 which is preferably of the flattened construction seen in Figs. 1 and 2, although it is apparent that a round or other coil spring or its equivalent may be employed without departing from the spirit of my invention.

8 designates a shoulder on the button set, the latter being located between the spring 7 and the reduced extremity 9 of the riveting cylinder 10, the rear portion of said sleeve or retainer 1 being threaded as indicated at 11, so as to engage the reduced threaded end 9 of said cylinder.

12 designates the shank of the button set or other working tool, the same being of less diameter than the head 6 or the shoulder 8 thereof, and being received in the chamber 13 which as will be understood from Fig. 1, is of slightly larger diameter than the bore 14 of the riveting cylinder 10, in which the piston 15 reciprocates, the latter being preferably the shape of a bolt of uniform diameter throughout its length and provided with

suitable valve mechanism (not shown) for the admission and exhaust of the motive fluid to the opposite ends of the cylinder.

16 designates the grasping handle of the tool, which is in threaded or other engagement with the cylinder 10, said handle being provided with the thumb or finger piece 17, whereby the admission of the motive fluid through the inlet or pressure supply duct 18 to the valve mechanism (not shown) is controlled according to requirements, as will be familiar to those skilled in the art.

I desire to call especial attention to the fact that the chamber 5 within the retainer 1 is of greater longitudinal area than the length of the spring 7, whereby there is a chamber formed of such area that the impact or blows of the hammering piston 15 are always transmitted directly from the shank 12 of the button set 6 to the head thereof and thence directly upon the rivet or other article 19 to be headed or treated without any impairment or diminishing of the efficiency or force of the blow by reason of the interposition of the spring 7. In other words, it will be apparent to those skilled in the art that when the button set or other working tool 6 is applied to the rivet or other desired point, as indicated in Fig. 4, the wall or shoulder 4 has no effect upon the spring 7 or the button set shoulder 8 other than to keep said spring from slipping out of the retainer, so that said shoulder 4 is usually in contact with the adjacent extremity of the spring only when the button set or other working tool is in position, seen in Fig. 4, with respect to the rivet or other material operated upon, and while the tool is in operation.

It will be understood that when the button set or other working tool 6 is applied to the rivet or other desired point and the piston strikes the set, as for example, as shown in Fig. 4, the shank 12 will be partially within the chamber 13 and the shoulder 8 will be out of contact with the reduced end 9 and the spring 7, as will be readily understood by those skilled in the art, it being apparent that by my construction of chamber 5 having the requisite proportions relative to the button set 6, spring 7 and shoulder 8, I am enabled to obtain the greatest efficiency from the hammering piston and to preserve the life of the sleeve or retainer 1 and to also minimize vibration, since the shoulder will be out of contact with any parts which tend to impair the efficiency of the blow of the hammering piston.

It will be understood by those skilled in this art that in the practical operation of my device, the workman grasps the tool handle 16, seen at the right of Fig. 1, in his right hand and with his left hand grasps the tool cylinder 10 at or near the sleeve 1, whereby the button set or working tool is readily applied to the red-hot rivet 19, or other desired

point and the piston 15 having been caused to reciprocate, its impact upon the button set, as indicated in Fig. 4, effects the heading of the rivet. Inasmuch as the pistons in tools of this character reciprocate from six to eight hundred times per minute, or so rapidly that the blows appear to be continuous, and since it is further essential in standard pneumatic hammering or riveting tools, that an ordinary sized rivet of say seven-eighths of an inch to an inch and an eighth in diameter shall be headed in from ten to fifteen seconds in practice, it will be seen that it is of the highest importance that the blows from the impact of the hammering piston be imparted not only to the button set, but from the latter to the heated rivet as instantaneously and directly as possible, or in other words, it is essential that there be no obstruction, spring or other cushioning device between the shoulder 8 of the button set and the inner wall 4 of the inclosing sleeve of such length or dimensions as to wholly fill the space between said shoulder and wall and thus impair or diminish the efficiency of the blows of the hammer, and there must, under ordinary conditions, during the hammering upon the button set or the driving of the rivet, be no undue or intentional contact of the ends of the cushioning device between said button set shoulder 8 and said inner wall 4 of said retainer, which will impair the efficiency or diminish the force of the blows of the hammering piston.

It will be apparent to those skilled in the art that if there is a constant contact between the button set shoulder 8 and the inner wall or flange 4 of the retaining sleeve 1, or if the entire space between said wall and shoulder is fully occupied by a spring or other cushioning device so as not to permit an entirely free movement of said shoulder 8 and button set, not only will the efficiency of the blows of the piston upon the button set be diminished to a serious extent, but in addition a retaining sleeve of this character will in a short time become in practice fractured and worthless and the vibration will be increased to an undesirable extent. It is therefore essential that an internal chamber, as 5, be provided within the retaining device 1 and it is also essential that the area and dimensions of such chamber be of proper proportion with respect to the button set shoulder 8 and the spring 7, so that the button set and button set shoulder may have sufficient free play for the reasons above explained.

Furthermore, it is essential in the practical application of these hammering tools, especially when used for riveting in corners, or for driving rivets upon lofty structures, such as bridges, and other structural steel buildings where many rivets must be driven in corners of angle irons, T-beams, I-beams and the like, that the button set end of the

cylinder be kept as free as possible from any extraneous transverse attachments, such as clamps, springs, rods or the like, which interfere not only with the handling of the tool, but (what is more serious) interfere with and prohibit the application of the set to the driving of rivets in corners or other similar inaccessible places, which under any conditions are more or less difficult of access.

In my present invention it will be apparent to those skilled in the art that by making the retainer 1 of the same external diameter as the hammer cylinder 10 or of slightly lesser diameter, as I have sometimes found it desirable in practice to do, the forward end of the tool can be readily applied to and directed upon the work at any desired point, under all conditions and there is furthermore no obstruction or interference to the left hand of the workman in handling or manipulating the forward end of the tool, since the joint between the retainer 1 and the cylinder 10 presents the appearance of a practically unbroken continuity, whereby the appearance of the hammer is not detracted from. It will furthermore be apparent that the retainer 1 serves as a neat and effective closure for the end of the cylinder, thereby preventing the entrance of dirt, chips or other extraneous matter, to the bore 14 of the cylinder, which is a frequent cause of sticking and scoring of the piston.

As is well known to those skilled in the art, hammers of this character are subjected to very severe usage and often times when a piston shoots out accidentally, as into sand or dirt, it is sometimes replaced into the cylinder without being thoroughly cleaned or wiped off, which is a source of constant trouble, whereby my device avoids all such trouble.

It will be apparent that while I have shown my device as applicable to a button set or rivet set, it is equally applicable to any other construction of working tool.

So far as I am aware I am the first in the art to produce the combination with a cylinder end, of a sleeve secured thereto and having a chamber within it of greater longitudinal area than the space occupied by the spring or cushioning device located within the inner wall of said chamber and the shoulder of said cushioning device, in conjunction with the reduced shank of the button set

projecting rearwardly into the tool cylinder, whereby the requisite play to the button set and button set shoulder is provided, and my claims to these features are therefore to be interpreted with a corresponding scope.

It will be apparent that while I have shown and described my invention in one embodiment thereof as being adapted to a pneumatic riveter, the same is equally applicable to a pneumatic chipper or in fact all other pneumatic impact or hammering tools now on the market.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is—

1. The combination with the cylinder of a pneumatic tool, of a retainer secured to the forward end thereof and having a chamber therein provided, at its forward portion, with an internal wall or shoulder, a working tool contained within said chamber and having a head of lesser diameter than said chamber, a shoulder thereon, a spring interposed between said working tool shoulder and the forward inner wall of said chamber, said spring being of less length than the distance between said shoulder and wall, and a shank for said working tool projecting into the end of said tool cylinder, said shank being of lesser diameter than said button set head and shoulder.

2. The combination of a pneumatic tool cylinder, having a reduced end, a retaining sleeve, having a chamber within it, the rear of said chamber being secured to said reduced end, said sleeve having an opening through its forward portion of lesser diameter than the inner bore of said chamber, a button set having a head of such length as to always project through said opening, said head being of lesser diameter than said bore, a shoulder on said head of greater diameter than the latter and of less diameter than said bore, a compressible element in said chamber of less length than the distance between said button set shoulder and the forward inner wall of said chamber, and a shank on said button set of less diameter than said head and shoulder, said shank projecting rearwardly into said tool cylinder.

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Witnesses:

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