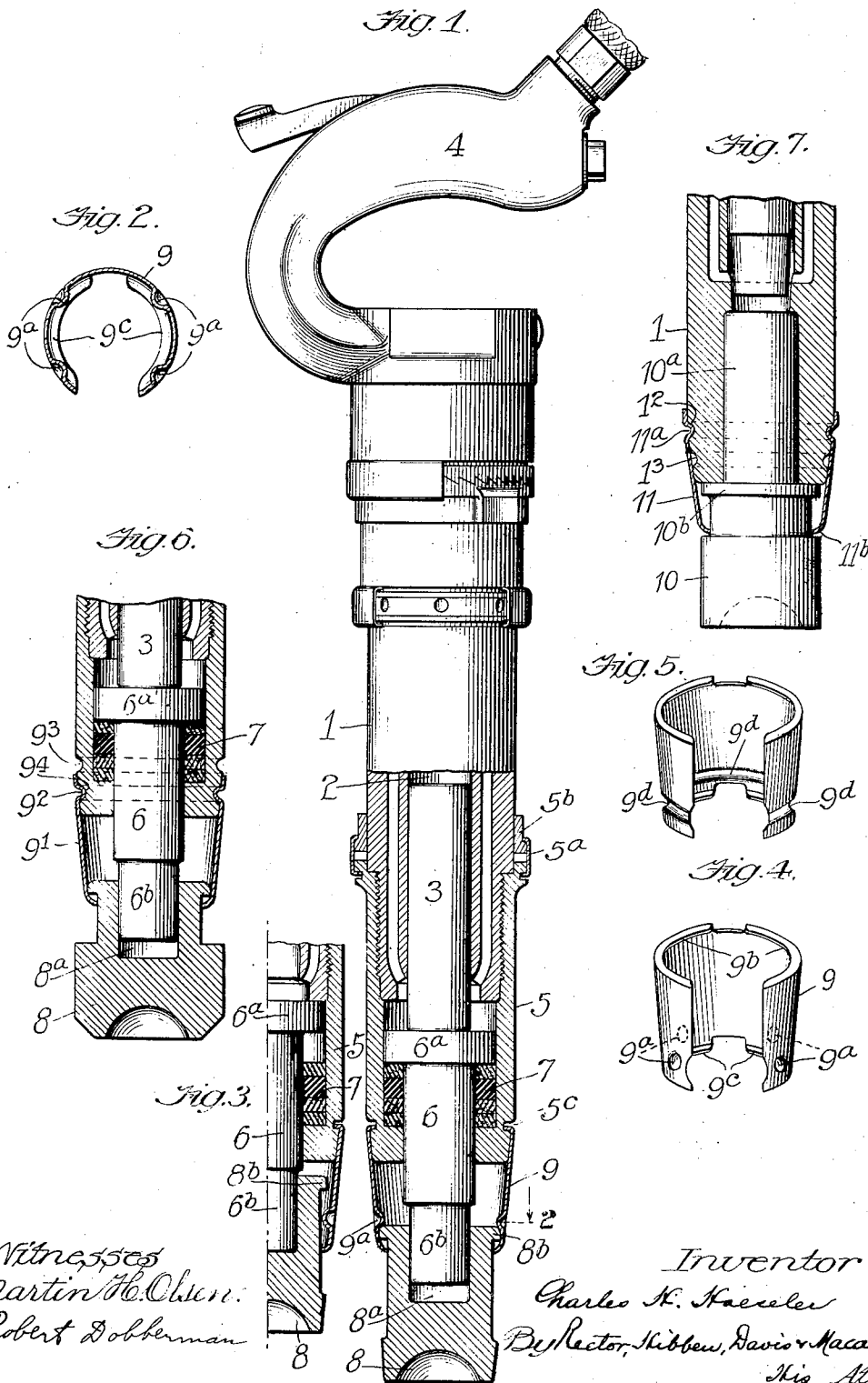


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 FLUID PRESSURE HAMMER.
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FLUID-PRESSURE HAMMER.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, CHARLES H. HAESELER, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Fluid-Pressure Hammers, of which the following is a specification.

My invention relates to a hammering tool such as a pneumatic hammer or riveter operated by compressed air and the general object thereof is to provide a new construction of the parts at the front or striking end of the hammer such as the rivet set, impact piece or anvil, etc.

The main object of the invention is to provide a shankless working tool such as a rivet set which is so formed as to be loosely mounted on the impact piece through which the blows of the hammer piston are delivered to the set, thereby insuring less liability of the set breaking and providing a less expensive part to make than the set usually employed, besides reducing the vibration of the entire hammer due to the blows being struck more directly upon the set and preventing the side slap of the shank of the set which occurs when a set with a shank or stem is employed which is not a neat working fit in the hammer cylinder or when the end of the hammer cylinder has become worn.

The employment of a loosely mounted shankless set or working tool as described also permits of the use of a combination of parts in connection therewith which provides a construction that effectually prevents the hammer piston from being shot out of the cylinder due to careless handling of the operator or due to the opening of the throttle valve (for admitting compressed air to the hammer) being accidentally or otherwise opened when the hammer is not held in position against the work.

Another object of this invention is to provide means such as a retainer in the form of a spring clip between the cylinder and the set or tool for preventing the set from being wholly disengaged from the impact piece after the first blow of the hammer piston has been struck, in case the air should be admitted when the hammer is not in working position. The employment of such a retainer prevents the set from being shot out of the retainer inasmuch as the retainer is

made sufficiently strong to withstand the blow of the piston through the impact piece and set and as means are provided to hold the set beyond the range of the piston blow after the first blow has been struck with the result that crystallization and breakage of the retainer from a large number of blows are prevented. Such crystallization and breakage would otherwise eventually occur if the retainer were subjected to a succession of blows for a considerable period of time as often occurs when such tools are improperly used as by stupid or careless workmen in shops or by mischievous boys. This safety feature is also of necessary practical importance because many States have enacted "safety first" laws relative to the use of hammering tools, particularly riveters wherein in previous constructions the rivet set and in fact the piston was liable to be shot out and cause injury.

Other features of advantage and utility in my new construction will be apparent from the description hereinafter given.

In the drawing, Figure 1 is an elevation partly in section of a pneumatic riveting hammer embodying my invention; Fig. 2 a section on the line 2 of Fig. 1; Fig. 3 a detailed section of a part of the front end of the tool similar to that shown in Fig. 1 but illustrating the working position of the impact piece and rivet set; Fig. 4 a perspective of the retainer or clip; Fig. 5 a view similar to Fig. 4 but illustrating a modified form of clip; Fig. 6 a detailed section of the front end of a tool illustrating a modified form of construction and Fig. 7 a detailed section illustrating still another modified form of construction but employing an ordinary shank-provided set.

While my invention is applicable to fluid pressure operated pneumatic tools of different types and employing different kinds of working tools yet for the purposes of a clear and definite description I have chosen to explain it in connection with a pneumatic hammer of the riveting type in which the working tool is a rivet set without intending to limit myself to such particular type of hammer and working tool.

Inasmuch as my invention concerns only those parts at the front end of the hammer it is unnecessary to illustrate and describe the complete hammer such as the distributing valve and passages for admitting the

fluid under pressure such as compressed air to and from opposite ends of the cylinder or piston chamber for reciprocating the piston. It will suffice to say in this regard that the hammer is provided with a cylinder 1, piston chamber 2, a hammer piston 3, reciprocable therein and a handle 4 secured to the rearward end of the cylinder.

The cylinder 1 differs somewhat from the ordinary cylinder of a riveting hammer inasmuch as its front end which formerly received the shank of a rivet set is not made integral with the cylinder but is made as a separable nose piece or extension 5 which in the present instance is internally screw-threaded at its rearward end to screw upon external screw threads upon the forward end of the cylinder. By preference this nose piece is provided with a locking clip 5^a which is a split ring of spring metal having inturned flanges fitting respectively in a circular groove in the nose piece and against a shoulder in a collar 5^b secured to the cylinder.

The nose piece is contracted at its forward end to form a central bore through which passes the cylindrical body portion of an impact piece 6 which is provided with an enlarged head 6^a received in the chamber formed between the front end of the cylinder proper and the bottom or forward end of the nose piece. This head 6^a directly receives the blows of the hammer piston 3 and the force of these blows is cushioned when the tool is not in working position by means of a washer or series of washers 7 interposed between the head 6^a and the contracted forward end of the nose piece. The forward end of the impact piece is reduced in diameter thereby forming a cylindrical extension 6^b which fits into the rivet set 8 as hereinafter described. The nose piece, particularly its forward end which forms a bearing for the impact piece is made quite accurate as to size and such impact piece is made of steel hardened and is accurately ground with the result that the air will not leak out of the front end of the tool and such fit will remain tight for a great length of time.

The working tool in the type of hammer being described is a rivet set 8 which is shankless and provided on its inner side with a central socket 8^a in which loosely fits the forward reduced end or extension 6^b of the impact piece. The construction and arrangement of the rivet set and impact piece are such that when the parts are in working position as in Fig. 3 the hammer piston 3 imparts its blows directly to the head of the impact piece which in turn delivers such blows direct to the bottom of the recess or socket 8^a of the rivet set, the forward end of such impact piece being at this time in contact with the bottom of such socket, Fig.

3. When, however, as hereinatter explained, the rivet set is not in working position it is put out of range of the impact piece after the first blow is struck. As shown in Fig. 5 the means for retaining the set in its advanced position instead of being depressions or internal projections 9^a may be in the form of an inwardly directed bead as shown at 9^d.

The retainer which has the double function of holding the set onto the hammer and also of holding the set forwardly out of range of the impact piece under certain conditions, is in the form of a clip 9 composed of a split ring of spring metal similar to the clips usually employed with the exception that it is provided with means for engaging a flange 8^b on the inner end of the set to hold the same extended as hereinafter explained. The particular means shown in Fig. 4 consists of several depressions 9^a formed in the body of the ring near the forward end thereof. This clip has the usual inwardly directed flange 9^b at its inner end and inwardly directed flange 9^c at its outer or front end, the former engaging the circumferential groove 5^c in the nose piece and the latter engaging in front of the flange 8^b of the set.

The hammer being constructed as illustrated in Figs. 1 to 4 operates as follows: Starting with the parts as illustrated in Fig. 3 at which time the tool is supposed to be in working position, that is with the set bearing against the rivet, the hammer is operated in the usual manner whereupon the piston 3 delivers its blows upon the head 6^a of the impact piece which directly imparts such blows to the set which in turn delivers them directly against the rivet. At this time the impact piece is in direct contact with the bottom of the socket 8^a and the blow is delivered directly through such bottom of the socket. If, however, the set should not be against the work when the tool was operated but the set was nevertheless in the relative position shown in Fig. 3 and the tool was thereupon operated, in that case the first blow of the hammer piston would drive the set to the position shown in Fig. 1, the flange 8^b of the set being forced against the depressions 9^a which are projections on the interior of the clip and operating such clip sufficiently to permit such flange 8^b to advance to a position in front of such projections and between them and the flange 9^c of the clip wherein such flange 8^b is caught and the rivet set thereby retained. In this manner and by these means the set is advanced to a position beyond the range of action of the impact piece which cannot now deliver any blows to the set and at the same time such set is retained in such advanced or inoperative position. Consequently the set cannot be

shot out from the tool nor of course can the impact piece or piston be shot out with the result that the hammer possesses the safety feature hereinbefore referred to. It will be understood that the hammer piston can keep reciprocating and delivering its blows to the impact piece without any danger whatever and in this case the impact piece is cushioned by means of the washers 7.

10 The rivet set is a shankless one fitting loosely on the anvil block or impact piece and possesses the different advantages referred to in the preamble of this specification.

15 In Fig. 6 I have illustrated a modified form of construction according to which the clip 9' is unprovided with any outer depressions or rather inner projections such as 9^a but is provided with a circumferential inwardly directed bead or projection 9² which is adapted to cooperate with either one of two parallel circumferential grooves 9³ and 9⁴ at the forward end of the nose piece. Normally the bead 9² is in the rearward groove 9³, that is when the tool is in working position, but in the event that the hammer is operated without being in working position the first blow of the hammer will force the rivet set and its clip bodily forward, withdrawing the bead from the groove 9³ and causing it to snap into the groove 9⁴ as shown in Fig. 5 at which time the rivet set is out of the range of the impact piece.

35 In Fig. 7 I have shown still another modified form of construction according to which a shank-provided rivet set may be employed. In this construction the usual cylinder 1 is employed, that is there is no special or removable nose piece and the shank 10^a of the rivet set 10 fits into the central bore of the cylinder at the front end thereof. The clip 11 is substantially the same as the clip 9', that is to say it is a split ring provided near its inner end with an inwardly directed bead 11^a adapted to fit in one or the other of the two parallel grooves 1² and 1³ near the forward end of the cylinder. The parts are shown in Fig. 6 in their working position so that when the hammer is operated the piston 3 will deliver its blows upon the shank of the working tool which in turn delivers the blows to the rivet. In case, however, the set should not be at such time applied to the work, upon the first blow of the piston the set will be forced outwardly whereupon its collar or flange 10^b forcibly contacting the inwardly directed flange 11^b of the clip will withdraw the bead 11^a from the rivet groove 1² and after a slight movement forwardly such bead will snap in the other groove 1³. At this time the shank of the set will be out of range of the hammer piston which will continue to

operate without being able to impart any blows to the set.

I claim:

1. A tool retainer for a fluid pressure operated hammer having means for engaging the front end of the hammer and adapted to loosely hold the tool in association therewith, and also having means at its forward end and operative upon the tool only when the latter is in advanced position for holding the tool in such advanced position beyond the range of the hammer blow after the first blow of the hammer when not in proper working position.

2. A working tool of a fluid pressure operated hammer provided on its inner end with a socket to loosely receive the end of the impact piece of such hammer through which the blows of the hammer piston are delivered; in combination with a tool retainer for a fluid pressure operated hammer having means for engaging the front end of the hammer and to loosely hold the tool in association therewith, and also having means for holding the tool in advanced position beyond the range of the hammer blow after the first blow of the hammer when not in proper working position.

3. In combination with a fluid pressure operated hammer including its cylinder, hammer piston and impact piece struck by the piston, a working tool having on its inner end a socket which fits loosely on the outer end of the impact piece, and combined means for loosely holding the tool to the front end of the cylinder and for retaining it in advanced position out of range of the impact piece when forced to such position by said piece.

4. In combination with a fluid pressure operated hammer including its cylinder, hammer piston and impact piece struck by the piston, a working tool having on its inner end a socket which fits loosely on the outer end of the impact piece, and a clip engaging the front end of the cylinder and loosely containing the rearward end of the tool, said clip having means for engaging and holding the tool in an advanced position out of range of the impact piece when forced to such position by the first blow of the hammer when not in working position.

5. In combination with a fluid pressure operated hammer including its cylinder, hammer piston and impact piece struck by the piston, a working tool having on its inner end a socket which fits loosely on the outer end of the impact piece, and a clip engaging the front end of the cylinder and loosely containing the rearward end of the tool, said clip having an inwardly directed projection at its forward end, and the tool having at its rearward end a member cooperating with such projection when the tool is forced for-

ward to an advanced position by the first blow of the hammer when not in working position.

6. In combination with a fluid pressure operated hammer including its cylinder, hammer piston and impact piece struck by the piston, a working tool having on its inner end a socket which fits loosely on the outer end of the impact piece, and a clip engaging the front end of the cylinder and loosely containing the rearward end of the tool, said clip having a series of projections inwardly directed at its forward end, and the tool having at its rearward end a flange cooperating with such projections when the tool is forced forward to an advanced position by the first blow of the hammer when not in working position.

7. In combination with a fluid pressure operated hammer including its cylinder, hammer piston and impact piece struck by the piston, a working tool having on its inner end a socket which fits loosely on the outer end of the impact piece, and a clip engaging the front end of the cylinder and loosely containing the rearward end of the tool, said clip having an inner flange ^b for engagement with the cylinder, an outer flange ^c to hold the tool, and an inwardly directed projection ^a at its forward end, and the tool having at its rearward end a flange cooperating with flange ^c and with projection ^a.

8. In combination with a fluid pressure operated hammer including its cylinder proper, a removable nose-piece secured to the front end of the cylinder, an impact piece arranged in the nose-piece and having an enlarged portion retained therein, a working tool having a socket on its rearward end into which the front end of said impact piece loosely fits, and means anchored to the nose-piece for retaining the working tool.

9. In combination with a fluid pressure operated hammer including its cylinder proper, a removable nose-piece secured to the front end of the cylinder, an impact piece arranged in the nose-piece and having an enlarged portion retained therein, a working tool having a socket on its rearward end in which the front end of said impact piece loosely fits, and a spring ring retainer anchored to the nose piece and cooperating with the working tool.

10. In combination with a fluid pressure operated hammer including its cylinder proper, a removable nose-piece secured to the front end of the cylinder, an impact

piece arranged in the nose-piece, a working tool having a socket on its rearward end into which the front end of said impact piece loosely fits, said nose-piece being provided with a chamber and the impact piece having a head receptacle therein, and means anchored to the nose-piece for retaining the working tool.

11. In combination with a fluid pressure operated hammer including its cylinder proper, a removable nose-piece secured to the front end of the cylinder, an impact piece arranged in the nose-piece, a working tool having a socket on its rearward end into which the front end of said impact piece loosely fits, said nose-piece being provided with a chamber and the impact piece having a head reciprocable therein, cushioning material between said head and the bottom of the chamber, and means anchored to the nose-piece for retaining the working tool.

12. A tool retainer for a fluid-pressure operated hammer having means for engaging the exterior of the forward end of the hammer, said retainer being designed to loosely hold the tool in association with the hammer and having means at its forward end and operative upon the tool only when the latter is in its advanced position for holding the tool in such advanced position beyond the range of the hammer blow and for preventing both inward and outward movement thereof except as to the application of positive force.

13. The combination with a fluid-pressure operated hammer and its working tool, of a tool retainer comprising a cylindrical sleeve supported by the exterior of the forward end of the hammer and adapted to loosely hold the tool in association with the hammer, said sleeve having means for holding the tool in advanced position beyond the range of the hammer after the first blow of the hammer when not in proper working position.

14. The combination with a fluid-pressure operated hammer and its working tool, of a tool retainer for holding the tool in association with the hammer, the tool being freely slidable in said retainer and free to vibrate therein and said retainer having means for holding the tool in advanced position beyond the range of the hammer blow after the first blow of the hammer when not in proper working position.

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