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AIR IMPACT HAMMER

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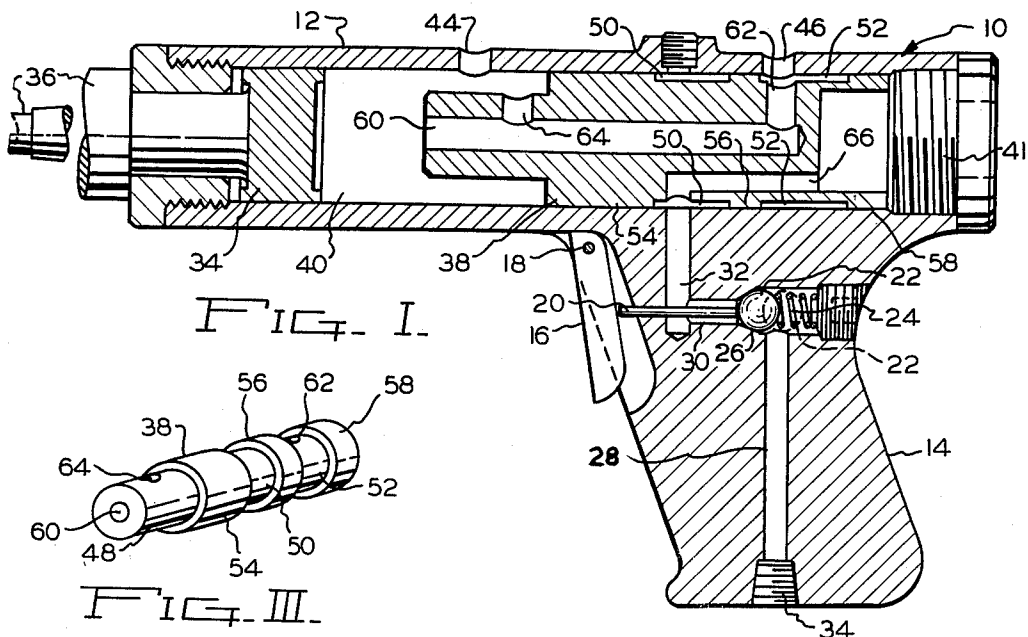


FIG. 1

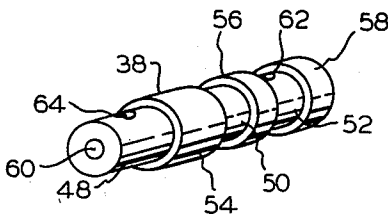


FIG. III.

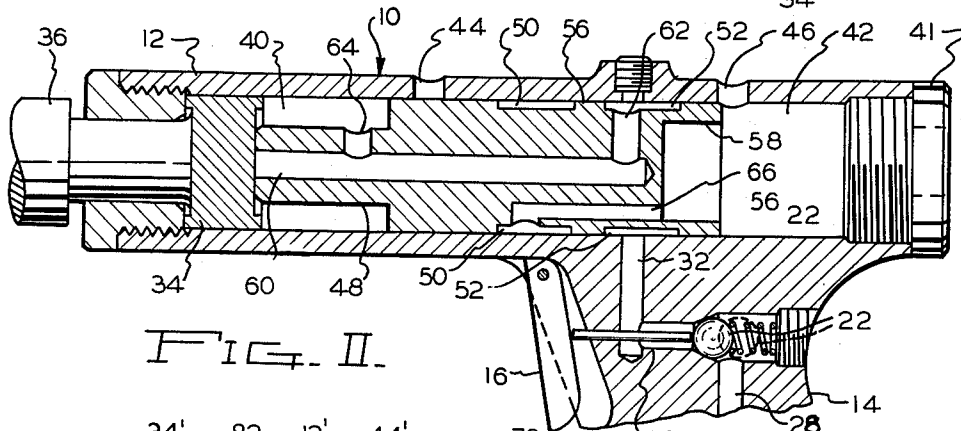


FIG. II.

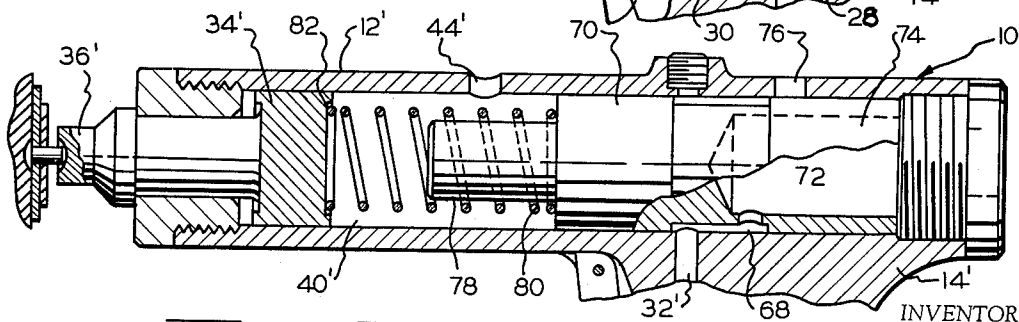


FIG. IV.

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1

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AIR IMPACT HAMMER

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1 Claim. (Cl. 121—17)

This invention relates to air impact hammers and particularly to portable hand type hammers which are capable of being hooked up to a source of compressed air.

It is an object of this invention to provide an air impact hammer which is not only exceedingly effective in use but is also constructed from relatively simple and few movable parts, and which can be readily manufactured and assembled to provide an exceptionally robust and efficient air impact hammer.

It is a further object of the invention to provide an air impact hammer which is of simple design and construction but utilizes the supplied air pressure to obtain a high pulsation effect.

Further objects and advantages of the invention, residing in the construction, arrangement and combination of parts, will appear clear from a consideration of the following description of two practical forms of the invention, by way of example, with reference to the accompanying drawings in which:

Fig. I is a longitudinal section of one form of air hammer in accordance with the invention, with the air flow control plunger in retracted position,

Fig. II is a similar view to Fig. I (the bottom portion of the handle being broken away) showing the air flow control plunger in projected position,

Fig. III is a perspective view of the air flow control plunger, and

Fig. IV is a fragmentary longitudinal section of another form of the invention, employing a spring return action.

Referring to the drawings, and first to Figs. I—III, 10 indicates, generally, an air gun having a barrel 12 and a handle 14 carrying a control trigger 16 pivotally mounted upon the handle at 18. The trigger, through the medium of the actuator rod 20, controls the opening of a valve element 22, shown in the form of a ball normally urged by a spring 24 against a seat 26 to seal off the flow of pressure air from a duct 28 in the handle to an elbow duct 30, 32 providing communication with the interior of the barrel 12 in the manner to be described.

The handle has a screwed nipple 34 by which the gun can be hooked up, by a flexible pipe line (not shown), to a source of compressed air. The spring 24, on release of pressure upon the trigger 16, serves to restore the trigger to its normal position, in which the valve 22 is held seated against the seat 26 to seal off communication between the duct 28 and the elbow duct 30, 32 as shown in the full line position of this ball valve in Figs. I and II. The open position of this valve is as indicated in dotted lines.

The barrel 12 accommodates, at its mouth end, an impact applying piston 34, through the medium of which the hammer blows are imparted to a tool, such as a riveter 36, by the impact of a plunger 38 slidably mounted in the barrel to define at one end thereof, between the plunger and the piston 34, an air chamber 40, and between the plunger and the rear end of the plunger, an air chamber 42.

The chamber 40 is sealed at its ends by the piston 34

2

and the plunger 38 whereas the chamber 42 is sealed at one end by the plunger 34 and, at its opposite end, by a plug 41 screwed into the screw-threaded rear end of the barrel.

44 and 46 indicate exhaust openings in the barrel which alternately open the chambers 40 and 42, respectively, to atmosphere in the movement of the plunger 38 between the positions of Figs. I and II.

The plunger 38 is of stepped formation to provide a reduced end portion 48, a pair of axially spaced annular chambers 50 and 52, and three piston surfaces 54, 56 and 58. The plunger also has an axial bore 60 extending from, and opening to, its end adjacent the air chamber 40, and terminating within the plunger, near its opposite end, in a transverse port 62 which opens into the annular chamber 52. This bore 60 also has a transverse port 64 which opens into the air chamber 40 and another axially extending bore 66, open at one end to the annular chamber 50 and at the opposite end to the air chamber 42.

In operation, with the parts as shown in Fig. I, and duct 26 connected to a source of compressed air, depression of trigger 16 will actuate the rod 20 to open the valve 22 against the action of its spring 24 and cause the compressed air to be admitted to the air chamber 42 via the annular chamber 50 and axial duct 66. At this time chamber 40 is open to atmosphere and chamber 42 is closed to its exhaust port 46. Accordingly, the air pressure, acting against the plug 41, as indicated by the arrows in Fig. I, will react against the plunger 38 to shift the same violently to the left, as seen in Figs. I and II, and cause the reduced plunger end to impact sharply with the impact applying piston 34. In its movement thus, the piston portion 54 of the plunger 38 travels over the exhaust port 44 to close the latter whereas the piston portion 58 travels over the exhaust port 46 to open this port and place the annular chamber 52 in communication with the admission duct 32. This is the position of the parts as illustrated in Fig. II. In such position, the chamber 42 is exhausted as the compressed air supply is delivered to the now sealed chamber 40 via the duct 32, annular chamber 52, port 62, axial duct 60 and port 64 as indicated by the arrows in Fig. II. This causes a reaction of pressure against the plunger to force same to the right, back to the position seen in Fig. I. This cycle of operations will persist at rapid rate while the trigger 16 is held depressed and will produce a rapid pulsation of the tool 36.

In Fig. IV the hammer is indicated generally at 10' with its barrel at 12', handle at 14' and trigger control at 16'. The handle construction of this embodiment is similar to that of the previously described embodiment with the valve 22, inlet port 26 and elbow duct, of which latter there is shown only the portion 32' in Fig. IV, opening, in the position shown, into an annular chamber 68 in a plunger 70 and having a port 72 opening into an air chamber 74 at the rear end of this plunger and with respect to which chamber the barrel provides an atmosphere exhaust port 76. The forward end of this plunger is reduced but solid, as indicated at 78 and defines one end of an air chamber 40', having an exhaust port 44' and the opposite end of which is defined by the impact applying piston 34' sealing off the mouth end of the barrel 12'.

The plunger end portion 78 receives one end of a return coil spring 80, the opposite end of which seats in a recess 82 on the inside face of the impact piston 34'.

In this embodiment of the invention the admission of compressed air into the chamber 74 in the condition of the parts as shown will cause the plunger 70 to be moved to the left against the action of the spring 80 and deliver an impact force against the piston 34' and hence the riveter 26', with energy being stored up in the compressed spring. This will alternate rapidly between the forcing of the plunger to the left, as seen in Fig. IV and the returning

3

of the plunger to the right by the release of the compressed spring when the exhaust port 76 is uncovered at the end of the forward movement of the plunger.

It will be appreciated, therefore, that I have provided an exceedingly simple and compact construction of air hammer which has few moving parts and can be readily manufactured and assembled.

Having thus described my invention, what I claim is new and desire to cover by Letters Patent is:

An air impact hammer comprising a main body structure defining a barrel and a handle, an air inlet passage defined in said handle and opening through the wall of said barrel into the interior thereof between the ends of said barrel, a manually actuated throttle valve in said inlet passage, an impact applying member located in one end of said barrel, an air control and impact plunger located in said barrel for longitudinal reciprocation intermediate the ends thereof, means closing the other end of said barrel, opposite ends of said plunger being shaped to provide chambers at opposite ends of said plunger, said chambers being defined in part by said plunger ends and the interior wall of said barrel, longitudinally spaced annular grooves defined in the outer surface of said plunger for alternate register with said air inlet upon reciprocation of said plunger, a longitudinal bore in said plunger connecting with one of said grooves and opening through one end of said plunger into one of said chambers, a second longitudinal bore in said plunger connecting with the other of said grooves and opening through the other end of said plunger into the other of said chambers, longitudinally

4

spaced radially extending exhaust ports defined in the wall of said barrel and opening directly into said chambers, said plunger having a portion overlapping one of said exhaust ports to close the same with said plunger at the end of its reciprocation in said first chamber, another portion of said plunger closing said other exhaust port with said plunger at the end of its reciprocation in said other chamber, said last exhaust port registering with one of said grooves to exhaust air from said first chamber through the interior of said plunger with the other of said grooves in register with said inlet port for admitting air to said second chamber.

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