Oct. 8, 1963 L. M. OSBORNE 3,106,134

FLUID ACTUATED HAMMER AND NAILER

Filed March 9, 1959 2 Sheets-Sheet 1

FIG. 1.

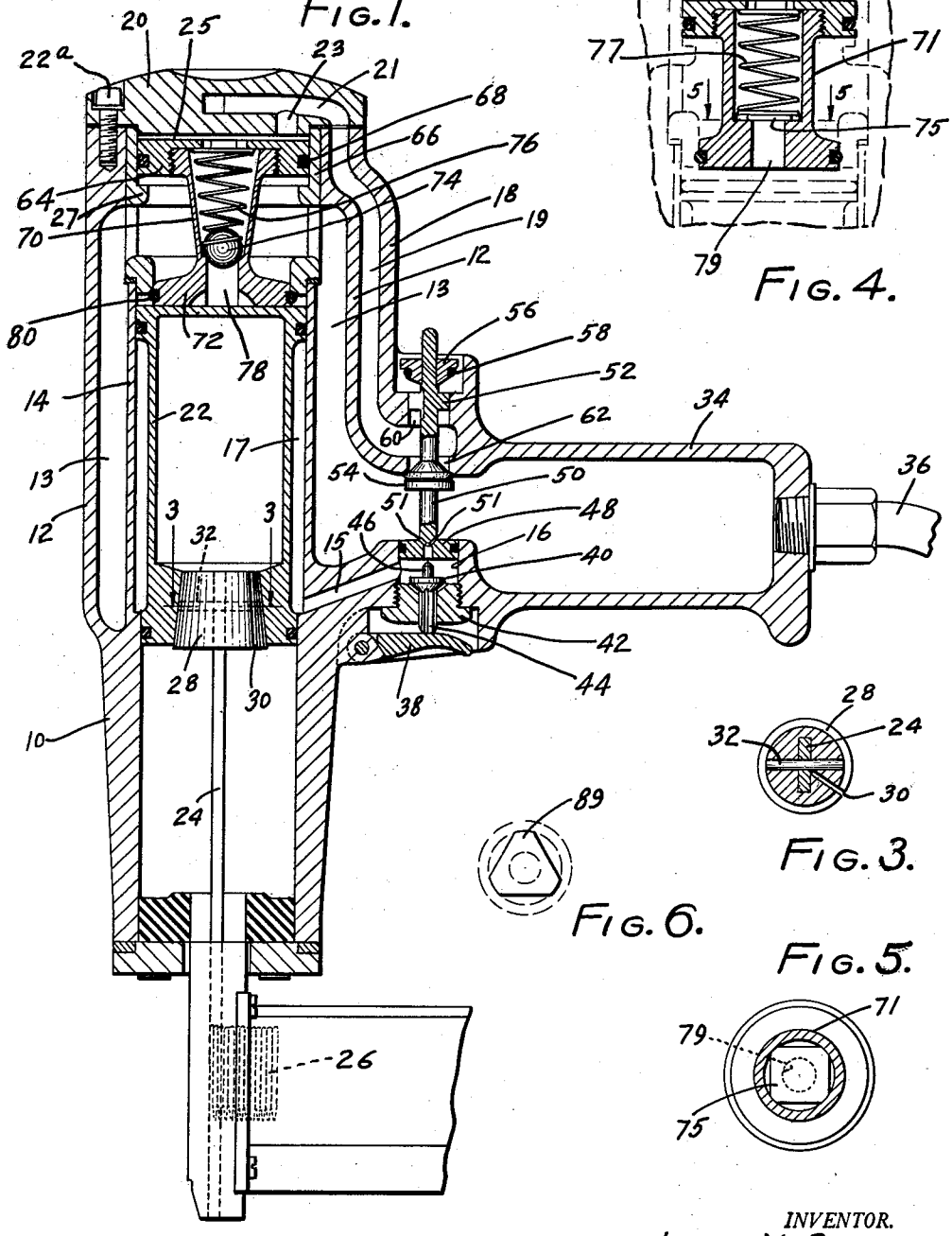


FIG. 4.

FIG. 3.

FIG. 6.

FIG. 5.

INVENTOR.
LLOYD M. OSBORNE
BY
ATTORNEY

Oct. 8, 1963 L. M. OSBORNE 3,106,134

FLUID ACTUATED HAMMER AND NAILER

Filed March 9, 1959 2 Sheets-Sheet 2

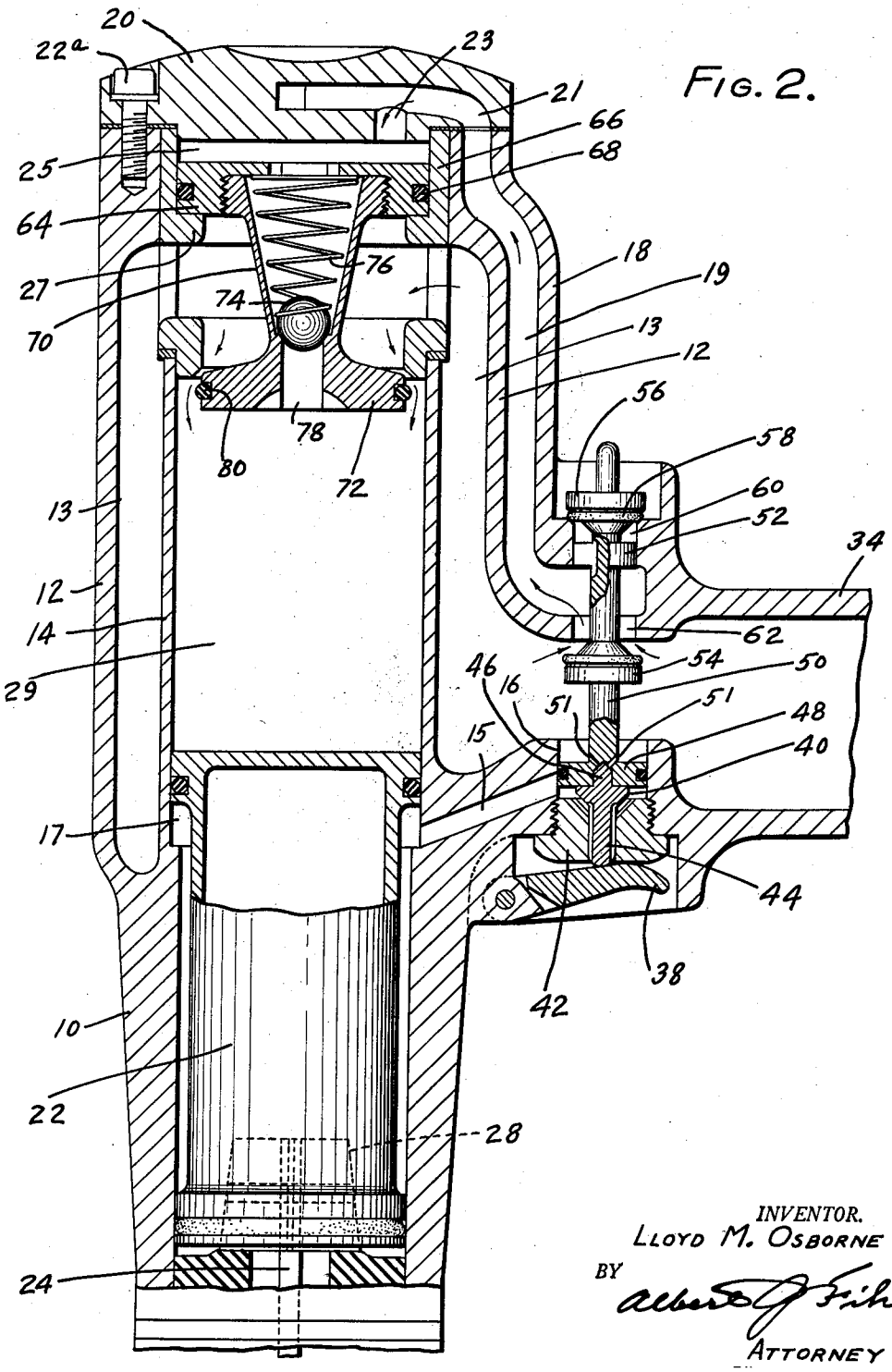


FIG. 2.

INVENTOR.
LLOYD M. OSBORNE
BY
Albert G. Fihe
ATTORNEY

United States Patent Office

3,106,134
Patented Oct. 8, 1963

3,106,134

FLUID ACTUATED HAMMER AND NAILER

Lloyd M. Osborne, Burbank, Calif., assignor, by mesne assignments, to Inventions Management Corporation, Raleigh, N.C., a corporation of North Carolina

Filed Mar. 9, 1959, Ser. No. 798,270
9 Claims. (Cl. 91—189)

This invention relates to an improved fluid actuated hammer and nailer and comprises an improvement over my earlier patent entitled "Fluid Actuated Fastener Applying Machine," No. 2,854,953, dated October 7, 1958. Also, my pending application for patent entitled "Pneumatic Hammer and Nailer," Serial No. 655,992, filed April 30, 1957.

One of the important objects of this invention is the provision of a device of the class described, wherein the power of the operating fluid, usually compressed air, is more efficiently employed, and with a better distribution of final effective power.

Another object of the invention is the provision in a fluid actuated hammer and nailer of an improved type of valve for controlling the fluid, both so far as application to the hammer and eventual release to the atmosphere is concerned.

A still further important object of this invention resides in the construction of an air hammer with a minimum of operating parts and a more simple all-over construction, whereby considerable excess and undesirable waiting is eliminated, while at the same time, the delivered power is increased.

Another and still further important object of this invention is the provision of an air actuated nailer which will operate efficiently with practically any type of fastening means and regardless of particular magazine for supporting said fastening means in position for the nailing or fastening operation.

Yet another object of the invention is the provision of a novel yet very effective means for fastening the hammer of the machine to the driving piston.

Other and further important objects of the invention will be apparent from the disclosures in the accompanying drawings and following specification.

The invention, in a preferred form, is illustrated in the drawings and hereinafter more fully described.

As shown in the drawings:

FIGURE 1 is a vertical section of the improved fluid actuated hammer and nailer of this invention of the same in normal retracted position.

FIGURE 2 is an enlarged sectional view of a portion of the structure of FIGURE 1 showing the device in its actual nail driving or fastener applying position.

FIGURE 3 is a detailed view, partly in section, taken on the plane of the line 3—3 of FIGURE 1, looking in the direction indicated by the arrows.

FIGURE 4 is a view, partly in section and parts omitted, illustrating a modified form of the valve arrangement depicted in FIGURES 1 and 2.

FIGURE 5 is a section on the line 5—5 of FIGURE 4, looking in the direction indicated.

FIGURE 6 illustrates a further modified form of the valve structure of FIGURES 4 and 5.

As shown in the drawings:

The reference numeral 10 indicates generally the casing of the improved fluid actuated hammer and nailer of this invention, the same preferably comprising a machined casting or the like; and with its upper portion constructed so as to include an outer and an inner sleeve 12 and 14 respectively at its forward face. The inner sleeve 14 is cylindrical, but the outer sleeve 12, at the rear of the casing is provided with an outlet 16, and the upper portion of this outer sleeve 12 is surmounted by a further

casing portion 18, which is integral with a cap or top 20. This cap is fastened by bolts or the like 22*a* to the main casing 10—12 and in an air tight relationship.

A hollow piston 22 moves in the sleeve 14, and a hammer or nail or staple 26 driving element 24 is removably attached to the lower end of the piston, as best shown in FIGURES 1 and 3. Referring now to FIGURE 3, it will be noted that the lower end of the piston includes a frusto-conical element or plug 28 which is split, as shown at 30 in FIGURE 3 enabling a ready insertion into a slot thereof of the upper end of the hammer 24. A pin 32 passes through aligned openings in the hammer and plug providing a secure connection which, however, can be taken apart for removal and replacement of the hammer with little or no difficulty. An extension of the outer casing 18 provides an inlet for compressed air, as shown at 34 and 36, the portion 34 also serving as a handle.

A trigger 38 is pivotally mounted in the casing 10 for operation of a valve combination which comprises an initially operated segment 40 slidably positioned in a screw threaded plug 42 adjacent the trigger, and this valve segment 40 including an integral stem 44 grooved, as shown to allow escape of air past the same when the valve portion 40 is unseated by action of the trigger 38. A valve 40—44 also includes an integral extension 46, which, when the valve is operated by the trigger, moves into a recess in a disc 48 slidable in an opening in the boss 16, which comprises a portion of the handle and casing segment 34.

When the disc 48 is in its lowermost position, as shown in FIGURE 2, it supports the main valve stem 50 for slidable movement in the opening between the chambers 12 and 34, and the valve stem is retained in a correct juxtaposition to the adjacent parts of the apparatus, mainly by reason of an integral annulus 52 slidable in a cylindrical opening formed in a projection of the casing 34.

Also, integral with or mounted on the valve stem 50 are valve elements 54 and 56 which include sealing means such as O-rings or the like 58. These valve elements 54 and 56 will alternately open and close openings 60 and 62 in the valve annulus 52 and the casing 34 respectively (FIGURE 1).

Positioned beneath the cap 20 and inside the casing is a piston-like element 64 adapted for a slight sliding movement in a sleeve or cylinder 66 in the upper portion of the casing 10—12. Fluid sealing is effected by an O-ring 68 in the piston 64.

Screw threadedly mounted in the underface of the piston 64 is a frusto-conical hollow element 70 having an integral lower valve-like disc portion 72 which moves in the upper end of the sleeve 14 just beyond the upper range of movement of the piston 22. A ball valve 74 is in the hollow conical portion and pressed into normal sealing by a spiral helical spring 76. A central passage way 78 through the valve portion 74 permits passage of air or other fluid through this portion of the apparatus, and an O-ring 80 for sealing purposes is provided.

In operation air under pressure is preliminarily admitted to the space 13 between the walls 12 and 14, and also by way of passages 51 in the lower end of the valve stem 50 to the space above the valve 40 and thence through a passage way 15 to the space 17 around the piston 22. This maintains the piston 22 in its upper-most position, as shown in FIGURE 1, against any pressure which might be on the upper face of the valve element 72, because the area of the piston 64 is greater than the area of the valve element 72; and any access of air to the space 19 between the casing portions 12 and 18 is prevented because the valve 54 is closed.

Referring now to FIGURE 2, it will be seen that when the trigger 38 is activated, the valve 40 is opened allowing air to escape through the passage 15 from the space

17 which surrounds the piston 22; and at the same time, the piston-like disc 48 will move downwardly because of lessened air pressure on its underside, opening the valve 54 and closing the valve 56. This allows air under pressure to enter the space 19 flowing into a passage way 21 in the cap 20 and thence through an opening 23 in the cap to the space 25 above the piston-like disc 64. This moves the disc downwardly against the shoulder or stop 27, which is integral with the sleeve 66 and at the same time opens the valve 72. As shown by the arrows in FIGURE 2, air then flows past the valve 72 into the space 29 above the piston 22, forcing it and its hammer downwardly. Air from the space 17 exits through the passage 15 and the open valve 40 with its slots 44.

It will be obvious that this results in a much faster action and greater final air pressure on the piston because all restraining air is immediately evacuated. When the pressure on the trigger 38 is released, the reverse action occurs, and the piston returns to its original position, as shown in FIGURE 1.

A slightly modified form of the valve is shown in FIGURES 4 and 5, wherein a cylindrical sleeve 71 is substituted for the conical sleeve 70, and a simple helical spring 77 is employed instead of the spiral spring 76. The valve element comprises a flat plate 75 shaped as shown in FIGURE 5, and fitted inside the sleeve 71 over the opening 79.

A further modified form of the valve plate is illustrated at 89 in FIGURE 6, this being somewhat triangular in shape, but with the same final action.

I am aware that many charges may be made and numerous details of construction varied throughout a wide range without departing from the principles of this invention, and I, therefore, do not propose limiting the patent granted hereon otherwise than as necessitated by the prior art.

I claim as my invention:

1. A fluid actuated hammer and nailer comprising a casing, an internal sleeve in the casing, a main piston in the sleeve having an external surface formed with a main portion thereof, a first air space between the major portion of the external surface of the piston and the sleeve, a second air space above the main piston, an air chamber above the sleeve and piston, a closure cap on the casing, said air chamber and closure cap having passageways therein for ingress of air, a secondary piston movable in

the air chamber above the main piston, main valve means in the passages leading to the secondary piston for allowing entry of air to the second space above the main piston, an inlet for compressed air in the casting and trigger operated valve means in the inlet, said trigger operated valve means comprising a first valve composed of two elements, a secondary valve mounted adjacent the trigger for initial operation, and a disk slidably mounted between the first and the secondary valves.

2. A device as deshcribed in claim 1, wherein a recess is provided in the disc for reception and guidance of a portion of the secondary valve.

3. A device as described in claim 1, wherein said disc comprises a stop for incoming compressed air in one position and allows egress of spent air in another position.

4. A device as described in claim 3, said valves including stems and wherein the stems of both valve elements are slotted and means for air release through said valve elements when said valve elements moved to operative position.

5. A device as described in claim 4, wherein the main valve stem includes an integral guide element, said guide element being slotted for release of air to atmosphere in one position.

6. A device as described in claim 1, wherein the valve means associated with the secondary piston comprises a spring pressed ball.

7. A device as described in claim 1, wherein the valve means in the secondary piston includes a spring pressed plate.

8. A device as described in claim 7, wherein said spring pressed plate is approximately square in cross section.

9. A device as described in claim 7, wherein said spring pressed plate is approximately triangular in cross section.

References Cited in the file of this patent

UNITED STATES PATENTS

2,100,092	Tear	Nov. 23, 1937
2,854,953	Osborne	Oct. 7, 1958
2,872,901	Goldring et al.	Feb. 10, 1959
2,881,738	Baker	Apr. 14, 1959
2,899,935	Dalton	Aug. 18, 1959
2,918,675	Smith	Dec. 29, 1959

FOREIGN PATENTS

219,827	Australia	May 16, 1957