

March 19, 1963

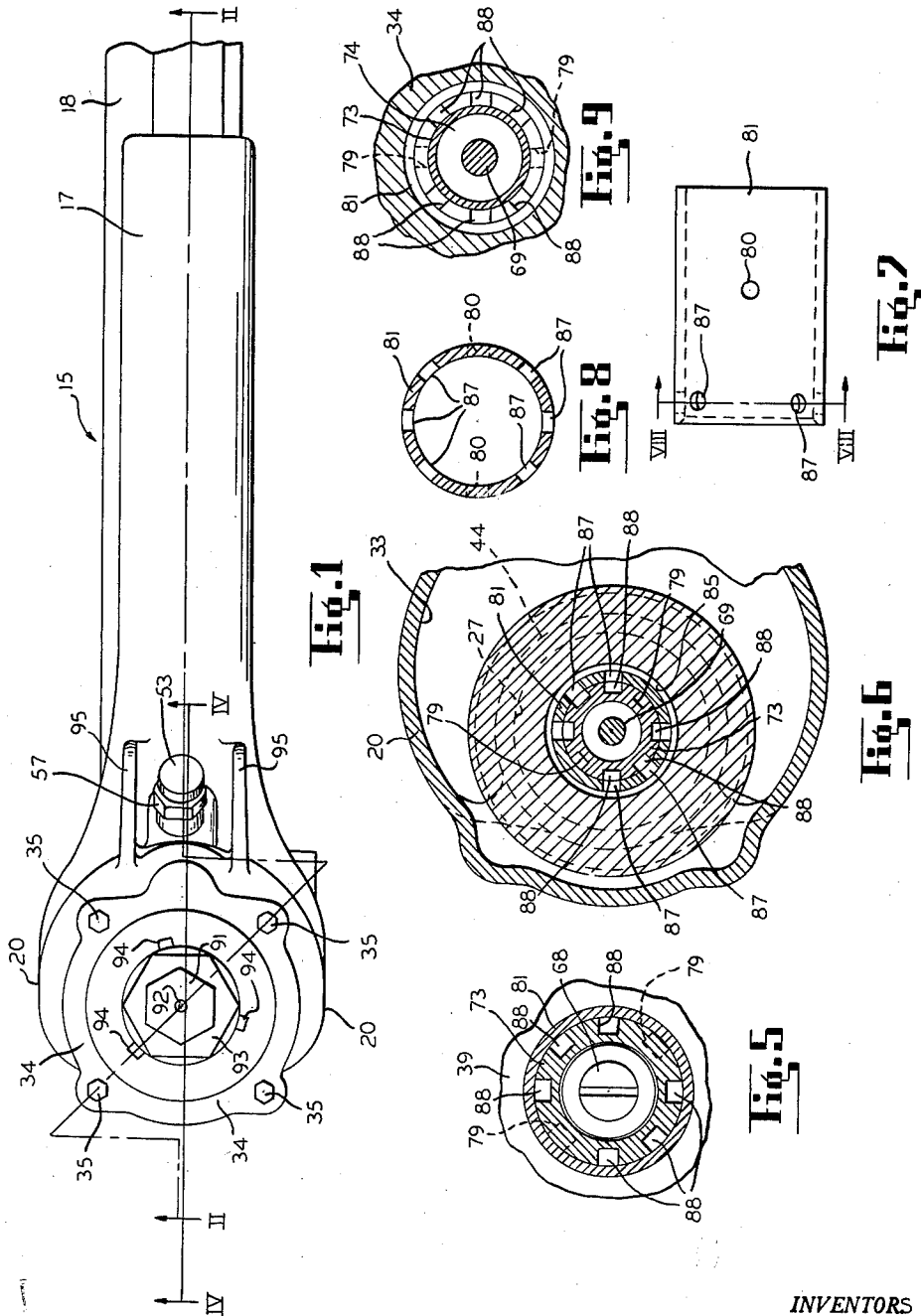
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PNEUMATIC FASTENER DRIVING MACHINE

Filed Oct. 29, 1956

3 Sheets-Sheet 1



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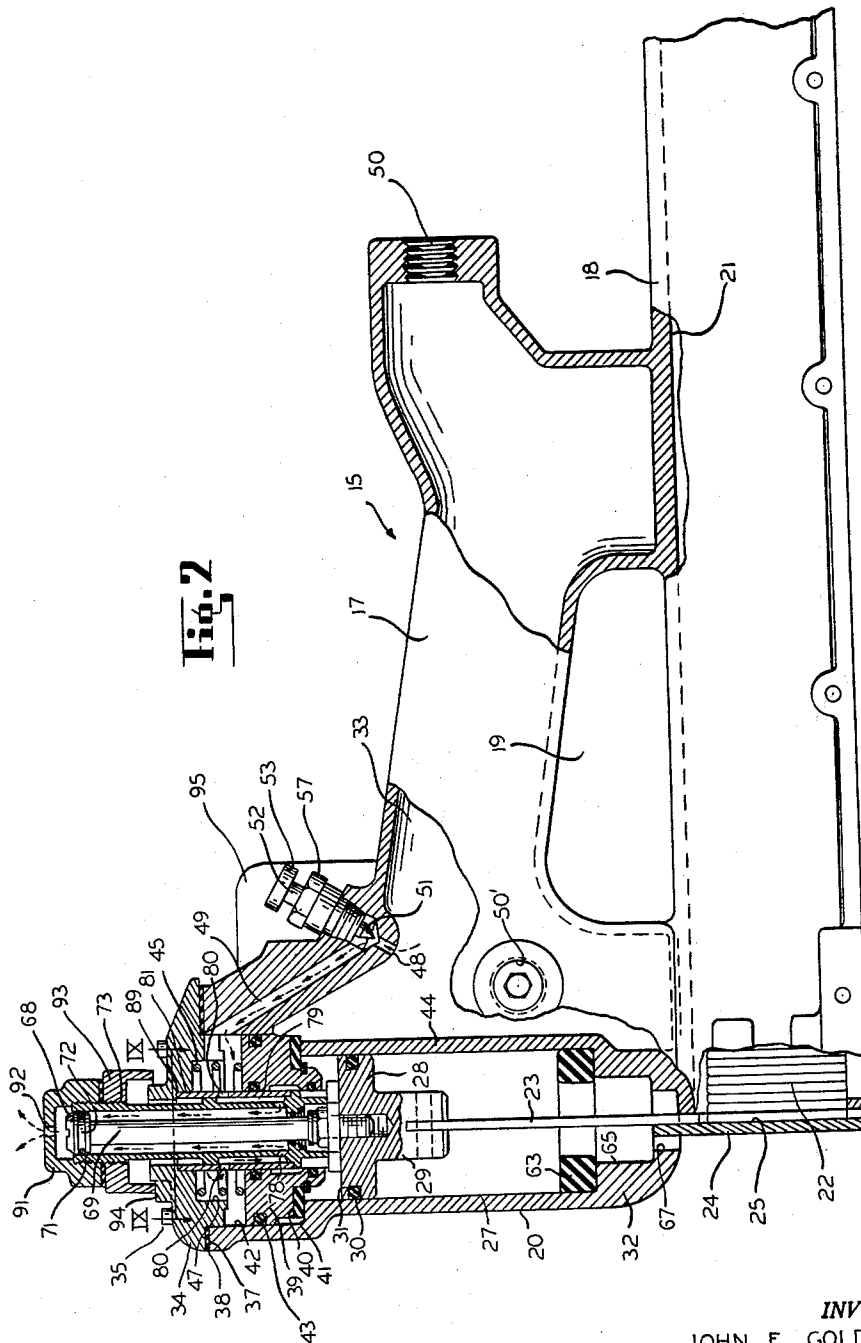
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PNEUMATIC FASTENER DRIVING MACHINE

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3 Sheets-Sheet 2



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PNEUMATIC FASTENER DRIVING MACHINE

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3 Sheets-Sheet 3

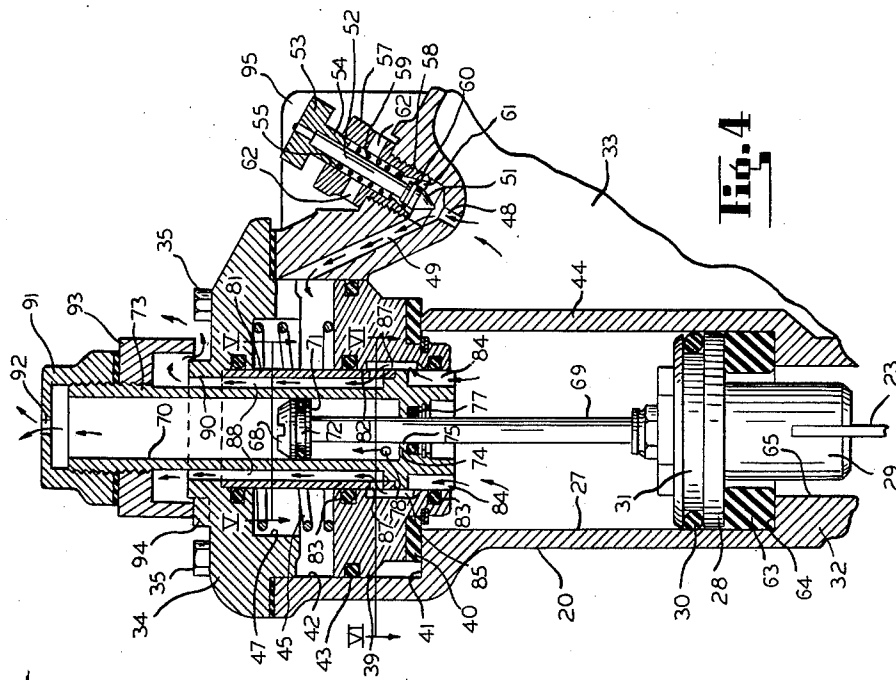


Fig. 4

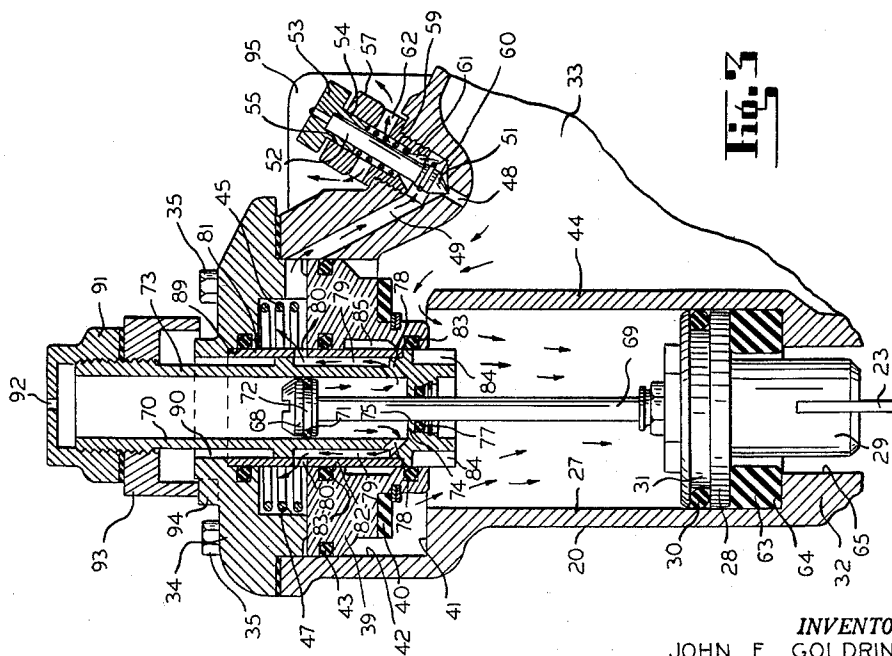


Fig. 3

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3,081,741

**PNEUMATIC FASTENER DRIVING MACHINE**  
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to Modernair Corporation, Bryan, Ohio, a corporation  
of Ohio

Filed Oct. 29, 1956, Ser. No. 618,773  
11 Claims. (Cl. 121—21)

The present invention relates to improvements in fastener driving machines and is more particularly concerned with pneumatically operated machines of this character especially adapted for efficiently driving industrial fasteners of the staple, nail or pin type, and while the machine may be of stationary, factory bench type for securing together certain mass produced assemblies such as window and door sash, furniture, and the like, the machine is especially suitable for portable manually operable usages where a suitable source of motivating pressure fluid such as compressed air or its equivalent (all to be encompassed by the term "pneumatic" in its various forms) is available for operation of the machine.

This application is a continuation-in-part of a copending application Serial No. 546,509 filed November 14, 1955, wherein there are disclosed certain earlier forms of the present invention. In said copending application, there is described a new mode of operating pneumatic fastener driving machines wherein the driving piston is motivated by pneumatic pressure directly from a fluid reservoir by exposing the piston head to the fully pressurized reservoir in each operative stroke, and without any of the conventional time lag or delayed action disadvantages of valved passages or ducts between the reservoir and the cylinder. Extremely prompt, rapid and powerful motivation of the driving piston is thus attained, free from recoil, coupled with unusual economy in pressure fluid expenditure.

An important object of the present invention is to provide a simplified and more efficient assembly of parts in fastener driving machines, especially of the kind referred to hereinabove, enabling assembly of all of the driving mechanism from the top of the driving head of the machine and thereby enabling the lower end of the driving head of the machine to be made solid with the frame or casing of the machine for withstanding extremely high pressure loads incident to driving especially fasteners of large and long types wherein, for example, driving force against the bottom of the driving piston cylinder may be as much as 4000 p.s.i.

Another object of the present invention is to provide a fastener driving machine of high power and impact capacity wherein return springs for the driving piston or plunger are entirely eliminated for thereby enabling virtually unlimited fastener driving stroking of the piston and driver as compared to return spring types of machines wherein it is necessary to replace broken return springs with some frequency due to inevitable fatigue failures of such springs.

Still another object of the present invention is to improve greatly the efficiency in the use of motivating fluid by minimizing and eliminating restrictive orifices and passages in the dynamic pressure fluid operating or use portions of the driving system of the machine.

It is a further object of the invention to provide improved automatically pressure fluid actuated control means for fastener driving machines.

Yet another object of the invention is to provide a pneumatic fastener driving machine construction wherein unusual freedom from wear-engagement of moving parts is attained.

It is also an object of the present invention to provide in fastener driving machines improved operating control

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means functioning on the principle of pressure differential or unbalancing motivation of control members or by negative valving instead of line interposed or positive valving where a valve located in a fluid duct or passage must be opened to permit flow of fluid through the passage.

A still further object of the invention is to provide an improved fastener driving machine of sturdy, economical construction that can be produced by low cost mass production methods of manufacture, and which is of such simple and readily accessible assembly that repairs can be readily effected.

Other objects, features and advantages of the present invention will be readily apparent from the following detailed description of certain preferred embodiments thereof taken in conjunction with the accompanying drawings in which:

FIGURE 1 is a fragmentary, top plan view of a fastener driving machine embodying features of the invention;

FIGURE 2 is a fragmentary, vertical sectional view, partially in elevation, of the machine taken substantially on the line II—II of FIGURE 1;

FIGURE 3 is an enlarged fragmentary vertical sectional view taken substantially in the same plane as FIGURE 2 and showing the head end portion of the machine with the driving piston as well as other mechanism of the unit in the positions assumed thereby during a driving stroke of the piston;

FIGURE 4 is an enlarged fragmentary vertical sectional detail view taken substantially on the line IV—IV of FIGURE 1;

FIGURE 5 is a fragmentary sectional detail view taken substantially on the line V—V of FIGURE 4;

FIGURE 6 is a fragmentary sectional detail view taken substantially on the line VI—VI of FIGURE 4;

FIGURE 7 is a side elevational view of the sleeve member serving as a valve piston guide and air flow control member in the driving head assembly of the machine;

FIGURE 8 is a sectional detail view taken substantially on the line VIII—VIII of FIGURE 7; and

FIGURE 9 is a fragmentary sectional detail view taken substantially on the line IX—IX of FIGURE 2.

In the embodiment of FIGURES 1 and 2, a fastener driving machine 15 is equipped for portable manual use and for this purpose has a frame structure including a combination handle and fluid reservoir 17 providing with a fastener magazine section 18 therebelow a convenient hand hole 19. On the forward end of the handle portion or section 17 and above the forward end of the magazine portion or section 18 is a driving head portion or section 20. All of the several portions or sections of the machine frame are adapted to be constructed as a unitary casting of light weight material such as aluminum or magnesium alloy.

Interiorly the magazine section 18 is hollow and provides a longitudinal fastener magazine chamber 21 within which is housed a replenishable supply of a substantial number of fasteners 22 adapted to be pushed forwardly by any suitable means for successive disposition in driving position under a driver preferably in the form of a blade member 23 extending downwardly from within the head section 20. For receiving and holding in driving position and for guiding the driver 23, a preferably removably attached thrust plate or nose or gate structure 24 is carried by the front end of the magazine section 18 and under the head section 20 and provides a downwardly opening fastener driveway and driver guide passage 25.

Within the head section 20 is a vertically elongated cylindrical chamber 27 for accommodating a driving piston 28 provided with a depending lug or boss 29 to which the driver 23 is attached. The diameter of the piston 28 is slightly smaller than the inside diameter of the cylinder

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27 whereby to avoid direct mechanical contact, and an O-ring seal member 30 is seated in a peripheral groove 31 in the piston and makes sealing contact with the opposing cylinder wall and maintains the piston concentric within the cylinder.

For enabling assembly of the piston 28 and the driver blade 23 from the top of the driving head section 20 so that the bottom of the cylinder 27 can comprise a solid base of substantial mass forming an integral part of the machine frame in one piece with the frame casting, the upper end of the inside diameter of the cylinder 27 opens freely upwardly, that is, it is free from any built-in obstruction to insertion or removal of the piston 28 through the top end of the cylinder. At the same time, for the attainment of instantaneous full power thrust or driving acceleration of the piston 28 at the inception of a driving stroke thereof, the upper, open end of the cylinder 27 opens normally freely into a preferably large volume capacity pressure fluid reservoir 33 which substantially surrounds the cylinder 27 within the head section 20 and includes the hollow space within the handle 17 (FIGS. 2 and 5).

Access into the reservoir chamber 33 above the cylinder 27 is adapted to be effected through an opening in the top of the head section 20 of the machine and closed for service by a closure member or cap plate 34. Removable attachment of the cap 34 may be effected as by means of screws 35 having the shanks extending there-through and threadedly drawn up into the upper end of the head section 20 which provides a preferably flat seat 37 against which the cap plate is clamped with a sealing gasket 38 interposed therebetween.

Mechanism for controlling operation of the driving piston 28 includes means normally closing the top end of the cylinder 27 but shiftable toward open position for opening the cylinder to full fluid pressure within the reservoir 33 for driving the piston 28 and the driving member 23 in a driving stroke thereof. To this end, a control piston or valve member 39 is provided with a lower end face carrying a resilient valve disk ring 40 which is sealingly engageable against a closure valve seat 41 defining the top of the cylinder 27. Reciprocable guiding of the valve piston 39 is effected within a cylinder 42 concentric with the cylinder chamber 27 and of somewhat larger diameter, provided in the upper portion of the head section 20 and spaced above the cylinder 27. By preference, an O-ring seal 43 is provided in the periphery of the valve piston for engagement with the opposing wall of the cylinder 42.

By having the valve piston 39 of larger diameter than the outside diameter of that portion of a generally cylindrical barrel wall 44 defining the cylinder 27 and exposed within the reservoir 33, pressure fluid within the reservoir normally acts on the margin of the valve piston 39 exposed within the reservoir tending to drive the valve piston from its seat 41. However, the pressure fluid is also normally active on the upper face of the piston valve 39 which is of greater effective area than at least the overhanging or radially outwardly projecting marginal portion of the valve piston contiguous the valve seat 41. In addition, a light biasing or priming coil spring 45 seated abuttingly within a centering recess 47 in the inner face of the closure cap 34 and thrusting against the upper face of the valve piston 39 normally overbalances the valve piston toward the cylinder closing position thereof on the valve seat 41.

Valve piston closing pressure fluid is conducted from the reservoir 33 through a supply orifice 48 in the casting opening at one end into the reservoir 33 and preferably located generally adjacent juncture of the handle section 17 with the head section 20, that is, at the back portion of the head section 20, and opening at its other end into a supply duct 49 which, in effect, is separated by a wall from the reservoir except for the orifice 48 which extends through such wall and opens or ports into the upper

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extremity portion of the cylinder 42 above the valve piston 39. The cross-sectional flow area of both the supply orifice 48 and the supply duct 49 are preferably such that pressure fluid from the reservoir 33 will pass there-through substantially without restriction to the cylinder 42. This assures that when pressure fluid is initially introduced into the reservoir 33 from a suitable source as by means of the usual piping or flexible duct connection (not shown) connected into a threaded orifice 50 opening into the handle through its rear end portion or through a side orifice 50' (FIG. 2) the force of the pressure fluid will be instantaneously effective upon the upper face of the piston valve 39 in differentially greater pressure than upon the lesser exposed underside margin about the valve seat 41 so that the piston valve is held quite firmly upon its seat for thus blocking access of the pressure fluid that fills the reservoir 33 to the top of the driving piston 28. In view of such free access of the pressure fluid to the top of the valve piston 39, there is no danger of premature firing of the driving piston 28 and the driver 23. Nevertheless, full unrestricted large volume motivating pressure fluid supply surrounds the valve seat 41 and is statically impressed upon the exposed underside margin of the valve piston in readiness to unseat the valve piston and fire the driving piston 28 when the pressure differential on the valve piston 39 is reversed.

Such reversal of the pressure differential is effected by a negative valve arrangement, that is a valve arrangement whereby pressure fluid to the upperside of the valve piston 39 is blocked, while the cylinder 42 above the valve piston is depressurized. Herein, this is efficiently accomplished by means of a needle or taper end valve 51 concentric with a valve seat provided at the passage end of the supply orifice 48, but normally open or backed off away from the orifice in the direction of pressure fluid flow so as to leave unrestricted passage between the orifice 48 and the supply duct 49.

Support for the valve 51 in a manner to enable ready operation thereof from the outside of the machine is provided by a valve stem 52 thereby providing a unitary valve member including and carrying a button type head 53 on its outer end portion including a stem or skirt portion 54 that is slidably guided in a central guide bore 55 of a body or a fitting 57 secured as by means of a threaded connection in a bore 58 of substantial diameter concentric with but spaced from the adjacent end of the supply orifice 48 (FIGS. 3 and 4). It will thus be seen that the valve body 57 is mounted on the casting of the machine on the opposite side of the duct 49 from the adjacent end of the orifice 48 and separated from and in outwardly spaced relation to both the separating wall between the duct 49 and the reservoir 33 and the adjacent end of the orifice but in alignment with the orifice. Normally a coiled compression biasing spring 59 urges the valve member 51 toward open position wherein an O-ring valve seal 60 carried by the valve immediately adjacent the widest end of the tapered valve tip engages sealingly with a flaring mouth or seat 61 at the inner end of a vent or bleed passage defined by the bore 55 within the fitting or bushing 57 and communicating with transverse vent openings 62 in the outer head end portion of the fitting. In the thus normally open position of the valve 51, pressure fluid is of course freely active from the reservoir 33 as indicated by the broken directional arrows in FIGURE 2 for holding the valve piston 39 closed.

Instantaneously upon shifting the valve 51 into closing or blocking relation to the orifice 48, as seen in FIGURE 3, by application of inward axial pressure to the valve stem 52 as by means of digital force against the button head 53 and venting of the cylinder 42 to atmosphere through the passage 55 and the vent opening 62 as shown by directional arrows in FIGURE 3, the pressure fluid within the reservoir 33 pops the valve piston

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39 from its seat and the full force of fluid pressure within the reservoir 33 spills into the cylinder 27 and drives the piston 28 under full head of pressure in a driving stroke.

At the end of the firing or driving stroke (FIG. 3), wherein the driving blade 23 drives one of the fasteners 22 from the magazine and into work positioned under the machine and more particularly under the head section 20 thereof, the underside of the driving piston 28 comes to rest against an annular resilient bumper 63 supported upon a shoulder 64 provided by the bottom portion 32 which is solidly integral with the rest of the head section 20 and more especially the cylinder barrel 44. At this time the driver blade carrying boss 29 projects downwardly through the resilient annulus 63 into a clearance recess or well 65 in the base portion 32. A central opening 67 (FIG. 2) in the lower end of the clearance recess 65 provides a vent to atmosphere for the lower end of the cylinder 27.

Pressure fluid from the reservoir 33 is utilized for returning the piston 28. For this purpose, an arrangement is provided including pneumatic return means for the piston 28 having a differentially pressured relationship to the side of the piston that is exposed to the pressure reservoir upon opening of the cylinder, so that in the closed condition of the cylinder 27 the pneumatic return means maintains the piston 28 in returned position. Herein the pneumatic return means comprises a piston 68 of substantially smaller diameter than the driving piston 28 and secured preferably concentrically to the top of the piston 28 through the medium of a piston rod 69 of substantial length.

Actuation of the return piston 68 is effected within an elongated cylinder 70 mounted in the head of the head section 20 and preferably in the closure cap 34. An O-ring seal member 71 mounted in a peripheral groove 72 of the return piston 68 effects sealing engagement with the opposing cylinder wall and maintains the return piston in slightly spaced concentric relation to the cylinder wall.

By preference, the cylinder 70 is provided within a sleeve or bushing member 73 extending at its lower end a short distance into the upper end of the cylinder 27 and thereby providing a return stop for the piston 28 to maintain the driving piston below the upper end of the cylinder 27 as best seen in FIGURE 2. A base wall 74 in the lower end portion of the bushing 73, closes the lower end of the cylinder 70 and has a central passage 75 for the piston rod 69 provided with a fluid seal 77 such as an O-ring engaging the piston rod. Thereby a pressure chamber is provided between the underside of the return piston 68 and the end wall 74.

Pressure fluid for driving the return piston 68 in a return stroke, that is upwardly as seen in FIGS. 2 and 4, and for maintaining the return piston in the returned position positively while the reservoir 33 contains fluid under pressure, is conducted to the pressure chamber within the cylinder 70 from the pressure chamber above the control valve piston 39. To this end, a pair of preferably diametrically opposite ports 78 lead into the lower end of the pressure chamber in the cylinder 70 from vertical peripheral passage grooves 79 in the outer wall surface of the sleeve member 73 and extending upwardly to be clear of the top of the valve piston 39 to communicate through respective ports 80 in an encompassing closure sleeve 81 opening into the spring recess 47 in the lower face of the closure member 34. It will be observed that the valve piston 39 has a central bore 82 slidably clearing the sleeve 81 and the lower portion of the bushing sleeve 73 and is provided adjacent its opposite ends within the bore 82 with respective O-ring seals 83 engaging sealingly about the sleeve 81 and the lower portion of the bushing 73 which thus provide a guide stem structure on which the valve piston 39 reciprocates. Through this arrangement, during the inactive condition of the driving piston 28,

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when pressure fluid is freely delivered into the pressure chamber within the cylinder 42 above the valve piston 39, pressure fluid freely enters through the passage provided by the ports 80, the passage grooves 79 and the ports 78 to the pressure chamber within the cylinder 70 as indicated by the broken directional arrows in FIGURE 2 and the directional arrow in FIGURE 4. Upon venting of the valve piston pressure chamber as shown in FIGURE 3, the pressure chamber within the return cylinder 70 is also vented as indicated by the directional arrows through the ports 78, the passage grooves 79 and the ports 80 so that the driving piston 28 is freed from pressure fluid restraint upon full driving force of the pressure fluid from the reservoir 33 upon the driving piston.

Instantaneously upon return of the control valve 51 and reopening of the pressure fluid port 48, and thereby snapping of the valve piston 39 into closing relation upon its seat 41, the pressure fluid enters the pressure chamber within the return cylinder 70 and drives the return piston 68 upwardly to return the driving piston 28 to its initial or uppermost position. At the same time, the cylinder 27 above the driving piston 28 is vented freely to atmosphere so that the relatively small pressure area provided by the return piston 68 is fully effective to produce the return stroke of the driving piston. Such venting is effected as best seen in FIGURE 4 by way of a plurality of vertical outer peripheral grooves 84 in the lower end portion of the bushing member 73 and an internal annular channel 85 in the bore 82 of the valve piston 39, thence through a plurality such as 6 ports 87 (FIGS. 4, 6, 7 and 8) in the lower end portion of the sleeve 81 and vertical grooves 88 in the outer periphery of the bushing 73 to atmosphere above the closure cap plate 34. Through this arrangement, it will be observed that the passages for pressure fluid and venting of the return cylinder pressure chamber under the piston 68 and the venting of the cylinder 27 are effectively isolated from one another in a structurally simple manner by the joined bushing and sleeve members 73 and 81 which in turn are secured in the cap plate member 34. In fact, in the construction shown the bushing member 73 is actually carried by and within the sleeve 81 and the sleeve 81 is in turn secured within a shouldered counterbore 89 of a central bushing clearing bore 90 through the cap plate member 34.

At its upper end portion, the bushing member 73 projects substantially above the cap member 34 and carries a protective cap 91 over the cylinder 70 provided with a vent bore 92. In addition, a baffle cap and muffle member 93, serving also as a lubricant guard is secured between the cap 91 and a plurality of radiating spacer lugs or projections 94 on the top of the cap member 34. Not only does this muffle and diffuse exhaust air but prevents spraying of oil up into the surrounding atmosphere incident to the return of the driving piston 28.

In a cycle of operation of the machine, depressing of the valve button 53 closes the valve 51 and at the same time opens the bleed for the piston valve cylinder chamber 42 as shown in FIGURE 3, thereby raising the piston valve 39 and releasing the pressure fluid in the reservoir 33 for driving the piston 28. This also effects bleeding of the pressure chamber within the return cylinder 70 by way of the ports 78, passages 79 and ports 80. At the same time, the exhaust passages for the driving piston cylinder 27 through the vertical slot grooves 84 in the lower end of the bushing 73 and the exhaust ducts 85 are sealed off by shifting of the control valve piston 39 so that the exhaust groove 85 is moved upwardly out of registration with the exhaust slots 84 and sealed off by the lower O-ring 83 from the internal pressure established within the cylinder 27 by opening of the valve piston. Thus leakage of pressure fluid is precluded.

Upon release of the valve 51 and return of pressure fluid to the control valve piston chamber 42, the control piston 39 snaps back into closing position upon its seat

41 and reopens to atmosphere the vent for the cylinder 27 while the pressure fluid for activating the return piston 68 enters by way of the ports 78 into the pressure chamber within the cylinder 70, as shown in FIGURES 2 and 4. This causes the driving piston 28 to be snapped back in a return stroke. Since the effective pressure area of the return piston 68 is relatively small, the force with which the piston 28 is returned against the stop end of the bushing 73 is minimal. If desired, of course, a cushioning bumper device may be provided either on the upper end of the piston 28 or on the stop end of the bushing 73.

In order to avoid accidental actuation of the shut-off and bleeder valve 51, 60, guard means are provided externally of the casting of the machine adjacent to the actuating button 53, herein comprising a pair of laterally spaced, upwardly and rearwardly projecting guard flange ears 95. These ears 95 are preferably formed integrally with the housing or frame casting generally in the angle between the handle 17 and the upwardly projecting portion of the head section 20, and project sufficiently beyond the depressible valve button 53 to avoid actuation of the latter except by application of an operator's finger or thumb thereto and down between the guard ears or ribs 95.

Although the machine has been provided in a form that is especially adapted for portable, manual use, it will be appreciated that the same machine could readily be utilized in stationary set ups wherein some mechanical means of plunger or lever type, or the like, may be utilized to actuate the control valve button or head, or may even replace such head and be connected directly to the stem of the control valve.

It will be understood that modifications and variations may be effected without departing from the scope of the novel concepts of the present invention.

We claim as our invention:

1. In a pneumatic driving machine, a frame structure including a head portion, said head portion having a top opening with a removably secured closure cap member closing the same, said head portion having therein a pressure fluid reservoir of large volume within which a cylinder is provided with an end opening arranged for exposure within the reservoir substantially spaced below said closure cap, a driving member actuating piston reciprocally operable in said cylinder and carrying a driving member directed toward the opposite end of the cylinder from said end opening, means normally urging the piston toward said end opening, said end opening being unobstructed so that the piston and driving member can be assembled or removed therethrough and through the open end of said head portion when said closure cap is removed, said closure cap having projecting therefrom and into the upper portion of said cylinder stop means engageable by the piston to normally hold the top of the piston below the end opening, and means normally closing said cylinder end opening but shiftable toward open position for opening the cylinder to full fluid pressure from within the reservoir for driving the piston and said member in a driving stroke thereof, said stop means including an exhaust passage system from said cylinder above said piston.

2. In a pneumatic driving machine, a frame structure including a head portion, said head portion having a top opening with a removably secured closure cap member closing the same, said head portion having therein a pressure fluid reservoir of large volume within which a cylinder is provided with an end opening arranged for exposure within the reservoir substantially spaced below said closure cap, a driving member actuating piston reciprocally operable in said cylinder and carrying a driving member directed toward the opposite end of the cylinder from said end opening, means normally urging the piston toward said end opening, said end opening being unobstructed so that the piston and driving member can be

assembled or removed therethrough and through the open end of said head portion when said closure cap is removed, said closure cap having projecting therefrom and into the upper portion of said cylinder stop means engageable by the piston to normally hold the top of the piston below the end opening, and means normally closing said cylinder end opening but shiftable toward open position for opening the cylinder to full fluid pressure from within the reservoir for driving the piston and said member in a driving stroke thereof, said stop means including an exhaust passage system from said cylinder above said piston, said shiftable closing means including valve structure operable to control said exhaust system.

3. In a pneumatic driving machine, a head portion and a frame structure providing a pressure fluid reservoir of substantial volume with means for supplying into said reservoir pressure fluid from a substantially continuous pressure source, a cylinder structure within said reservoir opening at one end for exposure to the pressure fluid in the reservoir, a piston carrying a driving member and reciprocally operable in said cylinder, said head portion having an open aligned with said cylinder end and provided with a closure member substantially spaced from said cylinder end, said closure member having a stop member extending therefrom into the cylinder adjacent to said cylinder end and engageable with said piston to hold the same in load position adjacent to but spaced from said cylinder end, said stop member providing a guide stem structure of substantially smaller outside diameter than said cylinder, said head portion having beyond said cylinder end and aligned with the cylinder a cylinder portion of larger diameter than said first mentioned cylinder, and an annular valve piston sealingly slidably reciprocally mounted within said larger diameter cylinder portion and engaging said guide stem and normally closely engaging on said first mentioned cylinder end but shiftable toward open position for opening the first mentioned cylinder to full fluid pressure within the reservoir for driving the piston and driving member in a firing or driving stroke thereof.

4. In a pneumatic driving machine, a head portion and a frame structure providing a pressure fluid reservoir of substantial volume with means for supplying into said reservoir pressure fluid from a substantially continuous pressure source, a cylinder structure within said reservoir opening at one end for exposure to the pressure fluid in the reservoir, a piston carrying a driving member and reciprocally operable in said cylinder, said head portion having an opening aligned with said cylinder end and provided with a closure member substantially spaced from said cylinder end, said closure member having a stop member extending therefrom adjacent to said cylinder end and engageable with said piston to hold the same in load position adjacent to said cylinder end, said stop member providing a guide stem structure of substantially smaller outside diameter than said cylinder, said head portion having beyond said cylinder end and aligned with the cylinder a cylinder portion, and an annular valve piston having means sealingly slidably reciprocally mounted within said cylinder portion and means engaging said guide stem and normally closely engaging over said first mentioned cylinder end but shiftable toward open position for opening the first mentioned cylinder to full fluid pressure within the reservoir for driving the piston and driving member in a firing or driving stroke thereof, said annular control valve piston being normally subjected to controlling pressure fluid from said reservoir, on a face thereof spaced from said cylinder end, by way of a passage into said cylinder portion and being movable away from said cylinder end upon closing of said passage and bleed-off of fluid from said cylinder portion.

5. In combination in a high velocity pneumatic fastener driving machine, a handle section with a head section of substantial vertical dimension at the forward end of the handle section, said head section having therein

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a cylinder with a massive lower closure end, there being a pressure fluid reservoir in the head section, the cylinder opening at its top into said reservoir, a driving piston in said cylinder having a driver disposed operatively through an opening in said cylinder lower closure end for driving fasteners under the head section, said head section providing in the upper portion spaced above said cylinder a control cylinder open from the top of the head section but closed by a closure member having projecting downwardly therefrom a stop extending adjacent to the upper end of said first mentioned cylinder for limiting upward or return movement of the piston, a control valve piston operable in said control cylinder, a fluid passage in the upper portion of said head section in the forward end of the handle section and communicating with said reservoir and with the upper end of said control cylinder for subjecting said valve piston to the pressure fluid in the reservoir to maintain the valve piston normally closed, said control valve piston being exposed in a limited marginal area on its lower side to the pressure fluid in the reservoir, said driving piston being normally biased toward said stop, and a plunger type control valve normally biased toward open position but operable adjacent juncture of the handle section with the head section for selectively closing said fluid passage and bleeding the same to atmosphere for unbalancing said control valve piston to open in response to pressure fluid within the reservoir on said limited marginal area for thereby opening said first mentioned cylinder to expose the driving piston to the driving force of said pressure fluid, said cylinder lower closure end having bumper and cushioning resilient means to receive the driving piston at the end of the driving stroke.

6. In a pneumatic driving machine, a frame structure including a head portion, said head portion having an access opening with a removably secured closure closing the same, said head portion having therein a pressure fluid reservoir of substantial volume and a cylinder having one end aligned with said access opening and arranged for exposure to the reservoir, a piston reciprocally operable in said cylinder and carrying a driver directed toward the opposite end of the cylinder, the piston being operable in a driving stroke from said one end, said one end being unobstructed so that the piston and driver can be assembled or removed therethrough and through the access opening of said head portion when said closure is removed, a member projecting centrally from the closure and provided with a portion extending into such relation to said one end of said cylinder as to provide stop means engageable by the piston to normally hold the piston within the cylinder, and means reciprocally guided by said member and normally closing said one end from the reservoir but separable relative to said one end for opening the cylinder to full fluid pressure from within the reservoir for driving the piston and said driver in a driving stroke toward said opposite end, said member including an exhaust passage system from said one end of the cylinder having control means closing the system when said one end is open and opening the system when said one end is closed.

7. In a pneumatic driving machine, a frame structure including a head portion, said head portion having an access opening with a removably secured closure closing the same, said head portion having therein a pressure fluid reservoir of substantial volume and a cylinder having one end aligned with said access opening and arranged for exposure to the reservoir, a piston reciprocally operable in said cylinder and carrying a driver directed toward the opposite end of the cylinder, the piston being operable in a driving stroke from said one end, said one end being unobstructed so that the piston and driver can be assembled or removed therethrough and through the access opening of said head portion when said closure is removed, means between said closure and said one end operative to retain the piston in

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the cylinder when the piston is adjacent to said one end, means normally closing said one end but separable relative to said one end for opening the cylinder to full pressure from within the reservoir for driving the piston and driver in a driving stroke toward said opposite end, and means providing an exhaust passage extending through said closing means from said one end when said one end is closed.

8. In a pneumatic driving machine, a frame structure including a head portion, said head portion having an access opening with a removably secured closure closing the same, said head portion having therein a pressure fluid reservoir of substantial volume and a cylinder having one end aligned with said access opening and arranged for exposure to the reservoir, a piston reciprocally operable in said cylinder and carrying a driver directed toward the opposite end of the cylinder, the piston being operable in a driving stroke from said one end, said one end being unobstructed so that the piston and driver can be assembled or removed therethrough and through the access opening of said head portion when said closure is removed, means between said closure and said one end operative to retain the piston in the cylinder when the piston is adjacent to said one end, a reciprocable member normally closing said one end and guided by said retaining means to be separable relative to said one end for opening the cylinder to fluid pressure from within the reservoir for driving the piston and said driver in a driving stroke toward said opposite end, and means providing an exhaust passage extending through said closing means and said retaining means from said one end when said one end is closed.

9. In a high velocity pneumatic fastener driving machine,

a frame structure comprising a casting having a handle section and a head section on the front end of the handle section,

the handle and head sections having therein a pneumatic fluid reservoir,

said head section having therein a cylinder with its end exposed within the reservoir,

a driving piston reciprocable in the cylinder and normally biased toward said end of the cylinder,

means for controlling the cylinder opening for driving of the piston by pneumatic fluid from the reservoir,

a pneumatic fluid supply duct in said casting communicating with said control means and having a wall separating it from the reservoir,

a supply orifice extending through said wall and opening at one end into the reservoir and opening at its other end into said supply duct and thereby affording a free passage into the duct for supplying pneumatic fluid from the reservoir by way of the duct to said control means,

and a control valve structure including

a valve body mounted on said casting on the opposite side of said duct from said other end of said orifice and separated from and in outwardly spaced relation to both said wall and said other end of the orifice but in alignment with the orifice,

and a unitary valve member reciprocally mounted in said valve body and having:

a portion engageable externally of the valve body and of the casting for effecting actuation of the valve member,

and an integral valve portion disposed adjacent the inner end of the valve body operatively within said duct and in opposed alignment with said other end of the orifice,

said valve member being normally biased outwardly away from and maintaining said valve portion in spaced relation to said other end of the orifice;

said other end of the orifice providing a valve seat spaced from said valve body but engageable by said

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valve portion upon actuation of said valve member in opposition to its bias to close the orifice and thereby close off said reservoir from said duct for effecting control of said control means.

10. A machine as defined in claim 9, wherein said casting has guard means externally thereof alongside said engageable portion of the valve member externally of the valve body whereby to protect said engageable portion against accidental actuation.

11. A machine as defined in claim 9, wherein said valve body has a bleed passage therethrough to the external end thereof for bleeding to atmosphere and has a valve seat thereon opposite said other end of the orifice, said valve member having a second valve portion thereon which is located between said engageable portion and said orifice-opposing valve portion and in the biased relation of the valve member normally seats in closing relation on said valve seat of the valve body to close said bleed passage,

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said bleed passage being openable by movement of said second valve portion from said valve body seat when the valve member is actuated to move said orifice-opposing valve portion into closing relation to the valve seat provided at said other end of said orifice.

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