

June 7, 1949.

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2,472,352

FLUID ACTUATED TOOL

Filed Dec. 30, 1943

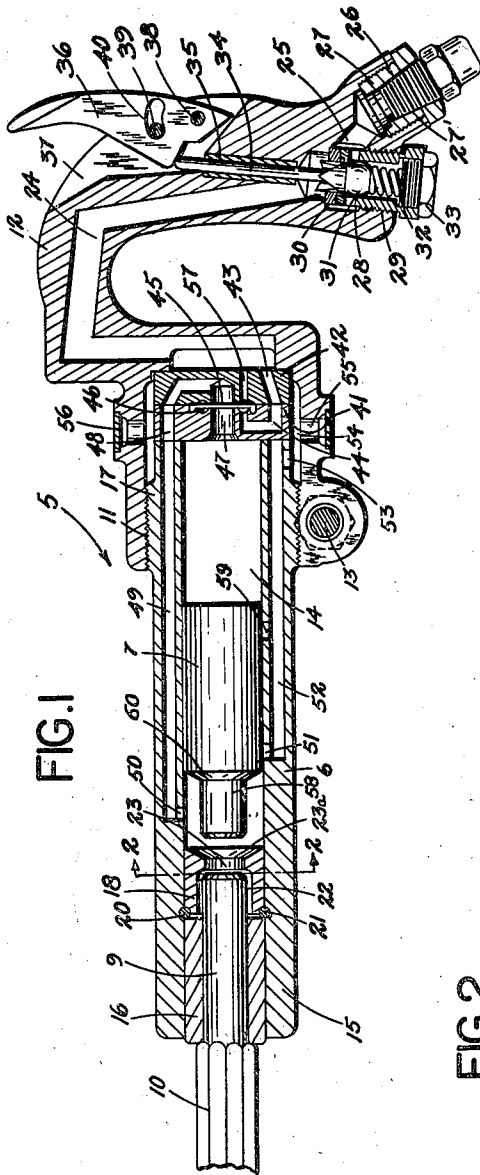


FIG. 1

FIG. 2

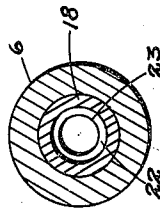
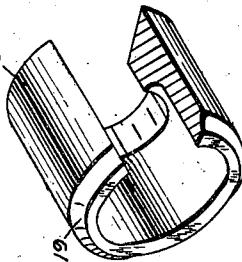


FIG. 3



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2,472,352

FLUID ACTUATED TOOL

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Application December 30, 1943, Serial No. 516,232

2 Claims. (Cl. 121-17)

1 The present invention relates broadly to fluid actuated tools, but more particularly to the construction of cushioning means for the plunger or piston of such tools.

An important object of the invention is to provide means in the front end of the barrel of a fluid actuated tool for cushioning the impacts of the reciprocating piston or plunger.

Another object of the invention is to provide a member in the form of a sleeve held in the front end of the barrel of a fluid actuated tool, which sleeve receives a portion of the shank of the cutting tool and serves to trap air between the forward end of the plunger and the sleeve, thus forming a cushion for the plunger.

Other objects and advantages more or less ancillary to the foregoing reside in the specific construction and aggroupment of the elements peculiar to this structure, as will become apparent from a more complete examination of this specification.

In the drawing which illustrates the invention:

Fig. 1 is a longitudinal sectional view of a fluid actuated tool embodying the invention.

Fig. 2 is a cross sectional view thereof taken substantially on line 2-2 of Fig. 1.

Fig. 3 is a perspective view, partly in section, of the cushioning sleeve removed from the tool.

Referring to the drawing for a more detailed description thereof, a fluid actuated tool of the chipping hammer type is generally designated by the reference numeral 5 and is shown to include a cylinder 6 having a piston or plunger 7 reciprocable therein and active on the shank 9 of a chipping tool 10. To the cylinder 6 is threadedly secured as indicated at 11 a pistol grip handle 12. A lock nut and bolt 13 maintains the handle in fixed position on the cylinder but capable of detachment therefrom.

The cylinder 6 serves as a barrel for the tool and is formed centrally thereof with a bore 14 in which the piston 7 is movably actuated by air or other compressible fluid admitted within the bore in a manner to be hereinafter more fully described. The front end 15 of the barrel has fitted therein a nose piece 16, the interior diameter of which is substantially equal to the outer diameter of the shank 9 whereby said shank is readily positioned and removed. Urged into the

2 bore 14 from the back end 17 of the barrel is a sleeve-like member 18, the forward end of which is formed with an annular groove 19 in which is fitted a split ring 20. As is to be understood, the ring 20, when initially inserting the sleeve 18 within the bore 14, is compressed so as to be insertable within the bore ahead of the sleeve, and the ring will maintain its compressed or reduced shape and size as said sleeve is moved forwardly of the barrel. An annular groove 21 is formed within the bore 14 adjacent the rear end of the nose piece 16 in which the ring 20 will snap as the sleeve 18 reaches that portion of the bore, indicating to the person assembling the tool that the sleeve 18 has about reached its desired location. As more particularly shown in Fig. 1 of the drawing, the sleeve 18 is formed with a bore 22 which is slightly larger in diameter than the shank 9 in which is loosely received the back end of said shank, and communicating therewith is a second bore 23 of slightly smaller diameter. The end of the sleeve 18 opposite the annular groove 19 tapers outwardly from the bore 23 as indicated at 23a for a purpose to be hereinafter more fully described.

The handle 12 is provided with a passage 24 which communicates with a valve controlled inlet passage 25 leading from the pipe connection 26 in which may be secured the end of a motive fluid supplying conduit (not shown). The pipe connection 26 is threadedly secured within a bushing 27 which is in turn removably connected by means of the threads 27' to the end of the handle. The lower end of the passage 24 communicates with a bore 28 formed in the handle 12 at an angle to the inlet passage 25. A bushing 29 is screwed within the bore 28 and supports on its upper end a pair of washer-like members 30 which serve as a seat for the valve 31 which valve is held against its seat by a spring 32 supported within the bushing by means of a nut 33. The valve 31 is normally in engagement with its seat 30 for preventing the admission of motive fluid from the passage 25 through the passage 24 into the bore 14 to effect reciprocation of the plunger 7. Extending upwardly from the valve 31 is a pin 34 slidable in a bushing 35 mounted in the handle coaxially with the bore 28. The upper end of the pin 34 is engaged by a trigger-like lever 36 pivotally secured within a handle

slot 37 by a cross pin 38. A second cross pin 39 is also provided in the slot 37 which guides the lever 36 through the arcuate shaped slot 40.

In the assembly of the tool a valve block 41 is positioned adjacent the back end of the barrel 6 which cooperates with the valve block button 42 for controlling the admission of motive fluid into the bore 14. The valve block button 42 is formed with a passage 43 which communicates with a passage 44 formed in the valve block 41, the latter passage being controlled by means of a disk valve 45 held within an annular groove 46 between the valve block and button 41 and 42, respectively. The disk valve 45 controls the admission of motive fluid into the bore 14 through the passage 47. The valve block and button are formed with a continuous passage 48 which communicates with a passage 49 formed in the wall of the cylinder 6 which passage communicates with the front end of the bore 14 through a port 50 preferably spaced a short distance from the front end of the cylinder or the rear end of the member 18. Air from the bore 14 is exhausted through the port 51 and passage 52, the latter communicating through the port 53 with an annular chamber 54 which surrounds the valve block and button 41 and 42. From the annular chamber 54 the fluid is exhausted through the ports 55 concealed by means of a deflecting ring 56. The valve block button 42 is formed with a passage 57 which communicates with the annular groove 46 controlled by the disk valve 45.

In the operation of the device, when desiring to operate the tool, the lever 36 is swung on its pivot 38 to depress the pin 34 to unseat the valve 31. Motive fluid is then free to flow through the passage 24 from the passage 25 where it is admitted through the passages 43 and 44 forcing the valve 45 toward the valve block button and permitting the fluid to enter the bore 14 through the passage 47. The admitted fluid moves the piston 7 toward the forward end of the tool moving the reduced end 58 thereof through the restricted bore 23 into contact with the end of the shank 9. As the plunger 7 moves forwardly in the barrel, it uncovers the exhaust port 59, allowing fluid in back of the piston to be exhausted through said port by means of the passage 52, port 53, chamber 54, and port 55 to atmosphere. This exhausting of the fluid will lower the pressure in the bore to such an extent that fluid entering the passage 57 will move the valve 45 toward the valve block 41, thereby closing the passage 47 and permitting the fluid to move through the passages 48 and 49 and port 50 for reversing the movement of the plunger 7. During that portion of the cycle when the fluid begins to discharge through the port 50, the end 58 of the plunger 7 has entered the restricted bore 23, thus preventing escapement of fluid through the front end of the tool and trapping the fluid between the flared end of the sleeve 18 and the tapered area 60 of the piston 7. This volume of fluid trapped between the plunger or piston and the sleeve 18 acts as a cushion to prevent abrupt contact of the plunger with the sleeve which would cause injury to one or both of the parts. As soon as the pressure of the fluid between the forward end of the piston and the sleeve is sufficient to overcome the pressure in back of the piston, said piston will be moved toward the back of the tool uncovering the port 51, permitting the fluid to be exhausted through the passage 52, port 53, chamber 54, and outlet 55, and the tool is then ready to repeat the cycle.

Fluid will be admitted into the bore 14, and the plunger 7 will continue to reciprocate so long as the lever 36 holds the pin 34 down and the valve 31 disengaged from its seat.

From the above description when taken in connection with the accompanying drawing, it will be readily apparent that a means has been provided in the front end of the barrel of a fluid actuated tool which will trap the motive fluid employed for operating the tool whereby said fluid will serve as a cushioning agent to prevent injury of the plunger as it impinges the cutting tool. It is also apparent that should the plunger impinge the cutting tool without being cushioned in the manner designed, the cutting tool 10 would, in all probability, be struck with sufficient force to completely dislodge it from its retaining nose 16.

Although the foregoing description is necessarily of a detailed character, in order to completely set forth the invention, it is to be understood that the specific terminology is not intended to be restrictive or confining, and it is to be further understood that various rearrangements of parts and modifications of structural detail may be resorted to without departing from the scope or spirit of the invention as herein claimed.

I claim:

1. In a tool of the character described: a housing having a bore extending therethrough, a handle secured to one end of said housing, a fluid actuated plunger reciprocable within said bore formed with an operating tool engaging reduced end portion, a nose piece secured within the other end of said housing adapted to slidably receive the shank of an operating tool to be impinged by the reduced end portion of said plunger, a sleeve secured in said housing bore adjoining the inner end of said nose piece, said sleeve having a bore therethrough with an enlarged front portion surrounding the end of said shank and a reduced rear portion affording a sliding bearing for the reduced portion of said plunger immediately before and after impingement of said plunger on said shank, and means for admitting motive fluid alternatively into opposite ends of said housing bore for actuating said plunger, said means comprising a conduit in said housing terminating in a port adjacent to but spaced from said sleeve and adapted to be closed by said plunger whereby motive fluid is trapped longitudinally between said plunger and sleeve and laterally between the wall of said housing bore and the front end portion of said plunger.

2. In a tool of the character described: a housing having a bore centrally therethrough of a uniform diameter, a fluid actuated plunger reciprocable within said bore formed with a front end portion of reduced diameter, a nose piece secured within the front end of said housing bore adapted to slidably receive the shank of an operating tool having impacts delivered thereon by the front end portion of said plunger, and a sleeve secured in said housing bore adjoining the inner end of said nose piece, said sleeve having a bore therethrough, which bore is provided with an enlarged front portion surrounding the end of said shank and a reduced portion affording a sliding bearing for the reduced front end of said plunger during impacts of the plunger on said shank, and means for admitting motive fluid alternatively into opposite ends of said housing bore for actuating said plunger, said means comprising a conduit in said housing terminating in a port adjacent to but spaced from said sleeve and adapted

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to be closed by said plunger whereby motive fluid is trapped longitudinally between said plunger and sleeve and laterally between the wall of said housing bore and the front end portion of said plunger.

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REFERENCES CITED

The following references are of record in the file of this patent:

	Number	Name	Date
5	482,942	Drawbaugh	Sept. 20, 1892
	605,486	Kotten	June 14, 1898
	1,022,837	French	Apr. 9, 1912
	1,124,627	Leyner	Jan. 12, 1915
	1,130,957	Bayles	Mar. 9, 1915
10	1,224,089	Hawley	Apr. 24, 1917
	1,240,708	Haesler	Sept. 18, 1917
	1,574,762	Smith	Mar. 2, 1926
	1,589,295	Jimerson	June 15, 1926
	1,968,376	Curtis	July 31, 1934

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UNITED STATES PATENTS