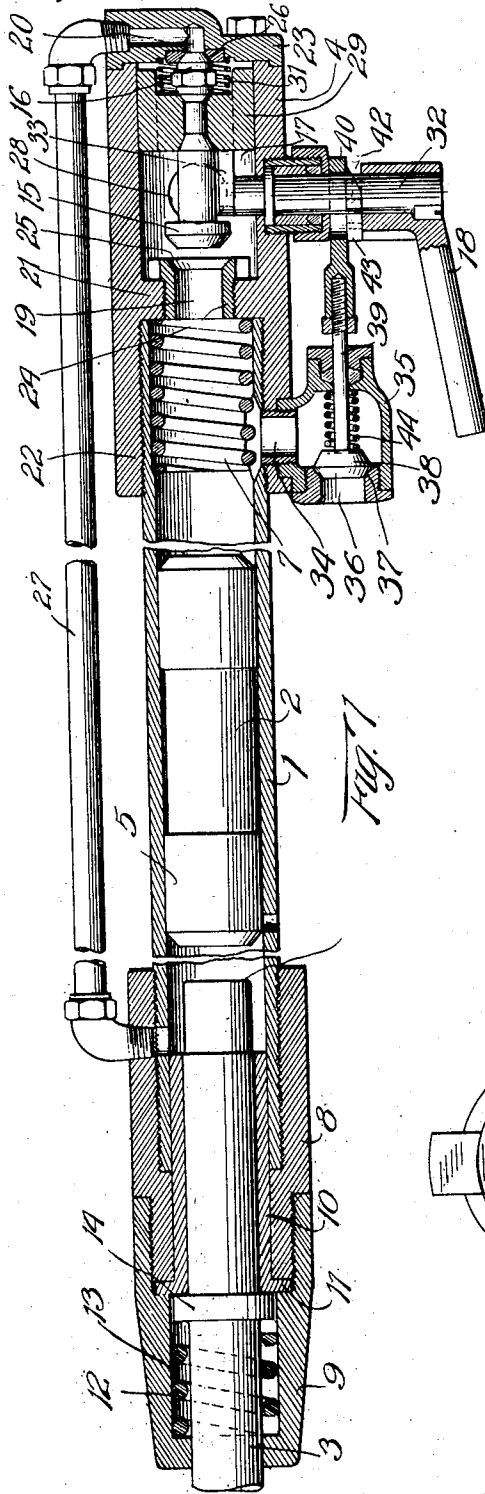
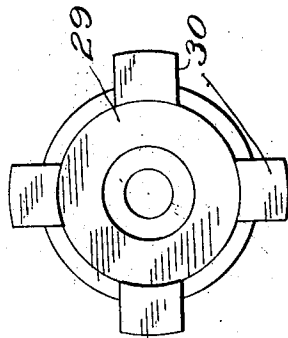
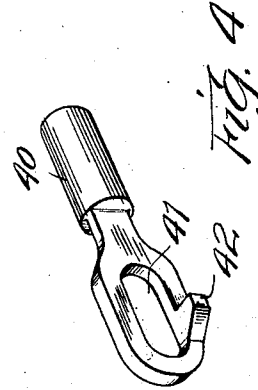
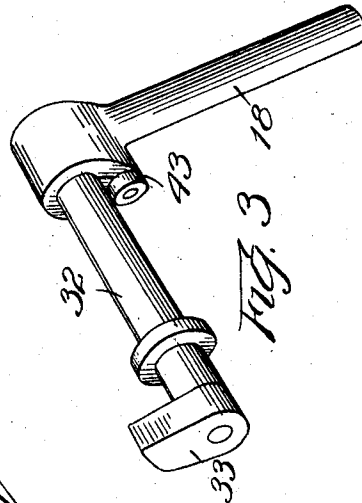


H. R. NEWBERT.
 FLUID OPERATED TOOL.
 APPLICATION FILED MAY 2, 1919.

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1,333,725.



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FLUID-OPERATED TOOL.

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Specification of Letters Patent.

Patented Mar. 16, 1920.

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To all whom it may concern:

Be it known that I, HARRY R. NEWBERT, a citizen of the United States of America, and a resident of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Fluid-Operated Tools, of which the following is a specification.

The main objects of this invention are to provide an improved form of fluid-operated tool wherein the flow of fluid under pressure, for reciprocating the plunger, is manually controlled; to provide an improved arrangement of valve mechanism for controlling the admission of the fluid pressure to the cylinder wherein the plunger is mounted; and to provide improved means for operating said valve mechanism.

An illustrative embodiment of the invention in the form of a pneumatic rivet-cutting tool is shown in the accompanying drawings, in which—

Figure 1 is a longitudinal sectional view of the complete tool.

Fig. 2 is an enlarged end view of the member which carries the valves by means of which the operating fluid is controlled.

Fig. 3 is a perspective view of the lever, arbor, and cam parts by which the shifting of the valve mechanism is controlled.

Fig. 4 is a perspective view of the member which coacts with the lever for actuating the exhaust port valve.

In the construction herein shown, the tool comprises a cylinder 1 in which a piston or hammer 2 is reciprocatingly mounted so that under the influence of fluid pressure, regulated by the valve mechanism mounted on one end of the cylinder 1, it is adapted to strike the cutting tool 3 shiftably supported in a tool holder secured to the other end of the cylinder 1.

The cylinder 1 preferably comprises a piece of seamless tubing of the desired length, depending upon the desired throw of the piston 2. This tubing is shown threaded at the ends, and at one end is connected to the head 4, which carries the fluid pressure regulating mechanism, and at the other end to the tool holder. The piston 2 is a cylindrical steel block cut away throughout a part of its length so that it has sliding contact with the cylinder 1 only at the ends 5, and has an intermediate expansion space to prevent loss of pressure around the pis-

ton. As the piston 2 is forced toward one end of the cylinder 1, it acquires momentum and strikes the head 6 of the tool 3 with the required force to cut off rivet heads, and its movement toward the opposite end of the cylinder is cushioned and arrested by a spring 7.

The tool holder comprises a bushing 8 screwed onto the end of the cylinder 1; a nipple 9 which is screwed onto the end of said bushing, and a sleeve 10. The sleeve 10 is secured in place on the bushing 8 by means of a flange 11 clamped between the abutting shoulders of the bushing 8 and nipple 9, and extends a short distance into the end of the cylinder 1. The tool 3 is slidingly mounted in the sleeve 10 and is normally urged by a spring 12 into a retracted position. The spring 12 is seated in a recess 13 formed in the nipple 9 and bears between the end of said nipple and an annular shoulder 14 on the tool.

The fluid pressure regulating means comprises a valve 15 and a valve 16 shiftably mounted in a fluid pressure chamber 17, formed in the head 4. The valves are connected together so as to be actuated by a lever 18 for controlling communication from the fluid pressure chamber 17 through the ports 19 and 20.

The head which carries the fluid pressure regulating mechanism is in the form of a cylindrical member having a partition 21 located between the ends thereof. The part at one side of the partition is provided with threads 22 by means of which the head is secured to the cylinder 1. The other side of the partition constitutes the fluid pressure chamber 17, the end of which is closed by a plate 23 secured thereto.

The port 19 is formed in a bushing 24 secured in the partition 21 and provided with a seat 25 with which the valve 15 coacts for closing communication between the fluid pressure chamber 17 and the cylinder 1. The port 20 is formed in the plate 23 in axial alinement with the port 19 and likewise is provided with a seat 26 with which the valve 16 coacts for closing communication between the fluid pressure chamber 17 and the other end of the cylinder 1, with which said port is connected by the pipe 27. It will be noted that the port 20 is considerably smaller than the port 19, the purpose of which is to reduce the volume of fluid

used to return the piston 2, which obviously is considerably less than that which is required to give the piston the desired momentum when it is driven to strike the tool. Fluid under pressure is admitted to the chamber 17 through a radially disposed inlet port 28 which is located intermediate the ports 19 and 20.

The valves 15 and 16 are rigidly secured together in axial alinement upon a member 29 which is slidably mounted in the fluid pressure chamber 17. The member 29 is disk-shaped and has wings 30 formed thereon which space it away from the periphery of the chamber 17 so as to permit the passage of fluid around the same to the port 20. A spring 31 bearing between the plate 23 and the member 29 normally urges the member 29 so as to seat the valve 15 and unseat the valve 16.

The valve-shifting mechanism by which the action of the valves 15 and 16 is controlled, comprises an arbor 32 journaled on the head 4 and carrying on its outer end the lever 18 and on its inner end a cam 33. The cam 33 is of the shape more clearly shown in Fig. 3, and is adapted to shift the member 29 against the action of the spring 31 when the lever 18 is turned to one position, and to permit the opposite shifting of the member 29 under the action of the spring 31 when the lever is swung in the reverse direction.

In order to more readily facilitate the return of the piston 2, an exhaust opening 34 is radially arranged in the head 4 to communicate with the interior of the cylinder 1. A fitting 35 is secured to the head to connect with said exhaust opening and is provided with a port 36. A seat 37 is formed on the fitting 35 so as to coact with a valve 38 shiftably mounted on the fitting 35 for controlling the exhaust from said cylinder through the port 36. The stem 39 of the valve 38 is connected to a member 40 provided at its upper end with a slot 41 by which the member embraces the arbor 32 and is slidably supported thereon. A shoulder 42 is formed on the member 40 and is adapted to coact with a cam or roller 43 on the lever 18 for causing the member 40 to shift the valve 38 against the action of the spring 44 when the lever 18 is turned. The arrangement of the shoulder 42 and the cam 43 is such that the valve 38 under the action of the spring 44 is normally seated when the valve 15 is open, and vice versa, when the valve 15 is seated and the valve 16 is retracted, the valve 38 is retracted.

This device is adapted for use with any kind of tool where it is desired to obtain intermittent blows, each of which is to be under the manual control of the operator, but is particularly designed for cutting rivets. Also, the device may be operated

by any fluid pressure, but is more particularly intended to be operated by compressed air.

The operation of the device herein shown is substantially as follows:

When it is desired to have the piston 2 strike a blow upon the tool 3, the lever 18 is turned to a position substantially as shown in Fig. 1. Such turning of the lever 18 causes the cam 33 to retract the member 29 against the action of the spring 31 and to seat the valve 16 to close the port 20 and unseat the valve 15 to open the port 19. Fluid is thereupon permitted to pass from the chamber 17 through the port 19 and cause the piston 2 to move toward the tool 3, striking it upon the head 6. After the blow has been struck, the operator shifts the lever 18 backwardly (to the right downwardly, with regard to Fig. 1), whereupon the cam 33 is retracted so as to allow the spring 31 to shift the member 29 and unseat the valve 16 so as to open the port 20 and seat the valve 15 for the purpose of closing the port 19. As soon as the lever 90 has moved far enough to nearly seat the valve 15, the cam 43 acting on the shoulder 42 shifts the member 40 and unseats the valve 38. With the parts in this position, fluid is allowed to pass from the chamber 17 through the port 20 and the pipe 27, into the cylinder 1 at the lower end thereof. Thereupon the piston 2 is forced upwardly and the fluid in advance thereof is exhausted through the ports 34 and 36. When it is desired to strike the tool another blow, the lever 18 is shifted so as to again seat the valve 16 and unseat the valve 15, whereupon the action previously described is repeated.

Although but one specific embodiment of this invention has been herein shown and described, it will be understood that numerous details of the construction shown may be altered or omitted without departing from the spirit of this invention as defined by the following claims.

I claim:

1. In a tool of the class described, the combination of a cylinder, a piston reciprocatingly mounted therein, a tool supported at one end of said cylinder, a valve head providing a fluid pressure chamber having ports communicating with respectively opposite ends of said cylinder, a valve for each of said ports, means rigidly connecting said valves, an arbor journaled on said head, a cam secured to said arbor and engaging said means, and a lever connected to said arbor for rotating the same so as to cause said cam to shift said means whereby said valves are simultaneously actuated for alternately opening communication from said chamber through said ports to opposite sides of said piston.

2. In a tool of the class described, the

combination of a cylinder, a piston reciprocatingly mounted therein, a tool supported at one end of said cylinder, a valve head secured to the other end of said cylinder and having a fluid pressure chamber formed therein, said head having a radially disposed inlet for admitting fluid under pressure to said chamber and having axially disposed ports located on opposite sides of said inlet, a member shiftably mounted in said chamber, valves secured to opposite sides of said member and adapted to seat respectively in said ports, an arbor journaled on said head, a cam secured to said arbor and adapted to engage said member for shifting the same, and a lever connected to said arbor for rotating the same so as to cause the shifting of said member whereby said valves are simultaneously actuated so as to alternately open communication from said chamber through said ports to opposite sides of said piston.

3. In a tool of the class described, the combination of a cylinder, a piston reciprocatingly mounted therein, a tool supported at one end of said cylinder, a valve head providing a fluid pressure chamber having ports communicating with respectively opposite ends of said cylinder, valve mechanism controlling said ports, a lever connected to said valve mechanism for shifting the same so as to alternately open communication from said chamber through said ports to opposite sides of said piston, said cylinder having an exhaust port arranged adjacent to and communicating with one end thereof, a valve for controlling said exhaust port, a member shiftably mounted adjacent to said lever and connected to said exhaust valve, a shoulder on said member, and a cam on said lever adapted to engage said shoulder for causing said member to shift said exhaust valve simultaneously with the shifting of said other valves.

4. In a tool of the class described, the combination of a cylinder, a piston reciprocatingly mounted therein, a tool supported at one end of said cylinder, a valve head providing a fluid pressure chamber having ports communicating with respectively opposite ends of said cylinder, valve mechanism controlling said ports, a lever connected to said valve mechanism for shifting the same so as to alternately open communication from said chamber through said ports to opposite sides of said piston, said cylinder having an exhaust port arranged adjacent to and communicating with one end thereof, a valve for controlling said exhaust port, a member shiftably mounted adjacent to said lever and connected to said exhaust valve, a shoulder on said member, and a cam on said lever adapted to engage said shoulder for causing said member to shift said exhaust valve simultaneously with the shifting of said other valves.

5. In a tool of the class described, the combination of a cylinder, a piston reciprocatingly mounted therein, a tool supported at one end of said cylinder, a valve head providing a fluid pressure chamber having ports communicating with respectively opposite ends of said cylinder, valve mechanism controlling said ports, a lever connected to said valve mechanism for shifting the same so as to alternately open communication from said chamber through said ports to opposite sides of said piston, said cylinder having an exhaust port arranged adjacent to and communicating with one end thereof, a valve for controlling said exhaust port, a slotted member embracing said arbor and shiftably mounted thereon and connected to said exhaust valve, a shoulder on said member, and a cam on said lever adapted to engage said shoulder for causing said member to shift said exhaust valve simultaneously with the shifting of said other valves.

5. In a tool of the class described, the combination of a cylinder, a piston reciprocatingly mounted therein, a tool supported at one end of said cylinder, a valve head providing a fluid pressure chamber having ports communicating with respectively opposite ends of said cylinder, a valve controlling each of said ports, a member shiftably mounted in said chamber and rigidly connecting said valves, and a spring normally urging said member to cause one of said valves to close its respective port and the other valve to open its respective port, an arbor journaled on said head, a cam connected to said arbor and engaging said member, and a lever connected to said arbor for rotating the same so as to cause said cam to shift said member whereby said one valve is retracted to open its respective port and the other valve is shifted to close its respective port.

Signed at Whiting, Indiana, this 29th day 90 of April, 1919.

HARRY R. NEWBERT.