G. H. GILMAN.

FLUID PRESSURE ACTUATED IMPACT TOOL.

APPLICATION FILED MAY 28, 1907.

974,375. Patented Nov. 1, 1910.

2 SHEETS—SHEET 1.

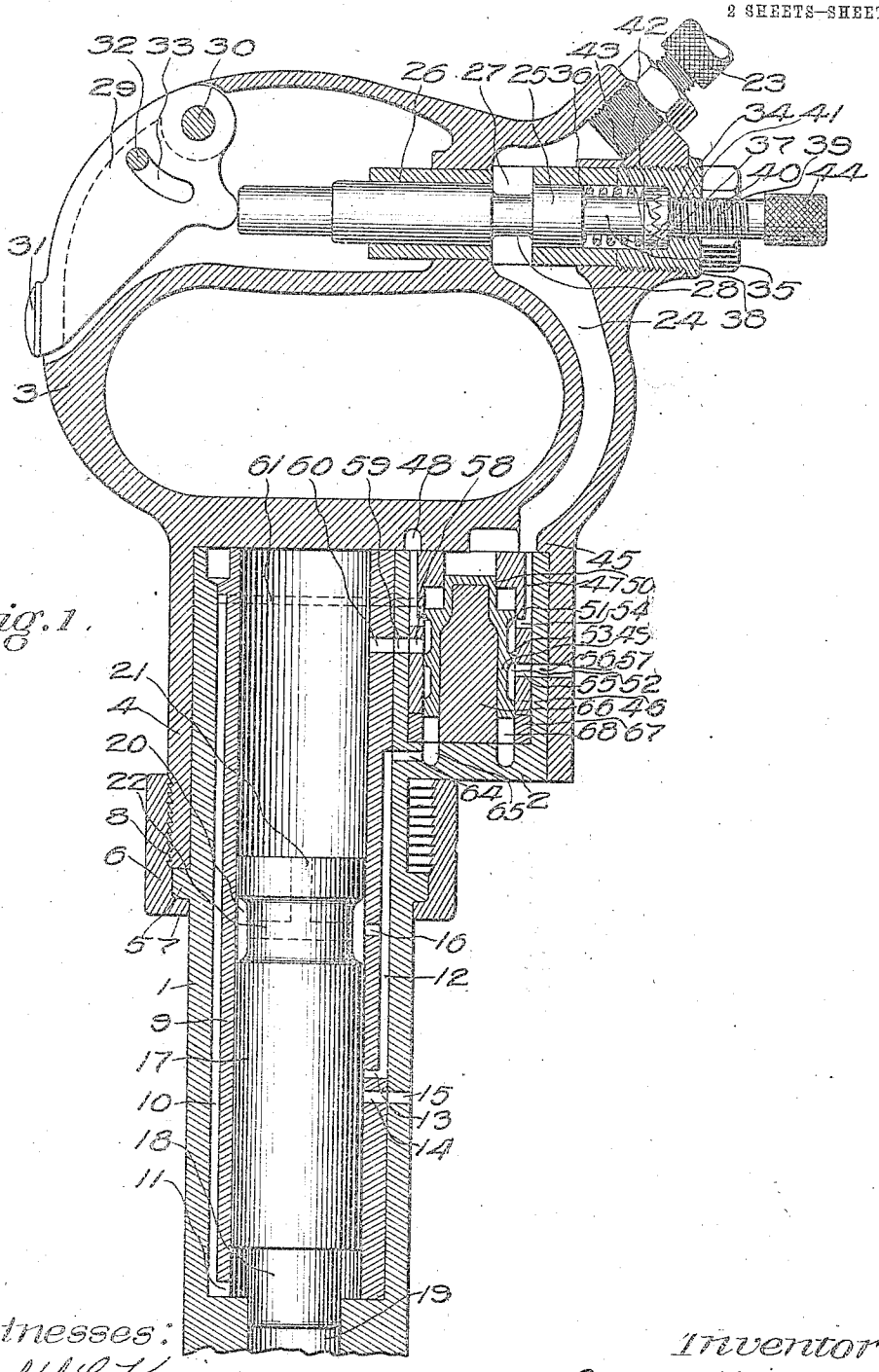

Fig. 1.

Witnesses:
Adolph C. Kaiser.
Robert H. Hammler.

Inventor:
George H. Gilman
By Emery and Booth.
Att'ys.

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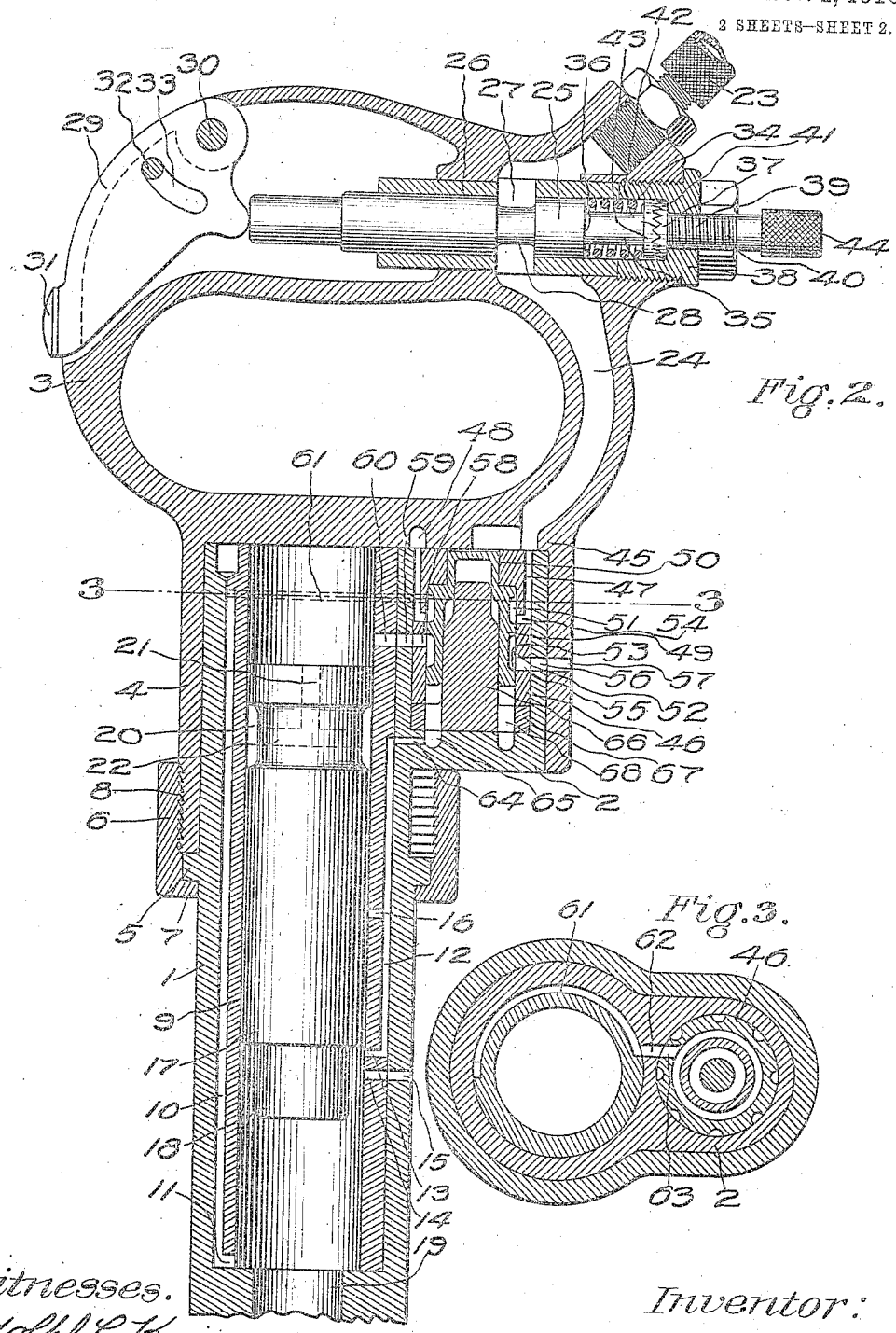

Fig. 2.

Fig. 3.

Witnesses.
Adolph C. Kaiser.
Robert H. Kammler.

Inventor:
George H. Gilman
by Emery and Booth.
Att'ys.

UNITED STATES PATENT OFFICE.

GEORGE H. GILMAN, OF CLAREMONT, NEW HAMPSHIRE, ASSIGNOR TO SULLIVAN MACHINERY COMPANY, OF CLAREMONT, NEW HAMPSHIRE, A CORPORATION OF MAINE.

FLUID-PRESSURE-ACTUATED IMPACT-TOOL.

974,375. Specification of Letters Patent. Patented Nov. 1, 1910.

Application filed May 28, 1907. Serial No. 376,060.

To all whom it may concern:

Be it known that I, GEORGE H. GILMAN, a citizen of the United States, residing at Claremont, in the county of Sullivan, State of New Hampshire, have invented an Improvement in Fluid-Pressure-Actuated Impact-Tools, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to fluid pressure actuated impact tools of any suitable type, a quarrying tool specifically intended for use as a chipping hammer being represented in the present embodiment of the invention. It is, however, apparent that the invention may be employed in various relations. In order that the principles thereof may be fully apparent, reference is made to the single type or embodiment thereof shown in the accompanying drawings, wherein—

Figure 1 is a vertical, longitudinal section of a chipping hammer with the piston thereof represented as in its forward or impact position; Fig. 2 is a similar view representing the piston as at or near the opposite end of its stroke; Fig. 3 is a transverse section upon the line 3—3 of Fig. 2.

Referring specifically to that single type or embodiment of the invention here shown, the casing, wherein the tool operating parts are mounted, is represented at 1, it being of generally cylindrical formation, but at the handle end thereof having a lateral enlargement or offset 2.

The tool handle is represented at 3, it having a hub like portion 4 adapted to be sleeved upon the casing 1, and preferably to contact with a shoulder 5 upon the latter. Herein an interiorly screw threaded collar 6 having an inturned flange 7 to engage the shoulder 5, engages a threaded portion 8 upon the hub 4, thereby to secure the handle and the casing in operative relation. Preferably and as indicated in Figs. 1 and 2, the screw threaded portion 8 extends but partially around the hub 4, the upper end of the collar 6 engaging when the parts are positioned the base of the lateral extension 2 of the casing 1.

While the casing 1 may be provided with suitable pressure passages, preferably I position in said casing a cylinder 9 having upon its periphery a pressure passage 10 leading from near the handle end of the cylinder to the lower end thereof and there communicating, as at 11, with the interior of the cylinder. Also peripherally formed upon the cylinder is a pressure passage 12, herein shown as oppositely disposed with respect to the passage 10 and communicating with the interior of the cylinder at a point between the ends thereof, as indicated at 13. The cylinder 9 is provided with a relief passage 14 registering with a similar passage 15 in the casing 1, a passage 16 being provided in the cylinder and placing the interior thereof in communication with the pressure passage 12 intermediate the ends of the latter.

Within the cylinder 9 is mounted for reciprocation a piston 17 with a preferably reduced portion 18 whereof a tool or tools may if desired be operatively connected, the casing 1 being preferably of reduced diameter at its lower end to receive such reduced end of the piston as indicated at 19. Preferably the upper portion of the piston is annularly recessed, as indicated at 20, and is provided with a passage 21 indicated in dotted lines, such passage communicating at its upper end with the space between the piston and the hear end of the cylinder 9 and at its opposite end with a transverse passage 22 indicated in dotted lines and communicating at opposite ends with the annular recess 20.

Any suitable means may be provided to supply fluid under pressure to the operating parts of the tool. Herein is indicated a supply pipe 23, by which fluid is conveyed to a passage 24 in the handle 3. Any suitable throttle or other valve may be employed to control the supply of fluid through the passage 24. Herein for the purpose is indicated a throttle valve 25 mounted in a cylindrical bushing 26 having a transverse opening 27 therein, with which the reduced portion 28 of the valve may be placed in register, as indicated in Figs. 1 and 2. Any suitable means may be employed to reciprocate the throttle valve. Herein for the purpose is indicated a lever 29 pivoted at 30 in the handle and provided with a portion 31 adapted to be engaged by the hand of the operator, whereby upon inward movement of the lever 29 the valve may be moved to the position indicated. Preferably a pin 32 is provided upon the handle to engage a suitable slot 33 in the lever 29 to limit

the movement of the latter. Preferably a coil spring 34 is provided tending normally to return the throttle valve to closed position, such spring being positioned about the inner end of an adjustable abutment 35 and engaging at one end the end 36 of the throttle valve and at its opposite end engaging a washer 37 tightly engaging the inner surface of a recessed portion of a sleeve or bushing 38, herein shown as screw threaded into the handle 3 and provided with an axially disposed screw threaded opening 39 to receive the screw threaded portion 40 of the adjustable abutment 35, the latter being also provided with a preferably integral annular enlargement 41, herein shown as having teeth 42 engaging similar teeth upon the washer 43. The outer end of the adjustable abutment may be provided with a knurled handle portion 44 to permit convenient operation thereof. By rotation of the adjustable abutment 35, the longitudinal position thereof may be adjusted and the inner end positioned as desired to limit the opening movement of the throttle valve, the spring 34 being compressed to any desired extent by such rotative movement of the adjustable abutment. In order to afford a means whereby the extent of inward movement of the adjustable abutment and the compression of the spring may be accurately ascertained, the toothed washer 37 and toothed enlargement 41 upon the adjustable abutment are provided. The washer may partake of the longitudinal movement of the adjustable abutment, but is prevented from rotative movement by its tight frictional engagement with the inner face of the sleeve or bushing 38. With this construction of parts, upon rotative movement of the abutment, the workman may, by counting the clicks made by the rotative movement of the teeth of the abutment past the teeth of the washer, determine the position of longitudinal adjustment of the abutment. Moreover, the interengaging teeth maintain the abutment in its adjusted position.

The upper portion of the lateral extension 2, viewing Figs. 1 and 2, is adapted when positioned to engage with an inwardly projecting shoulder 45 at the upper end of the hub like portion 4 of the handle. Such lateral extension 2, as most clearly indicated in Fig. 3, is provided with a cylindrically shaped recess disposed in parallelism with the cylinder 9 to receive therein a valve block 46 having a series of longitudinally disposed peripheral pressure passages 47 therein communicating at their upper end with the lower end of the pressure supply passage 24 in the handle, such passage 24 for this purpose being provided with an annular extension 48. The valve block is axially recessed to receive therein a valve 49, herein shown as hollow and having an end 50 of reduced diameter mounted in a correspondingly reduced portion of the axial opening of the valve block, such valve being at its upper end exposed to constant pressure through the pressure supply passage 24 in the handle. The valve 49 is, in this type of the invention, provided with two annular recesses 51 and 52 separated by a shoulder 53. The longitudinal peripheral passages 47 in the valve block at their lower ends communicate, as indicated at 54, with the annular recess 51 in the valve. The valve block 46 is provided with a relief opening 55 registering with a similar opening 56 in the lateral extension 2 and opening 57 in the hub portion 4 of the handle. The said valve casing is also provided with an opening 58 adapted to register with an opening 59 in the casing 1, and an opening 60 in the upper portion of the cylinder 9, whereby fluid pressure may be supplied to the upper or head end of the piston 17. As indicated in dotted lines in Figs. 1 and 2 and in full lines in Fig. 3, the cylinder 9 is provided with a substantially semi-annular pressure passage 61 near its upper end and communicating at one end with the upper end of the pressure supply passage 10 and at its other end with a short transverse passage 62 (see Fig. 3) in the casing 1, whereby the passage 61 is placed in communication with an opening 63 in the valve casing 46. The pressure passage 12 peripherally formed upon the cylinder 9 communicates at its upper end with a short transverse passage 64 formed in the base of the lateral extension 2 and communicating with an annular passage 65. Preferably positioned within the hollow valve 46 is a plug 66 shaped to conform to the inner surface of such valve and having a base 67 adapted to be received upon the lateral extension 2 and to receive upon its upper face the valve block 46. The base 67 of the block is provided with a suitable number of longitudinally disposed passages 68, whereby the lower annular end of the valve 49 is exposed to pressure through the passages 12 and 64.

When the lever 29 is operated to force the throttle valve into the position indicated in Figs. 1 and 2, fluid under pressure is supplied through the passage 24 and impinging upon the upper end 50 of the valve 49 forces the same downwardly or into the position indicated in Fig. 1. In such position of the parts, pressure is supplied through the longitudinal peripheral openings 47 of the valve block to the annular recess 51, which, in the described position of the valve, is in register with the openings 58, 59 and 60, whereby pressure is supplied to the head end of the piston 17, thereby forcing the same downwardly or into the position indicated in Fig. 1, thereby imparting a working stroke to the tool. As the piston moves downwardly upon its working

stroke, the annular recessed portion 20 thereof comes in register with the opening 16 in the wall of the cylinder 9, whereby through the passages 21 and 22, pressure passes from the head end of the piston through the passage 12 and thence by the transverse passage 64 in the base of the extension 2 to the lower annular end of the valve 49, thus lifting the same to the position indicated in Fig. 2. When the valve 49 is lifted to the position shown in Fig. 2, pressure is also permitted to escape from the space above the head end of the cylinder through the openings 60, 59 and 58, thence about the annular passage 52 and through the relief openings 55, 56, and 57 to the atmosphere. With the valve 49 in the position shown in Fig. 2, pressure then passes by the longitudinal peripheral passages 47 to the annular recess 51 of the valve 49 and from thence through the opening 63, the passage 62 and the semi-annular passage 61 to the longitudinal passage 10, whereby fluid pressure is supplied to the lower end of the piston, and thereby acts to elevate the same to the position indicated in Fig. 2. As the piston is so elevated, the relief openings 14 and 15 are exposed so that the fluid under pressure beneath the piston may escape to the atmosphere, and upon further upward movement of the piston the opening 13 at the lower end of the passage 12 is exposed so that the fluid under pressure that has maintained the valve 49 elevated as shown in Fig. 2, may escape through the relief openings 14 and 15, thus permitting the valve to be moved downwardly by pressure impinging upon the constant pressure end 50 thereof into the position indicated in Fig. 1, whereupon the cycle of operation described will be repeated.

Having thus described one type or embodiment of my invention, I desire it to be understood that although specific terms are employed, they are used in a generic and descriptive sense and not for purposes of limitation, the scope of the invention being set forth in the following claims.

1. A fluid-pressure actuated impact tool having a handle portion and a cylinder portion, the latter provided with an enlarged offset portion having a valve chamber, a valve mounted for movement in said valve chamber, said handle portion embracing the end of said cylinder portion and extending down below the offset portion thereof, and suitable clamping means for positively clamping the handle portion to the cylinder portion below the said offset portion.

2. A fluid-pressure actuated impact tool having a handle portion and a cylinder portion, the latter provided with an enlarged offset portion, a valve block in said offset portion, a valve adapted to seat therein, means to supply pressure to said valve, passages adapted to place latter in communication with the cylinder, said handle portion embracing the cylinder and the offset portion thereof and extending below the latter, and clamping means for securing the handle portion to the cylinder below said offset portion.

3. A fluid-pressure actuated impact tool having a handle portion and a cylinder portion, the latter provided with an enlarged offset portion having a valve chamber, said handle portion forming an end closure for the cylinder and the valve chamber and extending to the cylinder below the offset portion thereof, and clamping means thereat to clamp the handle portion to the cylinder portion.

4. A fluid-pressure actuated impact tool having a cylinder, a valve chamber contained in an enlarged offset portion of the cylinder, a valve in said valve chamber, a handle portion, a shoulder on said cylinder below said offset portion and a threaded collar adapted to clamp said handle portion to said cylinder by engagement with said shoulder and said handle portion.

5. A fluid pressure actuated impact tool comprising a casing 1, a handle 3 having a hub portion 4, said casing being provided with a lateral enlargement 2 and the hub portion provided with a corresponding enlarged portion, a plug 66 mounted in said enlarged portion 2, a hollow valve 49 closed at one end and having annular passages 51 and 52, means to supply fluid pressure to said valve, and fluid passages connecting said annular passages of said valve with opposite ends of the casing 1.

6. A fluid pressure actuated impact tool comprising a casing having a cylinder therein, a piston mounted for reciprocation in said cylinder, said casing having a lateral enlargement 2, a handle provided with a hub like portion 4 laterally enlarged to receive the enlargement 2, a valve block mounted in said enlargement 2, a hollow differential valve mounted in said valve block and having a closed end exposed to constant pressure, a plurality of annular grooves being provided upon said valve, one of said grooves being adapted alternately to supply pressure to opposite ends of said piston through said valve block, and the other of said grooves being adapted to permit the escape of pressure from one end of said piston.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

GEORGE H. GILMAN.

Witnesses:
H. C. BERKEY,
WM. MICHAEL.