W. PRELLWITZ.

FLUID PRESSURE OPERATED TOOL.

APPLICATION FILED APR. 8, 1909.

1,069,289.

Patented Aug. 5, 1913.

2 SHEETS—SHEET 1.

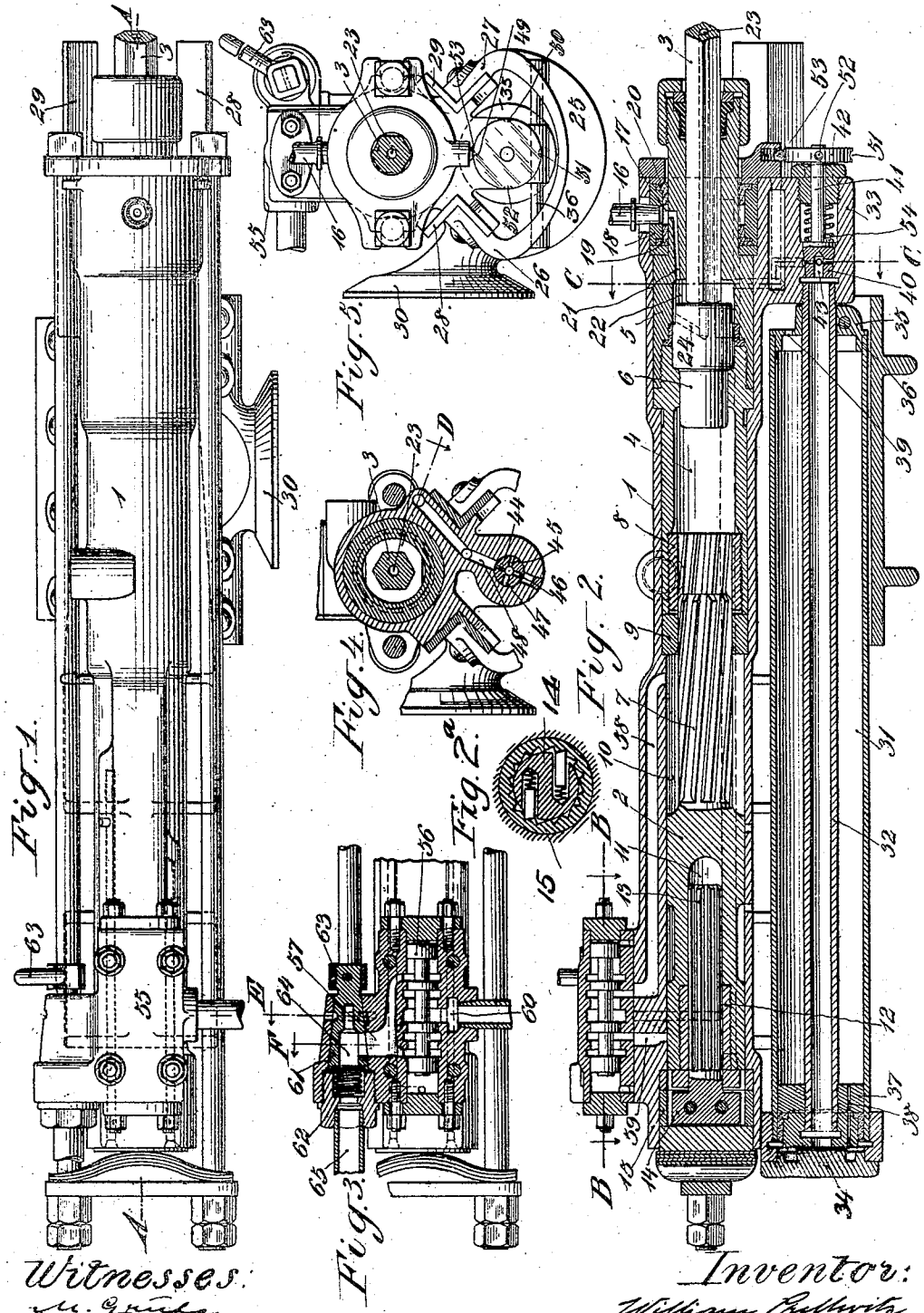

Fig. 1.

Fig. 5.

Fig. 4.

Fig. 2.

Fig. 2a.

Fig. 3.

Witnesses:

H. George Bauer

Inventor:

William Prellwitz

by his attorneys

Brown & Seward

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2 SHEETS—SHEET 2.

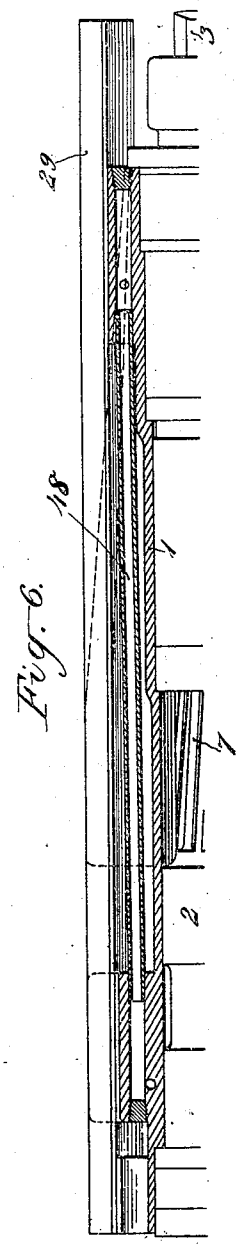

Fig. 6.

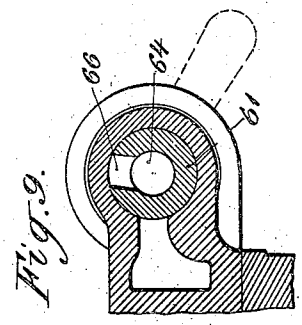

Fig. 9.

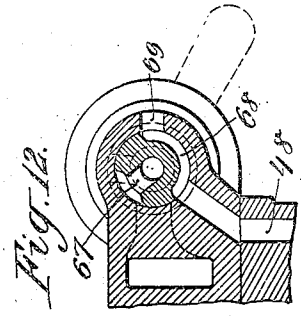

Fig. 12.

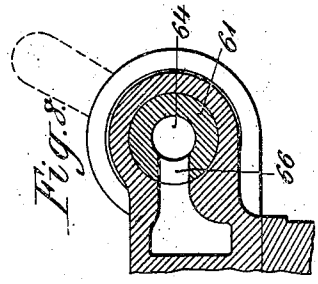

Fig. 8.

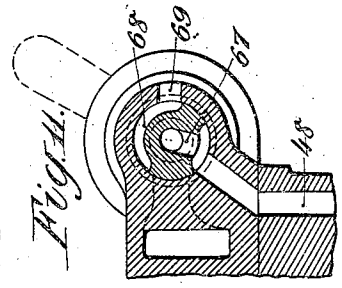

Fig. 11.

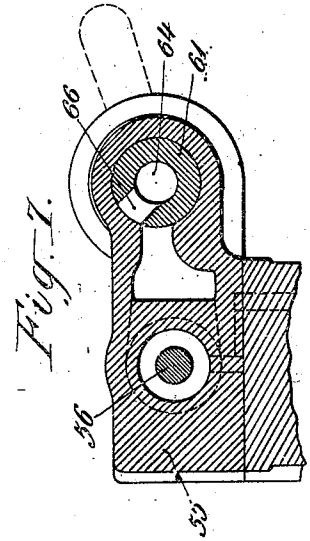

Fig. 7.

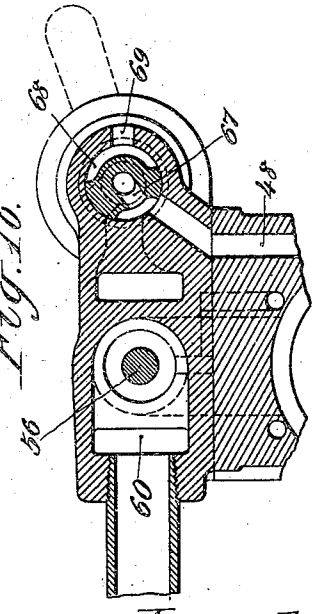

Fig. 10.

Witnesses

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UNITED STATES PATENT OFFICE.

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FLUID-PRESSURE-OPERATED TOOL.

1,069,289. Specification of Letters Patent. Patented Aug. 5, 1913.

Application filed April 8, 1909. Serial No. 488,720.

To all whom it may concern:

Be it known that I, WILLIAM PRELLWITZ, a citizen of the United States, and resident of Easton, in the county of Northampton and State of Pennsylvania, have invented a new and useful Improvement in Fluid-Pressure-Operated Tools, of which the following is a specification.

My invention relates to fluid pressure operated tools, such as hammer drills, having a fluid pressure operated feeding device, and has for its object to provide certain improvements in the construction, form and arrangement of the several parts thereof, whereby means are provided for regulating or governing the amount of fluid pressure in the feeding device so that the degree of power exerted by the tool feeding device may be adjusted for different inclinations of the tool; and in which the tool feeding device is located along the side of the tool thereby making the tool much shorter and more compact than heretofore.

A practical embodiment of this invention is shown in connection with a pneumatic hammer drill having a water feed attachment and an automatic rotation for the drill steel, and a pneumatic feed for the drill.

Figure 1 represents in top plan so much of a pneumatic hammer drill as will give a clear understanding of my invention, Fig. 2 is a longitudinal central section through the same in the plane of the line A—A of Fig. 1, Fig. 2ª is a detail section through the automatic rotation device. Fig. 3 is a detail section taken in the plane of the line B—B of Fig. 2, Fig. 4 is a transverse section taken in the plane of the line C—C of Fig. 2, Fig. 5 is an outer end view of the drill, the drill steel being shown in section, Fig. 6 is a detail longitudinal section taken in the plane of the line D of Fig. 4, Figs. 7, 8 and 9 are enlarged detail cross sections taken in the plane of the line E of Fig. 3, showing one of the manually operated controlling valves in three of its operative positions, and Figs. 10, 11 and 12 are enlarged detail cross sections through said manually operated controlling valve taken in the plane of the line F of Fig. 3, showing the valve in its three positions corresponding to Figs. 7, 8 and 9.

The hammer drill cylinder is denoted by 1 and its reciprocating piston by 2. The chuck for the hollow drill steel 3 comprises an inner member 4 and an outer member 5 both mounted within the cylinder 1. An anvil block 6 is located within the chuck at the rear end of the drill steel 3 in position to be struck by the hammer extension 7 of the piston 2.

An automatic step by step rotation is imparted to the drill steel by the reciprocation of the piston 2, as follows:—A nut 8 is screwed into the inner end of the inner member 4 of the chuck, which nut has a spirally fluted bore for engaging the spirally fluted hammer extension 7 of the piston 2. This extension 7 slides freely through a ring 9, which forms the front head of the piston chamber 10. The rear end of the piston 2 is provided with an axial bore 11 into which is screwed a nut 12 having a straight fluted bore arranged to engage a straight fluted bar 13 which projects forwardly from the inner member 14 of a rotating mechanism, the outer member of which is denoted by 15 and between which members is the usual pawl and ratchet connection.

A device for feeding fluid under pressure, as, for instance water, to the hollow drill steel is provided at the front end of the cylinder 1, which device is separate from the device for supplying the motive fluid to the tool and may be constructed as follows:—A water supply pipe 16 is in open communication through the side wall of the cylinder 1 with an annular water supply chamber 17 surrounding the outer member 5 of the chuck, which chamber is formed by providing a ring 18 located within the outer end of the cylinder 1 and spaced from the outer member 5 of the chuck. Washers 19 and 20 form water tight packings for the chamber between the ring 18 and the chuck member 5. A duct 21 leads from the annular chamber 17 to the space 22 around the inner end of the hollow drill steel 3. The bore 23 of the hollow drill steel is at all times in open communication with the space 22 and to insure this open communication, a port 24 may be formed in the head of the anvil block 6, one branch of which port is in alinement with the bore 23 of the drill steel and another branch of which port opens into the space 22. The cylinder is fitted to be moved along its supporting shell 25 as, for instance, by providing the arms 26, 27, of the shell with angle bars 28, 29, fitted

to portions of the cylinder 1 in which reentrant angles are formed. This shell 25 may have a cone 30 for pivoting the tool to any suitable support.

The device for feeding the tool forward to its work is constructed and arranged as follows: The feed cylinder 31 is located at the side of and in juxtaposition to the tool cylinder 1 and the hollow rod 32 of the feed piston has its forward end secured to an offset portion 33 at the outer end of the cylinder 1. The rear head of the cylinder 31 is denoted by 34 and the front head thereof, which forms a dust and dirt excluding cap, by 35. A cross pin 36 passes through the supporting shell 25 and the front head 35 of the cylinder 31 for holding the cylinder against longitudinal movement with respect to the supporting shell.

One means for regulating or governing the amount of fluid pressure in the feed cylinder according to the position or inclination of the hole being drilled, may be constructed, arranged and operated as follows:—The head 37 of the feed piston is provided with a hole 38 formed lengthwise therethrough so as to provide a fixed leak of a predetermined amount from the power side of the piston head to the other side thereof. The space in front of the piston head 37 is open to external atmosphere as, for instance, through a hole 39 in the cylinder front head or cap 35 so that the fluid which leaks through the hole 38 in the piston head escapes from the space in front of the head to external atmosphere. A manually operated valve is arranged in the offset portion 33 at the outer end of the cylinder 1 in position to control the amount of fluid pressure fed to the rear or power side of the piston head 37 through the hollow piston rod 32. This valve is herein shown as of the rotary plug type, the body of the valve being denoted by 40, its stem by 41 and its handle by 42. The valve body 40 is provided with an axial port 43, open to the interior of the hollow piston rod 32 and with a plurality of transverse ports, in the present instance four ports 44, 45, 46, 47, of gradually increasing area, any desired one of which is arranged to be brought into open communication with the passage 48 through which the pressure fluid is fed to the tool feeding device. This manually operated valve is yieldingly held in its different rotary positions as, for instance, by providing the periphery of the handle 42 with a series of recesses 49, 50, 51, 52, corresponding to the transverse ports 44, 45, 46, 47, any one of which recesses is arranged to be engaged by a spring pressed ball 53. A spring 54 surrounding the valve stem 41 serves to hold the body 40 of the valve in its seat.

The cylinder valve chest is denoted by 55, and the usual reciprocating valve 56, serves to open the fluid supply port 57 either to the front cylinder port 58 or the back cylinder port 59 and either the back cylinder port 59 or the front cylinder port 58 to the common exhaust port 60. This valve chest 55 is still further provided with a manually operated fluid supply controlling valve arranged to open and close the admission of the pressure fluid to the tool through the inlet port 57 and to open and close communication to the tool feeding device controlling valve as follows:—The tapered body of the valve is denoted by 61 and it is held in its seat by a coil spring 62. The smaller end of this valve is provided with a handle 63. The body 61 of this valve is provided with an axial port 64 in open communication with the fluid supply pipe 65. This axial port 64 is provided in one transverse plane with a transverse port 66 for opening and closing communication to the inlet port 57 and it is provided in another transverse plane with a transverse port 67 arranged to open and close communication to the passage 48 which leads to the face of the tool feeding device controlling valve. This valve body 61 is further provided with a circumferentially arranged bridge port 68 arranged in the plane of the transverse port 67 and fitted to open and close communication between the passage 48 and external atmosphere through a port 69.

In operation, when the manually operated fluid supply controlling valve is in the position shown in Figs. 7 and 10, the pressure fluid is open to the tool feeding device but closed to the tool. When the valve is in the position shown in Figs. 8 and 11, the fluid supply is still open to the tool feeding device and is also open to the tool for permitting the operation of the same. When the valve is in the position shown in Figs. 9 and 12, the fluid supply is cut off from both the tool feeding device and the tool; the tool feeding device at the same time being open to external atmosphere.

The reason for the fixed leak through the tool feeding piston and for the varying sizes of ports in the tool feeding device, is as follows:—When the tool is being used with its steel pointed downwardly in a substantially vertical position, only sufficient pressure is needed in the feed cylinder for working the tool in that position. Therefore, when the parts are in this position, the smallest port in the tool feeding device controlling valve would be used, the leak through the head of the tool feeding piston being smaller than the smallest port in said valve so that there would be sufficient pressure in the feed cylinder to compensate for the rebound of the tool. When the tool is to be used with its steel pointed upwardly in a substantially vertical position, it will be

seen that a sufficient amount of the pressure fluid must be fed to the feeding device to overcome the weight of the tool cylinder and its parts. This may be accomplished by turning the tool feeding device controlling valve into a position to open its largest port to the back of the tool feeding piston. The right amount of fluid to be fed for feeding the tool steel to its work in different angular positions between the downward vertical and upward vertical limits, can be taken care of with the intermediate sizes of ports in the tool feeding device controlling valve.

It will be seen that not only is the tool made much more compact by mounting the feeding device therefor along the side of the tool cylinder but also novel means are provided for regulating the amount of the pressure in the tool feeding cylinder according to the angular position of the tool with respect to its support.

While I have shown one means for regulating or governing the pressure in the feeding cylinder according to the conditions required, it is evident that other means might be employed for accomplishing the same result; hence I do not wish to limit myself to the means herein shown and described, but

What I claim is:—

1. A fluid pressure operated tool, a fluid pressure operated tool feeding device having a fixed leak and means for controlling the amount of pressure fluid fed to the feeding device.

2. A fluid pressure operated tool, a fluid pressure operated tool feeding device having a fixed leak, means adapted to admit pressure fluid to the tool and there maintain the supply and means for varying the amount of pressure fluid fed to the feeding device.

3. A fluid pressure operated tool, a fluid pressure operated tool feeding device, a manually operated valve for controlling the supply of pressure fluid to the feeding device, a second manually operated valve for controlling the supply of pressure fluid both to the tool and to the first-named valve, said feeding device having a fixed leak.

4. A fluid pressure operated tool, a fluid pressure operated feeding device therefor having a fixed leak and a manually operated valve having ports of different sizes for controlling the amount of pressure fluid fed to the feeding device.

In testimony, that I claim the foregoing as my invention, I have signed my name in presence of two witnesses, this seventh day of April 1909.

WILLIAM PRELLWITZ.

Witnesses:
F. GEORGE BARRY,
HENRY THIEME.