W. PRELLWITZ.

FLUID PRESSURE OPERATED TOOL.

APPLICATION FILED APR. 29, 1909.

978,484.

Patented Dec. 13, 1910.

2 SHEETS—SHEET 1.

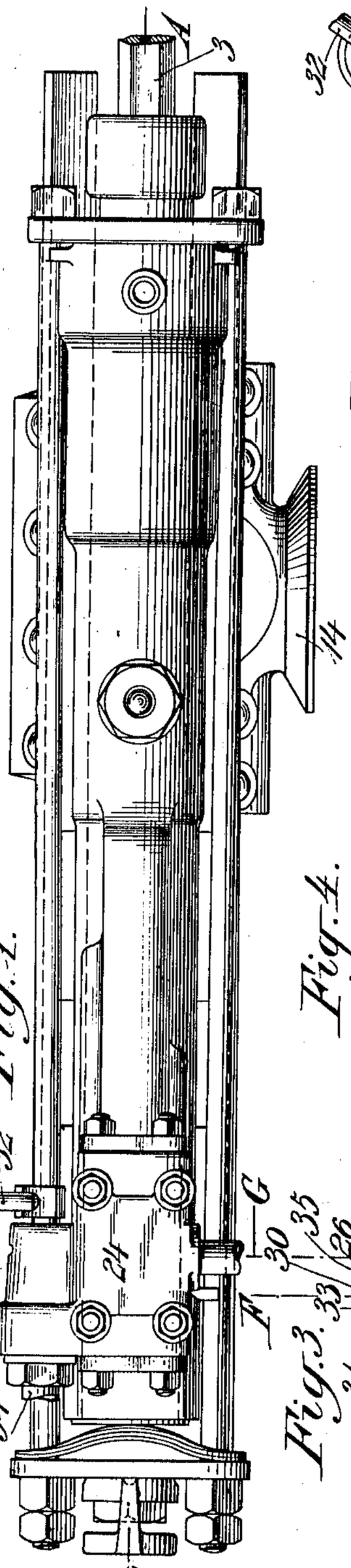

Fig. 1.

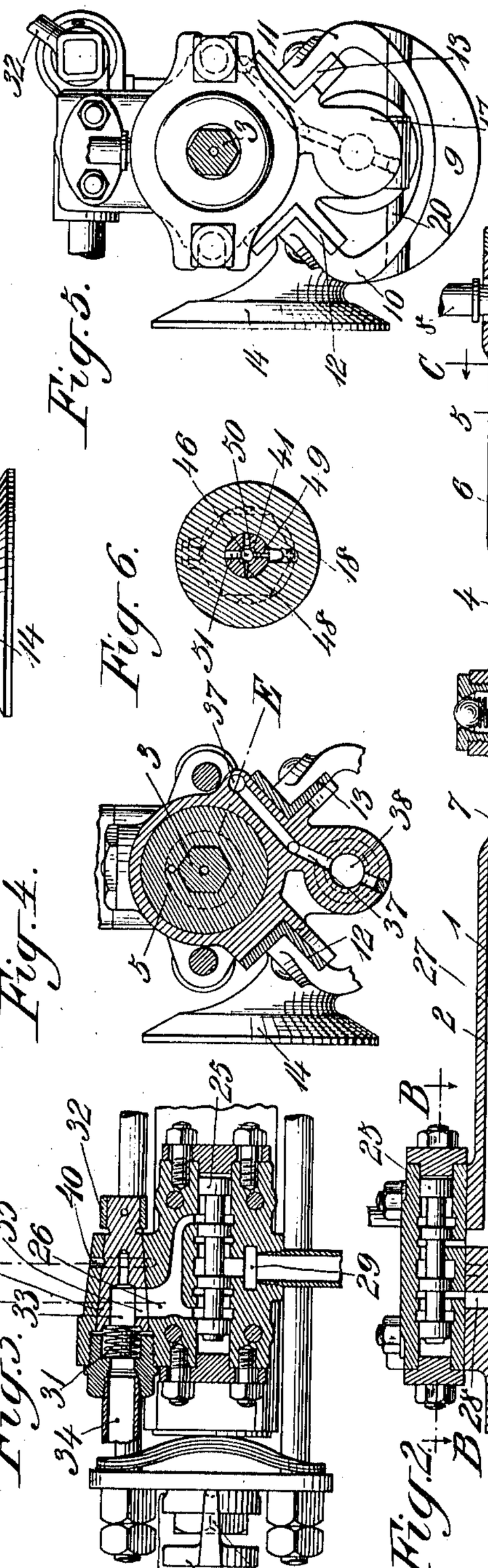

Fig. 5.

Fig. 6.

Fig. 4.

Fig. 3.

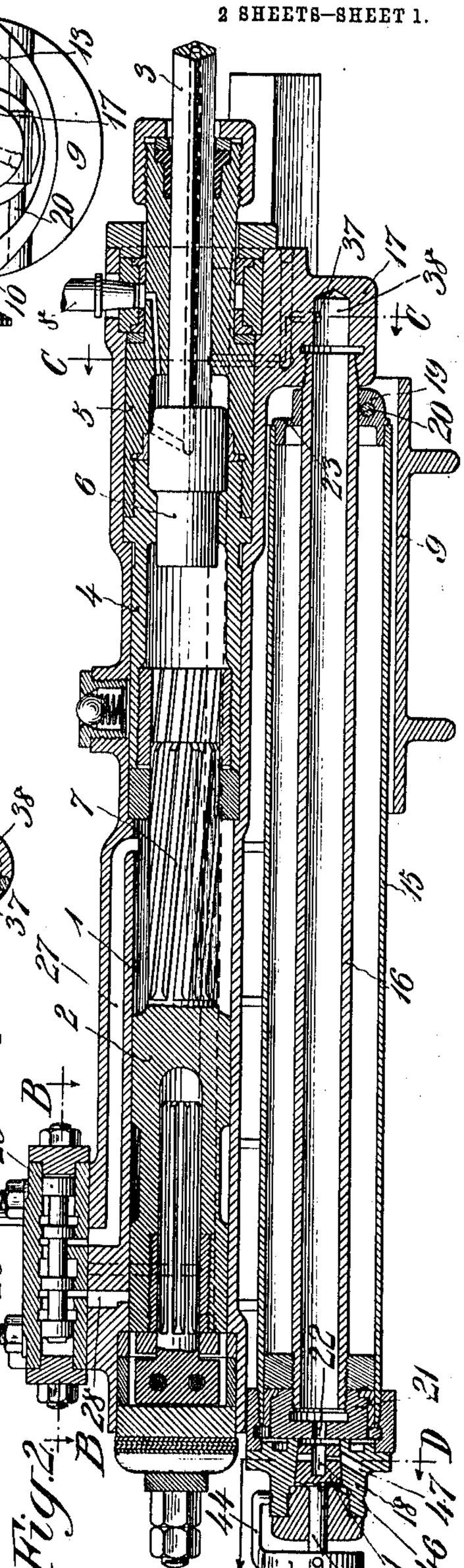

Fig. 2.

Witnesses:

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2 SHEETS—SHEET 2.

Fig. 7.

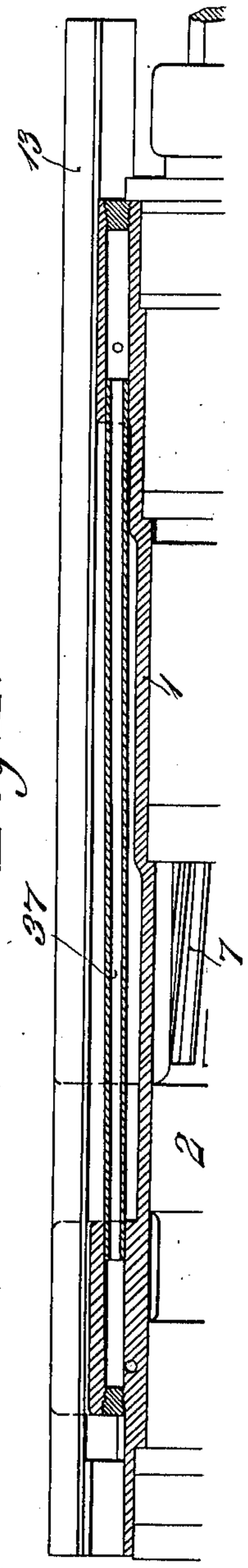


Fig. 10.

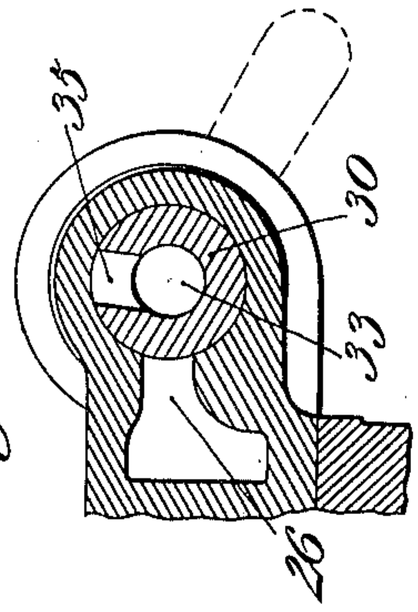


Fig. 13.

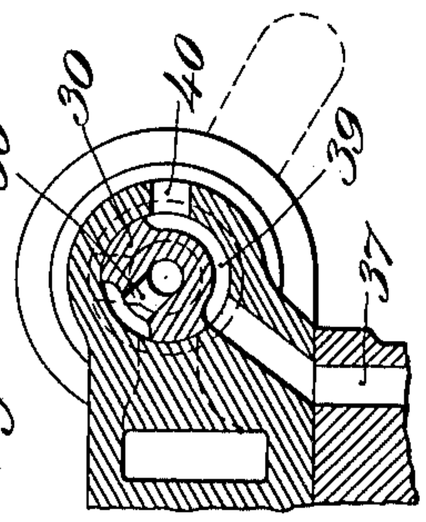


Fig. 9.

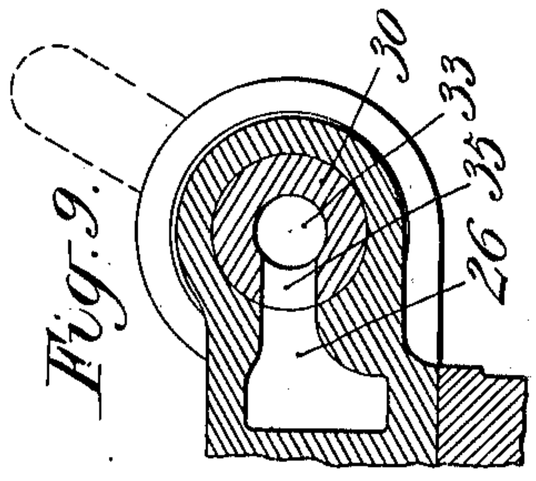


Fig. 12.

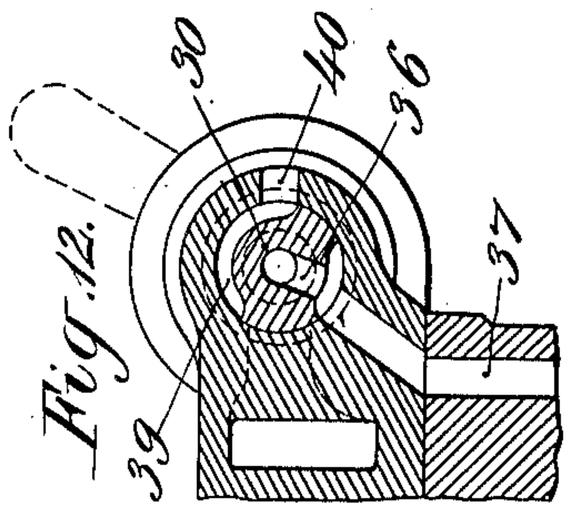


Fig. 8.

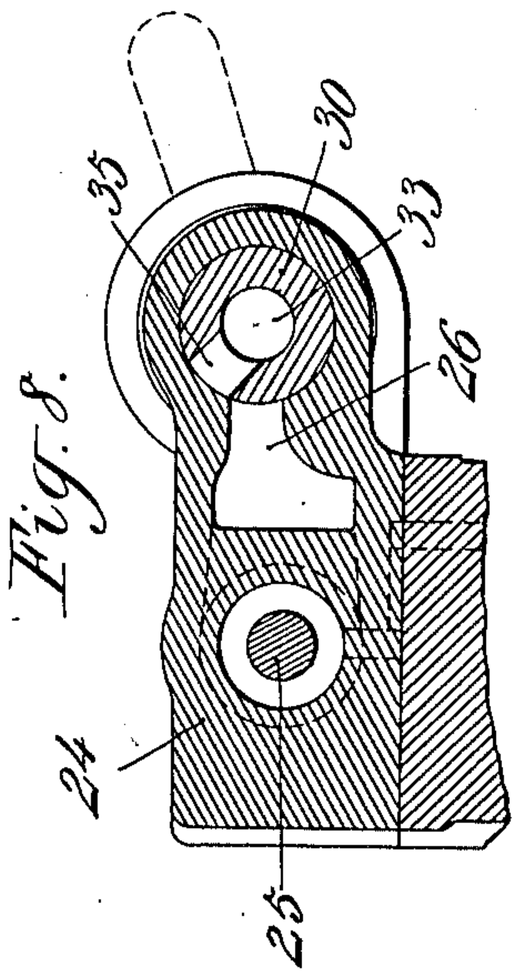
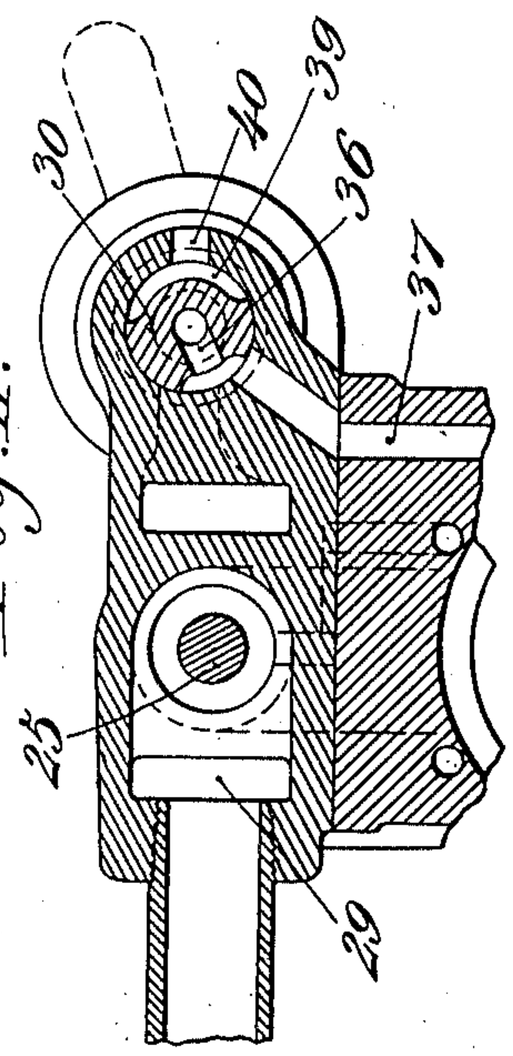


Fig. 11.



Witnesses:

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UNITED STATES PATENT OFFICE.

WILLIAM PRELLWITZ, OF EASTON, PENNSYLVANIA, ASSIGNOR TO INGERSOLL-RAND COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

FLUID-PRESSURE-OPERATED TOOL.

978,484. Specification of Letters Patent. **Patented Dec. 13, 1910.**

Application filed April 29, 1909. Serial No. 492,930.

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.

This invention is more particularly directed to providing means for varying the fluid pressure in the tool feeding device by providing a constant supply of pressure thereto and a variable leak therefor.

A practical embodiment of my 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. 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 transverse section taken in the plane of the line D—D of Fig. 2, Fig. 7 is a detail longitudinal section taken in the plane of the line E of Fig. 4, Figs. 8, 9 and 10 are enlarged detail cross sections taken in the plane of the line F, of Fig. 3, showing the manually operated fluid inlet controlling valve in three of its operative positions, and Figs. 11, 12 and 13 are enlarged detail cross sections taken in the plane of the line G of Fig. 3, showing the valve in its three positions corresponding to Figs. 8, 9 and 10.

The hammer drill cylinder is denoted by 1 and its reciprocating piston by 2. The chuck for the hollow drill steel 3 comprises inner and outer members 4, 5. 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. The piston 2 is connected to the inner member 4 of the chuck and to a suitable rotation device whereby a step by step rotation is imparted to the drill steel as the piston reciprocates. Fluid under pressure, as, for instance, water, may be fed to the hollow drill steel 3 through a pipe 8. The cylinder 1 is fitted to be moved along its supporting shell 9 as, for instance, by providing the arms 10, 11, of the shell with angle bars 12, 13, fitted to portions of the cylinder 1 in which reëntrant angles are formed. This shell 9 may have a cone 14 for pivoting the tool to any suitable support.

The device for feeding the tool forward to its work is constructed, arranged and operated as follows:—The feed cylinder 15 is located at the side of and in juxtaposition to the tool cylinder 1 and the hollow rod 16 of the feed piston has its forward end secured to an offset portion 17 at the outer end of the cylinder 1. The rear head of the cylinder 15 is denoted by 18 and the front head by 19. A cross pin 20 passes through the supporting shell 9 and the front head 19 for holding the feed cylinder 15 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 21 of the hollow feed piston 16 is provided with a hole 22 for permitting the passage of the pressure fluid which enters the front end of the hollow piston to pass into the space at the back of the piston head. The space in front of the piston head is open to external atmosphere as, for instance, through a hole 23 in the front cylinder head 19.

The cylinder valve chest is denoted by 24 and the usual reciprocating valve 25 serves to open the fluid supply port 26 either to the front cylinder port 27 or the back cylinder port 28 and either the back cylinder port 28 or the front cylinder port 27 to the common exhaust port 29. This valve chest 24 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 26 and to open and close communication to the tool feeding device as follows:—The tapered body of the valve is denoted by 30 and it is held in its seat by a coil spring 31. The smaller end of this valve is provided with a handle 32 and the body 30 has an axial port 33 in open communication with the fluid supply pipe 34. This axial port 33 is provided, in one transverse plane, with a transverse port 35 for opening and closing communication to the inlet port 26 and it is provided, in another transverse plane, with a transverse port 36 arranged to open and close communication to the passage 37 which leads to the chamber 38 in the offset portion 17 of the cylinder and thereby to the interior of the hollow feed piston 16. This valve body 30 is further provided with a circumferentially arranged bridge port 39 in the plane of the transverse port 36 fitted to open and close communication between the passage 37 and the external atmosphere through a port 40.

A variable leak is provided for the tool feeding device as follows:—A manually operated valve is arranged in the rear cylinder head 18. This valve is herein shown as of the rotary plug type, the body being denoted by 41, the stem by 42 and the handle by 43. This handle 43 is provided with a spring finger 44 arranged to enter one of a series of recesses 45 in the rear cylinder head 18 for yieldingly holding the valve in its different rotary adjustments. The valve body 41 is provided with an axial port 46 open to the space back of the feed piston head 21 and with a plurality of radial transverse ports any one of which is arranged to be brought into open communication with a passage 47 open to external atmosphere. In the present instance I have shown four of these transverse ports denoted by 48, 49, 50, 51, of gradually increasing area.

In operation, when the manually operated fluid supply controlling valve is in the position shown in Figs. 8 and 11, 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. 9 and 12, 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. 10 and 13, the fluid supply is cut off from both the tool feeding device and the tool, the tool feeding device being open to external atmosphere.

The reason for providing means for regulating or governing the amount of fluid pressure in the tool feeding device may be illustrated 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, the largest leakage port in the leak controlling valve would be used. 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 fluid pressure must be maintained in the feeding device to overcome the weight of the tool cylinder and its parts so that the steel may be held against its work. This may be accomplished by turning the leak controlling valve into a position to open the smallest leakage port to external atmosphere. The right amount of fluid to be maintained 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 leakage ports in the leak controlling valve.

What I claim is:—

1. A fluid pressure operated tool a fluid pressure operated feeding device therefor comprising a cylinder and its piston, and a manually operated valve having leakage ports of different sizes arranged to bring the interior of the cylinder into communication with external atmosphere for varying the amount of fluid pressure in the feeding device.

2. A fluid pressure operated tool, a fluid pressure operated feeding device located along the side of the tool and comprising a cylinder and its piston, and a manually operated valve having leakage ports of different sizes arranged to bring the interior of the cylinder into communication with external atmosphere for varying the amount of fluid pressure in the feeding device.

3. A fluid pressure operated tool, a fluid pressure operated tool feeding device comprising a cylinder and its piston, a manually operated valve having leakage ports of different sizes arranged to bring the interior of the cylinder into open communication with external atmosphere, said valve having different operative positions and means for yieldingly holding the valve in its different positions.

4. A support, a fluid pressure operated tool fitted to slide along the same, a fluid pressure operated tool feeding device comprising a cylinder and its piston, the one being fixed to the support and the other to the tool and a manually operated valve having leakage ports of different sizes arranged to bring the interior of the cylinder into open communication with external atmosphere for varying the amount of pressure fluid in the feeding device.

5. A fluid pressure operated tool, a fluid pressure operated tool feeding device, a manually operated valve for controlling the

supply of pressure fluid both to the tool and to the tool feeding device and a manually operated valve having leakage ports of different sizes for varying the amount of fluid pressure in the said tool feeding device.

6. A pressure fluid operated tool, a fluid pressure operated tool feeding device located along the side of the tool, a manually operated valve for controlling the supply of pressure fluid both to the tool and to the tool feeding device and a manually operated valve having leakage ports of different sizes for varying the amount of fluid pressure in the said tool feeding device.

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

WILLIAM PRELLWITZ.

Witnesses:

F. GEORGE BARRY,

HENRY THIEME.