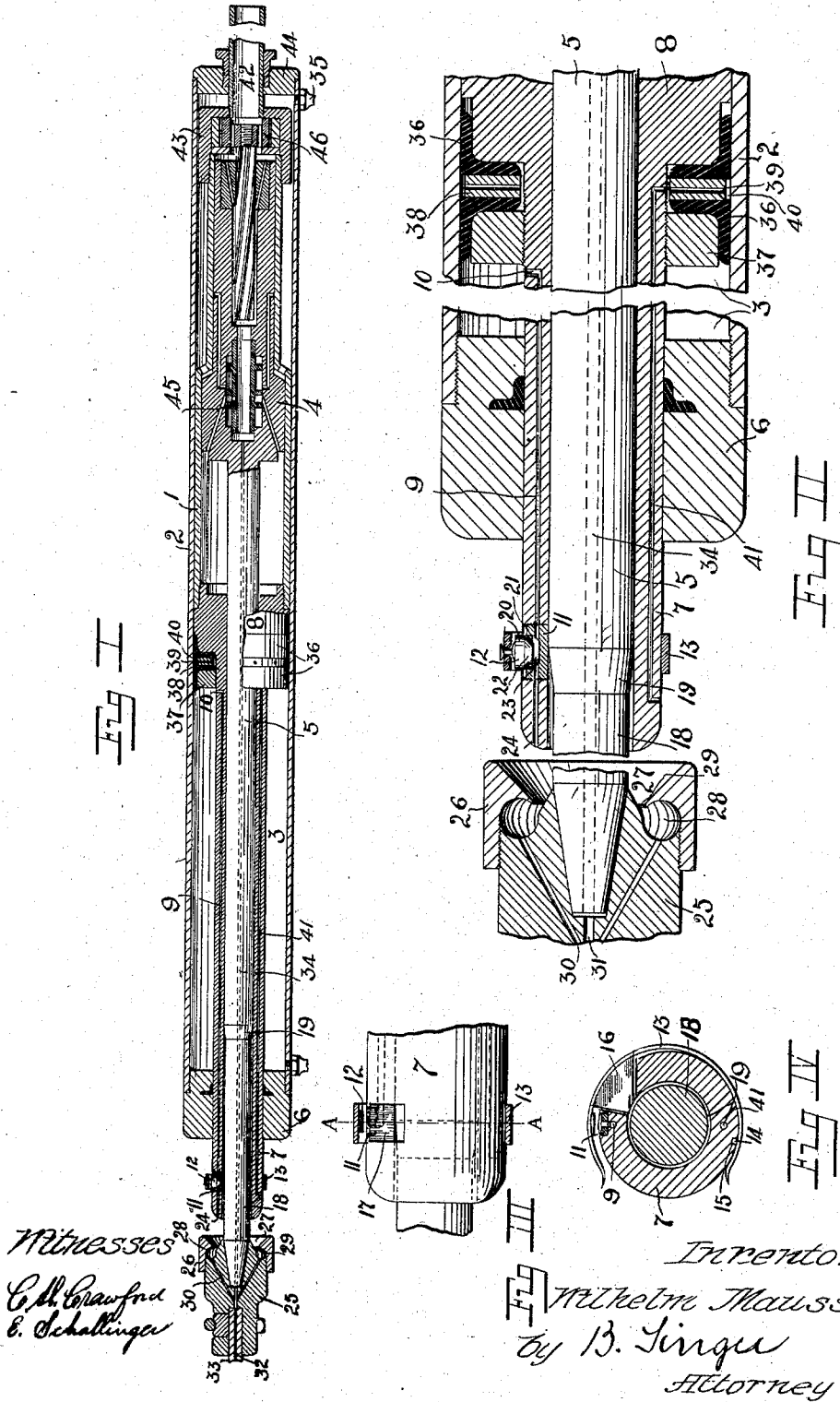


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SELF FEEDING PERCUSSIVE APPARATUS.
APPLICATION FILED DEC. 2, 1908.

965,828.

Patented July 26, 1910.



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WILHELM MAUSS, OF BRAKPAN, TRANSVAAL.

SELF-FEEDING PERCUSSIVE APPARATUS.

965,828.

Specification of Letters Patent.

Patented July 26, 1910.

Application filed December 2, 1908. Serial No. 465,616.

To all whom it may concern:

Be it known that I, WILHELM MAUSS, engineer, a subject of the King of Great Britain, and residing at the Victoria Falls Power Company Limited, Brakpan branch, Brakpan, Transvaal, have invented certain new and useful Improvements in Self-Feeding Percussive Apparatus, of which the following is a specification.

10 The present invention relates to self-feeding percussive apparatus, and more particularly to the type thereof described in the specification of application Serial No. 385579, in which the percussive machine proper is constantly pressed forward in an encircling shell and is checked by a body of liquid contained in the front of the shell, a portion of which is, upon a blow being struck, released.

20 It is the object of the present invention to provide certain improvements as hereafter defined, whereby the practical value of such apparatus is enhanced.

25 The invention aims in particular at improving the means for controlling the discharge of water from the water chamber: improving the disposal of the exhaust water and actuating fluid: and the prevention of undue pressure in the water chamber and of leakage to or from the same past the machine cylinder.

30 The accompanying drawings illustrate the several features of the invention, Figure I being a longitudinal section of the improved apparatus, Fig. II an enlarged partial section thereof, but showing the piston at the opposite end of its travel, Fig. III a side elevation of a detail modification, and Fig. IV a transverse section on the plane A—A Fig. III.

40 Numeral 1 indicates the machine cylinder sliding within a casing 2, the front part of which, viz., the space 3, constitutes the water chamber.

45 4 indicates the piston and 5 the piston rod thereof which extends beyond the head 6 of the casing through a neck 7 projecting from the cylinder head 8.

50 Escape of checking water from the water chamber is controlled by a valve opened by the piston at each complete forward stroke. The improvement in this connection consists in positioning the valve upon an external part of the apparatus, so that its action may be constantly under observation and its repair or adjustment is rendered possible with-

out having to take the whole machine apart. The improvement also consists in a simple and easily replaced valve device for this purpose.

60 9 represents a port extending longitudinally of the neck 7, opening at one end 10 into the water chamber 3 and at the other end to a perforated valve seat 11. Said valve seat is made of non-corrodible material and secured in place by any convenient means so that it may be readily extracted and replaced upon its becoming unserviceable.

65 The valve proper 12 is secured to a curved spring 13 shaped to embrace rather more than half the circumference of neck 7, and retained by a pin 14, entering a hole 15 in the neck. Also secured to the spring is a roughly segmental block 16 which extends through a recess 17 in the neck, into the vicinity of the piston rod 5 within the neck. Said block is so shaped as to permit it, the spring 13, and the valve 12 to be removed bodily when the pin 14 has been sprung out of the hole 15.

70 The forward end 18 of the piston rod 5 is reduced in diameter and joined to the unreduced part by a conical portion 19. Said reduced part is of such diameter as to permit the block 16 to enter fully into its recess 17 and thus cause the spring 13 to hold the valve firmly upon its seat; while contact of the cone 19 or the unreduced part of the piston rod, with the block 16, forces the latter outward and so lifts the valve. Upon the cylinder being forced forward in the shell by suitable means, the checking liquid in the chamber 3 will be put under pressure, but the valve 12 being closed (as in Fig. I), no forward movement of the cylinder will occur. The position of the cone 19 is so arranged that whenever in the course of its reciprocations the tool cuts into the rock, the block 16 will be forced out, thus opening the valve, as shown in Fig. II, and permitting liquid to escape and the cylinder to move forward, in accordance with the depth of the cut. The form of the valve and valve seat will depend upon the desired method for disposing of the water released from the water chamber. Thus the water may simply be discharged to atmosphere by using an open flat seat 11 and a flat valve 12 of leather or the like as shown in Figs III and IV. Again it is desirable in some cases to carry the water down a

hollow tool to wet the drilling debris. In this case the valve 12 and seat 11 may be formed with the fitting cylindrical parts numbered respectively 20 and 21 in Figs. I and II, and conical parts 22 and 23. The port 9 opens upon one side of the conical seat, and an eduction port 24 leads off from the other side thereof. To the rear of the tool chuck 25 is secured a collar 26 having an inwardly and forwardly inclined rear face 27. The internal surface of the collar and the rear end of the chuck are shaped to form an annular chamber 28 of substantially circular cross section and having a narrow annular inlet 29. From the chamber 28 a number of inclined passages 30 lead to the central bore 31 of the chuck. Such bore communicates forwardly with the axial hole 32 in the tool 33 and usually rearwardly with the bore 34 of the piston rod 5. With the arrangement described upon the raising of the valve at the termination of the forward stroke, liquid passed from port 9 and issuing as a jet from port 24, enters chamber 28. By means of the suction produced by movement of the tool in the bore hole and usually also by that set up by the exhaust air from the percussive machine passing down hole 34 as hereafter described, such collected water is drawn down passages 30 and ejected from the end of the tool.

The machine is usually forced forward in the shell by means of compressed air or other actuating fluid supplied to the rear end of the shell through the cock 35; and oppositely directed cup leathers 36 are secured to the cylinder head 8 by means of a nut 37, to form a packing between the front and rear shell spaces. With the object of keeping said leathers in close contact with the shell and to insure that no water shall pass into the air space, or vice versa, there is provided between the leathers an annular disk or spacing plate 38 perforated with a number of radial holes 39. From the space 40 between the leathers a channel 41 is carried up the neck 7 and opens upon that part of the peripheral surface of the same which is always clear of the shell. The space 40 between the leathers is thus maintained at atmospheric pressure, thereby enabling the pressure of the air and water on either side to keep the leathers tight. Moreover any quantity of either fluid which may chance to leak past its corresponding packing will be conducted away and prevented from passing under the other packing; and an inspection of the discharge from channel 41 will both disclose the existence of leakage and indicate which of the packings is defective.

When using fairly high air pressure with the machine as illustrated in the above mentioned prior specification, the lesser area of

the front of the cylinder as compared with its rearward area gave rise to an inconveniently high pressure in the water chamber. To remedy this the present invention provides for a reduction of the rearwardly directed area of the cylinder which is exposed to external pressure. Thus a rod 42 extending from the rear cylinder cover 43 may be caused to project through the rear cap 44 of the shell 2. Such extension moreover may be made hollow and utilized to convey a part or the whole of the exhaust actuating fluid from the machine. Thus in the machine illustrated the distributing valve 45 is adapted to pass the exhaust actuating fluid from the machine into the hollow interior of the piston. Preferably a part of such exhaust is passed down the relatively small bore 34 of the piston rod and assists in conveying to the drill the water ejected from the water chamber 3 and also assists in clearing the bore hole. The remainder of the exhaust passes to the rear of the piston, and thence through the ratchet box 46 to the hollow rod 42. By simply covering the open end of the rod 42 the whole of the exhaust air may be forced down the bore hole when special clearance of the same is required.

What I claim, and desire to secure by Letters Patent is:—

1. In combination, a shell containing checking liquid, a percussive machine cylinder slidable therein, and bearing against said liquid, a piston provided with a piston rod and working in said cylinder, a neck extending from the cylinder and surrounding the piston rod and projecting beyond the shell, and a valve device mounted upon the projecting part of said neck and controlling the escape of said liquid and being distinct from the piston.

2. In combination, a shell containing checking liquid, a percussive machine slidable therein, and bearing against said liquid, an extension from said percussive machine projecting beyond the shell and having a port extending substantially throughout said extension, said port communicating at one end with the liquid and opening at the other end externally of the shell, and means controlling said opening.

3. In combination, a shell containing checking liquid, a percussive machine cylinder slidable therein, a piston provided with a piston rod and working in said cylinder, said piston rod being of varying section, and means operated by engagement with the piston rod to control the escape of said liquid.

4. In combination, a percussive machine, means exerting forward pressure on the same, means containing a body of liquid by the release of which the percussive machine is permitted to advance, and a valve controlling the release of said liquid, said valve

being detachably mounted upon the percussive machine.

5. In combination, a percussive machine, means exerting forward pressure on the same, means containing a body of liquid by the release of which the percussive machine is permitted to advance, an extension from the percussive machine having a port communicating with the liquid, and a valve device controlling the mouth of said port, said valve device comprising an arcuate spring partially encircling the extension, a valve proper carried by said spring and closing said port, and means for flexing the spring to operate the valve.

6. In combination, a percussive machine, means exerting forward pressure on the same, means containing a body of liquid by the release of which the percussive machine is permitted to advance, an extension from the percussive machine having a port communicating with the liquid, and a valve device controlling the mouth of said port, said valve device comprising an arcuate spring partially encircling the extension, a valve proper carried by said spring and closing said port, means for detachably securing the spring to said extension, and means for flexing the spring to operate the valve.

7. In combination, a percussive machine, means for exerting forward pressure thereon, means containing a body of liquid by the release of which the percussive machine is permitted to advance, means controlling the escape of said liquid and including a renewable valve seat which is at all times external of the shell.

8. In combination, a percussive machine, means exerting forward pressure on the same, means containing a body of liquid by the release of which the percussive machine is permitted to advance, a piston and piston rod working in the percussive machine, a part surrounding the piston rod having a port communicating with the liquid and opening upon said part, an arcuate spring embracing said part, a valve proper carried by the spring and closing said port, a member carried by the spring and projecting through said part to engage the piston rod and being moved thereby to operate the valve.

9. In a percussive apparatus, in which forward movement of the percussive machine proper is checked by a body of liquid a portion of which is periodically released to determine the feed; a hollow piston and piston rod for the percussive machine, a hollow tool secured to the piston rod, said machine having an exhaust aperture at the rear thereof, means for conveying the exhaust checking liquid into the hollow tool and means for con-

veying the exhaust actuating fluid into the hollow piston, whence it passes partially down the hollow tool with the liquid and partially from the rear exhaust aperture aforesaid.

10. The combination with a shell and a reciprocating percussive machine slidable therein, of packing elements between the machine and the shell spaced apart from each other to form an intervening chamber, and means whereby the chamber between the packing elements is put into communication with the atmosphere.

11. The combination with a shell and a reciprocating percussive machine slidable therein, said machine being exposed to pressure at both ends, of packing elements between the machine and the shell spaced apart from each other to form an intervening chamber, and means whereby the chamber between the packing elements is maintained at a lower pressure than either of the pressures on the cylinder ends.

12. The combination with a shell and a reciprocating percussive machine slidable therein, said machine being exposed to pressure at both ends, of packing elements between the machine and the shell spaced apart from each other to form an intervening chamber, said machine having an exhaust port communicating with said chamber and opening to the atmosphere at such a point as to permit discharge therefrom to be observed.

13. The combination with a shell and a reciprocating percussive machine slidable therein and provided with a member slidable therein and projecting therethrough, said member having a port at all times open to the atmosphere at its outer end, packing elements between said machine and shell spaced apart to form an intervening chamber and arranged to communicate with the inner end of said port.

14. The combination with a shell and a reciprocating percussive machine slidable therein and provided with a member slidable therein and projecting therethrough and having a port opening to the atmosphere, packing elements between said shell and machine, a ported spacing plate interposed between said elements to form a chamber therebetween, the port in said member communicating with the ports in said plate and the said plate ports communicating with said chamber.

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

WILHELM MAUSS.

Witnesses:

ALFRED L. SPOOR,
J. WARREN VENNING.