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# UNITED STATES PATENT OFFICE.

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## VALVE-MOTION FOR ROCK-DRILLS.

993,218.

Specification of Letters Patent.

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Original application filed February 1, 1910, Serial No. 541,289. Divided and this application filed November 2, 1910. Serial No. 590,354.

*To all whom it may concern:*

Be it known that I, LEWIS C. BAYLES, a citizen of the United States, and resident of Johannesburg, Transvaal, have invented a new and useful Improvement in Valve-Motions for Rock-Drills, of which the following is a specification.

This invention relates to a valve motion for rock drills and has for its object to provide certain improvements in the construction, form and operation of the valve mechanism whereby a valve may be employed which is very simple in construction and positive in its action.

This invention is more particularly directed to a longitudinally reciprocating spool valve arranged to control the independent inlet and exhaust passages for both ends of the cylinder, the exhaust passages being controlled by one of the heads of the spool valve and the inlet passages being controlled by the other head of the spool valve.

A practical embodiment of my invention is represented in the accompanying drawings, in which—

Figure 1 represents in longitudinal central section so much of a rock drill as will give a clear understanding of the invention, Fig. 2 is a horizontal section taken in the plane of the line A—A of Fig. 1, looking in the direction of the arrows, and Fig. 3 is a transverse section taken in the plane of the line B—B of Fig. 1, looking in the direction of the arrows.

The cylinder of the rock drill is denoted by 1 and its piston by 2.

The valve chest is denoted by 3, which valve chest is provided with a motive fluid inlet 4 and a motive fluid outlet 5 communicating, respectively, with an inlet chamber 6 and an outlet chamber 7.

A longitudinally reciprocating spool valve is located within the valve chest 3, the stem of said valve being denoted by 8 and its head within the inlet chamber 6 by 9 and its head within the outlet chamber 7 by 10.

The cylinder is provided with independent inlet and exhaust passages for both of its ends, the inlet passage leading to the rear end of the cylinder being denoted by 11 and the inlet passage leading to the front end of the cylinder being denoted by 12. These passages 11 and 12 have ports 13, 14,

opening into the inlet chamber 6 upon opposite sides of the spool valve head 9, which ports are arranged to be alternately opened and closed by the said head 9 as the valve reciprocates.

The exhaust passage which opens into the work piston chamber within the cylinder 1 at a distance forwardly from the inlet passage 11 is denoted by 15 and the exhaust passage which opens into the work piston chamber at a distance rearwardly from the inlet passage 12 is denoted by 16. These ports 17, 18, respectively, which open into exhaust passages 15, 16, are provided with the exhaust chamber 7 upon opposite sides of the spool valve head 10, which ports are arranged to be alternately opened and closed by the said head 10 as the valve is reciprocated.

Proceeding to describe the operation of the device and supposing the parts to be in the position in which they are shown in the accompanying drawings with the work piston traveling in the direction indicated by the arrow in Fig. 1, the valve is in position to open the port 13 of the rear inlet passage 11 and the port 18 of the front exhaust passage 16. The port 14 of the front inlet passage 12 and the port 17 of the rear exhaust passage 15 are closed. The fluid flowing in back of the piston 2 will drive the same forward. As the piston closes the exhaust passage 16, it will begin to compress the air in front of the piston until the pressure becomes sufficiently great in the passage 12 to act upon the front face of the valve head 9 thus throwing the valve back to the limit of its other position and thereby closing the mouth 13 of the inlet passage 11 and the mouth 14 of the outlet passage 16 and opening the mouth 14 of the front inlet passage 12 and the mouth 17 of the rear exhaust passage 15. This movement of the valve will cause the work piston to be started back toward the rear of the chamber. As this work piston travels rearwardly it will close the exhaust passage 15 thus compressing the air back of the piston. The pressure of the air as it rises in the rear inlet passage 11 will act upon the rear face of the valve head 9 thus throwing the valve head over into the position shown in the drawings.

From the above description it will be seen that the valve and ports constructed and ar-



5 ranged to operate as herein set forth, permits the valve to control in a very simple and effective manner the opening and closing not only of the inlet passages but also  
10 of the discharge passages so as to insure a sufficient overbalancing of pressure upon one of the valve heads to throw the valve automatically at the desired times for obtaining the proper reciprocation of the work piston.

While I have shown this valve mechanism in connection with a rock drill, it is to be understood that I do not wish to limit myself to this use but contemplate its use wherever applicable in percussive drills or tools.

15 Claims to novel features not made herein are presented in my co-pending application Serial No. 541289, filed February 1, 1910, of which this application is a division.

20 What I claim is:—

1. A spool valve having two heads, and a cylinder having independent inlet and exhaust passages for both of its ends, the exhaust passages being controlled by one of  
25 the valve heads and the inlet passages being controlled by the other of the valve heads.

2. A spool valve having two heads, a cylinder having independent inlet and exhaust passages for both of its ends, one head of  
30 the valve serving to alternately open and close the exhaust passages and the other head of the valve serving to alternately open and close the inlet passages.

3. A spool valve having two heads, and a cylinder having independent inlet and exhaust passages for both of its ends, the exhaust passages opening directly to the opposite faces of one of the valve heads and the inlet passages opening directly to the opposite faces of the other valve head.

4. A reciprocating valve having a head and a cylinder having independent inlet and exhaust passages for both of its ends, the inlet passages opening to the opposite faces of a head on the said valve, said valve being provided with means for opening and closing the exhaust passages.

5. A cylinder, its piston, a valve chest, independent inlet and discharge passages for both ends of the cylinder having ports opening into the valve chest, and a spool valve reciprocating in a right line perpendicular to the faces of said ports, said valve having two heads, one head arranged to open and close the inlet passage ports and the other head arranged to open and close the discharge passage ports.

In testimony, that I claim the foregoing as my invention, I have signed my name in presence of two witnesses, this twentieth day of October 1910.

LEWIS C. BAYLES.

Witnesses:

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