L. C. BAYLES.

DIRECT ACTING ENGINE.

APPLICATION FILED OCT. 29, 1909.

996,448. **Patented June 27, 1911.**

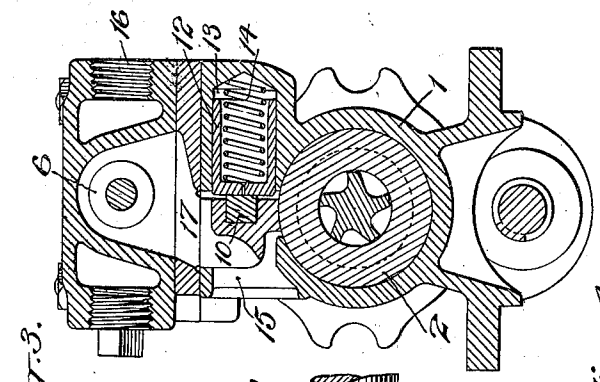

Fig. 3.

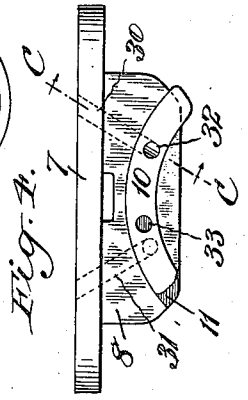

Fig. 4.

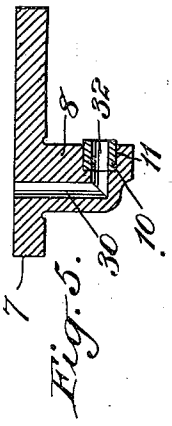

Fig. 5.

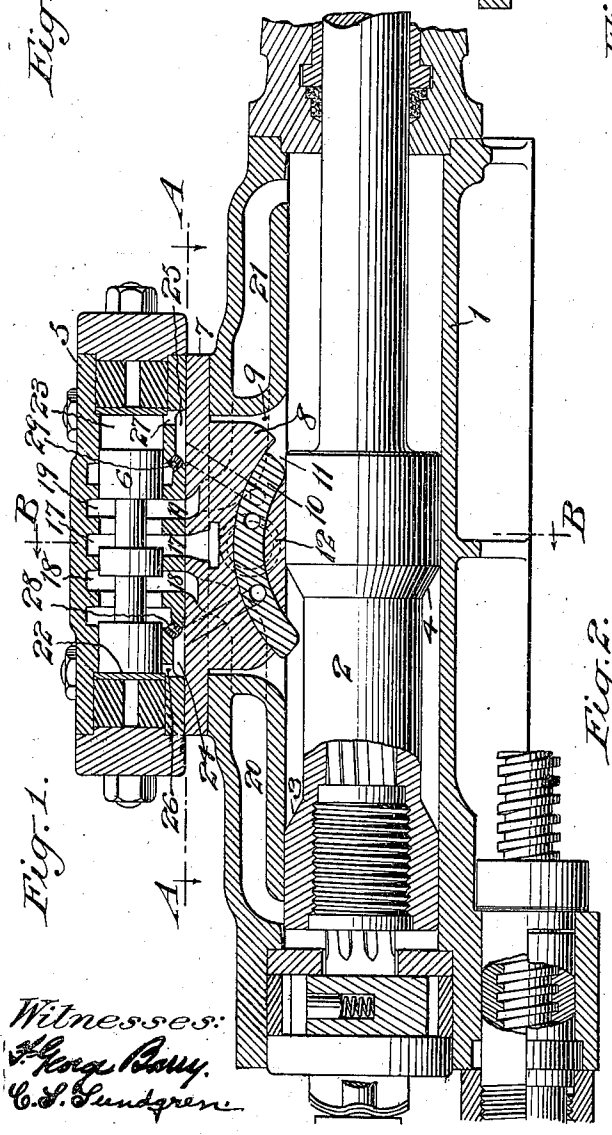

Fig. 1.

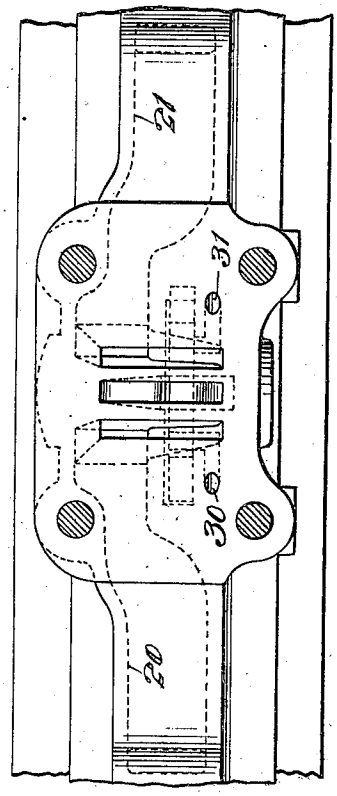

Fig. 2.

Witnesses:
E. George Bailey.
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Inventor:
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by his attorneys
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UNITED STATES PATENT OFFICE.

LEWIS C. BAYLES, OF JOHANNESBURG, TRANSVAAL, ASSIGNOR TO INGERSOLL-RAND COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

DIRECT-ACTING ENGINE.

996,448. Specification of Letters Patent. Patented June 27, 1911.

Application filed October 29, 1909. Serial No. 525,313.

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 Direct-Acting Engines, of which the following is a specification.

My invention relates to that type of direct-acting engines, such, for instance, as rock drilling machines, in which the movement of the main valve for admitting the motive fluid to and exhausting it from the piston cylinder, is controlled by a supplemental valve in the form of an arc-shaped slide valve moved in opposite directions by having its ends alternately engaged by oppositely arranged shoulders or projections upon the cylinder piston.

The object of my invention is to provide a mechanical means, such, for instance, as a spring-pressed plunger for holding the supplemental valve snugly in engagement with its seat.

In the accompanying drawings, Figure 1 is a longitudinal central section through so much of a rock drilling machine 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. 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, Fig. 4 is a detail side view of the renewable supplemental valve plate, and Fig. 5 is a detail section taken in the plane of the line C—C of Fig. 4, looking in the direction of the arrows.

1 designates the cylinder and 2 its piston. This piston 2 is provided with oppositely arranged shoulders 3, 4, located between its ends.

5 designates the main valve chest in which the main valve 6 of spool type is fitted to reciprocate.

A renewable supplemental valve plate 7 is interposed between the main valve chest 5 and a flattened surface on the cylinder 1. This plate 7 is provided with a projection 8 which enters and fits loosely within a cavity 9 in the cylinder 1. A supplemental valve 10, in the form of a slide valve, is mounted to reciprocate in a curved slideway or seat 11 in the projection 8 of the renewable plate 7. This supplemental valve 10 is held tightly in its seat for taking up wear thereon and for preventing leakage, by mechanical means, such, for instance, as a spring-pressed plunger 12 fitted to slide laterally within a recess 13 in the cylinder 1.

The head of the plunger is pressed firmly against the exposed face of the supplemental valve 10 by pressure, such, for instance, as a spring 14 which is interposed between the plunger 12 and the bottom of the recess 13. This recess 13 is in alinement with the exhaust port 15 of the cylinder. The ends of the supplemental valve 10 are alternately engaged by the oppositely arranged shoulders 3, 4, of the piston 2 for moving the valve and the valve is held in its position by the pressure exerted upon the valve by the spring-pressed plunger 12.

The fluid inlet for the valve chest 5 is denoted by 16. The valve chest is further provided with an exhaust port 17 at all times in open communication with the main exhaust port 15. Ports 18, 19, are also provided in the valve chest 5, which ports are at all times in open communication with the opposite ends of the cylinder 1 through passages 20, 21, respectively.

The main valve 6 is so arranged that when at the limit of its movement in one direction, it will open communication from the main fluid inlet 16 to the port 18 and when at the limit of its movement in the opposite direction will open the main fluid inlet port 16 to the port 19. These same movements of the main valve 6 will alternately open the exhaust port 17 to the port 19 or the port 18. The spaces 22, 23, beyond the opposite ends of the main valve 6 communicate with chambers 24, 25, through ports 26, 27. These chambers 24, 25, communicate at all times with the main motive fluid inlet 16 through small holes in plugs 28, 29, to provide fixed leaks from the main motive fluid inlet to the spaces 22, 23.

Passages 30, 31, lead from the chambers 24, 25, through the renewable plate 7 and its projection 8 to the inner face of the supplemental valve 10 at different points thereon. This supplemental valve 10 is provided with ports 32, 33, open to the main exhaust 15 through the space surrounding the projection 8, which ports are arranged to be alternately brought into communication with the passages 30, 31, for alternately

opening the spaces 22, 23, at the opposite ends of the main valve 6 to the main exhaust.

The fixed leaks from the motive fluid inlet 16 to the chambers 24, 25, will, at all times, supply sufficient pressure to move the main valve in one or the other direction accordingly as the space 22 or 23 is opened to exhaust. It will furthermore be seen that the length of the piston 2 may be materially decreased and thereby the length of the cylinder decreased as it is not, in the structure herein described, essential that the cavity 9 in the cylinder be at all times closed by the piston as has heretofore been necessary in direct-acting engines of this type where the cavity 9 has been open to main fluid pressure. In fact, by permitting the ends of the piston to over-run the ends of the cavity 9, which cavity is open at all times to exhaust, an auxiliary primary exhaust passage is provided for the piston chamber at the start of its movement in the opposite direction. This is another advantage obtained by the utilization of mechanical means for holding the supplemental valve in position.

What I claim is:—

1. The combination with a cylinder having a cavity through its side walls open to external atmosphere, a piston and a main valve arranged to control the admission and exhaust of the motive fluid, of a supplemental valve located in said cavity and operated by said piston and mechanical means for holding the supplemental valve tightly on its seat, the said piston being arranged to over-run an end of said cavity as the piston nears the limit of its movement in one direction for opening the space beyond the piston to external atmosphere through said cavity.

2. The combination with a cylinder having a cavity through its side walls open to external atmosphere, a piston and a main valve arranged to control the admission and exhaust of the motive fluid, of a supplemental valve located in said cavity and operated by said piston and mechanical means for holding the supplemental valve tightly on its seat, the said piston being arranged to over-run the ends of said cavity as the piston nears the limits of its movements in both directions, for alternately opening the spaces beyond the ends of the piston to external atmosphere through said cavity.

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 October, 1909.

LEWIS C. BAYLES.

Witnesses:
F. GEORGE BARRY,
C. S. SUNDGREN.