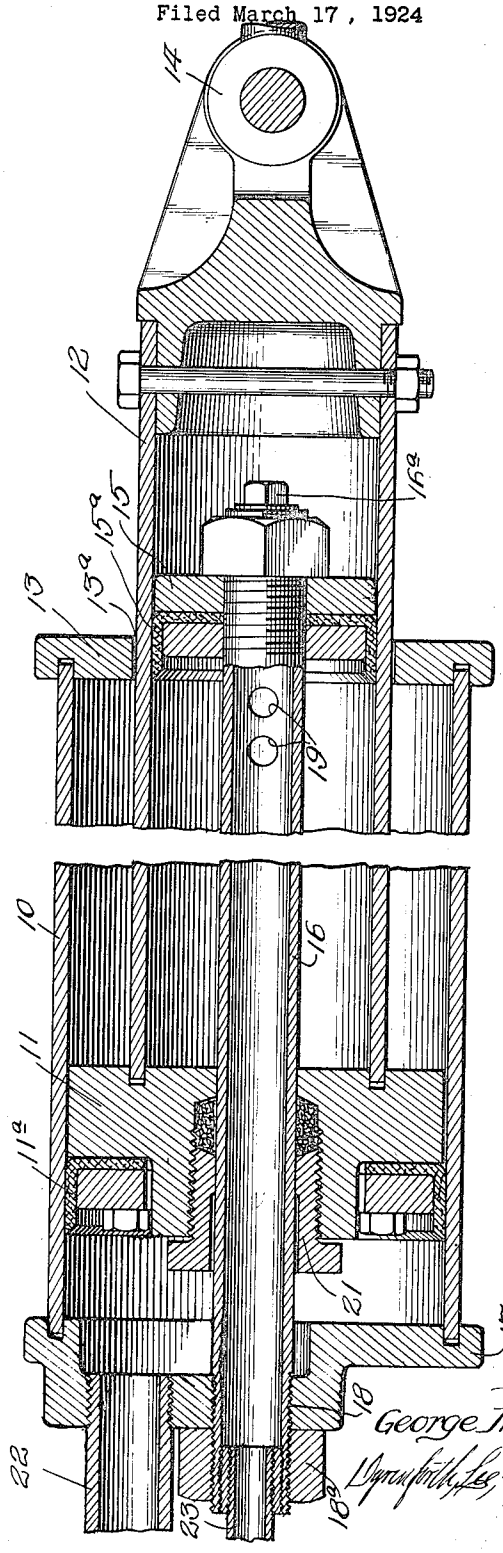
Sept. 16, 1924. 1,509,000

G. N. SIMPSON

POWER MECHANISM

Filed March 17, 1924



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UNITED STATES PATENT OFFICE.

GEORGE N. SIMPSON, OF CHICAGO, ILLINOIS.

POWER MECHANISM.

Application filed March 17, 1924. Serial No. 699,853.

To all whom it may concern:

Be it known that I, GEORGE N. SIMPSON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Power Mechanisms, of which the following is a specification.

This invention relates to improvement in power mechanisms and more especially to a double-acting cylinder which may be used for pushing, or pulling, or both.

One of the features of my invention is the provision of a pushing or pulling cylinder which has no exposed machined or polished parts. Because of this feature it is especially adapted for use in connection with mining machinery and the like, where the power device is frequently located in a position where it is exposed to dirt, dust, and water. In such a location an ordinary cylinder with a polished exposed piston rod is not well adapted for use because the piston rod is exposed to dirt which roughens it, or it may be liable to rust and corrosion with resulting damage to the apparatus.

My improved cylinder may also be easily and cheaply made, is strong and rugged in construction, and is practically self-oiling.

Other features of my invention will appear more fully as I proceed with my specification.

In that form of device embodying the features of my invention shown in the accompanying drawing, the figure is an axial sectional view of a double-acting pushing and pulling cylinder.

As shown in the drawings, 10 indicates a large outside cylinder in which is a piston 11 provided with a cup-washer 11ª. The piston 11 carries a large hollow tube, piston rod, or push rod 12 which extends through the front head 13 of the large cylinder 10. The front head 13 is bored out large enough at 13ª to permit the push rod 12 to slide freely through the opening and still not admit much dust or foreign matter.

The front end of the push rod 12 is provided with an eye 14 or any suitable attachment adapted to be fastened to the object to be moved.

The inside of the push rod 12 is finished. Inside of this there is fitted another piston 15 provided with a cup-washer 15ª. The piston 15 is connected to a hollow shaft 16 which extends to the rear head 17 of the large cylinder and to which it is securely fastened by means of the threads 18 and the lock nut 18ª. Ports 19 are provided in the front end of the hollow shaft 16. These ports 19 open into the interior of the push rod 12 back of the piston 15. The front end of the hollow shaft 16 is closed by means of the plug 16ª. Where the hollow shaft 16 passes through the piston 11, packing 20 and a packing nut 21 are provided to permit the piston 11 to slide on the hollow shaft 16.

A pipe 22 is provided at the rear end of the large cylinder 10. The operation is as follows. To obtain the pushing stroke, air is admitted under pressure into the pipe 22 entering the rear end of the large cylinder. This air forces the piston 11 forward to give the pushing stroke.

In order to obtain the return stroke, the pipe 22 is opened to the atmosphere and air is admitted under pressure through the pipe 23 which is connected to the rear end of the hollow shaft 16. Air entering through the pipe 23 passes through the hollow shaft 16 and escapes through the ports 19 into the inside of the push rod 12 between the two pistons 11 and 15, thus forcing the piston 11 back.

During the pushing stroke, the forward movement of the piston 11 is cushioned to any extent desired by restricting the escape of air from pipe 23. Likewise, the return stroke may be cushioned as desired by restricting the escape of air at 22.

In addition to the advantages of the device spoken of above, it is to be noted that by using a small cylinder for the return stroke only about one third as much air is used on the return stroke as on the forward stroke, and still there is sufficient power to return the push rod to the starting position. This is of advantage where the cylinder is used primarily for pushing. In such cases, a relatively small amount of power will suffice to return the device. Theoretically, it would not be necessary to use any more air in the large cylinder for the return stroke if the operator would cut the pressure off and allow the air to expand so that when the large piston reached the starting position the pressure would be very low in the cylinder. However, if a straight double-acting cylinder is used, the cylinder is usually filled full of air at the same pressure on the return stroke that is used on the pushing stroke, and an equal amount of air is used for each stroke.

In addition to the advantages referred to above, there is another advantage in the provision of a large pushing ram 12, which is so constructed that it is not necessary to use a very large stuffing gland where this ram extends from the cylinder. The making of a large gland would cost a considerable amount of money, while the maintenance of the gland would also be high and difficult to keep air tight.

It is to be noted further that in the device shown, the glands and pistons are all protected from dirt and the device is also practically self-lubricating.

Any suitable means, not shown, may be provided for admitting air under pressure into the pipes 22 and 23 and permitting the escape of air therefrom, as desired. Such details of construction are old in the art and consequently are not shown or described by me in detail.

While I have shown and described certain embodiments of my invention, it is to be understood that it is capable of many modifications. Changes, therefore, in the construction and arrangement may be made without departing from the spirit and scope of the invention as disclosed in the appended claims, in which it is my intention to claim all novelty inherent in my invention as broadly as possible in view of the prior art.

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

1. In a device of the character described; a cylinder; a piston therein; a hollow push rod attached to the piston and extending through the front head of the cylinder; a smaller piston in the hollow push rod; a connection between the smaller piston and the rear head of the cylinder, said connection extending through the larger piston; a port entering the large cylinder behind the large piston; and a passage extending from the atmosphere to the inside of the push rod behind the smaller piston.

2. In a device of the character described; a cylinder; a piston in the cylinder; a hollow push rod connected to the piston and projecting from the front end of the cylinder; a smaller piston in the hollow push rod; a connection between the smaller piston and the rear head of the cylinder, said connection extending through the larger piston; a port entering the large cylinder behind the large piston; and a passage extending from the atmosphere to the inside of the push rod behind the smaller piston.

3. In a device of the character described; a cylinder; a piston in the cylinder; a hollow push rod connected to the piston and extending from the forward end of the cylinder; a smaller piston in the hollow push rod; a hollow shaft closed at its forward end, connecting the smaller piston with the rear head of the cylinder, and extending through the larger piston; a port entering the cylinder back of the large piston; and a port in the hollow shaft just back of the smaller piston.

4. In a device of the character described; a cylinder; a piston in the cylinder; a hollow push rod connected to the piston and extending through the front head of the cylinder; a smaller piston in the hollow push rod; a hollow shaft closed at its forward end, connecting the smaller piston with the rear head of the cylinder, and extending through the larger piston; a port entering the cylinder back of the large piston; and a port in the hollow shaft just back of the smaller piston.

In witness whereof, I have hereunto set my hand and seal this 15 day of March, 1924.

GEORGE N. SIMPSON.