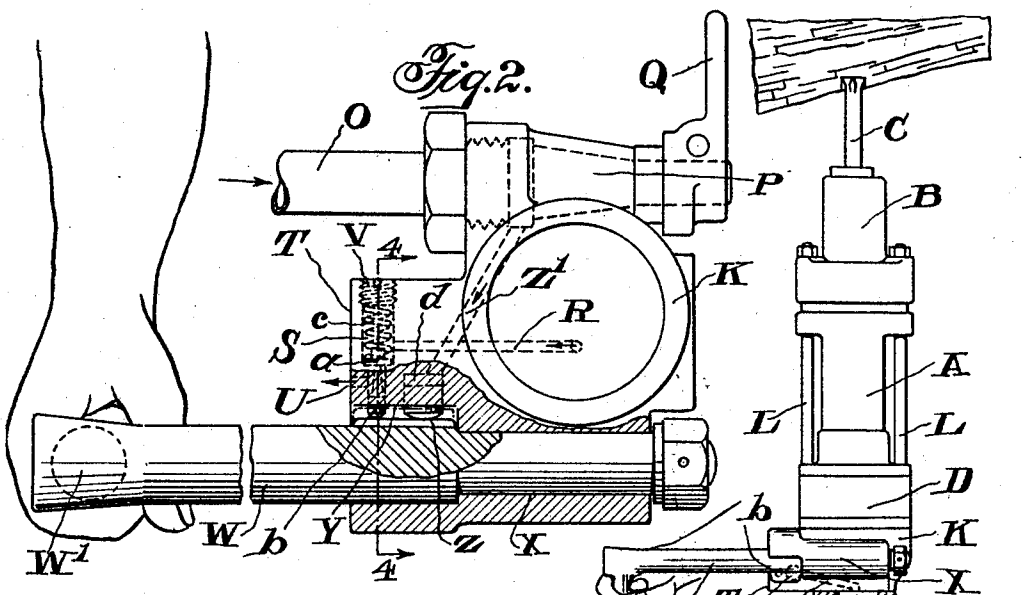
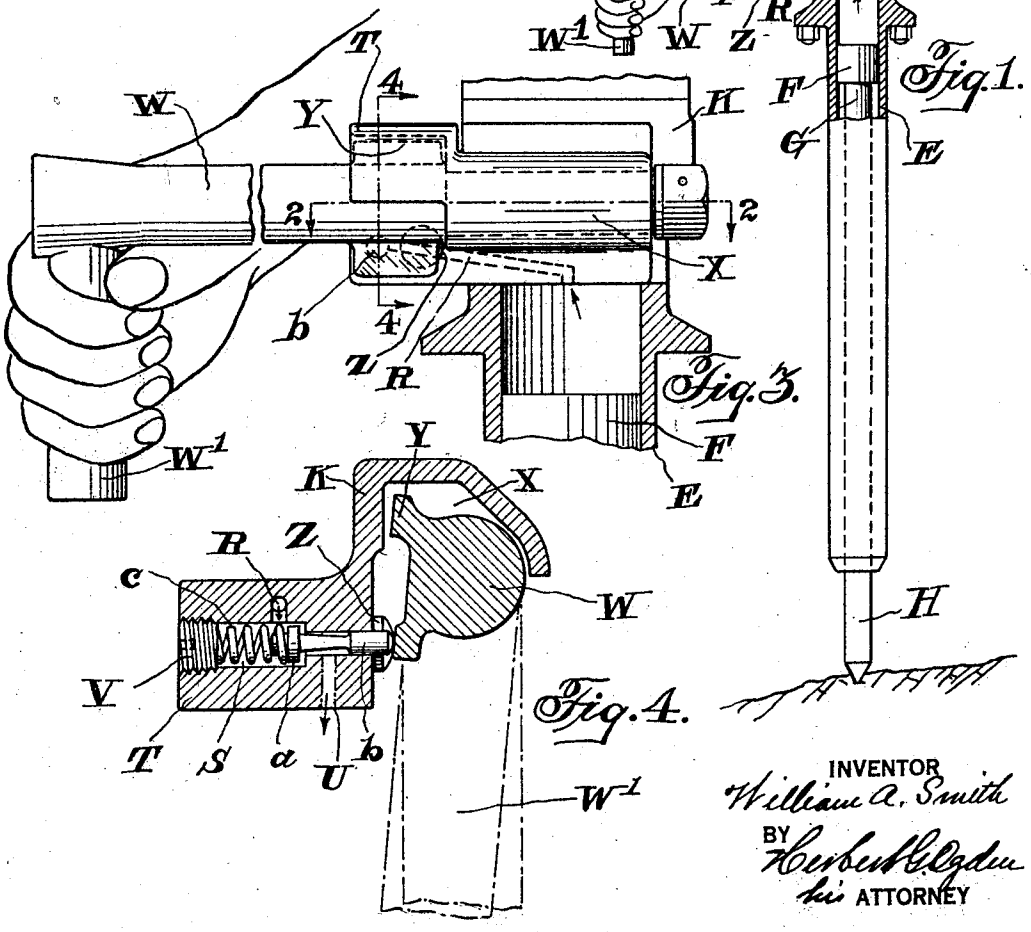
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AIR FEED CONTROL FOR ROCK DRILLS.

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1,406,907. Patented Feb. 14, 1922.





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AIR-FEED CONTROL FOR ROCK DRILLS.

1,406,907. Specification of Letters Patent. Patented Feb. 14, 1922.

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To all whom it may concern:

Be it known that I, WILLIAM A. SMITH, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Air-Feed Controls for Rock Drills, of which the following is a specification.

This invention relates to fluid pressure operated rock drills of the hammer type, but more particularly to air feed control for the feeding element of a stope drill.

The operator wishes to maintain full rotation and hammer power with reduced air feed when going through a soft spot for instance, but with the usual air feed controlling device, he must take his hand off the handle provided on a machine and turn the throttle, and he may not do this quickly enough to avoid trouble.

The primary object of the present invention is to make the air feed control automatic and not dependent upon the will of the operator, so that he does not have to take his hand off the handle, although he may also regulate the feed manually when desired. In carrying out this object, I provide means dependent upon the resistance to rotation for controlling an air feed regulating valve, so that the feeding element is automatically regulated in accordance with the requirements of the work.

Another object of the invention is to enable the air feed regulating valve to be controlled by the relative movements between the handle and the drill casing caused by resistance to rotation.

Further objects will hereinafter appear and to all of these ends the invention consists of the combinations of elements and features of construction, shown in the accompanying drawings, in which

Figure 1 is a side elevation partly in vertical section of a rock drill embodying the invention.

Figure 2 is an enlarged detail top plan view of the drill partly in horizontal section on the line 2—2 of Figure 3.

Figure 3 is a detail side elevation partly in vertical section of the parts shown in Figure 2, and

Figure 4 is a transverse vertical sectional view on the lines 4—4 of Figures 2 and 3 looking in the direction of the arrows.

Referring to the drawings, Figure 1 illustrates a stope drill to which the invention is applied having the cylinder A provided with the usual front head B carrying the drill steel C. The drill steel may be rotated by any suitable means, in this instance a rock drill of the independent rotation type being shown having the rotation motor casing D. The cylinder A with its operative parts for imparting the impact blows of the piston hammer to the drill steel C comprises the percussive element of the machine.

The feeding element is shown as the usual air feed cylinder E having the piston F and the piston rod G provided with the rock engaging point H. Between the cylinder A and the air feed cylinder E is preferably arranged in this instance, the head block K, the parts of the machine being held together by the usual side bolts L. Fluid pressure is admitted to the percussive and feeding elements through the inlet O controlled by the throttle P having the throttle handle Q.

In order to regulate the air pressure in the feeding cylinder E in accordance with this invention, I prefer to provide controlling means having an exhaust passage R leading from the feed cylinder to a valve chamber S in a projecting portion T of the head block K, communicating with the atmospheric port U. The valve chamber S may be closed by the screw threaded plug V and a valve *a* having a projecting stem *b* operates in said valve chamber S and is normally maintained in closed position by the spring *c*.

The machine is provided with an outwardly extending handle W, commonly called the rotation handle, in this instance having the gripping projection W′ at right angles thereto and extending downwardly, adapted to be grasped and held by the hand of the operator. The handle W is connected to the casing in any suitable manner so that it may be rotated through a limited angle about its longitudinal axis. In this instance the handle is rotatably held in a socket X in the head block K. A stop Y on the handle limits the angular movement in one direction by striking against the head block K. A plunger Z, constantly subjected to live air pressure from passage Z′ communicating with the inlet, as shown is seated in a socket *d* in the head block and bears against the handle W to normally rock the handle away from the head block into the

position indicated in Figure 2. The outward rocking movement of the handle is limited by the stop Y.

In the operation of the machine, the air feed cylinder relief valve *a* is normally closed and the handle W is in the position indicated in Figure 2. The operator maintains his hand on the handle W and the plunger Z will be forced inwardly and allow the handle W to open the valve *a* when the rotation becomes overloaded or at the sticking point of the rotation, due to the torque on the machine under resistance to rotation. The opening of the valve *a* will release the air feed and cause the machine to drop back, but as soon as the machine drops back, the resistance to rotation will be relieved, and at this point, the plunger Z will push the handle back and thus close the air feed cylinder relief valve. The handle and its cooperating parts are automatic in action and the drill will only push up tight as it were, when it is working in clean cutting ground but it will relax and drop back automatically according to the resistance to rotation. Another important feature in regard to this automatic action resides in the fact that the machine will push up in soft ground as long as the resistance to rotation does not become too heavy and it will not wait for the drill to stick before the air feed begins to release so that the action is quicker than in the case of hand control.

If the miner desires, he may at any time release the air feed by giving a quick pull on the handle W to open the air feed release valve *a*, but this operation will ordinarily not be required since the machine is entirely automatic in action as long as the operator has his hand on the handle W.

I claim:

1. A rock drill having a percussive element and a fluid pressure feeding element, a valve for regulating the pressure in the feeding element, and manually controlled means constantly subjected to fluid pressure and dependent upon the resistance to rotation for controlling said valve, whereby the feeding element is automatically regulated in accordance with the requirements of the work.

2. A rock drill having a percussive element and a fluid pressure feeding element, a valve for regulating the pressure in the feeding element, a handle movable relatively to the valve against fluid pressure and adapted to be grasped by the operator, a given resistance to rotation in drilling causing the handle to operate the valve and automatically reduce the pressure in the feeding element in accordance with the requirements of the work.

3. A rock drill having a percussive element and a fluid pressure feeding element, two normally separated relatively movable members for controlling the pressure in the feeding element, one member being constantly subjected to fluid pressure and adapted to be grasped and held by the hand of the operator, whereby a sufficient increase in resistance to rotation during drilling will automatically cause relative movement between said members and reduce the pressure in the feeding element in accordance with the requirements of the work.

4. A rock drill having a percussive element and a fluid pressure feeding element, a valve for regulating the pressure in the feeding element, a handle pivotally connected to the drill casing and adapted to control said valve, and fluid pressure means normally tending to force said handle into a position to permit the valve to close, whereby a given resistance to rotation during drilling will cause sufficient relative movement between the drill casing and the handle to cause the handle to open the valve and reduce the fluid pressure in the feeding element.

5. A rock drill having a percussive element and a fluid pressure feeding element, a valve mounted in the drill casing for regulating the pressure in the feeding element, an outwardly extending handle pivoted to the drill casing and adapted to be grasped by the operator for controlling the said valve, and fluid pressure means normally tending to force said handle into inoperative position with relation to the valve, whereby a given resistance to rotation during drilling will cause sufficient relative movement between the drill casing and the handle, to cause the handle to operate the valve and reduce the fluid pressure in the feeding element.

In testimony whereof I have signed this specification.

WILLIAM A. SMITH.