

No. 753,379.

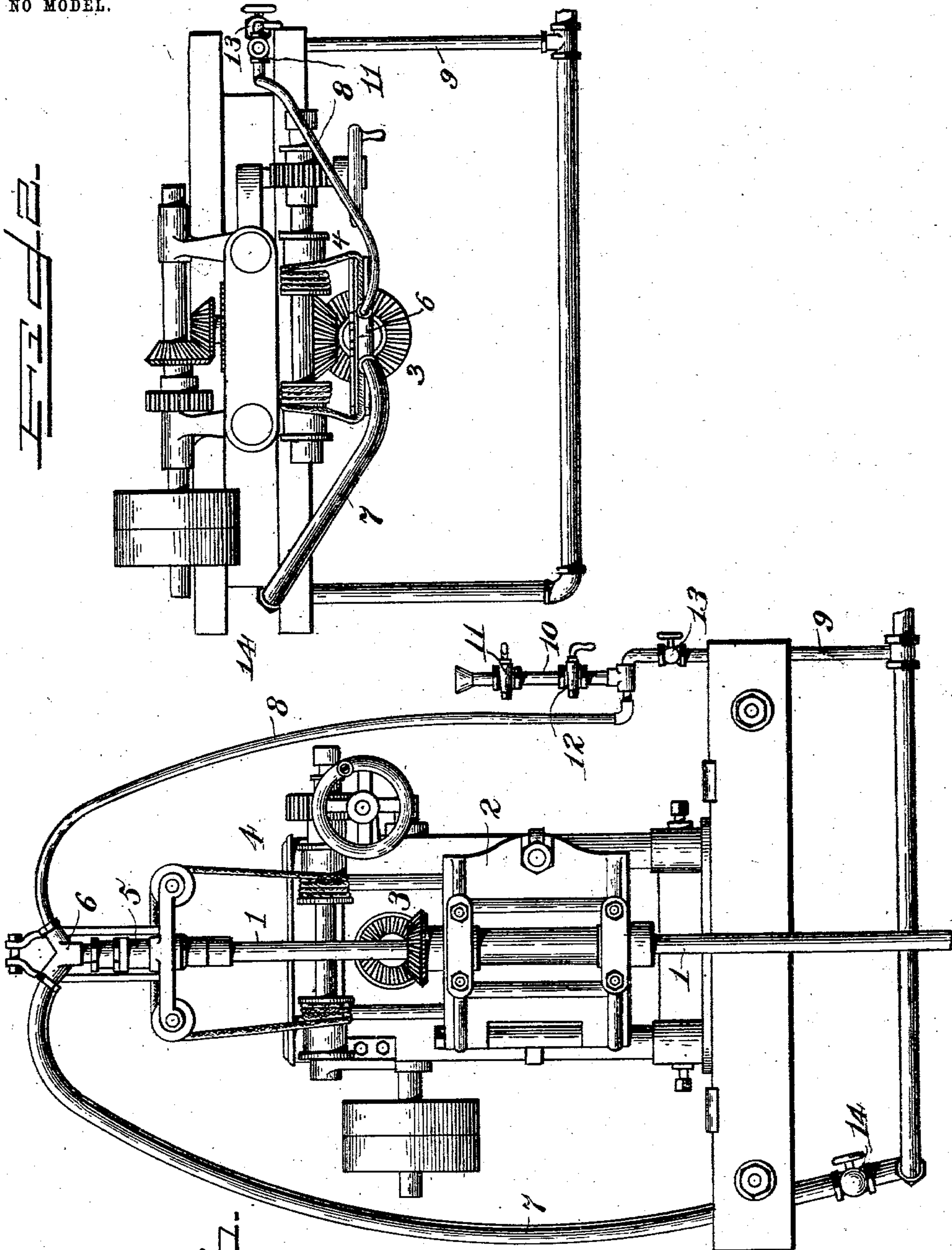
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W. S. EASTON.

SHOT FEED APPARATUS FOR DRILLING MACHINES.

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NO MODEL.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

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## SHOT-FEED APPARATUS FOR DRILLING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 753,379, dated March 1, 1904.

Application filed February 17, 1903. Serial No. 143,798. (No model.)

*To all whom it may concern:*

Be it known that I, WALTER SCOTT EASTON, a citizen of the United States, and a resident of Ellick, Somerset county, and State of Pennsylvania, have invented a certain new and useful Shot-Feed Apparatus for Drilling-Machines, of which the following is a specification.

My invention relates to improvements in shot-drilling apparatus, and particularly to means for introducing the shot in the bore. By shot-drilling apparatus I mean that class of earth-drills which bore the hole by means of the abrading action of small milling-spheres rotated by means of a drill rod and bit. The so-called "shot" used in this method of drilling are usually small and very hard chilled cast-iron spheres. In this specification I will continue to refer to them as "shot," it being understood thereby that I refer to the milling or abrading spheres employed as aforesaid. These shot are introduced into the bore through the hollow drill-rod. For this purpose it has been customary to remove the water-swivel or to provide an opening in the top thereof through which the shot could be poured into the drill-rod, this hole being closed by a screw-plug or other suitable device during the operation of the drilling-machine. To this method of introducing the shot there are several objections. First, it is necessary to turn off the water before the shot can be introduced; second, it frequently happens when the shot are poured through a hole in the water-swivel that some of them escape and by getting into the bearings of the machine and the gear-wheels cut and injure the bearings and mutilate the gears. Furthermore, the water-swivel is not always convenient to reach.

My invention consists in introducing the shot into the hollow drill-rod through a water-pipe connected with the water-swivel, the shot being carried into the drill-rod by water passing through said pipe and by reason of the velocity of the water.

The object of my invention is to facilitate the introduction of the shot into the bore-hole, to avoid the necessity of discontinuing a supply of water, to avoid the possibility of shot escaping and passing into the bearings

and gearings of the machine, and to render the means for introducing the shot readily accessible at all times.

I will now proceed to describe my invention with reference to the accompanying drawings and will then point out the novel features in claims.

In the drawings, Figure 1 shows a side elevation of an earth-drilling apparatus such as is commonly used for shot-drilling provided with my improved means for introducing the shot. Fig. 2 is a top view of the drilling apparatus.

The drilling apparatus herein illustrated is of the type shown in United States Patent No. 710,438, dated October 7, 1902, and comprises a hollow drill-rod 1, mounted within a suitable bearing in a support 2 and arranged to be rotated by means of gearing 3. The machine is provided with a rope feeding device 4, such as is shown for feeding the drill-rod downward. At its upper end the drill-rod is provided with a water-swivel 5, having at its upper end a siamese coupling 6. To one branch of this coupling 6 a water-supply hose 7 is connected, while to the other branch of the coupling a smaller hose 8 is connected. The hose 8 receives its water from the same main water-supply pipe to which the hose 7 is connected by means of a branch 9, connected thereto and to the said main supply-pipe. Between said hose and the branch 9, however, is interposed a device 10 for introducing the shot. This device in the simple form shown in the drawings consists of a chamber connected at one end to the pipe 9 and hose 8 and open at the other end and provided with two valves 11 and 12, arranged in series. These valves may be ordinary turn-plug valves. It is convenient to provide the upper end of the chamber 10 with a bell-mouth, as shown, to facilitate introducing the shot into it. In the pipe 9 is a valve 13 for turning on and off the water, and the main pipe 7 is provided with a similar controlling-valve 14, controlling admission of water to the hose 7.

The manner of using this shot-feed is as follows: Valve 12 being closed, valve 11 is opened and a suitable amount of the milling-shot are poured into the chamber 10 through the open-



ing in the top thereof. Valve 11 is then closed and valve 12 is opened. The water passes through pipe 9 and hose 8 with considerable velocity, because of the small size of this pipe  
 5 and hose relatively to the main supply-pipe, and so the water is caused to carry the shot, which drop from the chamber 10 when the valve 12 is opened, up through the hose 8 and into the water-swivel 5, from whence they fall  
 10 through the drill-rod to the bottom of the bore in the ordinary manner.

It will be seen that this shot-feeding device may be located at any convenient point, and therefore is always accessible, and, moreover,  
 15 it may be and ordinarily will be at a distance from the bearings and gearing of the machine, so that the shot cannot escape into such bearings and gearing accidentally while they are being fed into the machine. Ordinarily the  
 20 shot-feeding device will be located below the level of the water-swivel, this being usually the most convenient position.

This shot-feeding device might be connected with the main water-hose 7. By reason of  
 25 the fact, however, that earth-drills of this type are sometimes intended to be used interchangeably for the shot-drilling and cutter-drilling methods, the latter of which requires much more water than does the shot-drilling  
 30 system, it is desirable that the water-hose 7 be of a diameter larger than that required for the shot system or for feeding in the shot. Such hose when employed during the operation of shot-drilling may be throttled by the  
 35 valve employed in connection therewith; but this would not be practicable for feeding in the shot, as some velocity is required, and hence I preferably employ a branch hose having a smaller diameter. The chamber 10, with  
 40 its valves 11 and 12, constitutes what may be termed a "water-lock," which is analogous to the air-locks employed in pneumatic caisson-work and the like.

It is obvious that various means beside that  
 45 illustrated may be used for introducing the shot into the water-feed pipe and that the water-lock shown may be varied greatly in construction, and therefore I do not limit myself to the particular device for introducing  
 50 the shot illustrated and described.

What I claim is—

1. In an earth-drilling machine, the combination with a hollow drill-rod, means for rotating same, and a water-swivel upon the said drill-rod at a point above said rotating means,  
 55 of a water-pipe connected with such swivel, and means in connection with such pipe for introducing milling material therein.

2. In an earth-drilling machine, the combination with a drill-rod, means for rotating  
 60 same, and a water-swivel upon said drill-rod at a point above said rotating means, of a water-pipe connected with such swivel and a water-lock connected to said pipe at a point below the level of the water-swivel adapted to  
 65 permit the introduction of milling material into said pipe while the latter is under hydraulic pressure.

3. In an earth-drilling machine, the combination with a hollow drill-rod, and a water-  
 70 swivel thereon having connections for two water-pipes, of two water-pipes, one of smaller diameter than the other, such smaller pipe provided with means for introducing solid milling material into the stream of feed-water,  
 75 and causing the same to be carried into the drill-rod by the water in its movement.

4. In an earth-drilling machine, the combination with a hollow drill-rod, and a water-  
 80 swivel having connections for two water-pipes, of two water-pipes, one of smaller diameter than the other, such smaller pipe provided with a water-lock for introducing solid milling material into said pipe while the latter  
 85 is under hydraulic pressure.

5. In an earth-drilling machine, the combination with a hollow drill-rod, and a water-  
 90 swivel thereon having a siamese coupling, of two water-pipes connected to said coupling, one of said pipes being of smaller diameter than the other and being provided with means for introducing solid milling material into the stream of feed-water and causing the same to be carried into the drill-rod by the water in its movement.

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Witnesses:

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