Dec. 24, 1929.

E. T. HALL

1,740,692

FEEDING MECHANISM

Filed April 25, 1921

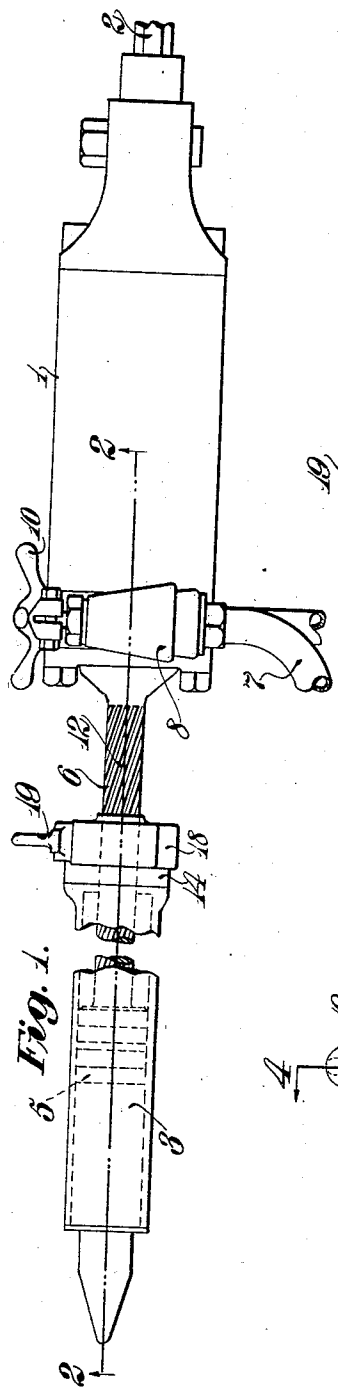


Fig. 1.

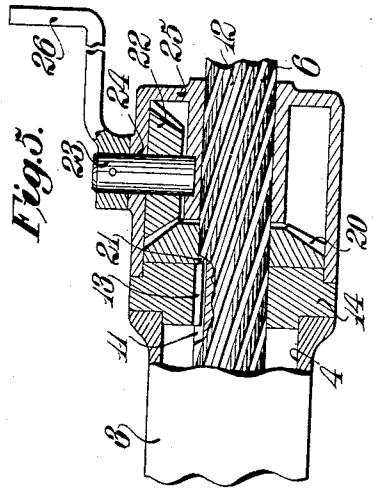


Fig. 5.

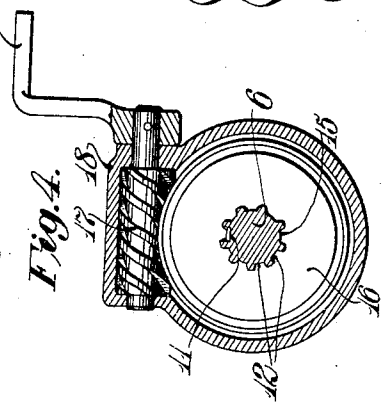


Fig. 4.

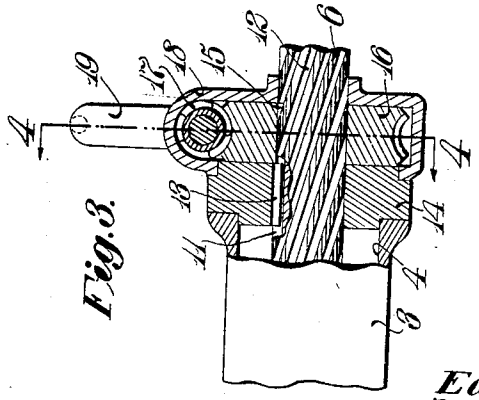


Fig. 3.

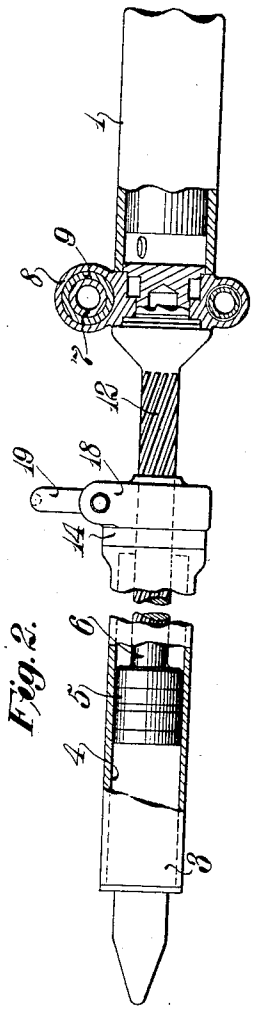


Fig. 2.

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UNITED STATES PATENT OFFICE

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FEEDING MECHANISM

Application filed April 25, 1921. Serial No. 464,343.

My invention relates to feeding mechanisms and more particularly to manually controlled feeding mechanisms for use in controlling the feed of that class of rock drills which are known as stopers.

An object of my invention is to provide an improved feeding mechanism. Another object of my invention is to provide improved feeding mechanism for use in connection with fluid pressure feeds whereby the strength and rate of feed may be manually controlled. A further object of my invention is to provide an improved feeding and control mechanism for use with stoping drills by means of which the strength of feed may be manually controlled and very readily estimated by the drill runner. Other objects of my invention will appear in the course of the following specification and appended claims.

In the accompanying drawings, I have shown for purposes of illustration, two forms which my invention may assume in practice.

In these drawings,—

Fig. 1 is a plan view of a stoping drill provided with my improved feed controlling mechanism.

Fig. 2 is a view partially in elevation and partially in central longitudinal section on the line 2—2 of Fig. 1, showing a different view of the structure illustrated in Fig. 1.

Fig. 3 is a fragmentary view on a section corresponding to the section of Fig. 2,

Fig. 4 is a view on the transverse plane indicated by the line 4—4 of Fig. 3.

Fig. 5 is a view similar to Fig. 3 and showing a modification.

For purposes of illustration, I have shown my improved feeding mechanism employed with a stoping drill comprising a tool 1 adapted to cause operation of the drill steel 2 and fed toward the work by means of feeding mechanism including a cylinder 3 having a bore 4 in which a piston 5 is mounted, and operative upon placing the end of the feed cylinder 3 against a stationary abutment to cause the piston 5 and the tool 1 to be advanced toward the work. The supply of motive fluid to the drill is accomplished by means of a pipe 7 leading to a valve casing 8 in which a valve 9 is rotatable by means of a hand wheel 10, the distribution of air from the valve 9 being well known and accordingly not disclosed.

In the form of my invention shown in Figs. 1 to 4 the piston rod 6 is provided with a straight groove 11 extending longitudinally thereof and is also providing with a series of spiral or helical grooves 12 on its periphery. The straight groove 11 cooperates with a straight tooth or spline 13 formed in the forward head member 14 of the feed cylinder and the spiral grooves 12 intermesh with spiral lands 15 in a worm wheel 16. The worm wheel 16 intermeshes with a worm member 17 journaled at its opposite ends in a housing 18 and controlled by a handle 19. By reason of the small pitch of the teeth of the worm 17 it will be obvious that unless the worm is rotated, the worm wheel 16 will be locked against rotation consequently preventing movement of the feed piston relative to the feed cylinder.

In Fig. 5 I illustrate another possible construction for accomplishing a similar purpose. In this form of my invention the piston rod 6 is provided with a straight groove 11 and spiral grooves 12 as in the other form described. These spiral grooves cooperate with spiral lands 21 formed in the interior periphery of a bevel gear 20 and the straight groove cooperates with a straight tooth or key 13 in the front head member 14. The bevel gear 20 intermeshes with a second bevel gear 22 which is in turn mounted on a shaft 23 journaled in a bearing 24 formed on a member 25 secured to the head 14 and controlled by a hand lever 26. It will be obvious that by means of the lever 26, the operator may obtain a considerable leverage and so check the rotation of the bevel gears as the feed piston is feeding forward under the action of air pressure. By suitably proportioning the parts, it will also be obvious that the drill runner can control with ease the rate of feed and the force exerted by the feed upon the rock.

The operation of the first form described will be readily apparent. Obviously the spiral grooves 12 in the piston rod 6 and the spiral lands 15 will tend to rotate the worm wheel

16 upon admission of pressure fluid to the feed cylinder 3. However, due to the self-locking feature of the worm and worm wheel such rotation is prevented. Accordingly the operator will readily control the feed without the exertion of any appreciable power by simply turning the worm at such a rate as to permit the desired rate or force of feed, the feed piston 5 moving relative to the normally stationary feed cylinder 3 only as the worm wheel 16 is manually rotated.

In the operation of the second form of my invention it will be obvious that the spiral grooves 12 in the piston rod and the spiral lands 21 in the bevel gear 20 will cause the gear 20 to rotate as the piston rod 6 moves forwardly relative to the normally stationary feed cylinders. Thus rotation of the bevel gear 20 will cause rotation of the bevel gear 22 and of the hand lever 26. Accordingly when the hand lever 26 is held stationary by the drill runner the feed of the drill will be interrupted and by this means it will be obvious that the drill runner can easily control the rate of feed as desired.

While I have in this application specifically described two forms which my invention may assume in practice, it will be understood that these forms of the same are shown for purposes of illustration and that the invention may be modified and embodied in other forms without departing from its spirit or the scope of the appended claims.

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

1. In a pneumatic drill feeding mechanism, relatively movable pressure fluid actuated feeding members, means for preventing relative rotation between said feeding members, and means for controlling longitudinal movement therebetween including a helical groove on one of said members, a rotatable nut carried by the other member and engaging said groove, a gear carried by said nut, a cooperating gear meshing therewith, and a manual grasping lever secured to said latter gear.

2. In a pneumatic drill feeding mechanism, relatively movable pressure fluid actuated cylinder and piston members, means for preventing relative rotation between said feeding members, and means for controlling longitudinal movement therebetween including a worm gear, a worm cooperating therewith, and means for positively rotating said gear upon relative movement between said cylinder and piston members during feeding.

3. In a pneumatic drill feeding mechanism, relatively movable pressure fluid actuated cylinder and piston members, means for preventing relative rotation between said feeding members, means for controlling longitudinal movement therebetween including a worm gear, a worm cooperating therewith, means for positively rotating said gear upon relative movement between said cylinder and piston members during feeding, and means for controlling rotation of said worm.

4. In a pneumatic drill feeding mechanism, relatively movable pressure fluid actuated cylinder and piston members, means for preventing relative rotation between said feeding members, and means for controlling longitudinal movement therebetween including a rotatable element having an opening therein through which one of said members extends, means carried by one of said members for effecting positive rotation of said element upon relative movement between said cylinder and piston members during feeding, and means for controlling rotation of said element.

5. In a pneumatic drill feeding mechanism, relatively movable pressure fluid actuated feeding members, means for controlling movement therebetween including a rotatable element having an opening through which one of said members extends, means for positively rotating said element during feeding, and means for limiting the rotation of said element to control the rate of feed.

6. In a pneumatic drill feeding mechanism, relatively movable pressure fluid actuated cylinder and piston members, and means for controlling movement therebetween including a helical groove on one of said members, means for preventing angular movement between said members, a rotatable nut carried by the other member and engaging said groove, and means for controlling rotation of said nut.

7. In a pneumatic drill feeding mechanism, coaxially arranged telescopic pressure fluid actuated feeding members, and means for controlling movement therebetween including a rotatable element disposed coaxially with one of said members, means for positively rotating said element during feeding, and a controlling element therefor rotatable on a transverse axis, and controllable to limit the rate of feed.

8. In a pneumatic drill feeding mechanism, relatively movable pressure fluid actuated cylinder and piston members, and means for controlling movement therebetween including a straight groove on said piston member, an element secured to said cylinder member and cooperating with said groove, a helical groove on said piston member, a rotatable nut carried by said cylinder member and engaging said helical groove, and means for controlling rotation of said nut.

9. In a pneumatic drill feeding mechanism, relatively movable pressure fluid actuated cylinder and piston members, and means for controlling movement therebetween including a straight groove on said piston member, an element secured to said cylinder member and cooperating with said groove, a helical groove on said piston member, a rotatable nut carried by said cylinder member and en-

gaging said helical groove, and means for controlling rotation of said nut comprising a gear formed on said nut and a cooperating gear meshing therewith.

10. In a drill feeding mechanism, a cylinder, a piston therein, said piston having a piston rod, a helical groove formed on the outer periphery of said piston rod, a nut carried by said cylinder and engaging said helical groove, and means for retarding rotation of said nut to control the feeding movement.

11. In a drill feeding mechanism, cooperating cylinder and piston elements for effecting feeding movement when subjected to fluid pressure, a rotatable cam element surrounding said piston element and secured to said cylinder element against longitudinal movement relative to said cylinder element, cooperating cam means on said rotatable element and said piston element for causing relative rotative movement therebetween during a feeding movement, and means for controlling said relative rotation to control the feed.

12. In a drill feeding mechanism, the combination with a drill, of feeding means therefor comprising a relatively stationary cylinder element and a piston element reciprocable in said cylinder and movable with the drill, means for supplying pressure fluid to said cylinder to effect feeding movement, means for controlling the rate of feeding movement comprising a manually controllable rotatable member carried by said cylinder, and means for causing rotation of said element in proportion to the amount of feed whereby the rate of feed may be controlled by controlling the rate of rotation of said member.

In testimony whereof I affix my signature.

EDWIN T. HALL.