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J. I. HULSHIZER
CONTROLLING DEVICE

2,134,405

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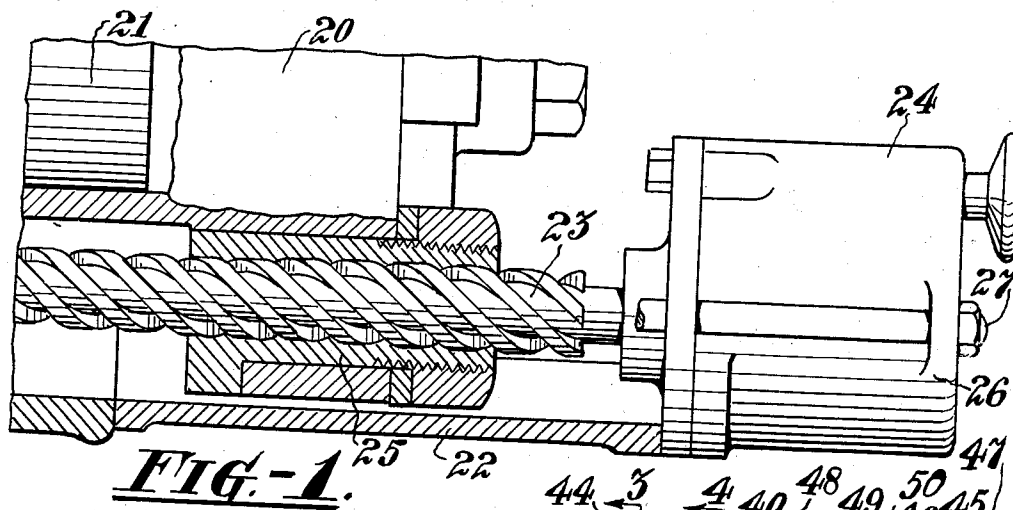


FIG. 1.

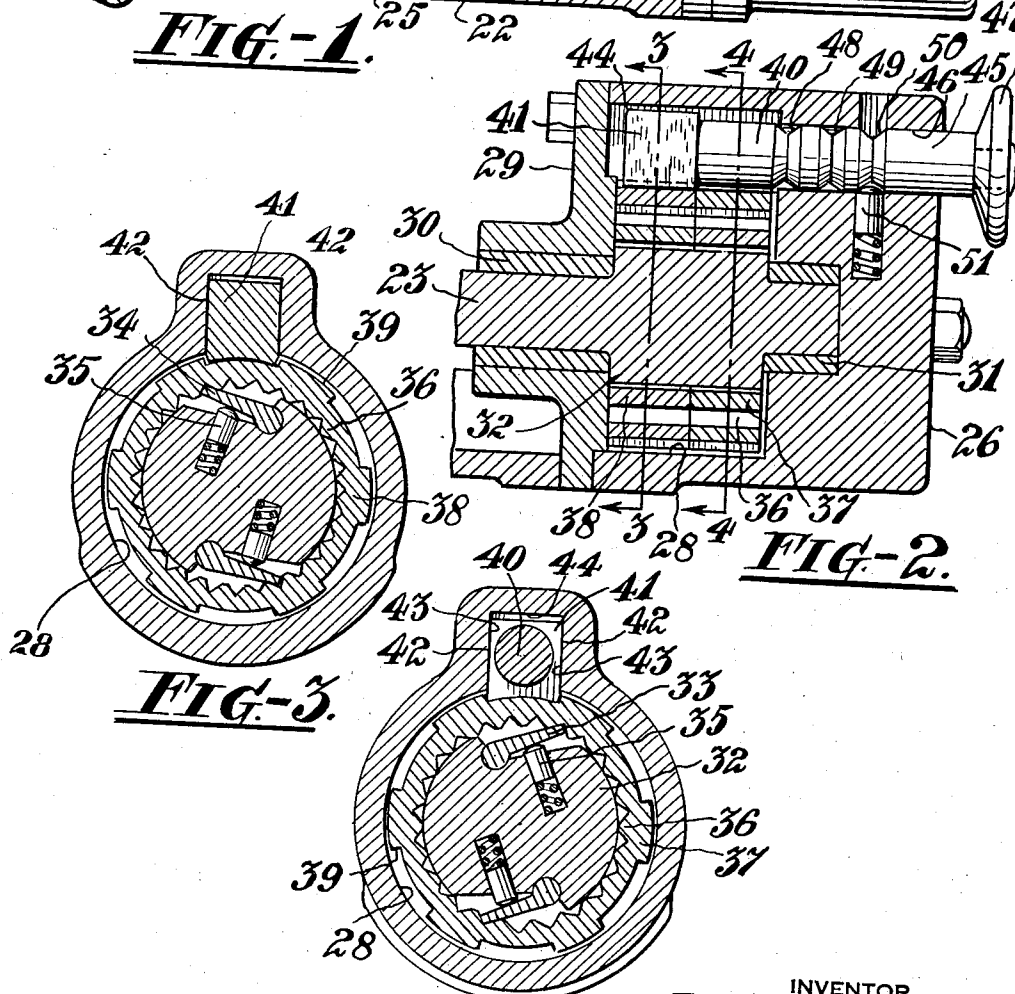


FIG. 2.

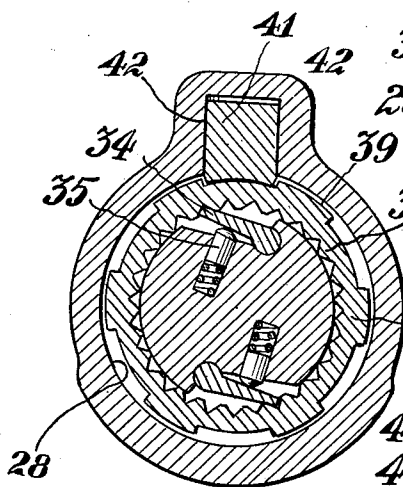


FIG. 3.

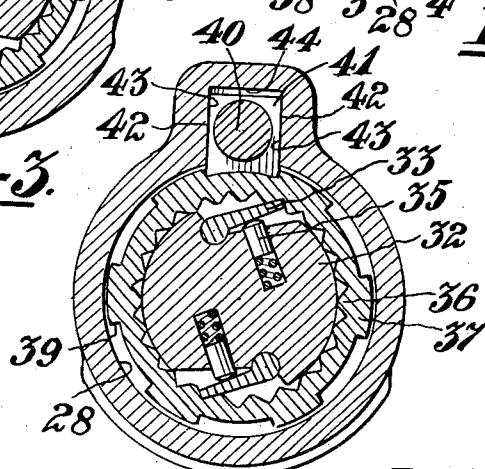


FIG. 4.

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CONTROLLING DEVICE

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4 Claims. (Cl. 188—81)

This invention relates to controlling devices, and more particularly to a controlling device for a rotatable member.

One object of the invention is to selectively control the direction of rotation of the rotatable member.

Another object is to prevent unauthorized rotary movement of the rotatable member.

Other objects will be in part obvious and in part pointed out hereinafter.

In the drawing accompanying this specification and in which similar reference numerals refer to similar parts,

Figure 1 is a longitudinal elevation, partly broken away, of a rock drilling mechanism equipped with a controlling device constructed in accordance with the practice of the invention,

Figure 2 is a longitudinal elevation, in section, of the controlling device, and

Figures 3 and 4 are transverse views taken through Figure 2 on the lines 3—3 and 4—4, respectively.

Referring more particularly to the drawing, the invention is shown embodied in a drilling mechanism comprising a rock drill, only a portion of the cylinder 20 and its piston 21 being shown, a shell 22 serving as a support for the rock drill, a feed screw 23 and a feed controlling mechanism 24 secured to the rear end of the shell 22.

The feed screw is in threaded engagement with a feed nut 25 carried by the cylinder 20, and the threads of the feed screw and the feed nut are of such inclination that the feed screw may be readily rotated by moving the rock drill longitudinally of the shell. The front end of the feed screw 23 may be journaled, in a well known manner, in the corresponding end of the shell, and the rear end of the feed screw extends into a casing 26 of the feed controlling mechanism 24 secured to the rear end of the shell by bolts 27.

The casing 26 is preferably of cup-shape, having a bore 28 of which the front end is closed by a cover plate 29 and contains a bushing 30 to form a bearing for the feed screw 23. An additional bearing is provided for the rear end of the feed screw 23 by a bushing 31 seated in the casing 26.

On the portion of the feed screw 23 lying between the bearings 30 and 31 is an enlargement 32 having arranged therein two sets of pawls 33 and 34 which are urged outwardly by spring-pressed plungers 35 slidable in the enlargement 32. The sets of pawls 33 and 34 incline in different directions and are respectively adapted to

engage introverted teeth 36 on ratchet rings 37 and 38 encircling the enlargement 32. The ratchet rings 37 and 38 are freely rotatable in the bore 28 and are centralized by the enlargement 32 of which the peripheral surface engages the crests of the teeth 36.

Means are provided to selectively lock the ratchet rings in fixed position, either singly or collectively, depending upon whether it be desired to effect rotary movement of the feed screw or to hold it immovable. The ratchet rings are accordingly provided on their peripheries with a series of clutch members 39, and in the casing 26 is a plunger 40 having a head 41 to interlockingly engage the clutch members 39 and hold the ratchet rings stationary, thereby enabling the teeth of the ratchet rings to serve as abutments for the pawls 33 and 34.

The head 41 has opposed flat surfaces 42 which slidably engage similar surfaces 43 in the casing 26 to prevent rotary movement of the plunger. The surfaces 43 form the sides of a slot 44 in the casing 26 and extending from one end of the bore 28 into which it opens so that the head 41 may slide into engagement with the clutch members 39 of the ratchet ring 38 or thus on the periphery of the ratchet ring 37 or both.

The stem 45 of the plunger 40 is of generally cylindrical shape. It extends slidably through a bore 46 in the casing 26 and has a portion projecting exteriorly of the casing to accommodate a button 47 which may be grasped by the operator for shifting the plunger into engagement with the clutch members.

To the end that the plunger 40 may be located in the various positions of engagement of the head 41 with the clutch members, the stem 45 is provided with a series of annular grooves, three in the present instance, designated 48, 49 and 50, to receive the end of a spring-pressed plunger 51 arranged in the casing 26. The grooves are so positioned that the plunger 51 engages the groove 50 when the head 51 is in engagement with the clutch members on the ratchet ring 38, and when the plunger is shifted to carry the head 41 into engagement with the clutch members of the ratchet ring 37 the plunger 51 will seat into the groove 48 for holding the plunger 40 in engagement with the clutch members.

The groove 49 is located between the grooves 48 and 50 and receives the plunger 51 to retain the head 41 in an intermediate position in which it interlockingly engages the clutch members of both ratchet rings.

During the operation of the device the force

employed for moving the rock drill longitudinally of the shell and, therefore, to rotate the feed screw to permit of such movement is supplied by the piston 21 at the instant of reversal in the ends of the cylinder 20. For example, when the piston 21 reaches the rear end of its stroke the resulting shock is imparted to the cylinder and moves the rock drill in the direction of the casing 26.

In like manner, when the piston reverses its direction of movement in the front end of the cylinder the jar tends to carry the rock drill in the direction of the work and in the absence of suitable restraining devices will rotate the feed screw 23. Assuming, therefore, that it be desired to advance the rock drill toward the work in order to maintain the percussive element within the correct striking distance of the working implement the plunger is moved into engagement with the clutch members of the ratchet ring 37 and is held thus by the plunger 51 which then engages the groove 48.

During the subsequent operation of the rock drill the jars resulting upon reversal of the piston in the front end of the cylinder and acting against the casing of the rock drill cause the feed screw to turn in a counter-clockwise direction, as viewed from the right hand ends of Figures 1 and 2. The pawls 33 will, during the rotary movement of the feed screw in the direction described, pass over the crests of the adjacent ratchet teeth 36 and will be constantly in position to engage a ratchet tooth. At the end of the return stroke of the piston 21 a similar jar is imparted to the rock drill casing but will be ineffective to disturb the position of the feed screw for the reason that the pawls 33 will then abut ratchet teeth 36 of the ratchet ring 37 to prevent retrograde movement of the rock drill.

The parts controlling the action of the feed screw continue to function in the manner described until the rock drill has advanced to the front end of the shell 22. The plunger 40 is then shifted to the position illustrated in Figure 2 in which the head 41 engages the clutch members of the ratchet ring 38 and, therefore, releases the ratchet ring 37.

In the new position of the plunger the ratchet ring 38 is held stationary and its teeth form abutments for the pawls 34 so that when the piston 21 reverses in the front end of the cylinder 20 the feed screw 23 will be held against movement permitting further movement of the rock drill toward the work. However, at the end of the subsequent rearward stroke of the piston 21 the jar applied to the rock drill and transmitted through the feed nut 25 to the feed screw causes the feed screw to rotate in a clockwise direction and thus permit the shock to carry the rock drill rearwardly along the shell 22. The delivery of repeated shocks or jars to the rock drill by the

piston 21 will move the rock drill rearwardly to its initial position in a manner well understood.

In the event that it should be desired to hold the rock drill immovable with respect to the shell the plunger 40 is moved into an intermediate position in which the head 41 partly overlaps each ratchet ring and engages the clutch members of both.

I claim:

1. In a controlling device, the combination of a casing and a rotatable member in the casing, a plurality of sets of spring-pressed pawls carried by the rotatable member, separate ratchet rings for each set of pawls encircling the member and being freely rotatable in the casing, and means to hold the ratchet rings singly or collectively immovable to provide abutments for the pawls for controlling the direction of rotation of the rotatable member or to prevent rotation of the rotatable member.

2. In a controlling device, the combination of a casing and a rotatable member in the casing, a plurality of sets of spring-pressed pawls carried by the rotatable member, separate ratchet rings for each set of pawls arranged on the rotatable member and being freely rotatable in the casing, clutch members on the ratchet rings, and means movable selectively into engagement with the clutch members to hold said clutch members stationary and thereby provide abutments for the pawls for controlling the direction of rotation of the rotatable member and to prevent rotation of the rotary member.

3. In a controlling device, the combination of a casing and a rotatable member in the casing, a plurality of sets of spring-pressed pawls carried by the rotatable member, separate ratchet rings for each set of pawls arranged on the rotatable member and being rotatable with respect to the casing and the rotatable member, clutch members on the peripheries of the ratchet rings, and a plunger slidable in the casing to different positions to engage the clutch members to hold the ratchet rings immovable and thereby provide abutments for the pawls for controlling the direction of rotation of the rotatable member and being slidable to another position to interlockingly engage the clutch members of both ratchet rings.

4. In a controlling device, the combination of a casing and a rotatable member in the casing, a plurality of sets of spring-pressed pawls carried by the rotatable member, separate ratchet rings for each set of pawls and being rotatable with respect to the rotatable member, and means to selectively hold the ratchet rings singly or collectively immovable to provide abutments for the pawls for controlling the direction of rotation of the rotatable member or to prevent rotation of the rotatable member.

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