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T. R. E. RUNDQVIST

DRILL MECHANISM

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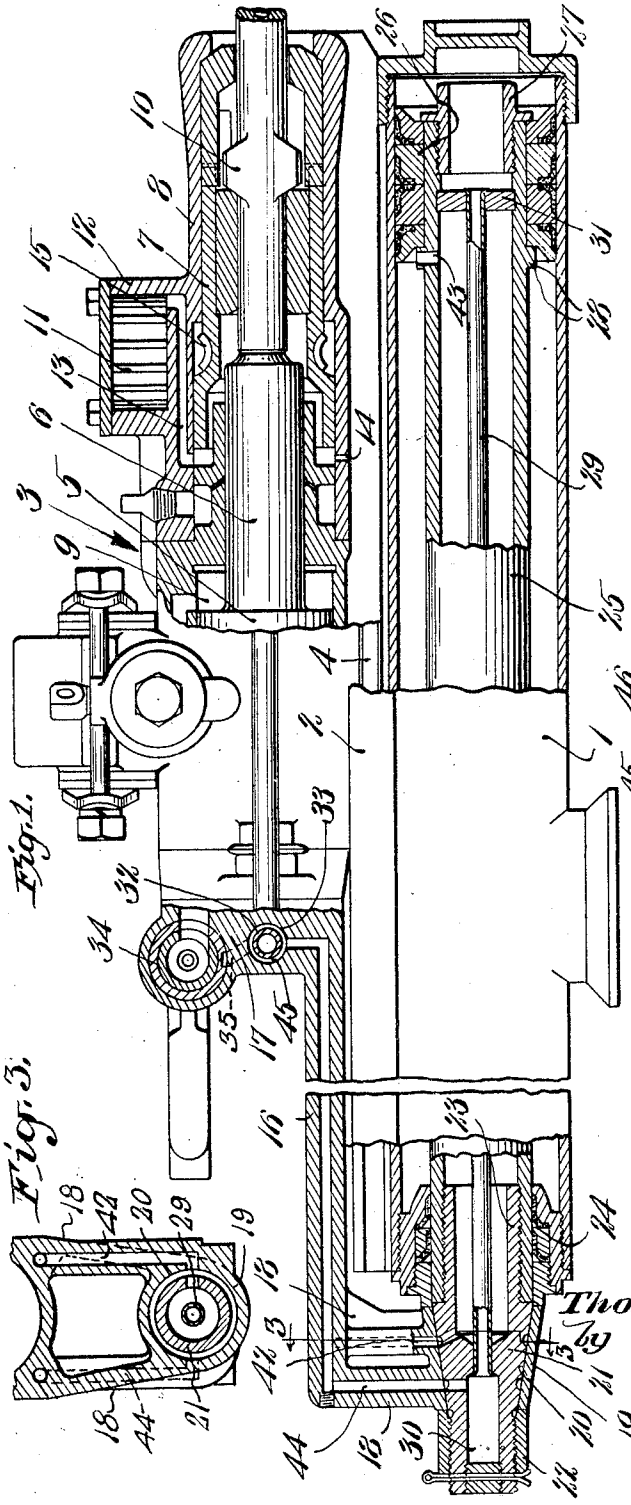


Fig. 1.

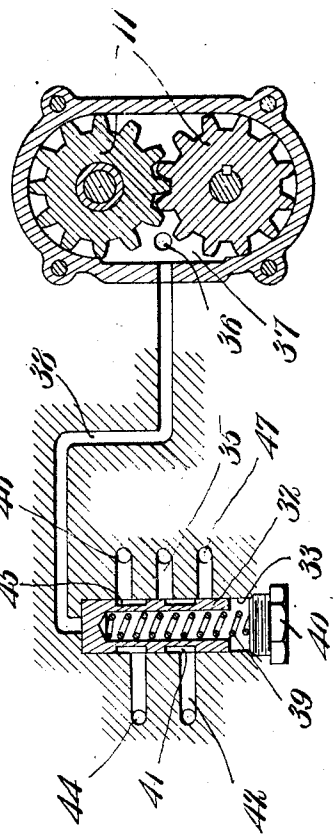


Fig. 2.

Fig. 3.

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DRILL MECHANISM.

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This invention relates to drill mechanism.

It has for its object to provide an improved drilling mechanism. A further object is to provide a drilling mechanism having improved feeding means therefor. Another object of my invention is to provide a drilling mechanism having rotation means for a steel and a pneumatic feed therefor with improved means for controlling the feed, which latter means is dependent upon the mode of operation of the steel. It is another object of my invention to provide improved automatic means for reversing the drilling mechanism feed when the operation of the steel is not complete, such as when the steel becomes stuck.

In the accompanying drawings I have shown for purposes of illustration one form which my invention may assume in practice.

In these drawings,—

Fig. 1 is a side elevation, partly broken away to show details of construction.

Fig. 2 is a diagrammatic view of the control means for the feed.

Fig. 3 is a transverse vertical sectional view taken substantially on line 3—3 of Fig. 1.

In the illustrative form of my invention I have shown the same embodied in a drifter type of drill which comprises a combined feed cylinder and shell 1 having usual guideways 2 mounted on the upper side thereof to carry a drilling mechanism generally indicated at 3 as by gibs 4 slidably mounted in said guideways. More specifically, the drilling motor comprises a usual reciprocable piston 5 having a striking bar 6 projecting forwardly therefrom and into a chuck sleeve 7 rotatably mounted within a chuck housing 8 carried on the front end of the motor cylinder 9. Suitable means are provided for rotating the sleeve 7 and to thereby rotate the steel 10, which means comprises a plurality of intermeshing rotors 11 carried in a suitable casing 12 projecting upwardly from the housing 8 and from which leads a suitable exhaust passage 13 communicating with exhaust ports 14 formed in the housing 8. One of the rotors 11 is adapted to actuate a worm wheel 15 formed on the periphery of the chuck sleeve 7 as by any suitable worm (not shown) mounted upon a vertically disposed shaft carrying one of said rotors 11. As this part of the mechanism per se does not form part of my invention it is not thought that further detailed description is necessary.

The feed for the drilling mechanism 3 comprises an arm 16 projecting rearwardly from the lower portion of the rear cylinder head 17 and having downwardly projecting arms 18 which carry a boss 19 having a conical bore 20 within which is fixed a member 21 as by a nut construction 22. Threadedly connected to a reduced forward portion 23 of the member 21 and projecting forwardly through the rear combined cylinder head and packing gland 24 is a hollow piston rod 25 carrying at its forward end a piston 26 formed of several parts and held together as by a hollow flanged nut 27 adapted to press said several piston elements against a rear flange 28 to hold the same in fixed relation. There is also carried by the member 21 a fluid conducting tube 29 which communicates at its rear end with a chamber 30 and terminates at its forward end in a partition 31 carried in the forward portion of the bore of the piston rod 25 while communicating as by the hollow portion of the nut 27 with the front side of the piston 26.

In my improved construction I have provided means whereby when the operation of the steel 10 is not complete or normal, such for instance, as when the same is prevented from rotating due to any cause, the forward feed will then be reduced or vented to atmosphere and the reverse feed actuated to free the stuck steel or to allow the complete operation of the same. This means comprises a spring pressed pilot valve 32 reciprocably mounted within a bore 33 formed in the rear head 17, said head also supporting the main control valve 34 adapted to cooperate with the pilot valve 32. Leading from the main control valve is a live pressure fluid inlet 35 communicating with the central portion of the bore 33 while a second live pressure fluid passage 36 likewise leads from the main valve 34 and communicates with the inlet chamber 37 of the steel rotation motor 11. From said chamber 37 a passage 38 leads to the rear end of the bore 33 at which end valve 32 is normally held for forward feed by a spring 39 seated against a plug 40 closing the opposite end of the bore 33. This spring is so tensioned that the valve will only move when the steel is prevented from rotating. In the position shown in Fig. 2 live fluid will flow through the passage 35 around an annular groove 41 formed on the periphery of the valve 32 and out through a passage 42 leading to the bore of the hollow piston rod 25

from which it will pass as by a port 43 to the rear side of piston 26 to cause forward movement thereof. During this operation the front side of the piston 26 is vented to atmosphere as by the tube 29 communicating with a passage 44 which terminates in the bore 33 so as to communicate adjacent one edge of the annular groove 45 formed in the periphery of the valve 32. There is also, an exhaust port 46 longitudinally disposed from the passage 44 and communicating at the other edge of the annular groove 45 so that fluid flowing through passage 44 may be exhausted to the atmosphere.

If the rotation motor 11 should be stopped for any reason such as by a steel sticking and while normal operating pressure is maintained, pressure in chamber 37 and consequently in the passage 38 will build up and thereby shift the valve 32 against the tension of the spring 39 so as to cut off communication between the inlet port 35 and the forward feed passage 42 and to also cut off communication between the exhaust port 46 and reverse passage 44. During this operation, however, the inlet passage 35 is connected to the reverse passage 44 as by annular groove 45 which allows live pressure fluid to flow through tube 29 to the front side of piston 25 to drive the same rearwardly. During this operation the rear side of the piston is exhausted to the atmosphere as by allowing communication between said rear side, as by passage 42, and an exhaust port 47 which communicates with an annular groove 41 when the valve 32 is in its shifted position.

It will thus be seen that I have provided an improved drilling mechanism having an independent rotation motor supported by and movable with a drilling mechanism and including an improved automatic valve control for the forward and reverse feed, such that upon the steel sticking the reverse feed will be thrown in to release the same.

While I have in this application specifically described one form which my invention may assume in practice, it will be understood that this form of the same is shown for purposes of illustration and that the invention may be modified and embodied in various 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. A drill mechanism comprising a drilling motor, a steel actuated thereby, a forward and reverse positive feeding means therefor comprising but a single reversible pressure fluid actuated motor, an independent pressure fluid actuated rotation motor for said steel, and pressure fluid operated means responsive to the resistance to steel rotation for reversing said feeding means.

2. A drill mechanism comprising a drilling motor, a steel actuated thereby, a fluid pressure actuated forward and reverse positive feeding means therefor comprising but a single reversible motor, an independent rotation motor for said steel, and means responsive to the resistance to steel rotation for affecting the flow of fluid relative to the forward and reverse feed simultaneously.

3. A drill mechanism comprising a drilling motor, a steel actuated thereby, a forward and reverse positive feeding means therefor comprising but a single reversible motor, an independent rotation motor for said steel, and means responsive to the resistance to steel rotation for automatically affecting either the forward or reverse feed.

4. A drill mechanism comprising a drilling motor, a steel actuated thereby, a forward and reverse positive feeding means therefor comprising but a single reversible motor, an independent rotation motor for said steel, and means dependent upon said rotation motor for automatically affecting both of said feeds.

5. A drill mechanism comprising a drilling motor, a steel actuated thereby, a forward and reverse positive feeding means therefor comprising but a single reversible motor, an independent rotation motor for said steel, and means controlled by said rotation motor for automatically reversing said feed.

6. A drill mechanism comprising a drilling motor, a steel actuated thereby, a forward and reverse positive feeding means therefor, an independent rotation motor for said steel, and a fluid actuated valve controlled by said rotation motor for automatically controlling said reverse feed.

7. A drill mechanism comprising a drilling motor, a steel actuated thereby, a forward and reverse positive feeding means therefor, an independent rotation motor for said steel, and a fluid actuated valve controlled by said rotation motor for controlling said reverse feed, said valve being actuated only when said steel is prevented from rotating.

8. In a drilling mechanism, work performing means comprising a plurality of motors one of which is of the reversible type, while another is rotary, and means responsive to the torque of said rotary motor for automatically reversing said reversible motor.

9. A drilling mechanism comprising a rotary tool rotating motor, a reversible feeding motor, and means responsive to the torque of said rotary motor for automatically reversing said feeding motor.

10. A drilling mechanism comprising a motor for hammering a drill steel, a motor for rotating the steel, a motor for feeding the steel, one of said motors being of the reversible type, and means responsive to the torque of one of said motors for automatically reversing said reversible motor.

11. A drilling mechanism comprising a drilling motor, a drill steel actuated thereby, an independent motor for rotating the steel, reversible means for positively feeding the steel in opposite directions comprising but a single reversible motor, and means responsive to the resistance to rotation for automatically controlling said feeding means.

12. A drilling mechanism comprising a drilling motor, a drill steel actuated thereby, an independent motor for rotating the steel, reversible means for positively feeding the steel in opposite directions comprising but a single reversible motor, and means responsive to the resistance to rotation for automatically reversing said feeding means.

13. A drilling mechanism comprising a drilling motor, a drill steel actuated thereby, an independent pressure fluid actuated motor for rotating the steel, reversible means for positively feeding the steel in opposite directions, and means including a valve responsive to the pressure changes in said rotation motor for automatically reversing said feeding means.

14. In a drilling mechanism, work performing means comprising a rotary motor, feeding means therefor comprising a reversible motor, and means responsive to the torque of said rotary motor for automatically reversing said feeding motor.

15. In a drilling mechanism, work performing means comprising a percussive motor and a rotary motor, a reversible feeding motor therefor, and means responsive to the load changes on one of said work performing motors for automatically reversing said feeding motor.

16. A drilling mechanism comprising an impact motor for actuating a drill steel, an independent motor for rotating the steel, reversible fluid actuated means for positively feeding the steel in opposite directions comprising relatively reciprocable cylinder and piston elements, and pressure fluid operated means responsive to the torque of the rotation motor for automatically reversing said feeding means.

17. In a drilling mechanism, work performing means comprising a rotary motor, reversible means for positively feeding the same forwardly or rearwardly comprising but a single reversible motor, and means responsive to the load changes on said rotary motor for simultaneously affecting both of said feeds.

18. A drill mechanism comprising a drilling motor, a drill steel actuated thereby, feeding means for said steel for effecting positive forward and reverse feed thereof comprising but a single reversible motor, an independent rotation motor for said steel, and means responsive to the resistance to steel rotation for automatically reversing said feeding means.

19. A drill mechanism comprising a fluid actuated drilling motor, a drill steel actuated thereby, fluid actuated feeding means for said steel for effecting positive forward and reverse feed thereof, an independent fluid actuated rotation motor for said steel, and means responsive to the pressure changes in said rotation motor due to the varying resistance to steel rotation for automatically reversing said feeding means.

In testimony whereof I affix my signature.

THORE R. E. RUNDQVIST.