No. 890,236. PATENTED JUNE 9, 1908.

R. C. JONES.

FEED FOR WELL DRILLING APPARATUS.

APPLICATION FILED FEB. 11, 1908.

3 SHEETS—SHEET 1.

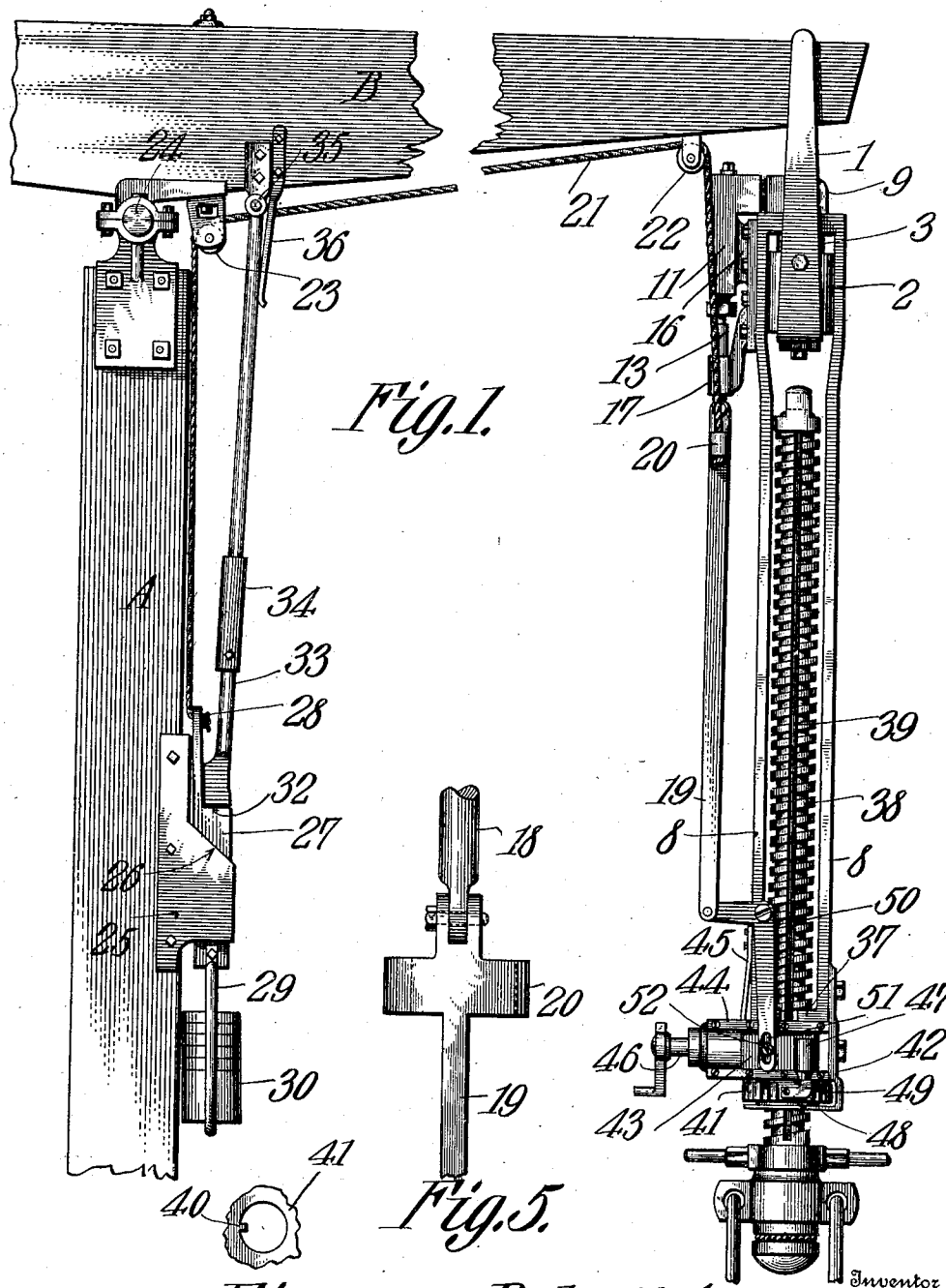

Fig. 1.

Fig. 5.

Fig. 10.

Witnesses

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3 SHEETS—SHEET 2.

Fig. 4.

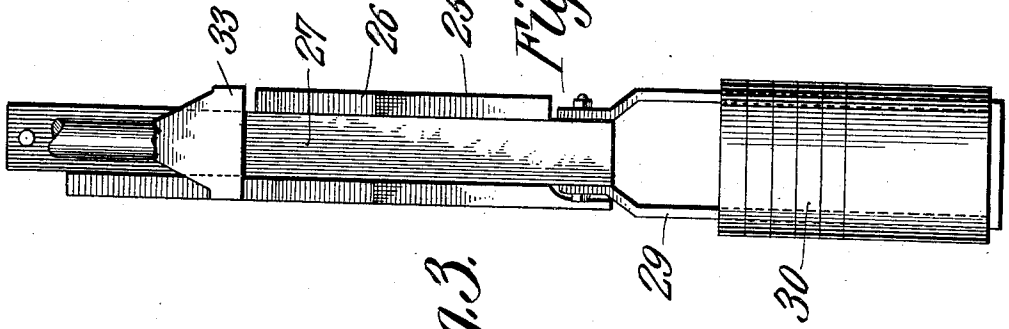

Fig. 3.

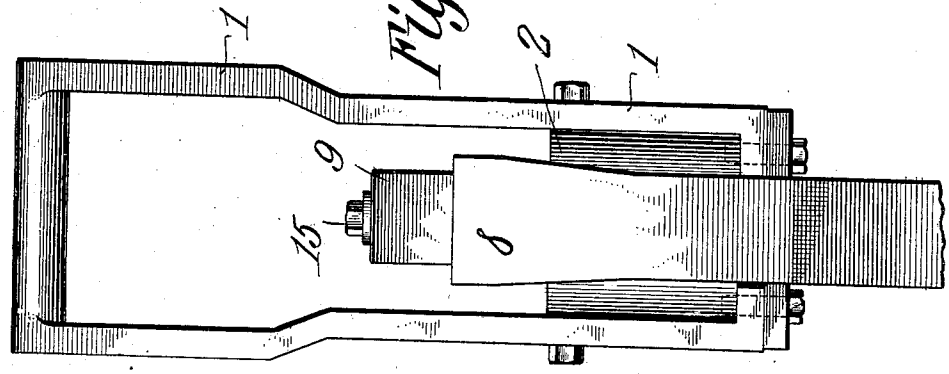

Fig. 6.

Fig. 2.

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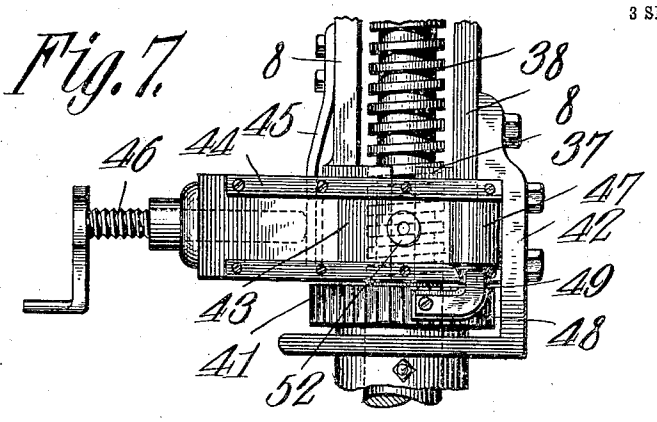
3 SHEETS—SHEET 3.

Fig. 7.



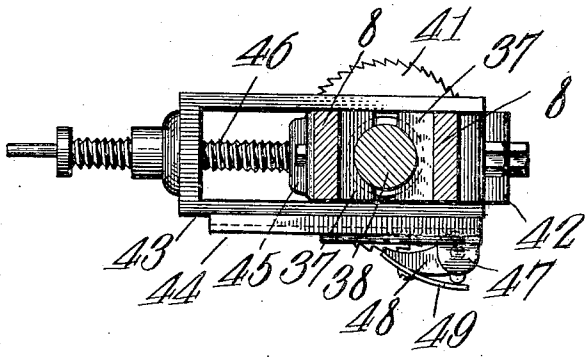
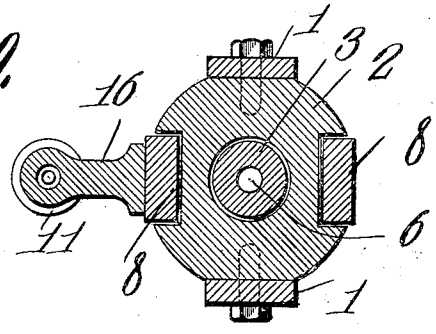


Fig. 8.

Fig. 9.



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UNITED STATES PATENT OFFICE.

ROBERT C. JONES, OF NEW CUMBERLAND, WEST VIRGINIA.

FEED FOR WELL-DRILLING APPARATUS.

No. 890,236. Specification of Letters Patent. Patented June 9, 1908.

Application filed February 11, 1908. Serial No. 415,428.

To all whom it may concern:

Be it known that I, ROBERT C. JONES, a citizen of the United States, residing at New Cumberland, in the county of Hancock and State of West Virginia, have invented a new and useful Feed for Well-Drilling Apparatus, of which the following is a specification.

This invention relates to well drilling apparatus and more particularly to means for automatically feeding or paying out the temper-screw, this automatic action being proportioned to the movement of the drilling tool so that said tool will be fed downwardly into the well only as rapidly as it drills.

The device is more particularly designed as an improvement upon the automatic feeding structures disclosed in Patents No. 836,384 dated Nov. 20, 1906, and No. 852,120 dated April 30, 1907, both issued to me.

The object of the invention is to improve upon the mechanism heretofore devised by utilizing hydraulic means for transmitting power from the tool to the temper-screw feeding device, thus reducing the number of working parts and rendering the device more durable and efficient in operation.

With these and other objects in view the invention consists of certain novel features of construction and combinations of parts which will be hereinafter more fully described and pointed out in the claims.

In the accompanying drawings is shown the preferred form of the invention.

In said drawings: Figure 1 is an elevation of the apparatus embodying the present improvements, a portion of the walking beam and samson post of a drilling machine being disclosed, said walking beam being partly broken away. Fig. 2 is a vertical section through the fluid containing portion of the mechanism. Fig. 3 is an elevation of the parts shown in Fig. 2 and viewed at right angles thereto. Fig. 4 is an elevation of the weight supporting slide and its guide. Fig. 5 is a detail view of the upper portion of the connecting rod to which the cable of the apparatus is connected. Fig. 6 is a plan view of one of the weights employed. Fig. 7 is an enlarged side elevation of the ratchet mechanism of the apparatus. Fig. 8 is a horizontal section through the feed screw and its reins and showing the ratchet mechanism in plan. Fig. 9 is a horizontal section through the hydraulic cylinders. Fig. 10 is a plan view of the central portion of the ratchet wheel.

Referring to the figures by characters of reference, A designates a samson post on which is mounted a walking beam B which may be of the usual construction. Suspended from one end of the walking beam is a stirrup 1 which projects under and is bolted or otherwise secured to the lower end of a hydraulic cylinder 2. A piston 3 is mounted to reciprocate within this cylinder and has a screw threaded extension 4 at its lower end on which is bolted or otherwise secured a cup 5′ of leather or other material designed to prevent leakage past the piston. Another threaded extension 5 is arranged at the other end of the piston and a passage 6 extends longitudinally through the piston and its two extensions as clearly indicated in Fig. 2. Extension 5 projects through one end 7 of temper-screw reins 8 and said extension is fastened to these reins by means of an ell 9 which is screwed thereon and acts as a nut to bind the reins and the piston together. This ell has a reduced threaded extension 10 engaging one end of an ell 11. One arm of ell 11 extends parallel with the cylinder 2 and constitutes a cylinder in which a piston 12 is designed to work. A suitable stuffing box 13 is located at the lower end of the cylinder formed by the ell 11 and a suitable inlet opening 14 is preferably located within the upper portion of said ell and normally closed by means of a screw plug 15. The ell 11 has an integral shoe 16 bolted or otherwise fastened to the reins 8 and a guide head 17 is also formed with this shoe and located below the piston 12.

Mounted within the head 17 is a slide 18 to which the piston 12 is connected and pivotally connected to this slide is a connecting rod 19 having laterally extending ears 20 to which a small rope 21 preferably of wire is secured. This rope extends over a sheave 22 fastened to the walking beam close to stirrup 1 and also over a sheave 23 fastened to the walking beam near its bearing 24. A guide bracket 25 is secured to the samson post A and the outstanding flanges thereof have their upper ends beveled as indicated at 26. A slide 27 is mounted within this bracket and rope 21 is secured to the upper end of this slide as indicated at 28. Slide 27 has a weight rein 29 suspended therefrom and designed to support a sectional weight 30 having opposite portions notched as indicated at 31 in Fig. 6 to receive the rein and prevent displacement. A shoulder 32 is formed ad-

jacent the upper end of this slide and constitutes an abutment for a plunger 33 preferably formed of sections adjustably connected by means of a sleeve 34. The upper end of this plunger is pivotally connected to the walking beam at a point between the sheaves 22 and 23 as indicated at 35 and a spring 36 is secured to the walking beam and exerts a constant pressure against the plunger so as to hold it normally positioned above the shoulder 32. The reins 8 have boxing clamps 37 at their lower ends between which is supported the temper-screw 38 and this screw has a longitudinal groove 39 into which projects a key 40 formed within a ratchet wheel 41. This ratchet wheel is mounted to rotate upon the temper-screw and is supported against longitudinal displacement by means of a bracket 42 bolted or otherwise fastened to the reins 8. A slide 43 is mounted in guide 44 disposed below the reins 8. A spring 45 is secured to one of the reins 8 and a screw 46 bears thereagainst. A lug 47 is formed upon the slide and has a pawl 48 pivotally connected to and normally held in engagement with ratchet wheel 41 by means of a spring 49. A bell crank lever 50 is fulcrumed upon one of the reins 8 and the connecting rod 19 is pivotally attached to one end of the lever, while the other end is slotted longitudinally as at 51 to receive a pin 52 outstanding from slide 43. The spring 45 is designed for exerting vibrating tension upon the boxing clamps 37 so that the temper screw may be turned out by the influence of weights 30 upon the relaxation of the drilling tools subsequent to the exertion of gravity force and to prevent the screw from turning out under the influence of gravity force on the downward thrust of the tools.

In using the apparatus the ells 9 and 11, passage 6 and cylinder 2 are filled with a suitable liquid such as alcohol, which is admitted through the opening 14 after which said opening is closed by means of the screw plug 15. The tools are then placed within the well and fastened to the rope clamps, not shown, so that they will be suspended a few inches from the bottom of the well. The weights 30 are then adjusted so as to practically balance the tools and hold the piston 12 in raised position. When the walking beam is in action the tools are projected downward into the well cutting the rock in the usual manner and as the depth of the cut increases the gravity force of the tools upon the rope or cable is increased, thus pulling downward on piston 3 through reins 8 and causing said piston to force the confined fluid against the piston 12. This piston will therefore be projected downward and will cause the weights 30 to be raised and the slide 43 to be shifted backward by the bell crank lever.

The tools, when projected downward, reach out beyond the length of the beam's movement or stroke to strike bottom, the natural elasticity of the cable admitting of such reaching out. The relaxation of the cable does not take place until the end of the beam has been upraised and begins its next downward movement. Consequently, it will be seen that the lower end of the spring-pressed plunger rod 33 will stand in a position overlying shoulder 32 at the beginning of said beam's downward movement, in which position it will exert a downwardly directed force upon said shoulder throughout a portion of said beam's downward movement for assisting in returning the parts of the mechanism to their normal position. In other words, substantially the first half of the beam's downward movement is utilized by the plunger rod 33 in aiding the weighted slide 27 to move downward. On the last half of the beam's movement, the lower end of said plunger rod engages the beveled upper end 26 of the guide bracket 22 and is thereby deflected or thrust from engagement with said shoulder 32, thus allowing the said slide 27 to be again upraised with the outreaching movement of the downwardly projected tools.

With the relaxation of the drilling cable, as above noted, the parts assume their normal positions. In returning to its normal position, the bell-crank 50 thrusts the slide 43 forward, and the pawl 48 carried thereby and which engages the ratchet 41 effects a slight forward rotation of the temper screw, thus paying out the tools.

It will be seen from the foregoing description that the mechanism herein described will efficiently operate to automatically feed the tools downwardly in proportion to the speed with which the drilling is effected, this feeding operation being absolutely controlled by the tools.

What is claimed is:

1. In a device of the character described the combination with a walking beam and a temper-screw suspended therefrom; of screw actuating mechanism, means operated by the fall of the drilling tools for setting said mechanism, and means automatically operating upon the relaxation of the tools for actuating said mechanism to pay out the screw.

2. In a device of the character described the combination with a walking beam; of a temper-screw suspended therefrom, means for rotating the screw, hydraulic mechanism operated by the fall of the drilling tools for setting said mechanism, and automatically operating means for actuating said mechanism upon the relaxation of the tools for rotating the screw.

3. In a device of the character described the combination with a walking beam, a cylinder suspended therefrom, a temper-screw, a support therefor, and means for confining a fluid between the support and cylinder; of screw rotating mechanism including a piston

disposed to be actuated by the confined fluid upon the dropping of the drilling tools to set the mechanism, and means for automatically actuating said mechanism to pay out the screw upon the relaxation of the tools.

4. In a device of the character described the combination with a walking beam, a relatively fixed element carried thereby, a relatively movable element, and means for confining a fluid between said elements; of a temper-screw supported by one of the elements, actuating mechanism disposed to be set by the confined fluid upon the dropping of the drilling tools, and means for automatically actuating said mechanism upon the relaxation of the tools for paying out the screw.

5. In a device of the character described the combination with coöperating relatively fixed and relatively movable fluid forcing means, and a walking beam supporting the same; of a temper-screw carried by one of said fluid forcing means, screw feeding mechanism disposed to be set by the confined fluid upon the dropping of the drilling tools, and means for automatically actuating said mechanism to pay out the screw during the relaxation of the tools.

6. In a device of the character described the combination with a walking beam; of a relatively fixed and a relatively movable fluid forcing member carried by the walking beam, supporting means rigid with the movable member, a temper-screw carried thereby, means operated during the relaxation of the drilling tools for imparting a partial rotary motion to the temper-screw and means operated by the fluid under pressure for setting the screw actuating means.

7. In a device of the character described the combination with a walking beam; of a relatively fixed and a relatively movable fluid forcing member carried by the beam, reins depending from the movable member, a temper-screw carried thereby, mechanism for imparting an intermittent rotary movement to the screw upon successive relaxations of the drilling tools, and means operated by the forcing of fluid for resetting said mechanism upon the dropping of the drilling tools.

8. In a device of the character described the combination with a walking beam; of a relatively fixed and a relatively movable forcing member carried by the beam, reins depending from the movable member, a temper-screw carried by the reins, mechanism for paying out the screw during relaxation of the drilling tools, and means carried by the walking beam and coöperating with said mechanism for positively operating it upon the movement of the beam in one direction, and hydraulic means for setting said mechanism during the dropping of the drilling tools.

9. In a device of the character described the combination with a supporting structure and fluid forcing devices supported thereby; of a temper-screw connected to one of said devices, screw actuating mechanism disposed to be set by the movement of the confined fluid during the dropping of the drilling tools, and means for automatically actuating said mechanism to pay out the screw during the relaxation of the tools.

10. The combination with a walking beam, a temper-screw and movably connected fluid confining members for suspending said screw from the walking beam; of mechanism for automatically rotating the screw during the relaxation of the drilling tools, and means operated by the confined fluid for setting said mechanism upon the dropping of the tools.

11. In a device of the character described the combination with a walking beam, and a cylinder suspended therefrom; of a piston mounted to work within the cylinder, reins carried thereby, a temper-screw supported by the reins, a ratchet wheel feathered upon said screw, means for actuating the ratchet wheel, a piston connected to and disposed to set said means, and means for directing a confined fluid from the cylinder and against the last mentioned piston upon the dropping of the drilling tools.

12. In a device of the character described the combination with a walking beam and a cylinder carried thereby; of a piston, reins carried thereby, a temper-screw supported by the reins, a ratchet wheel feathered upon said screw, a pawl for actuating said wheel, means for automatically actuating the pawl to impart an intermittent rotary motion to the wheel and screw upon successive relaxations of the drilling tools, and means operated by a fluid confined between the piston and cylinder for setting the pawl between the operations of the ratchet wheel.

13. The combination with a walking beam, fluid forcing means carried thereby, a temper-screw supported by said means; of mechanism for automatically actuating the screw upon relaxation of the drilling tools, and means operated by the fluid under pressure for setting said mechanism during the dropping of the drilling tool.

14. The combination with a walking beam and a cylinder supported thereby; of a piston mounted within the cylinder, reins carried thereby, a temper-screw supported by the reins, a ratchet wheel feathered upon the screw, a reciprocating pawl engaging the ratchet, means for automatically shifting the pawl in one direction during the relaxation of the drilling tools, and means operated by fluid confined between the cylinder for shifting the pawl in the opposite direction upon the dropping of the tools.

15. The combination with a walking beam; of a relatively fixed and relatively movable fluid forcing member suspended from the walking beam, reins carried by the relatively movable member, a temper-screw sup-

ported by the reins, a ratchet wheel feathered upon the screw, a reciprocating pawl normally engaging said wheel, means for automatically shifting the pawl in one direction during the relaxation of the drilling tools, and means operated by a fluid confined between the relatively fixed and the relatively movable members for shifting the pawl in the opposite direction during the dropping of the tools.

16. The combination with a walking beam and a relatively fixed and a relatively movable fluid forcing member carried thereby; of reins supported by the relatively movable member, a temper-screw supported thereby, a revoluble element feathered upon the screw, reciprocating means coöperating therewith for rotating said element, means operated by a fluid confined between the relatively fixed and relatively movable members for shifting said operating means in one direction during the dropping of the drilling tools, and means coöperating with the walking beam for shifting said operating means in the opposite direction during the relaxation of the tools.

17. The combination with a walking beam and a relatively fixed and a relatively movable fluid forcing member carried thereby; of reins supported by the relatively movable member, a temper-screw supported thereby, a revoluble element feathered upon the screw, reciprocating means coöperating therewith for rotating said element, means operated by a fluid confined between the relatively fixed and relatively movable members for shifting said reciprocating means in one direction during the dropping of the drilling tools, weighted means mounted upon the walking beam and connected to the fluid-operated means, and a plunger pivotally connected to the walking beam and coöperating with said weighted means for positively shifting said operating means during relaxation of the tools.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

ROBERT C. JONES.

Witnesses:

THOMAS M. COCHRAN,

JAMES E. BRANDON, Jr.