No. 735,694. PATENTED AUG. 11, 1903.

I. S. & D. S. AUSHERMAN.

WELL DRILLING MACHINE.

APPLICATION FILED FEB. 13, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

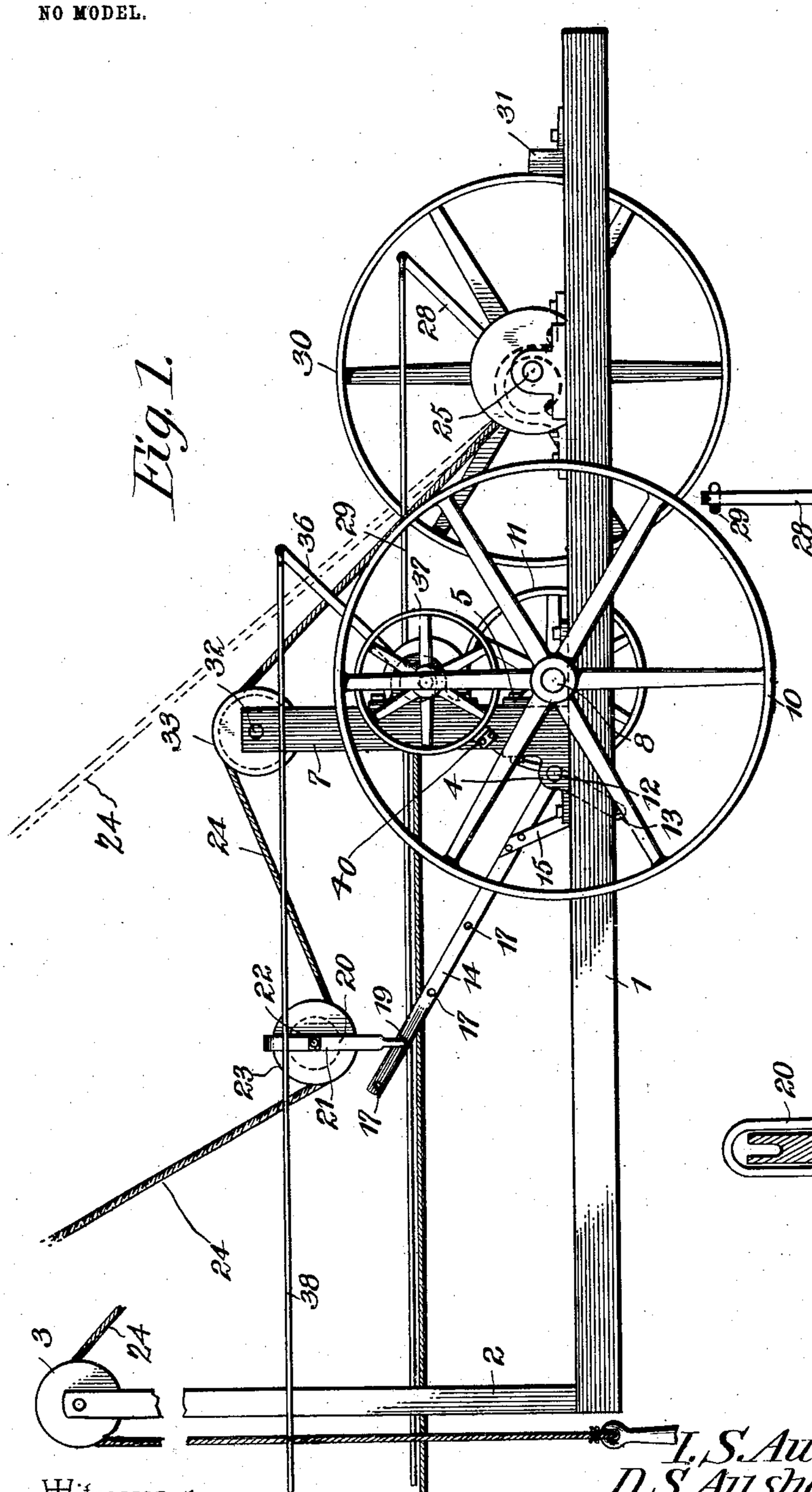



Fig. 4.

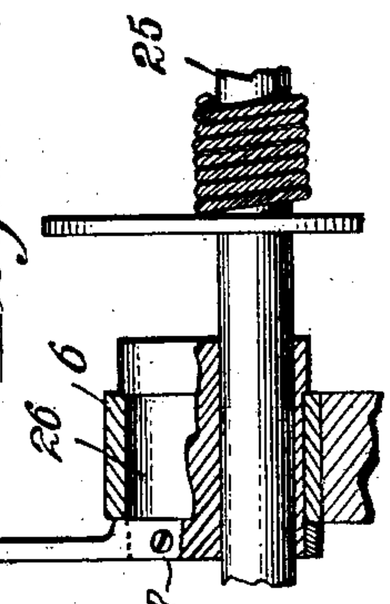
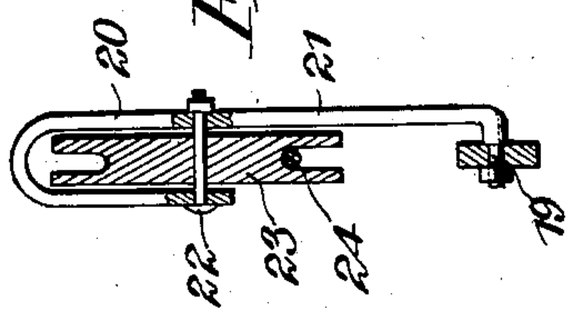



Fig. 5.

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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 2.

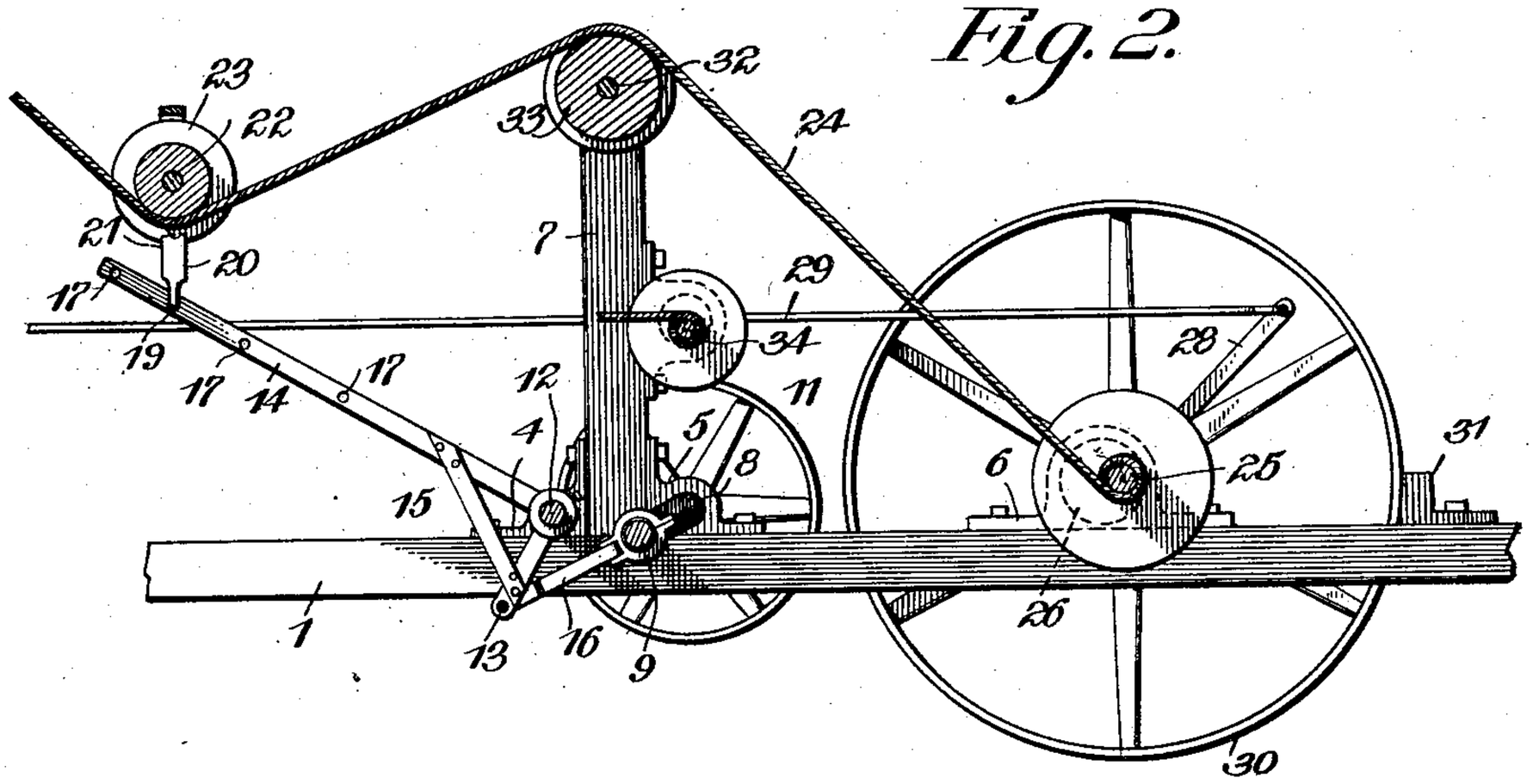
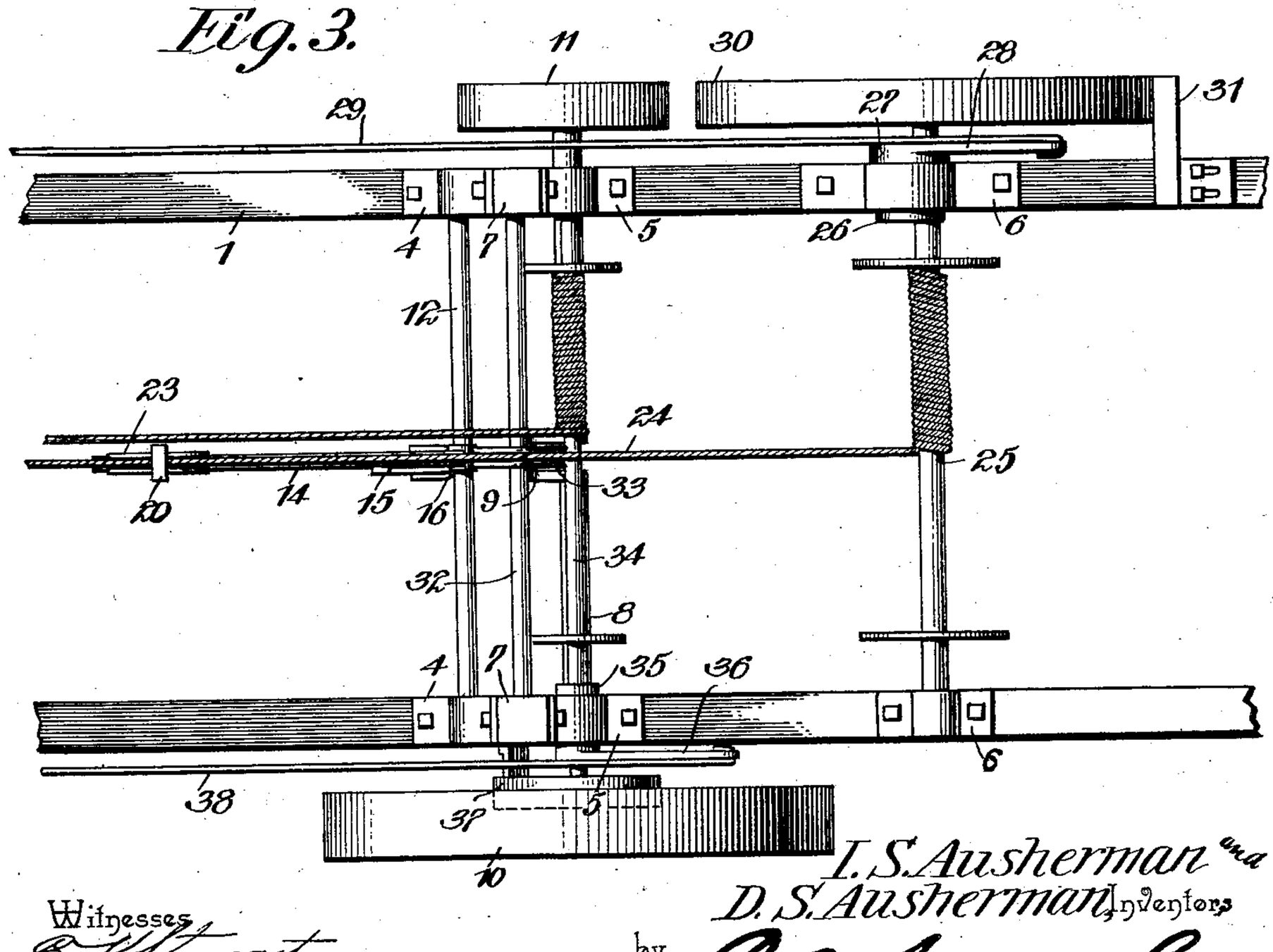



Fig. 3.

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No. 735,694. Patented August 11, 1903.

# UNITED STATES PATENT OFFICE.

ISAAC S. AUSHERMAN AND DAVID S. AUSHERMAN, OF ZION CITY, ILLINOIS
ASSIGNORS OF ONE-THIRD TO JOHN J. MOORE, OF FREDONIA, KANSAS.

## WELL-DRILLING MACHINE.

SPECIFICATION forming part of Letters Patent No. 735,694, dated August 11, 1903.

Application filed February 13, 1903. Serial No. 143,264. (No model.)

*To all whom it may concern:*

Be it known that we, ISAAC S. AUSHERMAN and DAVID S. AUSHERMAN, citizens of the United States, residing at Zion City, in the county of Lake and State of Illinois, have invented a new and useful Well-Drilling Machine, of which the following is a specification.

This invention relates to well-drilling machines, particularly well-drilling machinery of the type in which the drill is reciprocated by means of a rock-shaft and rocker-arm provided with a pulley over which the drill-cable passes.

The objects contemplated in the invention are to make the operation of machines of the class described smoother and less jerkey, thus diminishing the wear on the drill-cable and avoiding breakage of the cable, to do away with superfluous parts in such machines, and to simplify the construction and operation of the controlling mechanism of the machine. In attaining these objects we make use of the novel construction and combination of parts of a well-drilling machine hereinafter described, claimed, and shown in the accompanying drawings, in which corresponding parts are indicated by the same characters of reference throughout the several views, it being of course understood that we do not wish to be limited to the exact form, proportions, or mode of assemblage of the elements described and shown, but reserve the right to make such changes therein as do not depart from the spirit of the invention and which come within the scope of the appended claims.

In the drawings, Figure 1 is a side elevation of our complete machine. Fig. 2 is a longitudinal section of the main portion of the machine. Fig. 3 is a plan view of the parts shown in Fig. 2. Fig. 4 is a detail view showing the eccentric mounting of the bearing for shaft 25. Fig. 5 is a detail view of the pulley and supporting-frame.

Referring to the drawings by reference characters, 1 designates the supporting-frame of the machine, and 2 a derrick mounted at one end thereof and carrying at its top a pulley 3 for the drill-cable to pass over. Mounted on the side members of the frame 1 are blocks 4 4, 5 5, 6 6, in which are provided bearings for shafts, which will presently be specified. Between the blocks 4 4 and 5 5 are two standards 7 7, which also furnish bearings for operating-shafts presently to be described. The main shaft of the machine 8, provided with a crank portion at 9, carrying at one end a band or fly wheel 10 and having mounted on the other end a friction-wheel 11, is journaled in bearings provided in the blocks 5 5. Lying parallel with the main shaft 8 and journaled in the blocks 4 4 is a rock-shaft 12, which has rigidly mounted thereon the rock-frame, comprising two perpendicularly-disposed arms 13 and 14 and the brace 15. Connecting the end of the arm 13 and the crank portion 9 of the main driving-shaft is a pitman 16, by means of which motion is transmitted from the main driving-shaft to the rock-frame. The arm 14 of the rocking frame is pierced at 17 17, &c., by openings adapted to receive a pintle 19, provided at the lower end of a pulley-supporting frame 20, which consists of a single upright 21, bent over at the top to form an arch over the pulley and extending down far enough on the opposite side thereof to form a bearing for one end of the pulley-shaft 22, the other end of which is supported in the upright 21. The pulley 23 is provided on its periphery with a deep groove to prevent accidental disengagement of the drill-cable 24. The peculiar form of the pulley-supporting frame permits the ready disengagement of the cable from the pulley by simply drawing it out of the groove on the periphery and shifting it to one side, as there is no frame-standard on one side to prevent its escape.

Journaled on the blocks 6 6 is the shaft of the main cable-reel 25, one end of which is supported in bearings in an eccentric block 26. The eccentric block 26 is firmly held in a collar 27, to which is rigidly secured an arm 28, having pivotally fastened to its top an operating-rod 29. At the end of the shaft 25 which is mounted in the eccentric bearing is a large friction-wheel 30, adapted when the arm 28 is inclined away from the derrick 2 to lie in contact with a brake-shoe 31, which is mounted upon suitable supports on the side of the frame 1. The brake-shoe 31 is held normally stationary; but it may be adjusted

in position by means of the slots provided in the base of its support and the clamping-screws, which pass therethrough, in order to compensate for the wear of its surface.

When the arm 28 is inclined toward the derrick 2, the wheel 30 has its periphery brought into contact with the periphery of the wheel 11 on the main driving-shaft 8, and when the arm 28 is in a vertical position the wheel 30 lies midway between the brake-shoe 31 and the friction-wheel 11 without coming into contact with either.

Mounted in bearings of a suitable kind in the top of the standards 7 7 is a shaft 32, carrying an idle pulley 33, over which the main cable 24 runs as it passes from the reel 25 to the pulley 23. Also mounted on the standards 7 7 is the shaft 34 of the sand-reel. At one end the shaft 34 is mounted in bearings in an eccentric block 35, bearing securely fastened thereto an arm 36, by means of which the eccentric block may be shifted to vary the position of the shaft 34. At the eccentrically-mounted end of the shaft 34 is provided a friction-wheel 37 of such size that when the shaft 34 is in its lowest position the outer surface of the periphery of the friction-wheel lies a little below the inner surface of the periphery of the fly or band wheel 10, and when the shaft 34 is elevated by shifting the position of the eccentric block 35 the friction-wheel 37 is made to contact with the inner surface of the periphery of the band-wheel 10, so as to be driven thereby. When the wheel 37 is out of contact with the wheel 10, the shaft 34 is held against backward rotation by contact with a brake-shoe 40 on standard 7. Pivotally connected with the free end of the arm 36 is an operating-rod 38, which extends toward the forward end of the machine and is provided at its end with a suitable handle. (Not shown.)

The operation of our improved well-drilling machine will be readily understood by persons skilled in the art from the foregoing description and the accompanying drawings. The desired amount of cable having been unwound from the reel 25 and the drill having been adjusted in the well, the arm 28 is inclined rearward to bring the friction-wheel 30 in contact with the brake-shoe 31 to hold the reel stationary and prevent the unwinding of any more cable. The cable 24 is then drawn over the idle pulley 33 and passed under the pulley 23. The parts of the machine are now in proper relation for operation, and power is imparted to the band or fly wheel 10 through a belt (not shown) from any suitable source of power, as a steam-engine or other motor. As soon as the wheel 10 is set in motion the shaft 8 is caused to revolve and the rock-shaft 12 is given an oscillatory movement by the pitman 16. Similar motion is of course imparted also to the arm 14, on which is pivotally mounted the frame 20, carrying the pulley 23, under which the cable 24 passes. The oscillations of the arm 14 through the cable 24 cause the reciprocation of the drill in the well, so carrying on the boring operation. When it is desired to unwind more rope from the main cable-reel 25, the arm 28 is shifted so as to move the wheel 30 out of contact with the brake-shoe 31, and the desired amount of cable is allowed to unwind from the reel. Then the arm 28 is thrown back to its former position and the wheel 30 brought into contact with the brake-shoe 31, so checking the unwinding of the cable. When it is desired to wind the cable 24 on the reel 25 to draw the drill from the well, the cable is disengaged from the pulley 23 and at once rises to the position shown in dotted lines, passing directly from the pulley 3 at the top of the derrick to the reel 25. The arm 28 is then thrown forward until the wheel 30 comes into engagement with the friction-wheel 11 on the main shaft 8, and the reel is driven thereby to wind the cable 24 upon it. To wind or unwind the cable of the sand-reel, the arm 36 is shifted in the same manner as the arm 28, which controls the eccentric block 26. By throwing the arm 36 forward the wheel 37 is brought into contact with the inner surface of the periphery of the band-wheel 10 and motion is imparted to the shaft 34 of the sand-reel to wind the sand-rope thereon.

Among the peculiar advantageous features of construction inherent in our machine the pivotally mounting of the pulley-frame 20 on the arm 14 is of particular importance in securing smoothness of movement in drilling and relieving the cable of the excessive strains produced by jerks. As the arm 14 is rocked up and down the frame 20 swings to and fro, accommodating itself to the movement of the arm 14 and minimizing the strain upon the cable 24 in reciprocating the drill.

The eccentric movement of the shaft 25 on the main cable-reel and the arrangement of the friction-wheel 30, carried thereby, between the stationary brake-shoe 31 and the friction-wheel 11 on the main driving-shaft 8 simplify the control of the movement of the main cable-reel in a very appreciable degree. By having the brake-shoe stationary and having the shaft 25 shiftable in position by means of the eccentric mounting the need of any special operating means for the brake is obviated, and a single operating-rod serves to control the winding and unwinding of the cable and the application of the brake to the reel whenever it becomes necessary.

By providing the idler-pulley 33 on the shaft 32 at the top of the standards 7, over which the drill-cable 24 passes from the reel on the shaft 25 to the pulley 23, the cable 24 is always held in the same position upon the pulley 23, thus preventing the tendency of the cable to slide off the pulley as it moves up and down with the oscillation of the arm 14. If pulley 33 or some equivalent structure were not provided, the cable 24 would vary in position with reference to the pulley 23, according to the point at which it engaged the

reel-shaft 25, and when the point of contact with the reel on shaft 25 was near one end of the shaft the cable would be disposed at an angle to the plane of the circumferential groove of the pulley, and there would be a constant tendency for the cable to slip off the pulley and there would be a considerable amount of wear at the edges of the pulley where they came into contact with the cable. Both of these objectionable features are eliminated by the provision of the pulley 23 in the position shown in the drawings.

By having one side of the frame 20, in which the pulley 23 is supported, open and so permitting the ready disengagement of the cable 24 from the pulley 23 it is possible to wind the cable more smoothly on the reel 25 than if the cable were allowed to remain on the pulley 23 and be carried up and down by the oscillations of the rock-frame during the winding process. In some machines for well-drilling the oscillations of the rock-frame or its equivalent are stopped during the winding of the cable on the reel, so that it is unnecessary to disengage the cable from the pulley to prevent jerks on the cable during the winding process. In machines so constructed, however, it is necessary to have a clutch mechanism between the main driving-shaft and means for operating the rock-frame or its equivalent in order to impart movement to the rock-frame or not at will while the driving-shaft is in motion. This mechanism is necessarily expensive in character and subject to wear, and its action when new is no more satisfactory than our mode of winding with the cable disengaged from the pulley on the rock-frame.

Having now fully described the construction and operation of our improved well-drilling machine, what we claim as new, and desire to secure by Letters Patent, is—

1. The combination in a well-drilling machine, of a supporting-frame, a main driving-shaft, a rock-shaft, a rock-frame mounted on said rock-shaft, a pulley-supporting frame pivotally mounted on said rock-frame, a pulley journaled in said frame, and driving connections between said main driving-shaft and said rock-shaft.

2. The combination in a well-drilling machine, of a main driving-shaft having a crank portion, a rock-shaft, a rock-frame carried by said rock-shaft, a pulley-supporting frame pivotally mounted at its lower end upon said rock-frame, a pulley journaled in said frame, and a pitman connecting the crank portion of the main driving-shaft and the rock-frame.

3. The combination in a well-drilling machine of a crank-shaft and driving means therefor, a rock-shaft, a rock-frame carried by said rock-shaft, an arm forming part of said rock-frame and provided with a series of openings, a pulley, a frame in which said pulley is journaled, a pintle at the lower end of said frame adapted to engage the openings in the arm of said rock-frame, and a pitman connecting said crank-shaft and said rock-frame.

4. The combination in a well-drilling machine, of a rock-frame, an arm forming an extension of said rock-frame, a pulley-supporting frame pivotally mounted on said arm, said frame being open at one side to permit the ready removal of a cable therefrom, and a pulley journaled in said frame.

5. The combination in a well-drilling machine of a supporting-frame, a main driving-shaft mounted in bearings on said supporting-frame, a rock-shaft, driving connections between said main shaft and said rock-shaft, a rocker-arm secured to said rock-shaft and having a plurality of openings provided therein, a pulley-supporting frame comprising a vertical member having the upper end bent over to form a downwardly-disposed portion parallel to said vertical member, a bolt extending through said downwardly-disposed portion and said vertical member and a horizontal lug formed at the lower end of said vertical member and adapted to engage openings in said rock-shaft, and a pulley rotatably mounted on said bolt in said frame.

In testimony that we claim the foregoing as our own we have hereto affixed our signatures in the presence of two witnesses.

ISAAC S. AUSHERMAN.
DAVID S. AUSHERMAN.

Witnesses:
W. E. SCHOLZ,
GEO. W. ROSE.