

No. 775,417.

PATENTED NOV. 22, 1904.

M. T. CHAPMAN.
WELL SINKING APPARATUS.
APPLICATION FILED SEPT. 25, 1899.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 1.

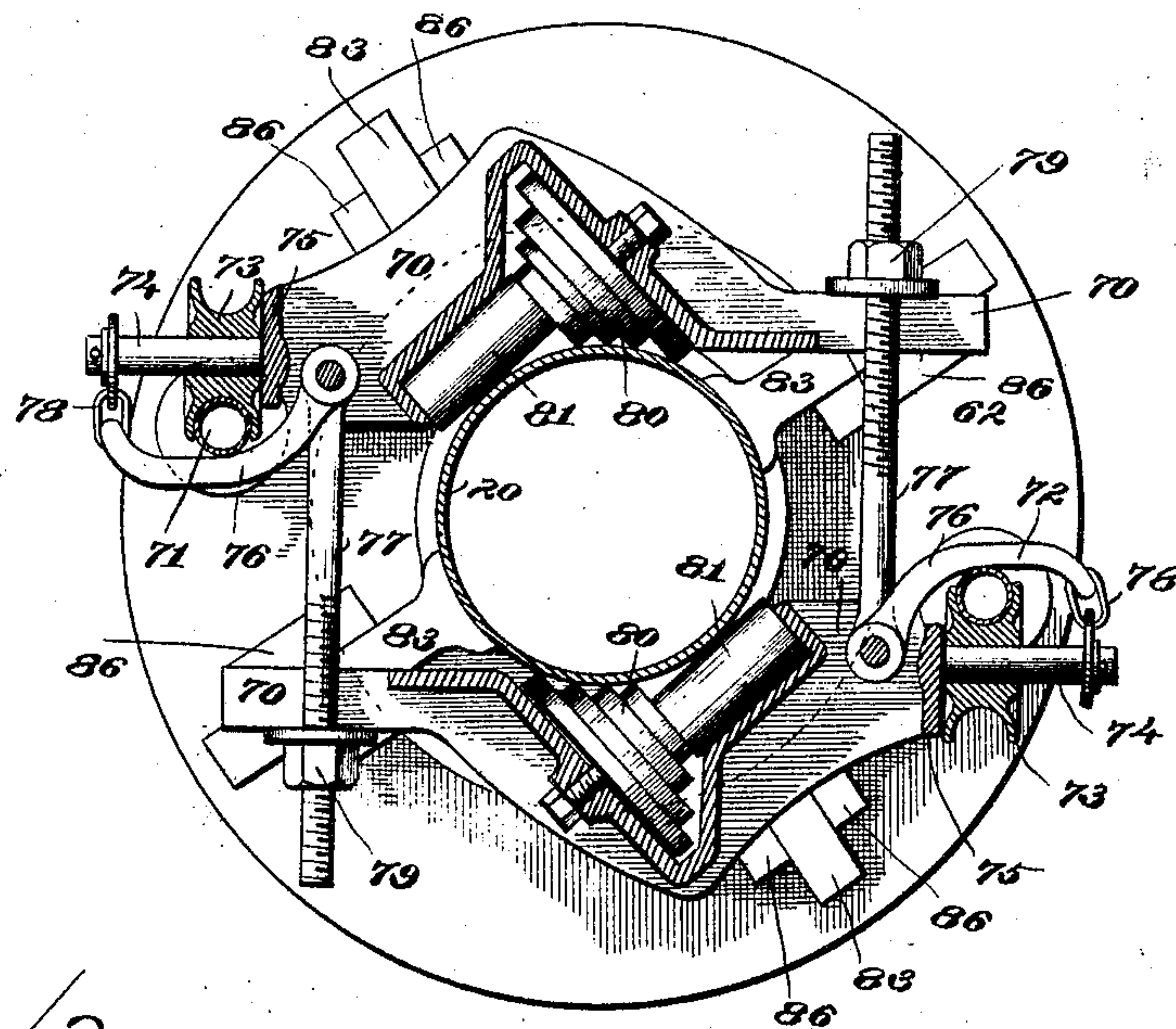
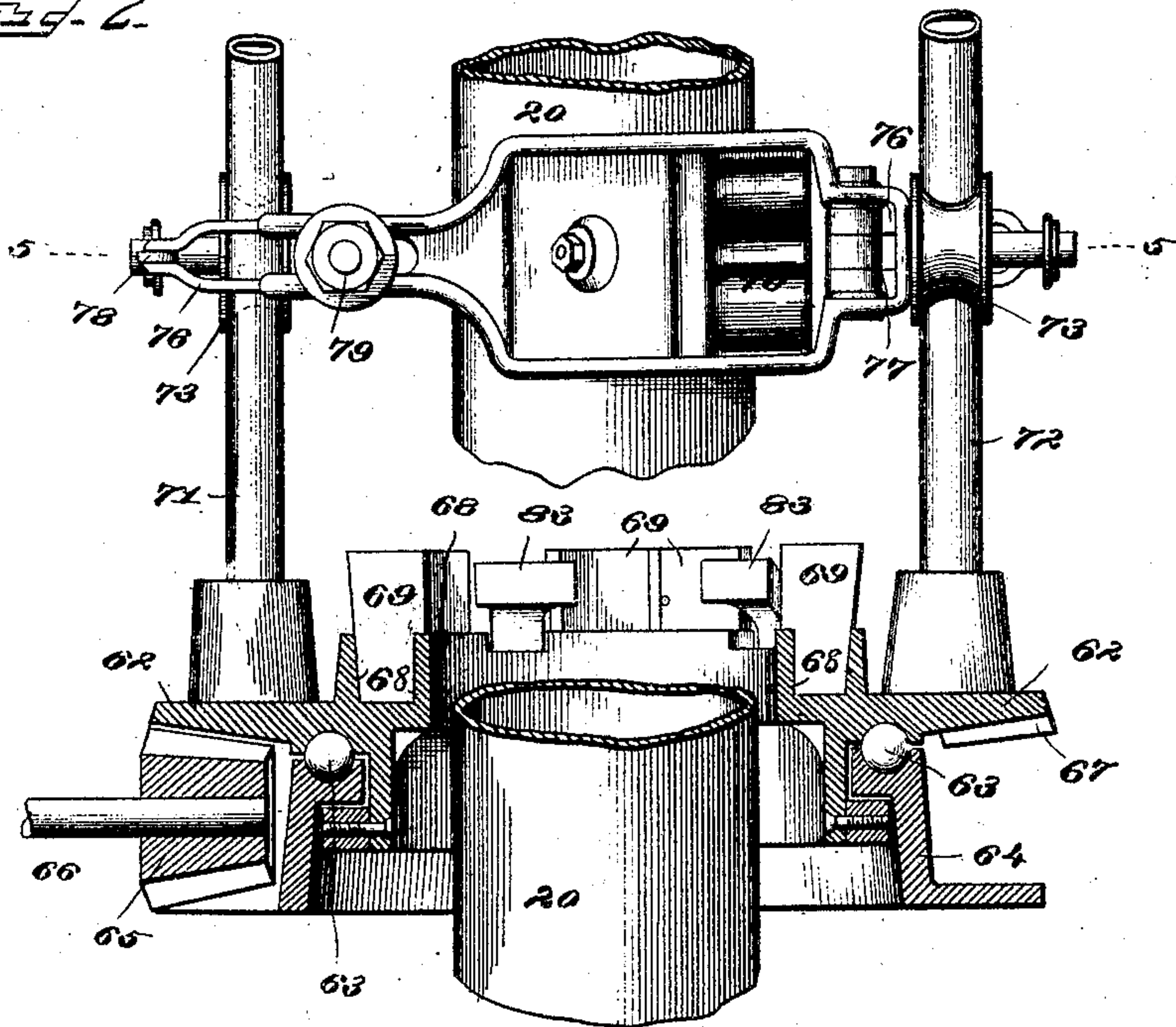


Fig. 2.



WITNESSES.

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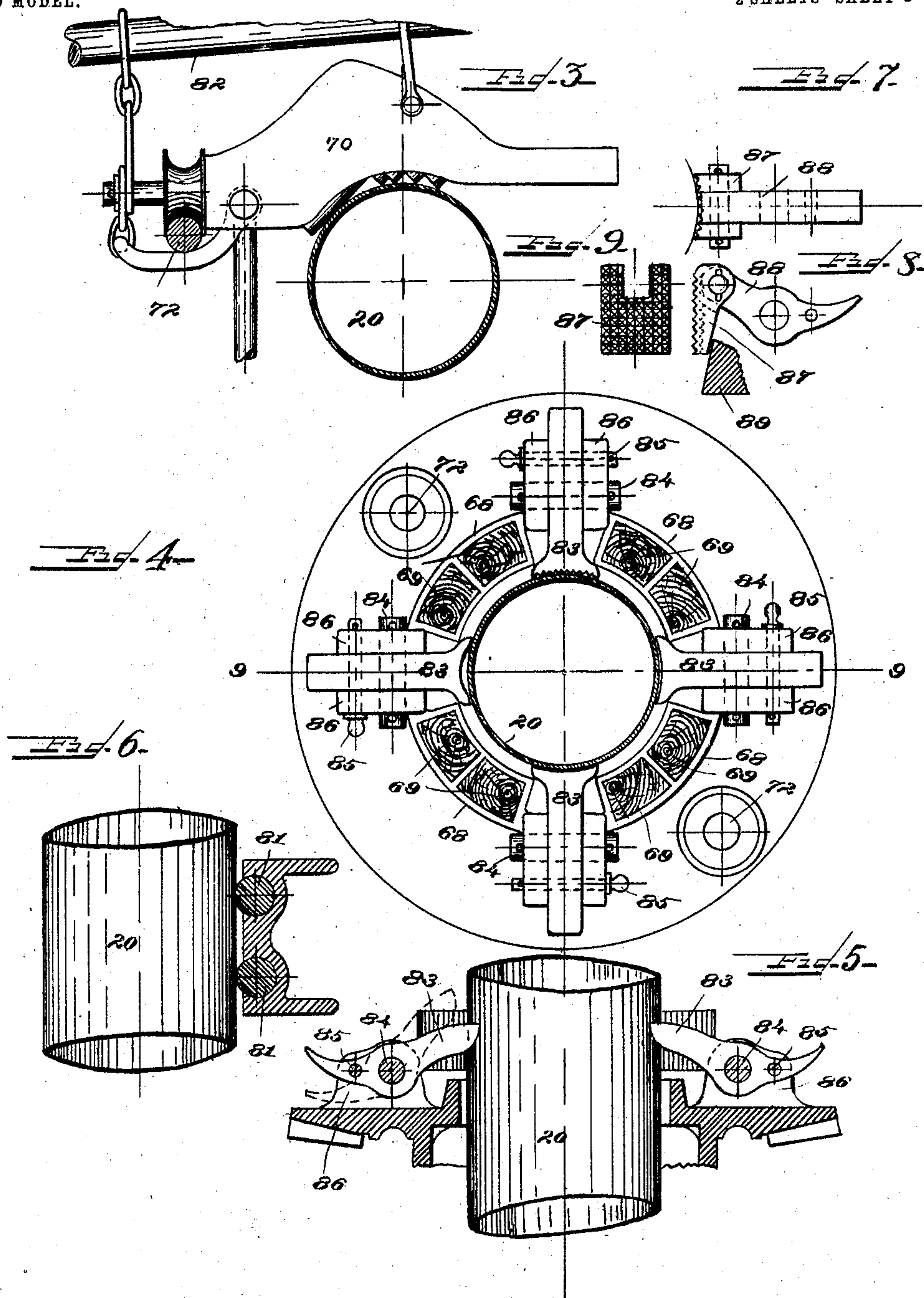
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UNITED STATES PATENT OFFICE.

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WELL-SINKING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 775,417, dated November 22, 1904.

Application filed September 25, 1899. Serial No. 731,507. (No model.)

To all whom it may concern:

Be it known that I, MATTHEW T. CHAPMAN, a citizen of the United States, residing at Aurora, in the county of Kane and State of Illinois, have invented certain new and useful Improvements in Well-Sinking Apparatus, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to apparatus for sinking wells, and has for its object to provide various improvements by which the sinking of wells may be more expeditiously and satisfactorily accomplished than heretofore.

One of the principal features of my invention consists in providing means for rotating the drill by which the well is bored which provides for rotating the drill not only when it is boring in the ordinary way, but when it is "jumped" or raised and dropped in order to cause the drill to penetrate the rock, so that it will bore more rapidly.

My invention also comprises certain other improvements, which will be hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a sectional view showing the clamp for gripping the well-casing. Fig. 2 is a side elevation of the same, showing also the turn-table, some parts being broken away. Fig. 3 is a horizontal section showing one of the clamp members and illustrating a modified form of apparatus for rotating the well-casing. Fig. 4 is a plan view of the turn-table, the well-casing being in section. Fig. 5 is a vertical section on line 5 5 of Fig. 4, illustrating the pawls for preventing downward movement of the well-casing. Fig. 6 is a side elevation showing the antifriction-rollers of the clamps in section. Fig. 7 is a plan view of one of the pawls for preventing downward movement of the well-casing, showing a modification. Fig. 8 is a side elevation of the parts shown in Fig. 7, and Fig. 9 is a view of the wedge-block shown in Fig. 8.

The apparatus illustrated and described in my present application is an improvement upon and in some respects embodies some of the parts of various prior patents issued to me, as follows: No. 382,689, dated May 15, 1888; No. 409,272, dated August 20, 1899;

Nos. 443,069, 443,070, 443,071, and 443,072, dated December 16, 1890, and No. 541,835, dated July 2, 1895, to which reference is made for a full description of the fundamental operation of well-sinking. For present purposes it is sufficient to say that a tube which forms the well-casing is suspended by suitable apparatus from a derrick placed over the site of the proposed well, said casing having at its lower end a drill adapted to bore through into the earth. Suitable guiding devices are provided by which the casing is guided and also apparatus for rotating the casing and drill to cause the drill to bore into the earth. Such rotating devices are so arranged as to permit vertical movement of the casing, so that as the drill penetrates the earth it may descend and the weight of the casing may rest upon the drill to force it down. My improved construction, in addition to this operation, provides for "jumping" of the drill, which consists in raising the casing and then permitting it to drop, thereby causing the drill-point to enter the rock, forming a cut or notch, so that when it is further rotated it engages the rock and drills more rapidly. This is especially necessary where the rock is so hard that the weight of the drill and casing is not sufficient to cause the drill to cut deeply into the rock. In such cases the rotation of the drill operates simply to cut a smooth surface on which the drill rests, and drilling by the rotation of the drill alone would therefore be very slow work.

No prior construction of which I am aware has provided for longitudinal movement of the well-tube or drill-rod independently of or through the clamping mechanism and also for jumping thereof, which constitutes an important feature of my present invention. My invention also provides for rotating the well-tube or drill-rod in addition to the other movements specified. After the well has been bored to a depth almost equal to that of the casing a second length of pipe is screwed upon the upper end of the first, additional sections being added from time to time as the casing descends into the earth.

Referring now to the drawings, 20 indicates the well-casing or boring-tube.

The casing 20 is rotated and otherwise op-

erated for boring a well by means of the mechanism illustrated in Figs. 1 to 5, inclusive. Referring to said figures, 62 indicates a turn-table resting on bearing-balls 63, carried by a base-plate 64, as shown in Fig. 2. The turn-table is adapted to be rotated by a pinion 65, mounted on a shaft 66, engaging an annular rack 67 on the under side of the turn-table or otherwise suitably arranged. The turn-table 62 is provided with a suitable central passage for the casing 20, and around said passage are arranged a number of frames 68, in which are placed stops or blocks 69, preferably of wood. Said blocks, however, may be of other elastic material. Said blocks are best shown in Fig. 4. The blocks 69 serve as stops to intercept and sustain the shock of a clamp-frame 70 when said frame descends violently, as in jumping the drill. 71 72 indicate upright rods secured upon the turn-table 62 at opposite sides thereof and rising vertically therefrom. Said rods form guides for the clamp-frame 70. They may be tubular, as illustrated in Fig. 2, or solid, as illustrated in Fig. 3.

The clamp-frame 70 is arranged in a horizontal position above the turn-table 62 and is guided by the rods 71 72, as already described. For the purpose of carrying said clamp-frame upon said rods and facilitating its vertical movement it is provided at opposite sides with grooved rollers 73, mounted on journals 74, which journals are carried by lugs 75, as shown in Fig. 1. The rollers 73 are held closely in contact with the bars 71 72 by locking-bars 76, the inner ends of which are pivoted to the clamp-frame. As illustrated in Fig. 1, the outer ends of the bars 76 are detachably secured by links 78 to the ends of the journals 74 and extend across the bars 71 72, binding said bars against the rollers 73. The clamps are adjusted and held in position by bolts 77, which are adjustable by means of nuts 79, as shown in Fig. 1, said bolts being secured in the clamp-frame 70. By this construction the clamp-frame may move vertically upon the guide-bars 71 72 and at the same time be rotated by the rotation of the turn-table. The clamping-frame 70 carries two or more sets of clamping-disks 80, arranged at different points around the well-casing and adapted to grip it for the purpose of rotating it. Various forms of clamping-disks are employed for such purposes. I prefer, however, the sharp-edged disks, pyramidally arranged, as illustrated in the drawings. 81 indicates antifriction-rollers arranged adjacent to the clamping-disks and adapted to bear against the surface of the casing. As illustrated in Fig. 6, two of such antifriction-rollers 81 are provided adjacent to each pair of clamping-disks, one being arranged above the other, as shown. By this construction the clamp-frame is held in position on the casing and prevented from rock-

ing thereon or turning over. The engagement of the clamping devices with the casing is sufficient to sustain the weight of the clamping-frame. Therefore when the casing is raised by means of the devices by which it is suspended from the derrick the clamping-frame is raised with it, the rotation of the casing being continued by means of the engagement of the clamping-frame with the upright bars 71 72. The same is true when the casing and clamping-frame descend, so that whether the casing is being jumped or not it continues its rotation. The jar caused by the rapid descent of the clamping-frame is received and lessened materially by the stops or blocks 69. Instead of rotating the casing by means of the pinion 65 it may be rotated by a sweep or lever 82, as shown in Fig. 3.

83 indicates a series of pawls, one or more of which may be used, preferably four. As illustrated in Fig. 4, said pawls are carried by the turn-table and are placed equally distant apart around the central opening thereof. Said pawls are mounted on pivots 84 and are adapted to be rocked thereon. When free, said pawls are adapted to engage the surface of the casing, as shown in Fig. 5, thereby preventing it from descending. The object of this arrangement is to prevent the accidental dropping of the casing into the well when it is being withdrawn, which sometimes occurs through the breakage of some of the apparatus, and also to sustain the weight of the casing or boring-pipe when sections are being attached to or removed from the upper end thereof. When a pipe is being lowered into the well, a length is lowered until the upper end thereof is at a convenient height for connecting the next length thereto. The pawls 83 or equivalent pipe-holders are then brought into engagement with the pipe, supporting its weight and preventing it from rotating while the upper length is being secured thereto, or, if preferred, the upper length may be held by the pawls and the lower length rotated in a backward direction to screw the two lengths together. When the two lengths have been joined, the pawls are thrown out of operative position and the pipe lowered into position to receive another length, as before. The pipe-holders are used in a similar manner to support the pipe when it is withdrawn from the well. When boring is in progress, the pawls 83 are thrown out of operative position, as indicated by dotted lines in Fig. 5, by turning them upon their pivots and locking them by means of pins 85, which pass through suitable openings in lugs 86, as shown in Fig. 5. The lugs 86 also carry the pivot-pins 84.

In Fig. 4 the pawls are shown as having concave bearing-faces adapted to engage the surface of the casing, the acting faces of some of said pawls being plain and those of others roughened. Either style may be used, or instead of using pawls wedge-blocks 87 may be

employed, said blocks being carried by rocking levers 88 and being moved inward into operative engagement with the casing by stationary blocks 89, as shown in Fig. 8.

5 In operation it is desirable for rapid work to employ two sets of clamps, so that one set of clamps can be attached to the length of pipe to be added, and when the two lengths are connected the lower clamp can be re-
10 moved, while the operation is continued with the clamp on the new section. Thus the operation of boring may be made practically continuous, as by my improvements the pipe can be turned for boring purposes and sunk
15 without removing the clamp, and it may also be jumped when necessary without displacing the clamp, the clamp being carried up with the pipe in jumping and falling with it until intercepted by the stops 69, when movement
20 of the clamping-frame is arrested; but the pipe may continue to descend until stopped by the resistance encountered by the drill-point. Besides, when the pipe is jumped it is also rotated, increasing the efficiency of the
25 drill.

I have described my improvements in detail; but it will be understood that various modifications may be made, as my invention is not restricted to the specific construction
30 described, except in so far as it is particularly claimed.

That which I claim as my invention, and desire to secure by Letters Patent, is—

35 1. In a well-sinking apparatus, the combination of vertically-adjustable means for gripping a boring-pipe for rotating it, said boring-pipe being movable endwise independently of said gripping means, substantially as described.

40 2. In a well-sinking apparatus, the combination of vertically-adjustable means for gripping a boring-pipe for rotating it, said boring-pipe being movable endwise independently of said gripping means, and means for rotating
45 said gripping means when adjusted vertically, substantially as described.

50 3. In a well-sinking apparatus, the combination of a boring-pipe, a clamping-frame adapted to clamp said pipe for rotating it, said boring-pipe being movable endwise independently of said clamping-frame, said clamping-frame being adapted to move vertically with
55 said boring-pipe when said pipe is "jumped," substantially as described.

60 4. In a well-sinking apparatus, the combination of a boring-pipe, a clamping-frame adapted to clamp said pipe for rotating it, said boring-pipe being movable endwise independently of said clamping-frame, said clamping-frame being adapted to move vertically with
65 said boring-pipe when said pipe is "jumped," and means for rotating said clamping-frame when adjusted vertically, substantially as described.

5. In a well-sinking apparatus, the combina-

tion of a turn-table, clamping mechanism supported by and movable toward and from said turn-table, means carried by said turn-table for rotating said clamping mechanism, said clamping mechanism being adapted to clamp
70 a round article for rotating it, the article gripped being movable endwise independently of said clamping mechanism, substantially as described.

6. In a well-sinking apparatus, the combination of a turn-table, clamping mechanism supported by and movable toward and from said turn-table, and means carried by said turn-table for rotating said clamping mechanism
75 when in its different positions of adjustment, said clamping mechanism being adapted to clamp a round article for rotating it, the article gripped being movable endwise independently of said clamping mechanism, substantially as described.
80

7. In a well-sinking apparatus, the combination of a turn-table, vertically-movable clamping mechanism supported thereby, said clamping mechanism being adapted to clamp a boring-tool, said boring-tool being movable end-
85 wise independently of said clamping mechanism, stops carried by said turn-table and adapted to intercept said clamping mechanism when the boring-tool is "jumped," and means carried by the turn-table for rotating said clamping
90 mechanism, substantially as described.

8. In a well-sinking apparatus, the combination of a turn-table, vertically-movable clamping mechanism supported thereby, said clamping mechanism being adapted to clamp a boring-
95 tool, said boring-tool being movable endwise independently of said clamping mechanism, stops carried by said turn-table and adapted to intercept said clamping mechanism when the boring-tool is "jumped," and means carried by the turn-table for rotating said clamping
100 mechanism when in its different positions of adjustment, substantially as described.

9. In a well-sinking apparatus, the combination with a turn-table, of a vertically-adjust-
105 able clamp for turning a round article, said clamp having gripping-jaws revoluble to allow the article gripped to have an independent endwise movement in the clamp when being rotated, thereby allowing the drill to follow
110 down as the hole is bored, said clamp being arranged to maintain its relative position on the article gripped as it is being "jumped" in turning the drill, substantially as described.

10. In a well-sinking apparatus, a vertically-
115 adjustable clamp having revoluble gripping-jaws that grip and turn a round article, such as a drill, and permit independent longitudinal movement thereof, in combination with turning mechanism, consisting of a turn-table,
120 means for rotating said turn-table, and devices connecting said clamp with said turn-table, meanwhile permitting independent vertical movement of said clamp, substantially as described.
125

11. In a well-sinking apparatus, the combination of a rotary turn-table for rotating a drill-rod or boring-pipe, with a vertically-adjustable clamp movable vertically independently of said turn-table, means carried by said turn-table for rotating said clamp when in its different positions of adjustment, said clamp having revoluble gripping-jaws to permit of an endwise movement of the article gripped while it is held and turned, thereby enabling the drill to descend as the hole is deepened by boring or drilling, substantially as described.
12. In a well-sinking apparatus, the combination of a drill-rod, with an adjustable clamp having gripping-jaws which grip the pipe sufficiently tightly to hold the clamp on the pipe and cause it to be lifted with said pipe when the drill is "jumped" and allow the drill-rod to move endwise in the clamp when said clamp reaches the limit of its downward movement, and means limiting the downward movement of said clamp, substantially as described.
13. In a well-sinking apparatus, the combination of a boring-tool having a circular rod or tube, a vertically-movable clamp adapted to grip said rod for rotating said tool, said rod being movable longitudinally independently of said clamp, and means for rotating said clamp about the axis of said rod while said rod and clamp are moving vertically, substantially as described.
14. In a well-sinking apparatus, the combination of a turn-table, a rod or tube extending therethrough, a clamp adapted to grip said rod for rotating it, meanwhile permitting longitudinal movement thereof through said clamp, said clamp being movable vertically toward and from said turn-table, and means connecting said clamp with said turn-table when in its various positions of adjustment, substantially as described.
15. In a well-sinking apparatus, the combination of a turn-table, a tube extending there-through, a clamp having rotary gripping devices adapted to grip said tube for rotating it, whereby longitudinal movement of said tube through the clamp is permitted, said clamp being movable vertically toward and from said turn-table with said tube, and means for rotating said clamp with said turn-table, substantially as described.
16. In a well-sinking apparatus, the combination of a turn-table, a tube extending there-through, a clamp having rotary gripping devices adapted to grip said tube for rotating it, whereby longitudinal movement of said tube through the clamp is permitted, said clamp being movable vertically toward and from said turn-table with said tube, means for rotating said clamp with said turn-table, and means for intercepting said clamp when the tube descends, substantially as described.
17. In a well-sinking apparatus, a removable vertically-adjustable clamp, having revoluble gripping-jaws adapted to grip and hold a round article for rotating it, at the same time allowing the article gripped to have an endwise movement, in combination with a turn-table having one or more stops which intercept said clamp, substantially as described.
18. In a well-sinking apparatus, a removable vertically-adjustable clamp for rotating a round article, having its gripping-jaws revoluble to permit endwise movement of the article gripped, at the same time permitting the article gripped to be turned and "jumped," in combination with a turn-table having two or more upright posts, and rollers carried by said clamp and running on said posts, substantially as and for the purpose specified.
19. In a well-sinking apparatus, a clamp for turning a round article, having revoluble gripping-jaws that grip the article clamped for turning it, at the same time permitting the article clamped to have an endwise movement, in combination with one or more arms or levers for rotating said clamp, a turn-table having two or more upright posts, and rollers carried by said clamp and turning on said posts, substantially as described.
20. In a well-sinking apparatus, the combination of a turn-table having one or more stops and upright bars, with an adjustable clamp having revoluble gripping-jaws for turning a round article and permitting endwise movement of the article gripped and turned, and antifriction-rollers carried by said clamp and engaging said bars, substantially as described.
21. In a well-sinking apparatus, the combination of a turn-table having a central passage, deadening-blocks carried thereby around said passage, and a vertically-movable clamp carried by said turn-table and provided with revoluble gripping-jaws for gripping a round article and permitting endwise movement thereof, substantially as and for the purpose specified.
22. In a well-sinking apparatus for gripping round articles for rotating them, meanwhile permitting longitudinal movement thereof, the combination of a gripping device arranged to permit independent endwise movement of the article gripped, and an antifriction-roller having an extended, *i. e.*, non-biting periphery arranged adjacent to said gripping device and bearing against the article gripped, substantially as described.
23. In a well-sinking apparatus for gripping round articles for rotating them, meanwhile permitting longitudinal movement thereof, the combination of circular rotary gripping-jaws for turning a round article, of antifriction-rollers having an extended, *i. e.*, non-biting periphery arranged adjacent to said circular gripping-jaws and bearing against the article gripped, to reduce the friction of the endwise movement of said article, substantially as described.

24. In a well-sinking apparatus for gripping round articles for rotating them, meanwhile permitting longitudinal movement thereof, the combination of rotary disks, the edges of which are adapted to engage the article to be gripped and form one side of the jaw, an antifriction-roller having an extended, *i. e.*, non-biting periphery arranged adjacent to said disks and forming the other side of the jaw, and a frame supporting said disks and roller, substantially as described.

25. In a well-sinking apparatus for gripping round articles for rotating them, meanwhile permitting longitudinal movement thereof, the combination of a plurality of gripping-jaws, each of said jaws consisting of one or more rotary disks the edges of which are adapted to engage the article to be gripped and form one side of the jaw, an antifriction-roller having an extended, *i. e.*, non-biting periphery arranged adjacent to said disks and forming the other side of the jaw, and means for forcing said jaws together upon the article gripped, substantially as described.

26. In a well-sinking apparatus, the combination of a gripping device arranged to permit independent endwise movement of the article gripped, a plurality of antifriction-rollers in different horizontal planes arranged adjacent to said gripping devices and bearing against the article gripped, substantially as described.

27. In a well-sinking apparatus, the combination of rotary disks the edges of which are adapted to engage the article to be gripped and form one side of the jaw, a plurality of antifriction-rollers arranged in different hori-

zontal planes adjacent to said disks and forming the other side of the jaw, and a frame supporting said disks and rollers, substantially as described.

28. In a well-sinking apparatus, a vertically-adjustable clamp, connected to a drill-rod having a revoluble serrated-faced cone that can be forced against a pipe to turn it, in combination with one or more antifriction-rollers placed in the clamp so that the rollers and cone will rest on the pipe gripped at three or more points, for holding the clamp from turning over, substantially as described.

29. In a well-drilling machine, the combination of a rotary plate, and gripping means secured thereon and capable of movement up and down with respect to the plate, means upon the plate for holding said gripping means and permitting the up-and-down movement thereof without interfering with the rotation of the plate, the said gripping means also permitting of the drill-tube moving longitudinally, substantially as described.

30. In a well-drilling machine, the combination of a rotary table, pins or stakes carried by said table, gripping means having a movable engagement with said pins, so that the gripping device may be raised or lowered without interfering with the rotation of the table, and grippers carried by the gripping means for turning a well-tube and yet permitting of its endwise movement, substantially as described.

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