

No. 763,254.

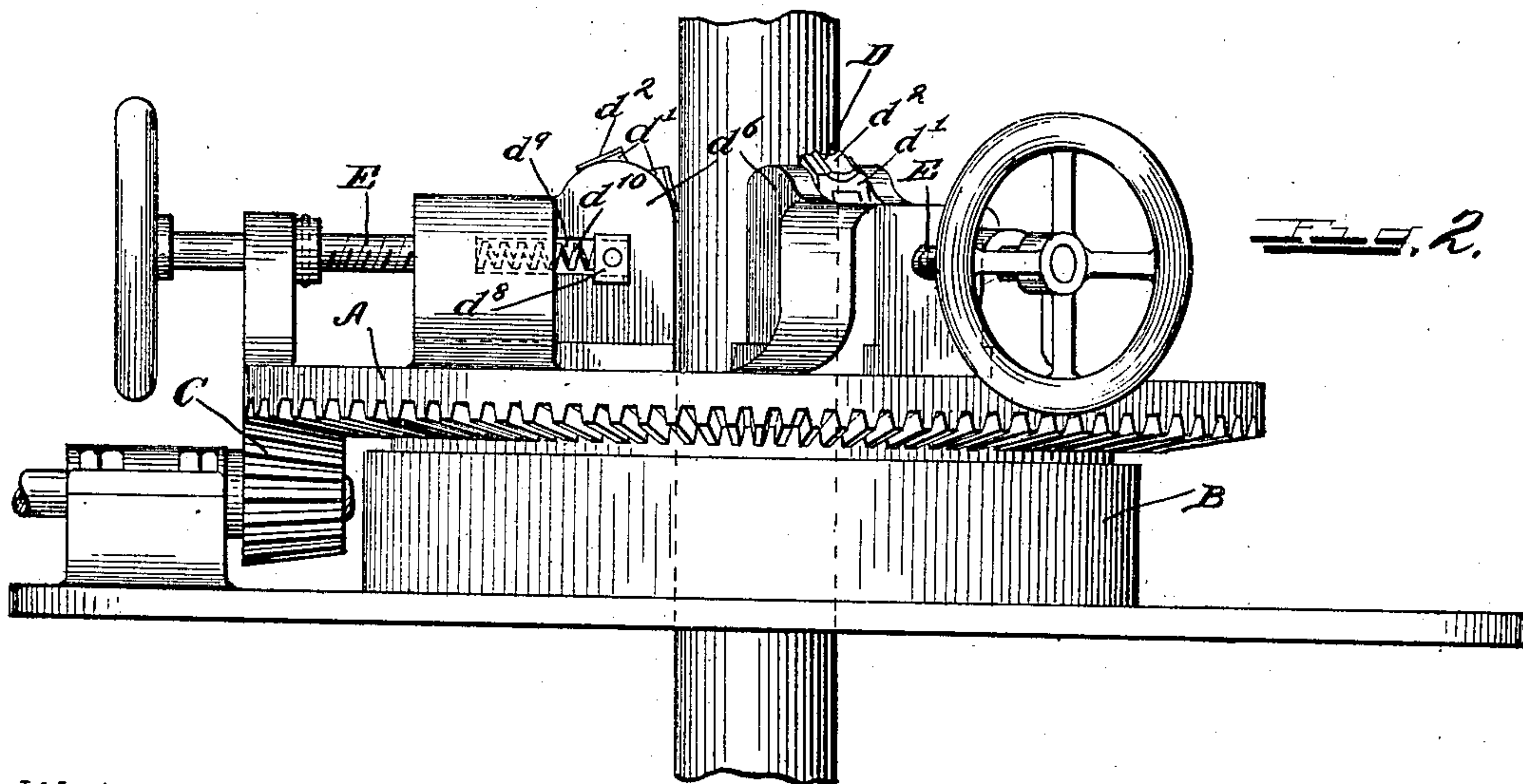
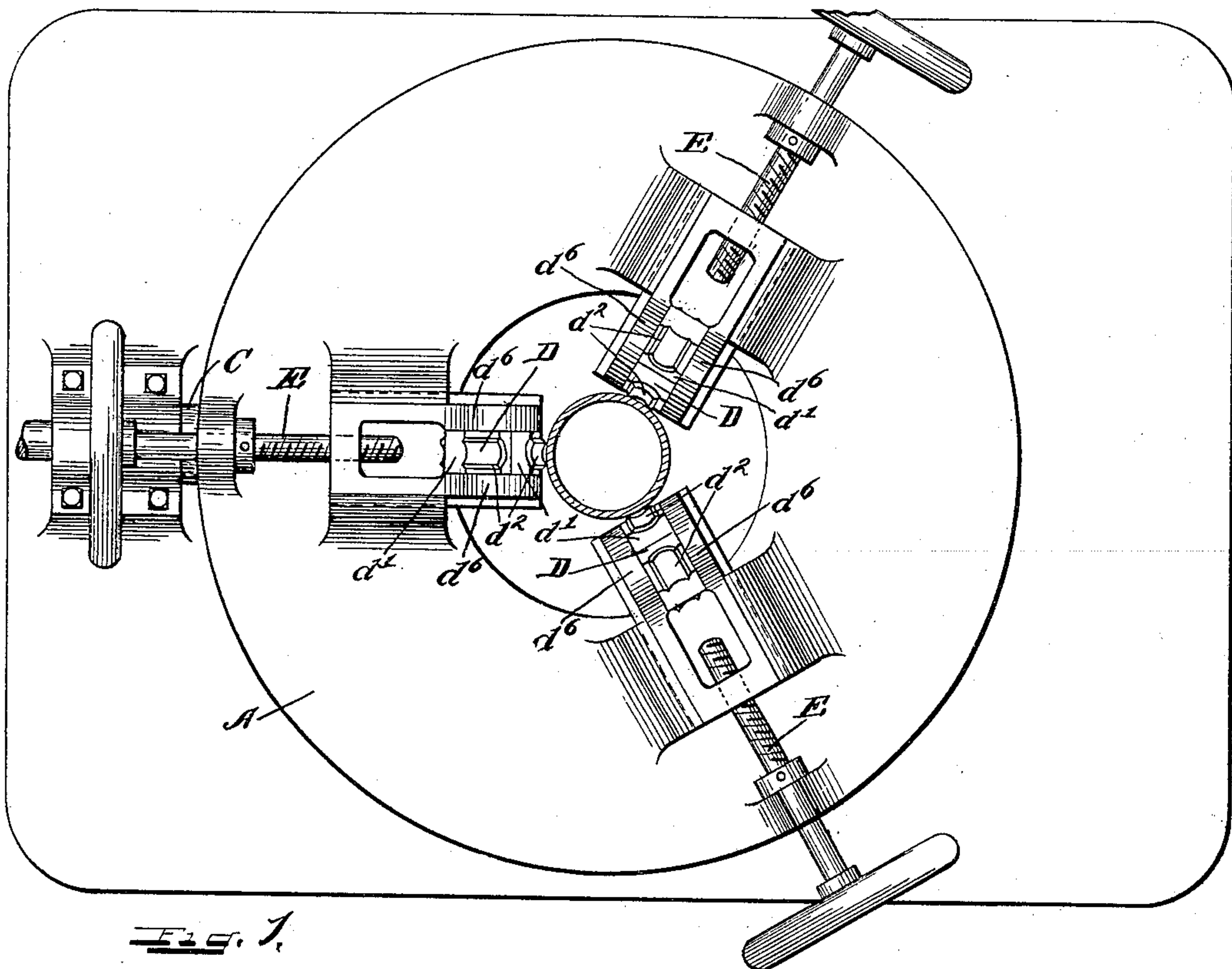
PATENTED JUNE 21, 1904.

M. G. BUNNELL.
WELL MACHINE.

APPLICATION FILED NOV. 9, 1901.

NO MODEL.

2 SHEETS—SHEET 1.



WITNESSES
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2 SHEETS—SHEET 2.

Fig. 3.

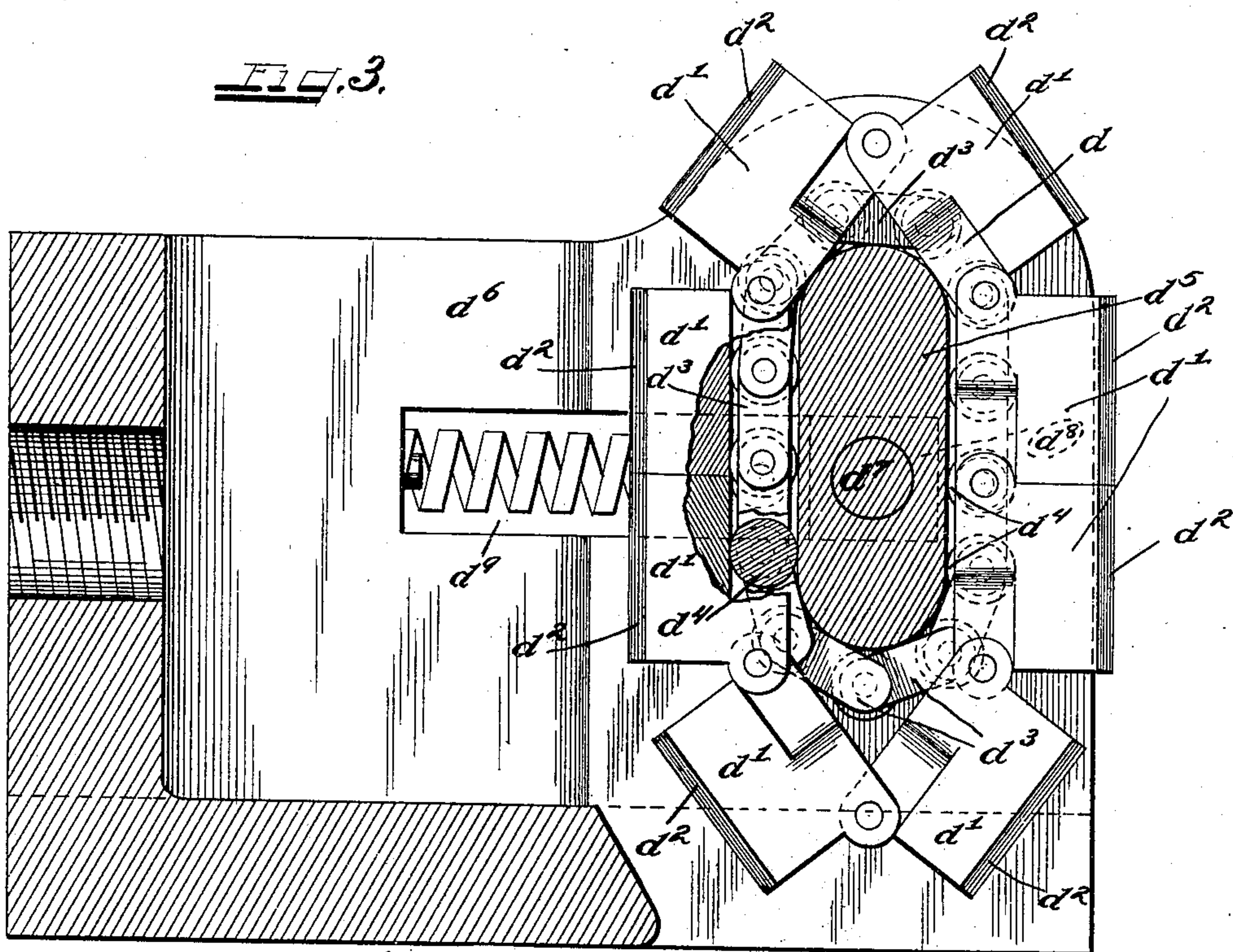


Fig. 4.

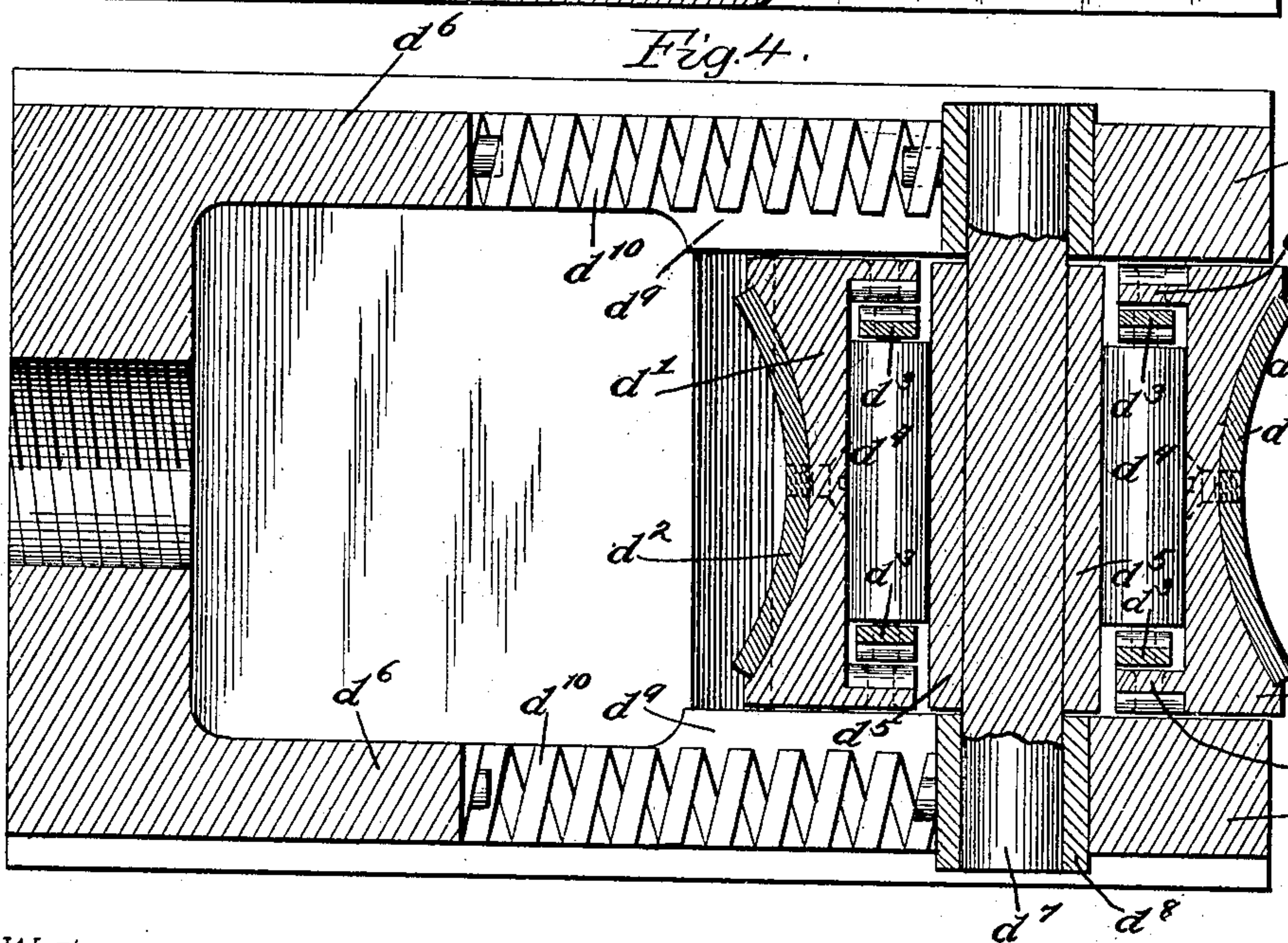
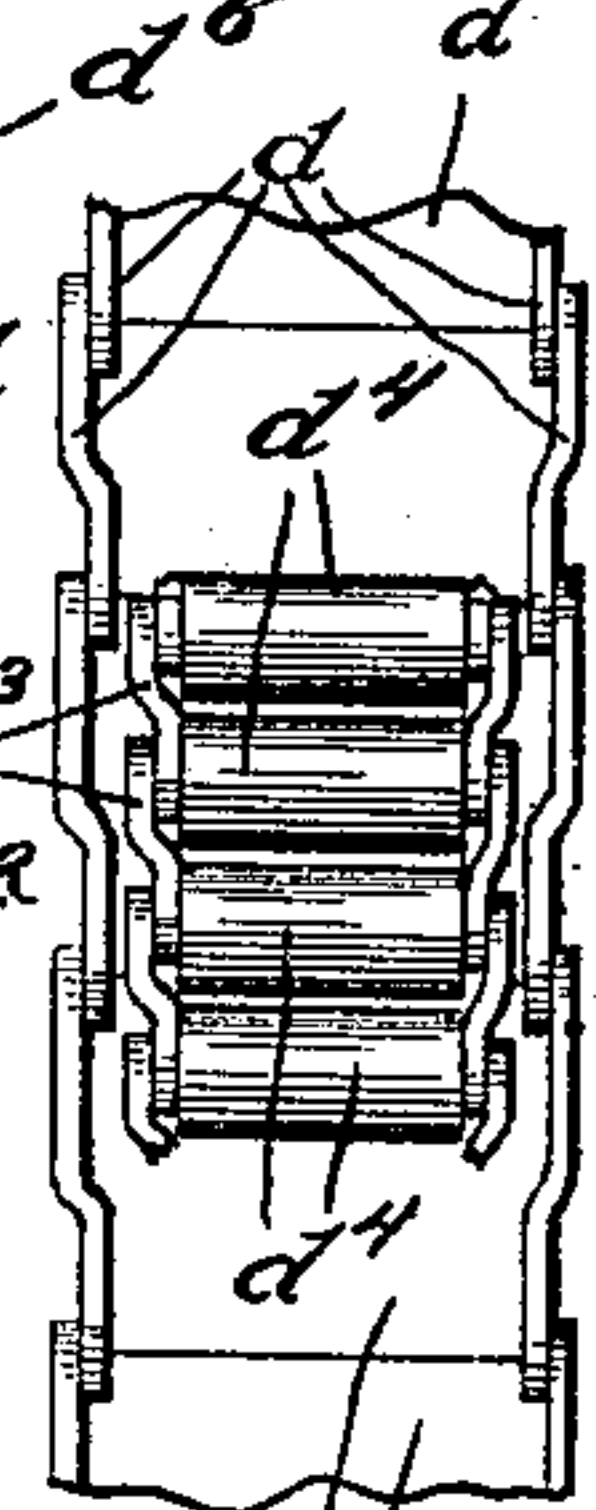


Fig. 5.



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UNITED STATES PATENT OFFICE.

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WELL-MACHINE.

SPECIFICATION forming part of Letters Patent No. 763,254, dated June 21, 1904.

Application filed November 9, 1901. Serial No. 81,667. (No model.)

To all whom it may concern:

Be it known that I, MORTON G. BUNNELL, a citizen of the United States, and a resident of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Well-Machines, of which the following is a specification.

My invention relates to rotary well-machines of that type in which an automatic pipe-grapple is provided for gripping and rotating the pipe or well-tube.

Generally stated, the object of my invention is to provide a pipe-grapple for rotary well-machines which will effectively grip and rotate the pipe or well-tube without crushing or mutilating the latter and which will automatically adjust itself with reference to the couplings or to any inequalities in the diameter of such pipe or tube.

Certain special objects are to provide a construction which will tend to reduce the cost of manufacture, to reduce friction, to apply the gripping or biting portions of the grapple-jaws in such manner as to make them readily removable in case of wear or breakage, and to provide certain details and features of improvement tending to increase the general efficiency and to render a well-machine of this character more effective and serviceable than has heretofore been the case with the known or approved device.

To the foregoing and other useful ends I preferably construct the jaws of the automatic pipe-grapple with backing-springs, which permit them to yield slightly while a coupling or other enlargement of the pipe is passing between the jaws. In this way the additional sections of the well-tubing can be coupled on and the joints or couplings passed through the grapple without the necessity of loosening up or adjusting the jaws. Furthermore, these jaws of the pipe-grapple are preferably in the form of endless link belts supported in such manner as to have their gripping-faces adapted to engage the cylindric surface of the well-tube. These link belts forming the gripping-jaws are preferably backed by antifric-tion-rolls, and with this arrangement each jaw is capable of engaging the tube or pipe some

distance along the latter's length, thereby in-creasing the effective bearing or gripping sur-face of the jaws in such manner as to obviate the necessity of squeezing or gripping the pipe with such a degree of pressure as might be likely to crush it. With the provision of the antifric-tion-rolls these endless link belt or chain jaws slide freely on their bearings and grip and rotate the pipe, but at the same time permit the latter to sink gradually downward without causing any cramping or binding or any undue friction. With a view to secur-ing an advantageous and peculiarly-effective application of these antifric-tion-rolls the latter are preferably mounted upon supple-mental endless link belts or chains. These roll-carrying chains or link belts can be ar-ranged to lie between the jaw-chains and the bearing or supporting structure for the lat-ter. This method of mounting the antifric-tion-rolls is simple and secures the desired separation of the rolls from each other—that is to say, it serves as a means for keep-ing the rolls in their proper relative positions as well as of preventing them from dropping away at the lower portions of the jaws, at which latter point the jaw-chains or link belts are preferably and desirably slack. As an ad-ditional means of securing the foregoing ends the gripping-jaws are preferably pivoted to swing about horizontal axes, and with this arrangement each jaw is capable of automati-cally adjusting itself so as to bring its en-tire bearing-surface into contact with the pipe. In this way the straight or lengthened bear-ing-surfaces of the jaws can be caused to make full and proper contact with the pipe or tube regardless of whether the latter is in a ver-tical or slightly-inclined position. The jaw-blocks of these endless link belt or chain jaws are preferably provided with removable en-gaging portions—that is to say, the portions of the jaws which engage the pipe or tube are preferably removably secured to the chains or link belts. With this provision and ar-rangement the only portions of the jaws which are likely to break and become much worn as a result of gripping and rotating the pipe or tube are readily removable and can be readily

replaced in case of wear or breakage. The nature and advantages of my invention will, however, hereinafter more fully appear.

In the accompanying drawings, Figure 1 is a plan of a rotary well-machine constructed with an automatic pipe-grapple embodying the principles of my invention. Fig. 2 is an elevation of the well-machine shown in Fig. 1. Fig. 3 is an enlarged sectional detail of one of the chain or link belt gripping-jaws and its mounting. Fig. 4 is a horizontal section on line 4 4 in Fig. 3. Fig. 5 is a detail showing the back of a number of the jaw-links and also of the adjacent roll-bearing links.

As thus illustrated, my improved rotary well-machine may comprise a turn-table A of any suitable or approved form or construction. This turn-table can be mounted in any suitable way—as, for example, upon a bed B, there being, preferably, antifriction rolls or balls interposed between this bed and the said turn-table. Preferably the turn-table is provided at its periphery with gear-teeth, and with this provision the turn-table resembles a bevel-gear. The turn-table thus formed can be advantageously and effectively rotated by means of a bevel-pinion C. This pinion can be rotated by any suitable driving mechanism, and when rotated it operates to communicate power and motion to the turn-table, it being observed that the latter when in motion rotates about a central and vertical axis. The turn-table is preferably and desirably formed with a central well or opening a, adapted to permit the passage of the pipe or well-tube, it being understood that the latter may be any suitable pipe or tubing employed in constructing pipe or tubular wells. The automatic pipe-grapple for gripping and rotating this pipe or well-tubing and which at the same time allows such pipe or tubing to sink gradually downward comprises the gripping-jaws D. It will be observed that these gripping-jaws are preferably supported upon the upper surface of the said turn-table and also that these jaws are arranged in such manner as to be readily adjustable in a direction to cause them to either grip or release the said pipe or tubing. Each jaw is preferably in the nature of an endless link belt or chain d , suitably mounted or supported and provided with jaw-blocks d' . Each of these jaw-blocks is provided with a face or engaging portion adapted to bite or grip the pipe or well-tube. In order that the entire link will not necessarily have to be thrown away when the said engaging surface or portion becomes worn or broken, I preferably provide each jaw-block with a removable biting or wearing piece d'' . These removable wearing or biting pieces can be made of hardened steel, while the balance of the chain can, of course, be of any suitable material, such as malleable iron or other metal. The said biting or wear-

ing pieces d'' can be secured to the jaw-chain or link belt in any suitable manner. Each jaw D preferably involves a supplemental link belt d^3 , provided with antifriction-rolls d^4 . These supplemental link belts or chains are, it will be observed, arranged within the jaw-chains or link belts, and the antifriction-rolls intervene between the backs of the jaw-blocks and the bearings or mountings d^5 , upon which the chains are mounted. With this arrangement there is very little or at least no objectionable friction between the chains and the mountings upon which they are supported, and, furthermore, the provision of a roll-supporting chain serves to keep the rolls properly supported and to prevent them from dropping or falling away at the lower portion of the jaws, where, it will be observed, the jaw-chains are preferably allowed to run slack, so as to avoid cramping or binding when the chains are pressed against the pipe or tubing and are moving around the mountings. Each mounting for these chains or link belts is preferably pivoted to swing or turn about a horizontal axis. This pivotal connection between the chain-mountings and the slides d^6 can be of any suitable form—as, for example, it may consist of a pin d^7 , extending through the mountings and also through the cheeks or side portions of said slides. With this arrangement each jaw is capable of tilting or turning, so as to automatically adjust itself and to bring its entire gripping or bearing surface into contact with the cylindric surface of the pipe or well-tube. As a further advantage the opposite or projecting end portions of these pivot-pins are preferably supported in blocks or bearings d^8 and arranged to slide in slots d^9 in the cheeks or side portions in the set of adjustable slides which carry the jaws. Each of these slides is provided with a yielding backing, preferably in the nature of a coil-spring d^{10} . With this provision and arrangement it is obvious that the jaws can be adjusted forward into contact with the piping and that by having these springs of proper strength or resistance they will hold the jaws firmly in contact with the pipe, so as to rotate the latter. It will further be seen, however, that while effectively holding the jaws in contact with the pipe these springs can also be of such strength and tension as to readily yield when it is desirable to have a coupling or other enlargement in the pipe pass between the jaws of the grapple. When additional sections of the pipe or well-tube are coupled on, the couplings or joints can be allowed to pass through the grapple without necessitating any loosening up or adjustment of the jaws, it being seen that the latter simply yield and allow these joints or couplings to pass, this automatic feature of the grapple being also to some extent due to the pivoting of the jaws. This will be understood by as-

suming that a coupling is about to pass between the jaws, in which event it will be seen that the upper ends of the jaws will first tilt back, that when the coupling is midway between the jaws the latter will then stand substantially square or in their normal positions, and that when the coupling is about to leave the jaws the latter are then tilted in the opposite direction. In this way the jaws are capable of adjusting themselves to enlargements or inequalities in the diameter of the pipe and also to inclined or improper positions of the pipe or well-tubing and that in each instance the jaw will automatically maintain its full bearing or tilting surface in contact with the pipe or well-tube. The gripping-jaws thus constructed can be supported for adjustment in any suitable manner—as, for example, by mounting the said slides in suitable ways on the turn-table and by providing hand-screws E or other like adjusting devices for causing the jaws thus slidably supported to move either toward or away from the pipe or well-tube. By rotating these hand-screws these jaws can be adjusted into contact with the pipe or well-tube, and when the turn-table is then rotated in the afore-described manner the jaws will grip and rotate the pipe. This rotary movement secures the desired drilling action at the lower end of the pipe or well-tube, and as this drilling action goes on the endless link belt or chain jaws travel on their bearings and permit the pipe to feed or sink gradually downward.

What I claim as my invention is—

1. A rotary well-machine comprising gripping-jaws constructed of endless link belts or chains provided with biting or gripping portions adapted to engage the pipe or well-tube, suitable mountings or supporting members upon which said chains are mounted, and supplemental chains provided with antifriction-rolls, said rolls being interposed between the said mountings or supporting members and the chains or link belts which grip the said pipe or tube, substantially as described.

2. In a rotary well-machine, the combination of gripping-jaws formed of endless link belts or chains, suitable mountings or supporting members on which said chains or link belts are mounted, antifriction-rolls interposed between said chains or link belts and said mountings or supporting members, and endless connectors adapted and arranged to connect and carry said antifriction-rolls, substantially as described.

3. In a rotary well-machine, the combination of endless link belt or chain jaws adapted to grip and rotate the pipe or well-tube, and pivoted mountings or supporting members upon which said chains are mounted and springs backing said mounting, the pivots of said mountings or supporting members permitting

the jaws to tilt about horizontal axes, substantially as described.

4. In a rotary well-machine, the combination of endless link belt or chain jaws for gripping and rotating the pipe or well-tube, pivoted mountings or supporting members upon which said link belts or chains are mounted, antifriction-rolls for reducing friction between said mountings or supporting members and the said link belts or chains, and endless connectors upon which said antifriction-rolls are mounted, substantially as described.

5. In a rotary well-machine, the combination of a suitable pipe or well-tube, jaws adapted to grip and rotate said pipe or well-tube and permit the same to automatically feed downward, yielding backings for said jaws, whereby the latter are capable of yielding in order to permit a pipe-coupling or other enlargement to pass between the jaws, substantially as described.

6. In a rotary well-machine, the combination of a suitable pipe or well-tube, endless link belt or chain jaws adapted to grip and rotate the pipe or well-tube, suitable supporting structures adapted and arranged to carry said chains, and yielding backings which permit the jaws to automatically yield and adjust themselves to enlargements or inequalities in the diameter of the pipe or well-tube, substantially as described.

7. In a rotary well-machine, the combination of a suitable pipe or well-tube, a plurality of jaws adapted to grip or rotate the pipe and at the same time permit the latter to sink gradually downward, and a plurality of springs adapted and applied as backings for the jaws, whereby the latter are capable of automatically adjusting themselves to differences or inequalities in the diameter of the pipe or well-tube, substantially as described.

8. In a rotary well-machine, the combination of a suitable pipe or well-tube, gripping-jaws formed of endless link belts or chains, suitable mountings or supporting members upon which said chains are mounted, slides carrying said mountings or supporting members, a rotary turn-table upon which said slides are mounted, and coil-springs interposed between said mountings or supporting members and the said slides, whereby the said chains or link belts are capable of automatically yielding and adjusting themselves to enlargements or inequalities in the diameter of the piping or well-tube, substantially as described.

9. In a rotary well-machine, the combination of a suitable pipe or well-tube, a plurality of gripping-jaws provided with endless link belts or chains, removable biting or wearing pieces mounted upon said chains or link belts and adapted to bite or engage the pipe or well-tube and a rotary turn-table upon which said jaws are adjustably mounted, substantially as described.

10. In a rotary well-machine, the combination of a suitable pipe or well-tube, a plurality of gripping-jaws provided with endless link belts, whereof each link is provided with a jaw-block, biting or wearing pieces removably secured to said jaw-blocks and adapted to bite or engage the pipe or well-tube and a rotary turn-table upon which said jaws are suitably mounted, substantially as described.

11. In a well-machine, the combination of a suitable pipe or well-tube, a rotary turn-table, mountings carried by said turn-table, endless link belts arranged upon said mountings and provided with portions adapted to grip said pipe or well-tube, said chains having slack at their lower portions, so as to prevent the links from cramping or binding, substantially as described.

12. In a rotary well-machine, the combination of a rotary turn-table, a plurality of spring-backed gripping-jaws suitably mounted upon said turn-table, each jaw being provided with a connected series of traveling gripping portions adapted to engage a pipe or well-tube for some distance along the latter's length, and pivotal connections for said jaws, each jaw being capable of tilting about a horizontal axis, substantially as described.

13. A well-machine comprising a rotary turn-table, a jaw mounted on said turn-table

and provided with an endless chain adapted to impinge upon and cause the well-pipe to partake of the rotary motion of said turn-table, said endless chain being yieldingly held in engagement with the well-pipe by spring-pressure, power-operated means for rotating said turn-table, and another jaw mounted on said turn-table and adapted to cooperate with said first-mentioned jaw in causing the well-pipe to partake of the rotary motion of the turn-table.

14. The combination of a jaw, and a spring-backed gripping device pivotally mounted therein, said gripping device consisting of a frame carrying traveling gripping-blocks arranged in endless series, substantially as described.

15. The combination of a jaw, and a spring-backed gripping device pivotally mounted therein, said gripping device consisting of a frame carrying separate traveling gripping-blocks arranged in endless series, substantially as described.

Signed by me at Chicago, Cook county, Illinois, this 7th day of November, 1901.

MORTON G. BUNNELL.

Witnesses:

E. A. GARDINER,

A. F. DURAND.