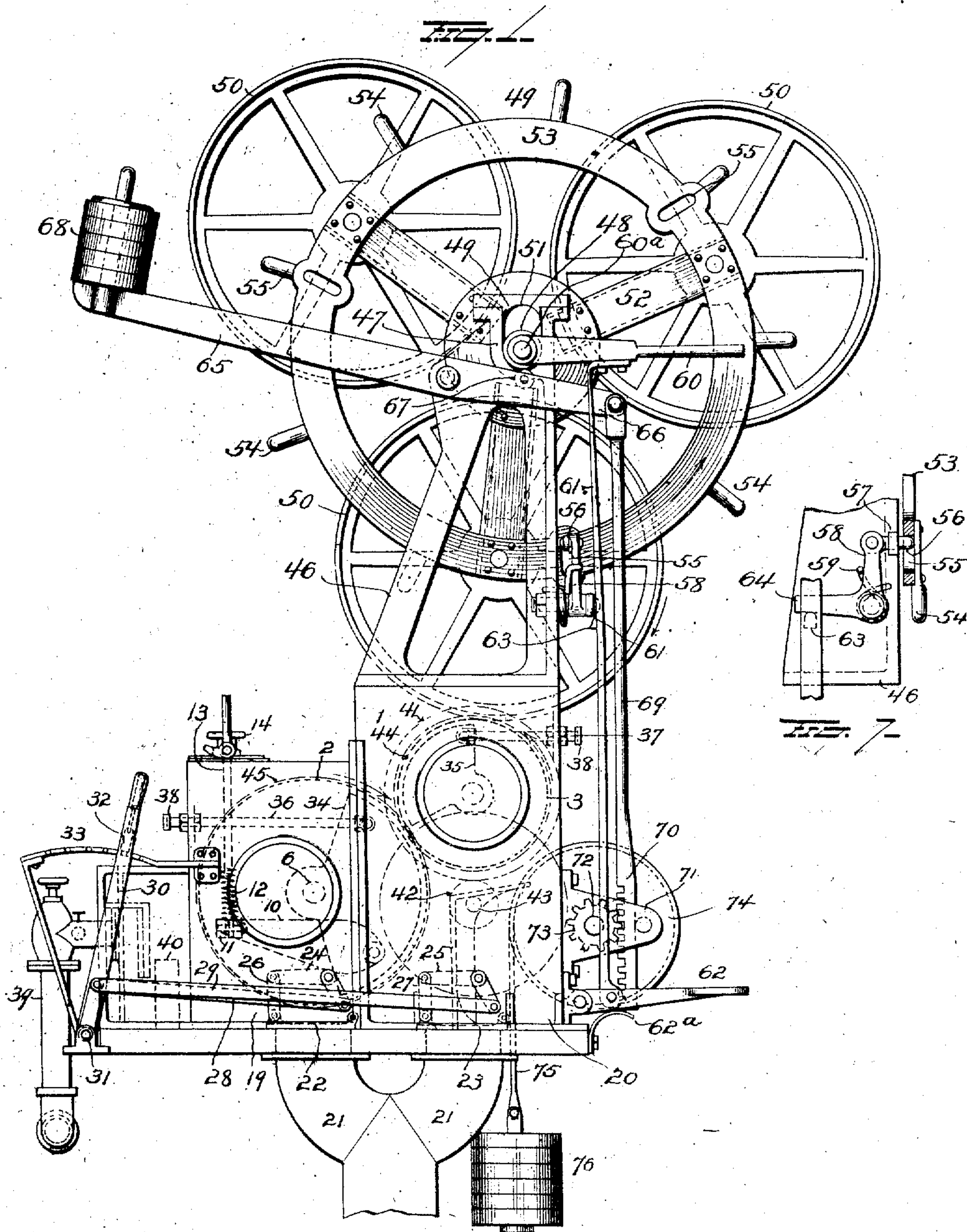


986,997.

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MACHINE FOR FELTING PULP.  
APPLICATION FILED NOV. 28, 1910.

Patented Mar. 14, 1911.

2 SHEETS—SHEET 1.



WITNESSES  
E. Nottingham  
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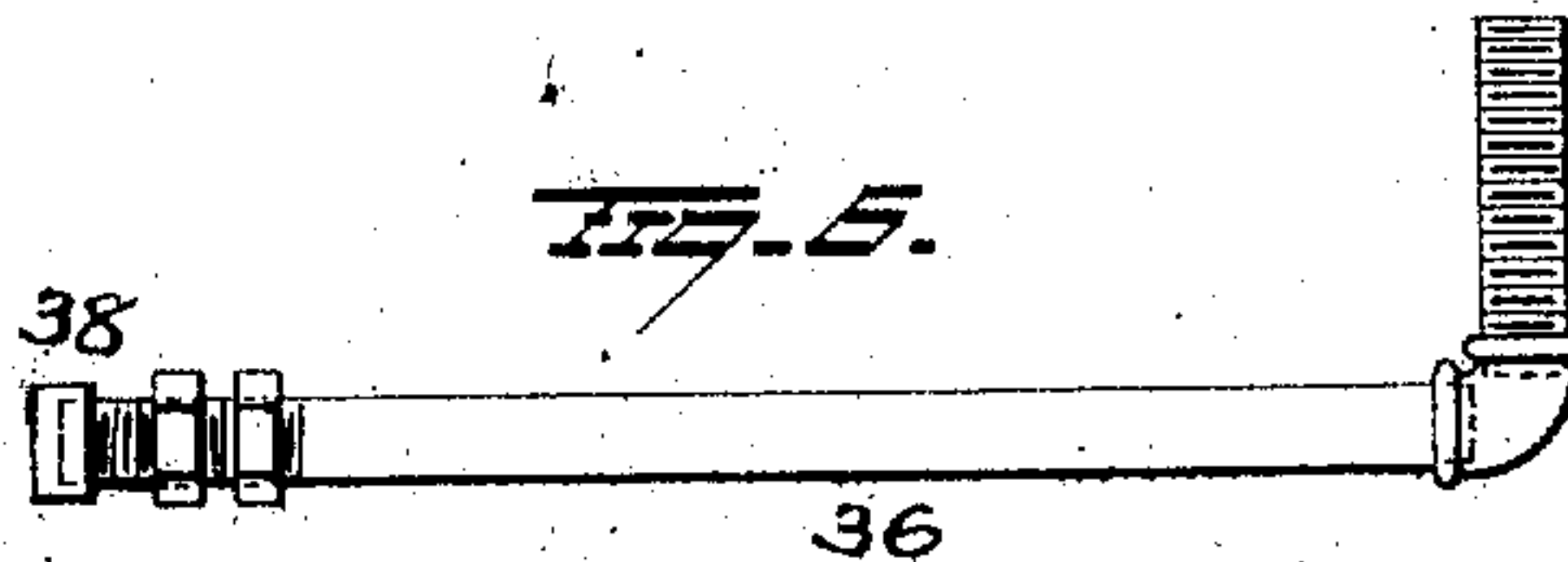
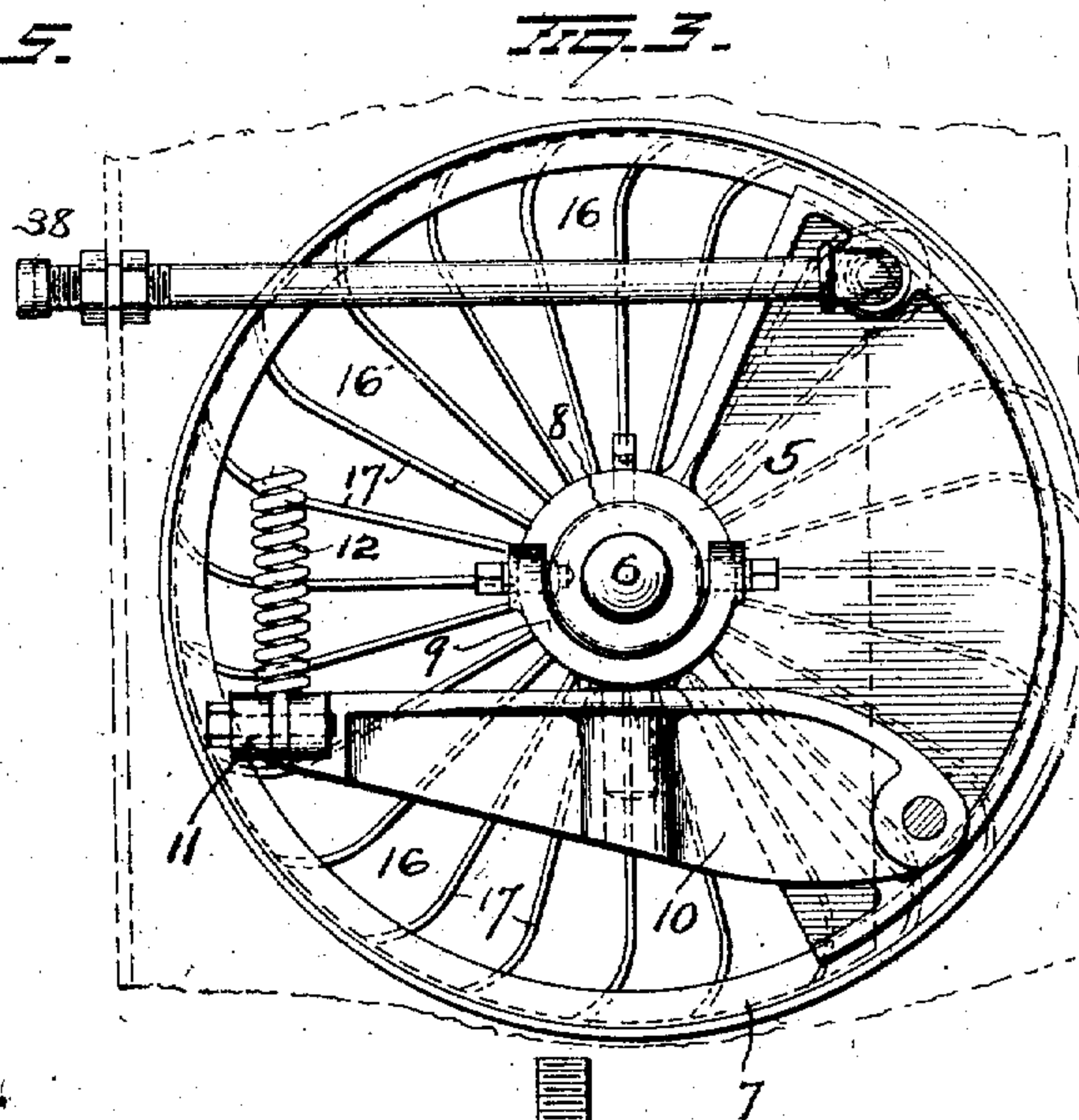
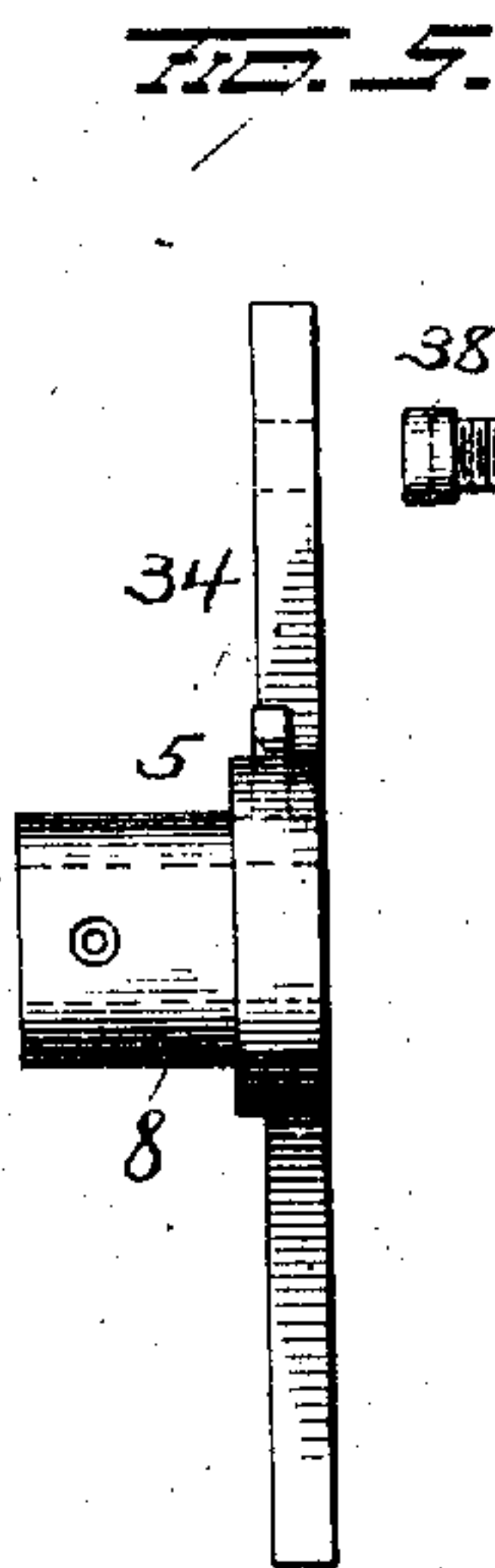
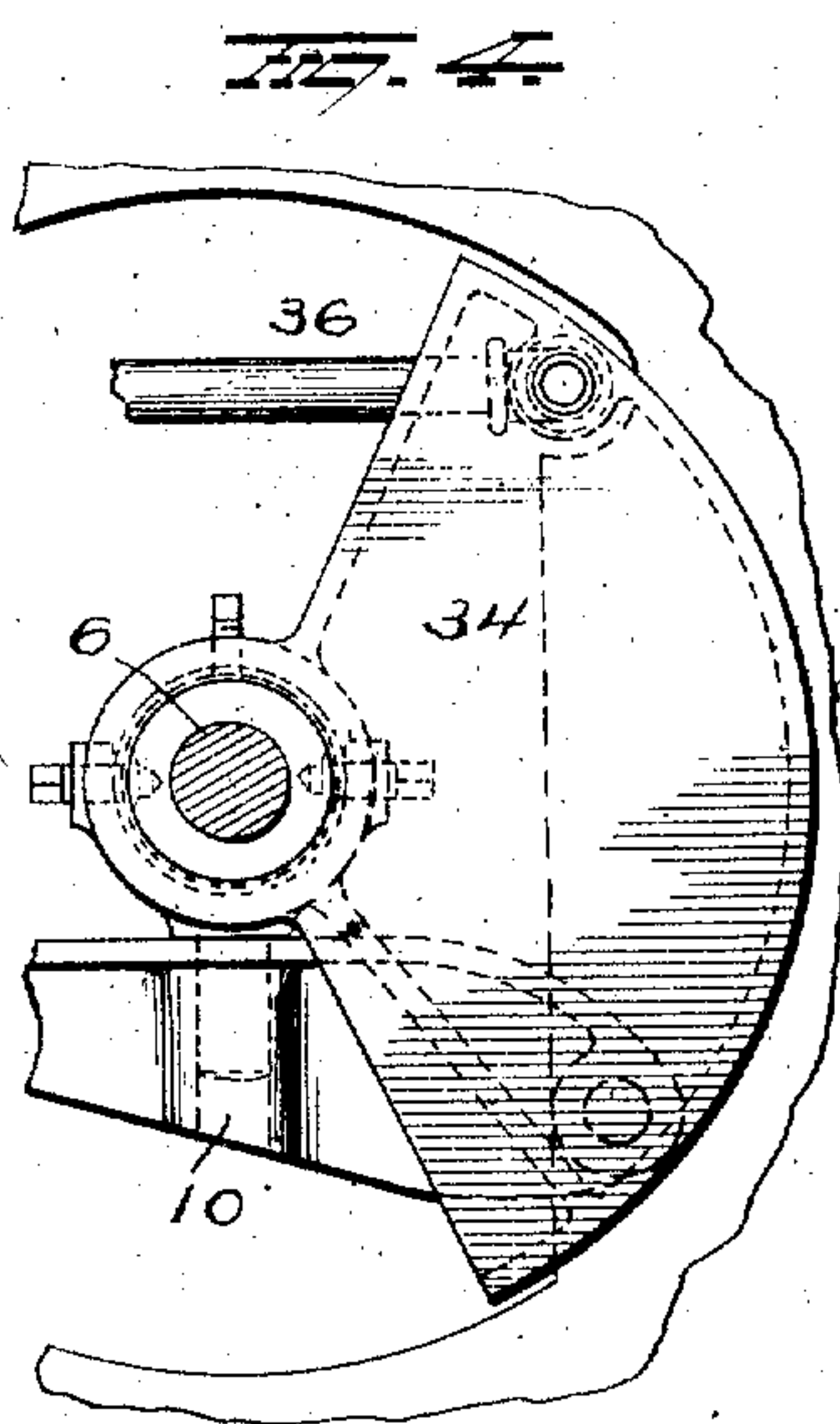
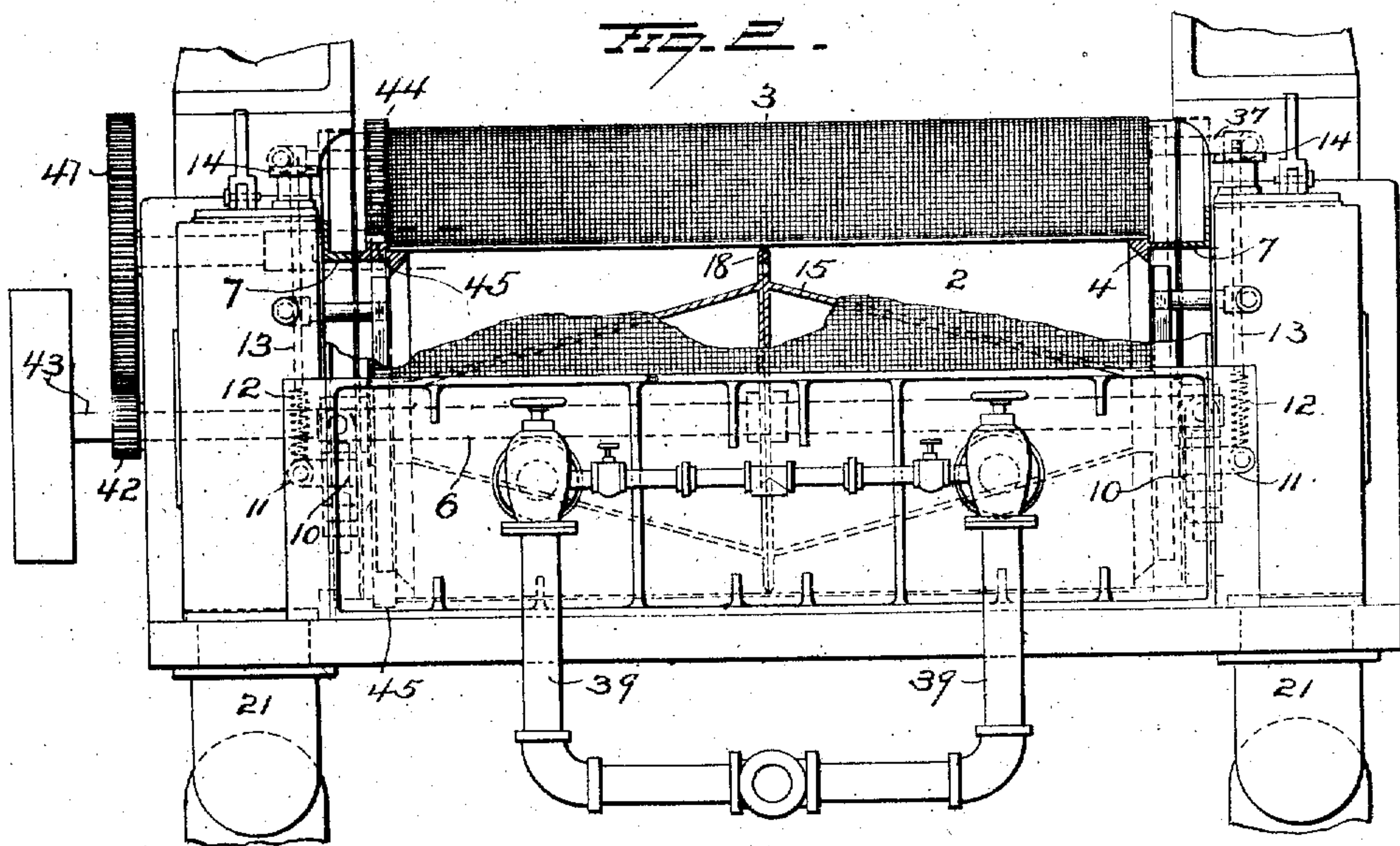
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Patented Mar. 14, 1911.

986,997.

2 SHEETS—SHEET 2.



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# UNITED STATES PATENT OFFICE.

FRANK E. KEYES, OF NEW YORK, N. Y.

## MACHINE FOR FELTING PULP.

986,997.

Specification of Letters Patent. Patented Mar. 14, 1911.

Application filed November 26, 1910. Serial No. 594,356.

*To all whom it may concern:*

Be it known that I, FRANK E. KEYES, of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Machines for Felting Pulp; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in machines for felting pulp and more particularly to such as are adapted to effectually transfer pulp, by means of mold and couch rolls to forming rolls,—one object of the invention being to provide simple and efficient means for supporting and controlling a plurality of forming rolls above the couch roll, so that pulp will be properly wound or formed on one of said forming rolls at a time.

A further object is to so construct the machine that the carrier for the forming rolls can be normally locked against rotation and yet be permitted to rise during the accumulation of pulp on one of the forming rolls, and so that said forming-roll carrier can be easily unlocked and then rotated to move a roll having a tube formed thereon, from the couch roll and simultaneously to move another forming roll into position over the couch roll, ready to receive pulp from the couch roll, without necessity of stopping the operation of the machine.

A further object is to provide simple and efficient means for breaking the vacuum within the mold and couch rolls adjacent to the juncture of said rolls and adjacent to the juncture of the couch roll and molding roll, to cause the proper transfer of weak pulp from the mold roll to the couch roll and from the latter to a forming roll.

A further object is to provide efficient means for counterweighting the forming rolls and their carriers.

With these and other objects in view, the invention consists in certain novel features of construction and combinations of parts as hereinafter set forth and set forth in the claims.

In the accompanying drawings; Figure 1 is a side elevation of a machine embodying my improvements; Fig. 2 is a front view, partly in section, of the lower portion of the machine; Fig. 3 is an enlarged end view showing the mold cylinder and support

therefor, and one of the suction cut-off plates and vacuum breaker pipe; Fig. 4 is a fragmentary view, partly in elevation, of features shown in Fig. 3; Fig. 5 is an edge view of one of the suction cut-off plates; Fig. 6 is a detail view of one of the vacuum breaker pipes; and Fig. 7 is a detail view showing the locking devices for the forming-roll carrier.

1 represents a tank or casing, in which a reticulated mold roll or shell 2 and a similarly constructed but smaller couch roll or shell 3 are located. The ends of the reticulated mold shell or roll are provided with open heads 4 having hubs for the accommodation of a shaft 6, and adjacent to said open heads of the mold shell or roll, fixed deckle rings 7 are located in the walls of the casing. Boxes 8 are provided for the journals of the shaft 6 and these boxes are pivotally mounted in yokes 9,—the latter being loosely mounted upon levers 10. Each lever 10 is pivotally supported at one end and provided at its other end with a laterally projecting arm 11, with which a spring 12 is connected. Each spring 12 has attached to its upper end, the lower end of a rod 13 which passes upwardly through the top of the casing and is provided with an adjusting nut 14. The mold shell or roll is thus yieldingly supported by the levers 10 and the supporting rods 13 and springs 12 are (by reason of the lateral arms 11 on said levers) located outwardly beyond the deckle rings.

The mold roll or shell 2 is provided centrally with a core 15 which is of double conical shape in longitudinal section—that is to say, in the shape of two hollow cones placed base to base—the portion outside of said central contact section being divided into compartments 16 by a series of radial partitions 17 which terminate in contact with the inner face of the perforated or reticulated periphery of the mold. The central part of the internal double cone is provided with a peripheral rib 18 for supporting the reticulated circumferential covering of the mold roll or shell.

The couch roll 3 is constructed the same as above described except that it is smaller, and is mounted in fixed bearings.

Air chambers 19—20 are located at each end of the vat or casing so as to communicate with the ends of the mold and couch rolls 2 and 3 respectively, and pipes 21 con-



nect these air chambers with any suitable exhaust device. Valves 22—23 are located in the bottoms of the air chambers 19—20.

At each end of the machine, bell-crank-levers 24 and 25 are located and connected, by means of links 26—27 with the respective valves 22—23. One arm of each bell-crank is located outside of the casing and these arms of the bell-cranks (at each end of the machine) are connected, by means of rods 28—29, with arms 30 secured to a shaft 31 which extends from one end of the machine to the other. A valve operating lever is secured to the shaft 31 for operating the valves at both ends of the machine. This lever is provided with a suitable detent 32 to cooperate with a notched segment 33, whereby the valves can be held in any desired position.

Segmental suction cut-off plates 34—35 are located at respective ends of the mold and couch rolls or shells and are provided with hub portions mounted on the shafts of said rolls or shells. These suction cut-off plates are normally held in fixed positions by means of pipes 36—37 which pass through said plates near the upper ends of the latter, said pipes extending outwardly from the plates 34—35 and through the walls of the casing, to which they are adjustably secured. The outer ends of the pipes 36—37 may be provided with caps 38, but when these caps are removed, said pipes perform another function, as presently explained.

Pulp and water are introduced into the vat or casing through suitable valved pipes 39, and the pulp will be maintained at a proper level within the vat or casing by means of an overflow outlet pipe 40.

The shaft of the couch roll or shell is extended beyond its bearing at one end and provided with a gear wheel 41 which receives motion from a pinion 42 on a driving shaft 43. The couch roll is also provided at one end with a gear 44, which meshes with a gear 45 on the mold roll for driving the latter.

It is apparent that during the rotation of the mold and couch rolls, the action of the suction in the compartments thereof will cause the pulp to adhere to the reticulated peripheries of said rolls, except on such portions thereof, where the suction is cut-off from compartments of said rolls by the segmental suction cut-off plates 34—35. Thus the mold roll or shell 2, rotating through the pulp in the vat, will receive the pulp in a comparatively thin layer on its reticulated peripheral portion and carry the same up toward the couch roll. As the upper edge of the layer of pulp on the mold roll approaches the couch roll, the suction in the compartments under the advancing layer of pulp will be cut-off by the plates 34 and hence the pulp will be transferred to the

couch roll. In like manner, the pulp will be delivered by the couch roll, to a forming roll over the same.

It sometimes becomes desirable, when weak pulp is being operated, that the partial vacuum within the reticulated roll shall be positively broken near the juncture of the mold and couch rolls and near the juncture of the latter with the forming roll, in order that the layer of pulp shall be more readily released. To accomplish such breaking of the vacuum, the pipes 36—37 are employed and when thus used, the caps 38 will, of course be removed.

Located upon the vat or casing 1 are standards 46 provided at their upper ends with elongated bearings 47 for the accommodation of the shaft 48 of a forming roll carrier. This carrier comprises two wheels 49 suitably spaced apart to receive a plurality of forming rolls 50 between them, and each of these wheels is provided with a hub portion 51 secured to the shaft 48 and spokes 52 connecting said hub portion with the rim portion 53 of the wheel. The wheels of each carrier are also provided with a plurality of handles 54 for turning the same to move one of the forming rolls from the couch roll and another forming roll into position over said couch roll. The rim portion 53 of one wheel of the carrier is provided with a plurality of elongated slots or grooves 55 corresponding in number with the number of forming rolls mounted in the carrier, the purpose of said slots or grooves being to receive a pin 56 for locking the carrier in position to retain a forming roll in position over the couch roll and yet permit the carrier and forming roll to move vertically as the pulp accumulates on said forming roll. The locking pin 56 is guided through a lug 57 on standard 46 and is pivotally connected to one arm of a bell-crank-lever 58, a spring 59 connected with said lever tending to normally force the locking pin 56 outwardly. A hand lever 60 is provided at one end with a pin or rod 60<sup>a</sup> to enter the tubular end of the shaft 48 to loosely connect said lever with the shaft 48 and with this lever, one end of a spring bar 61 is secured, the lower end of said bar being connected with a foot lever 62. The levers 60—62 and bar 61 are held up and returned to their normal positions by means of a spring 62<sup>a</sup> disposed under the foot lever 62. The spring bar 61 is provided with a tooth 63 normally disposed (before the pulp has been accumulated on the adjacent forming roll) below the horizontal arm 64 of the bell-crank-lever 58. As the pulp accumulates on the forming roll and the latter (together with the forming-roll carrier) rises, the locking pin 56 will move upwardly in the slot of groove 55, and the spring rod or bar 61 will also rise until the tooth 63 thereon, shall have passed above the



arm 64 of bell-crank 58. Should the operator now depress either the hand lever 60 or the foot lever 62, the spring rod or bar 61 will be moved downwardly and the tooth 63, engaging the arm 64 of bell-crank 58, will cause the latter to be turned and the locking pin 56 to be withdrawn to release the forming-roll carrier. After a tube shall have been completed on one of the forming rolls and the carrier released, the operator will turn said carrier to move the forming roll with the completed tube, away from the couch roll and to move an empty forming roll into position over the couch roll. This operation can be effected without stopping the machine. It will be observed that the shaft 48 which constitutes the axis of the forming roll carrier, is not in vertical alignment with the axis of the couch roll. When the carrier is turned to move a completed tube away from the couch roll the forming roll on which said tube has been wound, will also descend by reason of the descent of the forming-roll carrier, and consequently the pulp tube on said forming-roll will continue to have contact with the couch roll and will remove the pulp from a portion of the active surface of the couch roll before entirely leaving the latter. When the carrier shall have been turned sufficiently to bring another forming roll into position over the couch roll, the latter will not have turned far enough to cause a layer of pulp to be fully wound, and hence the pulp will be properly transferred from the couch roll to the new forming roll, and necessity for stopping the machine while the forming rolls are being shifted, will be avoided.

In order to properly counterweight the forming roll carrier and the forming rolls therein, and permit a forming roll to rise during the accumulation of pulp thereon, the appliances now to be described will be employed.

Levers 65 are pivotally mounted near the upper ends of the standards 46 at one side of the mountings of the shaft 48 and the short arms 66 of said levers (which project under the shaft 48) are provided with small rollers 67, to engage said shaft. The long arms of the levers 65 are provided with weights 68. The short arms 66 of said levers project beyond the standards and have pivotally attached to their free ends, the upper ends of vertical rods 69. The rods 69 are provided at their lower ends with rack bars 70 passing through guide brackets 71. A shaft 72 is mounted in the brackets 71 and carries pinions 73 to mesh with the rack bars 70. Drums 74 are also secured to the shaft 72 and on these drums, cables 75 are wound and provided at their free ends with depending weights 76. By the provision of the weights 68 and 76 connected with the forming roll carrier as above described, said

carrier and the forming rolls will be counterweighted in a manner to insure the accurate and easy operation of the tube forming mechanism.

Various slight changes might be made in the details of construction of my invention without departing from the spirit thereof or limiting its scope and hence I do not wish to restrict myself to the precise details herein set forth.

Having fully described my invention what I claim as new and desire to secure by Letters-Patent, is:—

1. In a machine for felting pulp, the combination with a vat or casing to contain pulp, a reticulated mold roll mounted in said vat or casing, a couch roll cooperating with said mold roll, and suction chambers communicating with said mold and couch rolls, of suction cut-off plates between said rolls and suction chambers, and pipes projecting through said plates and extending beyond the walls of said suction chambers, said pipes constituting vacuum breakers.

2. In a machine for felting pulp, the combination with a vat or casing, a reticulated mold roll therein and provided with a plurality of radial compartments, a roll to receive pulp from the mold roll, and a suction chamber communicating with the mold roll of a suction cut-off plate disposed between the mold roll and the suction chamber, and a vacuum breaker connected with the upper portion of said vacuum cut off plate.

3. In a machine for felting pulp, the combination with a vat or casing, a reticulated mold roll mounted therein and provided with a plurality of radial compartments, a roll to receive pulp from said mold roll, and a suction chamber communicating with the mold roll, of a suction cut off plate mounted on the shaft of the mold roll between an end of the latter and the suction chamber, a pipe secured to and passing through the suction cut-off plate and passing through the wall of the casing and means adjustably securing said pipe to the wall of the casing, said pipe constituting means for adjustably securing the suction cut-off plate in position and also constituting a vacuum breaker.

4. In a machine for felting pulp, the combination with a vat or casing, a reticulated mold roll therein, a reticulated couch roll cooperating with the mold roll, and a forming roll cooperating with the couch roll, of suction chambers communicating with the mold and couch rolls, suction cut-off plates disposed between the mold roll and the couch roll and said suction chambers, and vacuum breaker pipes passing the suction cut-off plates of both the mold and the couch rolls and terminating exteriorly of the suction chambers.

5. In a machine for felting pulp; the combination with a casing a reticulated mold



roll, suction chambers communicating with said mold roll, and deckle rings between the ends of the mold roll and the suction chambers, of levers pivotally supported at one end, journal bearings supported by said levers for the shaft of the mold roll, arms projecting laterally from the free ends of said levers, and yielding supporting means connected with said laterally projecting arms and extending upwardly outside the deckle rings and connected with the top of the casing.

6. In a machine for felting pulp, the combination with a vat, a rotatable carrier for forming rolls, above said vat, and means for covering pulp from the vat to a forming roll mounted in said carrier, of locking means for the carrier, and a lever for controlling the operation of said locking means.

7. In a machine for felting pulp, the combination with a vat, a rotatable carrier for a plurality of forming rolls, mounted above said vat, and means for transferring pulp from the vat to a forming roll, of locking means for said carrier, a hand lever, a foot lever, and a rod or bar connecting said levers and cooperating with said locking means to control the operation of the same to release the carrier.

8. In a machine for felting pulp, the combination with a vat, pulp transferring means therein, and standards rising from said vat, of a rotatable carrier for a plurality of forming rolls, said carrier comprising a shaft mounted in said standards and two wheels or heads on said shaft, one of said wheels or heads having a plurality of slots or grooves, a spring pressed bell-crank mounted on one of said standards, a locking pin connected with one arm of said bell-crank and adapted to enter one of the slots or grooves in said wheel or head, an operating lever, a spring rod connected with said operating lever and a tooth on said rod to cooperate with an arm of the bell crank to withdraw the locking pin.

9. In a machine for felting pulp, the combination with a vat, pulp transferring means therein, and standards rising from said vat, of a rotatable carrier for felting pulp, the combination with a vat, pulp transferring means therein, and standards rising from said vat and provided with

elongated bearings, of a rotatable carrier for a plurality of forming rolls, said carrier having journals mounted in said elongated bearings, counterweighting means for said carrier and the forming rolls, and locking means cooperating with said carrier to prevent rotation thereof and permitting said carrier to move vertically.

10. In a machine for felting pulp, the combination with a vat pulp transferring means therein, and standards rising from said vat and provided with elongated journal bearings, of a rotatable carrier for a plurality of forming rolls having journals mounted in the elongated journal bearings of the standards, said carrier having a plurality of radial slots or grooves in one end, means for counterweighting said carrier and forming rolls, a locking pin mounted on one of said standards and adapted to enter one of the slots or grooves of the carrier, a spring-actuated bell-crank mounted on said standard and having one arm connected with the locking pin, a lever loosely connected with a journal of the carrier, a lever pivoted to a stationary part of the machine, a spring rod connecting said levers, and a tooth on said spring rod to cooperate with an arm of the bell-crank for withdrawing the locking pin.

11. In a machine for felting pulp, the combination with a vat, pulp transferring means therein, and standards rising from said vat, and having vertically elongated journal bearings at their upper ends, of a forming-roll carrier having journals mounted in said elongated bearings of the standards, levers mounted on said standards and engaging under the journals of the carrier, a weight attached to one arm of each of said levers, rods attached to the other arms of said levers and provided with rack bars, a horizontal shaft, pinions on said shaft meshing with said rack bars, drums on said horizontal shaft, and weighted cables mounted on said drums.

In testimony whereof, I have signed this specification in the presence of two subscribing witnesses.

FRANK E. KEYES.

Witnesses:

WM. J. MAHON,  
WILLIAM F. KEYES.