

(No Model.)

2 Sheets—Sheet 1.

J. R. MOLE.
TRANSPLANTING MACHINE.

No. 461,920.

Patented Oct. 27, 1891.

Fig. 1.

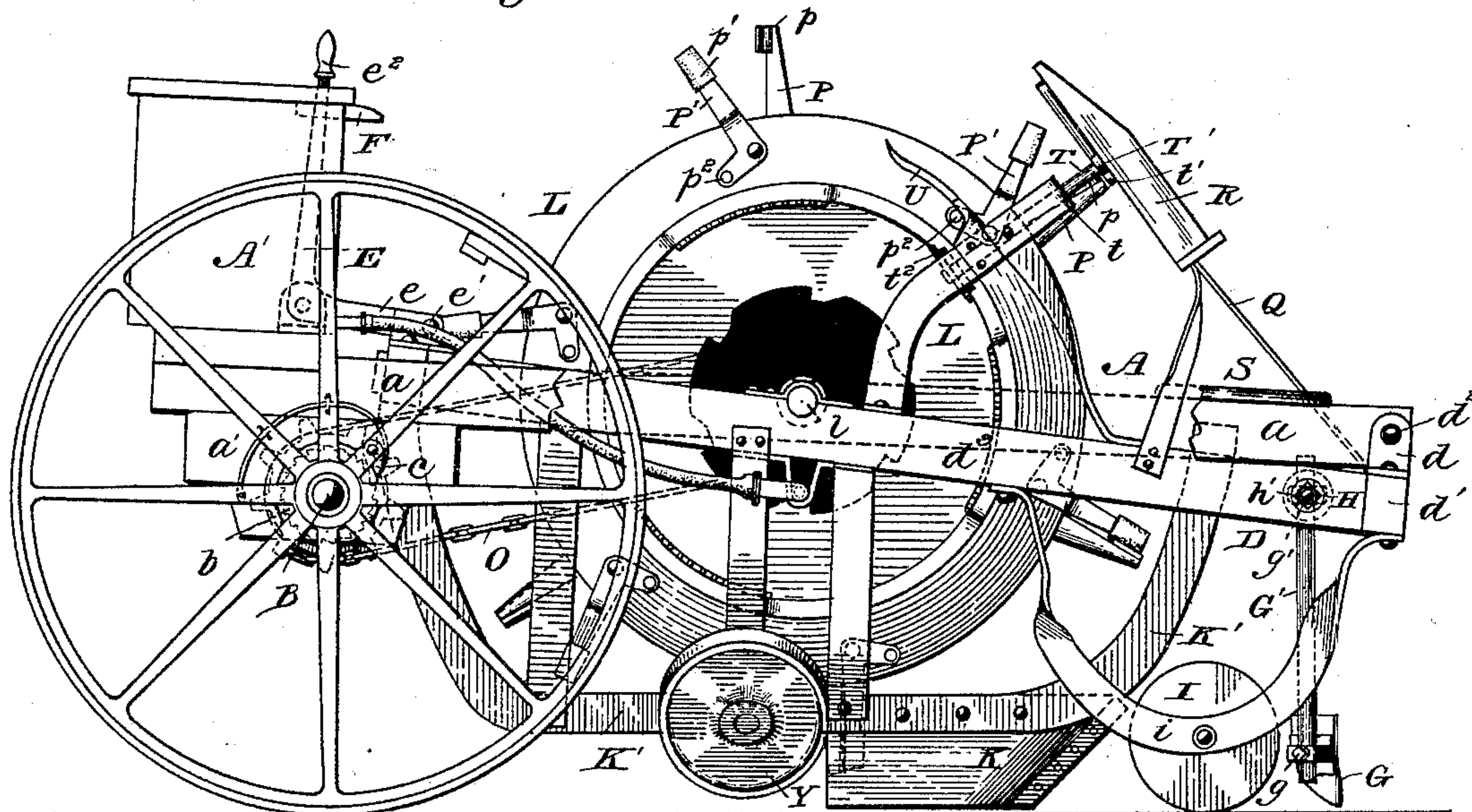
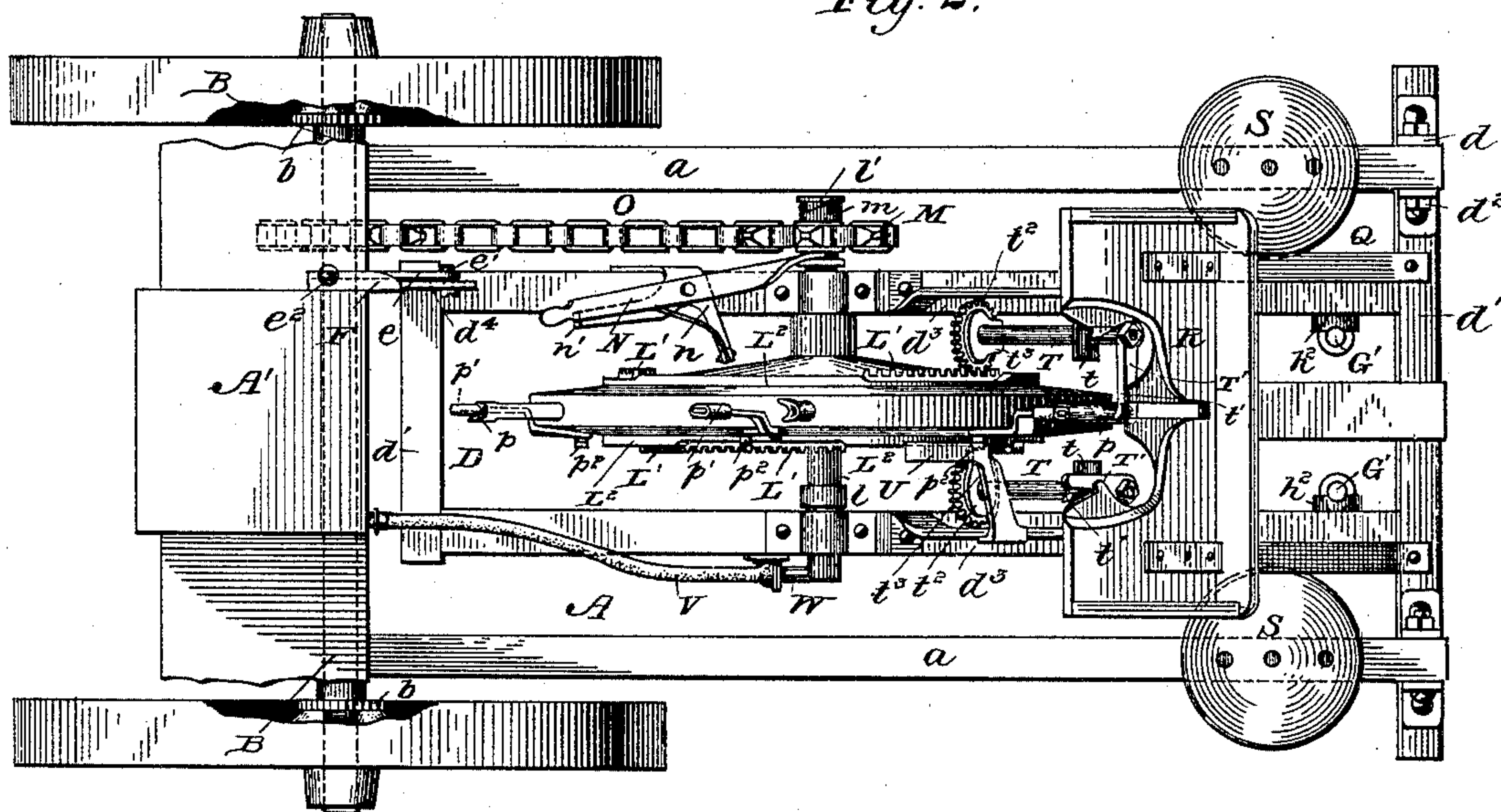


Fig. 2.



WITNESSES

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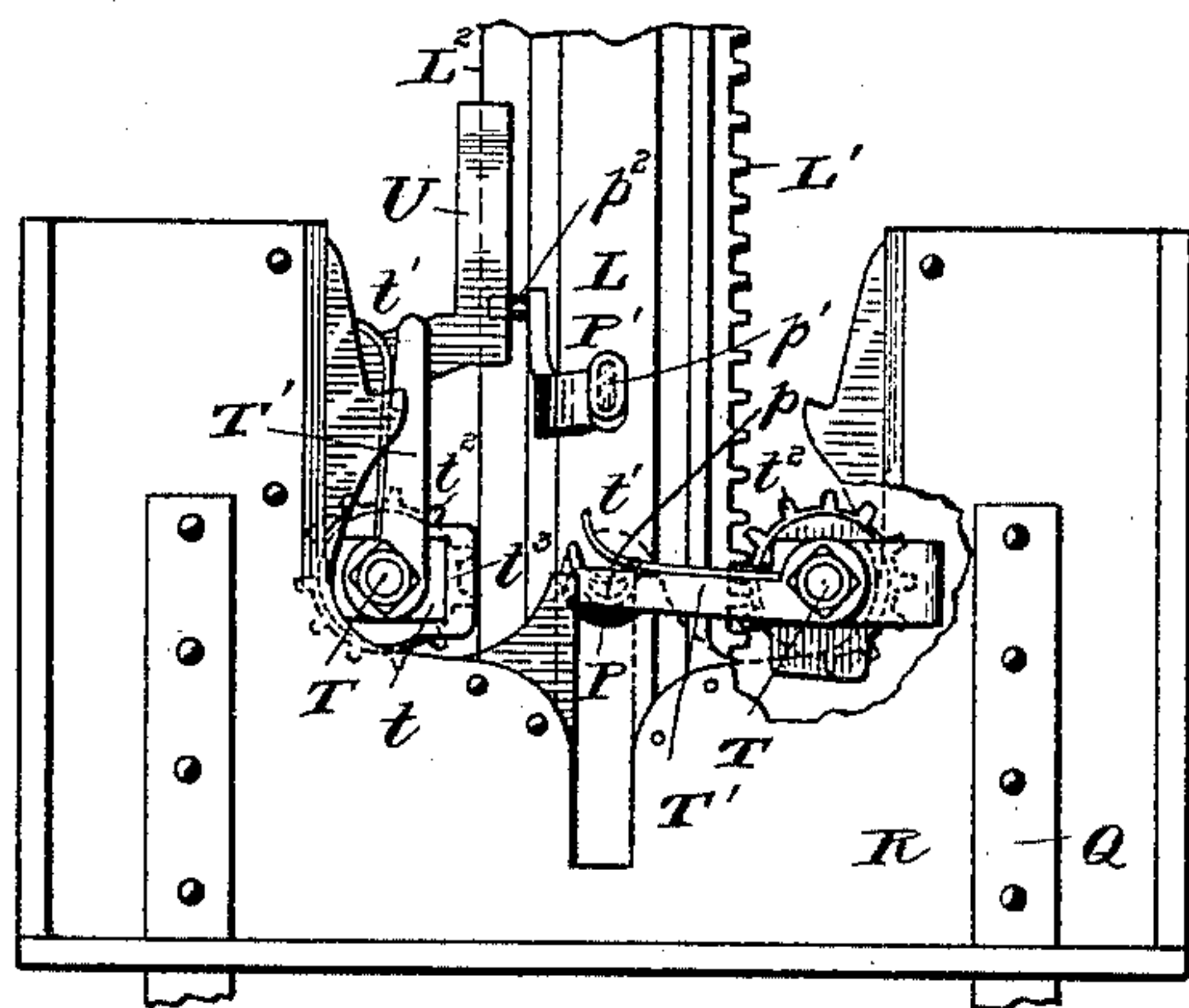


Fig. 3.

Fig. 4.

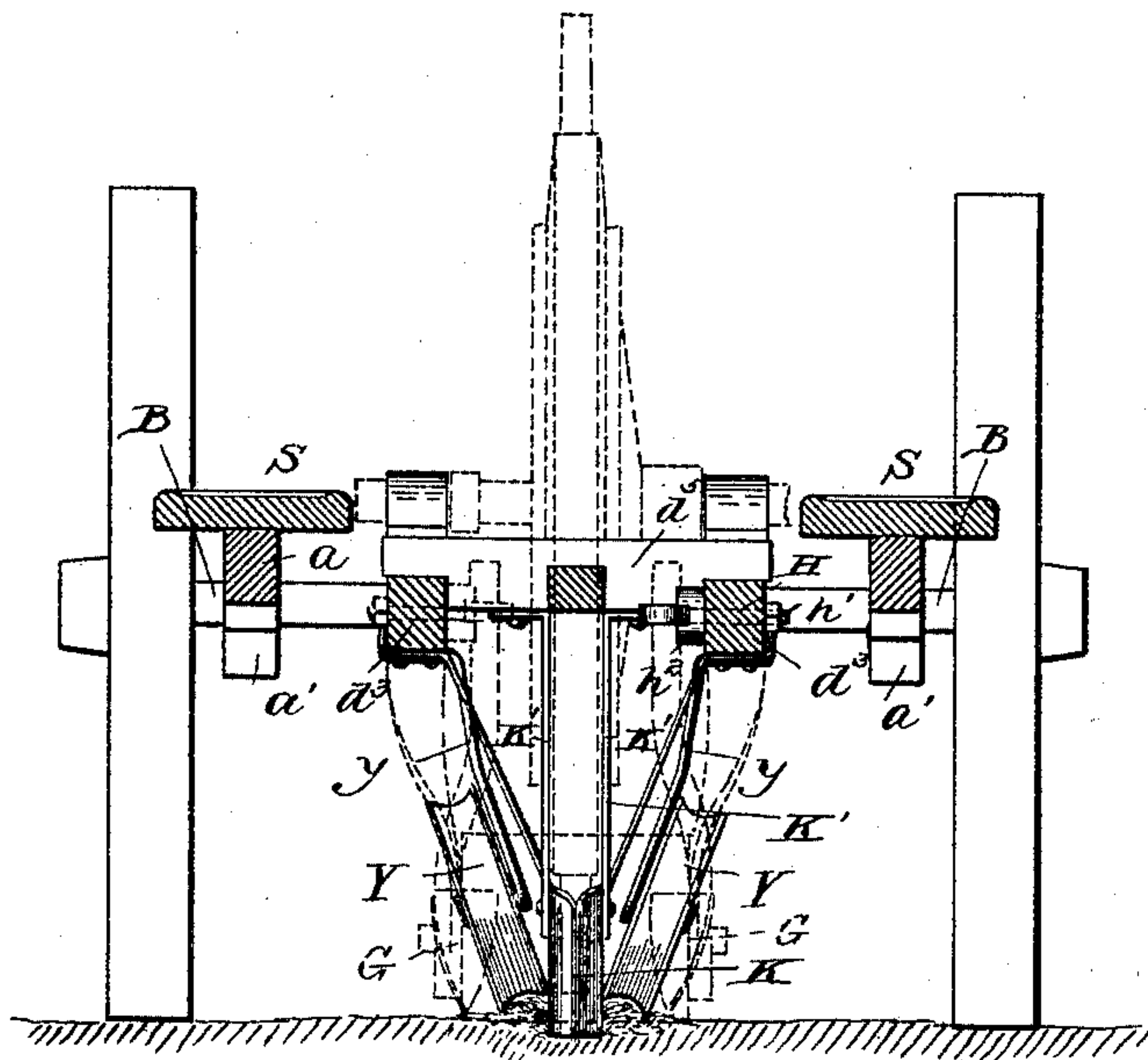
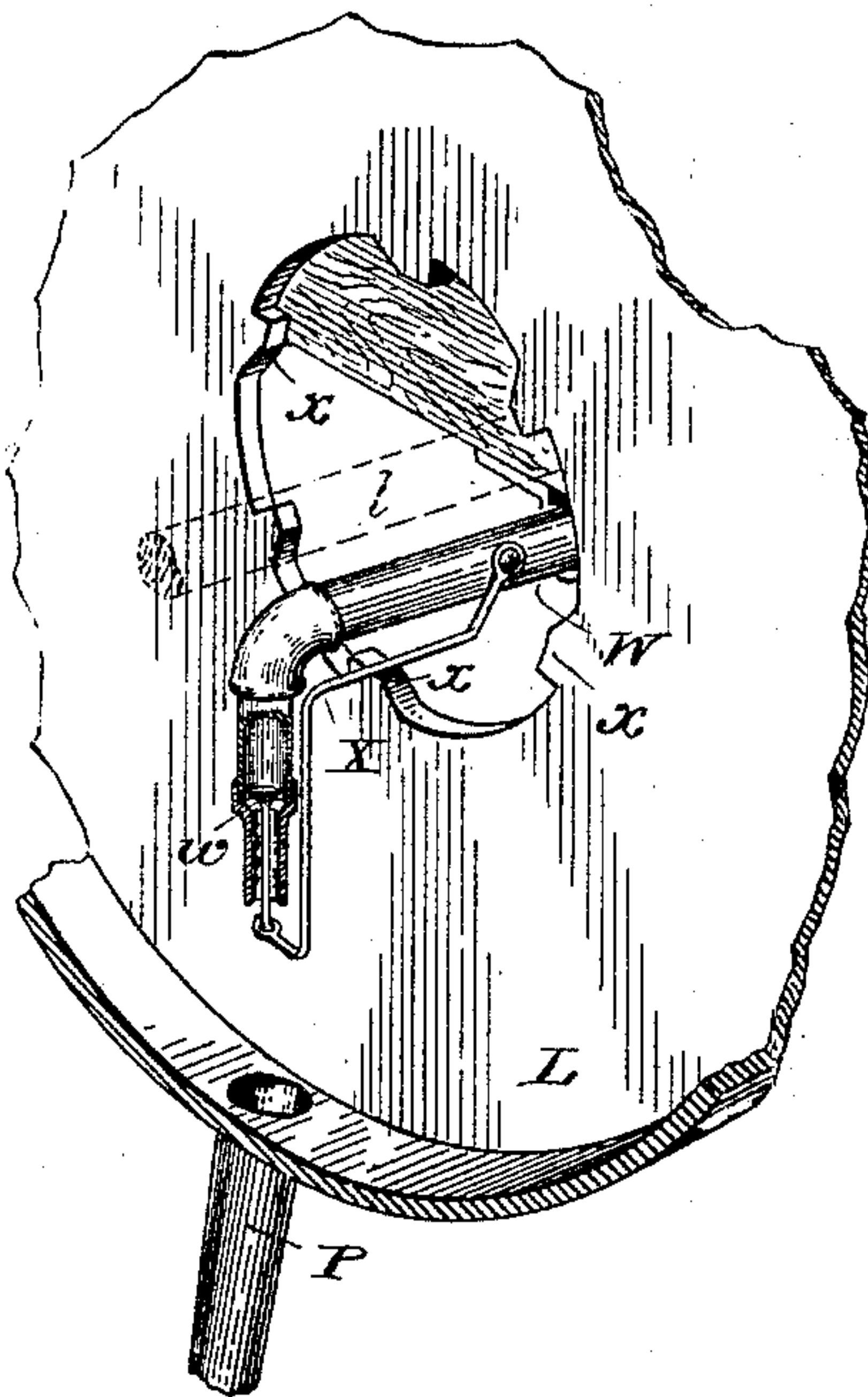


Fig. 5.

WITNESSES

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UNITED STATES PATENT OFFICE.

JAMES R. MOLE, OF JANESVILLE, WISCONSIN.

TRANSPLANTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 461,920, dated October 27, 1891.

Application filed April 14, 1890. Serial No. 347,864. (No model.)

To all whom it may concern:

Be it known that I, JAMES R. MOLE, a citizen of the United States, residing at Janesville, in the county of Rock and State of Wisconsin, have invented certain new and useful Improvements in Transplanting-Machines; and I do 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, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to machines for transplanting tobacco or other plants. Its object is to save labor and insure the rapid and regular setting of the plants; and it consists in the construction and arrangement of parts hereinafter described, and particularly pointed out in the claims, whereby the plant is seized, deposited in the ground in a trench, a quantity of water poured upon it, and the earth pressed around it, the entire operation being automatically performed.

In the accompanying drawings, Figure 1 is a side elevation of my improved transplanter. Fig. 2 is a plan view, the parts that operate upon the earth being omitted for the sake of clearness. Fig. 3 is a detail front view of the feeding-table. Fig. 4 is a detail, partly in section, of the watering devices, the view looking outward from inside the main wheel; and Fig. 5 is a front view, partly in section, to illustrate the section of the plow and packer-wheels.

The same reference-letters are used in all the figures.

The main frame A is composed of sills *a a*, resting at the rear end upon the main axle or driving-shaft B or upon blocks *a' a'*, to the under side of which the axle is journaled. The wheels C turn loosely on the shaft when backing; but their forward motion is communicated to the shaft by means of spring-pawls *c*, engaging with ratchet-wheels *b b*, rigidly secured to the shaft adjacent to the hubs of the wheels. The sills support a rear platform *a²*, upon which is supported the water-tank A'. The forward ends of the sills *a a* are received between ears *d d*, secured to a cross-bar *d'*. A bolt *d² d²*, passing through

said ears and the sill between them, hinges the bar to the sills. The bar *d'* is part of a rigid frame D, composed of end bars *d' d'* and side pieces *d³ d³*. The rear end of the frame is supported by a bell-crank lever E, fulcrumed upon the main frame A, and whose horizontal arm *e* extends forward over the end of the frame D, and is provided with a pin *e'*, engaging with a slotted ear *d⁴*, secured to the frame. The upright arm *e²* of the lever is adapted to enter and be retained by a notch in a plate F, fastened to the side of the water-tank A'. When thus engaged, the frame D is held raised, as shown in Figs. 1 and 2.

The working parts of the machine are mounted upon the frame D. These consist of shovels for ridging or ditching on each side of the intended row of plants, a roller for supporting the front of the machine and for rolling the ground, a furrow-opener or plow, the plant-setting wheel with its plant-holders and water-spouts, the feed-tubes and feeding devices, and the packer-wheels for pressing the earth around the plants. The ridging or ditching devices consist, preferably, of two shovels G, adjustably held by set-screws *g* on shanks G', which are preferably cranked at *g'* and are rotatable in eyes *h* on the inner ends of the bolts H, passing through the side pieces *d³* and provided with nuts *h'*. A thick washer *h²* surrounds the bolt, having in one face four equidistant notches, two of which receive the edge of the eye *h* and the other two the shank G'. By loosening the nut the shank cannot only be rotated in the eye, but can be swung in a fore-and-aft plane, the bolt turning in the side piece. The tightening of the nut secures the shank firmly in the position to which it has been adjusted. This construction permits the shovels G to be shifted to any desirable height, angle, and distance apart. The roller I is arranged immediately behind the ridgers G. It is journaled in hangers *i*, fastened to the frame D, and may be of any suitable length, diameter, and material, being preferably cylindrical, as shown. The plow or furrow-opener K is suspended behind the roller, being attached to two parallel frames K', which have straight bottom portions and slightly-curved upwardly-extending end portions attached to the rear

cross-bar d' and to an intermediate cross-bar d^5 , located over the roller I. The frames may be braced by bars k , and are held a few inches apart by suitable spacing-blocks, if desired.

5 The furrow-opener K is wedge-shaped in front, having its sharp edge inclined forward and upward. In the rear of its wedge-like front portion its sides are parallel. It is preferably composed of two sheets of metal fastened to

10 the frames K' and bent together and riveted in front to form the cutting-edge. The main wheel L is mounted on a shaft l , which is journaled in bearings on the frame D. The shaft is extended at one end to receive the loose

15 sprocket-wheel M, provided with an annular ratchet m , which can be interlocked with a similar ratchet l' , rigidly secured to the shaft l , the sprocket-wheel being capable of sliding axially on the shaft. A spring-actuated lever

20 N, fulcrumed on a bracket n , engages with a grooved collar on the sprocket-wheel and holds the ratchet normally in engagement. When thrown out of engagement, a lug n' on the bracket acts as a stop to hold the lever against

25 the tension of its spring. A drive-chain O connects the sprocket M with a similar sprocket B' on the driving-shaft B. The wheel L is hollow, and is preferably composed of two dish-shaped disks united at their edges. Pro-

30 jecting radially from the periphery of the wheel are the plant-holders, which comprise a pocket or a curved seat p , secured on the end of a radial arm P. These arms are preferably tubular and communicate with the interior of the wheel, constituting spouts to dis-

35 charge water on the plants. An arm P' is hinged to the wheel near the base of each spout and is adapted to close against the pocket p , being preferably covered with a

40 sleeve p' of soft material, such as rubber, so as not to injure the plant. The inner end of the arm is bent at right angles and is provided with a laterally-projecting pin p^2 , as shown, for a purpose hereinafter explained.

45 It will be seen that as the wheel L turns over forward the arms P' will fall by gravity against the pockets p and retain in the pockets the plants that may be placed there. I prefer to insert the plants in the pockets au-

50 tomatically by means of the following mechanism: Supported on rearwardly-inclined up-rights Q, rising from the frame D, is a table or rack R for holding a supply of plants. A seat S is provided on each side of the main

55 frame A for the boys who feed the plants to the machine. In the rear of the feed-table are two inclined parallel shafts T, suitably journaled in standards t , secured to the frame D and preferably having their axes radial to

60 the shaft of the main wheel. From the upper and forward end of each shaft and just behind the feed-table R projects a lateral finger T', arranged to revolve in a plane perpendicular to the axis of the shaft. Fastened

65 to the base of each finger is a flat spring t' , which rests normally along and against the

back of the finger, being curved a little outwardly at its end. The fingers are of such a length that in revolving they pass between the feed-table and the ends of the spouts P 70 and arms P', occupying a substantially horizontal position at that instant, with the springs t' uppermost. A plant held between the spring and the finger will thus be carried by them down upon the pocket p of the spout P, 75 that is then moving past, the arm P' being temporarily held up by a cam-plate U, secured to one of the standards t , and under which the pin p^2 rides. As the finger begins to pass down and away from its horizontal 80 position the pin p^2 slips from under the plate U, allowing the arm P' to drop and clamp the plant against the pocket.

In order to have the fingers act alternately, since only one is required to feed a plant 85 to each plant-holder, I prefer to furnish each shaft with a cog-wheel t^2 , adapted to mesh with the mutilated gear or series of curved racks L' on the side of the main wheel L, the segments of gear being alternated on the two 90 sides of the wheel, as plainly shown in Fig. 2, and each being just long enough to give the shaft T one entire rotation.

To hold the shafts from rotating during the intervals between the gears, a collar t^3 is se- 95 cured to each shaft, having a tangential surface on one side adapted to slide over the smooth face of a mutilated circular rib L² on the wheel L, which alternates with the gear L'. It will be seen from this arrangement 100 that while one finger is revolving the other is held stationary in a vertical position to receive the plant from the hands of the attendant.

In order to water the plant at the instant 105 it is set in the ground, a flexible hose V is led from the tank A' to a piece of pipe W, clamped to the frame D and having an elbow projecting into the main wheel through a central opening left in one side of the same. The 110 pipe depends within the wheel, as shown in Fig. 4, and is provided with a check-valve, preferably by having screwed upon its end a short section, forming a seat for a gravity-

115 valve w . This valve can be lifted to permit the water to escape, preferably by means of a bent lever X, which rests upon the edge of the central opening in the wheel, and is adapted to be lifted at regular intervals by

120 cams x upon the edge of the opening. The cams are so arranged as to open the valve when a spout P is under it.

On each side of the machine and behind the vertical plane of the main-wheel shaft is a packer-wheel Y, supported on a hanger y , 125 which is fastened to the frame D. The packer-wheels are tipped outwardly, so that their bottoms will crowd the earth toward the plant. The faces of these wheels are concave, as shown, which effects a much better 130 packing of the earth and rounds up the ridge in which the plants are set.

The operation of my transplanter is as follows: The machine is placed at one end of the proposed row of plants. The lever E is released, dropping the rear end of the frame D and forcing the ridgers and furrow-opener into the earth. The attendants then place a plant between each of the fingers T' and springs t', with its top toward the center of the wheel, and the machine is started across the field. The plants are carried automatically into the holders on the main wheel by the alternate intermittent action of the fingers, the stalk and roots of the plant being drawn through the slot r in the feed-table as the plant-holder moves downward. Passing down between the frames K' and into the hollow furrow-opener K, the plant is set, being easily drawn from the plant-holder by the resistance of the ground, the arm P' being now vertical and ready to fall away from the pocket p on moving upward with the revolution of the main wheel. At the instant that the plant is set it is automatically watered, the spouts being preferably funnel-shaped to empty a good supply of water directly upon the plant. The packer-wheels then press the loose earth firmly around the plant and the operation is finished. The space between the plants can be varied by changing the size of the sprocket-wheel M.

The machine is preferably drawn by horsepower, the driver sitting on the water-tank and controlling the levers E and N.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination, with the main axle, of the two main sills a a, mounted thereon at their rear ends, the frame D, comprising the cross-bar a', lying under the front ends of the sills a a, the pairs of upwardly-projecting ears d d, secured to the cross-bar and receiving the sills between them, the bolts d² d², passing through the ears and sills, the side pieces d³ d³, framed into the cross-bar d', the slotted ear d⁴, secured to the rear of the frame D, the elbow-lever E, fulcrumed on the main frame and engaging with the slotted ear d⁴, and the notched plate F for securing the lever, substantially as described.

2. The combination, with the suspended frame D, of the parallel depending frames K', having straight bottom portions and upwardly-extending end portions rigidly attached to the cross-bars of the frame D, spacing-blocks for holding the frames a few inches apart, a hollow furrow-opener arranged between the frames and rigidly attached thereto, and a plant-setting wheel mounted on the frame D between the frames K', substantially as described.

3. The plant-setting wheel L, provided with radial arms projecting from its periphery and having curved seats p at their outer ends, in combination with clamping-arms P', hinged behind the arms P, so as to close against the

curved seats p by gravity and to open automatically when the plant is set, substantially as described.

4. The combination of the wheel L, carrying pockets p and hinged arms P', having bent inner ends provided with pins p², and the stationary cam U, adapted to engage with the pins p², substantially as described.

5. The combination, with a plant-setting device, of mechanism for feeding a plant thereto, consisting of a rotatable shaft, a finger projecting from said shaft, and a spring lying normally along the back of the finger, the path of revolution of the finger being adjacent at one point to that of the plant-setting device, substantially as described.

6. A transplanting-machine having a revolving wheel carrying plant-holders, and a pair of intermittingly-revolving fingers adapted to alternately convey a plant to the holders as they pass said fingers, substantially as described.

7. The combination, with the frame D of a transplanting-machine, of plant-feeding mechanism consisting of two parallel shafts T, a finger T' on each shaft, a flat spring t', lying along the back of each finger, and means for giving the shafts an entire rotation alternately, substantially as described.

8. The combination, with the plant-setting wheel L, having the mutilated gear L', of the shaft T, having the finger T', and the cog-wheel t², substantially as described.

9. The combination, with the wheel L, carrying plant-holders and having the segment-gears L' alternating with each other on the opposite sides of the wheel, of the two shafts T, provided with fingers T', and cog-wheels t², substantially as described.

10. The combination, with the plant-setting wheel L, having the alternating segment-gears L' on opposite sides thereof, said gears alternating with the mutilated annular ribs I², of the two shafts T, having fingers T', cog-wheels t², and collars t³, provided with a tangential surface, substantially as described.

11. A transplanting-machine having the hollow wheel L, provided with spouts P, projecting radially from its periphery, clamping-arms adapted to coact with the spouts and form plant-holders, and means for delivering a quantity of water to each spout when it reaches the lowest point in its revolution, substantially as described.

12. A transplanting-machine having the hollow wheel L, provided with a central hole in one side, the funnel-shaped spouts P on the periphery of said wheel, a water-pipe projecting into said wheel through the central hole, a valve in said pipe, and means for automatically opening the valves at certain points in the revolution of the wheel, substantially as described.

13. The combination, with the wheel L, having a central opening, the edge of which is provided with cams x, of the water-pipe

W, having a valve *w*, and the lever X, adapted to be actuated by the cams to open the valve, substantially as described.

14. The combination, with the suspended
5 frame D, of the plant-setting wheel L, composed of two dished plates united at their edges to form a hollow reservoir for water, and a series of gravity-operated, self-closing, and self-opening plant-holders projecting ra-

dially from the periphery of the said wheel, so substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

JAMES R. MOLE.

Witnesses:

CHARLES C. McELWEE,
GEORGE G. SUTHERLAND.