(No Model.)

5 Sheets—Sheet 1.

H. D. PIERCE.

CAN FILLING MACHINE.

No. 584,891. Patented June 22, 1897.

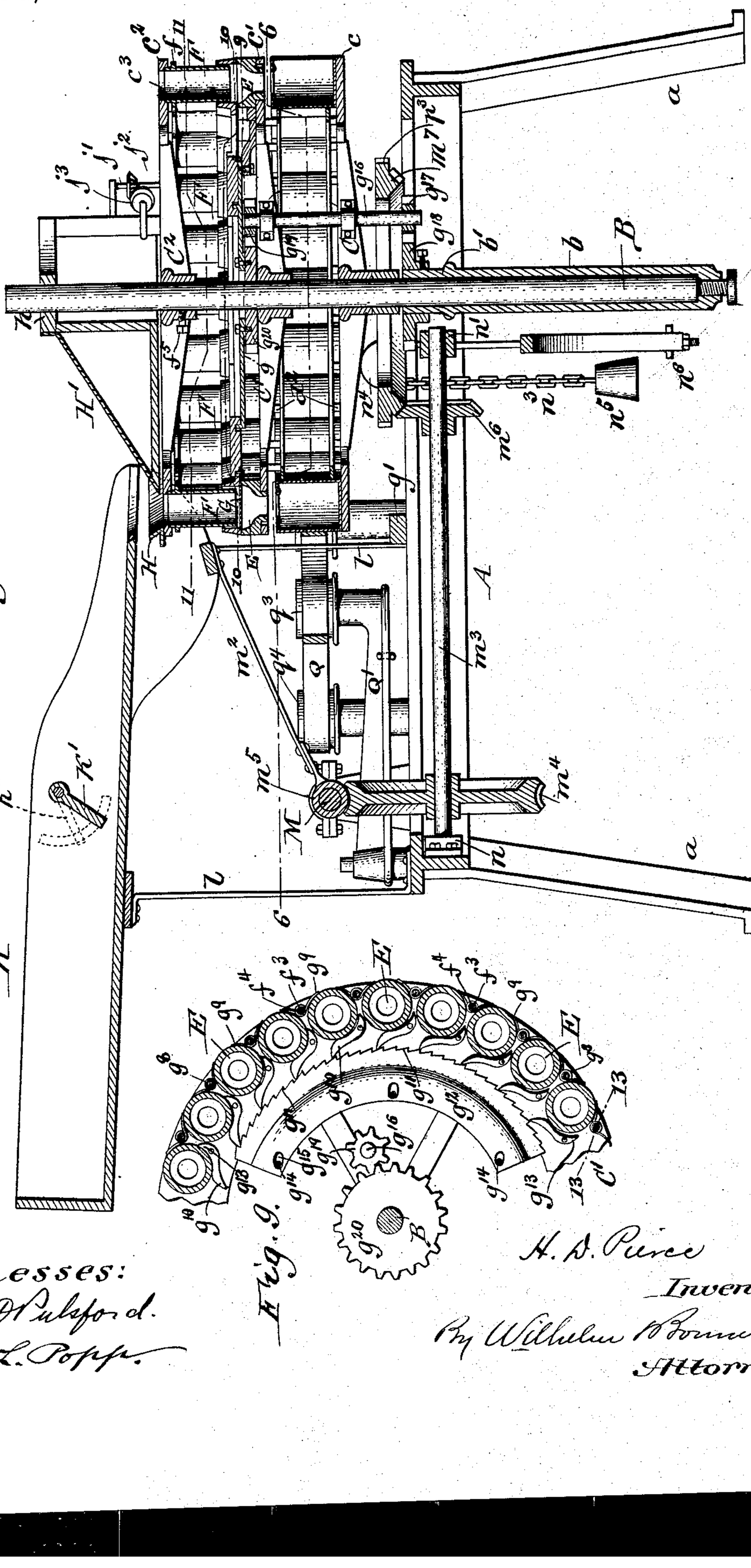

Fig. 1.

Fig. 9.

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(No Model.) 5 Sheets—Sheet 2.

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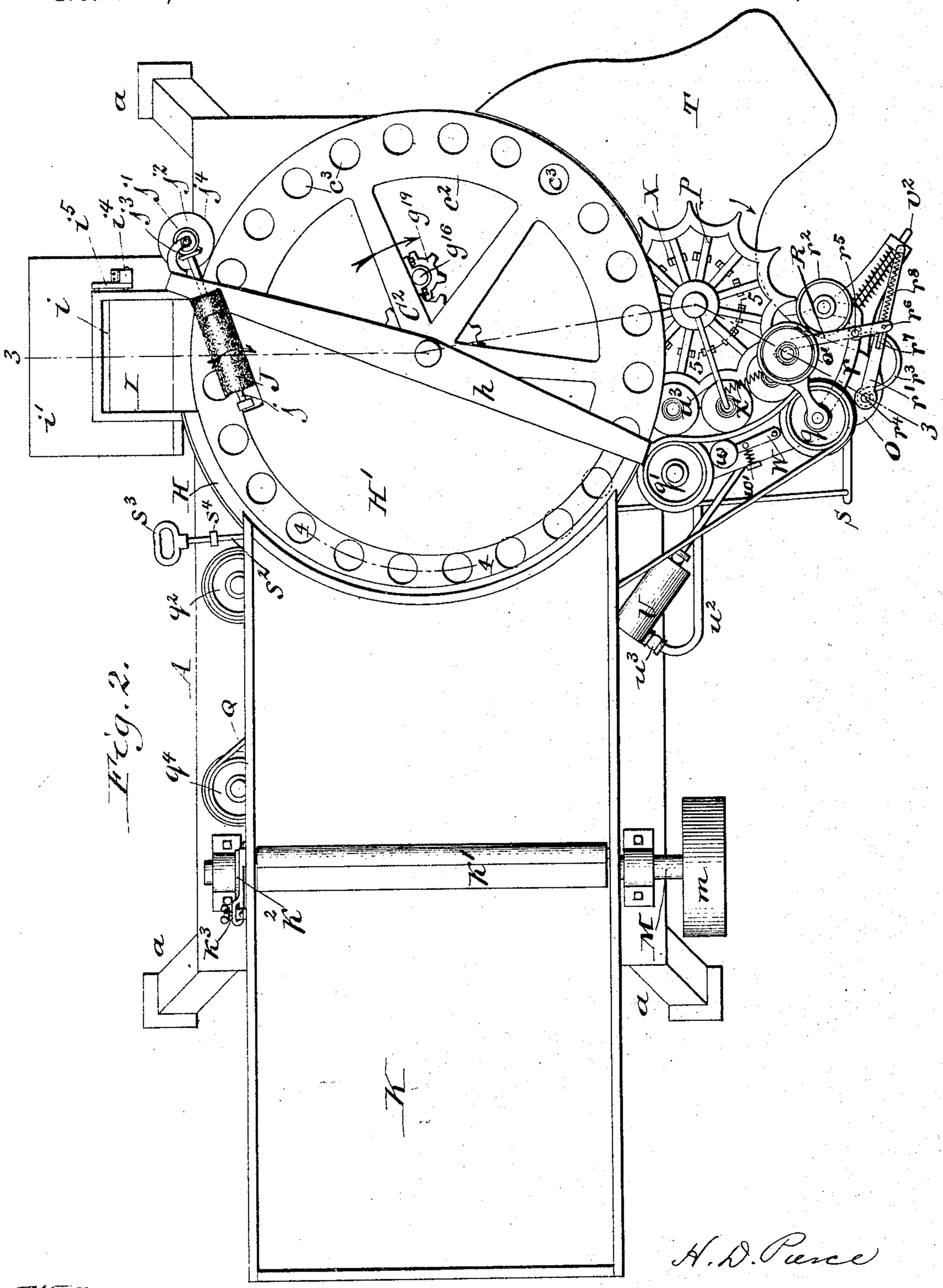

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(No Model.) 5 Sheets—Sheet 3.

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CAN FILLING MACHINE.

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Fig. 4.

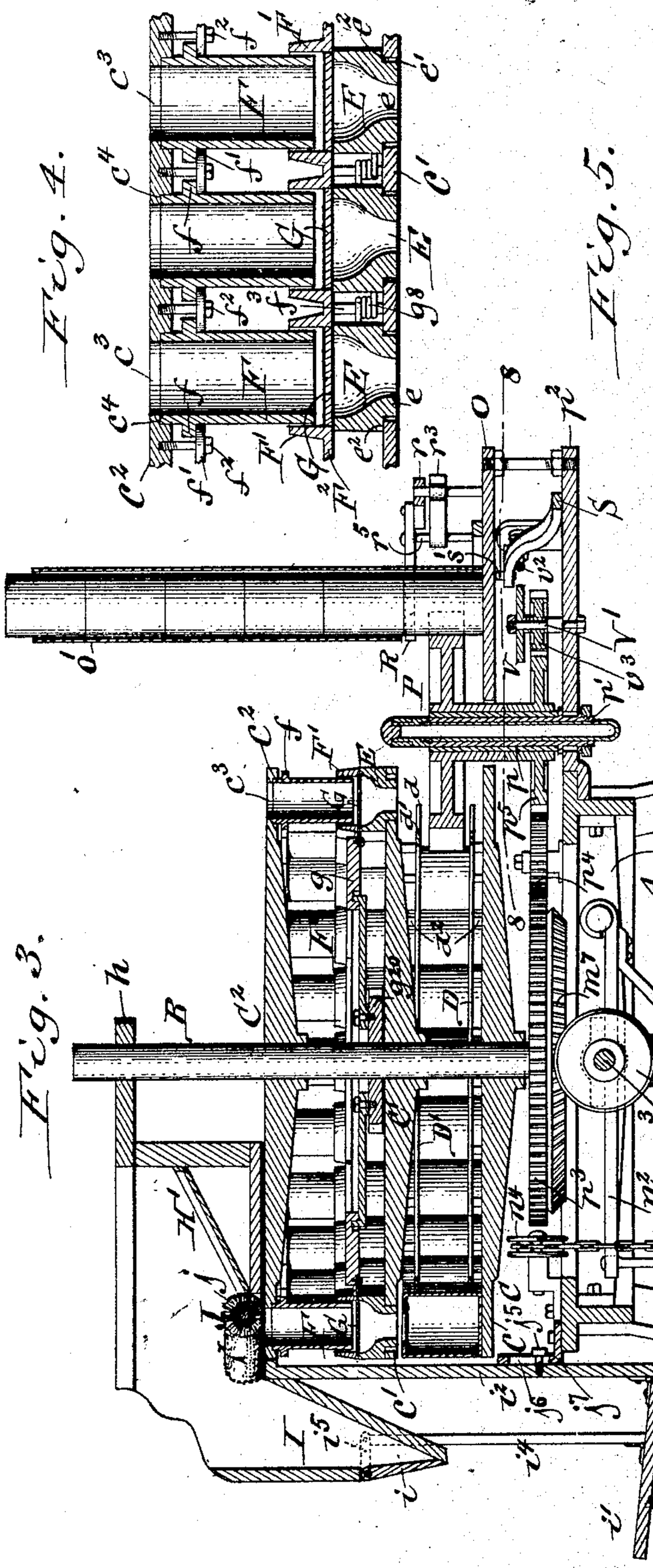

Fig. 5.

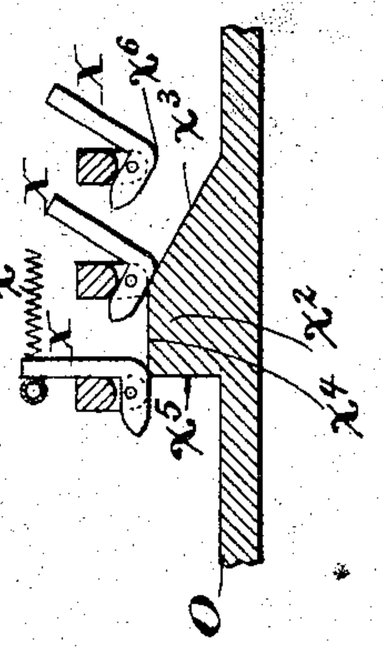

Fig. 3.

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(No Model.) 5 Sheets—Sheet 4.

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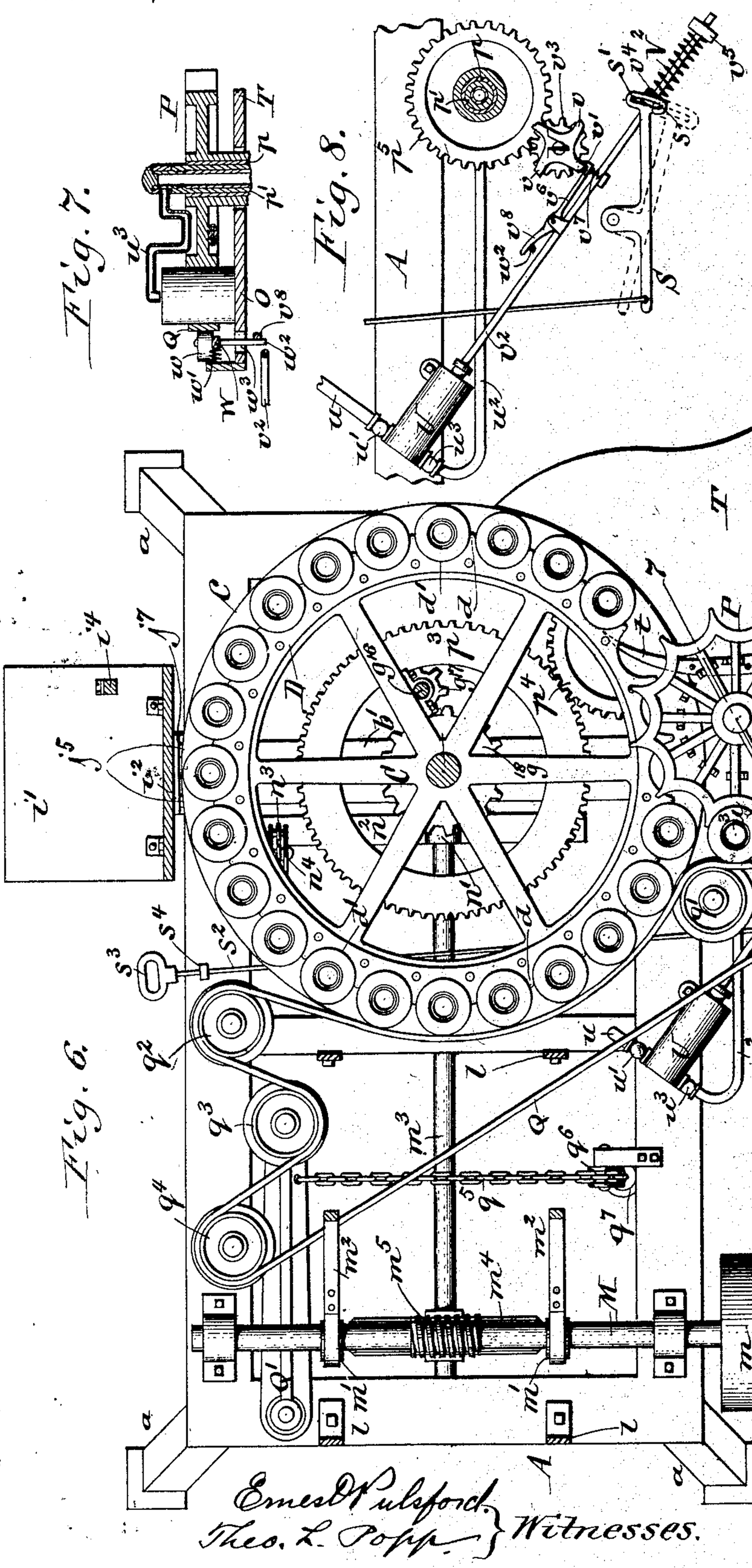

Fig. 7.

Fig. 8.

Fig. 6.

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CAN FILLING MACHINE.

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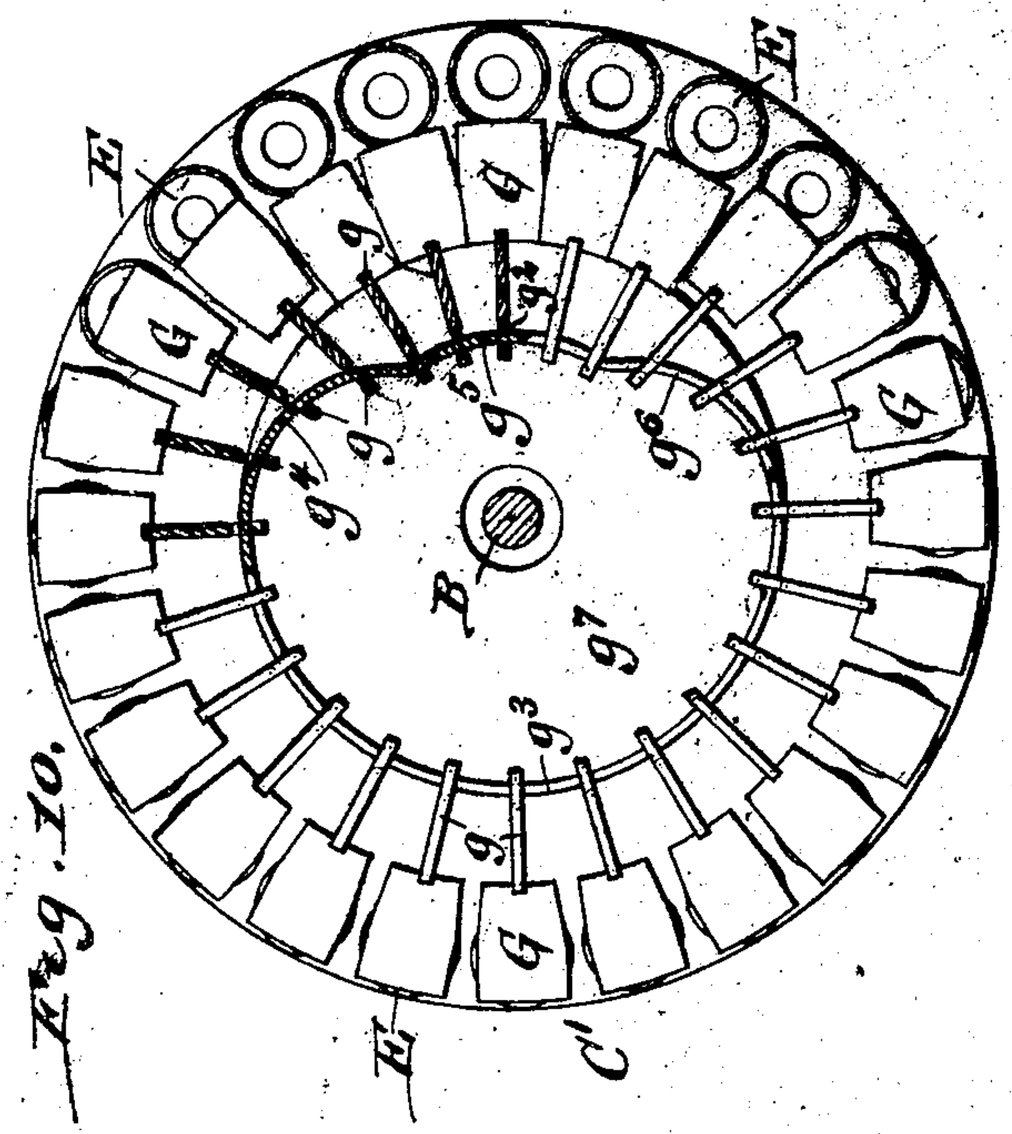

Fig. 10.

Fig. 13.

Fig. 11.

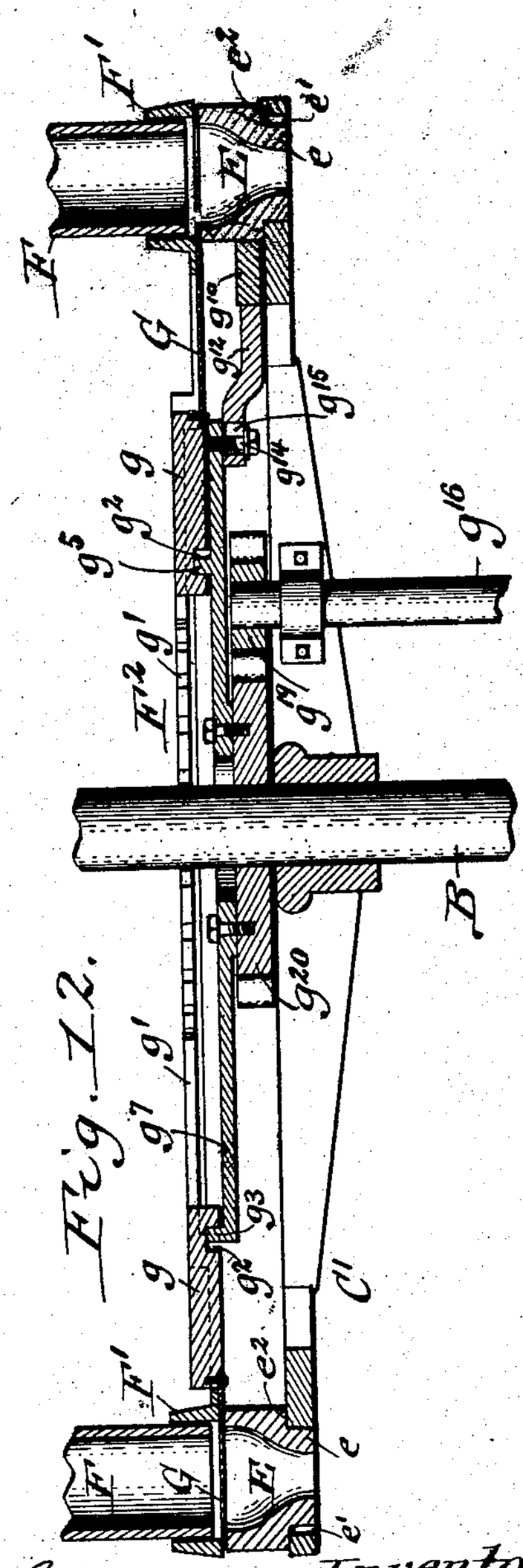

Fig. 12.

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UNITED STATES PATENT OFFICE.

HERBERT D. PIERCE, OF WATER VALLEY, NEW YORK.

CAN-FILLING MACHINE.

SPECIFICATION forming part of Letters Patent No. 584,891, dated June 22, 1897.

Application filed November 16, 1896. Serial No. 612,393. (No model.)

To all whom it may concern:

Be it known that I, HERBERT D. PIERCE, a citizen of the United States, residing at Water Valley, in the county of Erie and State of New York, have invented new and useful Improvements in Can-Filling Machines, of which the following is a specification.

This invention relates to a can-filling machine which is particularly designed for filling cans with peas, although the same may be used for filling cans with other material.

One of the objects of this invention is the production of a machine for this purpose which enables cans to be filled continuously without choking the machine and without crushing or bruising the material.

Another object of my invention is to provide a simple and reliable mechanism for automatically feeding the cans to the filling mechanism and removing the same therefrom.

My invention has the further objects to render the feeding of the syrup to the cans dependent upon the presence of a can under the syrup-nozzle and to improve the machine in several details of construction.

In the accompanying drawings, consisting of five sheets, Figure 1 is a vertical longitudinal section of my improved can-filling machine. Fig. 2 is a top plan view thereof. Fig. 3 is a vertical transverse section thereof in line 3 3, Fig. 2. Figs. 4 and 5 are fragmentary vertical sections, on an enlarged scale, in lines 4 4 and 5 5, Fig. 2, respectively. Fig. 6 is a horizontal section in line 6 6, Fig. 1. Fig. 7 is a fragmentary vertical section in line 7 7, Fig. 6. Fig. 8 is a fragmentary horizontal section in line 8 8, Fig. 3. Figs. 9, 10, and 11 are fragmentary horizontal sections in lines 9 9, 10 10, and 11 11, Fig. 1, respectively. Fig. 12 is a fragmentary longitudinal section, on an enlarged scale, similar to Fig. 1, showing the central or intermediate carrier-wheel and connecting parts. Fig. 13 is a fragmentary section in line 13 13, Fig. 9.

Like letters of reference refer to like parts in the several figures.

A represents the main frame of the machine, which is provided with supporting-legs *a*.

B represents a vertical shaft which is arranged centrally in the main frame and journaled with its lower portion in a bearing *b*, which is connected with the main frame by a cross-bar or bridge-tree *b'*. To the upper portion of the vertical shaft are secured three supporting or carrier wheels C C' C², which are arranged one above the other and separated from each other so as to form suitable intervening spaces between the adjacent rims of the wheels. The rim *c* of the lower supporting-wheel C serves to support an annular row of cans, which latter are placed with their bottoms on said rim and extend with their open upper ends close to the under side of the rim *c'* of the intermediate supporting-wheel C'.

D D' represent two toothed centering and retaining rings whereby the cans are compelled to turn with the supporting-wheels and held equidistant and which are secured, respectively, to the upper side of the rim of the lower supporting-wheel and the under side of the rim of the intermediate wheel. Each of these rings is preferably provided with twenty-four teeth *d* and twenty-four semicircular seats *d'*, formed between the teeth, which are adapted to receive a corresponding number of cans. The seats and teeth of the two rings are arranged vertically in line, and each can when placed in the proper position on the lower wheel-rim fits with its lower portion in a seat in the lower ring and with its upper portion in a seat in the upper ring. In order to prevent the retaining-rings from bearing against the seams at the upper and lower ends of the cans, the rings are separated a sufficient distance for this purpose from the wheel-rims by space-blocks *d²*.

E represents an annular row of twenty-four funnels whereby the peas or other material are directed into the cans and which are arranged above the cans and vertically in line with the cans and the seats of the retaining-rings. These funnels are provided with lower contracted portions *e*, which project downwardly through openings *e'* in the intermediate wheel-rim and form shoulders *e²* on the funnels, whereby the latter are supported on this rim.

In order to measure the material before delivering the same to the cans, the material is passed through an annular row of measuring cylinders or tubes, which are arranged above the funnels. These cylinders are equal in number to the funnels, and each cylinder consists of an upper section F and a lower

section F′, surrounding the lower end of the upper section, said sections being capable of sliding lengthwise or telescoping one upon the other for the purpose of varying the capacity of the measuring-cylinder and regulating the weight of the charge of material which is delivered into the cans. The upper sections of the measuring-cylinders are arranged underneath the rim c^2 of the upper supporting-wheel in line with filling-openings c^3 in the latter, and the upper ends of the measuring-cylinders are fitted against shoulders c^4, formed by enlarging the lower ends of the filling-openings c^3 in the upper supporting-wheel. Each cylinder is provided below the rim with an annular flange f, and the several cylinders are held against their shoulders by means of plates or washers f', each of which engages with the under side of the adjacent portions of the flanges of two cylinders and is connected with the upper supporting-rim by a bolt f^2, as represented in Fig. 4. The lower sections of the measuring-tubes are formed on a horizontal supporting plate or disk F^2, which is arranged above the funnels and supported on the intermediate wheel-rim by posts f^3 and secured thereto, so as to rotate therewith, by bolts f^4, passing through the supporting-disk, intermediate wheel-rim, and posts.

When it is desired to adjust the capacity of the measuring-cylinders, the set-screw f^5, whereby the upper supporting-wheel is secured to the vertical shaft, is loosened, which permits this wheel, together with the upper sections of the measuring-tubes, to be raised or lowered until the relative position of the upper tube-sections with reference to the lower tube-sections is such that the quantity of material which the sectional measuring-cylinders hold will have the desired weight, after which the upper supporting-wheel is again tightened on the shaft. While the measuring cylinders or tubes are being filled from the upper ends in passing around the inner side of the carrier the lower ends thereof are closed, and after the tubes are filled and pass around the outer side of the carrier the lower ends thereof are opened for discharging the material into the funnels and cans. This opening and closing of the lower ends of the measuring-tubes is automatically effected by the following mechanism:

G represents an annular row of horizontal slide-valves or cut-off plates, one of which is arranged to slide radially between the lower end of each measuring-tube and the funnel below the same. The inner ends of the slide-valves are provided with stems or fingers g, which are guided in radial slots g', formed in the supporting-plate E^2, and each of which is provided on its under side with a notch or recess g^2, forming a hook which engages with a stationary cam arranged horizontally around the vertical shaft above the intermediate supporting-wheel. This cam has the form of a flange, and consists of an outer or salient concentric portion g^3, whereby the slide-valves are held in their outer position for closing the lower ends of the measuring-tubes while the latter are being filled, an inwardly-throwing cam portion g^4, which follows the salient concentric portion and draws the stems of the slide-valves inwardly for opening the lower ends of the measuring-tubes, an inner or receding concentric portion g^5, which follows the inwardly-throwing cam portion and holds the measuring-tubes open a sufficient time to permit them to discharge their contents, and an outwardly-throwing cam portion g^6, which connects the receding concentric portion with the salient concentric portion and moves the slide-valves across the lower ends of the tubes preparatory to again filling the same. The slide-valve-operating cam is arranged on the upper side of a stationary supporting plate or disk g^7, which surrounds the vertical shaft.

While the measuring-tubes are discharging their contents into the funnel, the latter are vibrated, so as to prevent the material from choking the funnels, by the following mechanism: The lower contracted portion of the funnels are somewhat smaller in diameter than the openings in the intermediate wheel-rim through which they pass, which permits the funnels to move horizontally independent of this rim to a limited extent. The funnels are yieldingly held in engagement with the inner sides of the intermediate rim-openings by means of springs g^8, each of which is coiled around one of the posts f^3 and has its ends bent into arms g^9, which press inwardly against the outer side of the adjacent funnels, as represented in Figs. 4, 9, and 13. g^{10} represents an annular row of trip-levers, whereby the funnels are moved outwardly and which are pivoted vertically with their advancing end to the intermediate wheel-rim adjacent to the inner side of the funnels. The trailing end of the trip-levers are adapted to engage with a segmental row of ratchet or tripping teeth g^{11}, which are formed on a stationary trip-plate g^{12}, extending along the inner side of the path of the funnels approximately from the point where the lower ends of the measuring-tubes are opened to the point where these tubes are again closed.

Each of the ratchet-teeth has an inclined front side and an abrupt rear side, so that a trip-lever, as it passes over the inclined front side of a tripping-tooth, is gradually moved outwardly together with the funnel bearing against the same, and the instant the lever reaches the abrupt rear side of the tripping-tooth the lever and funnel are quickly pressed inwardly by the adjacent springs g^8 until the funnel strikes the inner side of the opening in the intermediate wheel-rim, whereby the funnel is jarred sharply. This operation is repeated every time the trip-lever passes over a tooth, so that the lever in passing over all the teeth imparts a rapidly-vibrating action to the funnel, which loosens any material clinging to the inside thereof, thereby caus-

ing the same to pass freely through the funnel and preventing choking of the same. In order to prevent the trip-levers from being displaced after they clear the last tooth of the trip-plate, each lever is provided on the front side of its pivot with a toe or projection g^{13}, which is adapted to bear against the advancing side of the adjacent funnel, and thereby prevent the trip-lever from becoming displaced with reference to the funnel. The trip-plate is secured to the under side of the inner stationary disk g^7 by means of bolts g^{14}, which pass through slots g^{15} in the trip-plate, and whereby this plate can be adjusted so that its teeth stand in the proper position for producing the desired throw of the trip-levers.

The mechanism for holding the inner disk g^7 stationary, while permitting the carrier to rotate, is constructed as follows:

g^{16} represents a vertical counter-shaft, which is journaled in bearings arranged on the arms of the lower and intermediate supporting-wheels, and which is provided at its lower end with a gear-pinion g^{17}, which meshes with stationary gear-wheel g^{18}, secured on the cross-bar b', concentric with the main vertical shaft. The upper end of the counter-shaft is provided with a gear-pinion g^{19}, which meshes with a gear-wheel g^{20}, mounted loosely on the main vertical shaft and resting on the hub of the intermediate gear-wheel. The inner stationary supporting-disk g^7 is secured to the upper side of the upper gear-wheel g^{20}. The upper and lower pinions of the counter-shaft are of the same size, and the gear-wheels meshing respectively with these pinions are also of the same size. As the carrier rotates with the main vertical shaft the counter-shaft, while being carried around with the carrier, is rotated in an opposite direction by its lower pinion meshing with the lower stationary gear-wheel. This movement of the counter-shaft is transmitted by its upper pinion to the gear-wheel g^{20}, whereby the latter and the parts connected therewith are held stationary, owing to the relative size of the gear-wheels.

The material is directed into the opening c^8 in the rim of the upper supporting-wheel by a semicircular trough or hopper which extends over about one-half of these openings. This trough or hopper consists of an outer inclined wall H, arranged in a curve along the outer side of the filling-openings, and an inner conical wall H', arranged in a curve along the inner side of the filling-openings, as represented in Figs. 1 and 2. The inner and outer walls of the trough are secured to a cross-piece h, which is mounted loosely on the upper end of the upright shaft. As the supporting-wheels are turned in the direction of the arrow, Fig. 2, the filling-openings are successively carried underneath the open lower side of the feed-trough and the material in the trough drops into the measuring-cylinders and fills the same, owing to the bottom of the cylinders being closed by the cut-offs while the cylinders are underneath the feeding-trough. The lower portion of the material in the trough is carried lengthwise around in the trough by resting on the upper rim, and in order to prevent this material from being crushed or bruised between the side walls of the trough while being carried around the opposing edge portions of the trough-walls diverge or gradually separate from their front ends toward their rear ends, thereby forming a gradually-widening trough, as represented in Fig. 2, which affords relief to the material in the direction in which it is being carried and permits the same to spread. This is particularly desirable when canning peas or other vegetables and fruits which should not be crushed or bruised.

I represents a relief-hopper, which opens with its upper end into the rear end of the feed-trough and which receives the surplus material carried around by the upper supporting-wheel. The lower end of this hopper is provided with an opening, which is opened and closed by a discharge-valve i, pivoted on the hopper.

i' represents a vertically-movable shelf arranged underneath the hopper and pivoted with its inner end to a supporting-board i^2, which is connected with the hopper. This shelf is yieldingly held in an elevated position by a spring i^3 or equivalent contrivance and is connected by a link i^4 with an arm i^5 on the pivot of the hopper-valve. Upon placing a pail or other receptacle on the shelf the latter is depressed and the hopper-valve is opened by the link, whereby the material in the hopper escapes from the latter into the receptacle, and upon removing the receptacle the spring raises the shelf and closes the hopper-valve, thereby automatically opening and closing the valve by the act of placing a pail on the shelf and removing the same therefrom, whereby scattering or wasting of material is avoided.

J represents a horizontal rotary brush whereby the surplus material is brushed off from the upper wheel-rim flush with the filling-openings and into the surplus hopper. This brush is arranged opposite the inlet of the hopper, at an angle to the path of the filling-openings, and is mounted on a shaft j, which is journaled in bearings on the cross-piece h. A constant rotary motion is imparted to this brush in the direction of the arrow, Figs. 2 and 3, by any suitable means—for instance, by a vertical spindle j', which is connected with the brush-shaft by intermeshing bevel gear-wheels j^2 j^3, and which is provided with a friction-wheel j^4, bearing against the outer side of one of the wheel-rims, as shown in Figs. 1 and 2.

The cross-piece h, feed-hopper, relief-hopper, and connecting parts are adjustably connected with the main frame by bolts j^5, secured to the inner side of the supporting-board i^2, and passing through vertical slots j^6

in a bracket j', which is secured to the main frame, whereby these parts are capable of being raised and lowered whenever the upper supporting-wheel is raised or lowered with the upper measuring-tube sections.

K represents a horizontally-vibrating feed-box, into which the material is dumped in a body and from which it is delivered in a uniform stream to the feed-trough from the open discharge end thereof. The latter is arranged over the feed-trough and curved substantially the same as the trough. k' represents a regulating-valve or gate whereby the flow of material from the feed-box is regulated. This gate is arranged across the central portion of the box and pivoted with its upper end to the side walls of the box, so that its lower end can be raised and lowered from and toward the bottom of the box for varying the size of the discharge-opening through which the material escapes. The gate is operated by means of a rock-arm k^2, secured to its pivot outside of the box, and is held in position by a clamp k^3, arranged on the adjusting-arm and engaging with a segment on the adjacent side of the box. The latter is movably supported by spring-standards l, secured with their upper and lower ends to the feed-box and main frame, respectively.

M represents the main driving-shaft, which is journaled transversely in bearings on the main frame below the feed-box, and which is driven by a belt passing around a pulley m at one end of the driving-shaft. The latter is provided with two cranks or eccentrics m', which are connected with the feed-box by bars m^2, for imparting a longitudinally-reciprocating movement to the feed-box.

m^3 represents a longitudinal shaft provided near its outer end with a worm-wheel m^4, which meshes with a worm m^5 on the main shaft, and near its inner end with a bevel gear-wheel m^6, which meshes with a bevel gear-wheel m^7, secured to the vertical shaft B, whereby the can-supporting device is driven from the main shaft. When the feed of the material to the cans is not fast enough to fill the cans, the rotary movement of the can-carrier is arrested momentarily, while the feed-box continues to vibrate until the normal feed is restored, after which the rotary movement of the can-carrier is resumed. This may be effected by uncoupling the carrier from and coupling the same with the driving mechanism in any suitable way, the preferred means for this purpose shown in the drawings being constructed as follows:

n represents a bearing on the main frame in which the outer end of the longitudinal shaft is journaled loosely, so that its inner end is capable of a vertical movement sufficient to engage its bevel gear-pinion with the gear-wheel of the can-carrier or to disengage the same therefrom. The inner end of the longitudinal shaft is journaled in a bearing n', arranged on a transverse rock-arm n^2, which is pivoted at one end on the bridge-tree b'.

n^3 is a chain or cord passing around a roller n^4 on the main frame and connected at one end with the free end of the rock-arm and with its opposite end to a weight n^5, which normally holds the bevel gear-wheel of the longitudinal shaft in engagement with the gear-wheel of the carrier-shaft. The inner end of the longitudinal shaft is depressed for disengaging its bevel gear-wheel from the bevel gear-wheel of the carrier-shaft by means of a treadle n^6, connected with the rock-arm n^2.

O represents a can-feeding table arranged on the front side of the machine with its top flush with the upper side of the lower wheel-rim, and o' is the vertical can-feeding tube or magazine, which is arranged with its lower end over the table and from which the cans are delivered successively to the table. The lower end of the magazine is cut away on its inner side sufficiently to form a lateral opening through which the lowermost can in the magazine while resting on the feed-table can be moved laterally out of the magazine.

P represents a toothed transfer-wheel whereby the cans are carried toward and from the toothed can-carrier and which is arranged to pass horizontally with its teeth across the lower end of the magazine and between the toothed retaining-rings of the lower and intermediate wheel-rims, as shown in Figs. 3 and 4. This wheel has preferably twelve teeth and a corresponding number of seats between the teeth and is secured to the upper end of a sleeve p, which is journaled on a hollow arbor p', secured with its lower end to a bracket p^2 on the main frame.

The transfer-wheel is turned in the direction of the arrow, Fig. 6, by a gear-wheel p^3, formed integrally with the bevel gear-wheel on the vertical shaft, an idler gear-wheel p^4, journaled on a bracket on the main frame, and a gear-wheel p^5, secured to the lower end of the sleeve p, and meshing with the idler gear-wheel. The spaces between the teeth of the transfer-wheel are formed into semi-circular seats or pockets the same as those in the toothed rings of the supporting-wheels, and upon turning the transfer-wheel in the proper direction its seats or spaces are brought successively into a concentric position under the magazine, which permits a can to drop from the magazine into each seat. As the lowermost can in the magazine is carried away by one tooth of the transfer-wheel the cans drop, so that the next following can stands in the path of the next tooth of the transfer-wheel. The cans after being fed to the transfer-wheel remain in engagement with the latter about one-third of a rotation and are then moved upon the lower supporting-rim and into the seats of the toothed rings of the wheel-rims, which latter in turn

remove the cans from the seats of the transfer-wheel and carry them around to be filled with the material which is to be canned.

Q represents a retaining belt or band, whereby the cans are positively held in engagement with the transfer-wheel and with the first portion of the toothed rings of the wheel-rims. This belt passes around a roller q, journaled on the feed-table adjacent to the magazine, thence around a roller q', arranged on the feed-table adjacent to the point of intersection of the transfer and supporting wheels, thence around a roller q^2, journaled on the main frame on the opposite side of the machine and at a point about one-quarter around the supporting-wheels, thence inwardly around a tightening-roller q^3, thence outwardly around a roller q^4 on the rear portion of the main frame, and thence forwardly to the front side of the machine to the place of beginning. That portion of the belt between the rollers $q\,q'$ is deflected by the cans, which are carried from the magazine to the supporting-wheels, and these cans are held in engagement with the transfer-wheel by the constant tendency of the belt to straighten itself between the rollers $q\,q'$. That portion of the retaining-belt between the rollers $q'\,q^2$ is deflected by the cans on the supporting-wheels, and its constant tendency to assume a straight line from one roller to the other serves to direct the cans into the seats of the toothed rings after they leave the transfer-wheel. The preferred means for taking up any slack in the belt and for yieldingly holding the same in engagement with the cans consists of a rock-arm Q', carrying the tightening-roller and pivoted on the main frame and a chain or cord q^5, passing around a roller q^6 on the main frame and secured at one end to said rock-arm and with its opposite end to a weight q^7.

In order to regulate the feeding of the cans from the magazines and prevent the cans from being injured, the following mechanism is provided:

R represents a stop-finger which is adapted to project with its free inner end across the outlet of the magazine for arresting the downward movement of the cans or to be retracted, so as to permit the cans to drop. This finger is pivoted with its central and outer portions to inner and outer rock-arms $r\,r'$, respectively, which are arranged substantially at right angles to the finger and pivoted to the feed-table, the outer rock-arm being somewhat shorter than the inner rock-arm, so that upon rocking these arms outwardly the free inner end of the finger will be moved under the outlet of the magazine, as represented in Fig. 2, and the cans are prevented from dropping, while upon rocking the same inwardly the finger will be moved from underneath the magazine-outlet, as represented in Fig. 6. The inward and outward movement of the stop-finger is controlled by a trip-roller r^2, which is pivoted on the inner rock-arm and which is moved toward and from the axis of the transfer-wheel by bearing against the undulating peripheral surface of the transfer wheel, which is formed by the teeth and seats thereof. The relative position and movement of the parts is such that when the trip-roller is in engagement with the outer end or apex of a tooth on the transfer-wheel the trip-roller is moved outwardly and the stop-finger is moved underneath the outlet of the magazine, as represented in Fig. 2, and when the trip-roller engages with a seat between two teeth of the transfer-wheel the roller moves toward the axis of the wheel and the stop-finger is moved from underneath the magazine, in which latter position one of the seats of the transfer-wheel stands underneath the magazine in the proper position for receiving a can, as represented in Fig. 6. The trip-roller is yieldingly held in contact with the periphery of the transfer-wheel by a spring r^3, which is preferably fastened at one end to the pivot-pin r^4 of the outer rock-arm r' and with its other end to the pin r^5, which pivotally connects the stop-finger with the inner rock-arm r, as shown in Figs. 2, 3, and 6.

In order to prevent injury to the can or to the stop-finger if the latter strikes a can which has been caught in the magazine and failed to drop to the table, the outer pivot-pin r^6 of the stop-finger is arranged to move in a slot r^7 in the outer rock-arm and is yieldingly held in the outer end of this slot by a spring r^8. If during its movement underneath the magazine the finger strikes a can, the spring r^8 will be strained and the connecting-pin r^6 will move toward the inner end of the slot r^7 in the outer rock-arm while the latter, together with the inner rock-arm and trip-roller, is moved inwardly by the comparatively heavy spring r^3.

S represents a shifting lever whereby the stop-finger can be retained under the outlet of the magazine, so as to arrest the feeding of cans to the transfer-wheel. This lever is pivoted on the bracket p^2 and is provided in one of its arms with a slot s, which receives a pin s' on the under side of the inner rock-arm r. In the normal position of the shifting lever its slotted arm is moved inwardly, as shown in full lines, Fig. 8, and the pin of the inner rock-arm r moves freely back and forth in the slot of the shifting lever as the trip-roller is moved in and out by the transfer-wheel, but when the shifting lever is turned so that its slotted arm is moved outward, as shown in dotted lines, Fig. 8, the inner end of the slot in the shifting lever serves as a stop which prevents the trip-roller from moving inwardly, thereby holding the stop-finger under the can-magazine and arresting the feed of cans.

s^2 is a shifting rod connected at one end with the other arm of the shifting lever and provided at its opposite end with a handle s^3 and with a stop-collar s^4, which is adapted to

be engaged with the edge of the main frame for holding the shifting lever in an abnormal position.

While one side of the transfer-wheel is delivering empty cans to the can-carrier in moving inwardly, the opposite side of the transfer-wheel engages its teeth with the filled cans in moving outwardly and removes them from the can-carrier to a discharge-table T, which is arranged flush with the top of the lower wheel-rim. In order to aid the transfer-wheel in removing the cans from the can-carrier, a curved or inclined guide *t* is employed, which is secured with its outer end to the discharge-table and projects at an angle across the path of the cans adjacent to the delivery portion of the carrier. As the cans engage with the guide they are crowded outwardly out of the toothed carrier and directed into spaces between the teeth of the transfer-wheel, which latter then carries them to the discharge-table.

While the cans are moving from the magazine to the can-filler, a quantity of syrup or preserving liquid is delivered into each can by a syrup-feeding mechanism which is constructed as follows:

U represents the cylinder of a syrup pump, which has an inlet-pipe *u*, connecting with a supply and provided with an inwardly-opening check-valve *u'*, and which has a delivery-pipe u^2, provided with an outwardly-opening check-valve u^3. The delivery-pipe extends upwardly through the hollow arbor *p'* and is provided above the transfer-wheel with a discharge-nozzle u^3, which is pivoted concentrically with its inner end to the delivery-pipe, so as to swing horizontally, and arranged with its outlet centrally over the path of the cans while they are carried by the transfer-wheel from the magazine to the can-filler. The plunger of the pump is moved forward for drawing a charge of syrup into the cylinder by means of a rotary tappet-wheel V, having four tappets *v*, which are adapted to successively engage with a catch *v'* on the plunger-rod v^2 and pull the same forwardly. This tappet-wheel is secured to a gear-pinion v^3, which is journaled on an arbor V', secured to the bracket and which meshes with the gear-wheel p^5, connected with the transfer-wheel. The backward movement of the pump-plunger for discharging the material is produced by a spring V^2 surrounding the plunger-rod and engaging with one end against a collar or shoulder v^4 on the rod and with its opposite end against a lug v^5 on the bracket in which the rod is guided.

For the purpose of rendering the operation of the pump dependent on the presence of a can under the syrup-nozzle an automatic controlling mechanism is provided which is constructed as follows: The catch *v'* is arranged on the front arm v^6 of a trip-lever, which is pivoted on the plunger-rod, so that by turning this lever the catch can be moved into or out of the path of the tappets. The catch is moved into the path of the tappets by a spring v^7, interposed between the front arm of the trip-lever and the plunger-rod.

W represents a presser-arm pivoted on the feed-table and provided with a roller *w* at its free end, which is constantly pressed by a spring *w'* against that portion of the retaining-belt Q which is arranged adjacent to the nozzle.

w^2 is a pin arranged on the presser-arm and extending through a slot w^3 in the feed-table into engagement with the rear arm v^8 of the trip-lever, as represented in Figs. 7 and 8. When the cans are fed regularly to the transfer-wheel, that portion of the retaining-belt Q between the guide-rollers *q q'* is deflected outwardly, which causes the presser-arm and its pin to be moved outwardly sufficiently to permit the spring v^7 to turn the trip-lever, so that its catch stands in the path of the tappets and the latter engage with the catch for operating the pump. If for any reason no can is carried from the magazine to the filler, that portion of the retaining-belt between the guide-rollers *q q'* will become straightened out between these rollers and move toward the transfer-wheel, and the presser-arm which is constantly pressed against this portion of the belt will partake in this movement. As the presser-arm moves inwardly, its pin engages with the rear arm of the trip-lever and turns the same, so that the catch on its front arm clears the path of the tappets, thereby preventing the latter from operating the pump. When the normal feed of cans is restored and the retaining-belt resumes its deflected position, the presser-arm is again moved outwardly and the trip-lever is permitted to move with its catch into the path of the tappets for operating the pump.

In order to prevent the nozzle from dripping the syrup on the tops of the cans and wasting the same, the nozzle is caused to move temporarily with each can and at the same speed as the latter while the syrup is being delivered into the same by the following mechanism:

X represents an annular row of twelve elbow or coupling levers, each of which is pivoted with its lower arm to the under side of one of the arms of the transfer-wheel and adapted to engage with its arm against the syrup-nozzle and cause the latter to move temporarily and intermittently with the transfer-wheel. The syrup-nozzle is turned in the direction opposite to that in which the transfer-wheel moves by a spring *x'*, which is connected with its ends to the nozzle and the magazine or any other stationary part of the machine.

x^2 is a trip-lug or stationary cam whereby each elbow-lever is turned so that its upper arm is raised and engaged with the nozzle or permitted to drop, so as to clear the nozzle. This lug is arranged on the top of the feed-table below the receiving portion of the transfer-wheel and in the path of the elbow-levers, and is provided with an inclined front end x^3

a horizontal top x^4, and an abrupt rear end x^5. During the rotation of the transfer-wheel the heel or elbow x^6 of each elbow-lever engages with the inclined front side of the trip-lug and turns the same, so that its upper arm is lifted into the path of the nozzle. The elbow-lever is held in this position by the horizontal portion of the lug engaging with the heel of elbow-lever, and the nozzle is carried with the same until the lever reaches the abrupt rear end of the lug, when the heel of the elbow-lever clears the lug and the upper arm drops and clears the nozzle. The instant the nozzle is released from one lever it is turned backward by the spring and engaged with the next following lever, which latter has been turned in the meantime by the trip-lug so that its upper arm stands in the path of the nozzle, whereby the latter is again carried forwardly with the transfer-wheel and in line with the next can. The downward movement of the upper arm of each elbow-lever is limited by its lower arm engaging with the front side of the arm of the transfer-wheel which carries the same.

The relative movement of the parts which operate the pump and the nozzle is such that the nozzle stands over the opening in a can when one of the elbow-levers is in engagement with the same, and the discharge of the pump takes place while the nozzle is being carried forward with the transfer-wheel and can, and the suction of the pump takes place while the nozzle is moved backward by the spring from one can to the next following can.

I claim as my invention—

1. The combination with a rotating can-carrier adapted to support an annular row of cans, of an annular row of measuring-tubes open at their upper and lower ends and mounted on the carrier over the cans and rotating therewith, a feed-hopper having its outlet arranged over a portion of the path of the measuring-tubes to fill the same as they pass underneath the outlet, and a valve mechanism whereby the lower ends of the measuring-tubes are closed while the tubes rotate underneath the feed-hopper and receive the material therefrom, and are opened after the measuring-tubes pass the outlet of the feed-hopper to deliver the material from the lower ends of the tubes into the cans during the subsequent rotative movement of the tubes and cans, substantially as set forth.

2. The combination with a can-carrier and the measuring-tubes, of individual valves whereby each tube may be opened and closed independent of the other tubes and a cam whereby the valves are operated successively, substantially as set forth.

3. The combination with the can-carrier adapted to support an annular row of cans, of an annular row of measuring-tubes adapted to discharge into said cans, an annular row of radially-movable valves adapted to open and close the outlet of said tubes successively, and a plate provided with ways in which said valves are guided, substantially as set forth.

4. The combination with the can-carrier provided with a rim having filling-openings, of measuring-tubes bearing with their receiving ends against the under side of said rim in line with said openings and provided with shoulders or flanges, a plate bearing against the shoulders or flanges of adjacent tubes, and bolts connecting said plates with said rim, substantially as set forth.

5. The combination with a rotating can-carrier adapted to support an annular row of cans, of an annular row of funnels mounted on said carrier and adapted to discharge into the cans, an annular row of measuring-tubes mounted on said carrier and adapted to discharge into the funnels, a feed-hopper arranged with its outlet over a portion of the path of the measuring-tubes, valves arranged between the outlets of the measuring-tubes and the inlets of the funnels, and mechanism whereby said valves are closed while the upper ends of the tubes are under the outlet of the feed-hopper and opened after passing said outlet, substantially as set forth.

6. The combination with a rotating can-carrier and measuring-tubes rotating therewith, of laterally-movable discharge-funnels arranged below the tubes, and mechanism whereby the funnels are bodily vibrated for discharging the material into the cans, substantially as set forth.

7. The combination with the can-carrier, the support arranged above the path of the cans, and the funnel movably mounted on said support, of a spring whereby the funnel is moved in one direction, a trip-lever whereby the can is moved in the opposite direction, and mechanism for operating said trip-lever, substantially as set forth.

8. The combination with the rotary can-carrier adapted to support an annular row of cans and provided with a support above the path of the cans, an annular row of funnels movably mounted on said support, springs mounted on said support and bearing against one side of the funnels, trip-levers pivoted on said support and bearing against the opposite side of the funnels and a stationary trip-plate provided with a row of teeth against which the trip-levers are adapted to engage substantially as set forth.

9. The combination with the main frame and the rotary carrier provided with a lower support for an annular row of cans, an intermediate support carrying an annular row of funnels and an upper support carrying an annular row of measuring-tubes, of slide-valves arranged between said tubes and funnels a stationary cam whereby said valves are operated, trip-levers and springs mounted on the intermediate support and adapted to vibrate the funnels, a stationary trip-plate provided with teeth with which said levers are adapted to engage, a stationary supporting-plate carrying said cam and trip-plate, a stationary

inner gear-wheel mounted concentrically on said carrier and connected with said supporting-plate, a counter-shaft journaled on the carrier and provided at one end with a gear-pinion meshing with the inner gear-wheel and an outer stationary gear-wheel secured to the main frame concentric with the carrier and meshing with a gear-pinion on the opposite end of the counter-shaft, substantially as set forth.

10. The combination with the movable can-carrier and the measuring-tubes mounted on said carrier, of a feed-hopper arranged above the inlet of the tubes and having its discharge flared or gradually enlarged in the direction in which the can-carrier moves, substantially as set forth.

11. The combination with the movable can-carrier and the measuring-tubes mounted on said carrier, of a feed-hopper arranged above the inlets of the tubes, and a relief-hopper or receptacle having its inlet also arranged above the measuring-tubes and connected with the rear end of the feed-hopper, substantially as set forth.

12. The combination with the movable can-carrier and the measuring-tubes mounted on said carrier, of a feed-hopper arranged above the inlets of the tubes, a relief-hopper having its inlet also arranged above the measuring-tubes and connected with the rear end of the feed-hopper and a rotary brush whereby the surplus material is brushed from the carrier into the relief-hopper, substantially as set forth.

13. The combination with the rotary can-carrier and the measuring-tubes mounted on the carrier, of a crescent-shaped feed-hopper arranged immovably above the inlets of said tubes, a relief-hopper connected with the rear end of the feed-hopper, a rotary brush arranged obliquely above the inlets of the measuring-tubes, and connecting-gearing whereby said brush is driven from the carrier, substantially as set forth.

14. The combination with the movable can-carrier, the feed-hopper and the relief-hopper connected with the rear end of the feed-hopper, of a valve controlling the outlet of the relief-hopper, a vertically-movable shelf arranged below the outlet of the relief-hopper and adapted to support a receptacle, and a connection between the shelf and valve whereby the latter is opened upon depressing said shelf and closed upon raising said shelf, substantially as set forth.

15. The combination with the movable can-carrier, the feed-hopper and the relief-hopper connected with the rear end of the feed-hopper, of a valve pivoted on the relief-hopper and controlling the outlet thereof, a rock-arm secured to the pivot of the valve, a pivoted shelf adapted to support a receptacle underneath the outlet of the relief-hopper, a rod pivotally connecting the shelf with said rock-arm, and a spring whereby the shelf is yieldingly held in an elevated position, substantially as set forth.

16. The combination with the rotary can-carrier adapted to carry the cans past the filling mechanism, of a separate transfer-wheel, one side of which feeds the empty cans to the carrier and the opposite side of which removes the filled cans from the carrier, substantially as set forth.

17. The combination with the can-carrier adapted to carry the cans to the filling device, and the can-magazine, of a transfer-wheel whereby the cans are carried from the magazine to the can-carrier, and a retaining-belt supported on rollers and arranged to bear against the outer side of the cans which are in engagement with the receiving portions of the transfer-wheel and can-carrier, substantially as set forth.

18. The combination with the can-filling mechanism, the can-magazine and the transfer-wheel whereby the cans are carried from the magazine to said filling mechanism, of a movable stop-finger adapted to project across the outlet of the magazine for stopping the feeding of cans or to clear the same for permitting the cans to discharge from the magazine and a trip mechanism whereby the stop-finger is actuated and which is controlled by the transfer-wheel, substantially as set forth.

19. The combination with the can-filling mechanism, the can-magazine and the toothed transfer-wheel whereby the cans are carried from the magazine to said filling mechanism, of a movable stop-finger adapted to project across the outlet of the magazine for stopping the feeding of cans or to clear the same for permitting the cans to discharge from the magazine, and a rock-arm connected with said finger and provided with a roller engaging with the teeth of the transfer-wheel, substantially as set forth.

20. The combination with the can-filling mechanism, the can-magazine and the toothed transfer-wheel whereby the cans are carried from the magazine to said filling mechanism, of a movable stop-finger adapted to project across the outlet of the magazine for stopping the feeding of cans or to clear the same for permitting the cans to discharge from the magazine, inner and outer rock-arms pivotally connected with the stop-finger, a roller arranged on one of said arms, and a spring whereby said roller is pressed against the teeth of the transfer-wheel, substantially as set forth.

21. The combination with the can-filling mechanism, the can-magazine and the toothed transfer-wheel whereby the cans are carried from the magazine to said filling mechanism, of a movable stop-finger adapted to project across the outlet of the magazine for stopping the feeding of cans or to clear the same for permitting the cans to discharge from the magazine, an inner rock-arm pivotally connected with the stop-finger and provided with

a roller bearing against the teeth of the transfer-wheel, an outer rock-arm provided with a slot which receives a pin on the stop-finger, a spring whereby said pin is yieldingly held in the outer end of said slot, and a spring whereby said roller is yieldingly held against the teeth of the transfer-wheel, substantially as set forth.

22. The combination with a can-carrier, of a syrup-pump having its plunger-rod provided with a catch, a tappet-wheel provided with tappets adapted to engage with said catch for moving the plunger forward, mechanism for operating the tappet-wheel and a spring for moving the plunger backward, substantially as set forth.

23. The combination with a can-carrier, and a syrup-pump, of a presser-arm adapted to be shifted by the cams and a driving mechanism which operates the pump, and which is controlled by said presser-arm, substantially as set forth.

24. The combination with a can-carrier and a syrup-pump provided with a plunger-rod, of a tappet-wheel provided with tappets, a catch pivoted on the plunger-rod and adapted to be moved into or out of the path of the tappets and a presser-arm which is adapted to bear against the cans as they are moved forward by the carrier and which is connected with said catch, substantially as set forth.

25. The combination with a can-carrier, the retaining-belt whereby the cans are held in engagement with the carrier, and the syrup-pump provided with a plunger-rod, of a tappet-wheel provided with tappets, a rock-lever pivoted on the plunger-rod and provided on its front arm with a catch which is movable into and out of the path of said tappets, a spring whereby the rock-lever is turned for moving the catch into the path of the tappets, a rock-arm provided with a roller bearing against the rear arm of the rock-lever, and a spring whereby the rock-arm is turned for pressing the roller against the retaining-belt, substantially as set forth.

26. The combination with a can-carrier, of a movable syrup-nozzle arranged over the path of the cans and in line with the openings thereof, and an actuating mechanism whereby the nozzle is caused to move with each can during a portion of the forward movement of each can, substantially as set forth.

27. The combination with a can-carrier, of a movable syrup-nozzle arranged over the path of the cans and in line with the openings thereof, and a coupling mechanism whereby the nozzle is intermittently connected with said carrier and caused to move with the same during a portion of the forward movement of each can, substantially as set forth.

28. The combination with the can-carrier, of a movable syrup-nozzle arranged over the path of the cans and in line with the openings thereof, a spring whereby the nozzle is moved in a direction opposite to that in which the cans are moved by the carrier, a movable coupling arranged on the carrier and capable of being moved into or out of the path of the nozzle, and a stationary cam adapted to engage with said coupling and move the same into the path of the nozzle, substantially as set forth.

29. The combination with the can-carrier, of a movable syrup-nozzle arranged over the path of the cans and in line with the openings thereof, a spring whereby the nozzle is moved in a direction opposite to that in which the cans are moved by the carrier, a coupling-lever pivoted on said carrier, and a stationary cam whereby the coupling-lever is turned so that its upper arm stands in the path of the nozzle and which is provided with an inclined front end, a horizontal top and an abrupt rear end, substantially as set forth.

30. The combination with a rotary can-carrier, of a syrup-nozzle pivoted concentrically with said carrier, and arranged with its outlet over the path of the cans and in line with the openings thereof, a spring whereby said nozzle is moved backwardly, a coupling-lever pivoted on said carrier and adapted to engage with said nozzle for moving it forward, and a stationary cam whereby the operation of the coupling-lever is controlled, substantially as set forth.

Witness my hand this 24th day of September, 1896.

HERBERT D. PIERCE.

Witnesses:
KATHRYN ELMORE,
JNO. J. BONNER.