

No. 768,492.

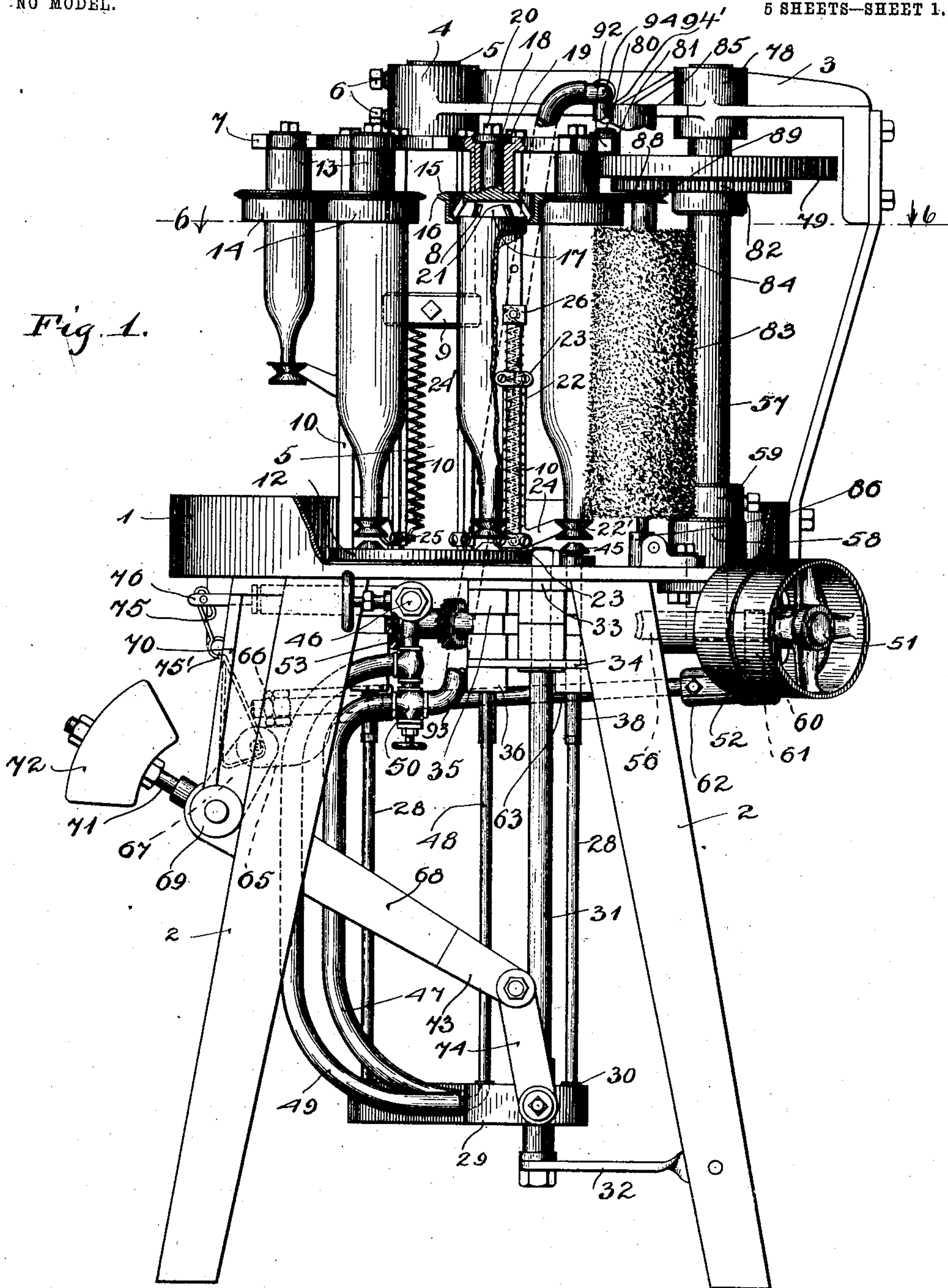
PATENTED AUG. 23, 1904.

C. E. TUNELIUS.
BOTTLE WASHING MACHINERY.

APPLICATION FILED SEPT. 28, 1903.

NO MODEL.

5 SHEETS—SHEET 1.



Witnesses
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Attorney

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Fig. 2.

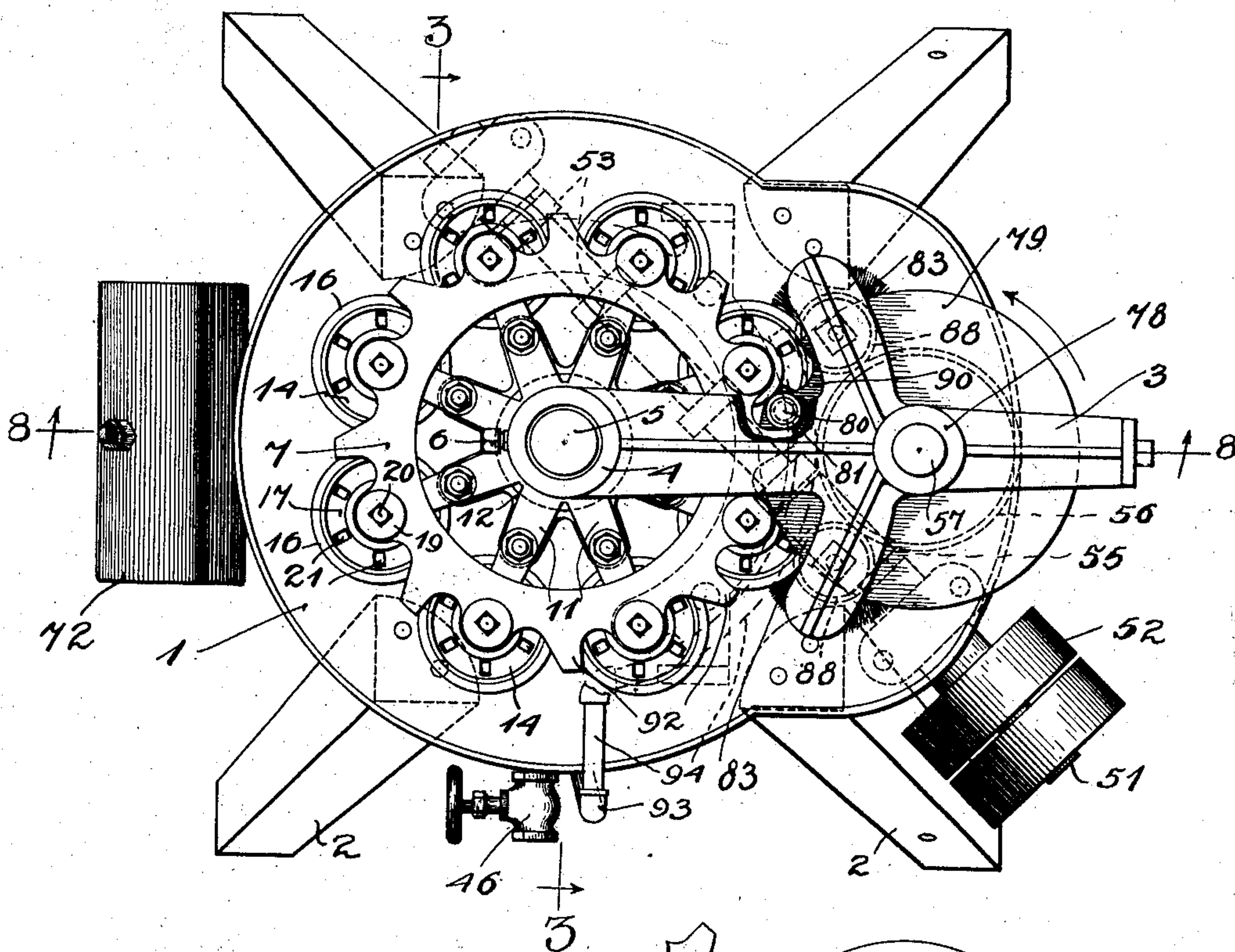
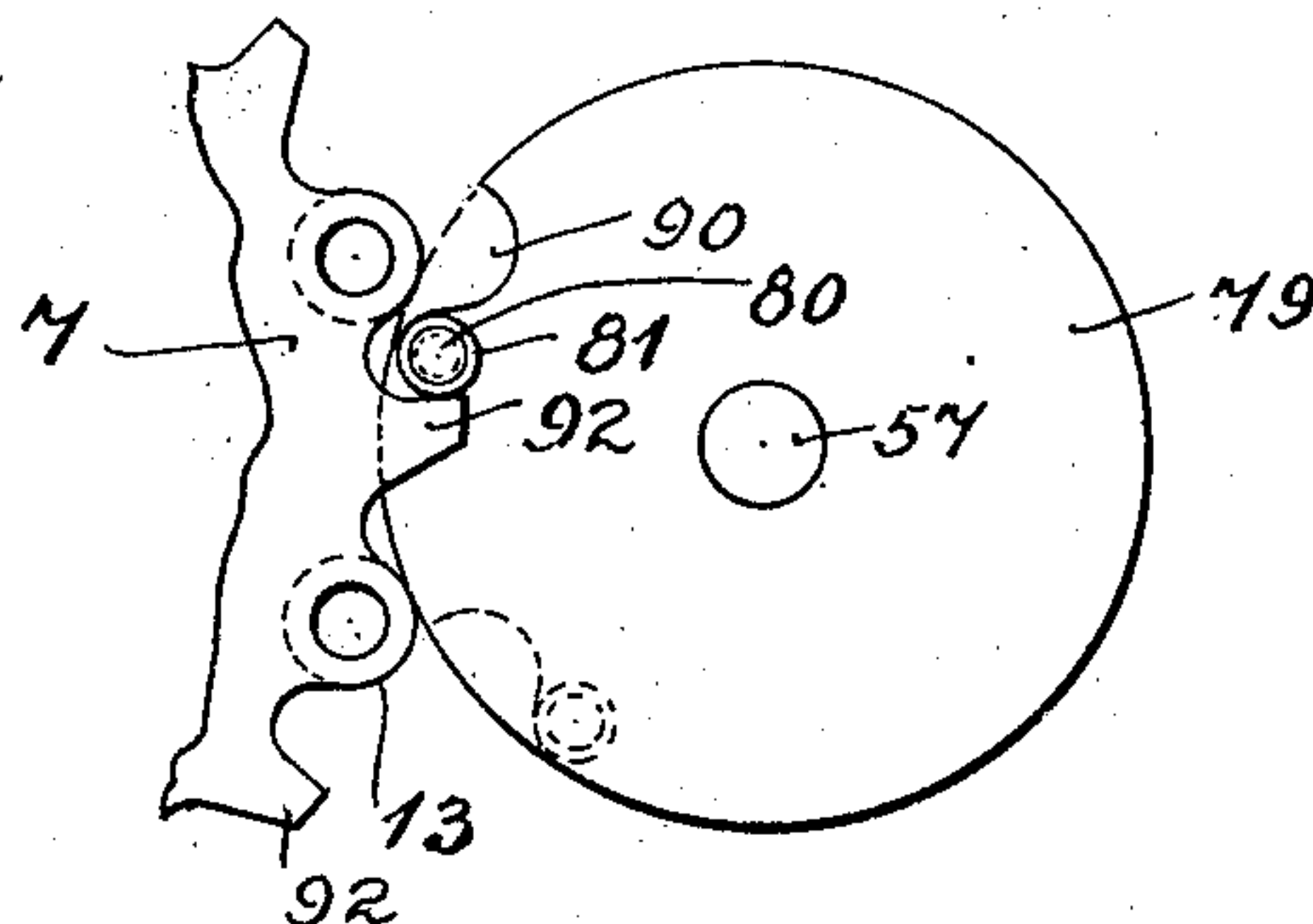


Fig. 4.



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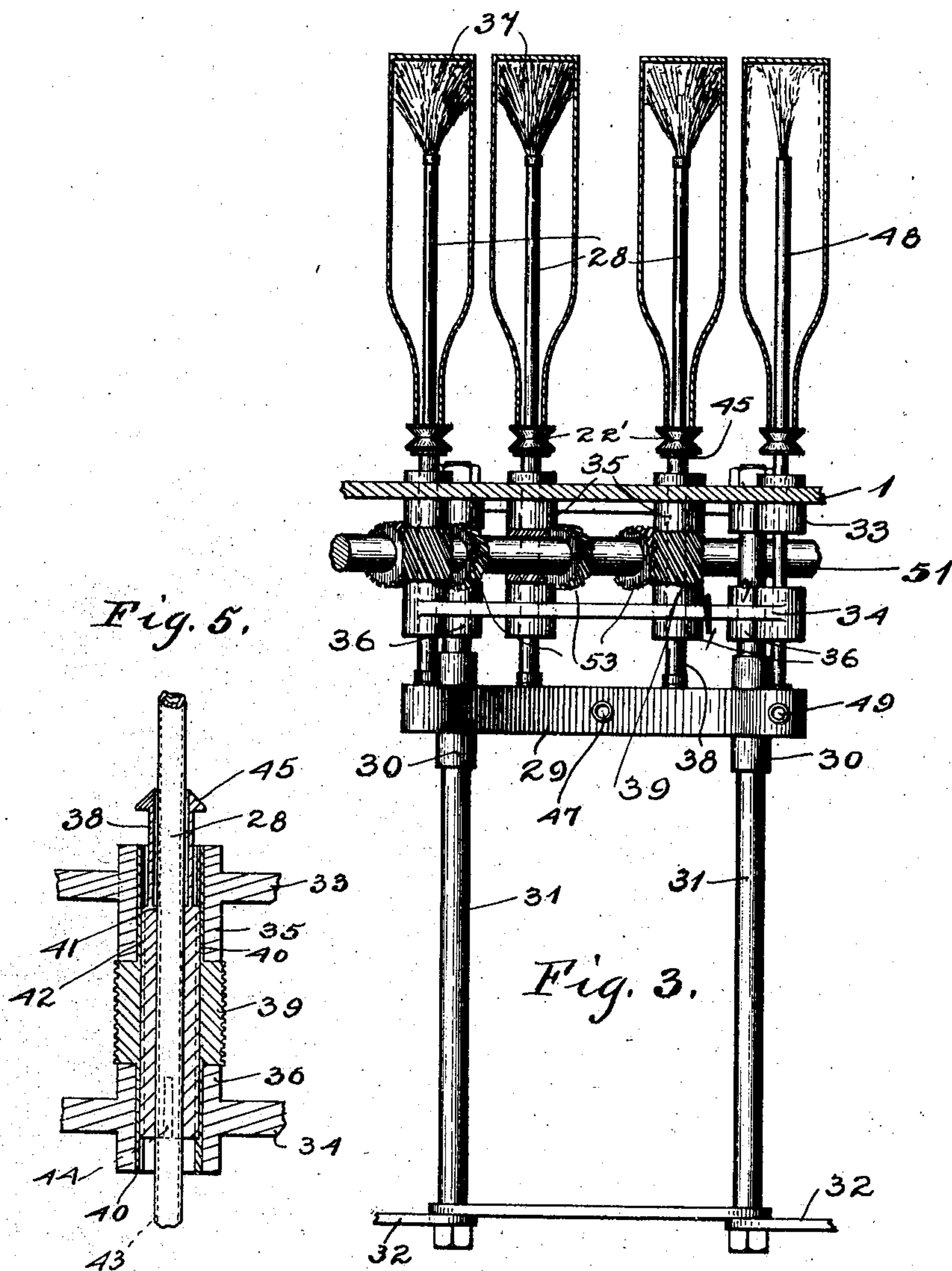
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5 SHEETS—SHEET 3.



Witnesses.

Leonard W. Novander.

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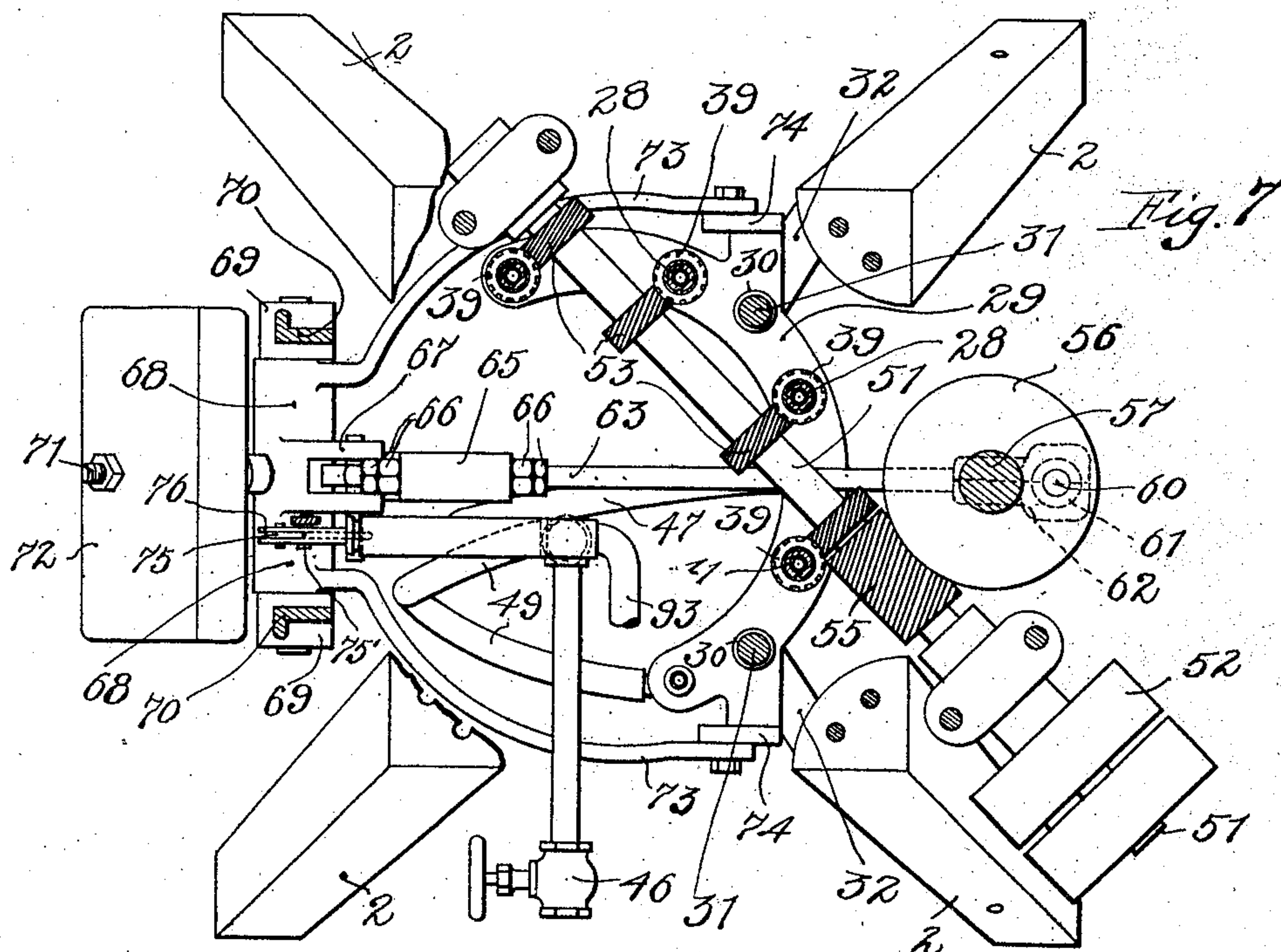
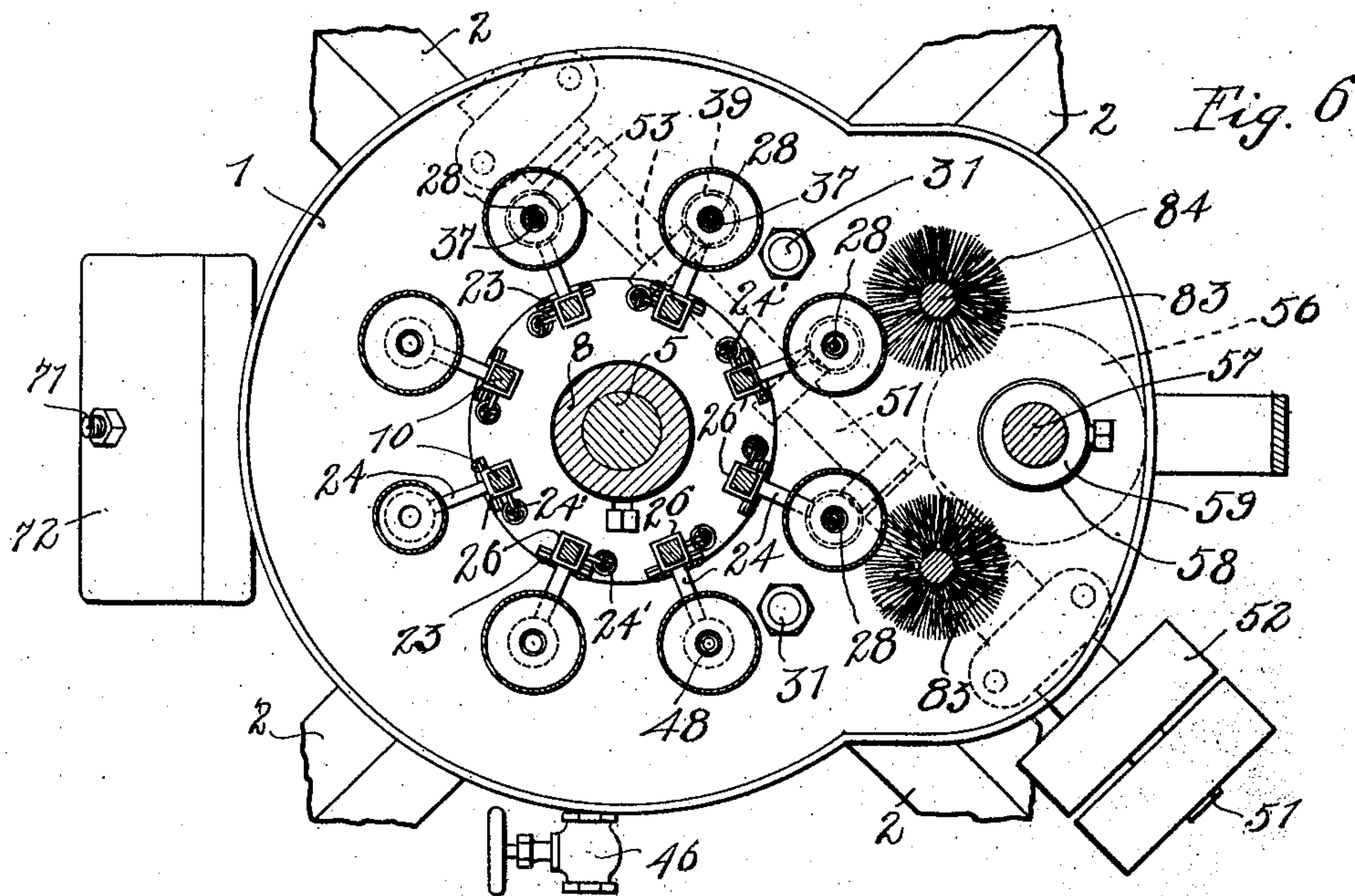
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APPLICATION FILED SEPT. 28, 1903.

NO MODEL.

5 SHEETS—SHEET 4.



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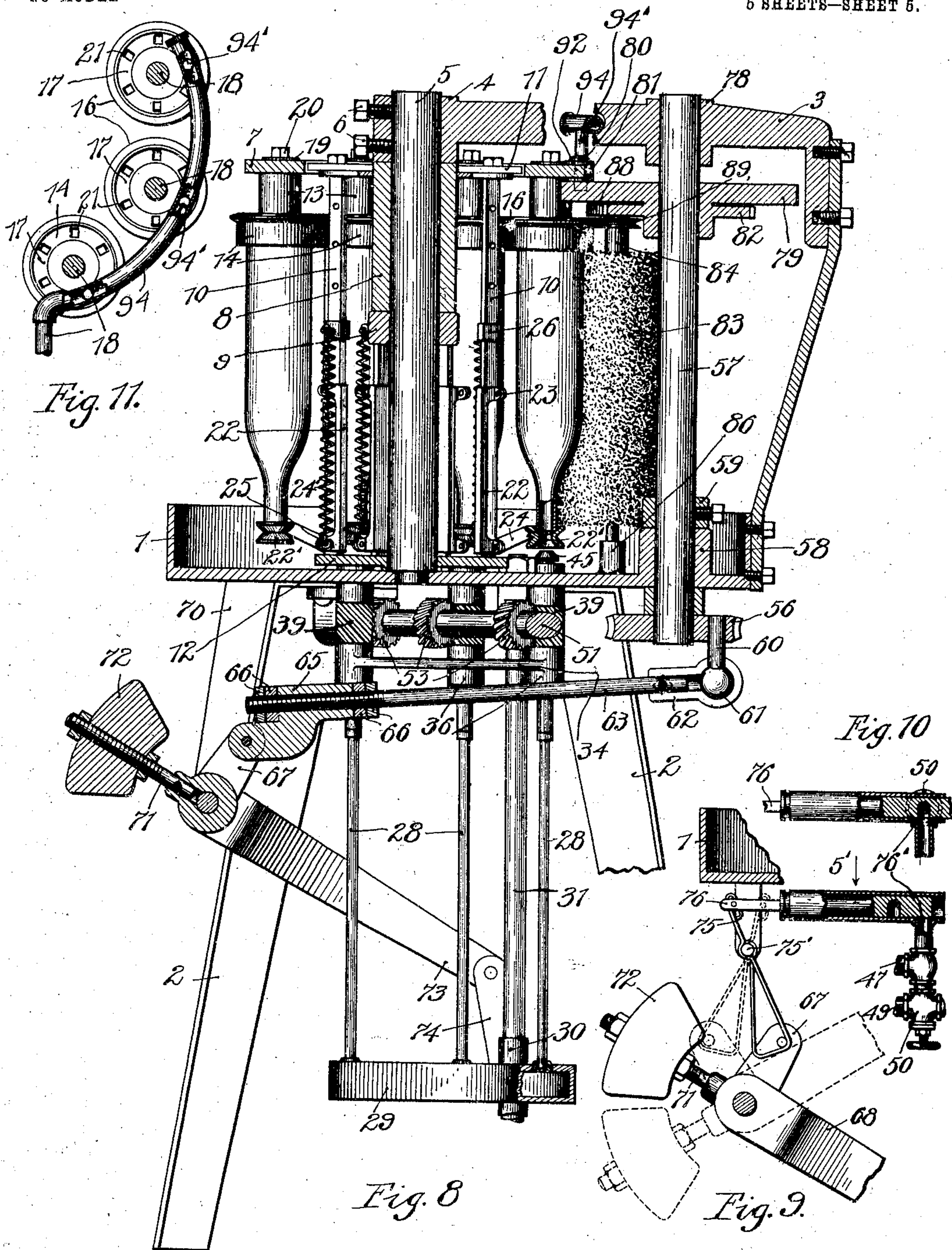
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BOTTLE WASHING MACHINERY.

APPLICATION FILED SEPT. 28, 1903.

NO MODEL

5 SHEETS—SHEET 5.



Witnesses:

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Charles J. Schmidt

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UNITED STATES PATENT OFFICE.

CHARLES E. TUNELIUS, OF CHICAGO, ILLINOIS.

BOTTLE-WASHING MACHINE.

SPECIFICATION forming part of Letters Patent No. 768,492, dated August 23, 1904.

Application filed September 28, 1903. Serial No. 174,847. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. TUNELIUS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Bottle-Washing Machines, (Case 1,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to bottle-washing machinery, and has for its object improved and simplified construction of such a machine.

Briefly speaking, my present invention is an improvement over the bottle-washing machine invented by me and described in Letters Patent No. 575,046, granted therefor.

Some of the chief features of this invention comprise improved and simplified construction of the cam mechanism for intermittently rotating the bottle-rack and the application of gearing apparatus whereby all chains and belts are eliminated, making the transmission of power much more direct and efficient.

In the accompanying drawings I have shown various views of the machine and the features of invention thereof.

Figure 1 is an elevation view of the machine. Fig. 2 is a plan view thereof. Fig. 3 is a sectional view taken on line 3 3 of Fig. 2. Fig. 4 shows a detached and detailed view of the cam employed, and Fig. 5 illustrates in detail the disposition of the brush-spindle-mechanism parts. Fig. 6 is a sectional view taken on line 6 6, Fig. 1. Fig. 7 is a plan view of the machine, the pan and everything above it being removed. Fig. 8 is a vertical sectional view taken on line 8 8, Fig. 2. Figs. 9 and 10 are detail views showing the construction and operation of a water-controlling valve, and Fig. 11 shows in detail the distributing and rinsing pipe.

Like characters of reference refer to like parts throughout the various figures.

A pan-shaped frame 1 is supported by legs 2 2, an L-shaped brace member 3 extending upwardly and sidewardly and terminating in a bearing 4, disposed above the center of the pan-frame. A shaft 5 extends upwardly from the pan-frame 1 and is secured at its upper

end in bearing 4 by means of set-bolts 6 6. A frame 7 has a downwardly-extending hub 8 adapted to sleeve over shaft 5, being secured thereto in position by means of and over a collar 9. A plurality of vertical square shafts 10 10 extend between the spokes 11 11 of the frame and a frame 12, disposed about the bottom of the shaft 5. The frame 7 is provided with downwardly-extending hubs 13 13. The bottle-sockets 14 14 consist of an outer rim portion 15, having an annular ridge 16, and an inner socket-shaped portion 17, having a stud 18 extending therefrom and adapted to pass through the hubs 13 to be engaged at its end by a washer 19 and a nut 20. Openings 21 through said socket portion serve to allow water to pass therethrough to the outside of the bottle. A vertical frame 22, having a square bearing 23 at each end thereof, is provided for each of the square shafts 10 and adapted for vertical travel thereon.

An arm 24 extends sidewardly from said frame 22 and terminates in a pulley-shaped conical socket 22' for receiving the mouth of the bottle, the opening in the center of said socket being in vertical alinement with a corresponding socket secured to the frame 7. A tension-spring 24' is interposed between any point, such as 25, on the slidable frame 22 and the square collars 26, which may be vertically adjusted and secured in any position on said shafts to secure the proper spring-tension for bottles of different lengths, the bottle being placed between said sockets and held in place by said springs, the frame being normally held in place against the collar 26 by the spring. The bottles are thus in position to receive the brush-spindles 28 28, which communicate at their lower end with a hollow cross-head 29, provided with bearings 30 30, adapted to slidably engage upright rods 31 31, which rods are secured between the pan-frame 1 and lower supporting-bars 32 32. An upper spindle-frame 33 is secured beneath the pan-frame 1, and a lower spindle-frame 34 is secured to the upright rods 31. This upper spindle-frame is provided with bearings 35 35, while the lower spindle-frame is provided with bearings 36 36, the brush-spindles passing through these bearings, said

brush-spindles being hollow and terminating in brushes 37 37. Sleeves 38 also pass through bearings 35 and 36 and are disposed about the brush-spindles. Spiral gears 39 39
 5 are disposed between bearings 35 and 36 and are provided with sleeve-hubs 40, which pass through these bearings and about the sleeve 38. The sleeve 38 is provided with inner and outer keys 41 and 42, the inner keys, 41, fitting in keyways 43 on the brush-spindles 28,
 10 while the outer keys, 42, engage similar keyways in the gear-hubs 40. The sleeves and the brush-spindles are thus allowed to move relatively to each other and to the gear-hubs.

15 On the normal position the cross-head 29 is disposed at the lower end of the uprights 31, and the brushes at the end of their spindles are disposed within the sleeves 38. The sleeves 38 are provided with longitudinal slots
 20 44, whereby frictional engagement is maintained with the brush-spindles, and as the cross-head 29 is raised the sleeves are carried with the brush-spindles until the conical tops
 25 45 of the sleeves engage the lower part of the conical sockets 22', the spindles, however, continuing in their upward travel into the neck of the bottle and carrying their brushes a proper distance to engage the bottom of the
 30 bottle.

Water under suitable pressure is supplied to the hollow cross-head 29, and thus to the brush-spindles, from a supply-pipe 46 by means of a hose or pipe 47. One of the spindles 48 is not provided with a brush, but acts as
 35 a rinsing-spindle and connects directly and independently with the source of water-supply by means of the hose or pipe 49, the pressure through this rinsing-spindle being preferably maintained as high as possible to insure good
 40 rinsing, while the pressure through the pipe 47 and brush-spindles is reduced by means of a valve 50.

A driving-shaft 51 extends transversely across and below the pan-frame 1 and is provided at its end with a driving-pulley 52 and
 45 at intermediate points is provided with similar spiral gears 53 53, adapted to mesh with the similar spiral gears 39, connected with brush-spindles, as best shown in Fig. 3. The
 50 spiral gears are disposed in the arc of a circle, and this shaft may engage any number of the spindles. However, I prefer to cause the shaft to engage at each side thereof an equal number of gears, and I have shown four spindles engaged, two on each side of the shaft.
 55 The gears being all similar will cause the spindles on opposite sides of the shaft to be rotated in an opposite direction. This disposition of the shaft with respect to the spindles entirely eliminates end thrust and creeping, as the end thrust and creeping occasioned by the gears on one side of the shaft is entirely counterbalanced by that of the gears at the other side of the shaft. The shaft 51
 60 is also provided with a worm-wheel 55, mesh-

ing with a worm-gear 56, secured to the bottom of a vertical cam-shaft 57, which passes through a bearing 58 on the pan-frame and is secured in a vertical position by means of a collar 59. A crank-pin 60, secured to the
 70 worm-gear 56, is provided with a balled end 61, adapted for engagement with a socket member 62, secured to a horizontally-extending connecting-rod 63. A lug 65 is secured at the other end of said rod 63 between ad-
 75 justing lock-nuts 66 66 and pivotally engages with a lever 67, extending upwardly from a main lever 68, which lever is pivoted in a bearing 69, secured at the lower end of a depending bearing-frame 70. An arm 71, ex-
 80 tending from lever 68, carries a weight 72, the other end of said main lever being bifurcated, the ends 73 thereof engaging with connecting-links 74, which connecting-links are pivoted to the hollow cross-head 29. As the
 85 drive-wheel 52 now rotates the rod 63 is given a reciprocatory horizontal motion and the main lever 68 caused to raise the cross-head 29 and the spindles connected therewith, the spindles at the same time being rotated by
 90 means of the spiral gearing between them and the horizontal shaft 51, the weight 72 helping to maintain the balance of the parts. As the rod 63 pushes lever 67 another lever, 75, pivoted at 75', is engaged to actuate a valve-stem
 95 76 to open a valve 76' to allow a supply of water to the hollow cross-head and spindles. Upon backward travel of the rod 63—that is, when the cross-head 29 is lowered to withdraw the brushes—the valve-stem 76 is corre-
 100 spondingly actuated to shut out the supply of water to the spindles, as shown in Fig. 9.

The top of the cam-shaft 57 journals in a bearing 78, integral with the brace member 3, and a cam 79 is secured to said shaft below
 105 said bearing and provided near its periphery with an upwardly-extending stud 80, upon which is journaled a cam-roller 81. A gear-wheel 82, which may be integral with the
 110 cam 79, is disposed below said cam and concentric therewith. Vertical brushes 83 83 are mounted upon brush-shafts 84 84, extending from bearings at the ends of a cross-frame 85 to bearings 86 86 on the pan-frame. Pinions 88 88 are secured to said brush-shafts
 115 to mesh with the gear-wheel 82 on shaft 57, and directly below said pinions are mounted friction-pulleys 89 89, adapted to engage with the peripheral flanges on the sockets secured to the cam-rack.
 120

At one side of the stud 80 the cam is provided with a gap or groove 90, adapted to engage the hubs 13, extending from the frame 7. As power is now applied to the driving-shaft 51 rotation is transmitted to cam 79 and gear-
 125 wheel 82 through the medium of the worm-wheel, worm-gear, and shaft 57, the brushes being thus continually rotated. The frame 7 is provided with teeth 92 92, and as cam 79 rotates in the direction of the arrow the cam-
 130

roller 81 thereon engages one of these teeth to start rotation of the frame. The gap or groove 90 shortly thereafter engages the hub 13, disposed between the engaged tooth and the following tooth. The cam-roller finally leaves the tooth; but the cam-groove still engages the hub 13 to continue the rotation of the frame until this hub also leaves the groove, whereupon the unbroken periphery of the cam engages between two of the hubs 13, thus locking the frame 7 in position to prevent rotation thereof until the cam-pulley again comes to a position where the cam-roller may engage the next tooth of the frame 7, whereupon the frame 7 is given another rotary impetus, as before. Each rotation of the cam causes an angular advancement of the frame 7 equal to the angle between two teeth, and when the rotation of the frame 7 is stopped a bottle is disposed opposite each brush to be cleansed thereby, this cleansing going on until the cam again engages the frame 7, whereupon another bottle is brought into position to be cleaned. Each bottle thus gets two brushings, as when it passes from one brush the angular advancement of the frame 7 brings it into engagement with the other brush, and upon leaving this brush after its final cleansing the next angular advancement brings it over the rinsing-spindle 48 to be finally rinsed upon the inside.

A hose or pipe 93 leads from the valve 50 to a distributing-pipe 94, disposed above the positions occupied by the bottles when washed upon the outside and finally rinsed in the interior, as best shown in Fig. 11k. The water from this distributing-pipe passes from spouts 94', leading from pipe 94, and then through the openings 21 in the sockets 17, thus supplying water for the exterior brushes and also supplying water for finally rinsing the outside of the bottle when in position above the rinsing-spindle. The bottles when in engagement with the brushes 83 are given a rotary motion by virtue of engagement of the pulleys 89 with the peripheral flanges 16, the speed of the brush-bristles, however, being very much greater than that of the engaged bottles, whereby a thorough cleansing is assured.

Having thus described the operation of the various parts of the machine, I shall now describe the manner in which these parts cooperate. As power is applied to the driving-shaft 51 the cam-shaft and the cam thereon are rotated, the cam-roller and the cam-gap engaging a tooth and hub of the frame 7 to advance the bottle-rack. The unbroken part of the cam-periphery will now engage two of the hubs, thus preventing the bottle-rack from further rotation when the cam-gap passes out of engagement with the hub. At this moment the connecting-rod 63 is operated to cause the lever 68 to raise the cross-head 29 and the spindles, the water at the

same time being admitted to the spindles, the brushes of the spindles distending as they enter the bottles and pass upwardly to wash the bottom of the bottle. As the gear-wheels are continually in mesh, the spindles are continually rotated. As the connecting-rod travels backward the spindles are withdrawn from the bottles, and at this moment the cam-roller and gap will again have come into position to engage the next tooth on the frame 7, whereupon the same cycle of operations is repeated. While the bottle-rack is locked by the cam the bottles opposite the vertical brushes are thoroughly washed on the outside and the bottle which has just left a vertical brush is being finally rinsed upon the inside and outside.

Changes may readily be made in the various parts of the machine without departing from the spirit and scope of the invention. I do not, therefore, wish to be limited to the precise construction shown; but

I claim as new and desire to secure by Letters Patent—

1. In a bottle-washing machine, the combination with a supporting-frame, of a rotatable bottle-rack, an upper frame for said rack having teeth about its periphery and downwardly-extending hubs, upper rotatable bottle-sockets having studs passing through said hubs, lower bottle-sockets slidably supported on said bottle-rack, a cam for intermittently rotating said bottle-rack, said cam consisting of a circular disk having a vertical stud near its periphery for engagement with said teeth, and a gap in said periphery near said stud for engagement with said hubs, a rotatable vertical shaft supporting said cam, a gear-wheel on said shaft below said cam, vertical brush-holder shafts, pinions at the top of said shafts for engagement with said gear-wheel, and means for causing rotation of said cam-shaft, whereby said brush-shafts are rotated and whereby said upper frame is given an angular advancement when engaged by said stud and said gap, substantially as described.

2. In a bottle-washing machine, the combination with a supporting-frame, of a rotatable bottle-rack having teeth disposed about its periphery and having downwardly-extending hubs, upper rotatable bottle-sockets mounted in said hubs, lower bottle-sockets slidably mounted on said bottle-rack between which sockets the bottles are supported, an annular ridge on said upper bottle-sockets, a cam mounted on cam-shaft, said cam consisting of a circular disk having a vertical stud near the periphery thereof for engagement with said teeth, and a gap in its periphery near said stud for engagement with said hubs, a gear mounted upon said cam-shaft, vertical brush-shafts bearing rotary brushes, a friction-pulley mounted at the top of each of said brush-shafts for engagement with the annular ridges on said upper bottle-sockets, pinions at the

top of said brush-shafts for engagement with the said gear on said cam-shaft, and means for causing rotation of said cam-shaft, whereby said brushes and the bottle-sockets are rotated, said cam being so disposed that, as the unbroken periphery thereof engages two of the hubs of said rack, said rack is locked against rotation, and as said stud and gap engage a tooth and hub of said rack, said rack is given an angular advancement equal to the angular distance between two teeth, substantially as described.

3. In a bottle-washing machine, the combination with a supporting-frame, of a rotatable bottle-rack, a reciprocating hollow cross-head, a series of hollow brush-bearing spindles mounted thereon and communicating therewith, means for reciprocating said cross-head and said spindles to enter the bottles on said rack, and spiral gearing for causing rotation of said brush-bearing spindles, substantially as described.

4. In a bottle-washing machine, the combination with a supporting-frame, of a rotatable bottle-rack, a hollow cross-head, a series of circularly-disposed brush-bearing spindles mounted on said cross-head and communicating therewith, means for raising said cross-head so that the spindles may enter into the bottles on said bottle-rack, a horizontal shaft passing between said spindles, a spiral gear on each spindle, and spiral gears on said horizontal shaft adapted to mesh with said spindle-gears, whereby said spindles are given rotary motion, substantially as described.

5. In a bottle-washing machine, the combination with a supporting-frame, of a rotatable bottle-rack, a hollow cross-head, hollow spindles extending upwardly from said cross-head, means for raising said cross-head whereby said spindles enter the bottles supported by said bottle-rack, spiral gearing for causing rotation of said spindles, a source of water-supply connecting directly with one of said spindles, brushes at the ends of said other spindles, the water-supply connecting with said hollow cross-head and with said brush-bearing spindles, and means for reducing the pressure of the water-supply leading to said hollow cross-head, substantially as described.

6. In a bottle-washing machine, the combination with a supporting-frame, of a rotatable bottle-rack, a plurality of brush-spindles disposed in the arc of a circle, means for raising said brush-spindles into the bottles on said rack, a shaft passing between said spindles so that an equal number of spindles is disposed on each side thereof, spiral gears on said spindles, and spiral gears on said shaft adapted to mesh with said spindle-gears, substantially as described.

7. In a bottle-washing machine, the combination with a supporting-frame, of a rotatable bottle-rack, a plurality of brush-spindles disposed in the arc of a circle, means for raising

said brush-spindles into the bottles on said rack, a shaft passing between said spindles so that an equal number of spindles is disposed on each side thereof, spiral gears on said spindles, and spiral gears on said shaft adapted to mesh with said spindle-gears, said gears being all alike, whereby the spindles on opposite sides of the shaft are rotated in opposite directions, and whereby end thrust and creeping are entirely counterbalanced, substantially as described.

8. In a bottle-washing machine, the combination with a supporting-frame, of a rotatable bottle-rack, a plurality of vertical brush-spindles disposed in the arc of a circle, means for raising said vertical brush-spindles into the bottles on said rack, a horizontal shaft passing between said spindles so that an equal number of spindles is disposed on each side thereof, spiral gears on said spindles, and spiral gears on said shaft adapted to mesh with said spindle-gears, said gears being all alike, whereby the spindles on opposite sides of the shaft are rotated in opposite directions, and whereby end thrust and creeping are entirely counterbalanced, substantially as described.

9. In a bottle-washing machine, the combination with a supporting-frame, of a rotatable bottle-rack, a plurality of hollow spindles disposed in a circle, a hollow cross-head upon which said spindles are mounted, a source of water-supply connecting directly with one of said spindles, the other spindles being provided with brushes at their ends and communicating with said hollow cross-head, said cross-head being connected with said source of water-supply, means for reducing the pressure of said water-supply through said cross-head and said brush-bearing spindles, a spiral gear on each of said brush-bearing spindles, a horizontal shaft having spiral gears adapted to mesh with said spindle-gears, said shaft being disposed to drive an equal number of spindles on each side thereof, and means for reciprocating said cross-head and the spindles connected therewith, substantially as described.

10. In a bottle-washing machine, the combination with a supporting-frame, of a rotatable bottle-rack, a plurality of spindles disposed in a circle, a hollow cross-head to which said spindles are secured, brushes at the ends of said spindles, a source of water-supply connecting with said hollow cross-head and said hollow spindles, a bell-crank lever pivoted at its elbow and one arm thereof connecting with said cross-head, a source of rotary motion, and a connecting-rod extending from said source and engaging the other arm of said bell-crank lever, the reciprocation of said connecting-rod causing vertical reciprocation of said cross-head and the brush-bearing spindles, substantially as described.

11. In a bottle-washing machine, the combination with a supporting-frame, of a rotatable bottle-rack, a hollow cross-head, a plurality

of hollow brush-bearing spindles disposed in a circle and mounted upon and communicating with said cross-head, a source of water-supply communicating with said cross-head, 5 a horizontal, driven shaft, spiral gears on said shaft, spiral gears on said spindles adapted to mesh with the gears on said shaft to be driven thereby, said shaft being disposed to engage on each side thereof an equal number 10 of spindles, a worm on said shaft, a worm-wheel driven by said worm, a crank-pin on said worm-wheel, a bell-crank lever pivoted at its elbow, one arm thereof engaging with said cross-head, a connecting-rod interposed 15 between the other arm of said lever and said crank-pin, rotation of said shaft causing horizontal reciprocation of said connecting-rod to produce vertical reciprocation of said cross-head and said spindles connecting therewith, 20 substantially as described.

12. In a bottle-washing machine, the combination with a supporting-frame, of a rotatable bottle-rack, an upper frame on said bottle-rack having teeth disposed about its periphery and 25 downwardly-extending hubs, rotatable bottle-sockets journaled in said hubs, vertically-slidable lower sockets, a plurality of brush-bearing spindles disposed in the arc of a circle, a hollow cross-head with which said brush-spin- 30 dles communicate, gears on said brush-spindles, a horizontal driving-shaft having similar gears adapted to mesh with said spindle-gears to rotate said spindles, said shaft being disposed so that each side thereof drives an equal 35 number of spindles in opposite directions, a vertical cam-shaft, a worm-wheel at the bottom of said shaft, a worm on said driving-shaft engaging said worm-wheel, a crank-pin on said worm-wheel, a connecting-rod having 40 ball-and-socket engagement with said crank-pin, the other end of said connecting-rod engaging with one arm of a bell-crank lever pivoted at its elbow, the other arm of said bell-crank lever engaging with said cross-head, a cam at the top of said cam-shaft for 45 engaging said frame to cause intermittent rotation thereof, and means for rotating said driving-shaft, whereby said connecting-rod is reciprocated to actuate said bell-crank lever 50 to cause vertical reciprocation of the spindles, to cause rotation of said spindles by means of said gearing, and to cause rotation of said cam, substantially as described.

13. In a bottle-washing machine, the combination with a supporting-frame, of a rotatable 55 bottle-rack, an upper frame on said bottle-rack having teeth disposed about its periphery and having downwardly-extending hubs, upper rotatable bottle-sockets journaled in said hubs, 60 brush-bearing spindles disposed in the arc of a circle and adapted to enter the bottles carried by said bottle-rack, a hollow cross-head with which said spindles communicate, spiral gears on said spindles, a horizontal driving- 65 shaft having spiral gears adapted to mesh with

the gears on said spindles to cause rotation of said spindles, said shaft being disposed to drive on each side thereof and in an opposite direction an equal number of spindles, a cam- 70 shaft extending upwardly, a worm-wheel at the bottom of said shaft, a worm on said driving-shaft adapted to mesh with said worm-wheel, a crank-pin on said worm-wheel, a horizontal connecting-rod having ball-and- 75 socket engagement with said crank-pin, its other end being pivoted to one arm of a bell-crank lever pivoted at its elbow, the other arm of said bell-crank lever engaging said cross-head, a cam at the top of said cam-shaft, said cam consisting of a circular disk having 80 a vertical stud near its periphery for engaging the teeth of said cam-frame, and a gap in its periphery near said stud for engaging the hubs of said cam-frame, rotation of said driving-shaft causing rotation of said cam to in- 85 termittently rotate said bottle-rack and to lock said bottle-rack against rotation when out of engagement with said cam-stud and gap, said connecting-rod, during its reciprocation, caus- 90 ing vertical reciprocation of said cross-head, whereby said spindles are carried into the bottles on said bottle-rack, the spindles being continually rotated by means of the gearing connecting them with said driving-shaft, substan- 95 tially as described.

14. In a bottle-washing machine, the combination with a supporting-frame, of a rotatable bottle-rack, an upper frame for said rack, a lower frame for said rack, shafts extending 100 between said upper and lower frames, bottle-sockets supported from said upper frame, lower sockets corresponding with said upper sockets, frames for supporting said lower sockets adapted to slidably engage said shafts, 105 collars on said shafts adapted to be adjustably held thereon in any position, and tension-springs interposed between said collars and some point on said slidable frames, said slid- 110 able frames being normally held against said collars, substantially as described.

15. In a bottle-washing machine, the combination with a supporting-frame, of a bottle- 115 rack, an upper frame for said bottle-rack, a lower frame therefor, square shafts extending between said upper and lower frames, upper bottle-sockets supported from said upper 120 frame, lower bottle-sockets corresponding with said upper bottle-sockets, frames for supporting said lower sockets, square bearings on said frames for engaging said shafts whereby 125 said frames are vertically slidable, collars adapted to be secured to said shafts in any vertical position, and springs intervening between a point on said slidable frames and said adjustable collars, said frames being normally 130 held against said collars by said springs, substantially as described.

16. In a bottle-washing machine, the combination with a supporting-frame, of a bottle- 130 rack, an upper and a lower frame for said rack,

shafts extending between said upper and said lower frame, bottle-sockets supported from said upper frame, lower sockets corresponding with said upper sockets, a frame slidably
5 mounted on each of said shafts for supporting a lower socket, a collar on each of said shafts adapted to be adjustably held in any position above said frames, and a tension-spring interposed between each of said collars and some
10 point on the corresponding slidable frame, each frame being normally held against the corresponding collar, substantially as described.

17. In a bottle-washing machine, the combination with a supporting-frame, of a bottle-rack, an upper and a lower frame for said rack, shafts extending between said upper and said lower frame, bottle-sockets supported from said upper frame, lower sockets corresponding
20 with said upper sockets, a frame slidably mounted on each of said shafts for supporting a lower socket, a collar on each of said shafts adapted to be adjustably held in any position above said frames, a tension-spring interposed
25 between each of said collars and some point on the corresponding slidable frame, each frame

being normally held against the corresponding collar, a series of brush-bearing spindles adapted to enter the bottles supported on said rack between said sockets, and spiral gearing for
30 causing rotation of said brush-bearing spindles, substantially as described.

18. In a bottle-washing machine, the combination with a supporting-frame, of a rotatable bottle-rack having teeth about its periphery
35 and having hubs extending downwardly therefrom, a cam for causing intermittent rotation of said bottle-rack consisting of a circular disk having a stud near the periphery for engaging said teeth and a gap in said periphery
40 near said stud for engaging said hubs, a series of brush-bearing spindles adapted to enter the bottles supported on said bottle-rack, and spiral gearing for causing rotation of said brush-bearing spindles, substantially as described. 45

In witness whereof I hereunto subscribe my name this 26th day of September, A. D. 1903.

CHARLES E. TUNELIUS.

Witnesses:

CHARLES J. SCHMIDT,
HARVEY L. HANSON.