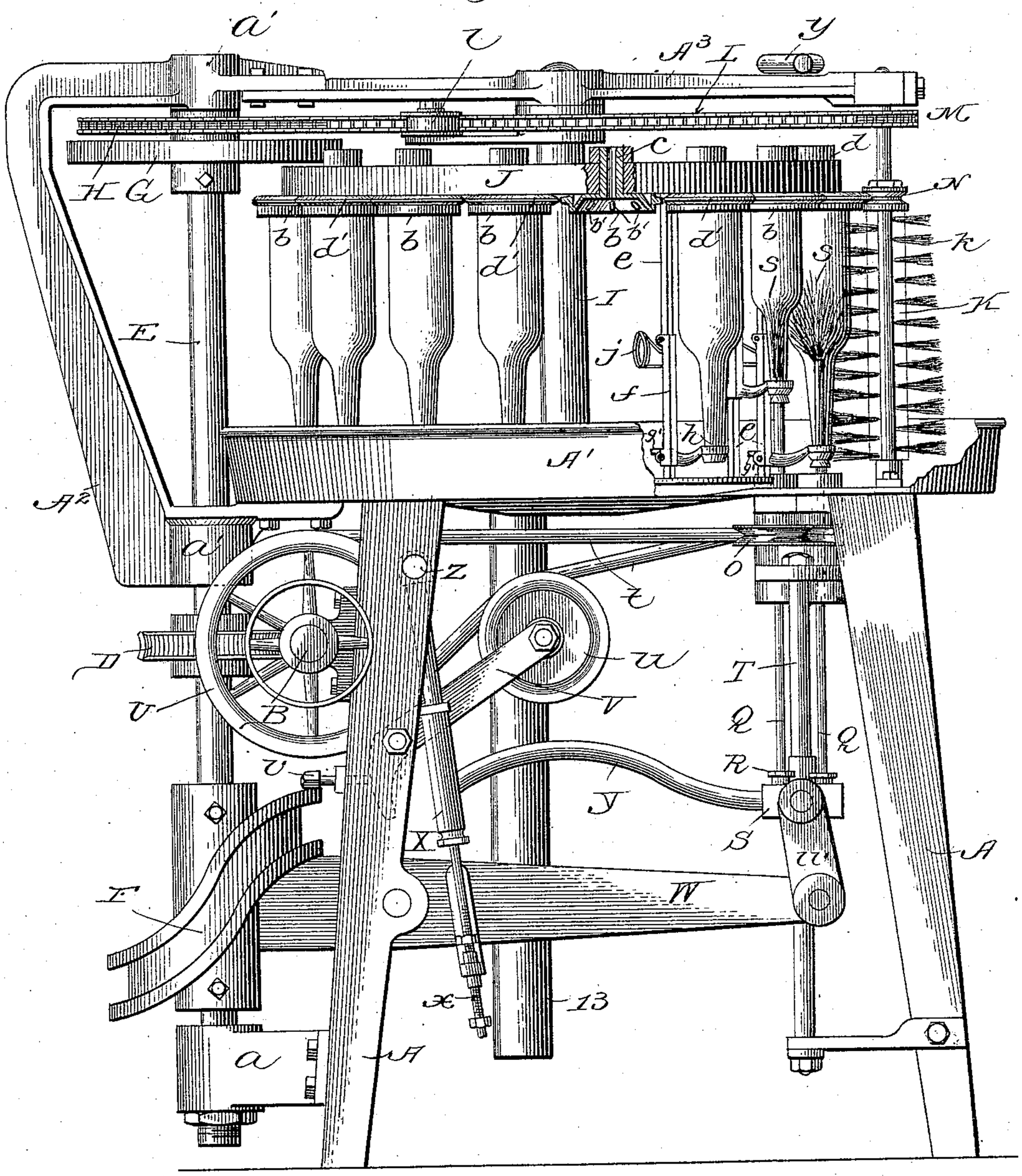
(No Model.) 4 Sheets—Sheet 1.

C. E. TUNELIUS.

BOTTLE WASHER.

No. 575,046. Patented Jan. 12, 1897.

Fig. 1.



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ATTORNEY.

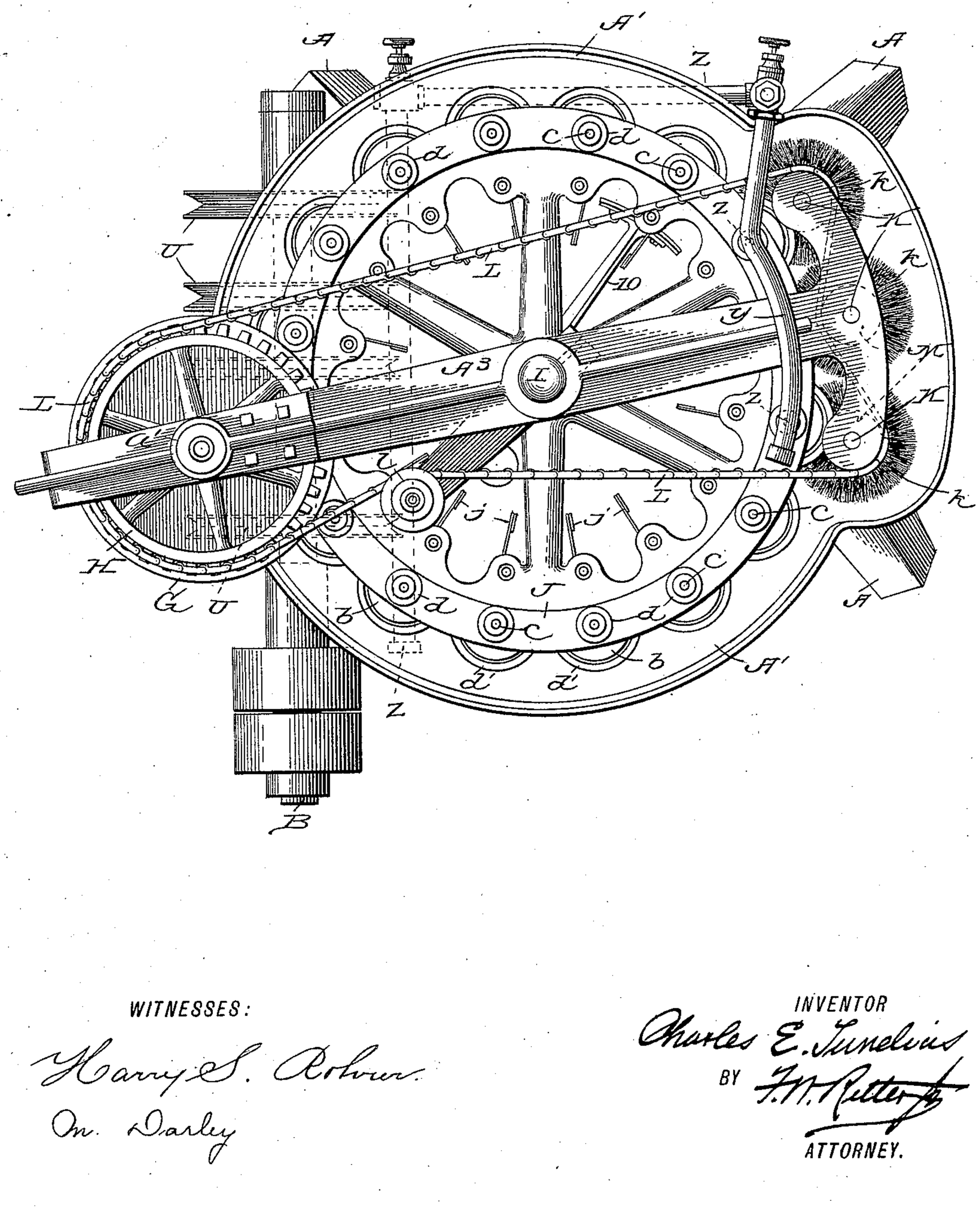
(No Model.) 4 Sheets—Sheet 2.

C. E. TUNELIUS.

BOTTLE WASHER.

No. 575,046. Patented Jan. 12, 1897.

Fig. 2.



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(No Model.)

4 Sheets—Sheet 3.

C. E. TUNELIUS.

BOTTLE WASHER.

No. 575,046. Patented Jan. 12, 1897.

Fig. 3.

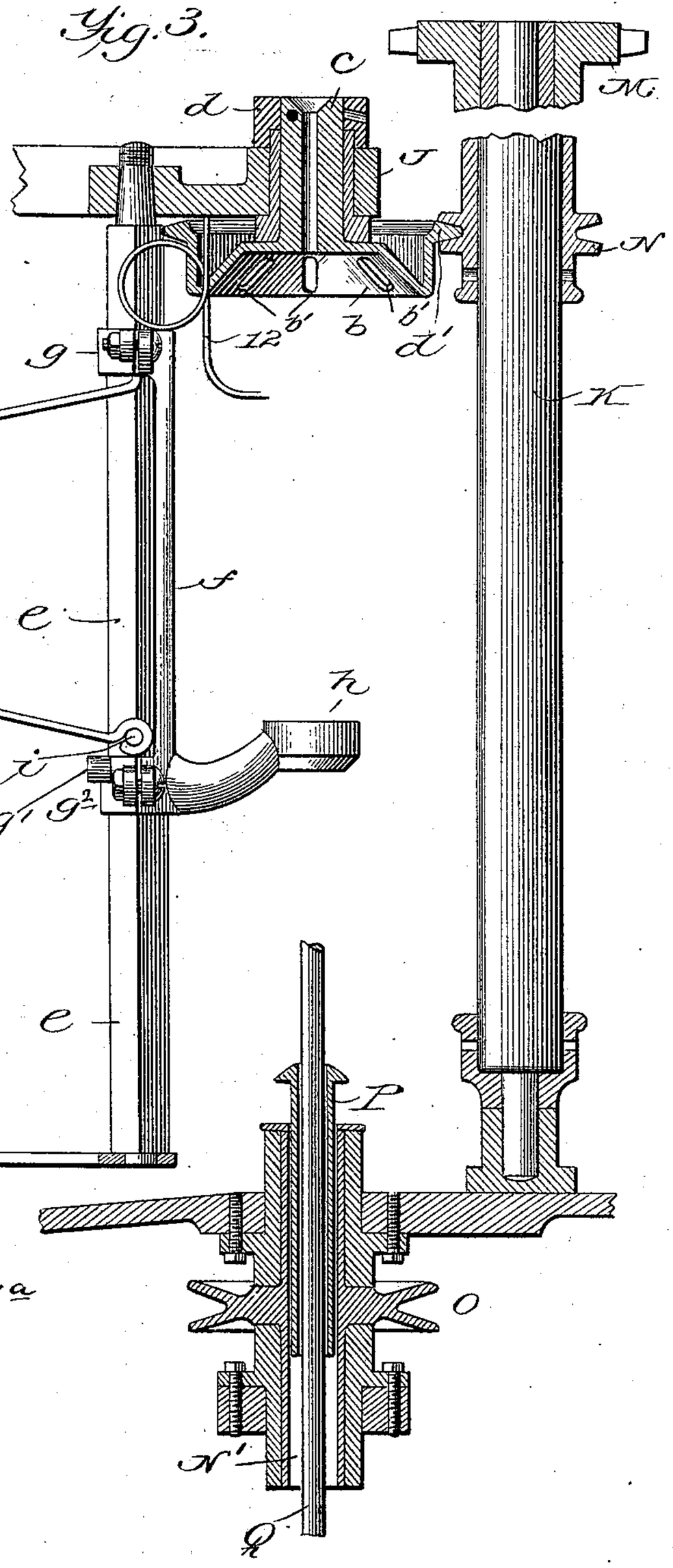


Fig. 10.

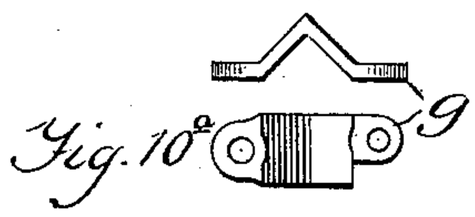


Fig. 11.

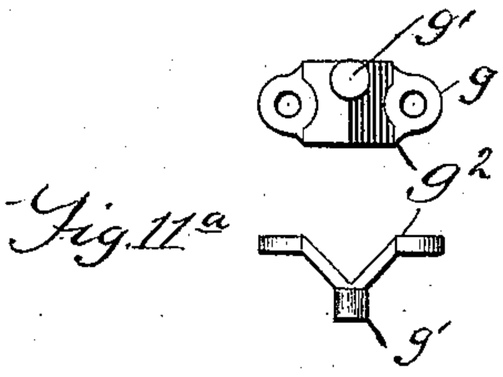


Fig. 9.

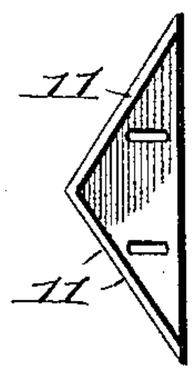
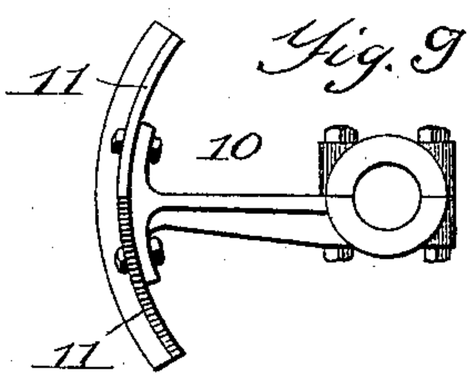


Fig. 9ª



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(No Model.) 4 Sheets—Sheet 4.

C. E. TUNELIUS.

BOTTLE WASHER.

No. 575,046. Patented Jan. 12, 1897.

Fig. 4.

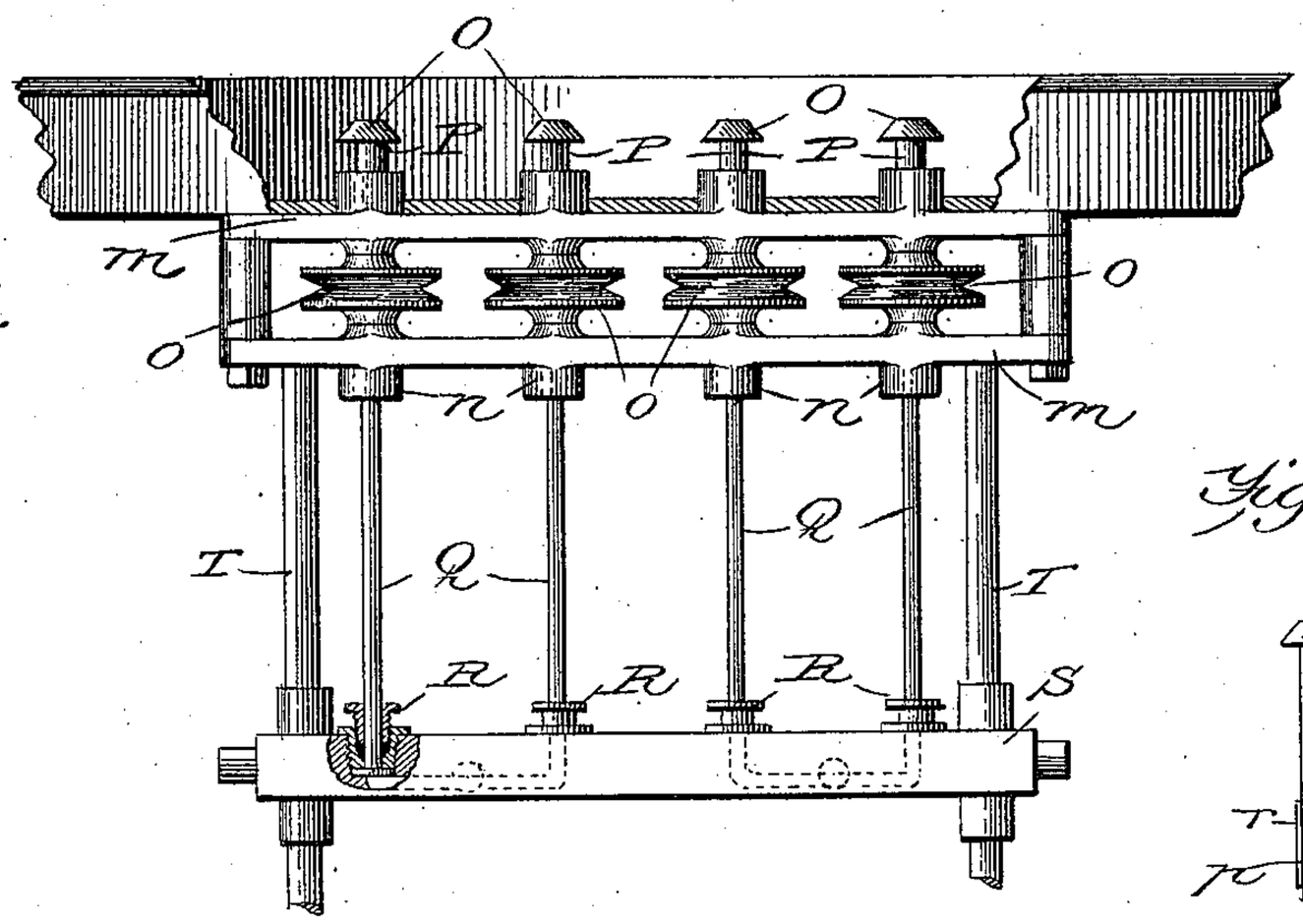


Fig. 8.

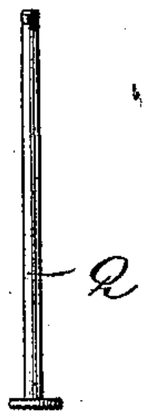


Fig. 7.

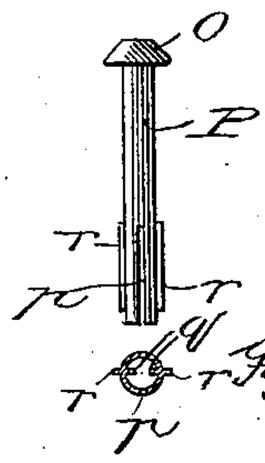


Fig. 7a

Fig. 6.

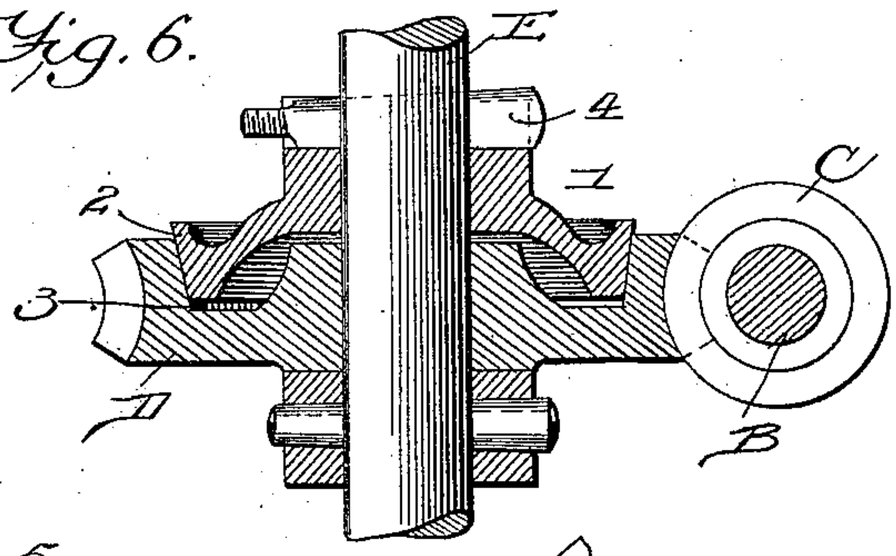
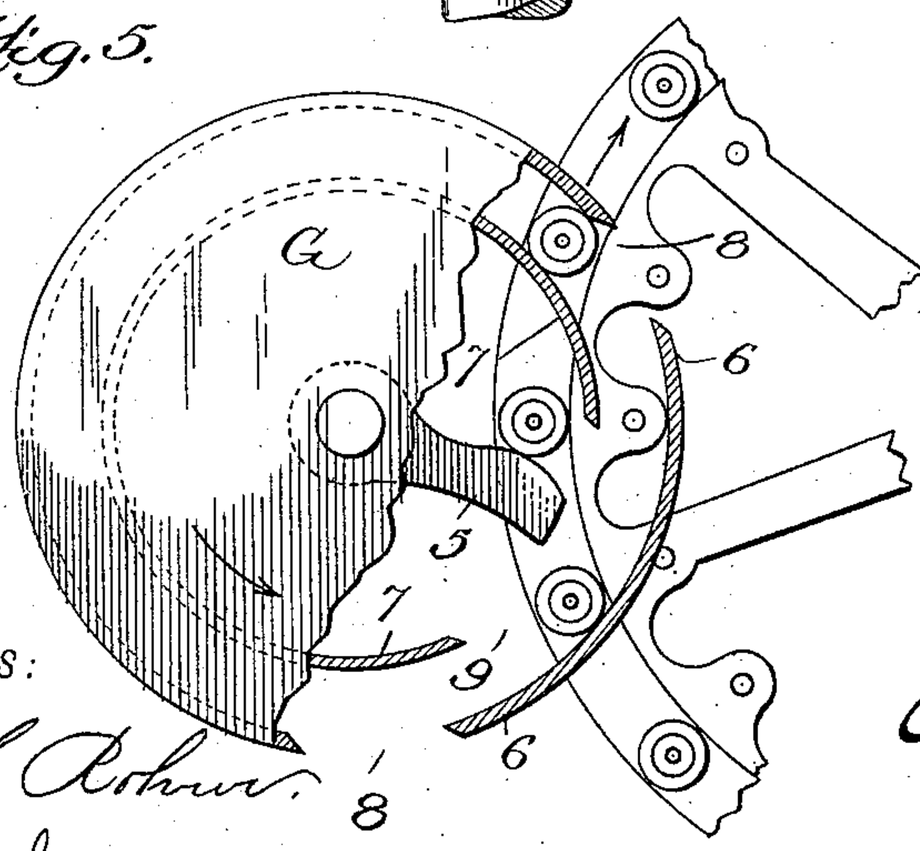


Fig. 5.



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UNITED STATES PATENT OFFICE.

CHARLES E. TUNELIUS, OF CHICAGO, ILLINOIS.

BOTTLE-WASHER.

SPECIFICATION forming part of Letters Patent No. 575,046, dated January 12, 1897.

Application filed July 28, 1896. Serial No. 600,765. (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 an Improvement in Bottle-Washing Machines, of which the following is a specification.

My invention relates to devices for washing bottles or similar vessels, and has among its objects the production of a machine capable of efficiently cleansing the exterior and interior of such bottles or vessels in an automatic manner; a machine adapted without special adjustment to receive and operate upon bottles of different size, also to inject a stream of clean water, either hot or cold, into the bottles with each repeated brushing operation; to continuously handle the bottles in an inverted position for purposes of draining, and finally to deliver them upon a suitable incline or conveyer in a thoroughly-cleansed condition.

With these objects in view the machine contemplates and includes the use of a suitable frame, a drip-pan mounted thereon, a horizontally-rotating bottle-rack above said pan, a cam of special construction for imparting to the rack an intermittent motion, a double set of exterior and interior brushes, means for revolving all brushes and of periodically elevating one set into the bottles, a drive-shaft for supplying power to movable parts, a frictional safety-clutch mechanism for regulating such supply, and a valve for automatically admitting clean water to the bottles when brushes are inserted and cutting off the supply as they are withdrawn.

The invention will be hereinafter, described and particularly pointed out in the claims following.

In the accompanying drawings, which form part of this specification, and whereon corresponding reference letters and numerals indicate like parts in each view, Figure 1 represents a side elevation of my invention, showing one of the several bottles removed for purposes of clearness. Fig. 2 is a plan view of the invention. Fig. 3 is an enlarged sectional view taken through one of the bottle-holders and hollow brush-spindles. Fig. 4 is a rear elevation of the four interior brush-spindles, together with means for elevating them, supplying water thereto, and revolving said spindles. Fig. 5 is a fragmentary plan view illustrating a section of the bottle-rack wheel and a cam for imparting an intermittent rotary motion thereto. Fig. 6 is also a detached view showing in section a frictional safety-clutch and worm-gear for operating upon the main drive-shaft. Figs. 7, 7^a, and 8 are detail views, in side elevation, of telescoping brush-spindle. Figs. 9 and 9^a represent in side elevation and plan a stationary cam or incline for automatically depressing one member of the bottle-holders to deliver bottles therefrom; and Figs. 10, 10^a, 11, and 11^a are detail views, also in side elevation and plan, of sliding brackets forming part of each bottle-holder.

Reference being had to the drawings and letters thereon, A A' A^2 A^3 represent the frame of the machine, composed, respectively, of supporting-legs, a shallow drip-pan secured thereon, an upwardly-extending bracket or angular arm, and a cross-bar or extension bolted to the latter.

B indicates a main horizontal drive-shaft journaled in suitable bearings upon two of the legs A and provided with a worm C, in mesh with a worm-wheel D, mounted upon a vertical shaft E, which therefore receives a slow rotary motion when the machine is in operation. Vertical shaft E is supported in a step-bearing *a*, secured to two of the legs A, as also in additional bearings *a' a'* in the bracket A^2 above, and has fixed thereon, near its lower end, an incline or grooved cam F, near its upper end a second cam G, of skeleton form, and above the latter a sprocket-wheel H, the several uses and operations of which will later appear. Fixed at one end in the center of cross-bar A^3, and at its other end in the pan A', is a central pivot-post I, upon which is mounted a rotatable bottle-carrying device or rack consisting principally of the wheel J, affording a main support for balance of parts, and provided with a series of equidistant individual bottle-holders or sockets *b* of substantially cup-shape inverted. Each individual holder *b* is provided with an upwardly-extending hollow shank *c*, journaled in the rack-wheel J and there retained by a washer or stud *d*, constituting also a surface roller to coact with cam G, as will appear, and in addition to this the holders are pro-

vided with a peripheral flange d' for periodically engaging a friction-wheel, by which they are revolved. Suspended from the same support, at points adjacent to the holders b aforesaid, are a corresponding number of square shafts e, bound together at their lower ends by an annulus which affords them rigidity. Upon each of these shafts is mounted a sliding frame f, having vertically-movable square bearings g g^2, and at its lower end a hollow conical socket h to receive the neck of an inverted bottle. On the inside of lowermost bearings g^2 is a projecting pintle g', assisting to depress frames f periodically when engaged by a suitable fixed cam, and interposed between the frames f and a fixed support i on the square shafts e is an expansion-spring j, having a sufficient range of tension to firmly retain bottles of different size between the holder b and socket h until positively released.

At its extremity cross-arm A^3 is of hammer-head or T form and has therein journaled the upper ends of three corresponding spindles K K K, the opposite ends whereof are journaled in bearings within pan A'. Each of these spindles K is surrounded by a cylindrical brush k and driven at constant speed by means of a link belt L, running over sprocket-wheel H and the smaller sprockets M M M, which latter are fixed upon the brush-spindles K K K, as shown by Fig. 2, said belt or chain being engaged at a suitable point by an idler l, fixed upon the central pivot-post I. In line with peripheral flanges d', and fixed upon each of the spindles K, which they surround, are grooved friction disks or wheels N, adapted to be engaged successively by flanges d' on each of the bottle-holders b as they pass, thus imparting to the latter a rotary motion the reverse of that maintained by the brushes k.

In addition to the exterior brushes described a series of four (more or less) internal brushes or brushes adapted to be inserted within the bottles are provided. To accommodate these, the bottom of pan A' is equipped with a spindle-frame, the parallel members m m of which are provided with a series of hangers or journal-bearings n, in which are located the hollow hubs N' of the spindle-pulleys O. Within each of the hubs N' is located a hollow telescoping sleeve P, turned to fit the hub loosely and bored to receive a hollow reciprocating brush-spindle Q, while its upper projecting end o bears a conical head and its lower end is slotted, as at p, for the purpose of maintaining proper tension upon the spindle Q, surrounded thereby. The sleeve P is also provided with internal and external keys or feathers q r, the former fitting in keyways of brush-spindle Q and the latter in similar ways of the spindle-pulley O, thereby transmitting the rotary motion of pulleys O to sleeves P and spindles Q. Upon their upper ends the four hollow spindles Q are equipped with suitable brushes s, and at their lower ends are connected by packing-nuts R to a hollow cross-head S, adapted to reciprocate upon the guide-rods T, and for the double purpose of projecting the brushes s from sleeve P and simultaneously supplying them with fresh water through their hollow spindles. Pulleys O and dependent parts are driven by belts t, running over driving-pulleys U, fixed upon the main shaft B, and these belts are kept under tension by the aid of idlers u, each journaled upon an angular support V, pivoted to legs A and arranged to be depressed or raised by action of a tension-screw v, mounted upon same legs, bearing upon each of said angular supports.

As a means of periodically elevating cross-head S with its brush-spindles Q and simultaneously admitting to said head and spindles a supply of water, a bifurcated lever W is journaled upon the legs A, with its single end engaging the groove in cam F of main shaft B and its outer ends connected by side links w w to the vertically-movable cross-head S. This lever as it rises and falls is arranged and adapted to automatically control the main water-supply valve X by means of a valve-rod x in adjustable connection with the lever. Interposed between and communicating with said valve X and the hollow cross-head S is a flexible hose or tubing Y, as shown by Fig. 1, while from same supply-valve a second pipe Z is passed beneath pan A', thence across one side of the machine, terminating in a curved horizontal overhead member y, having suitable openings z, situated so as to convey water through the hollow centers of bottle-holders b, and through radial openings b' therein to the outside of bottles being operated upon.

Upon vertical shaft E, above the worm-wheel D, is keyed a safety-clutch 1, the flanged periphery 2 whereof is in frictional contact with the outer wall of annular depression 3, formed in the upper surface of the wheel D. Clutch 1 is secured to its shaft by means of a wedge key-bolt 4, adapted to be drawn partly through its seat or keyway by a nut, (not shown,) and to be thus forced into greater or less frictional contact with the wheel D.

Near the upper end of shaft E is firmly keyed the intermittent cam G, consisting of a disk or body having a radial arm 5, also outer and inner concentric rings or ridges 6 7, respectively, on its under surface, the former being mutilated or broken, as at 8 8, and the latter, as at 9, to allow passage of the rollers d on the wheel J, as will appear in connection with the description of operation.

Upon the central pivot-post I is mounted a stationary cam 10, (shown detached in Fig. 9,) having angular inclines or shoes 11 11 on its under surface so arranged and located as to be engaged by the upper surface of the projecting pintles g' on square bearings g of lower bottle-sockets h, causing the latter to descend automatically and to release the bottles therefrom after the washing operation has been completed. As a means of assisting

the automatic release and successive delivery of bottles from the apparatus ejecting-springs 12 are secured in the under side of rack-wheel J, adjacent to each bottle-holder *b*, with their free ends adapted to exert pressure upon their respective bottles.

As a means of draining waste water, which accumulates in pan A′, the latter is provided with a drip-pipe 13, leading to any suitable point of discharge.

This being substantially a description of my invention, its use and operation are as follows: Bottle-sockets *h* are by an operator depressed in succession against the action of their retaining-springs *j*, and bottles or similar vessels to be cleansed are inserted between each rotatable holder *b* and its lower socket *h*. Power now being applied to the main drive-shaft B is transmitted through its worm C to worm-wheel D, mounted upon the vertical shaft E and in frictional engagement with the safety-clutch 1, adjustably keyed to the same shaft. Cam G then going into action rotates continuously in the direction indicated by arrow in Fig. 5, its radial arm 5 engaging the rollers *d* upon the surface of bottle-rack wheel J to advance them successively with each rotation of the cam, imparting to the bottle-rack an intermittent movement and also locking same against accidental movement upon its axis during further rotation of the cam, as follows: One roller *d* having been advanced by arm 5 is permitted to escape from the confines of ring 7 through gate 9 therein, whereupon it is stopped by the wall of outer ring 6. Simultaneously with this action the succeeding roller *d* is caused to enter the confines of ring 7 through same gate 9, but on the opposite or trailing side of arm 5, in which position the particular rollers are retained on either side of the inner ring 7 until cam G completes one revolution upon its axis. The operation of arm 5 is then repeated with relation to the next succeeding roller *d*, the one last operated upon finding an exit through the foremost or advance gate 8 of outer ring 6 at the same instant a third roller *d* enters the second of said gates 8, and this operation is continued.

Thus the contents of the bottle-rack are successively and periodically presented to each of the brushes *k k k*, rapidly revolving under action of the link belt L, working over and receiving power from sprocket H on the shaft E, each bottle-holder *b* when presented to said brushes engaging with its peripheral flange *d′* the friction-wheels N, by which it is revolved, and receiving a supply of water from pipe Z above, having outlets arranged to play upon said bottles through hollow shanks *c* and radial openings *b′*, provided therein. After this external washing and brushing operation a continued rotation of the bottle-rack J brings pintles *g′* on the lower sockets *h* of the bottle-holders into contact with incline shoe 11 of stationary cam 10, by which said socket is depressed, the bottle being released and thrown to one side by action of its ejecting-spring 12, leaving the holder in condition to receive another bottle as the operation proceeds.

At the instant the external brushes go into action upon the bottles the four internal brushes do likewise. The distal end of lever W is elevated through the agency of cam F to reciprocate cross-head S upon its guide-rods T and project the brush-spindles Q with their brushes through conical bottle-sockets *h*, which are at the time in alinement, and through them into the bottles held thereby. During this movement controlling-valve X is opened by engagement of the lever W as it rises, and water from the main source of supply is projected through flexible tube Y, cross-head S, and hollow brush-spindles Q to their brushes within the bottles being washed. As the spindles Q are projected through their hollow pulley-hubs N′ the brush-carrying telescoping sleeves P advance with them until arrested by the under side of bottle-sockets *h*, thus insuring proper admission of the brushes to the bottles. Pulleys U on main shaft B revolving in the meantime rapidly rotate the four spindle-pulleys O through connecting-belts *t*, and from the latter the same motion is communicated to the internal brushes through pulley-hubs N′, sleeves P, and the interposed sliding keys or feathers *q r*.

This being a description of my invention in its preferred form as embodied in the accompanying illustrations, it will be noted that many changes of construction and arrangement of parts may be made and substituted for those herein shown and described without in the least departing from the spirit of my invention as set forth in the following claims.

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

1. In a bottle-washing machine the combination with a supporting-frame, of a rotatable bottle-rack bearing a series of driving-studs, and a constant-speed cam comprising a radial arm and mutilated concentric rings for engaging said studs successively to communicate thereto an intermittent motion, substantially as described.

2. In a bottle-washing machine the combination with a supporting-frame, of a rotatable bottle-rack bearing a series of driving-studs, suitable cleaning-brushes, and a constant-speed cam comprising a radial arm and mutilated concentric rings for engaging said studs successively to advance and lock them, substantially as described.

3. In a bottle-washing machine the combination with a supporting-frame, of suitable cleaning-brushes and a bottle-rack, of a studded drive-wheel forming part of said rack, upper and lower bottle-sockets mounted upon the drive-wheel, and a constant-speed cam

comprising a radial arm and mutilated concentric rings for imparting to said rack an intermittent motion, substantially as described.

4. In a bottle-washing machine the combination with a supporting-frame, of suitable cleaning-brushes and a bottle-rack, of a stud-bearing drive-wheel forming part of the rack, a revoluble bottle-socket journaled in said drive-wheel, a spring-retained lower bottle-socket, a depending shaft upon which the latter is vertically adjustable, and a cam comprising a radial arm and mutilated concentric rings for imparting to the rack an intermittent motion, substantially as described.

5. In a bottle-washing machine the combination with a supporting-frame, of a bottle-rack having rotatable and vertically-adjustable hollow bottle-sockets, means for connecting such sockets in pairs, pipes for periodically injecting water through both sockets, a main supply-valve, and means for automatically controlling the valve, substantially as described.

6. In a bottle-washing machine the combination with a supporting-frame, of a bottle-rack having rotatable and vertically-adjustable hollow bottle-sockets, of means for connecting such sockets in pairs, a peripheral flange upon the rotatable sockets, a grooved friction-wheel running at constant speed for periodically engaging said flange, pipes for periodically injecting water through both sockets, a main supply-valve, and a reciprocating lever for automatically controlling the valve, substantially as described.

7. In a bottle-washing machine the combination with a supporting-frame, of a bottle-rack bearing hollow bottle-sockets having radial water-openings, a corresponding series of hollow adjustable bottle-sockets, means for connecting such sockets in pairs, pipes for periodically delivering water through both sockets, a main supply-valve, and means for automatically controlling the valve, substantially as described.

8. 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, a corresponding series of telescoping sleeves upon the spindles, positively-driven spindle-pulleys for revolving said sleeves and spindles, a water-supply pipe communicating with the cross-head and spindles, a main supply-valve, and a lever for periodically opening the valve and elevating the cross-head, substantially as described.

9. In a bottle-washing machine the combination with a supporting-frame and drip-pan, of a drive-shaft, a vertical power-shaft driven thereby, an interposed safety-clutch, a rotatable bottle-rack, a series of revolving exterior brushes, a second series of revolving internal brushes, a reciprocating sleeve with split end surrounding each brush-spindle, a pulley driven from the main shaft for revolving each spindle, a hollow reciprocating cross-head supporting said spindles, a water-supply pipe in communication with the cross-head and spindles, a second pipe for delivering water upon the exterior of bottles, a main controlling-valve, a lever for opening said valve and simultaneously elevating the brush-spindles, and cams upon the driven shaft for rocking the lever aforesaid and imparting to the bottle-rack an intermittent motion, substantially as described.

In testimony whereof I affix my signature, in presence of two witnesses, this 27th day of June, 1896.

CHAS. E. TUNELIUS.

Witnesses:
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A. M. HANSON.