Jan. 24, 1939. C. HAMANN 2,144,759

BOTTLE WASHER

Filed April 13, 1933 12 Sheets-Sheet 1

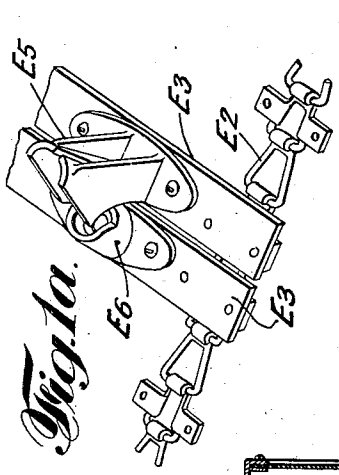


Fig. 1a.

Fig. 1.

INVENTOR
Charles Hamann
BY
E. M. Bentley
ATTORNEY

Jan. 24, 1939. C. HAMANN 2,144,759

BOTTLE WASHER

Filed April 13, 1933 12 Sheets-Sheet 2

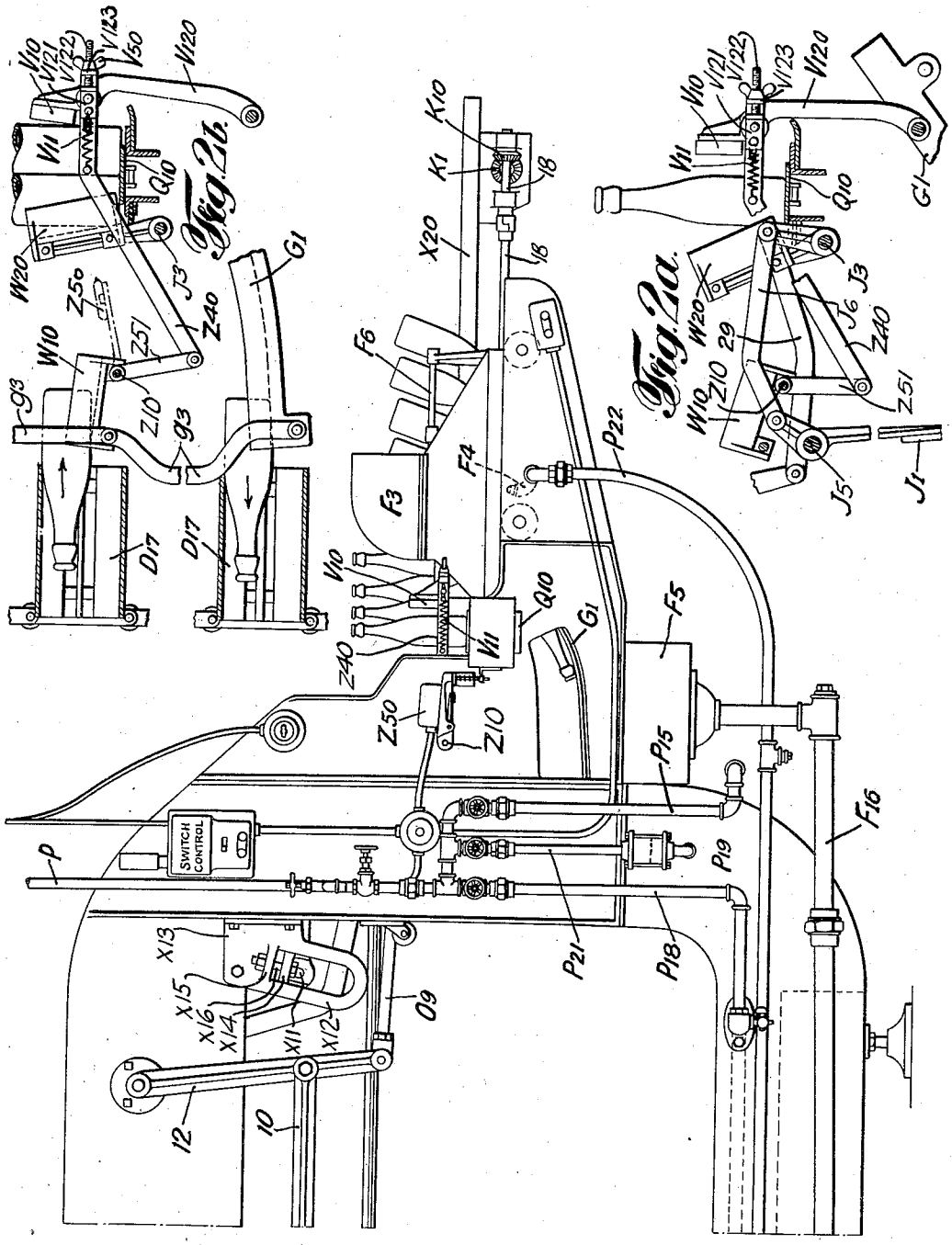


Fig. 2.

Fig. 2a.

Fig. 2b.

INVENTOR
Charles Hamann
BY
E. M. Bentley
ATTORNEY

Jan. 24, 1939. C. HAMANN 2,144,759

BOTTLE WASHER

Filed April 13, 1933 12 Sheets-Sheet 3

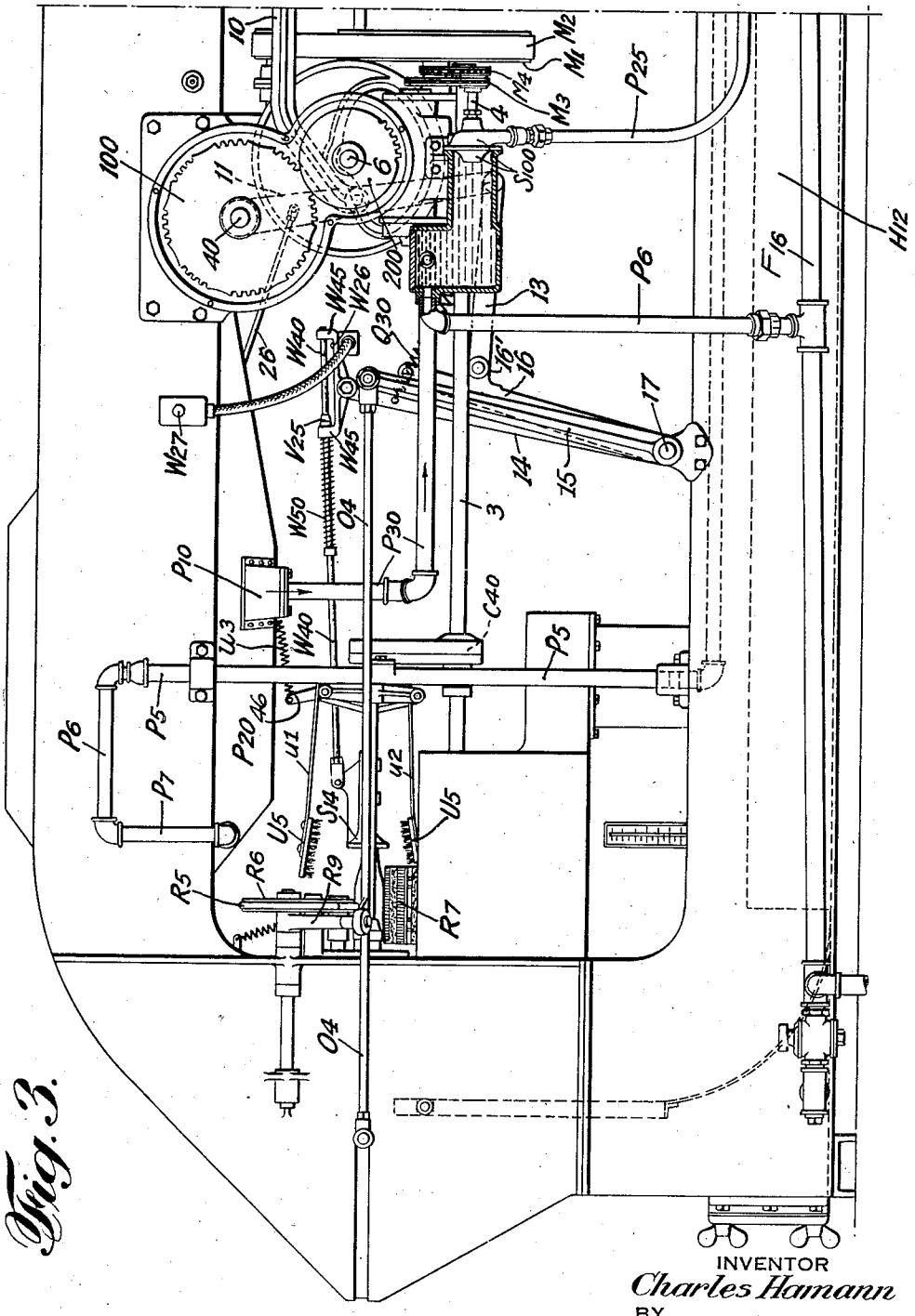


Fig. 3.

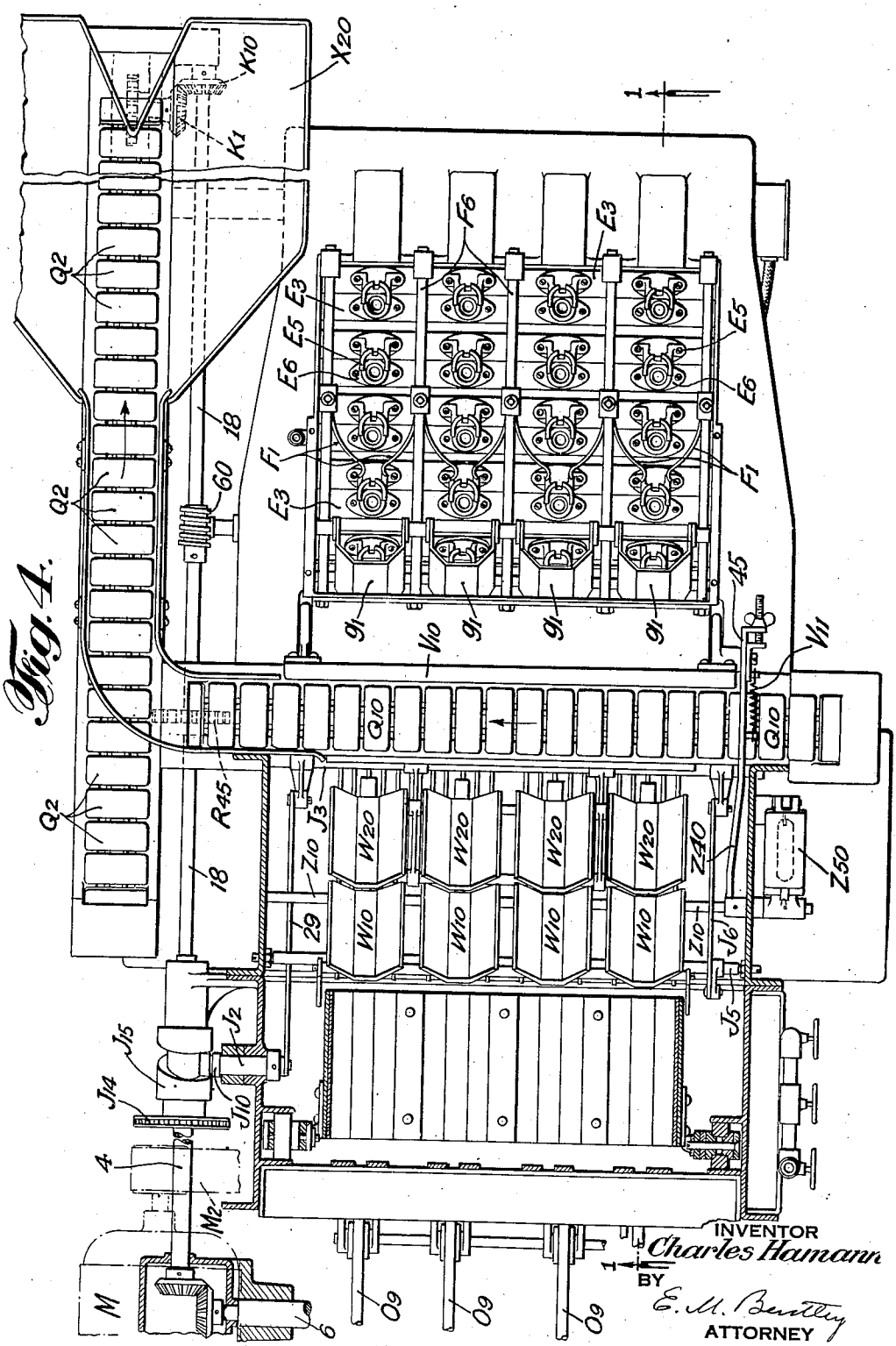
INVENTOR
Charles Hamann
BY
E. M. Bentley
ATTORNEY

Jan. 24, 1939. C. HAMANN 2,144,759

BOTTLE WASHER

Filed April 13, 1933 12 Sheets-Sheet 4

Fig. 4.



Jan. 24, 1939. C. HAMANN 2,144,759

BOTTLE WASHER

Filed April 13, 1933 12 Sheets-Sheet 5

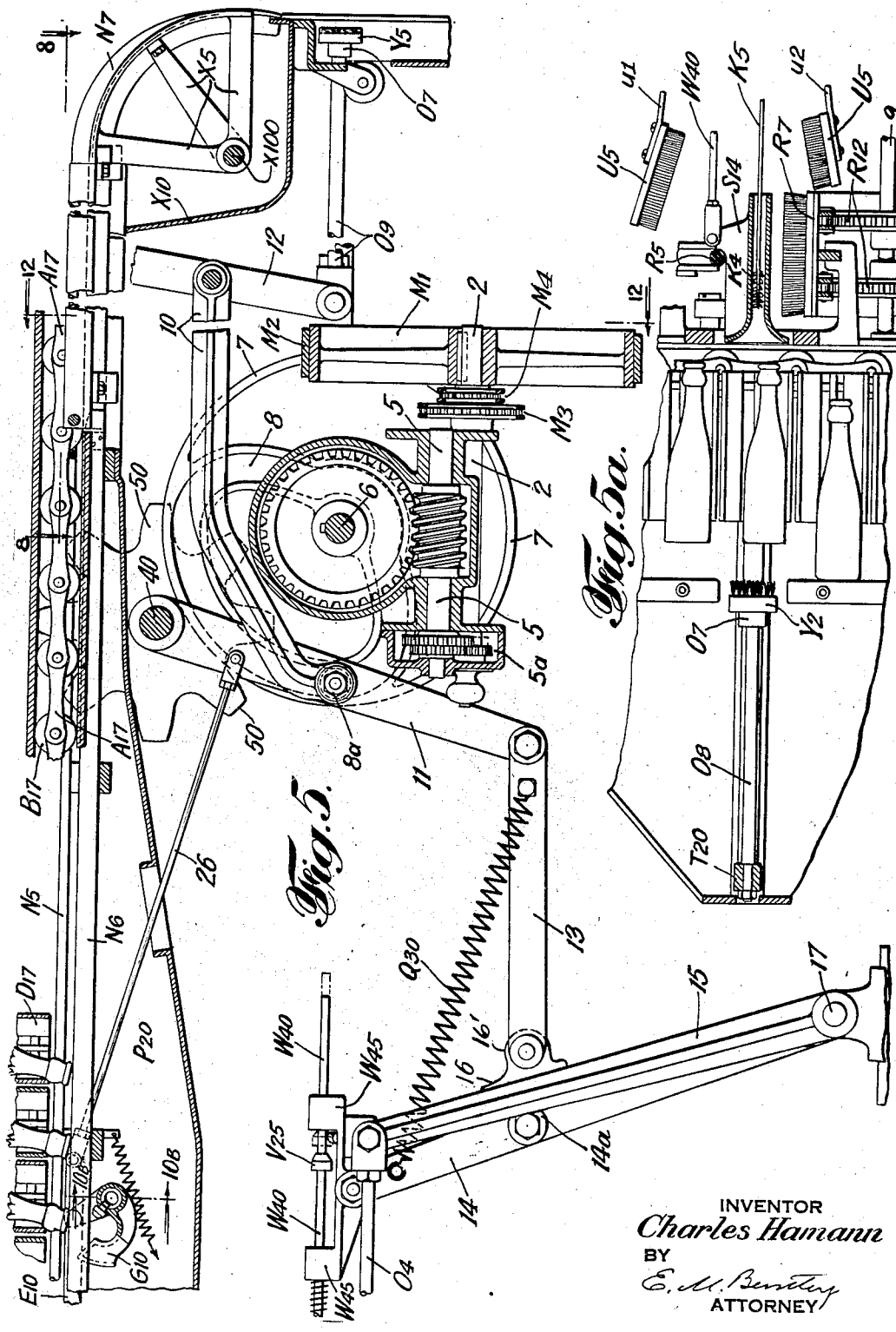


Fig. 5.

Fig. 5a.

INVENTOR
Charles Hamann
BY
E. M. Bentley
ATTORNEY

Jan. 24, 1939. C. HAMANN 2,144,759

BOTTLE WASHER

Filed April 13, 1933 12 Sheets-Sheet 6

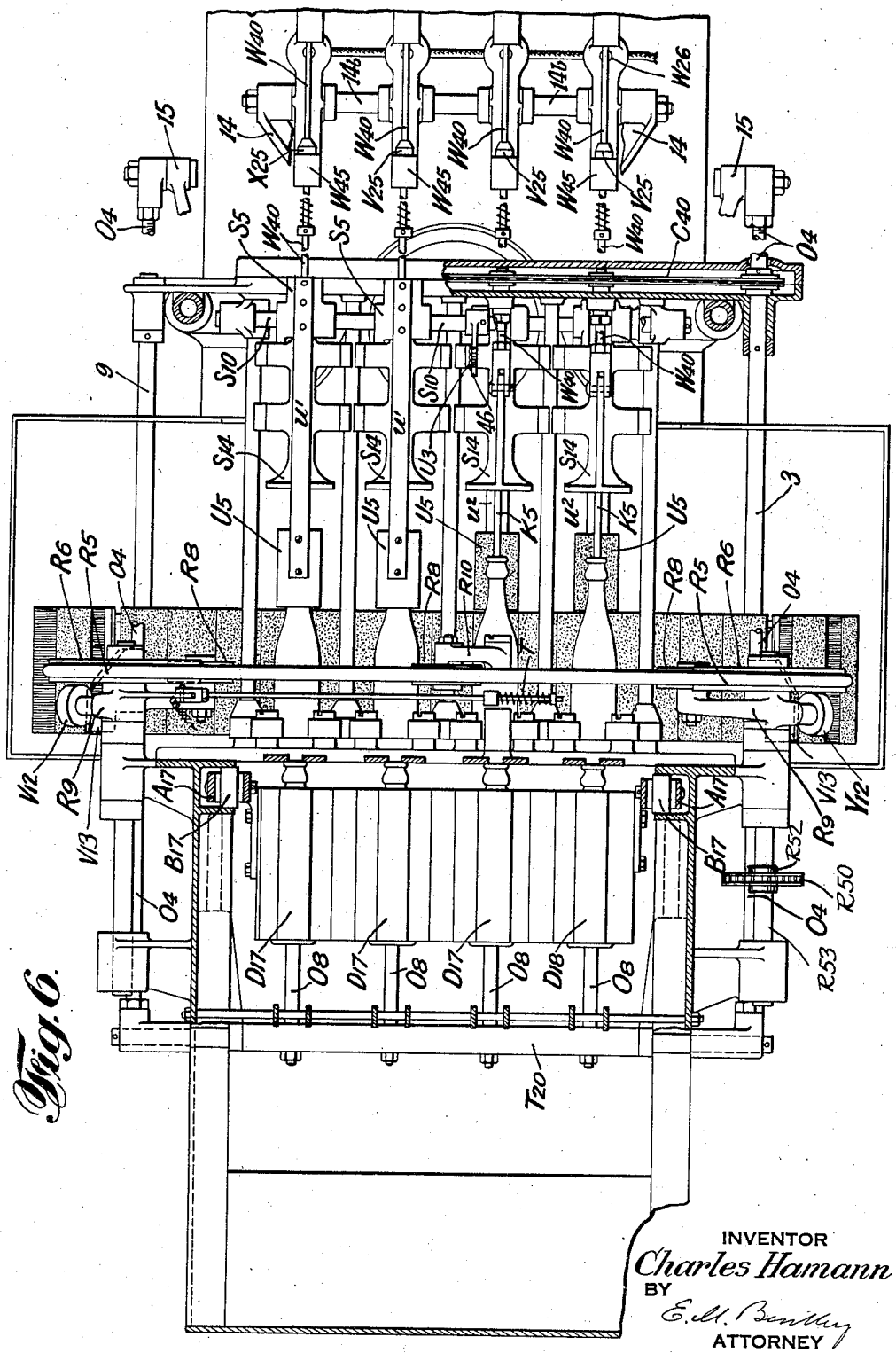


Fig. 6.

INVENTOR
Charles Hamann
BY
E. M. Bentley
ATTORNEY

Jan. 24, 1939. C. HAMANN 2,144,759

BOTTLE WASHER

Filed April 13, 1933 12 Sheets-Sheet 7

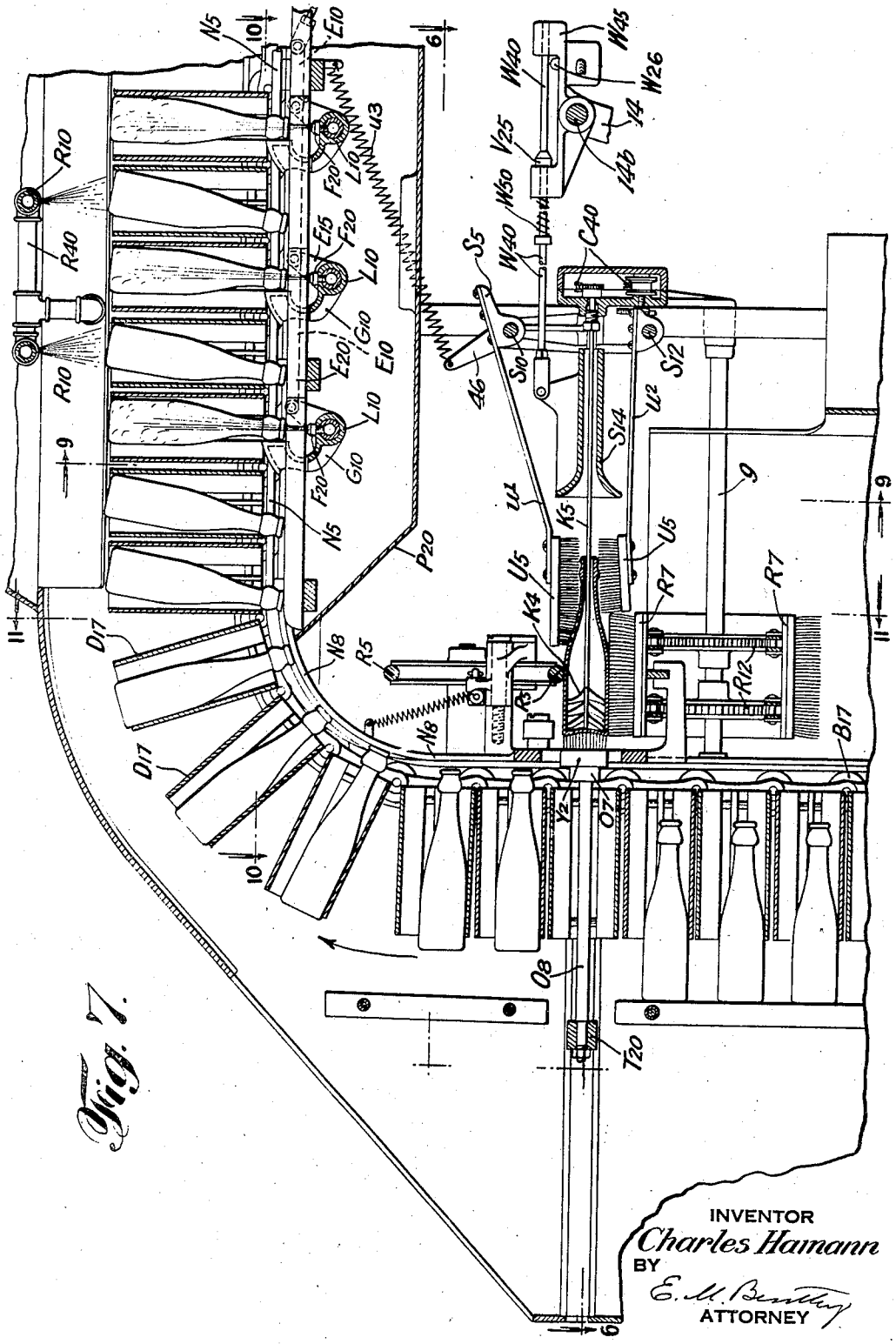


Fig. 7.

INVENTOR
Charles Hamann
BY
E. M. Bentley
ATTORNEY

Jan. 24, 1939. C. HAMANN 2,144,759

BOTTLE WASHER

Filed April 13, 1933 12 Sheets-Sheet 8

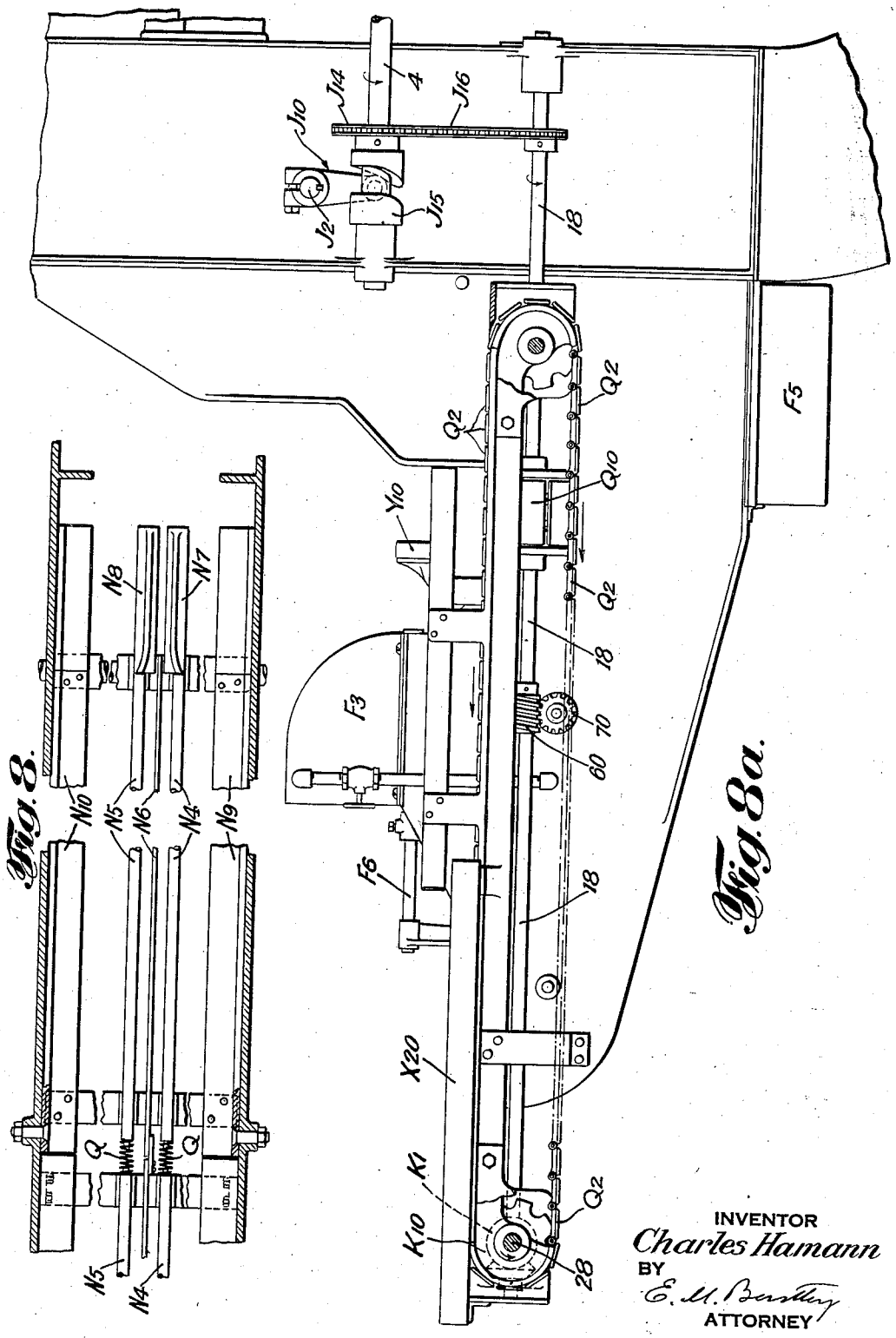


Fig. 8.

Fig. 8a.

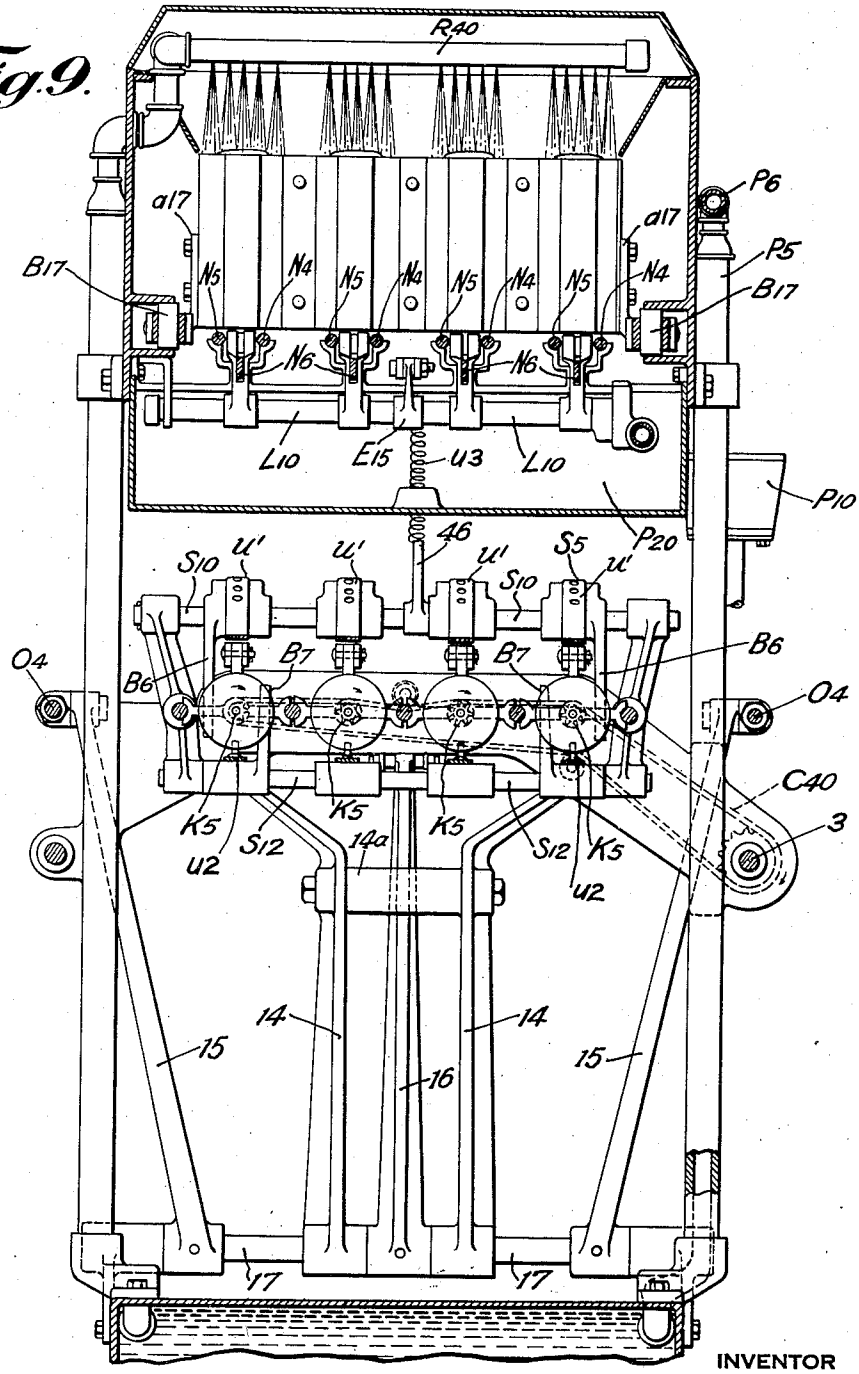
INVENTOR
Charles Hamann
BY
E. M. Bentley
ATTORNEY

Jan. 24, 1939. C. HAMANN 2,144,759

BOTTLE WASHER

Filed April 13, 1933 12 Sheets-Sheet 9

Fig. 9.



INVENTOR
Charles Hamann
BY
E. M. Bentley
ATTORNEY

Jan. 24, 1939. C. HAMANN 2,144,759

BOTTLE WASHER

Filed April 13, 1933 12 Sheets-Sheet 10

Fig. 10.

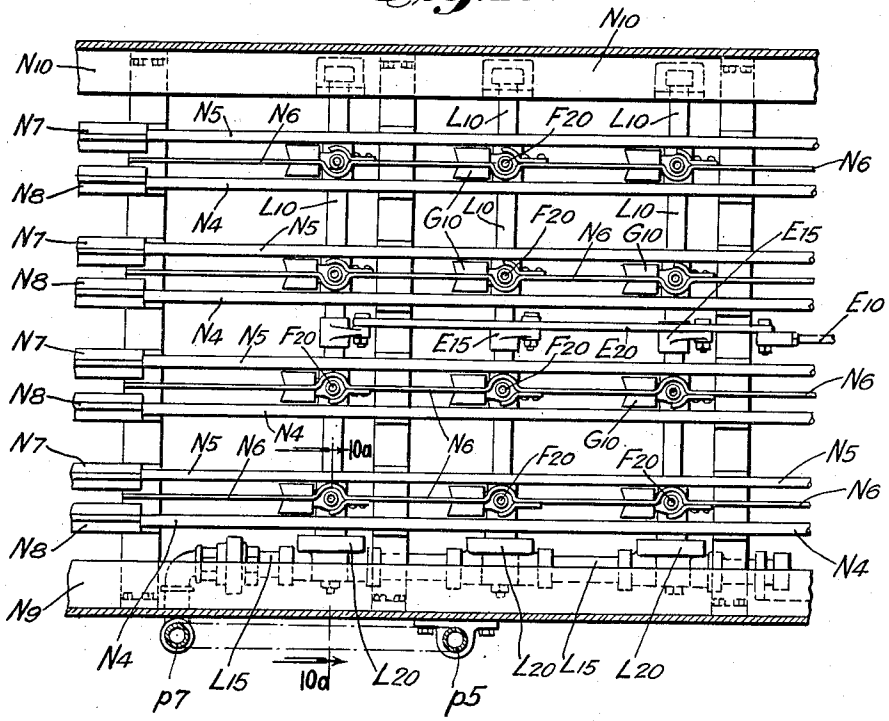


Fig. 10a.

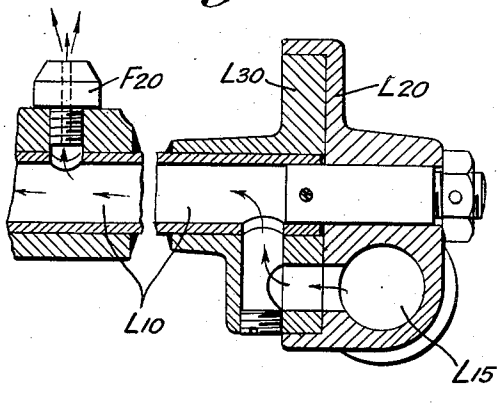
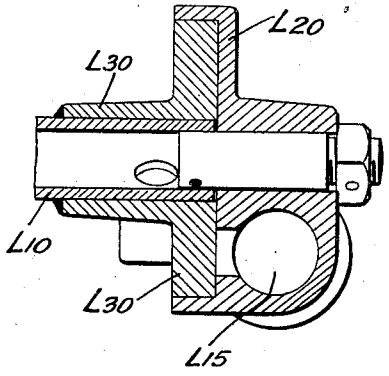


Fig. 10b.



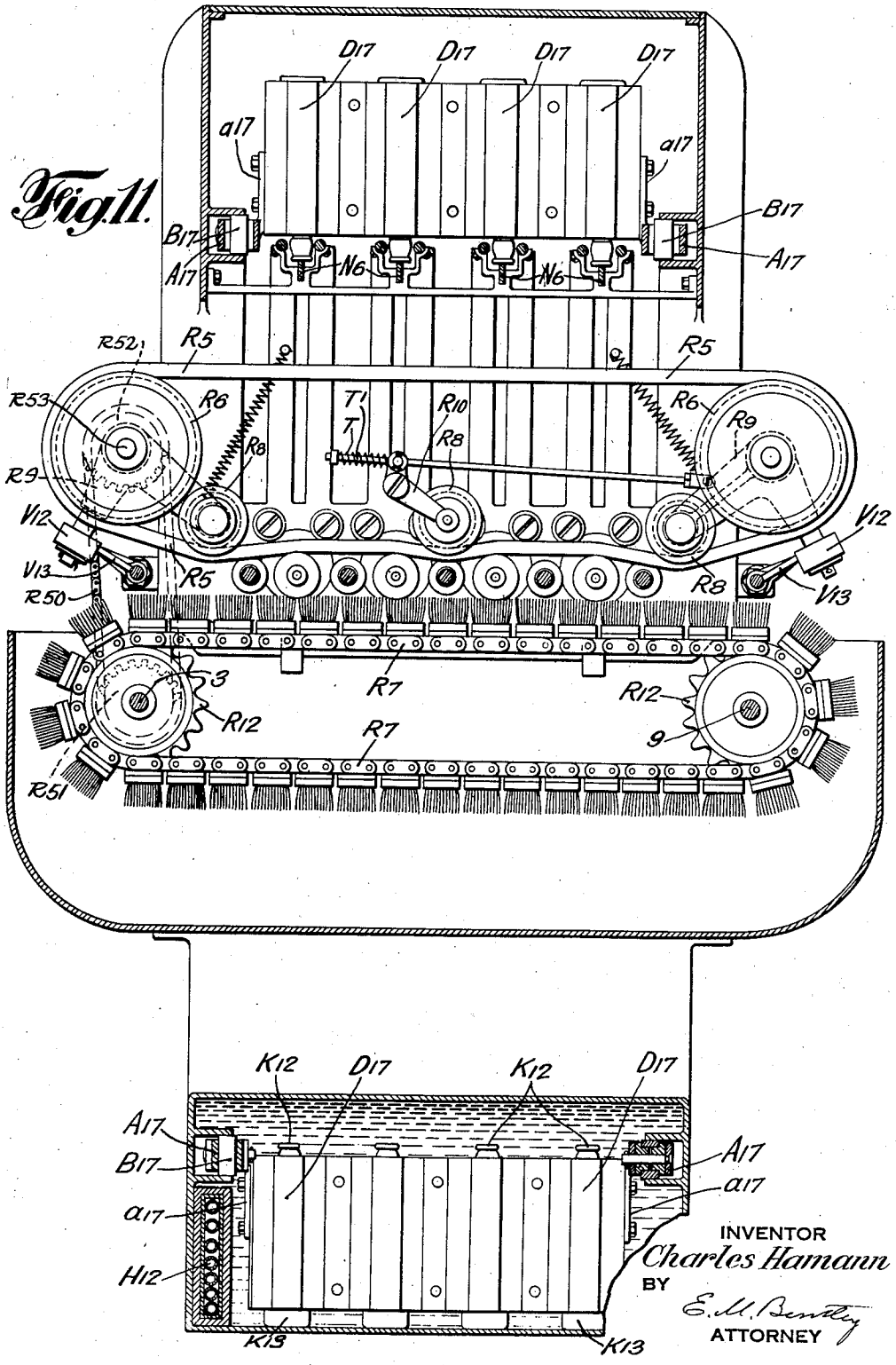
INVENTOR
Charles Hamann
BY
E. M. Bentley
ATTORNEY

Jan. 24, 1939. C. HAMANN 2,144,759

BOTTLE WASHER

Filed April 13, 1933 12 Sheets-Sheet 11

Fig. 11.



INVENTOR
Charles Hamann
BY
E. M. Bentley
ATTORNEY

Jan. 24, 1939. C. HAMANN 2,144,759

BOTTLE WASHER

Filed April 13, 1933 12 Sheets-Sheet 12

Fig. 12.

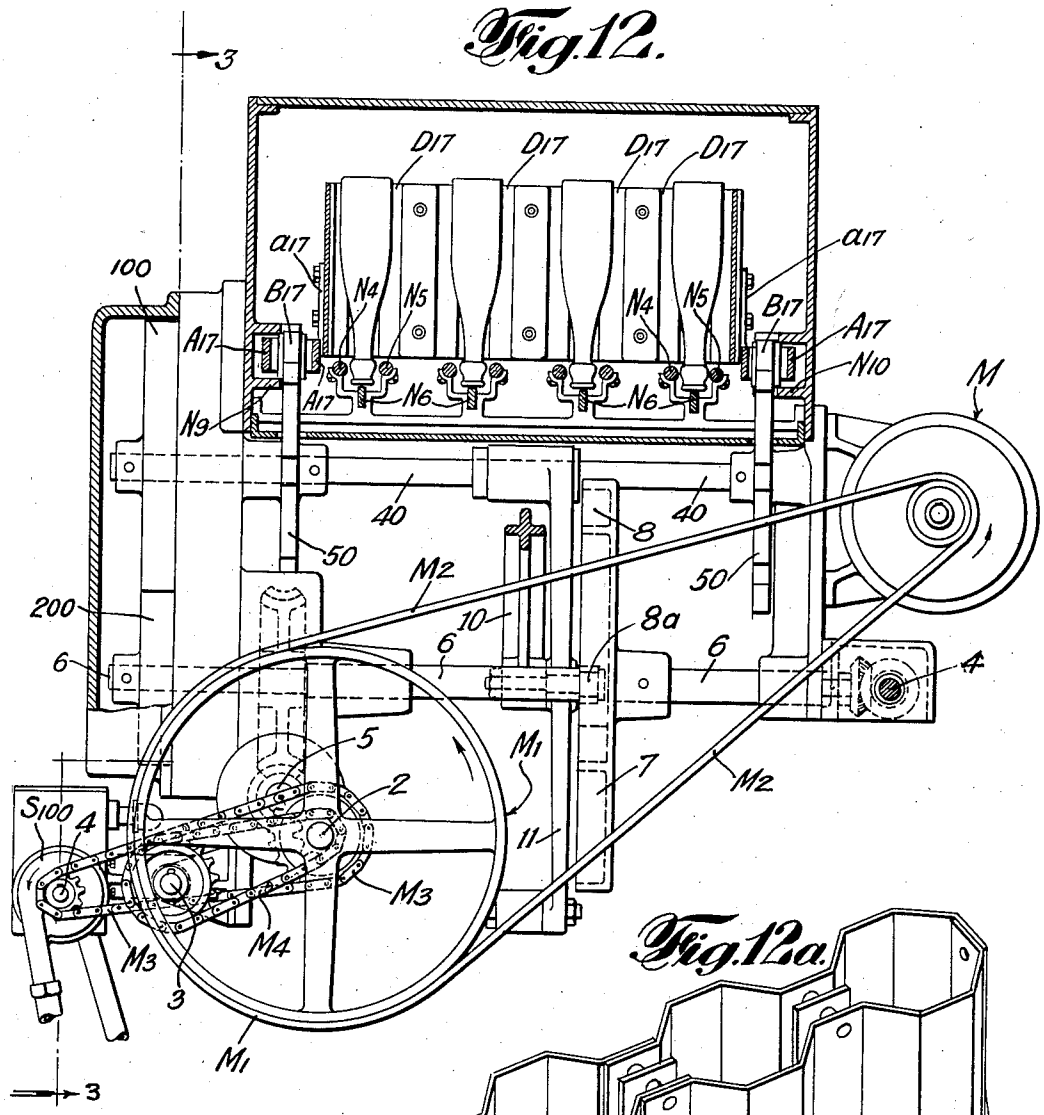
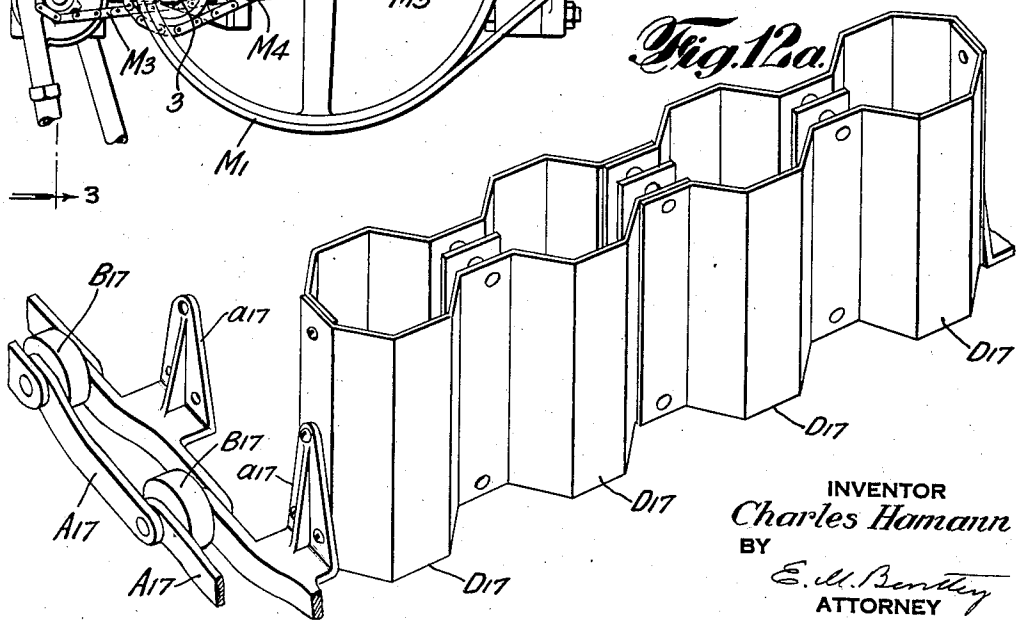


Fig. 12a.



INVENTOR
Charles Hamann
BY
E. M. Bentley
ATTORNEY

Patented Jan. 24, 1939 2,144,759

UNITED STATES PATENT OFFICE

2,144,759

BOTTLE WASHER

Charles Hamann, Port Chester, N. J., assignor to Henry Scarborough, Milwaukee, Wis.

Application April 13, 1933, Serial No. 666,005

2 Claims. (Cl. 15—61)

For a detailed description of the present form of my invention, reference may be had to the following specification and to the accompanying drawings forming a part thereof.

My invention consists in a bottle washer organized to perform automatically all of the operations required in cleansing bottles.

These operations include a preliminary rinsing, a soaking in a tank containing a caustic solution, an emergence from the tank with an amount of said solution therein, a scrubbing both internal and external, a draining out of any solution remaining therein, and a final rinsing with fresh clean water. Means are provided for keeping the bottles moving through the several operations outlined above, beginning at the start, when they are first applied to the entrance conveyor and continued up to their final delivery on the reception platform. This reception platform is located at the same end of the machine at which the bottles enter. Together with the conveyance just mentioned there are, in addition, auxiliary means for transferring the bottles from one conveyor to another at succeeding stages, including the temporary ejection from the conveyor for washing, and their final ejection and setting up when the operations are finished.

I will first describe the operations and will then describe the mechanism that performs them.

Referring to the drawings:

Fig. 1 is a vertical section taken longitudinally of the machine along the line 1—1 of Fig. 4 and shows the entry of the bottles into the tank;

Fig. 1[a] is a perspective view showing a detail of the entry conveyor;

Fig. 2 is a side elevation and shows the front end of the tank and bottles in starting and outcoming positions, the arcuate cover of tank P^{13} not being shown;

Figs. 2[a] and 2[b] are longitudinal sections and show the delivery and setting up of the bottles;

Fig. 3 is a longitudinal section taken on line 3—3 of Fig. 12 showing the rear end of the machine and is a continuation of Fig. 2 which shows the front end of the machine;

Fig. 4 is a plan of the entering and delivering end of the machine;

Fig. 5 is a vertical longitudinal section near the front of the machine;

Fig. 5[a] is a vertical section showing a detail of the scrubbing mechanism;

Fig. 6 is a horizontal section taken along line 6—6 of Fig. 7 and shows the scrubbing mechanism in plan;

Fig. 7 shows a vertical section of the rear end of the machine;

Fig. 8 is a horizontal section and shows the bottle track at the top of the machine for draining them;

Fig. 8[a] is a side elevation of the outside auxiliary conveyor;

Fig. 9 is a transverse section taken along line 9—9 of Fig. 7 near the middle of the machine looking to the front;

Fig. 10 is a horizontal section taken along line 10—10 of Fig. 7 looking down on the drainage track;

Figs. 10[a] and 10[b] are sectional views taken along the lines 10[a]—10[a] of Fig. 10 and 10[b]—10[b] of Fig. 5, respectively, and show respectively the open and closed positions of the control valve for the rinsers;

Fig. 11 is a transverse section taken along the line 11—11 of Fig. 7 looking towards and showing the scrubbing brushes;

Fig. 12 is a transverse section taken along the line 12—12 of Fig. 5 showing the driving mechanism;

Fig. 12[a] shows the carriers or buckets of the main conveyor.

The machine in general comprises a rectangular casing of sheet metal preferably left open at the center. This casing, with attachments, is about twelve feet long and six feet high and its width, or horizontal depth, is dependent on the number of lines of bottles passing through it in parallel lines. With four such lines the width, or depth, is about four feet. The capacity of the machine may be changed by adding to, or subtracting from, the number of such lines of travelling bottles.

In this casing there is one fundamental conveyor, travelling intermittently in a rectangular circuit, and consisting of two or more parallel chains moving over guides and bridged across at intervals by a series of upstanding sheet metal cells, buckets or carriers. This main conveyor is illustrated in detail in Fig. 12[a], wherein the several chain links are marked A^{17} and the rollers B^{17}. Each link is formed with a bracket a^{17} to which is riveted one end of a set of sheet metal carriers D^{17}. There are in this illustration four such carriers in a set, and the remote end of the set is similarly attached, as shown in Fig. 12, to a corresponding bracket a^{17} in a parallel chain on the opposite side of the machine. The cells, buckets or carriers stand above the chains in Fig. 12, but on the bottom rim of the machine they will project below the chains, and will project to right or left of the chains on the vertical rims. Just above Fig. 12[a] is Fig. 12, which shows a cross section of the top length of the rectangular casing, and in this Fig. 12 these carriers D^{17} appear in section with a bottle in each. These carriers D^{17} are open at each end for admitting or removing the bottles and are somewhat larger in cross section than the bottles inside of them. That is to receive different sizes of bottles and to avoid a tight fit.

In addition to the main conveyor aforesaid,

there are various short auxiliary conveyors, similar in principle, that lead to or from the main one.

Referring to Fig. 1 (Sheet 1) the start of the operation is there shown. At the right of the figure is an auxiliary conveyor, which we may designate as the "entry-conveyor", for the bottles to be washed are first applied to it. Its details are shown in the small Fig. 1^a on the same sheet. A top view of the entry conveyor and the bottle holders for the bottles applied to this conveyor appears in Fig. 4, Sheet 4. It comprises two parallel chains E^2, of which only one is shown in Fig. 1^a, the links thereof being connected across at intervals by bridge plates E^3 on which are the bottle holders E^5 and E^6. The head of the bottle is dropped in the socket-shaped part E^6 of the holder, while the body of the bottle lies against the bracket-like part E^5. Thus the bottle stands bottom-up in the holder at a slight angle (see Fig. 2, Sheet 2) when in place on the entry-conveyor. The upper run or length of this entry-conveyor moves to the left in Fig. 1 advancing the bottles toward the machine. This entry-conveyor is located on the right and in line with the main conveyor, see Fig. 4. The receiving table X^{20}, at which the washed bottles finally arrive, is located at the same end of the machine, back of the said entry-conveyor and to the right thereof, looking toward the machine in Figs. 1 and 4.

As the upstanding bottles move to the left, being guided by the rods F^6 extending along their sides, as shown in Figs. 1, 2 and 4, they enter between the prongs of a forked guide F^1 (see Figs. 1 and 4) and are thereby steadied as they, one by one, reach the position of the last holder on the top run of the conveyor chain E^2. At this position they receive the preliminary rinsing jets from the nozzle F^4 below them and from the nozzle F^2 above the bottle, in the spraying hood F^3. The water from nozzle F^2 washes the outside and that from nozzle F^4 the inside of the bottle. The water from the rinsing collects in the sink F^5 at the bottom of the enclosure and goes out by waste pipe F^{16}, as appears in Fig. 2, Sheet 2. After being rinsed by these jets, the bottle, as it starts to turn over, strikes the weighted and pivoted guide g^1. It is the side of the bottle near its bottom end that collides with this guide g^1 and the bottle is thereby twisted out of the holders E^5, E^6 and drops, neck foremost, into an inclined chute G^1.

The chute G^1 leads the bottle to the main line of carriers D^{17} which are shown, on the left-hand side of Fig. 1, as moving downward on their vertical rims. In Fig. 2^b, Sheet 2, a bottle from chute G^1 is seen entering a cell or bucket D^{17} of the conveyor, while from the next higher cell or bucket D^{17} a bottle which has finished its washing experience, is emerging. The said chute G^1, besides being pivoted at its right hand end by the pivot g^2, as shown in Fig. 1, is also pivotally supported at its left hand end by a long vertical link g^3 which is attached at its upper end to a spring g^4. Intermediate its ends the link g^3 is also used as a support for one end of a trough W^{10} hereinafter to be described. By this means, should there be any failure in the alignment of the mouth of chute G^1 with the mouth of the bucket on D^{17}, into which the chute delivers the bottle, the chute G^1 will yield vertically to meet the mouth of the bucket. In the event of such misalignment being too great, the movement of the chute will be sufficient to cause the stoppage of the machine by pulling down on the link g^3. The inside surface of chute G^1 is ribbed on the bottom, as shown at g^5 in Fig. 1, to provide for the smooth sliding of the bottles therein. As each bottle enters a bucket it is positively pushed from behind by a pad J^1 on the end of a lever arm projecting from a shaft J^5 which is rocked by means of a link J^6 as shown in Fig. 1.

The bottle has now reached the main conveyor and has entered a bucket therein. The conveyor transports it downward into the lower horizontal part of the casing which forms the soaking tank, as may be seen in cross section in Fig. 11. In this tank is the coil of pipes H^{12} which carries hot water for heating the tank. In this Fig. 11 the tops of the bottles, projecting above the buckets D^{17} are shown at K^{12} and their bottoms appear at K^{13}. The buckets, being open at both ends, become filled with the solution from the tank, which solution is of a caustic nature, and travel slowly along horizontally to the opposite end of the tank where the conveyor-chain turns upwardly bringing the bottles to the scrubbing apparatus, as may be seen in Fig. 7, Sheet 7. For the scrubbing operation the main conveyor is stopped for the time required by that operation. It may be said here that the main conveyor is also stopped for the final removal of the bottles therefrom at the end of the operation. The intermittent movement of the main conveyor will be explained later.

In Fig. 7, the bottles, moving upward in the buckets, as shown at the left, are pushed out of the buckets, by pushers O^7, on the end of pusher rods O^8, against the brushes. The body brush R^7 is best shown in the sectional view appearing in Fig. 11, Sheet 11. The sections of the brush are carried by a link-chain which passes over the sprocket wheels R^{12}, R^{12} by one of which it is driven. This brush bears against the under side of the row of four bottles, and the bottles are pressed down against the brush by a flexible belt R^5 which runs parallel to the brushes over the two pulleys R^6 and, on its lower branch, over three smaller pressing rolls R^8, R^8, R^8. The two end rolls R^8 are mounted respectively on two angle levers R^9, R^9, while the central roller R^8 is carried by a smaller angle lever R^{10} and pressed downward by a spring T which is connected by a rod and spring arrangement T^1 to one of the levers R^9. When the angle-lever R^9 presses the small pressing roll R^8 against the belt R^5, the rod T^1 is pulled to the right in the view shown in Fig. 11, thus compressing spring T which bears against a portion of the angle-lever R^{10} whereby to thrust the central pressing roll R^8 downwardly. Each of the said angle levers R^9 carries a roller V^{12} on its outer leg which is positioned adjacent rods O^4. The rod O^4 is provided with a short cam V^{13} and, in the longitudinal movement of the rods O^4, the cams V^{13} thrust the rollers V^{12} outwardly and upwardly to accomplish the tightening of the flexible belt R^5. A plan of the flexible belt R^5, its pulleys R^6 and the rollers R^8 appears in Fig. 6, Sheet 6. It is by means of this flexible belt R^5 that the bottles are kept in rotation while the brushes bear upon them.

The flexible belt R^5 is driven by means of a chain R^{50} extending between and around sprockets R^{51} and R^{52} which are respectively mounted on shaft 3 and on the shaft R^{53} supporting the pulley which carries belt R^5 as shown at the left in Fig. 11.

Referring again to Fig. 7, wherein the body brush R^7 is shown in longitudinal section bearing against a bottle, there is similarly shown the neck brushes U^5 and U^5 which bear against the outside

necks of the bottle. There is a pair of these neck brushes for each bottle, the upper one being carried by a spring arm u^1 and the lower one by a similar spring arm u^2. These arms, u^1 and u^2, are carried respectively by rockshafts S^{10} and S^{12}, as appears in Fig. 9. As shown clearly in Figs. 6, 7 and 9, the collars and extensions therefore S^5 are keyed to the rock shaft S^{10} and provide mounting surfaces for arms u^1. The rock shaft S^{10} is provided with an upstanding arm **46** to which spring U^3 is attached. The spring thus normally retracts the brushes U^5 and the upper end of the spring U^3 is attached to the frame adjacent the part E^{10}, as shown in Fig. 7.

From shaft S^{10} project downward the arms B^6 and from shaft S^{12} project upward the corresponding arms B^7. As the mouth-piece S^{14}, Figs. 5^a, 6 and 7 (hereinafter described) moves backward away from the bottle, it hits the said arms B^6 and B^7 and rocks the shafts S^{10} and S^{12}. That forces the said spring-arm u^1, which carries neck-brush U^5 down and spring-arm u^2, which carries the other neck-brush U^5 up, into contact with the neck of the bottles. This contact continues until the mouth piece S^{14} again moves back, to push the bottles back into the carrier cell or bucket. Then it releases the said arms B^6, and B^7, and the spring U^3 (Fig. 7) lifts up arm u^1 and brush U^5, while arm u^2 and the other brush U^5 drop of their own weight.

There is also a brush Y^2 for the outside bottom of the bottle, and this is shown in Fig. 5^a in its retracted position and in Fig. 7 in its advanced position. It is mounted on and forms the front face of the aforesaid pusher O^7 on the rod O^8. By this means the effect of friction against the rotating bottle by reason of the impact of the pusher on the rotating bottle is averted, and the cleaning of the bottom of the bottle by its rotation against the brush Y^2 which intervenes between the bottle and the pusher O^7, is ensured.

When the bottles are pushed out of the buckets of the main carrier by pusher O^7, they come out horizontally between the body brush R^7 below and the flexible belt R^6 above. In consequence they then have no rigid centering. Yet a definite centering is required, if an inside brush is to be entered through the mouth and neck of the bottle to scrub it internally. I therefore provide for such bottle a beveled mouth piece S^{14} (see Fig. 7, Sheet 7, and Fig. 5^a and Fig. 6), which may be moved up against the mouth of the bottle, as shown in Fig. 3, when the bottle is moved back into the conveyer. The level of this mouth piece S^{14} will centralize the bottle on its emergence from the conveyer and while it is still being rotated by the flexible belt R^5. While the bottle is thus centralized, I project into it, through its mouth, an internal brush K^4 (Fig. 7) mounted on a rod K^5 which is thrust out through the center of the aforesaid mouth piece S^{14}. The bottle is rotating in one direction while the internal brush K^4 is rotated in the opposite direction by the chain C^{40} as appears in Fig. 6. Therefore the brush K^4 serves to scrub the inside of the bottles just as the body brushes R^7 and the neck brushes U^5 serve to scrub the outside of the bottle.

I will describe hereinafter the mechanism by which these brushes, also the carrier and other moving parts, are operated at the right instant and to the necessary degree.

It remains to explain that after the scrubbing and after the re-entry of the bottles into the buckets of the carrier, through the same open end of the bucket from which it had been pushed by the pusher, the bottles are carried upwardly by the conveyor and then horizontally, along the top length of the conveyor route back towards their starting point. The re-entry of the bottles into the carrier buckets after the scrubbing is accomplished by the reverse stroke of the pushing-out means. This will be described later when I take up the motive mechanism of the apparatus.

When replaced in the carrier-buckets after scrubbing the bottles travel, as just stated, upward therewith and then turn to a horizontal line of travel for the purpose of rinsing and draining out. For draining purposes the lower ends of the bottles, which are now travelling mouth downward, come to a different form of track on which the bottle mouths bear. This track is open to permit the exit of the water, and under it is a pan P^{20} (Fig. 7), to receive the water. This pan P^{20} forms the bottom of the upper horizontal reach of the main casing. This special track aforesaid is shown in plan at Fig. 10, Sheet 10, and in more detail in Fig. 8, Sheet 8, and in the cross section at Fig. 9, Sheet 9. In these figures N^4 and N^5 represent a pair of parallel rails or rods, which I term guards, there being such a pair of guards for each of the four lines of travelling bottles. Between each pair of guards N^4 and N^5 and at a lower level runs a narrow rail N^6 standing on edge. As appears in the cross section, in Fig. 11, the bottle mouth rests on this knife-edge rail N^6 with the guards N^4 and N^5 on either side of the bottle head. The wheels B^{17} of the carrier chain run on the outside tracks N^9 and N^{10} formed by flanges on the inside of the casing. Just before the bottles reach this special drainage track they ride on the normal form of rail shown at N^7 and N^8 in Fig. 10, and from said rails N^7 and N^8 the bottles slide off onto the rail N^6 as just mentioned. The guards N^4 and N^5 are formed in sections, and, as clearly appears at the left of Fig. 8, springs QQ are interposed between their abutting sections. This is to permit of adjustments in the length of the carrier chain composed of the aforesaid links A^{17}. When adjustments of the chain are made, an adjustment of the chain supporting structure is likewise required and provision is made therefor in the upper corner of the conveyor system at the loading end of the apparatus. In Figs. 1, 2 and 5 attention is called to the arcuate sectors N^7 over which the carrier passes. These sectors are carried upon arms X^5 which in turn are carried by a shaft X^{100}. Shaft X^{100} is mounted upon and between adjustable slides X^{11} which are supported between the spaced arms X^{12} of a frame bracket X^{13}. Slide X^{11} is provided with an ear X^{14} and the frame bracket X^{13} is provided with a corresponding ear X^{15}. Extending between and through these ears is an adjusting bolt X^{16} which, when tightened, draws the slide X^{11} upwardly to thrust the shaft X^{100} and the sector N^7 radially outwardly of the entire apparatus whereby to tighten the conveyor chain A^{17}.

In the length of the aforesaid rail N^6, there are included at intervals the spray nozzles F^{20}, as appear in Figs. 7 and 10. The water comes to these nozzles, F^{20}, by cross pipes L^{10} (see Fig. 10, also Figs. 10^a and 10^b, Sheet 10), which branch from the main water pipe L^{15}. At each point where a cross pipe L^{10} branches from the main L^{15} there is a cut-off valve L^{20}, the details of which are shown in Figs. 10^a and 10^b. In Fig. 10^a that valve is open and from the main L^{15} water can flow freely through a hole in disc L^{30} to cross pipe L^{10} and the nozzles F^{20} thereon.

But the said disc L^{30} is fixed to the pipe L^{10} and by a slight rotation of said pipe L^{10} the disc L^{30} may be also rotated to cut off the flow from main L^{15} as shown in Fig. 10^b. The required cut-off rotation of the pipes L^{10} is afforded by the reciprocating rod E^{10} which works a link E^{20} that is connected to a short lever arm E^{15} on each of the cross pipes L^{10}. Thus by means of the rod E^{10} all of the spray nozzles may be turned on or turned off simultaneously. The sprays from nozzle F^{20} are of fresh water to remove the caustic water remaining on the bottles after their soaking in the bottom tank which I have heretofore described. Referring to the showing of the aforesaid spray nozzles F^{20} in Figs. 7 and 10, there is shown mounted on the cross pipe L^{10}, adjacent to each nozzle, a lug G^{10}. As each bottle comes into a vertical line with a nozzle F^{20}, this lug G^{10} is raised, by means just described, for rotating pipe L^{10}, to turn on the spray. The lug hits the head of the bottle from behind, and thus makes the bottle stand up straight for receiving the spray through its mouth, whereas the bottle would otherwise stand in a slightly inclined position, as heretofore stated. Thus in Fig. 7 each bottle that is directly over a nozzle F^{20} is standing up vertically, the setting-up lug G^{10} being up against the bottle mouth. On the contrary, the other bottles are in their normal inclined position, due to the fact that the carrier buckets are larger in diameter than the bottles to allow of the free movement of the bottles into and out of the buckets, and avoiding a tight fit such as would involve extreme accuracy in the spacing of the brackets with respect to the bottles. Such accuracy would be impractical. Moreover the large sized buckets will permit of bottles of differing sizes up to the limit where the bottle would fit too tightly.

Besides the internal rinsing of the bottles by the spray nozzles F^{20}, which I have just described, they are also rinsed externally by sprays directed on them from above. This is shown in Fig. 7, at the top of the figure, where two sprays R^{10}, R^{10} are also applied to the outside of the bottles. It is also shown in the sectional view of Fig. 9.

After being rinsed, as I have just described, the bottles on the carrier are transported by the main conveyor to the end of the machine, where the track bends over the three-armed angular support X^5 (Fig. 5), and starts downward. Just below the hood X^{10} containing the aforesaid three-armed, angular support X^5, there is shown, in the same figure, (Fig. 5), a pusher rod O^9 which acts like the above-described rod O^8 to push the bottles out of the carrier buckets. As the bottle emerges finally from its bucket, it slides onto a short, slightly inclined, chute W^{10} (see Figs. 2^a and 2^b, Sheet 2, also the plan view in Fig. 4) which is normally stationary.

The lower ends of the chutes W^{10} are supported upon a shaft Z^{10} which is supported at its ends in the respective side members of the frame of the apparatus and the shaft Z^{10} therefore forms the pivot about which the chutes W^{10} may oscillate.

From chute W^{10} the bottle slides onto a second chute W^{20} which tilts up at its front end, as shown in Fig. 2^b, and delivers the bottle into a standing position on top of an auxiliary transversely moving chain-table Q^{10}. The bottles are stopped from falling off the chain-table Q^{10} by a vertical board V^{10} which (as shown in Fig. 1 and Figs. 2^a and 2^b and, in plan, in Fig. 4) extends across the line of travel of the tilted-up bottles and parallel to the edge of the table Q^{10}. This board V^{10} is secured to pivoted arms V^{120} and restrained by a spring V^{11} (see Fig. 1). The bottles have now arrived at the chain-table Q^{10} (see Fig. 4) which moves from left to right (looking at the machine from its entry end, which is at the right of Fig. 4), and carries the bottles to the auxiliary longitudinally-moving chain-table Q^2, shown at the top of Fig. 4, and there moves, in that Fig. 4, from left to right. This chain-table Q^2 brings the bottles to the delivery table X^{20} which stands at the right of the entry-conveyors in Fig. 4. Thus the bottles, which were first applied to the entry conveyors, are finally delivered on the table X^{20} at the same end of the machine at which they entered. In the meanwhile they have encountered the soaking operation in the bottom tank, have been scrubbed, rinsed and drained, and finally are brought to the delivery table X^{20}, located right beside the entry-conveyor, where they first entered the machine.

I will now describe the motive apparatus, which has kept the bottles moving along the above described course, and, finally, the safety provisions for stopping the machine in the event of a mishap to one of the bottles in its progress through the several operations.

The prime mover is a motor, preferably an electric motor, M (shown at the upper right in Fig. 12). By a belt M^2 the power of motor M is transmitted to a driving pulley M^1 on the main shaft **2**. This power plant is located in the open space between the horizontal soaking tank below it and the horizontal casing above it in which the bottles are rinsed and drained after their scrubbing on the vertical run of the main conveyor. Main shaft **2** drives the sprocket chains M^3 and M^4 (Fig. 12).

The chain M^3 drives the shaft **4** of a pump S^{100} (also shown in Fig. 3 at the extreme right), while the chain M^4 drives shaft **3** which is the brush-operating shaft (see also Fig. 3). The worm on shaft **5** is driven from the aforesaid main shaft **2** through the gearing 5^a (as shown in Fig. 5) and drives a transverse shaft **6** from which the chief movements of the machine are derived. Thus (referring to Fig. 5) on the said shaft **6** is a large wheel **7** that contains a cam track **8** in which track runs a roller 8^a. This cam **8** gives a reciprocating movement to the parts ahead of it, whereas, the movements of the parts behind it have, up to this point, been rotary. The aforesaid roller 8^a is mounted on a link **10** which, at its left end, reciprocates a lever-arm **11** and at its right end reciprocates a lever-arm **12**. That reciprocates push-off pusher O^9.

The said lever-arm **11** gives several required reciprocating movements. By means of the link **13**, it reciprocates five upright lever-arms which center on the cross shaft **17** at the bottom of the machine in Fig. 5. For a more complete showing of these five lever arms, it becomes necessary to turn to Fig. 9, where, of said five lever-arms, the two outer ones, **15**, **15**, are pinned to shaft **17** and move therewith, as does also the center arm **16** also pinned to shaft **17**. But the intermediate arms **14** are loose on the shaft **17**. The two outer arms **15** are respectively jointed at their outer ends to the rods O^4 which extend to the rear end of the machine (as appears in Fig. 3) where they are joined to the cross bar T^{20} (see Fig. 6) which carries the four pusher rods O^8 that serve to eject bottles into the scrubber from the carrier buckets to permit the scrubbing operation. The

stroke of the aforesaid rods O^4 and O^8 together with the cross bar T^{20} is determined by the oscillating stroke of the aforesaid shaft 17 to which the lever arms 15 are likewise pinned. The contact lever arm 16, also pinned to shaft 17, is the one by which the shaft 17 is oscillated through link 13 aforesaid. It has the same stroke as the aforesaid rods O^4 and pusher rod O^8. The two intermediate lever-arms 14, which are not pinned to shaft 17, are operated in one direction, i. e., to the right in Fig. 5, by a strong spring Q^{30} anchored at its right end to the link 13 which is jointed to the aforesaid cam-operated arm 11. So when the arm 11, by its link 13, pulls positively on control lever arm 16, pinned to shaft 17 to operate that shaft, it also exerts a yielding pull through spring Q^{30} on the intermediate lever-arms 14 which are not pinned to shaft 17. The arm 16 is provided with a boss 16' as shown in Fig. 5 and it is to this boss 16' that the link 13 is attached. When thus spring-pulled, a stop 14^a which forms a cross connection between the arms 14 abuts against the said control lever-arm 16. At their upper ends the aforesaid lever arms 14 (see the right-hand end of Fig. 6) are connected by a cross rod 14^b on which are carried the four brackets W^{45} through which pass horizontally the mouth-piece operating rods W^{40}. Each rod W^{40} leads to and is pivoted to one of the centralizing mouth-pieces S^{14}. Between the two upward projections on each of the brackets W^{45}, through which projections the rods W^{40} pass, there is an adjustment sleeve V^{25} (see Figs. 5 and 7) that can be set forward or backward on rod W^{40} to compensate for bottles of different sizes. The rod W^{40}, it will be remembered, is moved by the aforesaid lever arms 14 to the left (see Fig. 3) against the force of spring W^{50} and is itself connected to the mouth piece S^{14}. When a bottle is pushed out of the carrier for scrubbing by the aforesaid pusher O^8, it engages the mouthpiece S^{14} and moves it back against the said spring W^{50}. Conversely the mouth-piece S^{14}, when worked by lever arms 14 acts to push the bottle back into the carrier after the scrubbing. The movement of the lever arms 16 is positive in accord with the operation of the link 13, whereas the movement of the lever arms 14 lags somewhat during the tensioning of the spring Q^{30}. Therefore the bottles as they leave the cells of the conveyor are guided by the mouthpieces S^{14} before the mouthpieces are actually moved by the lever arms 14. In the event of a failure of the bottle to reenter the carrier cell or bucket D^{17} the spring W^{50} will yield and ultimately the aforesaid sleeve V^{25} will hit a push button W^{26} and cause the machine to stop. The stopping can also be caused by pressing manually on the button W^{27}.

Also from the aforesaid lever-arm 11 extends (see Fig. 3) leftwardly and upwardly a rod 26 that goes to and operates the above-described bottle-straighteners G^{10}.

We may turn next to the work performed by the lever-arm 12, which, like said lever-arm 11, is reciprocated by the large cam 8. As appears in Fig. 5, this lever-arm 12 is jointed at its lower end to the left end of the aforesaid push rod O^9 which performs at the front end of the machine the same function that is performed by rod O^8 at the rear end. That is, it pushes the bottles out of the vertical line of buckets or carrier cells of the main conveyer at the front of the machine. At this front end it pushes them out onto the aforesaid chute W^{10}, preparatory to their progress to chute W^{20} by which they are tilted into upright position. Lever 12 and pusher rod O^9 appear in Fig. 2, as well as in Fig. 5. On the same center 40 with lever arm 11 is one of the sprocket wheels 50 driving the main conveyer belt, and, as appears in Fig. 3, the shaft 40, which carries the said sprocket wheels 50 is driven intermittently by a stop-gear 100 driven by a gear 200 on the aforesaid shaft 6. This explains the intermittent travel of the main conveyer.

The chutes W^{20} that tilt to upright position the outcoming bottles, are worked by a rock-shaft J^2, in Fig. 1, which also works the bottle-follower J^1 aforesaid. This shaft J^2 (as best appears at the right of Fig. 8^a and in the upper left of Sheet 4) is oscillated by a short lever J^{10} and the cam J^{15} on the shaft 4. Shaft 4 is driven by bevelled gears from the main shaft 6 (see also Fig. 4), and, by a chain J^{16} driven by sprocket wheel J^{14}, drives the shaft 18, which, in turn, operates the conveyer Q^2 through the gearing K^{10}, K^1. The oscillated shaft J^2 is connected (as shown in Fig. 4), by a rod 29 to the shaft J^3 of the tilting chute W^{20}. The worm 60 on shaft 18 and the worm wheel on shaft 80 comprise power connection between shaft 18 and the carrier E^2.

The aforesaid guard-board V^{10} which is mounted on the arms V^{120}, has adjustably connected to it the rod Z^{40} (Fig. 2^b) which operates the safety stop Z^{50} through the link Z^{51} and shaft Z^{10}. Thus if the bottles crowd too numerously on the conveyer Q^{10} they will push against the guard-board V^{10} and stop the machine. The arms V^{120} are attached to a slide V^{121} upon rod Z^{40} and the slide V^{121} is adjustable on the rod Z^{40} under the control of a bolt V^{122} extending through an apertured ear V^{123} against which a wing-nut V^{50} adjacent end 45 of the link Z^{40} upon the bolt V^{122} is caused to bear by reason of a spring V^{11} extending between the slide V^{121} and a point of attachment upon rod Z^{40} as shown clearly in Fig. 2^b.

What I claim as new and desire to secure by Letters Patent is:

1. An automatic bottle-washer including a traveling bottle carrier mounted to follow a substantially rectangular path, and provided with spaced groups of cells arranged side by side, a brush-belt mounted within the space encompassed by said carrier to follow a path at right angles to the path of travel of the carrier, means for thrusting bottles from a group of cells onto the brush-belt for a scrubbing operation, means for returning said bottles to cells on the carrier and a separate belt positioned to press the bottles upon the brush-belt.

2. An automatic bottle-washer including a traveling bottle carrier mounted to follow a substantially rectangular path, and provided with spaced groups of cells arranged side by side, a brush-belt mounted within the scape encompassed by said carrier to follow a path at right angles to the path of travel of the carrier, means for thrusting bottles from a group of cells onto the brush-belt for a scrubbing operation, means for returning said bottles to cells on the carrier, a separate belt positioned to press the bottles upon the brush-belt and a belt tightener for said separate belt responsive to the position of the thrusting means whereby to tighten said separate belt when the thrusting means has placed a group of bottles upon the brush-belt.

CHARLES HAMANN.