June 13, 1933. J. M. McCLATCHIE 1,914,145

MACHINE FOR WASHING CANS AND THE LIKE

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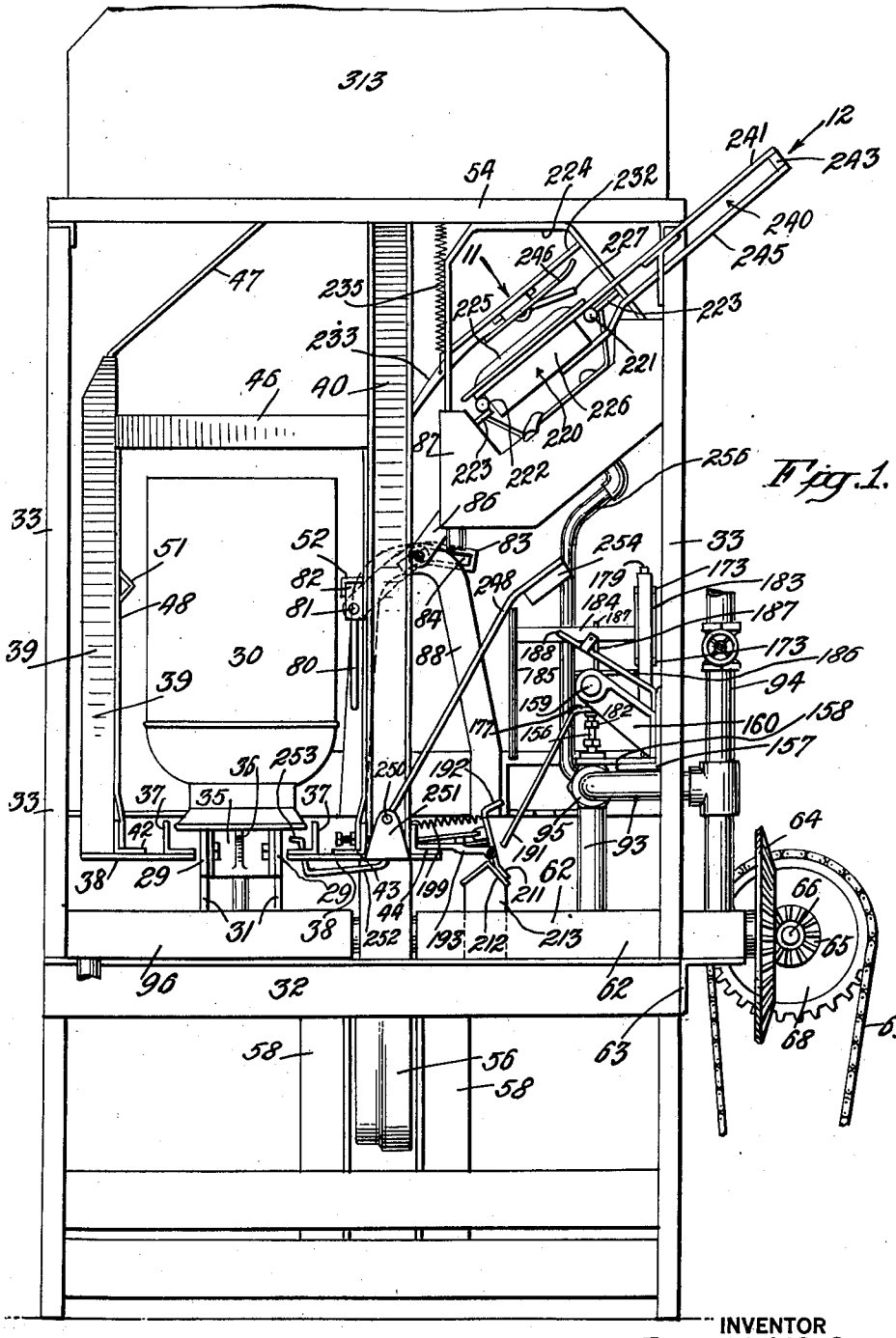


Fig. 1.

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MACHINE FOR WASHING CANS AND THE LIKE

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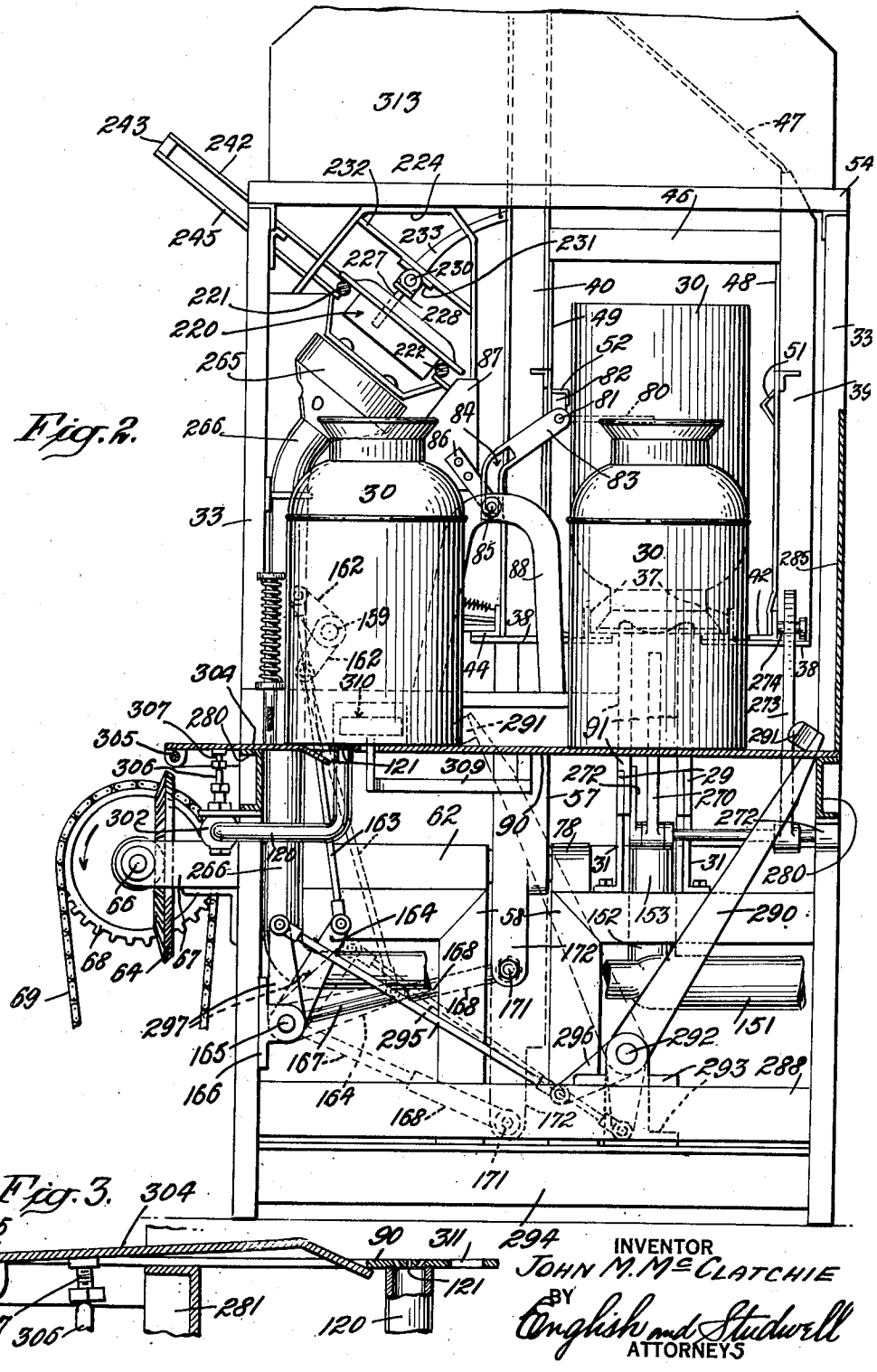


Fig. 2.

Fig. 3.

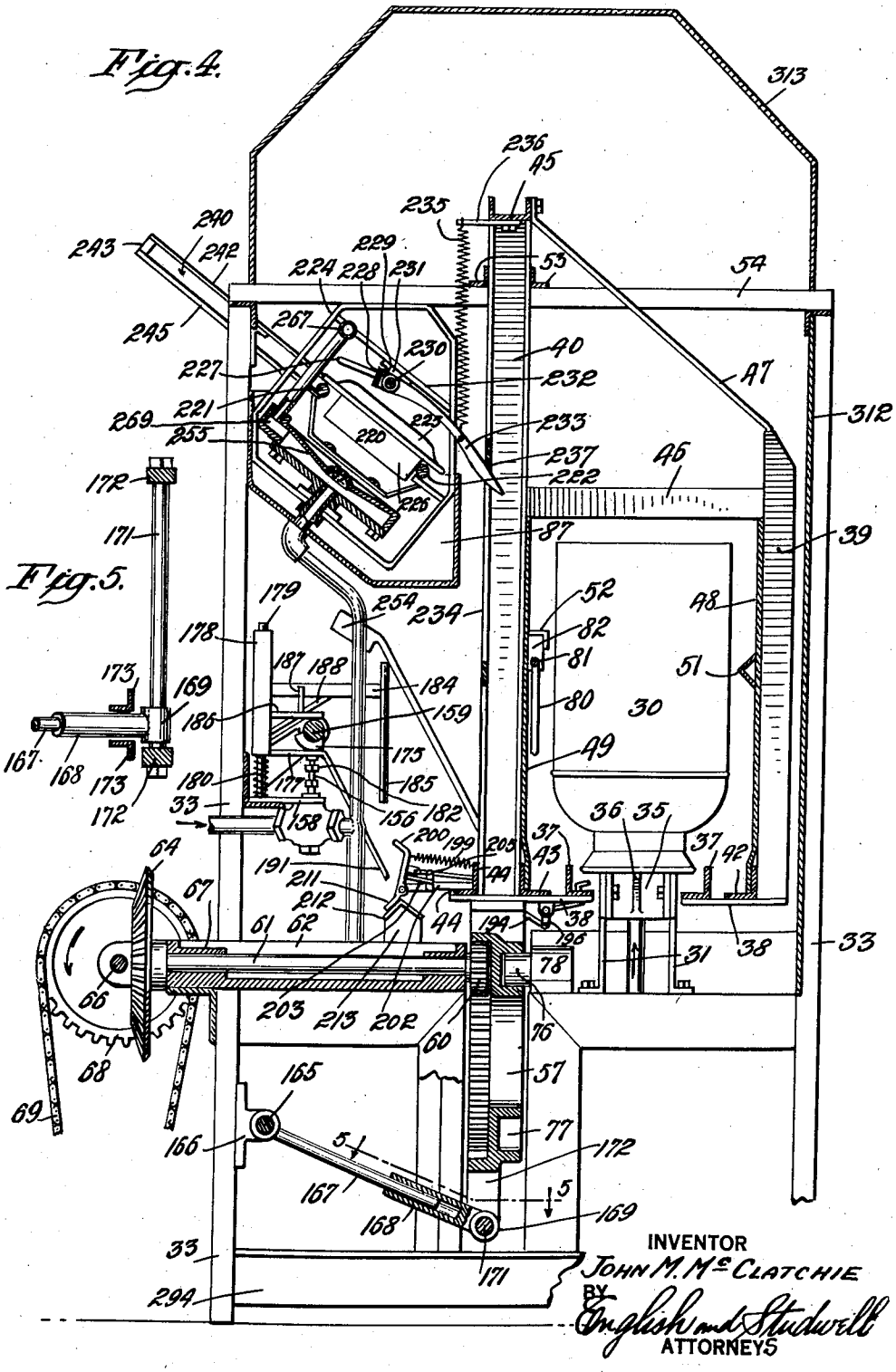
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MACHINE FOR WASHING CANS AND THE LIKE

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Fig. 4.

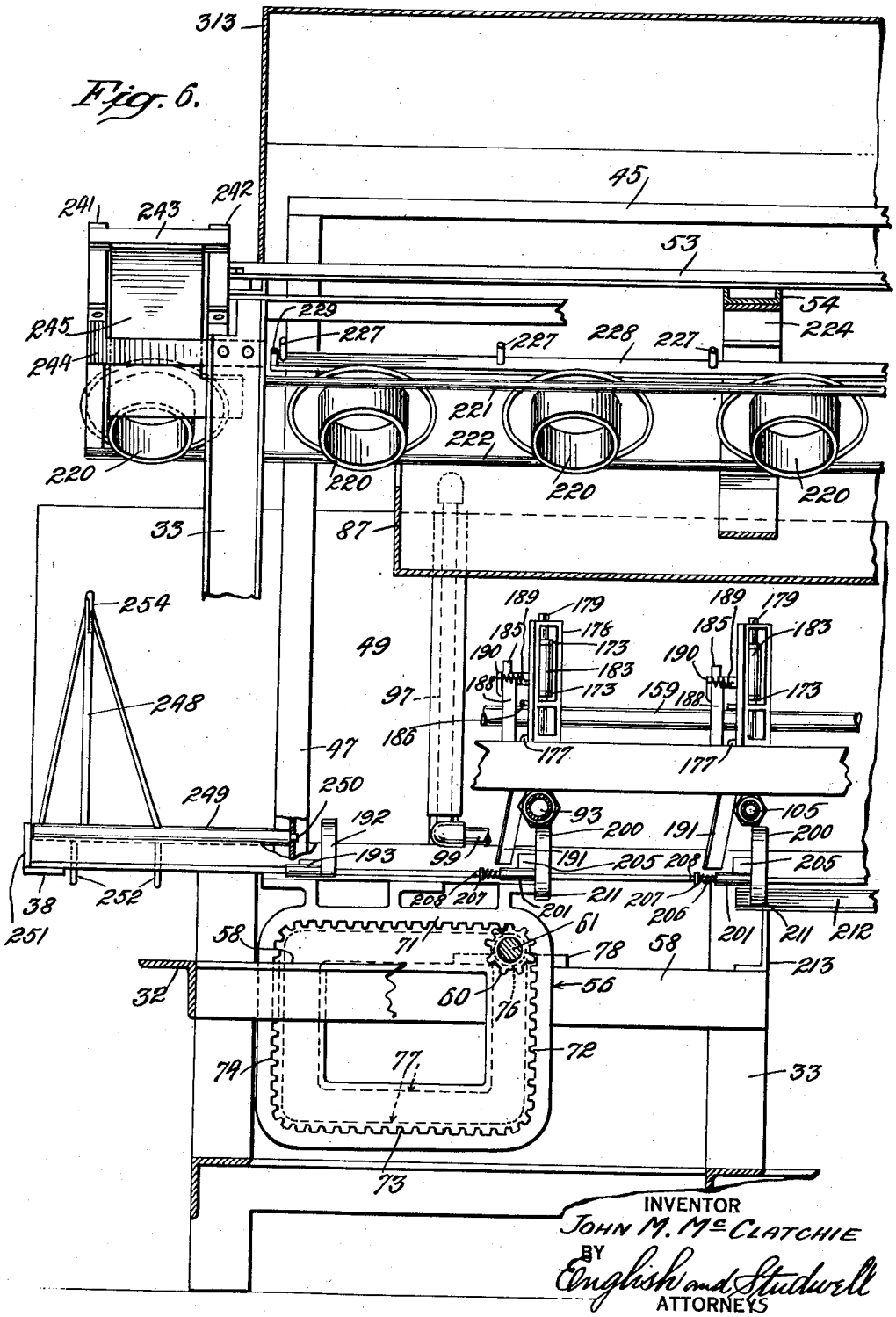


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Fig. 6.



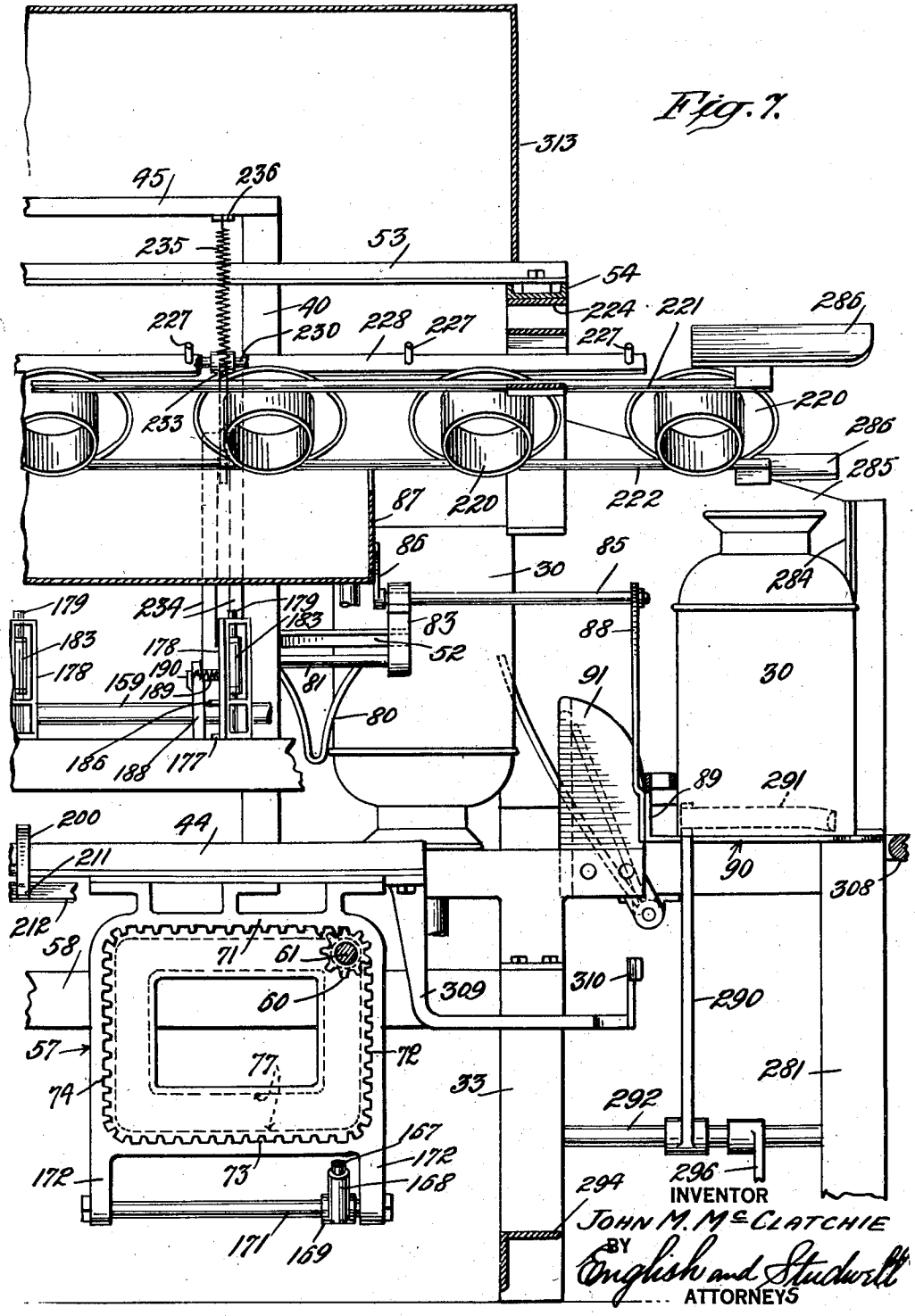
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Fig. 7.



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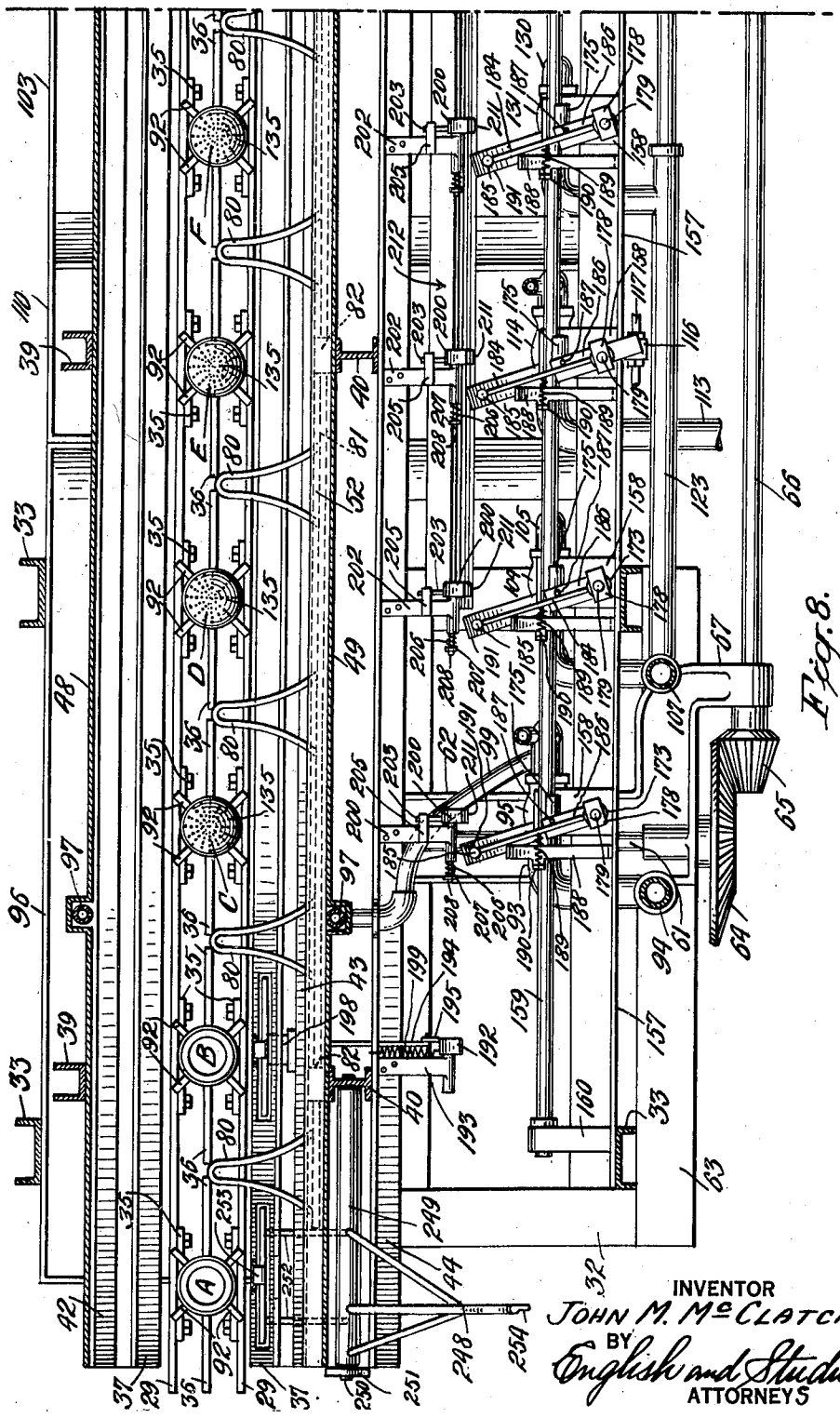


Fig. 8.

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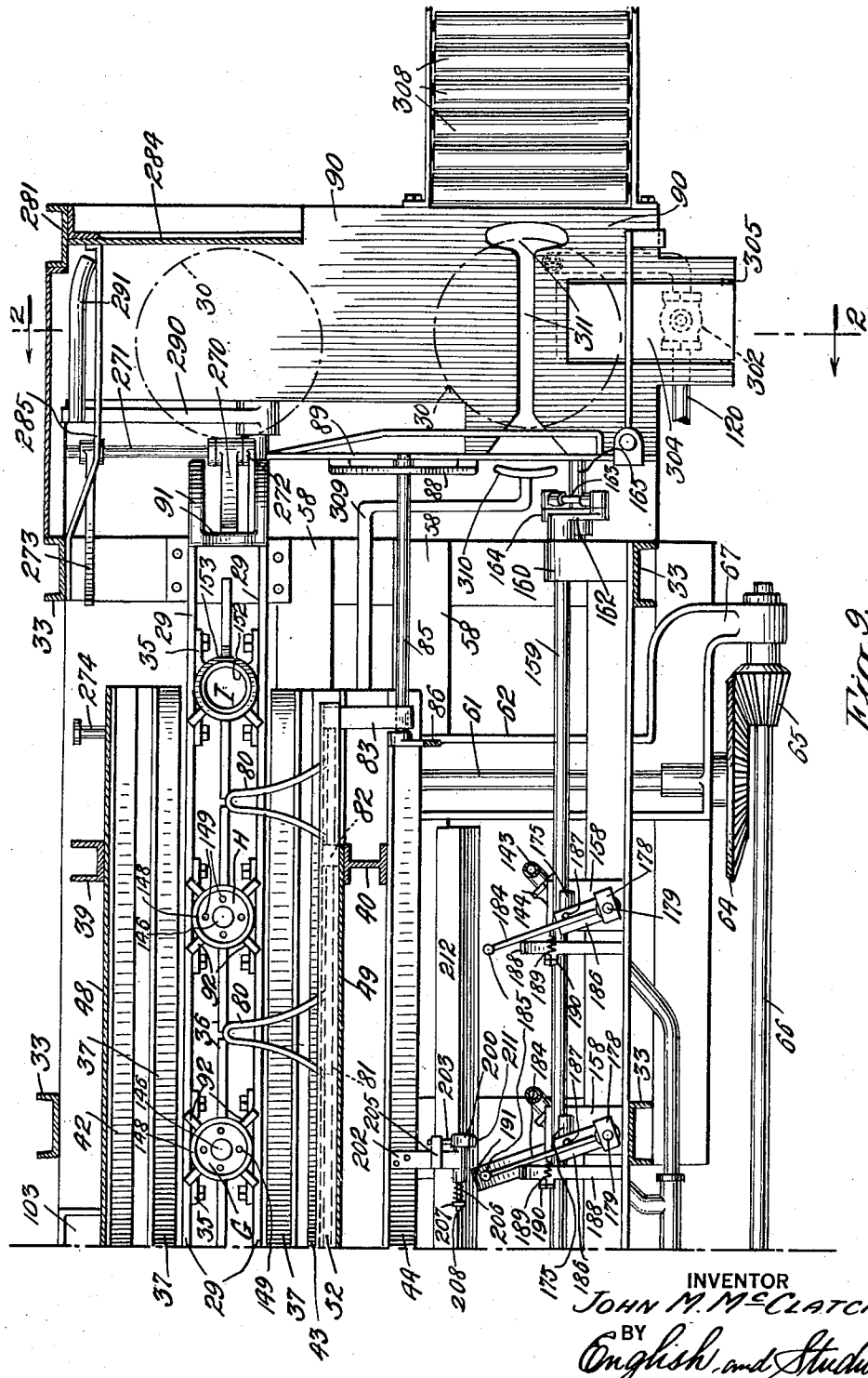


Fig. 9.

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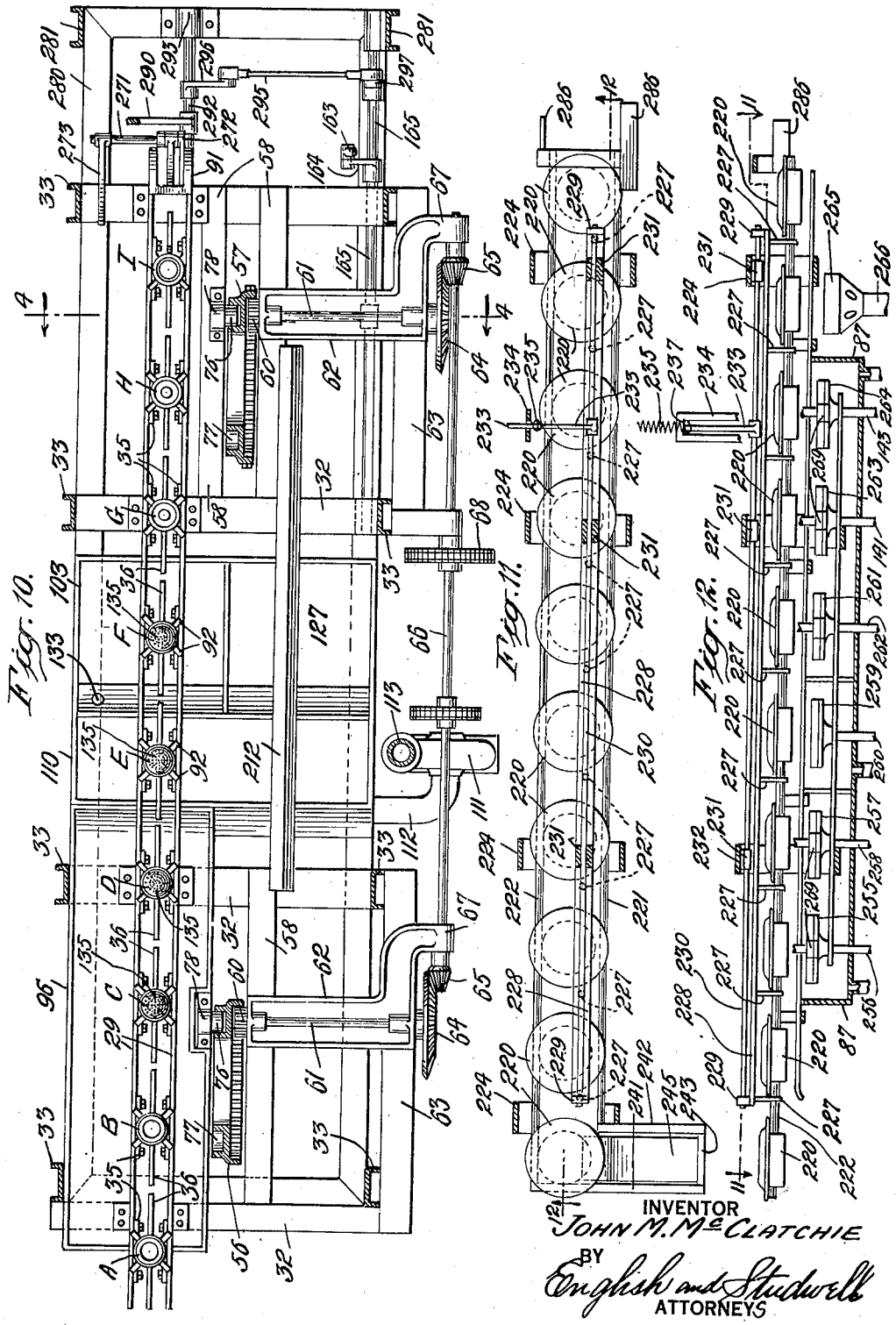


Fig. 10.

Fig. 11.

Fig. 12.

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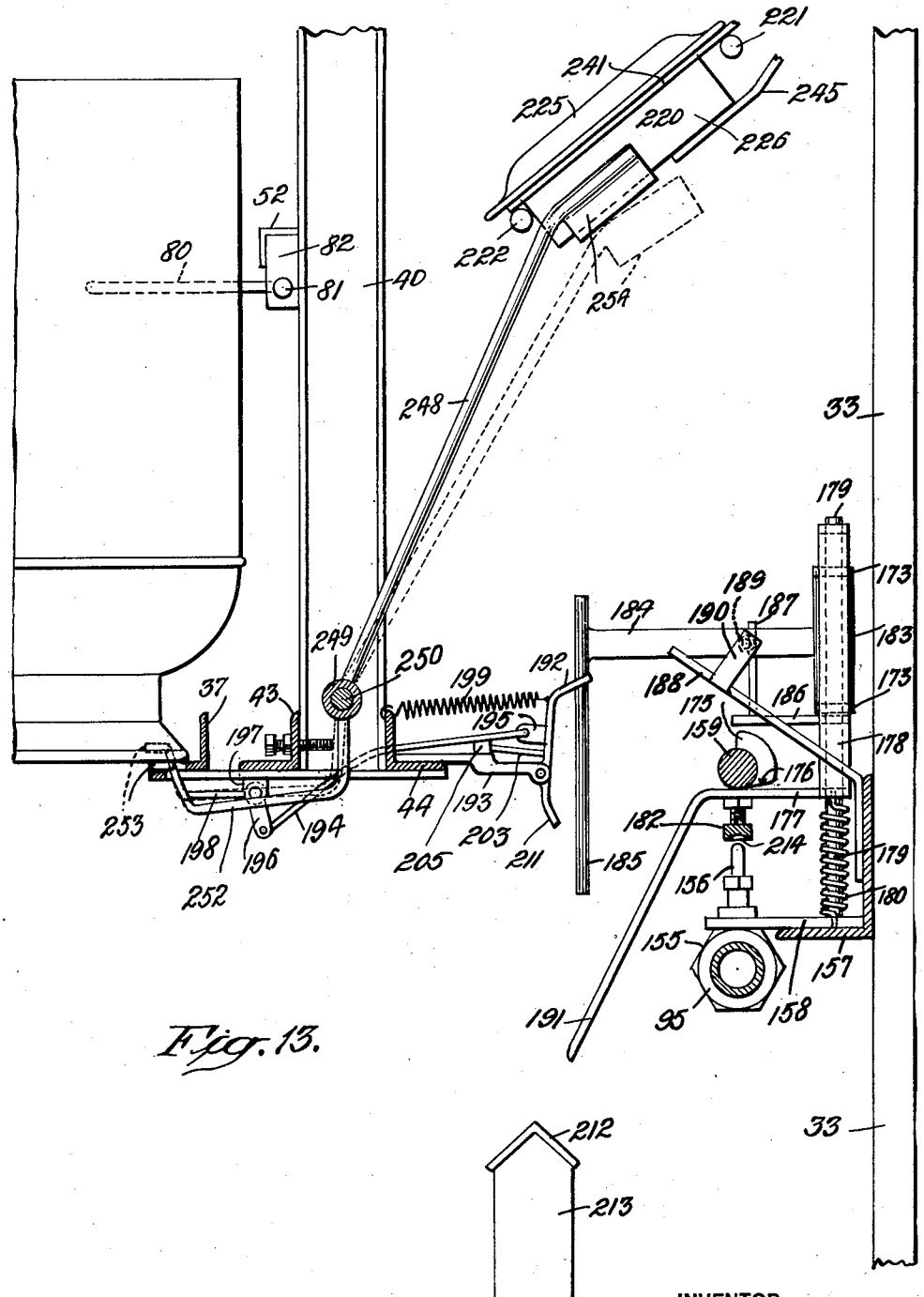


Fig. 13.

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Fig. 14.

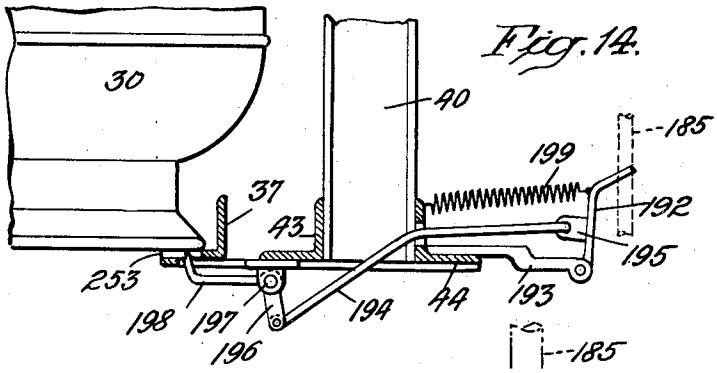


Fig. 15.

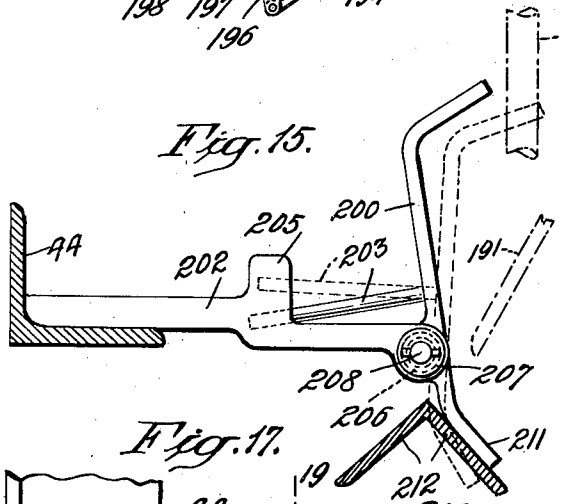


Fig. 16.

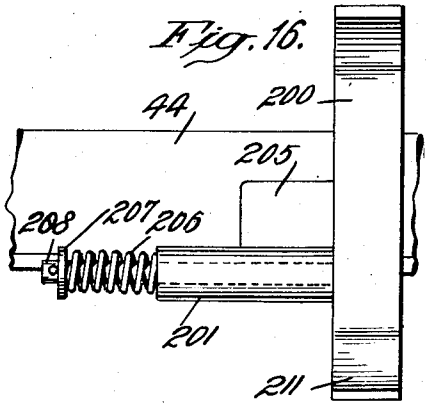


Fig. 17.

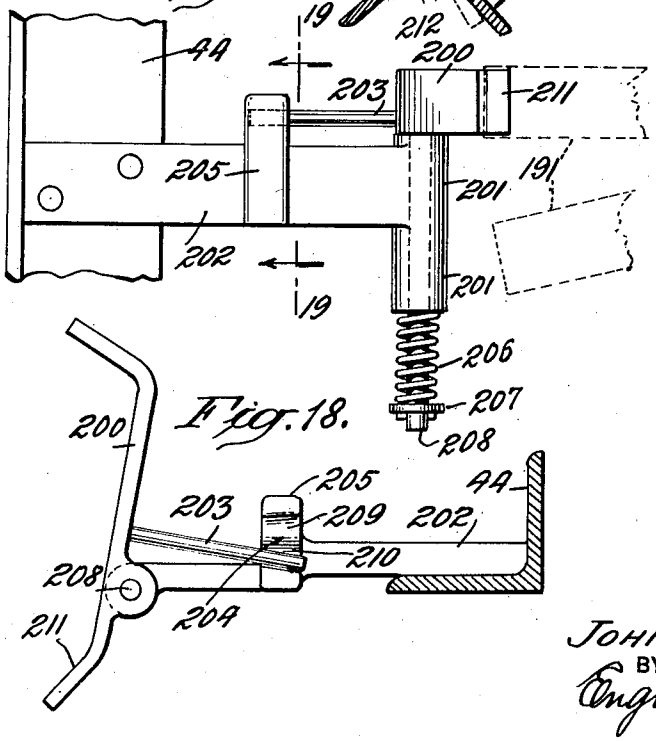


Fig. 19.

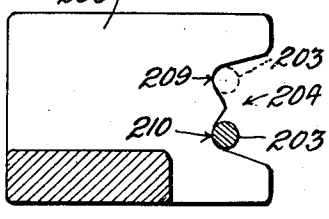


Fig. 18.

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Fig. 22.

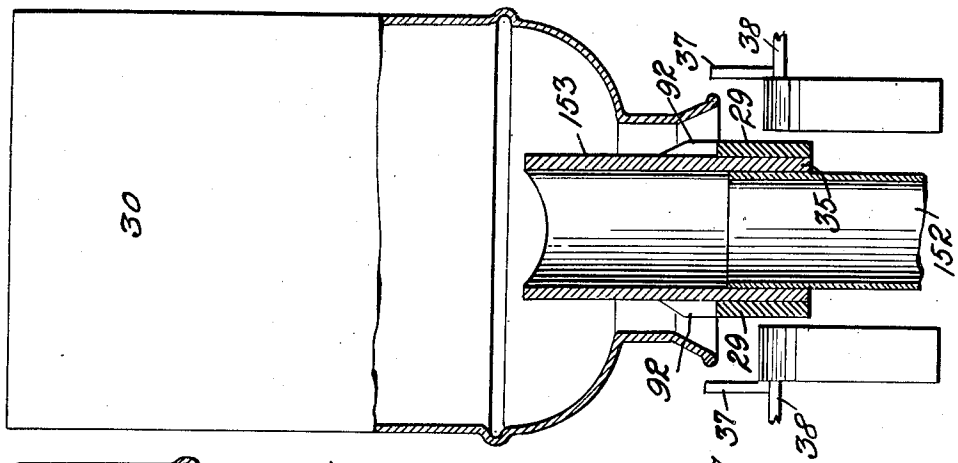


Fig. 21.

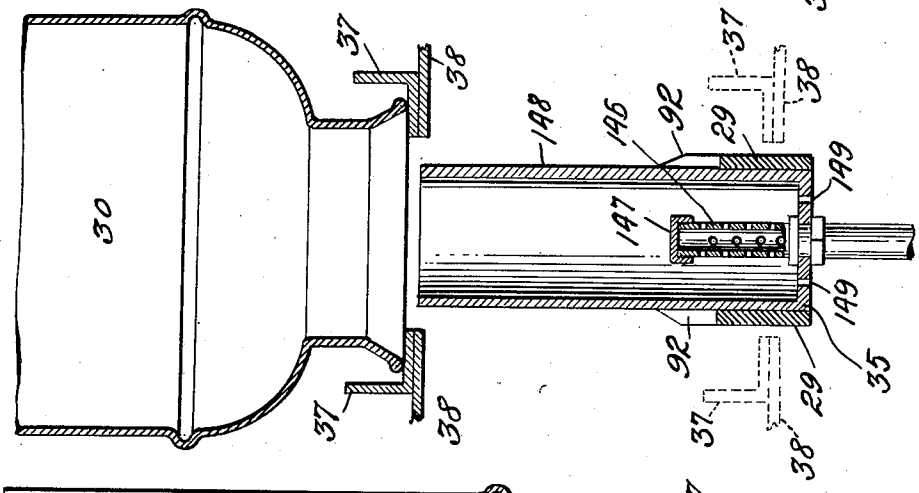
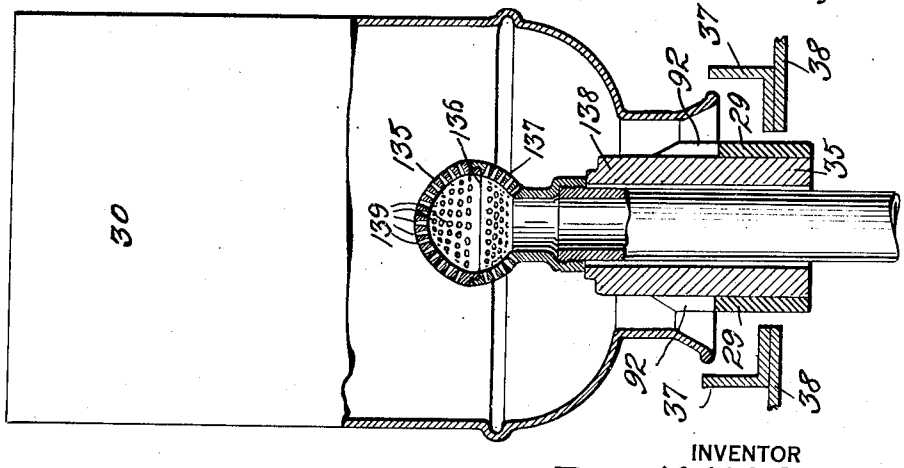


Fig. 20.



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Fig. 23.

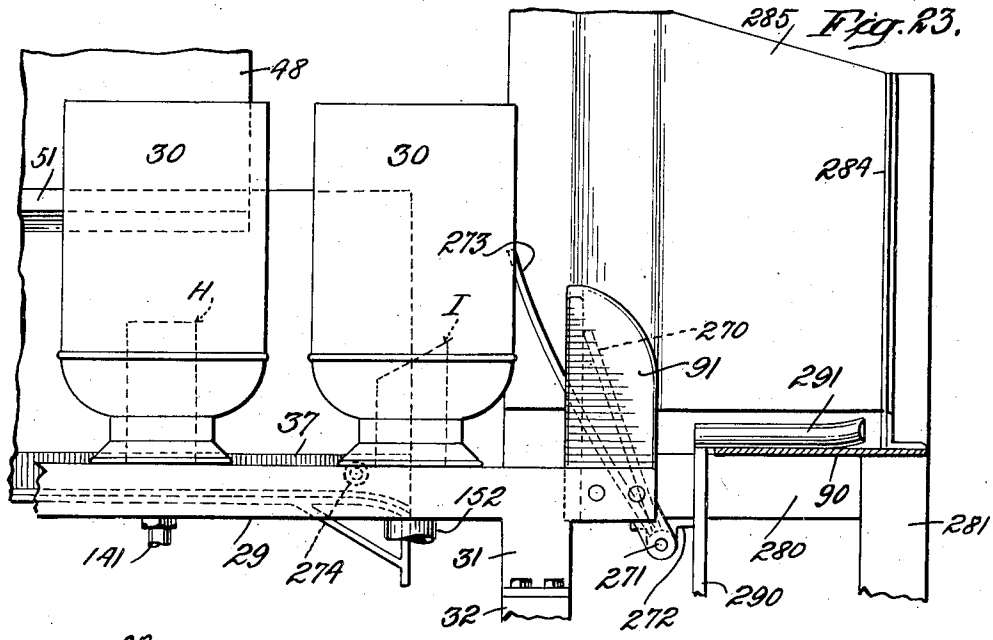
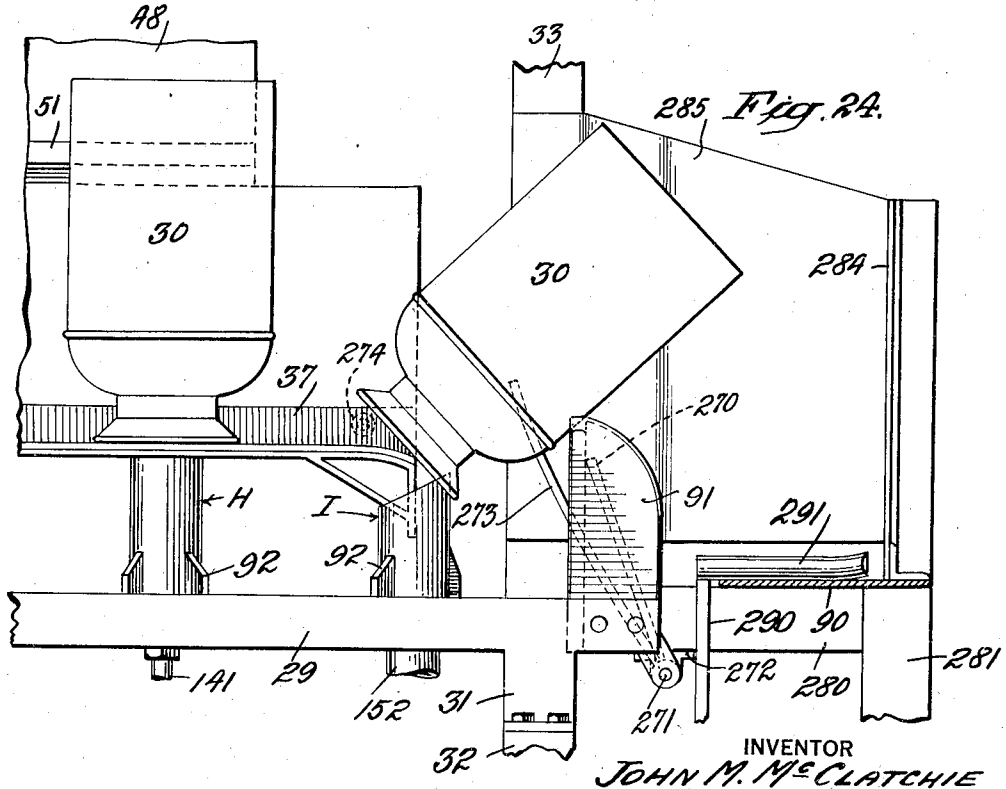


Fig. 24.



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Fig. 25.

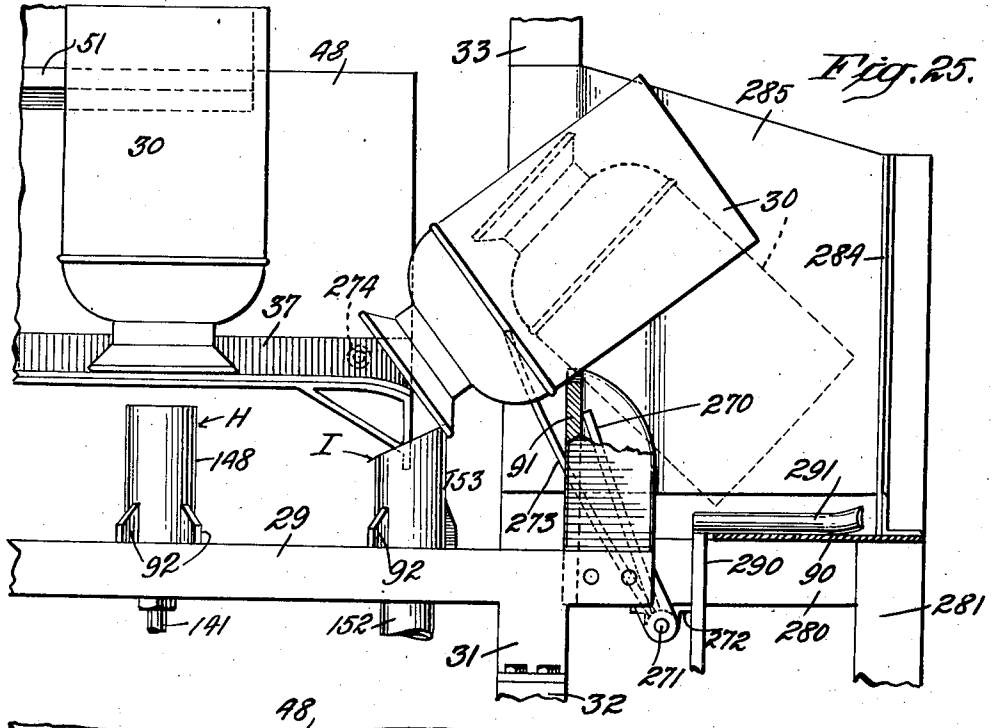
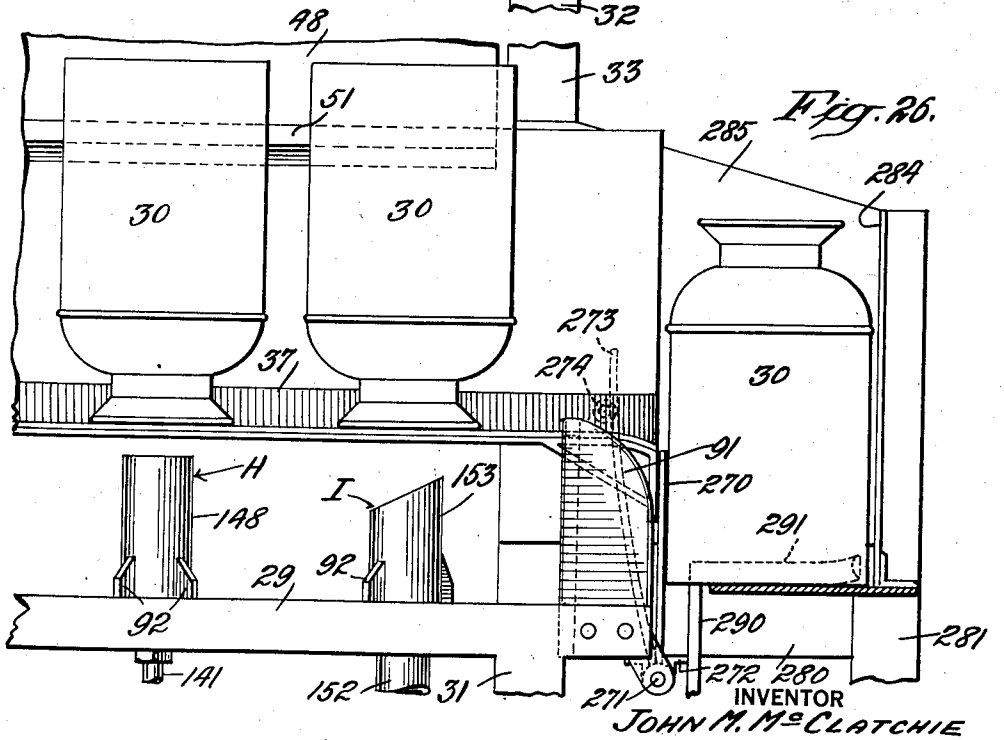


Fig. 26.



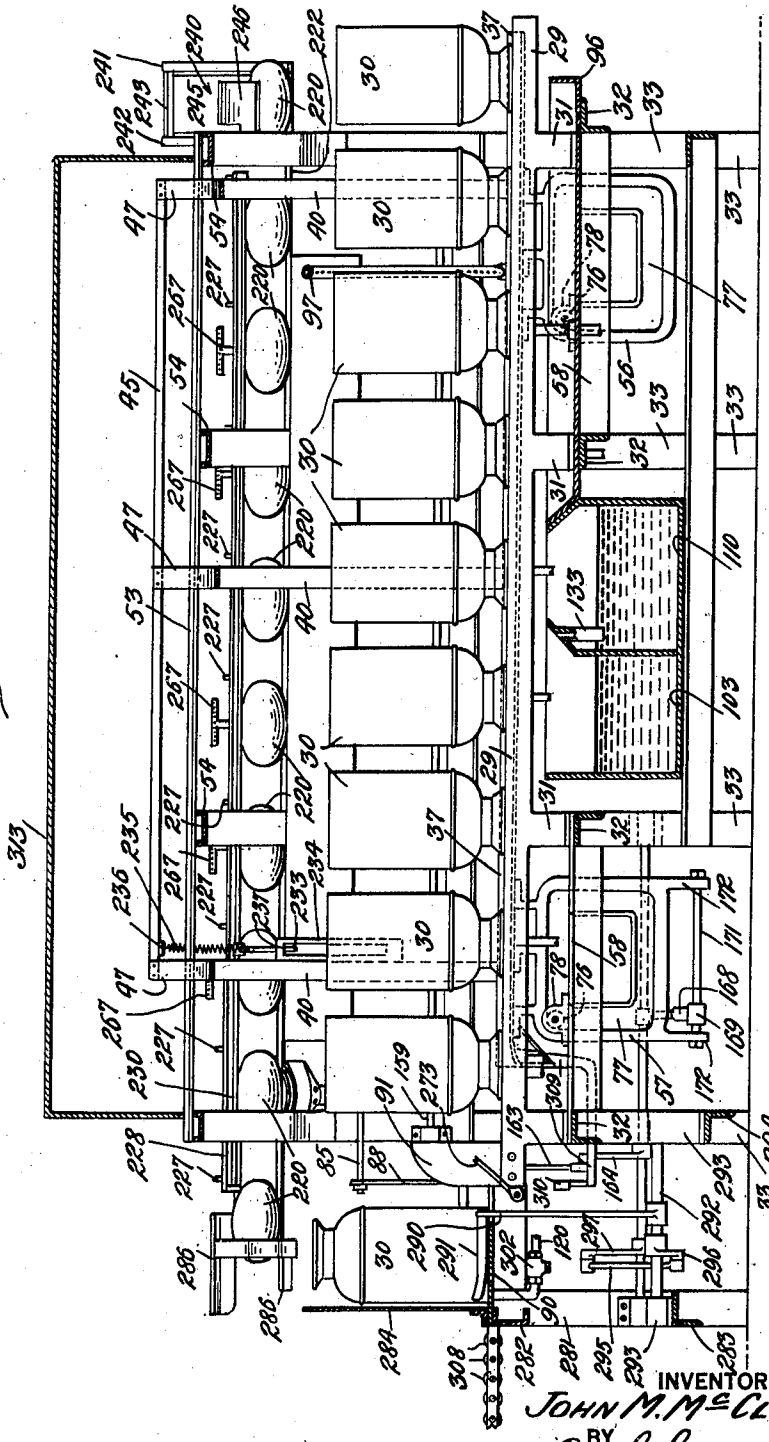
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Fig. 27.



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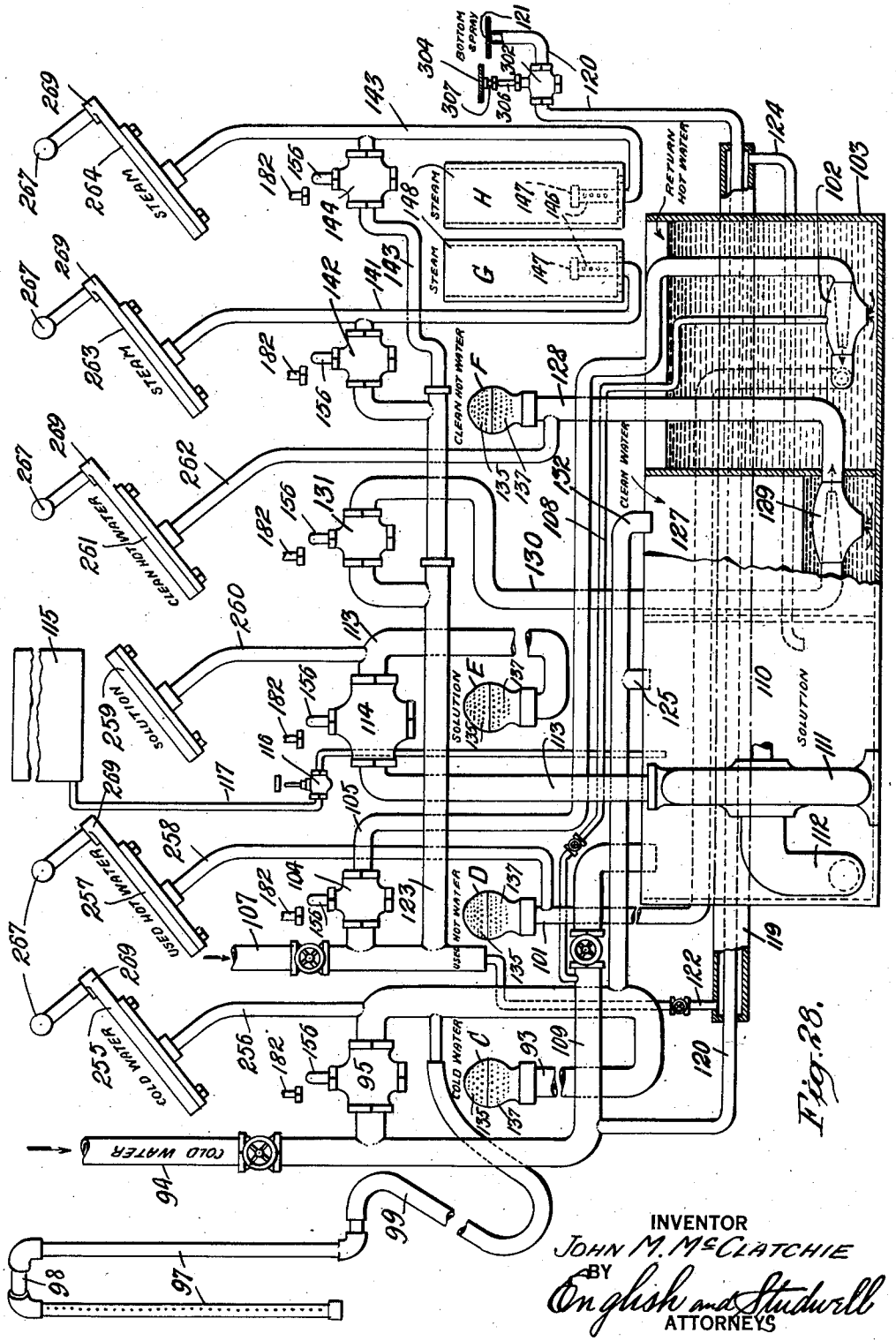


Fig. 28.

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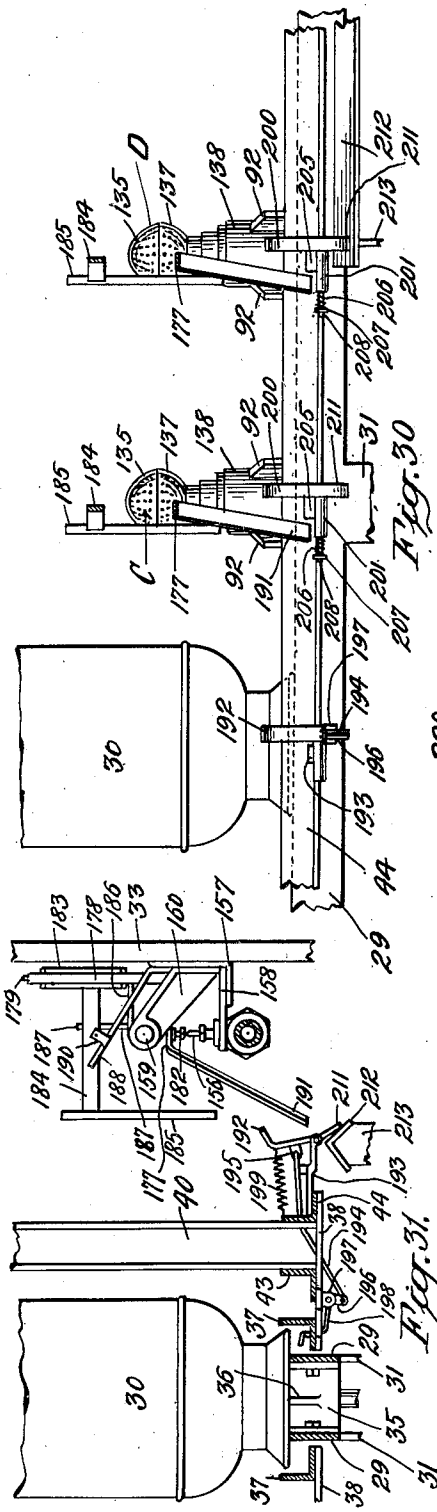


Fig. 30.

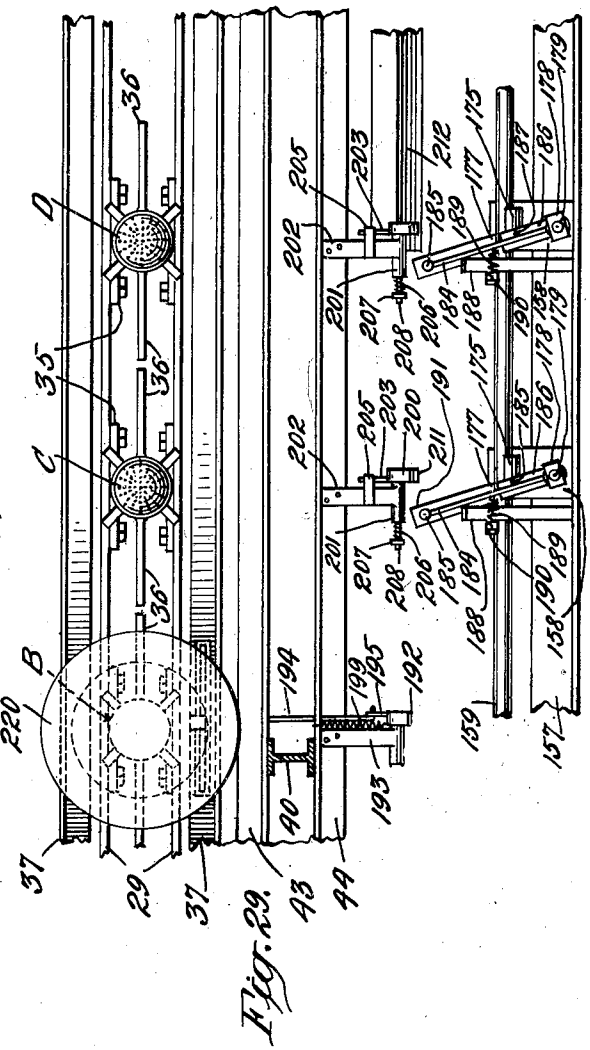


Fig. 29.

Fig. 31.

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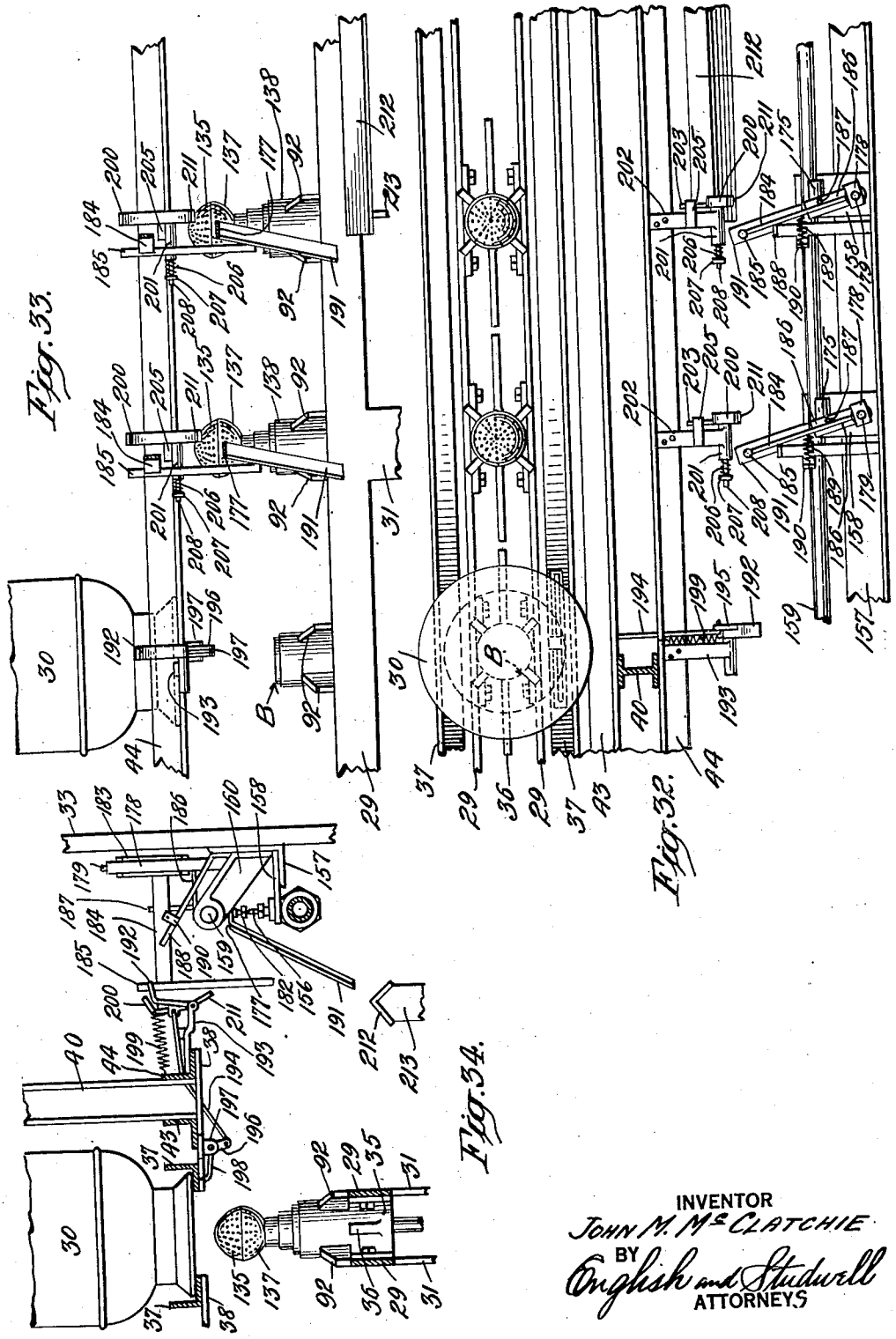


Fig. 33.

Fig. 32.

Fig. 34.

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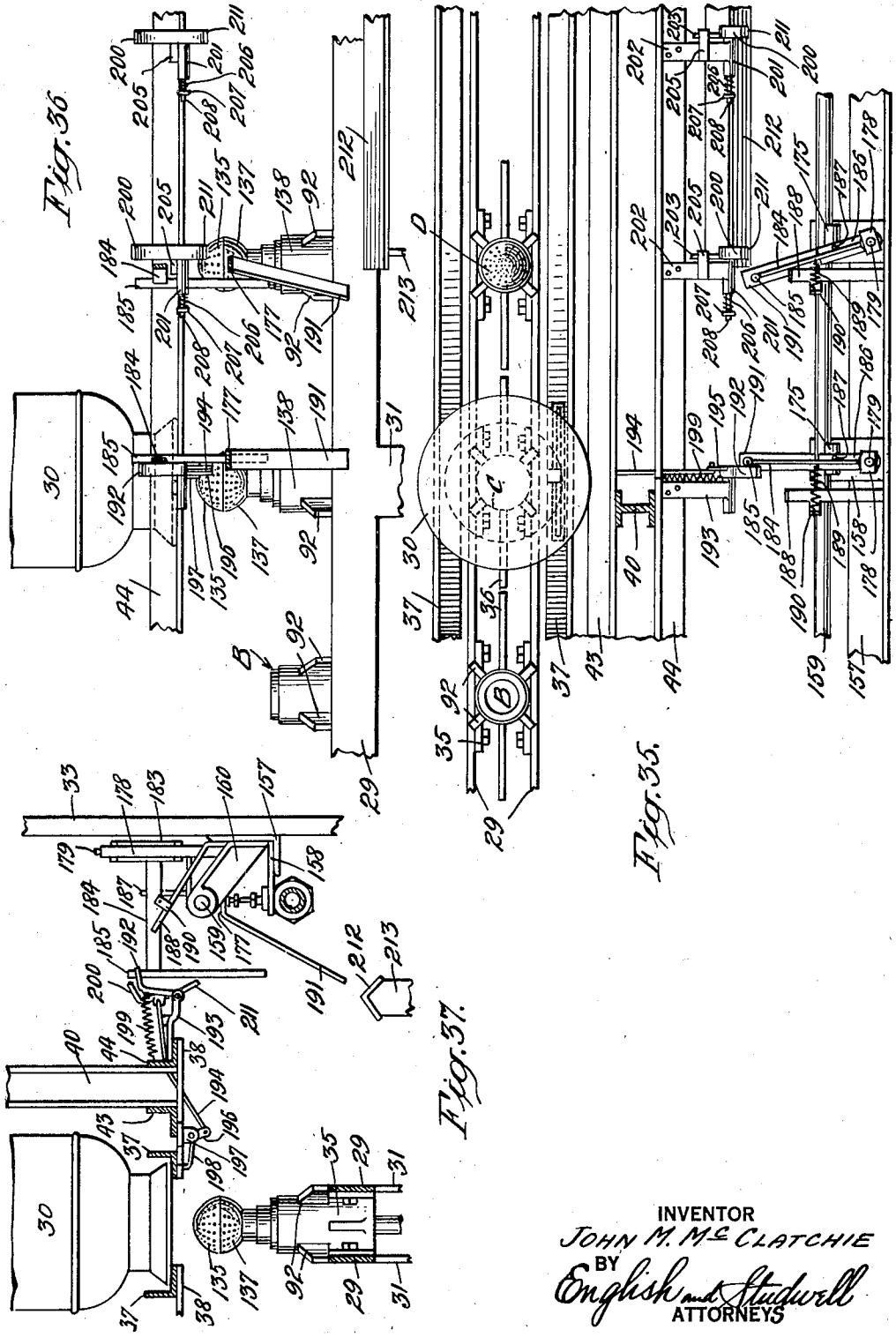


Fig. 56.

Fig. 55.

Fig. 57.

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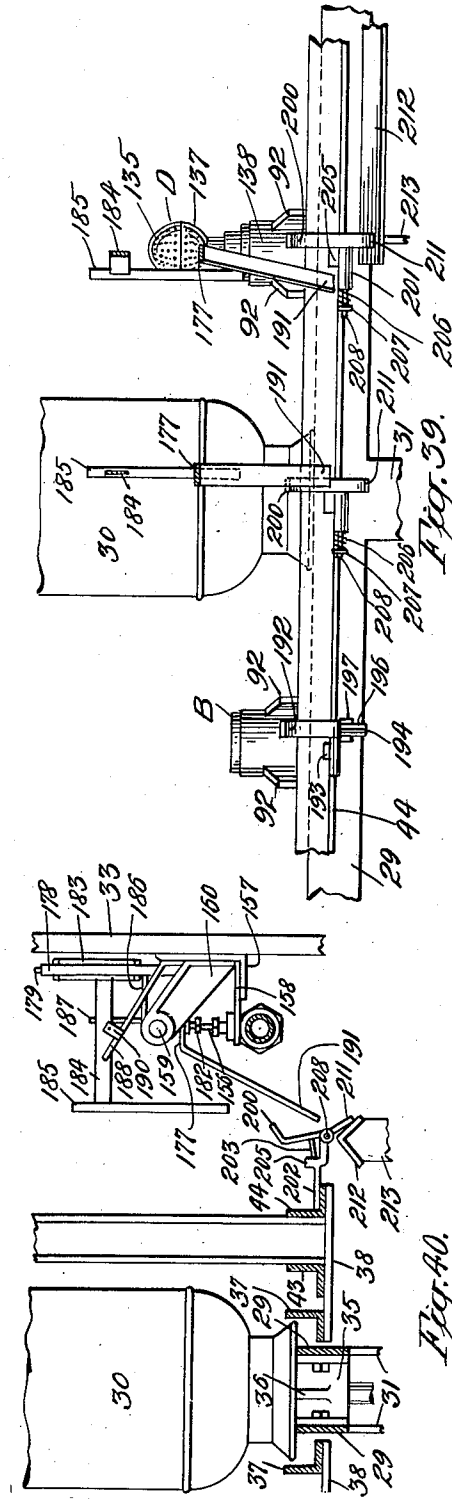


Fig. 39.

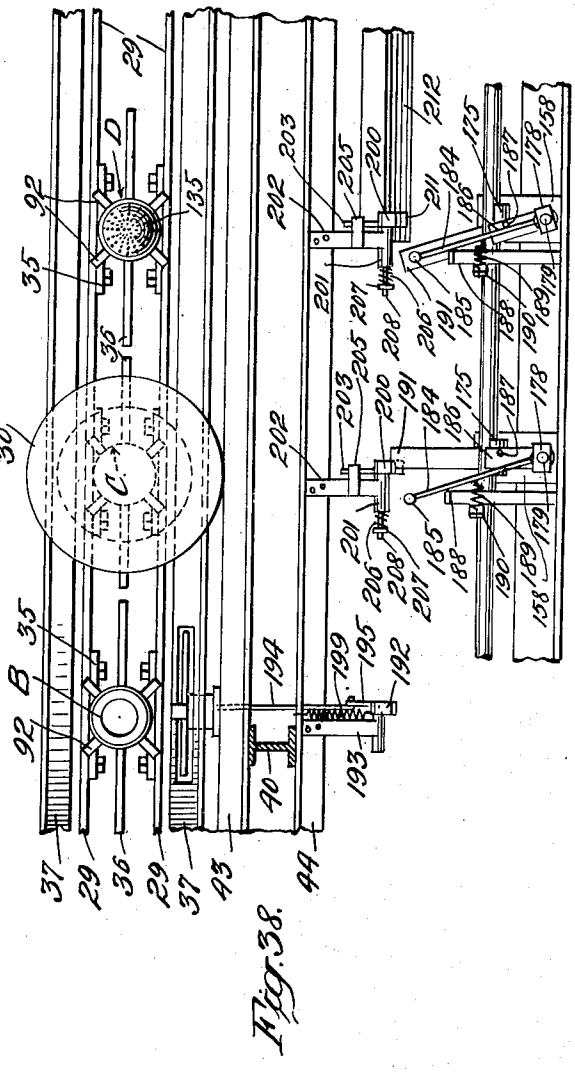


Fig. 38.

Fig. 40.

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Patented June 13, 1933 1,914,145

UNITED STATES PATENT OFFICE

JOHN M. McCLATCHIE, OF NEW YORK, N. Y., ASSIGNOR TO THE BORDEN COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY

MACHINE FOR WASHING CANS AND THE LIKE

Application filed May 7, 1931. Serial No. 535,673.

The invention relates to an improvement in machines for washing cans and the like, and more particularly to an improvement in the can washing machine disclosed and claimed in my copending application, Serial No. 444,963, filed April 17, 1930. The object of the present invention is to simplify and improve the construction and mode of operation of certain of the parts of the machine disclosed in said application as hereinafter fully described and particularly pointed out in the appended claims.

The improved can washing machine is illustrated in the accompanying drawings in which Fig. 1 is an elevation of the intake end of the machine, with parts removed in order to show the illustrated parts more clearly; Fig. 2 is a sectional elevation of the discharge end of the machine, the section being taken on the line 2—2 of Fig. 9; Fig. 3 is an enlarged section of the means for washing the bottom of the cans, the section being taken on the line 2—2 of Fig. 9; Fig. 4 is a transverse section taken on the line 4—4 of Fig. 10, but on an enlarged scale; Fig. 5 is a detail section taken on the line 5—5 of Fig. 4; Figs. 6 and 7 taken together are an enlarged elevation of the right hand side of the machine, with the middle section left out and with certain parts removed in order to show the illustrated parts more clearly; Figs. 8 and 9 taken together are a longitudinal section through the complete machine, and showing the arrangement of the nozzles and of the valves for controlling them in top plan; Fig. 10 is a longitudinal section, on a reduced scale, of the complete machine, and showing more particularly the arrangement of the main driving or actuating means; Fig. 11 is a longitudinal section taken on the line 11—11 of Fig. 12, the view being taken looking in the direction of the arrow marked 11 in Fig. 1; Fig. 12 is a longitudinal section taken on the line 12—12 of Fig. 11, the view being taken looking in the direction of the arrow marked 12 in Fig. 1; Fig. 13 is an elevation, partly in section, and looking from the intake end of the machine, of the cover advancing means and of the first unit of the valve actuating means; Fig. 14 is an elevation of a portion of the first unit of the valve actuating means; Fig. 15 is an elevation, looking from the intake end of the machine, of one of the latches of the valve actuating means; Fig. 16 is a front elevation of the parts shown in Fig. 15; Fig. 17 is a top plan of the parts shown in Fig. 15; Fig. 18 is a view similar to Fig. 15 but looking from the discharge end of the machine; Fig. 19 is a section taken on the line 19—19 of Fig. 17; Fig. 20 is an enlarged section through one of the fluid nozzles and showing it inserted in a can; Fig. 21 is a similar section through one of the steam nozzles and showing it with relation to a can about to descend over it; Fig. 22 is a transverse section through the air nozzle for drying the cans and showing it inserted in a can; Figs. 23 to 26, inclusive, are detail elevations of a portion of the discharge end of the machine and illustrating the action of uprighting a clean and dried can; Fig. 23 showing the position of the parts on the completion of the return stroke of the carriage after a can has been deposited over the air nozzle; Fig. 24 showing the position of the parts during the next upstroke of the carriage, during which the dried can is partly tilted; Fig. 25 showing the position of the parts on the completion of the upstroke of the carriage; and Fig. 26 showing the position of the parts on the completion of the next forward stroke of the carriage, during which the can has landed in upright position on the discharge platform; Fig. 27 is an elevation, partly in section, of the left hand side of the machine; Fig. 28 is a diagrammatic view of the spray nozzles, of the valves controlling them, and of the sources of the fluid used in treating the cans and covers, the air ducts alone not being shown, and Figs. 29 to 40 inclusive, show diagrammatically the valve actuating mechanism and the means for setting the valve actuating mechanism, and in these figures, Fig. 29 is a top view of a fragment of the machine showing the valve actuating mechanism in inoperative condition, a can being positioned at the second station and the carriage in lowered position; Fig. 30 is a side view and Fig. 31 is an end view of the parts shown in Fig. 29; Fig. 32

is a view similar to Fig. 29, except that the carriage is in elevated position, raising the can from the second station; Fig. 33 is a side view and Fig. 34 is an end view of the parts shown in Fig. 32; Fig. 35 is a view similar to those shown in Figs. 29 and 32, except that it shows the can advanced by the forward stroke of the carriage into position over the first spray nozzle, and a corresponding positioning of the valve actuating mechanism for this station; Fig. 36 is a side view and Fig. 37 is an end view of the parts shown in Fig. 35; Fig. 38 is similar to Figs. 29, 32 and 35, but shows the carriage lowered at the completion of its forward stroke and the can lowered thereby over the first spray nozzle, with its corresponding effect upon the valve actuating mechanism; and Fig. 39 is a side view and Fig. 40 an end view of the parts shown in Fig. 38.

The can washing machine of the present invention is constructed and operates on the general principle of the can washing machine disclosed and illustrated in my copending application. The machine of the present invention differs from the machine of said application in the following particulars:—In the machine of the copending application the cleaned and dried can is uprighted on the down stroke of the can transporting carriage, whereas in the present machine the cleaned and dried can is uprighted on the up stroke of the carriage. In the machine of the copending application the covers are advanced through the machine one step in advance of the cans, whereas in the present machine, by reason of the change in uprighting the can, the covers are advanced through the machine pari passu with the cans, with the result that the machine is shortened by the length of one step or forward advance of the cans and covers, and simplified and improved means are employed for placing the covers within range of the cover advancing means. In the machine of the copending application each valve and its actuating means are directly controlled by a can approaching the station at which it is to be treated, whereas in the present machine only the first valve and its actuating means are directly controlled by the can approaching the first station or nozzle, the remaining valves and their actuating means being controlled from the first valve and its actuating means. That is to say, as the can approaches the first station or nozzle it engages a feeler and thereby controls the operation of the first valve, and the fact that the first valve is thus set in operation is availed of to cause the remaining valves to be successively set in operation as the can successively approaches the remaining stations. Since the operation of each valve is dependent upon that which precedes it, the failure of any one valve to function will automatically prevent the operation of all of the valves succeeding it. The machine of the present invention is also provided with sundry improvements such as means for preventing the cans from toppling over during their advance from nozzle to nozzle, and with other improved devices the advantages of which will be pointed out as the description proceeds.

The improved can washing machine as illusted in the drawings comprises two longitudinally extending bars 29 on which the cans 30 are supported in inverted position during the various operations of washing, sterilizing and drying the cans. The bars 29 are provided at intervals throughout their lengths with legs 31 which rest on cross pieces 32 supported at their outer ends from the upright standards 33 forming part of the main or stationary frame of the machine. The bars 29 extend throughout the length of the machine, one end of the bars, the right hand end, viewing Fig. 27, being located at the intake end of the machine and the other end of the bars being located at the discharge end of the machine. The nozzles for directing the washing, sterilizing and drying fluids into the cans extend upwardly from the can supporting bars 29 and are arranged at equally spaced intervals, being fixed in position between the bars by means of brackets 35. Each bracket 35 is provided with two oppositely disposed, longitudinally extending wings 36 the upper edges of which are flush with the upper edges of the bars 29. The bracket wings 36 cooperate with the bars 29 in supporting the inverted cans over the nozzles. In this connection it will be observed that although the bars 29 are shown as of unbroken continuity throughout their length, they may consists of a series of interrupted supports like the bracket wings 36, since the cans are not advanced or slid along the bars but are advanced through the machine out of contact with the bars and only rest on the bars during the washing operations, as will be presently explained.

The means for advancing the cans through the machine and depositing them successively over the nozzles comprises, as in my copending application, two longitudinally-extending, oppositely-faced angle bars 37 which are spaced apart far enough to support on their horizontal parts the flanged mouths of the usual types of large milk cans. The bars 37 rest on the inner ends of the pairs of transversely arranged pieces 38 secured to the lower ends of the outer row of uprights 39 and the inner row of uprights 40. The uprights 39 and 40 are held in spaced relation by the longitudinally extending angle irons 42, 43 and 44 secured to their lower ends and by the channel iron 45 resting on the upper ends of the inner uprights 40, and are braced transversely by the cross pieces 46 and obliquely arranged braces 47.

There is thus produced a light movable frame or carriage rigid enough to lift all the cans in the machine simultaneously and transport them through the machine by a step by step movement. To the inner surfaces of the outer row of uprights 39 is secured a guard plate 48 and to the inner surfaces of the inner row of uprights 40 is secured a guard plate 49. The cans are prevented from striking the guard plates 48 and 49 by the longitudinal-extending rails 51 and 52.

The cans are placed manually in the machine at the intake end thereof and they are then advanced through the machine by the carriage to which a four-step cycle of movements is imparted. The first step of the carriage is upward, lifting the cans to a point at which their flanged mouths are above the plane passing through the upper ends of the nozzles. The carriage then moves forward one step toward the discharge end of the machine and at the end of the forward step the carriage descends to lower the cans onto the bars 29, after which the carriage freed from the cans returns toward the intake end of the machine into position to pick up the next can which has been placed in the machine.

The means for imparting the four-step cycle of movements to the can transporting carriage comprises two rectangularly-shaped gear frames 56 and 57 supported from the lower sides of the angle irons 43 and 44. The gear frames 56 and 57 have parallel sides and are guided in their movements between the longitudinally arranged bars 58 supported on the cross pieces 32. The upper ends of the inner row of uprights 40 of the can carriage are guided between two longitudinally extending angle irons 53 resting on the transversely arranged channel irons 54 supported on the upper ends of the uprights 33 of the stationary frame of the machine.

Each gear frame 56 and 57 is provided with a four-sided internal gear, with round corners, adapted to be engaged by a pinion 60. The two pinions 60 are mounted on the inner ends of the transversely arranged shafts 61 journaled at their ends in frames 62 which are supported at their inner ends on the bars 58 and at their outer ends on the angle irons 63 supported from uprights 33. On the outer ends of the shafts 61 are mounted bevel gears 64 which are driven by pinions 65 mounted on the opposite ends of the longitudinally arranged shaft 66 journaled in brackets 67 projecting outwardly from the frames 62. The shaft 66 may be driven from a conveniently placed motor and for this purpose is provided with a sprocket wheel 68 and chain 69. The shaft 66 rotates in a clockwise direction, viewing Fig. 1, or in a counter-clockwise direction, viewing Fig. 2. From this it will be understood that while the rotating pinions 60 are in mesh with the teeth of the upper horizontal gear sections 71 the can carriage is traveling backwardly or toward the intake end of the machine, that while the pinions are in engagement with the vertical gear sections 72 the carriage is rising or traveling upwardly, that while the pinions are in engagement with the lower horizontal gear sections 73 the carriage is advancing toward the discharge end of the machine, and that while the pinions are in engagement with the vertical gear sections 74 the carriage is descending or traveling downwardly. Since the pinions 60 rotate constantly and the gear sections constitute two internal, rectangular gears, the travel of the can carriage is substantially continuous, even at the points where it changes its direction of travel. However, the end of the backward movement or travel of the carriage toward the intake end of the machine may be regarded as the point of beginning of the four-step cycle of movements of the carriage in transporting the cans through the machine. The cans rest in inverted position on the bars 29 during the whole of the backward stroke of the carriage and are supported by the carriage during the upward, forward and downward strokes of the carriage, it being understood that the carriage deposits the cans on the bars 29 just previous to the completion of the downward stroke, and reengages the cans just after the beginning of the upward stroke. The can carriage is supported during its upward and downward movements and also while the pinions 60 are in engagement with the lower gear sections 73 by means of the rolls 76 concentrically alined with the shafts 61, respectively, and traveling in grooves 77 formed in the rear sides of the gear frames 56 and 57, as shown in Figs. 4, 10 and 27. The rolls 76 are mounted in the journals 78 resting on the angle irons 58.

To prevent the cans from toppling over during the forward movement of the carriage, I provide a series of guard arms 80 each consisting of a V-shaped piece of metal the ends of the arms of which are fastened to the longitudinally extending rod 81 journaled in blocks 82 secured to the inner surfaces of the guard plate 49 at the points where the latter are in engagement with the uprights 40. The angle iron 52 overhangs the blocks 82 and rod 81. At the discharge end of the machine the rod 81 is provided with an arm 83 having an offset free end in which is formed a cam slot 84 which receives a fixed rod 85 supported at one end by a bracket arm 86 secured to a drip tank 87 and at its other end by a bracket 88 rising from a rail 89 formed on one edge of the discharge platform 90. The disposition of the rod 85 and of the cam

slot in the arm 83 is such that when the can carriage is on its rearward stroke returning toward the intake end of the machine, the arm 83 is held raised by the rod 85 and the guard arms 80 are thereby held pointed downwardly so as not to interfere with the cans, as shown in Figs. 1 and 4. When, however, the can carriage rises to carry the cans one step toward the discharge end of the machine, the arm 83 is turned by the rod 85 to raise the guard arms 80 into horizontal position between the cans so that if a can should tend to topple over during the forward movement of the carriage it will be caught and held by the adjacent guard arm and returned to normal position on the downward stroke of the carriage depositing the cans on the supports 29. It will thus be understood that the guard arms 80 are moved upwardly between the cans as the carriage rises, continue in horizontal position during the forward step of the carriage, and are returned into inoperative vertical position on the downward travel of the carriage.

The points along the can supporting bars 29 at which the can carriage successively deposits the cans may be regarded as stations at which the cans pause for the successive washing, sterilizing and drying treatments to which the cans are subjected in cleansing them. These stations are indicated at A, B, C, D, E, F, G, H and I. At each station there is located a nozzle, but the nozzles at stations A and B are false nozzles. These first two stations are provided partly to afford the operator opportunity to place an inverted can in the machine, as at station A, and partly to permit the milk or other substance remaining in the can to run out before the can is subjected to the preliminary cold water rinse which occurs at station C and is followed by a hot water rinse at station D. A washing solution is directed against the inner surfaces of a can at station E and at station F any solution adhering to the can is removed by a hot water rinse. At stations G and H the interior surfaces of the cans are subjected to a steam bath, and at station I a blast of air is directed into the can to dry it.

When the machine is first started in operation the operator places a can in inverted position over the false nozzle at station A. It will be noted in this connection that all of the nozzles, including the false nozzles at stations A and B, are provided with radially extending wings 92 over which the mouths of the cans pass and which thereby serve to guide or center the cans with respect to the nozzles. At the end of the stroke or travel of the carriage toward the intake end of the machine the rear ends of the angle irons 37 of the carriage are positioned under the can resting on the rear ends of the bars 29 at station A, so that on the upstroke of the carriage the can is lifted from over the false nozzle at station A and on the next forward stroke of the carriage is brought to position over the false nozzle at station B, over which the carriage deposits the can on the down stroke of the carriage and at which it leaves the can as it returns toward the intake end of the machine. While the carriage is depositing the can at station B and until the carriage completes its return movement the operator has opportunity to place another can in inverted position on the bars 29 at station A. On the next upward stroke of the carriage the two cans are lifted simultaneously from the bars 29, and are transported to the next successive nozzles on the next forward step of the carriage, the can at station B being moved to station C and the can at station A being moved to station B. As the carriage continues to pass through its four-step cycle of movements, and the operator continues to place cans in inverted position over the false nozzle at station A, the cans are successively placed over the succeeding nozzles until there is a can at each station, nine in all. After a can has been placed over the air nozzle at station I to receive the blast of air against its interior surfaces during the backward stroke of the carriage, the dried can is lifted from over the air nozzle on the next upward stroke of the carriage and is then pushed upwardly over a stationary abutment 91 so as to land top side up on a discharge platform 90, the uprighting of the can occurring during the upward and the forward strokes of the carriage. During the next downward stroke of the carriage which deposits the next succeeding can over the air nozzle, and the return of the carriage toward the intake end of the machine, the operator has opportunity to place another can over the false nozzle at station A. It is thus seen that nine cans are constantly in the machine during the normal, continuous operation thereof, and that of these nine, seven are simultaneously subjected to cleansing, sterilizing and drying operations, and that as each dried can is uprighted onto the discharge platform 90 an unwashed can is placed in the machine. It will be understood that in the practical operation of the machine the operator can only place a can in the machine when the can has been emptied, and that consequently many gaps will occur in the line of cans passing through the machine. The valves corresponding to the absent cans will not be operated, but the valves opposite the stations occupied by cans will be operated. The operation of the machine is continuous, the cans being placed in the machine manually and then treated and discharged entirely automatically. The automatic placing of the covers on the cans will be described later.

The nozzles at stations C to H, inclusive, which direct the cleansing and sterilizing fluids against the interior surfaces of the

cans, are supplied by a complicated system of piping which cannot conveniently be shown in the detailed views illustrating the actual construction of the machine and is therefore shown diagrammatically in Fig. 28. By referring to this figure in connection with the other views illustrating these parts it will be readily understood how the fluids for treating the cans are conducted to the nozzles.

The nozzle at station C which directs the spray of clean cold water against the inner surfaces of the can is connected by the pipe 93 with a cold water main 94. In the pipe 93 is located a pop valve 95, which is opened to permit the water to escape through the nozzle C as the can descends thereover. Return water from the can at station C, as also the drippings from the cans at stations A and B, runs into a pan 96 supported on cross pieces 32. From the pan 96 the waste may be conducted to a sewer or otherwise disposed of.

While the can is at station C the cylindrical exterior surfaces of the can, but not the bottom thereof, is subjected to a water spray to remove loose particles of dirt adhering thereto. For this purpose two vertically arranged pipes 97 are provided. The pipes 97 are set in recesses formed in the guard plates 48 and 49. The pipes 97 are connected at their upper ends by a transverse pipe 98 and the pipe 97 located in the plate 49 is connected at its lower end by a flexible hose 99 with the pipe 93 at a point where it is controlled by the valve 95. The pipes 97 are perforated on their inner sides so as to direct streams of water against the opposite sides of the can at station C as the carriage is depositing the can at station C, is traveling toward the intake end of the machine and is passing through the first part of its upward movement. It will be understood referring to Fig. 8, that while the carriage is depositing the can at station C, the pipes 97 are located between stations C and D, the carriage being shown in Fig. 8 at the limit of its return movement. The drippings from the exterior surfaces of the can at station C fall into the pan 96.

The nozzle at station D directs a stream of hot water against the interior surfaces of the can. This nozzle is fed through the pipe 101 which has its intake end connected with an injector 102 located in the bottom of a drip tank 103 positioned under the nozzle at station F. The valve 104 for controlling the passage of hot water through the nozzle at station D is located in a pipe 105 connected at one end with a steam main 107 and at its other end with the injector 102 which operates in the usual manner. The nozzle at station F is used to direct a final rinsing of hot water against the inner surfaces of the cans and consequently the water in the tank 103 is generally too hot to permit of the maximum operation of injector 102 by means of the steam entering the injector from the pipe 105. For this reason a constant small stream of cold water is fed into the injector 102 by the valve controlled pipe 108 connected with the part 109 of the cold water main 94. The hot water drippings from the can at station D fall into the pan 96.

After the interior surfaces of the cans have been rinsed with cold and hot water at stations C and D they are thoroughly cleansed by streams of solution directed against them by the nozzle at station E. The washing solution is drawn from a tank 110 located under the nozzle at station E by means of a pump 111. The intake 112 of pump 111 is located near the bottom of tank 110. The outlet of pump 111 is connected with the nozzle at station E through the pipe 113 in which is located the valve 114. The tank 110 is supplied with a determined quantity of concentrated solution from the tank 115 each time the valve 114 is operated. For this purpose the valve 116 located in the pipe 117 leading from the tank 115 into the tank 110 is caused to be operated each time the valve 114 is operated. In making up the solution in tank 110 at the beginning of the day's run, water is fed into the tank from the main 94 through the valve-controlled pipe section 109. The tank 110 is also supplied with distilled water from a steam jacket 119 which surrounds the pipe 120 leading from the pipe 109 to a nozzle 121 which directs a spray of water against the bottoms of the uprighted cans on the platform 90 just before they are discharged from the machine. The steam jacket 119 is used to heat the water passing through pipe 120. The jacket 119 is connected by the valve controlled pipe 122 with the offset section of a pipe 123 connected with steam main 107. The condensate from the jacket 119 flows through the pipe 124 into the tank 110, as is clearly indicated in Fig. 28. The tank 110 is also supplied with a definite quantity of water from the pipe 93 through the branch pipe 125 each time the valve 95 is operated. The return solution from the can undergoing treatment at station E falls back into tank 110.

The solution adhering to the interior surfaces of the can which has just been treated at station E is removed therefrom by a spray of clean hot water directed into the can at station F. The clean hot water is taken from a tank 127 located beside the tank 103, as best indicated in Fig. 10. In the diagrammatic arrangement shown in Fig. 28, tank 127 is shown located between tanks 103 and 110. The nozzle at station F is connected by the pipe 128 with the discharge of an injector 129 located in the bottom of tank 127. The intake end of the injector 129 is connected by the pipe 130, in which the valve 131 is located, with the steam pipe 123. The tank 127 is

supplied with a definite quantity of clean cold water through the branch 132 of the pipe 93 each time the valve 95 is operated. By this arrangement only so much water is admitted into the tank 127 as is necessary to assure the proper rinsing of the solution-covered inner surfaces of the can at station F. The return water from the can at station F falls into tank 103 from which it is taken and used as the preliminary hot water rinse at station D. Overflow from tank 103 passes through the pipe 133 into tank 110. To prevent tank 110 from running over it may be provided with the usual overflow pipe.

The nozzles at stations C, D, E and F are all alike in construction and mode of operation. One of these nozzles is shown in enlarged longitudinal section in Fig. 20, and comprises a substantialy spherical, hollow head made in two parts, the upper half or top 135 being provided on its lower edge with a threaded flange 136 which screws into the internally threaded upper end of the lower nozzle section 137, the lower end of which is formed as a pipe and rests on the top of the central hollow section 138 of a bracket 35. Into the open lower end of the nozzle section 137 is threaded the upper end of a pipe leading from the valve which controls the nozzle. The upper and lower nozzle sections 135 and 137 are provided with the apertures 139 through which fluid is directed against the interior surfaces of the can undergoing treatment by the nozzle.

At stations G and H the interior surfaces of the cans which have been thoroughly cleaned of surface impurities at stations C to F, are subjected to the action of live steam to kill any deleterious micro-organisms adhering to them. The nozzle at station G gives the can a preliminary steaming and the nozzle at station H simply repeats and renders more effective the action of the nozzle at station G. The nozzle at station G is connected with the steam pipe 123 by the branch pipe 141 in which is located the valve 142, and the nozzle at station H is connected with the steam pipe 123 with the branch pipe 143 in which is located the valve 144.

The steam nozzles at stations G and H are alike in construction and operation. The construction of the nozzles is brought out most clearly by the enlarged longitudinal section shown in Fig. 21. Each nozzle comprises a central perforated pipe 146 having a closed top 147. The perforated pipe 146 is located at the bottom of a cylindrical shell or casing 148 open at its top end and closed at its lower end except for the apertures 149 therein. Each shell or casing 148 is supported at its lower end from the bars 29 by one of the brackets 35. The center of the bottom of the shell or casing 148 is pierced to receive the lower end of the perforated pipe 146 which is secured to the upper end of the branch pipe 141 or 143. When the valve connected with each steam nozzle is open the steam rushes up into the perforated pipe 146, carrying with it any condensate which has gathered in the pipe 123 or in the branch pipe 141 or 143 with which the nozzle in operation is connected. The condensate is prevented from being directed against the inner surfaces of the can by the cap 147 which compels the steam to leave the pipe 146 through the apertures therein and pass out of the casing 148 through its upper end. The condensate carried by the steam emerging through the apertures in the pipe 146 will impinge against the inner surfaces of the lower end of the casing 148 and fall down onto the bottom of the casing and pass out through the holes 149. Consequently only steam freed from condensate will be driven against the inner surfaces of the cans and so a very effective sterilizing action will be obtained.

At station I the inner surfaces of the cleaned and sterilized cans are dried by subjecting them to a blast of air conducted from a conveniently placed blower by the pipe 151 with which the branch pipe 152 leading to the nozzle 153 at station I is connected. The nozzle 153 is shown in an enlarged transverse section in Fig. 22 and consists simply of a cylindrical piece of tubing supported at its lower end from the bars 29 by one of the brackets 35. The nozzle 153 at station I is not controlled by a valve and consequently a continuous blast of air passes through nozzle 153.

The valves for controlling the passage of fluid through the nozzles at station C to H, inclusive, are all alike in their arrangement and mode of operation, being pop valves of usual construction, the valve 95 for controlling the nozzle at station C being indicated in Fig. 13 and comprising a body portion or casing 155 and a vertically acting stem 156. The valves are all supported from a longitudinally extending angle iron 157 by means of the inwardly extending bracket plates 158. The angle iron 157 is secured to the inner sides of the uprights 33 at the right hand side of the machine.

The valves are normally in closed condition and are opened by depressing the valve stems 156. The means for depressing the valve stems comprises a series of cams 175 mounted on an oscillatory shaft 159 journaled in bearings 160 supported from the uprights 33 at the right hand side of the machine. The shaft 159 is oscillated by the up and down movements of the can carriage and for this purpose the right hand end of the shaft (Figs. 8 and 9) is provided with an outwardly extending crank arm 162 pivotally connected with the upper end of a link 163 the lower end of which is pivotally connected with an inwardly extending crank arm 164 (Fig. 2) fixed on a shaft 165 jour-

naled in bearings 166 supported on the inner side of uprights 33. On the shaft 165 is fixed a rod-like arm 167 (Fig. 4) the free outer end of which is slidingly received in a sleeve 168 provided with a head 169 slidingly mounted on a rod 171 carried by the lower ends of the downward extensions 172 of the gear frame 57. The arrangement is such that when the can carriage descends the shaft 165 is turned in a counter-clockwise direction, looking from the intake end of the machine, whereas the shaft 159 is turned in a clockwise direction. On the other hand when the can carriage rises the shaft 165 is turned in a clockwise direction, whereas the shaft 159 is turned in a counter-clockwise direction. If cans are in the machine at stations corresponding to the valves, the valves are operated when the shaft 159 is turned on the descent of the can carriage, and the valves are released and thereby close when the shaft 159 is turned in the reverse direction on the rise or upward stroke of the can carriage. When the can carriage is moving longitudinally toward either the discharge end or the intake end of the machine, the rod 171 slides in the head 169 and shafts 165 and 159 remain stationary. In order that the rod 171 and head 169 may not bind, the sleeve 168 moves in a vertical slot formed by the uprights 173 (Fig. 5).

The cams 175 do not contact with the valve stems and so do not immediately actuate the valves. The actuating means for each valve is a member 182 adjustably secured to the underside of the inner end of a plate 177 extending inwardly from a frame 178 loosely mounted on a rod or stud 179 fixed at its lower end in the valve supporting plate 158. When the cams 175 are in operative position their lower edges are substantially horizontally disposed above the plates 177, as shown in Fig. 13. The valve actuating members 182 are normally held out of alinement with their respective valve stems, so that when the plates 177 are depressed as the shaft 159 and cams 175 rotate each time the can carriage descends, the members 182 will not contact with and actuate their valves unless cans are at the stations or nozzles corresponding to the valves. The means for holding each valve actuating member 182 out of alinement with its respective valve stem comprises a double acting torsion and expansion spring 180 encircling the lower end of each rod 179 and having its upper end attached to a plate 177 and its lower end attached to a plate 158. The action of each spring 180 is to support its respective plate 177 and frame 178 and also to swing them so as to normally hold the valve actuating member 182 out of alinement with its valve stem 156.

The means for swinging each frame 178 against the action of its spring 180 to aline the valve actuating member 182 with its valve stem 156, includes a vertical rod 185 carried on the end of an arm 184 having a hub 183 loosely mounted on the stud 179 between two confining collars 173, the arm 184 being adapted to engage with an upright pin 187 on a plate 186 extending inwardly from the frame 178 above the plate 177. A spring 189 secured at one end to the arm 184 and at its other end to an ear 190 of a bracket 188 supported by angle iron 157 normally holds the arm 184 against the end of bracket 188. The spring 180 presses the pin 187 against the other side of the arm 184. When arm 184 is swung away from bracket 188 the plate 177 will be swung in like manner, due to the engagement between the arm 184 and the pin 187, and the actuating member 182 will be alined with its valve stem to actuate the valve on the next rotation of cam shaft 159.

In former machines of this character, so far as known, the actuation of a valve is controlled directly by a can entering the station, that is, coming to position over the nozzle, corresponding to the valve. This mode of operation was secured by mechanism subjected to the washing and cleansing fluids, with consequent deterioration of the parts. In the present machine I largely avoid subjecting the valve controlling mechanism to the action of the washing and cleansing fluids by a novel method and means of controlling the operation of the valves. In this machine the can to be cleansed directly controls the operation of the first valve only. The second valve is put in operation because the first valve has been set in operation, and in like manner each succeeding valve is set in operation from the operation of its preceding valve. The valves operate only when cans move to position over the corresponding nozzles, as in former machines, but the cans do not directly control the operation of any of the valves except the first. The arrangement of parts by which this novel mode of operation is attained will now be described.

The devices for controlling the adjustment of the valve actuating mechanisms are mounted on the can carriage, there being as many control devices as there are valves and valve actuating mechanisms. Only the first of these devices is adapted to be engaged and operated by a can, all the others being operated from the setting of the first valve actuating mechanism. The first control device, that is, the one adapted to be operated by a can, includes a finger 192 pivotally mounted on a bracket 193 secured to the rail 44 of the can carriage. A link 194 attached at one end to an ear 195 on finger 192, connects the finger to an arm 196 of a bell crank lever pivoted in a bracket 197 secured to the rail 43 of the carriage. The other arm 198 of the bell crank lever projects into position to be engaged and depressed by the flange of a can picked up at station B by the carriage.

When said arm 198 is depressed by the can, the finger 192 is thrown outwardly so as to engage the vertical rod 185 on the forward stroke of the carriage, as shown in Fig. 37. When said arm 198 is not depressed, a spring 199, attached at one end to the finger 192 and at its other end to angle iron 44, holds finger 192 retracted and out of engaging relation with the rod 185, as shown in Figs. 1 and 31. This spring 199 also resiliently holds the arm 198 raised and in position for engagement by a can.

The other devices on the carriage for adjusting the valve actuating mechanisms are all alike but differ from the device just described, in that they are not actuated or adjusted by the engagement of a can therewith. Each of these other devices, as shown in Figs. 15 to 18 inclusive, includes a finger 200 pivoted on a bracket 202 secured to the frame member 44 of the carriage, and adapted to be swung outwardly into position for engagement with its corresponding rod 185, and to be swung inwardly from such position.

Each finger 200 has a stem 203 seating in a recess 204 provided in a member 205 formed on, or attached to, the bracket 202, so that the side walls of recess 204 limit the extent of movement of finger 200. A spring 206, compressed between the bracket bearing 201 and a washer 207 on the protruding end of the pivot pin 208, holds the stem 203 resiliently engaged in either one of two depressions, 209 and 210, formed in the inner wall of recess 204, whereby the stem 203 is resiliently held in either position to which it has been moved.

Each finger 200 is provided with a heel 211, adapted when the finger is in outward position, and the carriage descends, to engage the cam surface of a rail 212, which extends a certain distance along the machine, whereby the fingers 200 are moved into retracted position. This rail may be supported on suitable brackets 213 resting on certain frame members of the machine.

The heels 211 of fingers 200 are also adapted, when the fingers are in retracted position and the can carriage rises, to engage the extended ends 191 of the plate 177, whereby the fingers are thrown outwardly into position for engagement with the rods 185.

The method and mechanism for controlling the valve operation will now be described more in detail, reference being had particularly to Figs. 1, 13 and 29 to 40, inclusive.

Whenever, on the rising of the can carriage, the arm 198 is depressed by a can being picked up by the carriage at station B, the control finger 192 is projected outwardly into line with the first rod 185, and the can will hold the finger 192 in this position of adjustment until the can has become removed from the carriage at the next station C. Toward the end of the forward stroke of the carriage the finger 192, so held projected, will engage with the first rod 185, and will thereby cause the arm 184 and plate 177 to turn on the stud 179. The finger 192 and rod 185 are so placed that when the carriage reaches the limit of its forward stroke, the valve engaging member 182 carried on plate 177 will be in exact alinement with its valve stem 156. This alinement is maintained during partial descent of the carriage and at least until the cam 175 has depressed the valve actuating member 182 into engagement with the valve stem 156 so as to prevent their relative lateral displacement. To aid in preventing such relative displacement of the parts 182 and 156, member 182 may be provided with a recess 214 in which the top 215 of valve stem 156 is adapted to interlock when member 182 is engaged therewith.

Toward the completion of the descending movement of the carriage the finger 192 passes downwardly beyond the lower end of rod 185 and out of engagement therewith. Thereupon, spring 189 draws arm 184 carrying rod 185 against the stop 188. The purpose of this arrangement is to prevent a next succeeding control finger from engaging behind a preceding rod on the return stroke of the carriage and thereby avoid damage or jamming that might result therefrom.

Upon the completion of the down stroke of the carriage, the can is deposited on the bars 29 at station C, and then the carriage draws away therefrom. Thereupon arm 198 is released from the can and is restored to raised position by spring 199, which, at the same time, draws the control finger 192 inwardly and out of position for engagement with rod 195.

The carriage now makes its rearward stroke and then begins to rise. The first control finger 200 is so located on the carriage that as the carriage rises the heel 211 of this finger will strike the end 191 of the first plate 177, which is still held in valve actuating position by the pressure of cam 175. Accordingly, as the carriage rises, the engagement of heel 211 with member 191 will project the control finger 200 outwardly and position it to engage and move the second rod 185 as the carriage completes its next forward stroke. As the carriage continues to rise, the cam 175 releases its pressure on plate 177, which then, under the action of the expansion and torsion spring 180, rises and swings aside until the finger 187 is brought against the arm 184. As plate 177 rises, the valve 95 closes.

After rising, the carriage makes its next forward stroke, advancing the can to the next nozzle, say from station C to station D. Toward the completion of this stroke, the finger 200 which has been set into rod engaging position by the end 191 of plate 177 of the valve actuating mechanism at station C, will

engage the rod 185 opposite station D, and will adjust the valve actuating mechanism at that valve into valve actuating position, and will maintain this adjustment until cam 175 has interengaged the valve actuating member 182 with its valve stem 156. At the end of the subsequent return stroke of the carriage the heel of the next finger will become positioned under the end 191 of the plate 177 at this valve, so that when the carriage then rises this finger will be adjusted into rod engaging position by the heel of the finger striking member 191. Consequently, on the next forward stroke of the carriage, which then advances the can to the next station, for instance, to station E, this adjusted finger will engage the rod 185 opposite station E to adjust the valve actuating mechanism thereat into valve actuating position. The valve actuating mechanisms of all the valves are similarly adjusted in succession as the can is advanced step by step through the machine. Each control finger, except the first one, 192, is adjusted by contacting a member 191 at one valve to engage and set the valve actuating mechanism at the next valve. However, no finger 200 will strike or be set by a member 191 of any valve actuating mechanism which is not set in valve actuating adjustment, since, in such case, the member 191 is normally out of the path of travel of the tail 211 of a finger 200. Therefore, if no can is picked up at the first station to be carried successively to the next stations, the control fingers for the valve actuating mechanisms at said next successive stations will not be set into rod engaging position, and the valve actuating mechanisms at said stations will not be adjusted into valve actuating position. On the other hand, when a can has been picked up at the first station, the fingers for controlling the adjustment of the valve actuating mechanisms at the next succeeding stations will be successively set into rod engaging position, so that the valve actuating mechanisms at said next succeeding stations will be successively set into valve actuating position.

While the cans are passing through the machine and undergoing the washing, sterilizing and drying operations, the covers or tops for the cans are also passing through the machine and are subjected to a similar washing, sterilizing and drying treatment. The runway along which the covers are advanced occupies the space above the valves and their associated parts at the right hand side of the machine, viewing Fig. 1. The covers 220 are supported topside up in oblique position on two rails 221 and 222 fixed on the upper edges of the inturned fingers 223 of a series of frames or brackets 224 secured to the cross pieces 54.

Each can cover consists of a flanged top portion 225 and a cylindrical or tubular neck portion 226 which fits in the mouth of the can. The covers are adapted to be slid along the rails 221 and 222 and since these are arranged on an inclined plane and the rail 222 is lowermost the cylindrical part of the cover will bear against the rail 222. The rails 221 and 222 extend from a point opposite the false nozzle at station A to a point over the discharge platform, as shown in Figs. 6 and 7 and also in Fig. 27. See also Fig. 10 in relation to Figs. 11 and 12.

The means for advancing the covers step by step along the rails 221 and 222 comprises a series of fingers 227 secured to a longitudinally extending bar 228 provided at each end with a boss 229 secured to a shaft 230 journaled in the bearings 231 supported from the cross pieces or braces 232 in the upper part of the frames 224. The shaft 230 is positively oscillated in the direction to lift the fingers 227 above the plane passing through the top surfaces of the can covers, and is yieldingly oscillated in the opposite direction to place the fingers 227 in cover-engaging position. For this purpose the shaft 230 is provided with an arm 233 the free end of which projects through a slotted plate 234 secured to the upright 40 of the can carriage. A contraction spring 235, the lower end of which is attached to the arm 233 and the upper end of which is attached to a pin 236 secured to the channel beam 45 normally holds the free end of the arm 233 against the top 237 of the slotted plate 234. On the down stroke of the can carriage, part 237 engages with the arm 233, depresses the free end thereof and so oscillates the shaft 230 to lift the fingers 227 above the can covers, as shown in Fig. 4. As the can carriage rises the spring 235 holds the free end of the arm 233 against the underside of the part 237 and thereby causes the shaft 230 to oscillate and place the fingers 227 in cover-engaging position, as shown in Fig. 2. If during the movement of the fingers 227 into cover-engaging position one of the fingers should encounter a misplaced cover, the spring 235 will yield while the can carriage and part 237 complete their upward travel, and thus no injury will occur to any of the parts of the machine. While the fingers 227 are held above the tops of the can covers by the engagement of the part 237 with the arm 233, the can carriage is moving toward the intake end of the machine, and while the fingers 227 are in cover-engaging position the can carriage is moving toward the discharge end of the machine and consequently the fingers 227 advance the covers one step. Bar 228 reciprocates in unison with the can carriage because arm 233, which is secured to shaft 230, is always engaged in the slot of member 234 mounted on the carriage.

Before the operator places a can in inverted position over the false nozzle at station A,

he places the cover on a hopper-like chute indicated generally at 240. The chute 240, as shown best in Figs. 1, 4 and 6, is obliquely arranged and comprises two side or guide bars 241, 242, the lower ends of which are connected, respectively, with the rails 221 and 222, the outer or upper ends of the bars being connected by the cross piece 243. The bars 241 and 242 are supported in position by the bracket 244 extending from the first upright 33 at the right hand side of the machine. The chute is provided with the obliquely arranged bottom 245. When the can is placed in inverted position at station A the cover for the can is placed topside up in the chute, the lower edges of the cylindrical neck of the cover resting on the bottom 245 of the chute. The cover slides down the chute until the cylindrical neck portion thereof rests against the outer end of the lower rail 222, as shown in Fig. 1. Arranged over the lower end of the chute is a directing guard member 246 supported from the first brace 232.

Each cover is advanced its first step along the rails 221, 222, by means of a pusher lever 248, pivotally mounted on the carriage. Lever 248 has a hub 249 (Fig. 13) rotatably mounted on a shaft 250 supported in brackets 251 secured to the carriage. This hub carries an arm 252 having a can-engaging end 253 so placed that when the carriage rises to pick up a can from over the false nozzle at station A the arm 252 will be depressed and the pusher lever will be rocked upwardly, so that when the carriage is fully raised the pusher end 254 of lever 248 will come into line with the neck of the can cover. Then, as the carriage makes its forward stroke the cover will be pushed along one step by the pusher. However, if there is no can at station A to be picked up by the carriage as it rises, arm 252 will not become depressed and the pusher lever 248 will not engage the can cover when the carriage advances, but will pass by beneath it. When a cover has been advanced such initial step it is in position to be engaged by the first of the cover advancing fingers 227.

When a cover is at the base of the chute 240 its position in the machine corresponds with the position of a can placed over the false nozzle at station A. When the machine advances the can from station A to the false nozzle at station B, the cover simultaneously is advanced by means of the pusher lever 248 to a position in the machine corresponding to the position of the can at station B. Now when the carriage, after its return stroke, rises to lift this can from station B preparatory to advancing it to station C, the rising of the control member 234 for the arm 233, which controls the positioning of the cover fingers 227, causes the first cover finger 227 to be lowered into position behind this cover, so that when the raised carriage advances the can to position over station C, the first cover finger 227 simultaneously advances the cover along the rails 221 and 222 into a position in the machine corresponding to the position of the can deposited at station C. A cover washing nozzle 255 is appropriately placed so that a cover advanced to the position referred to will be acted on by nozzle 255. Upon the next forward stroke of the carriage, whereby the can is advanced from station C to station D, the second finger 227 of the cover advancing means engages behind this cover and advances it another step along the rails 221 and 222 and into a position corresponding with the position of the can deposited at nozzle D. An appropriate nozzle is also disposed at this point for treating the cover thereat. Upon the next forward stroke of the carriage, the can will be advanced from station D to station E and the third finger 227 of the cover advancing means will advance the cover another step along the rails 221, 222, and into position for treatment at another nozzle. Thus, each cover is advanced step by step along the rails 221, 222, and from one nozzle to the next in correspondence with the advancement of a can through the machine; that is, a can and a cover start through the machine together and are advanced correspondingly step by step until discharged.

At each station the corresponding cans and covers are subjected to treatment simultaneously. At the first cover treating station, which corresponds to can station C, the cover treating nozzle 255 is supplied with cold water through a pipe 256 which leads from the pipe 93 which supplies the can treating nozzle C, so that whenever valve 95 is opened, a can over nozzle C will be treated with a cold water spray and a cover over the nozzle 255 will be subjected to similar treatment. The nozzle 257 at the second cover treating station is connected by pipe 258 to the pipe 101, which supplies hot water to the nozzle D, so that when the valve 104 is opened, both the can over nozzle D and the cover at the second cover treating nozzle 257 will be washed with hot water. The nozzle 259 at the third cover treating station is connected by a pipe 260 to the part of the pipe 113 leading from the nozzle E, so that when valve 114 is opened, both the can over nozzle E and the cover over nozzle 259 will be treated with the washing solution transmitted through valve 114. The nozzle 261 at the fourth cover treating station is connected by a pipe 262 to the pipe 128, which leads to the nozzle F so that when valve 131 is open, both the can and cover over nozzle 261 will be treated with clean hot water which passes through valve 131. A branch of pipe 141 which leads from valve 142 to the steam nozzle at can station G also leads to the nozzle 263 at the fifth cover treating station, so that when valve 142 is opened, both

the can at nozzle G and the cover over nozzle 263 will be given steam treatment. Similarly, the pipe 143 which receives steam through valve 144, not only leads to the steam nozzle at can station H, but also leads to the nozzle 264 at the sixth cover treating station, so that when valve 144 is opened, the can at station H and the cover over nozzle 264 will be subjected to steam treatment simultaneously. As the can is then advanced to station I to receive the air blast from nozzle 153, the cover is advanced to the seventh cover treating station where it also receives a blast of air from a cover treating nozzle 265, which is supplied through pipe 266 leading from the air blower pipe 151. The treatment of both can and cover has now been completed, and thereafter, the can becomes disposed in upright position on the discharge platform and simultaneously the cover is advanced into position for placement on the uprighted can. Each of the cover treating nozzles, except the one at the third station for the solution treatment, and the last one, which supplies air, is provided with a branch pipe 267 supported by a nipple which is screwed into an extension 269 extending upwardly from the nozzle. Each branch pipe 267 directs the treating fluid downwardly upon the tops of the covers.

It will be noted that in accordance with the present invention, the cover treating stations may be arranged approximately opposite the can washing stations, and that the covers are progressed from cover station to cover station pari passu with the progression of the cans through the machine, both from position of initial placement in the machine, thus requiring a shorter path of travel for the covers through the machine, and permitting a corresponding reduction in its length. This constitutes an improvement over the arrangement shown in my co-pending application, wherein the cover stations were positioned one step in advance of the can stations, thus requiring an extension of the cover path relatively to the path of the cans. In accordance with the present invention, the position of a cover at the base of the chute 240 is approximately opposite the first false can station A, and as the cover is advanced step by step, it successively assumes positions approximately opposite the successive can stations from B to I inclusive.

As the can is being treated by the air blast at station I, the can carriage completes its return stroke toward the intake end of the machine. The forward ends of the rails 37 of the can carriage are so arranged that on the completion of the return stroke of the can carriage, they will aline approximately with the center of the can at station I, as shown in Fig. 23. Thus when the carriage rises, the ends of the rails 37, which are curved forwardly and downwardly, will engage with the rear half of the can flange. This will cause the can to be tilted against or onto the abutment 91, and then as the carriage completes its upward movement and moves forward, the can is pushed over the abutment and lands bottom side down on the discharge platform. To secure this mode of operation the height of the abutment is adjusted to the length of the upward stroke of the carriage, and the position of the abutment is determined by the size of the cans and the length of the forward stroke of the carriage. If a can is not properly uprighted after sliding over the abutment the uprighting of the can on the discharge platform is completed by means of a pusher arm 270 secured to a shaft 271 journaled in bearings such as 272 secured to appropriate frame members of the machine. Shaft 271 has also secured thereto an operating lever 273 against which a suitable stud or pin 274 carried on the can carriage is adapted to engage as the carriage completes its forward stroke. By this engagement, the operating lever 273 is moved to swing the arm 270 against the rear side of the can and to push the can into upright position in case the can should be leaning against the abutment 91.

In my said prior application, the machine advanced the can one step beyond station I and then somersaulted the can on to the discharge platform on the following down stroke of the can carriage. By uprighting the can on the up and forward strokes of the carriage, in accordance with the present invention, this extra step of advancing the can beyond nozzle I prior to delivering it to the discharge platform is eliminated and the length of the machine may be shortened to the extent of that step, and a number of movements and the time required to put the can through such movements are eliminated.

The platform 90 extends transversely across the discharge end of the machine and is supported on longitudinal channel irons 280 extending from the last pair of uprights 33 to the final short pair of uprights 281. At its forward edge, platform 90 is supported by the channel iron 282 extending transversely of the two uprights 281. These uprights are also connected toward their lower ends by an angle iron 283.

The cans are discharged on to platform 90 at a point in alinement with the bars 29, and here the forward edge of platform 90 is provided with an upright plate 284 which assists in guiding the can into upright position and prevents the uprighting can from toppling off the end of the machine. There is also a guard plate 285 secured along the adjacent side edge of the platform.

The uprighted can is now moved transversely across the discharge end of the machine on the platform 90 into position to receive a spray of water against its bottom, and to receive its cover. For this purpose

an arm 290, having a can engaging piece 291 at its upper end, is fixed on a shaft 292 journaled in bearings 293, one resting on cross piece 283 connecting the end uprights 281 and the other bearing resting on cross piece 294 extending between the last two uprights 33. Arm 290 is oscillated by means of a link 295 connected at one end to an arm 296 secured to shaft 292 and connected at its other end with an arm 297 secured to shaft 165. It will be seen that whenever shaft 165 turns in clockwise direction, viewing Fig. 2, arm 290 will be swung across the platform 90, for instance, from the position shown in full lines in Fig. 2 to the position shown in dotted lines in said figure, and will be returned to initial position when shaft 165 rotates counterclockwise. The rear edge of platform 90 is cut away, as shown in Fig. 9, to allow for the swinging of arm 290. As the arm swings, its can engaging end 291 will be brought against the side of the can and will push the can across the platform 90 into position over the nozzle 121, which directs a spray of water against the bottom of the can to wash it. In the pipe 120 which feeds nozzle 121 there is a valve 302 having a stem 306 over which is located an actuating member 307 adjustably secured to the underside of a plate 304 hinged at 305 to the platform. This plate 304 is normally retained slightly raised above platform 90, as shown in Fig. 3, by the pressure of the valve stem 306 against the member 307. When a can is moved across the platform by the arm 290 into position over plate 304, the weight of the can will depress this plate and consequently depress the valve stem 306, causing the valve to open and a spray of water to issue from the nozzle 121 and impinge against the bottom of the can. The nozzle 121 forms part of the platform 90.

On the next forward stroke of the carriage, the can is pushed forwardly off of platform 90 and on to the rollers 308 which carry the can away from the machine. The means for discharging the cans from the platform 90 includes an arm 309 secured to one of the rails 44 of the can carriage, as shown in Fig. 7. Arm 309 has a can engaging end 310 which, when the carriage is raised, comes into line with the can to be discharged. Then on the forward stroke of the carriage, this end 310 of arm 309 will move against the rear of the can and push it from the platform 90 on to the rollers 308. Then the carriage lowers and the end 310 of arm 309 will move into position below the platform 90, and will be out of the way of another can being moved across the platform. The platform 90 is suitably cut away as at 311 to allow for movement of the arm 309 and its can engaging end 310 relatively to the platform, both vertically and horizontally.

On the forward stroke of the carriage which uprights a can on to the platform 90 opposite the discharge end of the bars 29, the cover which has just been subjected to a blast of air over nozzle 265 is advanced to the end of the rails 221 and 222 in position to be pushed off on the next forward stroke of the carriage. Before this occurs, the can is moved across the platform and into position under the ends of the rails 221 and 222, so that on the next or discharging stroke of the carriage—during which the cover is pushed off the rails 221 and 222—the cover will fall onto the open top of the can as the latter is discharged from the machine. Plates 286 are secured to the ends of the rails 221 and 222 to act as a guard for the reciprocating bar 228.

The left hand side of the machine is provided throughout its length and height with a sheathing indicated at 312, and the entire top of the machine is provided with a hood 313.

In the operation of the machine an operator stands at the intake end of the machine. When he removes a cover from a can, he places it top side up in the chute 240. He then empties the can and places it in inverted position over the false nozzle at station A. The machine now advances this cover and can pari passu through the machine in successive stages or steps from one nozzle to the next until on being raised from the last nozzle the can is pushed into upright position on the discharge platform, after which the can is moved across the discharge platform, its bottom is washed and then as it is discharged from the machine its cover is applied. As soon as the machine has advanced a can from the station A and its cover from the corresponding cover position, the operator may, and is intended to, place another cover in the chute 240 and another can over false nozzle A. The time allotted the attendant to place a cover and a can in the machine is the time consumed by the can carriage subsequent to the removal of a can from station A until it has returned to pick up another can from this station. The attendant, therefore has no difficulty in placing a cover and can in the machine which may operate at a speed consistent with the utmost speed with which the attendant can properly empty and handle the cans.

In the event that the attendant places a cover in the machine but does not place a can in the machine, the cover will not be advanced on the forward stroke of the carriage because the initial advancement of the cover depends upon the arm 252 being depressed by the flanged mouth of a can positioned at station A. However, a can may be advanced through the machine without an accompanying cover but this can be avoided by always placing the cover in the chute 240 before the can is placed on the bars 29 at station A.

When the machine is kept loaded to its full capacity, there is a can at each station, and a can is discharged from the machine and a new can is fed into the machine for each cycle of the can carriage movement.

Except for the initial setting of the first control device for the valve actuating mechanism in response to the raising of a can from station A, the control devices and the valve actuating mechanisms are entirely free of any contact with or control by a can; and all the other control devices become set to properly adjust the valve actuating mechanisms automatically at the proper times and in the proper sequence as the can is progressed through the machine. As pointed out before, this constitutes an improvement over the means disclosed in my said copending application, wherein the control of the adjustment of each valve actuating mechanism is dependent upon a can properly engaging a separate control member for the valve actuating mechanism. By having the can engage the control mechanism only once, the failure of adjustment at any valve due to possible failure of the can to properly engage a control member for each valve separately is avoided. Moreover few moving parts are used and exposed to the action of the washing fluids.

Having thus described the invention what I claim as new is:—

1. A machine for washing cams comprising, a can transporting carriage having an upward, forward, downward and backward movement, a series of equally spaced can supporting platforms having their upper surfaces all on substantially the same plane, a series of upright nozzles associated with the platforms respectively, said carriage serving to position an inverted can successively over the nozzles, a series of valves corresponding to the nozzles, said valves serving to control the passage of washing fluid to the nozzles, an actuating member for each valve normally out of alinement with its valve, an alining element associated with each actuating member for alining it with its valve, each said actuating member and its alining element being independently spring-pressed to normal disalined position, each said alining element having a vertical rod shorter than the limit of the downward stroke of the carriage, a controlling device on the carriage for engaging the first vertical rod and alining the first actuating member with its valve, said controlling device being normally spring-pressed out of position for engaging the first vertical rod and being set in position by a properly placed can on the carriage on the first upward stroke of the carriage to engage the first vertical rod and aline the first actuating member with its valve as the carriage reaches the end of its first forward stroke, said device being freed from the rod before the carriage reaches the end of its downward stroke, and a second movable device on the carriage for engaging the second vertical rod and alining the second actuating member with its valve, said second device having a tail portion, a fixed abutment against which the tail portion of the second device strikes on the downward stroke of the carriage to move the second device out of position to engage the second vertical rod, said second device being moved into position by the first actuating member when it is alined with its valve on the upward stroke of the carriage to engage the second rod and aline the second actuating member with its valve as the carriage reaches the end of its forward stroke, the second device being freed from the second rod before the carriage reaches the end of its downward stroke.

2. In a machine of the character described, a series of valves, an actuating member for each valve normally out of alinement with its valve, an alining element associated with each actuating member for alining it with its valve, a carriage for transporting an article from one point to another, said carriage having an upward, forward, downward and backward movement, a controlling device on the carriage for engaging the first alining element to cause it to aline the first actuating member with its valve, said controlling device being normally spring-pressed out of position to engage the first alining element and being set into position by a properly placed article on the carriage during the first upward stroke of the carriage to engage the first alining element on the first forward stroke of the carriage and aline the first actuating member with its valve, and a second device on the carriage for engaging the second alining element to cause it to aline the second actuating member with its valve, said second device having a tail portion, a fixed abutment against which the tail portion of the second device strikes on the downward stroke of the carriage to move the second device out of position to engage the second alining element, said second device being moved into position on the upward stroke of the carriage by the first valve actuating member when it is alined with its valve to engage the second alining element on the forward stroke of the carriage and aline the second actuating member with its valve.

3. In a machine of the character described, a series of valves, an actuating member for each valve normally out of alinement with its valve; an alining element associated with each actuating member for alining it with its valve, a carriage for transporting articles from one point to another, said carriage having an upward, forward, downward and backward movement, a controlling device on the carriage for engaging the first alining

element to cause it to aline the first actuating member with its valve, said controlling device being normally out of position to engage the first alining element and being set in position by a properly placed article on the carriage during the first upward stroke of the carriage to engage the first alining element on the forward stroke of the carriage to aline the first actuating member with its valve, and a second device on the carriage for engaging the second alining element to cause it to aline the second actuating member with its valve, said second device being normally out of position to engage the second alining element and being set in position on the second upward stroke of the carriage by the first alined actuating member to engage the second alining element on the second forward stroke of the carriage to aline the second actuating member with its valve.

4. In a machine of the character described, a series of valves, an actuating member for each valve normally out of alinement with its valve, an alining element associated with each actuating member for alining it with its valve, a carriage for transporting articles from one point to another, said carriage having an upward, forward, downward and backward movement, a controlling device on the carriage for engaging the first alining element to cause it to aline the first actuating member with its valve, said controlling device being normally out of position to engage the first alining element and being set in position to engage the first alining element by a properly placed article on the carriage, and a second device on the carriage for engaging the second alining element to cause it to aline the second actuating member with its valve, said second device being normally out of position to engage the second alining element and being set in position to engage the second alining element by the first actuating member when it is alined with its valve.

5. In a machine of the character described, a series of valves, an actuating mechanism for each valve normally out of alinement with its valve, a carriage having an upward, forward, downward and backward movement, a series of devices on the carriage for engaging and alining the actuating mechanisms with their respective valves, each device being normally out of position to engage its corresponding valve actuating mechanism, the first device constituting a controlling device and being set in position by a properly positioned article on the carriage on the first upward stroke of the carriage to engage the first valve actuating mechanism on the first forward stroke of the carriage, and the second device being set in position on the second upward stroke of the carriage by the first valve actuating mechanism when said valve mechanism is alined with its valve, to engage the second valve actuating mechanism on the second forward stroke of the carriage.

6. In a machine of the character described, a series of valves, an actuating mechanism for each valve normally out of alinement with its valve, a carriage for transporting articles from one point to another, said carriage having an upward, forward, downward and backward movement, a controlling device on the carriage for engaging and alining the first actuating mechanism with its valve, said controlling device being normally out of position to engage the first valve actuating mechanism and being set in position to engage the first valve actuating mechanism by a properly positioned article on the carriage, and a second device on the carriage for engaging and alining the second actuating mechanism with the second valve, said second device being normally out of position to engage the second valve actuating mechanism and being set in position to engage the second valve actuating mechanism by the first valve actuating mechanism when the latter is alined with its valve.

7. In a machine of the character described, a series of valves, an actuating mechanism for each valve normally out of alinement with its valve, a carriage for transporting articles from one point to another, said carriage having forward, backward and vertical movement a separate device on the carriage for engaging and alining each actuating mechanism with its valve normally out of position to engage its corresponding valve actuating mechanism, the first device being set in position to engage the first valve actuating mechanism by an article placed in a given position, the second device being set in position to engage the second valve actuating mechanism by the first valve actuating mechanism when the latter has been alined with its valve by the operation of the first device, and each succeeding device being set in position to engage its corresponding valve actuating mechanism by the preceding valve actuating mechanism when alined with its valve.

8. In a machine of the character described, a series of valves, an actuating mechanism for each valve normally out of alinement with its valve, a carriage having an upward, forward, downward and backward movement, a movable controlling device on the carriage normally out of position to engage the first valve actuating mechanism, said controlling device being moved into position by a properly placed article on the first upward stroke of the carriage to engage the first valve actuating mechanism and aline it with its valve on the first forward stroke of the carriage, a second movable device on the carriage normally out of position to engage the second valve actuating mechanism, said second device being moved into position by the first

alined valve actuating mechanism on the second upward stroke of the carriage to engage the second valve actuating mechanism and aline it with its valve on the second forward stroke of the carriage.

9. In a machine of the character described, a series of valves, an actuating mechanism for each valve normally out of alinement with its valve, means controlled in its operation by an article placed in a given position for alining the first valve actuating mechanism with its valve, means controlled in its operation by the first valve actuating mechanism when alined with its valve for alining the second valve actuating mechanism with its valve, and means controlled in its operation by the second valve actuating mechanism when alined with its valve for alining the third valve actuating mechanism with its valve.

10. In a machine for cleansing cans and the like, an elongated stationary can support, a plurality of equally spaced nozzles projecting upwardly from the support for directing fluid against the inner surfaces of a can lowered over the nozzles successively, a carriage having an upward, forward, downward and backward movement for advancing the can along the support and raising and lowering it over the nozzles successively, a plurality of valves corresponding to the nozzles for controlling the passage of fluid to the nozzles, an actuating member for each valve normally out of alinement with its valve, an element for shifting each actuating member, a control member for each valve actuating member adjustable to cause the shifting element to be moved to aline the corresponding valve actuating member with its valve each time the carriage moves forwardly, means controlled by a can for adjusting the first control member to cause it to aline the first actuating member with its valve, means for retaining the adjusted valve actuating member in alinement with its valve during the return stroke of the carriage, and means movable with the valve actuating member and adapted to be engaged by the second control member as the carriage rises, whereby said second control member is adjusted to engage the shifting element for the second valve actuating member to aline said member with its valve when the carriage moves forwardly.

11. In a machine for cleansing cans and the like, an elongated stationary can support, a plurality of equally spaced nozzles projecting upwardly from the support for directing fluid against the inner surfaces of a can lowered over the nozzles successively, a carriage having an upward, forward, downward and backward movement for advancing the can along the support and raising and lowering it over the nozzles successively, a plurality of valves corresponding to the nozzles for controlling the passage of fluid to the nozzles, an actuating member for each valve normally out of alinement with its valve, an element for shifting each actuating member, a control member for each valve actuating member adjustable to engage a shifting element to cause it to aline the corresponding valve actuating member with its valve each time the carriage moves forwardly, means controlled by a can for adjusting the first control member to cause it to aline the first actuating member with its valve, means for retaining the adjusted valve actuating member in alinement with its valve during the return stroke of the carriage, means movable with the valve actuating member and adapted to be engaged by the second control member as the carriage rises, whereby said second control member is adjusted to engage a shifting element to cause it to aline the second valve actuating member with its valve when the carriage moves forwardly, and means on the machine for moving said second control member out of operable relation to its valve actuating member as the carriage completes its downward movement.

12. In a machine for cleansing cans and the like, an elongated stationary can support, a plurality of equally spaced nozzles projecting upwardly from the support for directing fluid against the inner surfaces of a can lowered over the nozzles successively, a carriage having an upward, forward, downward and backward movement for advancing the can along the support and raising and lowering it over the nozzles successively, a plurality of valves corresponding to the nozzles for controlling the passage of fluid to the nozzles, an actuating member for each valve normally out of alinement with its valve, an element for shifting each actuating member, a control member for each valve actuating member adjustable to engage a shifting element to cause it to aline the corresponding valve actuating member with its valve each time the carriage moves forwardly, means controlled by a can for adjusting the first control member to aline the first valve actuating member with its valve, a cover runway arranged parallel with, but above and to one side of the can support, means actuated by the carriage for advancing the cover of the can along the runway, means controlled by the can at the first nozzle and actuated by the carriage for placing the cover within the range of the cover advancing means, a plurality of nozzles controlled by the valves for directing fluid against the cover, a platform arranged transversely across the rear end of the machine, an abutment located beyond the last nozzle and effective on the up stroke of the carriage taking the can from the last nozzle to turn the can right side up on the platform, means for moving the uprighted can to position under the rear end of the cover runway, and means connected with the carriage for pushing the can off the platform as the cover

advancing means pushes the cover off the runway.

13. A machine for cleansing cans and the like, comprising a plurality of equally spaced nozzles, a valve for each nozzle, actuating mechanism for each valve, means for lowering and raising cans over said nozzles successively and including a carriage having upward, forward, downward and backward movement, control devices on said carriage, one for each valve actuating mechanism, said control devices being separately adjustable into position to engage and set its corresponding valve actuating mechanism into valve actuating condition, and means on each preceding valve actuating mechanism adapted when in valve actuating condition to be engaged by the control device for the next valve actuating mechanism when the carriage rises to adjust said next control device into position to engage and move its corresponding valve actuating mechanism into valve actuating condition.

14. In a machine of the character described, in combination, a plurality of equally spaced nozzles, a plurality of valves corresponding to the nozzles individually controlling the flow of fluid to the nozzles, valve actuating mechanism associated with each valve and adjustable into and out of operable relation thereto, means, including a can carriage having an upward, forward, downward and backward movement for progressing cans from nozzle to nozzle successively for treatment thereat, a plurality of control devices on the carriage, one for each valve actuating mechanism, and each adapted to be set into and out of operable relation to the valve actuating mechanism adapted to be controlled thereby, and control device setting means, associated with each preceding valve actuating mechanism and adjustable therewith into and out of operable position, for setting the control device for the valve actuating mechanism of the next suceeding valve into operable adjustment, the setting means for each control device being in operable setting position when its associated valve actuating mechanism is in operable relation to its valve and being out of operable setting position when its associated valve actuating mechanism is out of operable relation to its valve.

15. In a machine of the character described, in combination, a plurality of equally spaced nozzles, a plurality of valves, corresponding to the nozzles, individually controlling the flow of fluid to the corresponding nozzles, valve actuating mechanism associated with each valve and adjustable into and out of operable relation thereto, means, including a can carriage having an upward, forward, downward and backward movement for progressing cans from nozzle to nozzle successively for treatment thereat, a plurality of control devices on the carriage, one for each valve actuating mechanism, and each adapted to be set into and out of operable relation to the valve actuating mechanism adapted to be controlled thereby, means on the carriage adapted to be engaged and actuated by a can encountered by the carriage at a certain place and associated with the control device for the valve actuating mechanism of one of the initial valves for setting said control device into operable relation to said valve actuating mechanism when a can is so encountered by the carriage, and means associated with said valve actuating mechanism and adapted, when said mechanism is adjusted into operable relation to its valve, to be encountered by the next succeeding control device whereby said device is set into operable relation to the valve actuating mechanism of the next succeeding valve.

16. In a machine of the character described, in combination, a plurality of equally spaced nozzles, a plurality of valves, corresponding to the nozzles, individually controlling the flow of fluid to the corresponding nozzles, valve actuating mechanism associated with each valve and adjustable into and out of operable relation thereto, means, including a can carriage having an upward, forward, downward and backward movement for progressing cans from nozzle to nozzle successively for treatment thereat, a plurality of control devices on the carriage, one for each valve actuating mechanism, and each adapted to be set into and out of operable relation to the valve actuating mechanism adapted to be controlled thereby, means on the carriage adapted to be engaged and actuated by a can encountered by the carriage at a certain place and associated with the control device for the valve actuating mechanism of one of the initial valves for setting said control device into operable relation to said valve actuating mechanism when a can is so encountered by the carriage, means associated with said valve actuating mechanism and adapted, when said mechanism is adjusted into operable relation to its valve, to be encountered by the next succeeding control device whereby said device is set into operable relation to the valve actuating mechanism of the next succeeding valve, means for setting the control device first mentioned out of operable relation to the valve actuating mechanism adapted to be controlled thereby when the carriage becomes free of said can, and means for setting the control device for the valve actuating mechanism of the next succeeding valve out of operable relation thereto at a certain stage in the movement of the carriage.

17. In a machine of the character described including a horizontally extending support, a plurality of equally spaced nozzles projecting upwardly from the support, a carriage having an upward, forward, down-

ward and rearward movement for placing a can in inverted position over the nozzles successively, a fixed abutment located beyond the last nozzle effective on the up stroke of the carriage lifting the can from the last nozzle, to upright the can on the next forward stroke of the carriage, and a platform on to which the can is uprighted.

18. In a machine of the character described, including a horizontally extending support, a plurality of equally spaced nozzles projecting upwardly from the support, a carriage having an upward, forward, downward and rearward movement for placing a can in inverted position over the nozzles successively, a fixed abutment located beyond the last nozzle effective on the up stroke of the carriage lifting the can from the last nozzle to upright the can on the next forward stroke of the carriage, and a platform on to which the can is uprighted, the end of said carriage when the carriage is at the limit of its backward stroke terminating approximately at the center of a can disposed on said last nozzle, whereby when the carriage rises, said end of the carriage engages against the rear side of the mouth of the can and causes the can to fall forwardly against the abutment.

19. In a machine of the character described, including a horizontally extending support, a plurality of equally spaced nozzles projecting upwardly from the support, a carriage having an upward, forward, downward and backward movement for placing a can in inverted position over the nozzles successively, a fixed abutment located beyond the last nozzle against which the can falls as the carriage rises to lift the can from the last nozzle and over which the can is pushed into upright position by the carriage on its next forward stroke, and a platform on which the can lands in upright position.

20. In a machine of the character described, including a horizontally extending support, a plurality of equally spaced nozzles projecting upwardly from the support, a carriage having an upward, forward, downward and backward movement for placing a can in inverted position over the nozzles successively, a fixed abutment located beyond the last nozzle, the forward end of the carriage being inclined downwardly and terminating at substantially the vertical axis of the last nozzle when the carriage is at the limit of the backward stroke, whereby when the carriage rises to lift the can from over the last nozzle the can is caused to fall forwardly against the abutment over which the carriage pushes the can on its next forward stroke, and a platform on which the can lands in upright position.

21. In a machine of the character described, including a horizontally extending support, a plurality of equally spaced nozzles projecting upwardly from the support, a carriage having an upward, forward, downward and backward movement for placing a can in inverted position over the nozzles successively, a fixed abutment located beyond the last nozzle, the forward end of the carriage terminating at substantially the vertical axis of the last nozzle when the carriage is at the limit of its backward stroke, and a platform located beyond the abutment, the upward stroke of the carriage lifting the can from over the last nozzle and the next forward stroke of the carriage causing the can to fall against and to be pushed over the abutment onto the platform in upright position.

22. In a machine of the character described, including a horizontally extending support, a plurality of equally spaced nozzles projecting upwardly from the support, a carriage having an upward, forward, downward and rearward movement for placing a can in inverted position over the nozzles successively, a fixed abutment located beyond the last nozzle effective on the up stroke of the carriage lifting the can from the last nozzle to upright the can, a platform on to which the can is uprighted, the end of said carriage terminating approximately at the center of a can disposed over said last nozzle whereby when the carriage rises it engages against the rear side of the mouth of the can causing the can to fall forwardly against the abutment over which the can is pushed on the next forward stroke of the carriage, and means engaging the can on said forward stroke of the carriage adapted to upright a somersaulted can leaning against the forward side of said abutment, said means including a rock shaft having a can engaging arm, an operating lever, and an actuating member mounted on the carriage and adapted to engage and actuate said actuating lever on the forward stroke of the carriage to move the can engaging arm.

23. In a machine for cleansing cans and the like, comprising a horizontally extending can support, nozzles defining a plurality of can stations, a horizontally extending cover support defining a plurality of cover stations corresponding to said can stations, a can being adapted to be placed at the first can station and a cover being adapted to be placed at the first can station manually, means for advancing the can from the first can station to the next, and means for simultaneously advancing a cover from the first cover station to the next, said cover advancing means including a member mounted on said carriage for movement therewith and adjustable into and out of position for engaging a cover at said first station, and means associated with said member and adapted to be engaged and actuated by a can at said

first station, whereby said cover engaging member is adjusted into cover engaging position, and when the can is advanced by the movement of the carriage from the first can station to the next, the cover is simultaneously advanced from the first cover station to the next.

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