April 21, 1964 P. C. READ 3,129,713

BOTTLE WASHING MACHINE WITH IMPROVED RINSING MEANS

Filed April 4, 1963 6 Sheets-Sheet 1

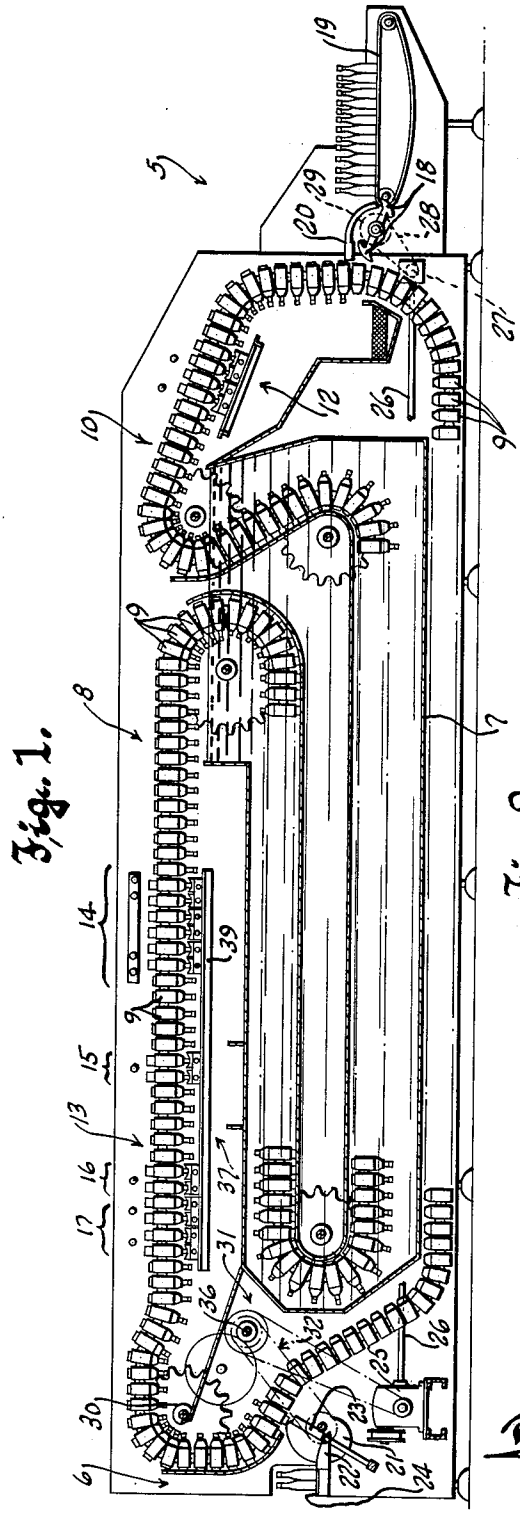


Fig. 1.

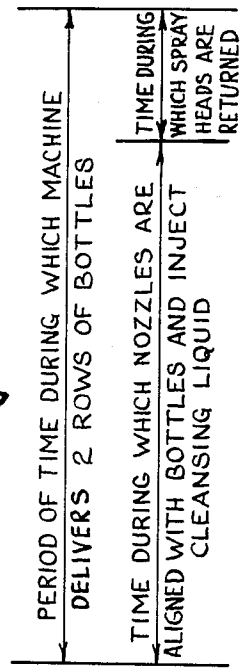


Fig. 9.

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April 21, 1964 P. C. READ 3,129,713

BOTTLE WASHING MACHINE WITH IMPROVED RINSING MEANS

Filed April 4, 1963 6 Sheets-Sheet 2

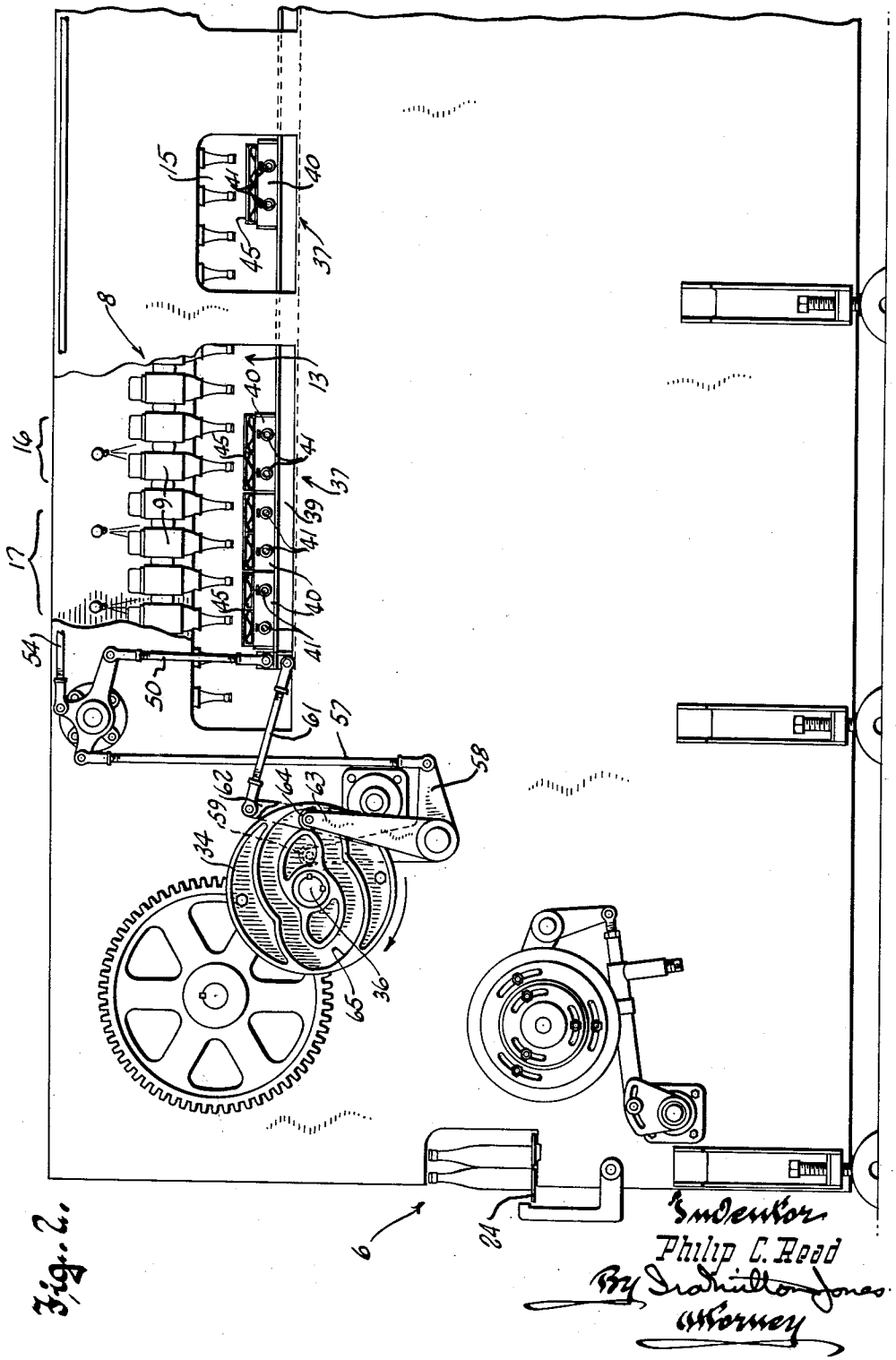


Fig. 2.

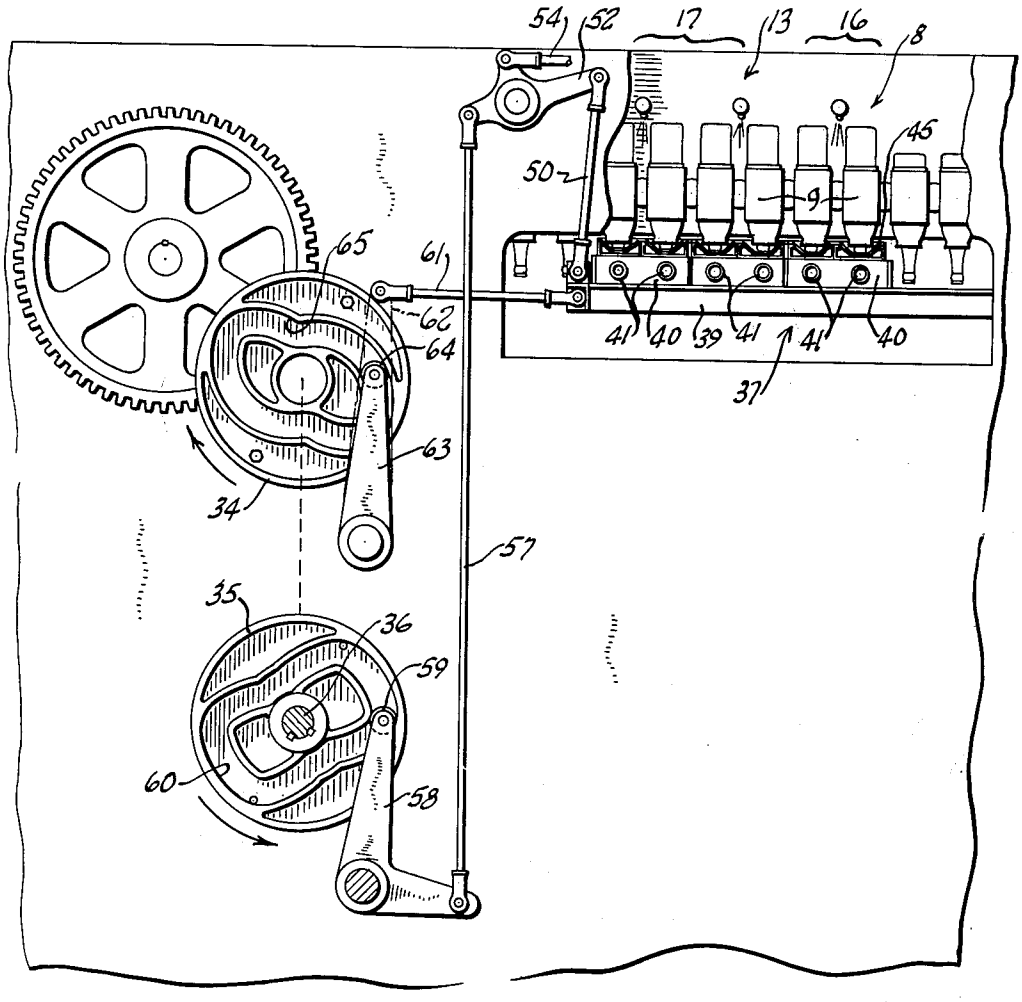
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BOTTLE WASHING MACHINE WITH IMPROVED RINSING MEANS

Filed April 4, 1963 6 Sheets-Sheet 3

Fig. 3.



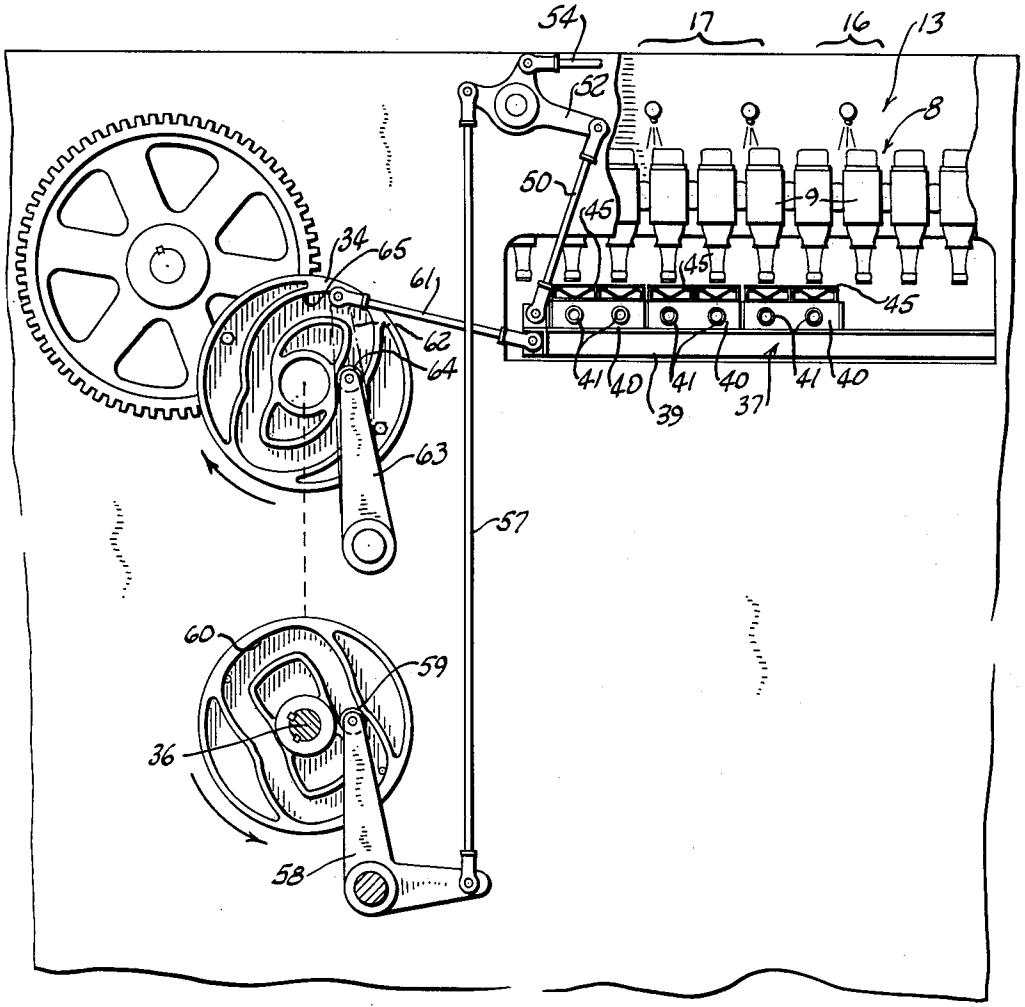
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BOTTLE WASHING MACHINE WITH IMPROVED RINSING MEANS

Filed April 4, 1963 6 Sheets-Sheet 4

Fig. 4.



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April 21, 1964 P. C. READ 3,129,713

BOTTLE WASHING MACHINE WITH IMPROVED RINSING MEANS

Filed April 4, 1963 6 Sheets-Sheet 5

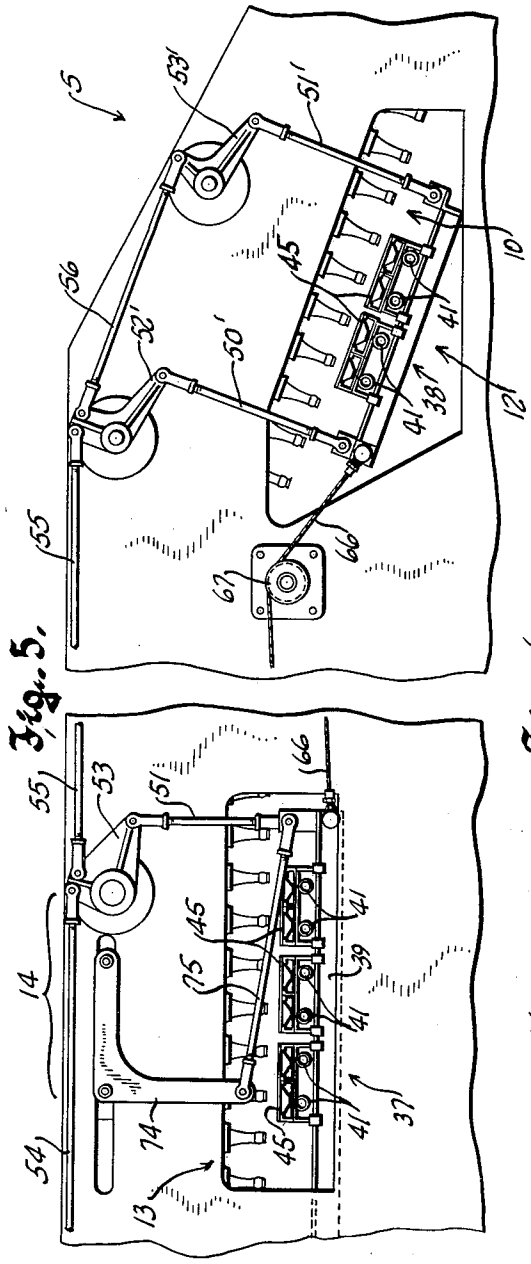


Fig. 5.

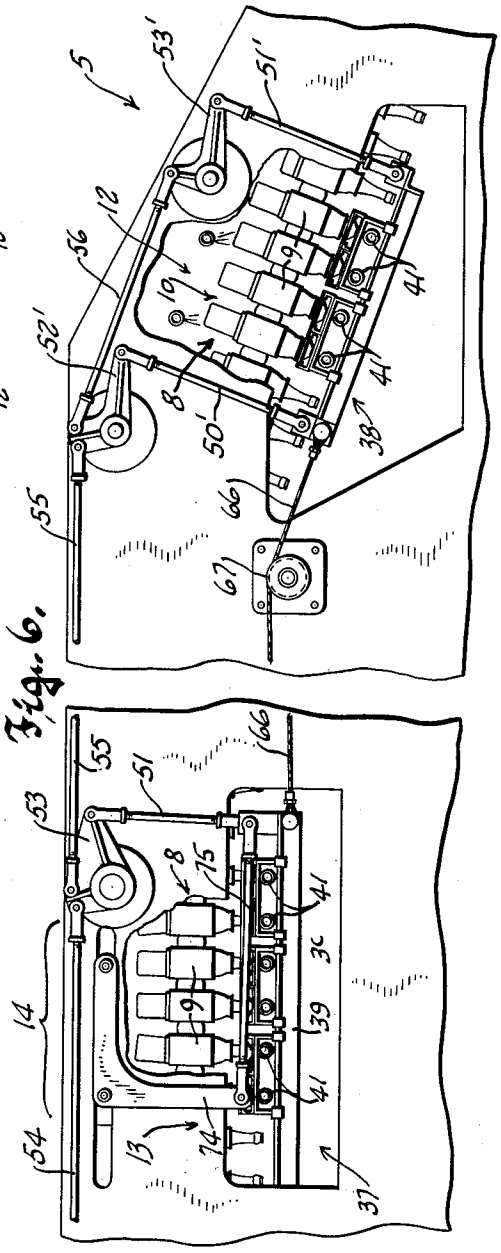


Fig. 6.

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BOTTLE WASHING MACHINE WITH IMPROVED RINSING MEANS

Filed April 4, 1963 6 Sheets-Sheet 6

Fig. 7.

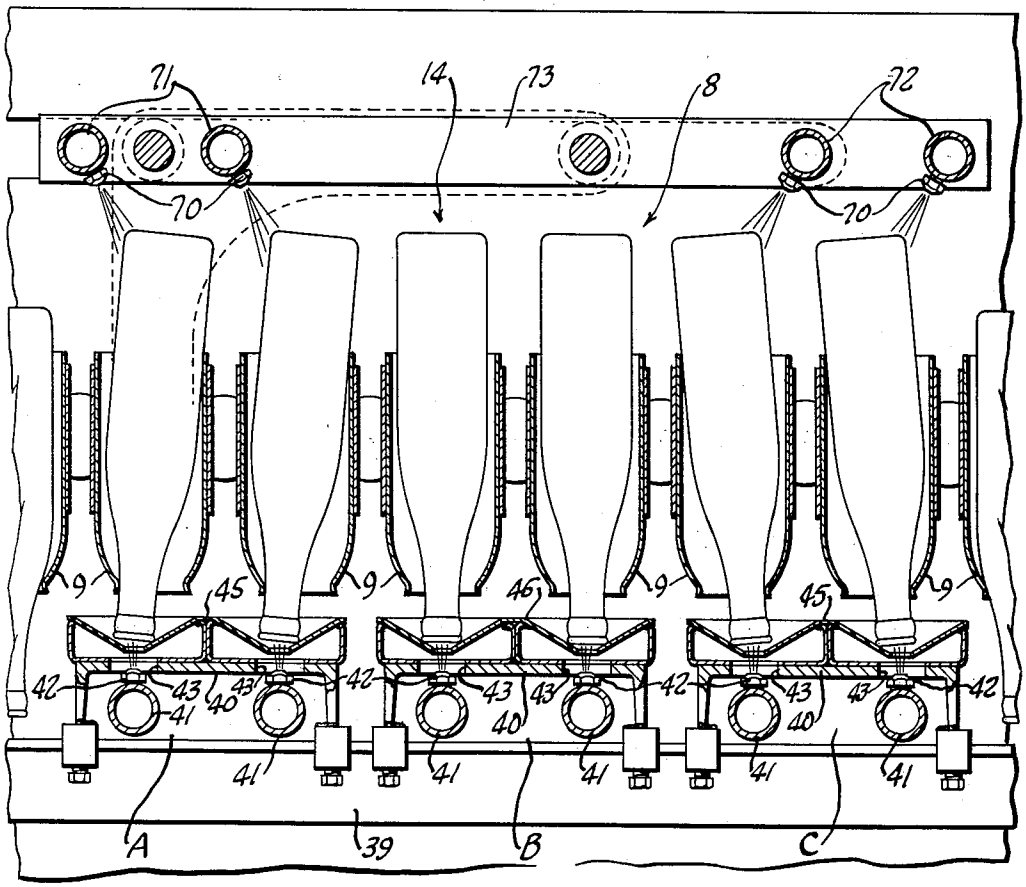
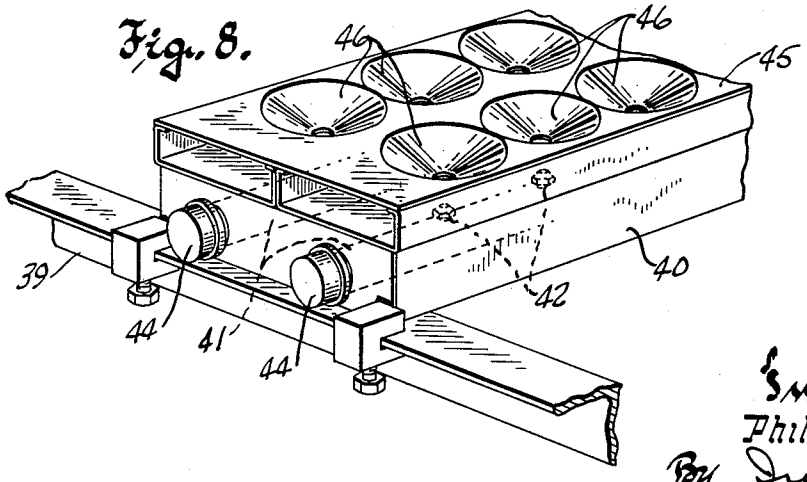


Fig. 8.



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United States Patent Office 3,129,713 Patented Apr. 21, 1964

3,129,713

BOTTLE WASHING MACHINE WITH IMPROVED RINSING MEANS

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Filed Apr. 4, 1963, Ser. No. 270,684
10 Claims. (Cl. 134—73)

This invention relates to bottle washing machines of the type wherein endless conveyors equipped with transversely extending rows or flights of bottle receiving pockets, carry the bottles to be cleaned through the machine. The bottles are placed, neck first, into the conveyor pockets by a loading mechanism like that of the Read et al. Patent No. 2,861,670, and after being cleaned in their passage through the machine they are removed from the pockets by unloading mechanism like the one disclosed in the application of Philip C. Read, Serial No. 253,854, filed January 25, 1963.

Understandably, manufacturers of bottle washing machines are not unmindful of the need for increasing the capacity of their machines. Bottlers are constantly asking for machines that are capable of handling more bottles per unit of time. To a degree, this demand can be satisfied by increasing the width of the machine so that there are more bottles in each row thereof as they move successively through the machine, but there is a practical limit to the width of a bottle washing machine. Transportation facilities alone impose a very definite limit upon the width of the machine.

Another way of increasing the bottle-handling capacity of a bottle washing machine is, of course, to speed up its cycle. Prior to the advent of the improved loading and discharging mechanisms of the aforesaid Read et al. Patent No. 2,861,670, and the aforesaid pending application Serial No. 253,854, it was these sections or portions of the machines which limited the speed at which the machines could be safely run. With the improved loading and unloading mechanisms, a new "bottle neck" limiting the speed at which the machines could be run without sacrificing good results, was found to exist in the section of the machine which does the rinsing of the bottles.

Obviously, internal rinsing cannot be effected unless the forcibly projected streams or sprays of cleansing liquid which are intended to perform this function enter the bottles, and this requires alignment between the nozzles from which these streams or sprays are projected and the mouth of the bottles. All bottle washing machines, therefore, have provision for effecting the necessary alignment. In the earlier types of machine, the nozzles were stationary so that the bottles had to be advanced intermittently to bring them into alignment with the nozzles, row after row thereof, and leave them there while the rinsing action took place. In the present machines, the conveyor carrying the bottles moves continuously. This, of course, necessitates moving the spray nozzles with a reciprocating action so that they may travel with the bottles for a period of time.

Heretofore, with a relatively slow moving conveyor, there was sunfficient time for effective rinsing, and the return stroke of the nozzles could be accomplished without too much difficulty. But, when the machine was speeded up to increase its output, the internal rinsing was not as effective as it should be, and the return stroke of the spray head became too rapid for satisfactory machine operation.

It is the removal of this limitation upon the speed at which the machine may be operated which constitutes the primary purpose of this invention, and as will appear hereinafter, the invention accomplishes this purpose in a very simple and efficient manner.

In broad perspective, this invention accomplishes this

purpose by keeping the internal rinsing nozzles operative—not only for a part of a single cycle of the machine, as in the past (a cycle being the loading of one row of bottles onto the conveyor and the substantially simultaneous removal of another row therefrom), but instead maintaining the internal rinsing nozzles active for the major portion of at least two successive machine cycles.

Another way in which the invention accomplishes its purpose of enabling the machine to operate at a faster rate of speed, is by having at least certain of the upper spray nozzles which forcibly project cleansing liquid down onto the outer surface of the bottles, travel with the bottles while these nozzles are active.

In this connection, it is an object of the present invention to provide a bottle washing machine having traveling upper spray nozzles drivingly connected with the lower spray nozzles which project their streams or sprays into the inverted bottles, so that both upper and lower nozzles move in unison with the bottles, at least during the time the nozzles are active.

One of the most common reasons for rejecting bottles delivered by a bottle washing machine has been imperfect rinsing of the external surface of the bottles, especially at the shoulder portions thereof because, with past machines, these shoulder portions of the bottles have been more or less protected from being impinged by the downwardly directed external rinsing sprays. In recognition of this inherent objection, which of course would be aggravated with increased speed of operation, the present invention has as another of its purposes the provision of means by which the bottles are tilted out of their normal vertical positions, first in one direction and then the other, so that the cleansing streams or sprays issuing from the upper nozzles can more readily reach the shoulder portions of the bottles.

With the above and other objects in view which will appear as the description proceeds, this invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the hereindisclosed invention may be made as come within the scope of the claims.

The accompanying drawings illustrate one complete example of the physical embodiment of the invention, constructed according to the best mode so far devised for the pracical application of the principles thereof, and in which:

FIGURE 1 is a longitudinal sectional view through a bottle washing machine of the type with which this invention is concerned;

FIGURE 2 is a side view with parts broken away, of the delivery end portion of the machine, said view being on a scale larger than that of FIGURE 1;

FIGURE 3, like FIGURE 2, is a side view of a portion of the delivery end of the machine drawn to a still larger scale, and having portions broken away, and the cams which control and produce the motions of the traveling spray heads separated for clarity of illustration, the illustrated portion of the lower spray head being shown in this view as advancing with the conveyor;

FIGURE 4 is a view similar to FIGURE 3, but showing the illustrated portion of the lower spray head fully advanced and lowered preparatory to being returned for the next successive operation thereof;

FIGURE 5 is a fragmentary side view of the machine, illustrating a medial portion thereof and part of its loading end portion, and showing the traveling spray heads at these portions of the machine in positions which correspond to that illustrated in FIGURE 2;

FIGURE 6 is a view similar to FIGURE 5, but with

the illustrated spray heads in positions corresponding to that of FIGURE 3;

FIGURE 7 is an enlarged sectional view through the traveling upper and lower spray heads which are located in the middle portion of the machine;

FIGURE 8 is a fragmentary perspective view illustrating a portion of the lower traveling spray head which, as is customary, is equipped with bottle positioning means in the form of funnels to receive the open ends of the inverted bottles; and

FIGURE 9 is a diagram portraying the time relationship between the operation of the traveling spray heads and the cycling of the loading and unloading mechanisms.

Referring now particularly to the accompanying drawings in which like numerals indicate like parts throughout the several views, it will be seen that the bottle washing machine of this invention is of the so-called double-ended type having a bottle loading station, indicated generally by the numeral 5, at one end, and a bottle delivering or unloading station, indicated generally by the numeral 6, at its opposite end. Between the bottle loading and unloading stations, the machine has an elongated tank 7 which contains a hot caustic solution through which the bottles to be cleaned are carried by an endless conveyor, indicated generally by the numeral 8.

The conveyor 8 consists essentially of a pair of sprocket chains connected by a multiplicity of equispaced transversely extending rows of bottle receiving pockets 9. Since this invention does not concern the construction of the conveyor 8, it has not been illustrated in detail. Moreover, the bottle carrying conveyor, with its successive rows of bottle receiving pockets 9, may be of any conventional construction well known to those skilled in the art.

The sprocket chains of the endless conveyor are trained over sprockets which, as shown in FIGURE 1, are so disposed and located relative to one another and to stationary track means (not shown) which also serve to guide the travel of the conveyor, that the rows of bottle receiving pockets 9 are successively presented to the bottle loading mechanism 5, to have bottles loaded therein. The conveyor then carries the bottles along an upwardly inclined stretch 10 which passes through a pre-rinse zone 12 where the bottles are given a preliminary rinsing, both inside and out.

The conveyor next carries the bottles through the hot caustic solution in the tank 7 and, as they emerge therefrom, it advances the bottles in inverted condition horizontally along a stretch 13 to the unloading station 6. As the bottles are carried along the stretch 13, they first pass through a mild caustic, rinsing zone 14, then through a caustic removal spray zone 15, a warm water rinse zone 16, and finally, as the bottles leave the stretch 13, they pass through a final fresh water rinse zone 17.

The loading mechanism, which as noted hereinbefore may be—and preferably is—like that of the Read et al. Patent No. 2,861,670, includes rows of diametrically opposite transfer fingers 18, each of which lifts a row of bottles as they are presented thereto by conveyor belts 19, and pushes them along guide tracks 20 into the adjacent row of conveyor pockets. The unloading mechanism, being like that of application Serial No. 253,854, includes continuously rotating cams 21 which lower the bottles, row after row thereof, from the conveyor pockets onto stationary supporting tracks 22, along which they are pushed by an oscillating transfer device 23 onto a delivery conveyor 24.

Obviously, the operation of loading and unloading mechanisms must be synchronized with the travel of the conveyor 8. This may be done by having the entire mechine driven from a common source—as indicated in FIGURE 1, wherein a variable speed drive unit 25 driven in any suitable manner from a prime mover (not shown) drives a shaft 26 which extends lengthwise of the machine and drives a sprocket 27 which in turn is connected through a sprocket chain 28 with a sprocket 29 on the shaft of the lifting fingers 18. The variable speed drive unit also drives the driven sprockets 30 of the conveyor 8 through appropriate chain, sprocket and gear drive instrumentalities, indicated generally by the numeral 31; and through other chain and sprocket means 32, it drives the cams 21 and the transfer mechanism 23 of the unloading mechanism 6 in the manner fully explained in the aforesaid pending application.

At the various zones, heretofore identified, there are upper nozzles which forcibly project streams or sprays of cleansing liquid down onto the bottles, and lower nozzles which forcibly project streams or sprays of cleansing liquid up into the bottles. All of the lower nozzles travel with the bottles as they perform their function, but—of the upper nozzles—only those at the caustic, rinsing zone 14 travel, the others are stationary. Obviously, of course, the motion of the traveling nozzles must be coordinated with the advance of the conveyor. This timing is accomplished with a pair of box cams 34 and 35, both of which are keyed to a shaft 36 which forms part of the chain, sprocket and gear drive instrumentalities 31. Although in practice the cams 34 and 35 are disposed back-to-back and are actually opposite faces of a single casting, for clarity in FIGURES 3 and 4 they are shown separated from one another and the cam 35 is illustrated as a mirror image of itself.

All of the lower spray nozzles that act upon the bottles as they travel along the horizontal stretch 13 are herein collectively considered one lower spray head 37, and the other traveling lower nozzles at the pre-rinse zone 12 are considered a second lower spray head 38.

The specific structure of the spray heads 37 and 38 is, of course, subject to modification; but, generally, each comprises a frame including opposite side rails 39 and inverted channel shaped cross members 40 mounted on the rails 39 for adjustment lengthwise thereof. Embraced within each of the inverted channels 40 are two parallel pipes 41 which serve as headers for nozzles 42 arranged to project the streams or sprays issuing therefrom upwardly through holes 43 in the channel members 40. One end of each of the pipes 41 is capped, as at 44 (see FIGURE 8); the opposite end thereof is connected to a pressurized source of the cleansing liquid which is to be projected from their respective nozzles, in any suitable manner, as by means of flexible hoses, not shown.

Fixed to the top of each of the inverted channels 40 is a bottle positioning unit 45 which has funnels 46 to engage and hold the mouths of bottles in proper alignment with the nozzles.

The spray head 37 is suspended for back and forth substantially horizontal reciprocation and also for up and down motion by pairs of links 50 and 51, each link of each pair being located at one side of the machine. The links 50 have their lower ends pivotally attached to the end of the spray head nearest the unloading end of the machine, and the links 51 have their lower ends connected with the opposite end of the spray head. The upper ends of the links 50 and 51 are respectively connected to lever arms 52 and 53, mounted to swing about fixed horizontal axes.

The other spray head 38 is similarly suspended beneath the inclined stretch 10 of the conveyor, i.e. by links 50' and 51' which connect the opposite ends of the spray head with lever arms 52' and 53'.

All of the levers 52, 53, 52' and 53' are connected by links 54, 55 and 56 to oscillate in unison, and all of them are connected with the cam 35 through a connecting rod 57 and a bell crank 58 which rocks about a fixed horizontal pivot, and has a cam follower 59 riding in the track 60 of the cam 35. It will be noted that the track 60 is duplicated at opposite sides of the cam axis, so that the cam produces its intended cycle of motion twice during each revolution of the cam.

The fore and aft motion of the spray heads **37** and **38** is produced by the cam **34**, for which purpose a link **61** connects the adjacent end of the spray head **37** with a first lever arm **62** which in turn is connected with a second arm **63** to swing in unison therewith, the latter arm **63** carrying a cam follower **64** which rides in the track **65** of the box cam **34**. This track is also duplicated at opposite sides of the axis of rotation so that for each revolution of the cam two cycles of movement are imparted to the spray head.

The other spray head **38** is caused to move in unison with the head **37** as a result of being tied to it through cables **66**, one at each side of the machine, which cables run over suitable guide pulleys **67**. Gravity returns the spray head **38** while a pull on the cables **66** advances it in unison with the head **37**.

The traveling upper spray nozzles **70** at the zone **14**, as best shown in FIGURE 7, are mounted on two pairs of transverse parallel pipes **71**, **72**, which in turn are mounted in a suitable frame **73**. The frame **73** is guided for horizontal translation by any suitable track means carried by some stationary part of the machine—as, for instance, its side walls. At the opposite sides of the machine, this frame **73** is connected with the lower spray head **37** by downwardly projecting arms **74** on the frame, and links **75** which connect these arms with the spray head **37**.

Since the conveyor **8** travels continuously at a rate determined by the setting of the variable speed drive unit **25**, it follows of course that the rows of bottle receiving pockets and the bottles carried therein all travel the same distance in any given period of time. It also follows that inasmuch as the drives for the loading and unloading mechanisms are synchronized with the conveyor, the conveyor travels a definite distance during each cycle of operation of the loading and unloading mechanisms.

Heretofore, in machines of this type wherein the conveyor advanced continuously, the motion of the traveling spray nozzles was so timed that they moved forwardly with the conveyor for a part of each and every machine cycle, i.e. each and every cycle of the loading and unloading mechanisms, and quickly returned during the remainder of that machine cycle. Therefore, any attempt to increase the output of the machine by simply increasing its speed of operation would, of necessity, sacrifice effectiveness of the rinse, since inevitably it would reduce the time the sprays could be directed into the bottles.

The speed at which the machine could be run heretofore was also limited by the fact that the traveling spray head—being a relatively heavy structure, with substantial inertia, could not be successfully returned in less than a predetermined time.

This invention removes both of these limitations by the simple expedient of having the cams **34** and **35** so shaped and timed with respect to the travel of the conveyor as to effect advance of the traveling spray heads in unison with the conveyor throughout the major portion of two full cycles of the machine. This relationship between operation of the spray heads and machine cycles is diagrammatically illustrated in FIGURE 9 which shows that, for approximately four-fifths of the time devoted to the performance of two machine cycles, the nozzles of the spray heads are aligned with the bottles and are projecting their streams into the bottles. During most of this four-fifths period, the spray heads advance with the conveyor. The return of the spray heads takes place during the remaining one-fifth of the time devoted to two machine cycles. This means that the nozzles are aligned with the bottles and project their streams into them for fully nine-tenths of each machine cycle. It also means that the return movement of the spray heads is accomplished without undue wear and objectionably fast traverse.

Although a meticulous examination of the profiles of the cams **34** and **35** could be undertaken to demonstrate how they effect this desirable result, it is deemed unnecessary since those skilled in the art will readily understand how the cams **34** and **35** produce the described motions.

Since the spray heads advance for the major portion of two successive cycles of the machine, the nozzles of the spray heads must be arranged in groups of two. If the advance occupied the major portion of three sucessive machine cycles, the grouping would have to be in threes. In every case, however, the relative travel of the conveyor and spray heads during the retraction stroke of the latter must be such that the next successive group of two or three rows of bottles, whichever it might be, would be acted upon during the next cycle of the spray heads.

In the specific embodiment of the invention illustrated, there are two groups of two each rows of nozzles performing the internal pre-rinse function in the zone **12**; in the mild caustic sprays at the zone **14**, the internal spray nozzles are arranged in three groups of two each, identified as A, B and C in FIGURE 7, for purposes to be hereinafter described; the caustic removal spray at zone **15** has only one group of two rows of internal rinse nozzles, as is also the case in the warm water rinse at the zone **16**. But the final fresh water rinse at zone **17**, again has two groups of two rows of nozzles.

Thus, at the beginning of each cycle of operation of the traveling spray heads, the nozzles thereof are always aligned with the next two rows of bottles being advanced by the conveyor.

Heretofore, all of the upper spray nozzles were stationary. With a view toward increasing the effectiveness of the upper spray nozzles **70** at the zone **14**, these nozzles move in unison with their associated lower spray nozzles, as already noted. By simply having the upper nozzles move with the bottles a substantial improvement is effected. But still greater assurance against leaving any portion of the external surfaces of the bottles dirty is obtained by a novel coaction which this invention provides between the bottle positioning means—specifically the funnels **46**—and the direction in which the upper nozzles **70** project their streams or sprays. As to the latter, it will be seen that the nozzles on the pipes **71** project their streams or sprays toward the right, as viewed in FIGURE 7, while those on the pipes **72** project their streams or sprays to the left.

It will also be seen that the structures comprising the nozzle group A and the structure comprising the nozzle group C are so located on the frame of the traveling spray head as to be offset outwardly with respect to the bottle pockets thereabove. Consequently, as the bottle positioning funnels **46** of these groups A and B rise and contact the mouths of the bottles thereabove, the bottles—being relatively loose in their pockets—will be tilted in oppoiste directions, those engaged by the funnels of group A being tilted to the right in FIGURE 7, and those of group C being tilted to the left. Nevertheless, the bottle positioning funnels **46** hold the mouths of the bottles engaged thereby in alignment with the spray nozzles therebeneath.

This tilting of the bottles, together with the opposite inclination of the streams or sprays directed downwardly onto them, assures that all portions of the bottles, including the shoulder portions thereof, i.e. those portions of the bottles which merge the necks thereof with their bodies, will be subjected to the cleansing sprays directed downwardly against them.

The bottle positioning funnels **46** of the middle group B, do not tilt the bottles but hold them in their normal vertical positions.

From the foregoing description, together with the accompanying drawings, it will be readily apparent to those skilled in the art that this invention makes possible full utilization of the improved high speed loading and unload-

ing mechanisms of the aforesaid Read et al. Patent No. 2,861,670, and the pending application Serial No. 253,854; and, in addition, achieves improved cleansing of the bottles.

What is claimed as my invention is:

1. In a bottle washing machine:

(A) an endless conveyor equipped with bottle receiving pockets uniformly spaced lengthwise of the conveyor to loosely receive bottles to be cleaned and to carry the bottles inverted in one stretch of the conveyor;

(B) drive means operatively connected with the conveyor to continuously advance the conveyor at a uniform rate so that successive pockets and bottles carried thereby travel the same distance along said stretch of the conveyor within any given time interval;

(C) a lower spray head mounted beneath said stretch of the conveyor for back and forth movement along a path generally parallel with the path of travel of the conveyor along said stretch, said lower spray head having

(1) a plurality of nozzles to project streams of cleansing liquid into bottles in said pockets when the nozzles are aligned with the mouths of the bottles,

(*a*) said nozzles being spaced lengthwise of the conveyor the same distance as are the pockets, so that the plurality of nozzles may simultaneously project streams of cleansing liquid into as many successive bottles as there are nozzles;

(D) drive means synchronized with the drive means for the conveyor and operatively connected with the spray head to impart forward and return movement to the spray head between defined fore and aft limits, said drive means for the spray head including

(1) cam means governing the rate of movement of the spray head, and

(*a*) so shaped as to effect forward movement of the spray head in unison with the conveyor with its nozzles aligned with the mouths of the bottles thereabove, during the major portion of the time it takes the conveyor to travel a distance equal to the number of said nozzles times said distance between adjacent nozzles, and to effect return movement of the spray head during the remainder of said time.

2. In a bottle washer, the structure of claim 1, further characterized by

(A) an upper spray head mounted above said stretch of the conveyor for back and forth movement along a path parallel with the path of travel of the conveyor along said stretch, said upper spray head having

(1) nozzles arranged to project streams of cleansing liquid down onto bottles carried in the pockets therebelow; and

(B) motion transmitting means drivingly connecting the two spray heads so that they move back and forth in unison.

3. In a bottle washing machine, the structure of claim 1, wherein

(A) said plurality of nozzles on the lower spray head comprises a first group thereof, and further characterized by

(B) another group of nozzles on the lower spray head to likewise project streams of cleansing liquid into bottles, the nozzles in said other group also being spaced apart lengthwise of the conveyor a distance equal to the distance between adjacent pockets of the conveyor, and being spaced from the first group of nozzles a distance which is a multiple of said spacing between adjacent pockets;

(C) bottle positioning means on the lower spray head to engage bottles in pockets above the nozzles of the first group and align the mouths of the bottles with the nozzles and at the same time tilt said bottles in one direction; and

(D) other bottle positioning means on the lower spray head to engage bottles in pockets above nozzles in said other group thereof to align the mouths of the bottles with the nozzles and also tilt the bottles but in the opposite direction.

4. In a bottle washing machine, the structure of claim 3 further characterized by:

(A) an upper spray head mounted above said stretch of the conveyor for back and forth movement along a path parallel with the path of travel of the conveyor along said stretch;

(B) motion transmitting means drivingly connecting the upper and lower spray heads for back and forth movement in unison, with the upper spray head superimposed above the lower spray head; and

(C) downwardly facing nozzles on the upper spray head to project streams of cleansing liquid onto the external surface of bottles in the conveyor pockets therebeneath.

5. The bottle washing machine of claim 4, wherein the downwardly facing nozzles of the upper spray head are arranged in two groups, with the nozzles of the two groups disposed to direct the streams projected therefrom in oppositely inclined directions with respect to the vertical.

6. In a bottle washing machine:

(A) an endless conveyor equipped with bottle receiving pockets uniformly spaced lengthwise of the conveyor to loosely receive bottles to be cleaned and to carry the bottles inverted in one stretch of the conveyor;

(B) drive means operatively connected with the conveyor to continuously advance the conveyor at a uniform rate so that successive pockets and bottles carried thereby travel the same distance along said stretch of the conveyor within any given time interval;

(C) a lower spray head mounted beneath said stretch of the conveyor for back and forth movement along a path generally parallel with the path of travel of the conveyor along said stretch, said lower spray head having

(1) a plurality of nozzles to project streams of cleansing liquid into bottles in said pockets when the nozzles are aligned with the mouths of the bottles,

(*a*) said nozzles being spaced lengthwise of the conveyor the same distance as are the pockets, so that the plurality of nozzles may simultaneously project streams of cleansing liquid into as many successive bottles as there are nozzles;

(D) an upper spray head mounted above said stretch of the conveyor for back and forth movement along a path parallel with said stretch, said upper spray head having

(1) a plurality of nozzles to project streams of cleansing liquid onto bottles in the pockets therebeneath;

(E) motion transmitting means connecting the upper and lower spray heads so that they move back and forth in unison; and

(F) drive means synchronized with the drive means for the conveyor and operatively connected with one of the spray heads to impart back and forth movement to both spray heads, said drive means for the two connected upper and lower spray heads including

(1) a rotatable cam governing the rate of movement of the spray heads and

(*a*) so shaped as to effect forward movement of both spray heads in unison with the conveyor with the nozzles of the lower spray head aligned with the mouths of bottles

thereabove, as the cam turns through a predetermined angle, and to effect retraction of the spray heads during a lesser angle of rotation of the cam.

7. In a bottle washing machine,

(A) a conveyor having bottle receiving pockets to loosely receive bottles and to carry them inverted as the conveyor moves along a substantially horizontal stretch,

(1) the pockets being equispaced along the length of the conveyor;

(B) a lower spray head mounted below said stretch of the conveyor for back and forth movement along a path substantially parallel to said stretch of the conveyor,

(1) said lower spray head having upwardly facing nozzles to project streams of cleansing liquid into bottles, the mouths of which are aligned with the nozzles, said nozzles being spaced apart lengthwise of the conveyor the same distance as are the pockets, and being arranged in at least two groups;

(C) bottle positioning means at each of said nozzles to engage the mouths of bottles thereabove and align the same with the nozzles,

(1) said bottle positioning means at said groups of nozzles being disposed to tilt the bottles engaged thereby, in opposite directions; and

(D) upper spray nozzles mounted above said stretch of the conveyor, said upper spray nozzles being arranged to project streams downwardly onto the tilted bottles.

8. The bottle washing machine of claim 7, wherein said upper spray nozzles are arranged to direct their streams in oppositely inclined directions with respect to the vertical.

9. In a bottle washing machine having

(A) a continuously traveling endless conveyor equipped with bottle receiving pockets in which bottles to be cleaned are carried inverted in one stretch of the conveyor,

(B) cyclically operating bottle loading and unloading mechanisms by which dirty bottles are loaded into certain pockets of the conveyor and cleaned bottles

are taken from other pockets of the conveyor and discharged from the machine,

(C) common drive means for driving the conveyor and the bottle loading and unloading mechanisms,

(D) a traveling spray head beneath said stretch of the conveyor, said spray head comprising

(1) nozzles to direct cleansing liquid into the bottles carried by said stretch of the conveyor when the nozzles are aligned with the bottles and move with them, and

(2) header means connected with the nozzles to supply cleansing liquid to them,

(E) means mounting the spray head for forward movement parallel to and in unison with said stretch of the advancing conveyor and for return movement in the opposite direction, and

(F) drive means operatively connected with the spray head and driven from said common drive means of the machine to impart said forward and return movement to the spray head, the improvement which comprises:

cam means forming part of said drive means for the spray head, shaped to impart forward motion to the spray head in unison with the advance of said stretch of the conveyor during the major portion of a plurality of successive cycles of the cyclically operating bottle loading and unloading mechanisms and to impart return movement to the spray head during only a portion of one of said cycles, to thereby give the sprays issuing from the nozzles sufficient time to thoroughly cleanse the interior of the bottles despite a fast machine cycle.

10. The bottle machine of claim 9, in which said cam means is shaped to impart said forward movement to the spray head during the major portion of two successive cycles of the bottle loading and unloading mechanisms, and to impart return movement to the spray head during the balance of said two successive cycles.

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