

Oct. 24, 1939.

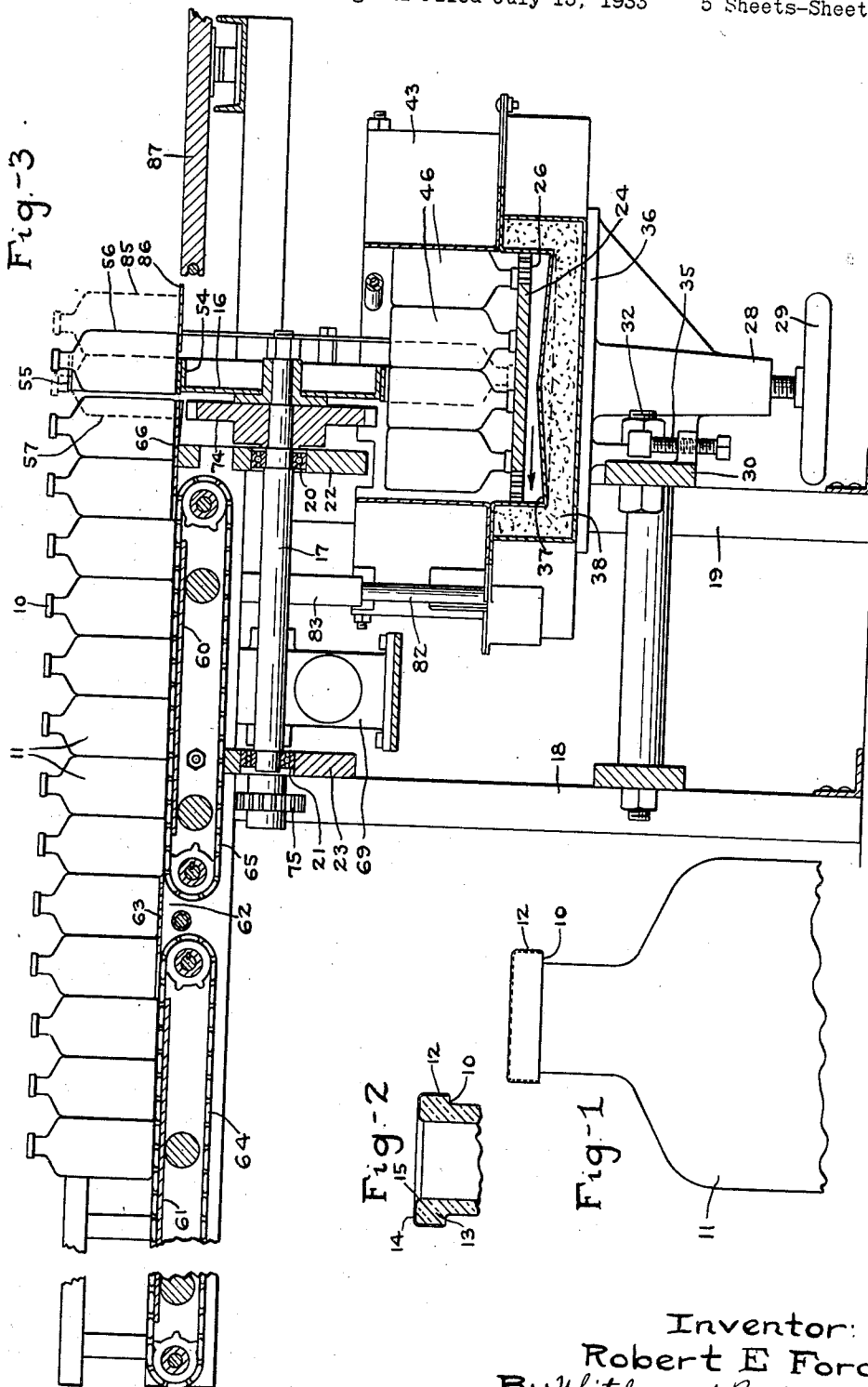
R. E. FORD

2,177,625

MACHINE FOR APPLYING FILMS TO POURING ORIFICES OF CONTAINERS

Original Filed July 15, 1933

5 Sheets-Sheet 1



Inventor:
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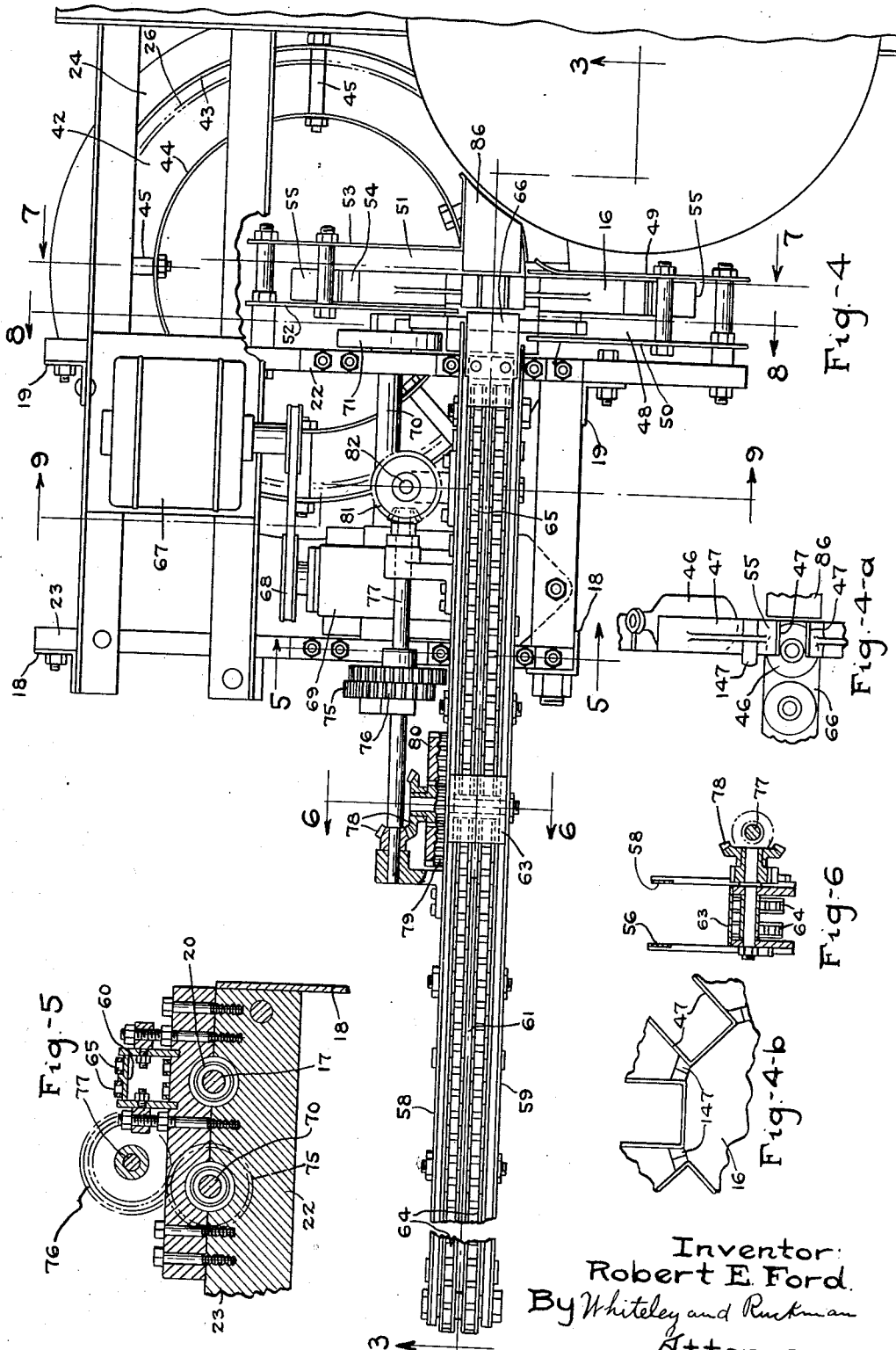
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5 Sheets-Sheet 2



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MACHINE FOR APPLYING FILMS TO POURING ORIFICES OF CONTAINERS

Original Filed July 15, 1933 5 Sheets-Sheet 3

Fig-7

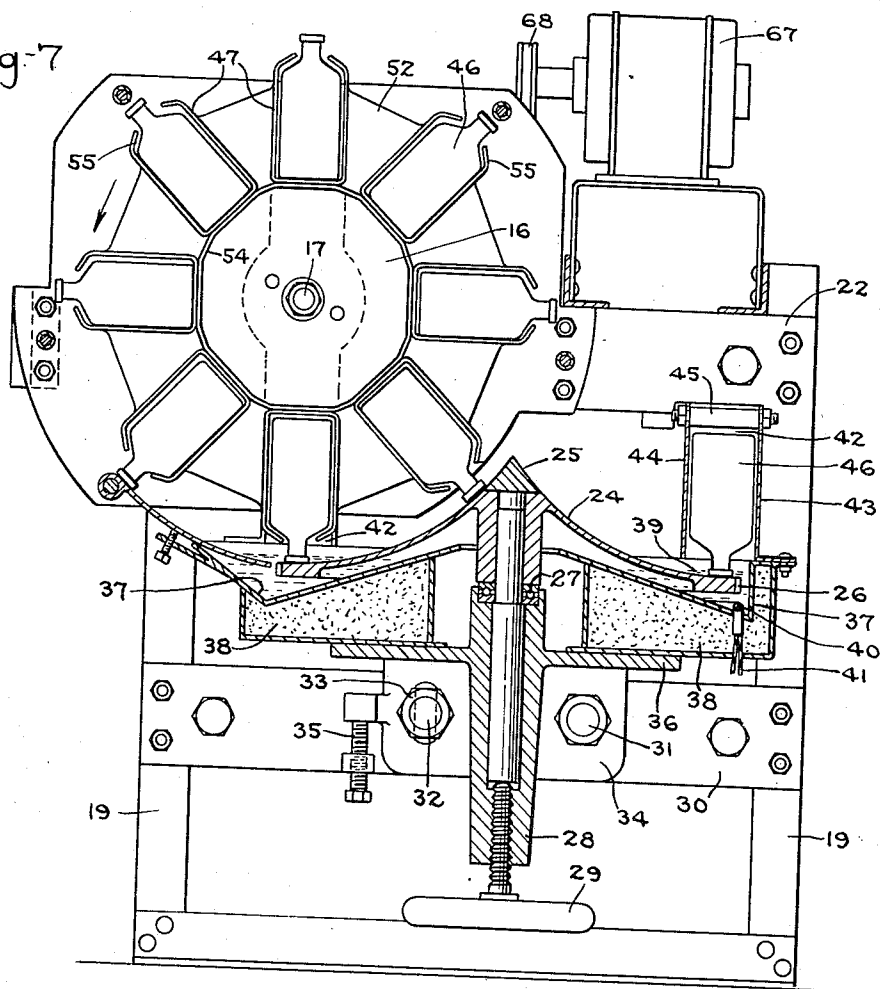
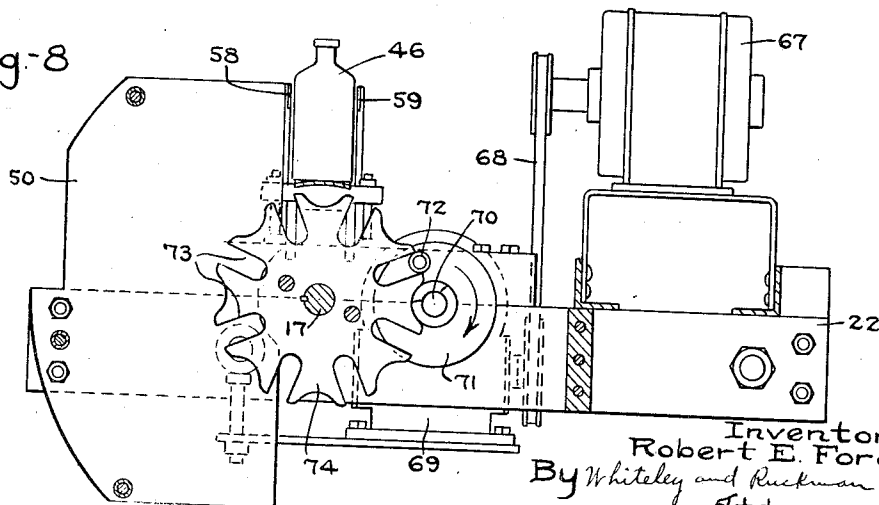


Fig-8



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5 Sheets-Sheet 4

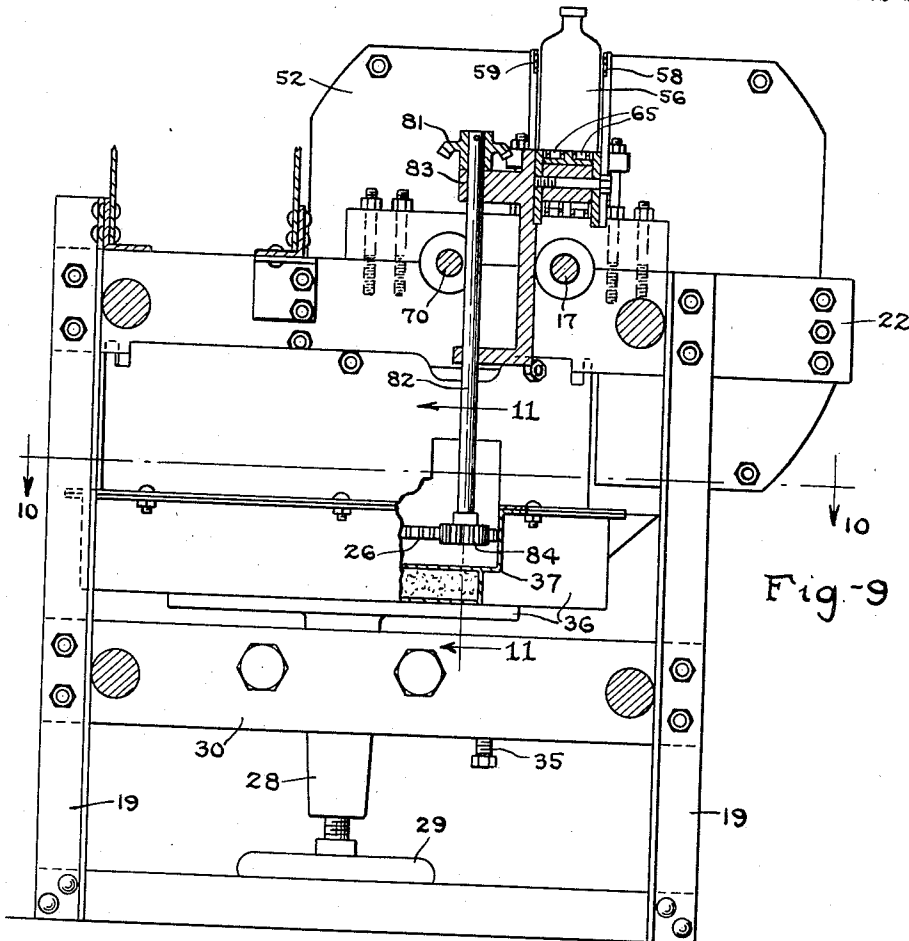


Fig-9

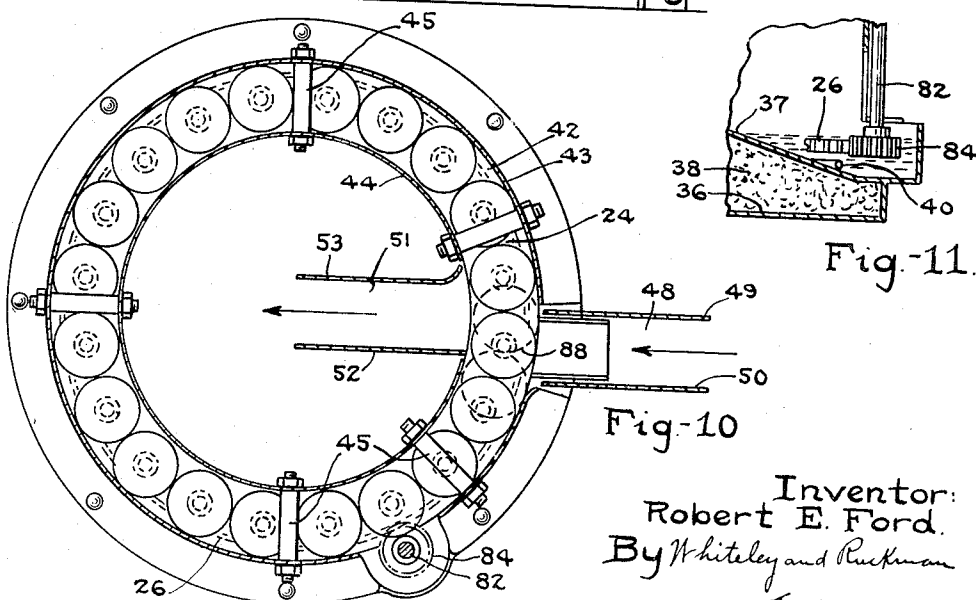


Fig-11.

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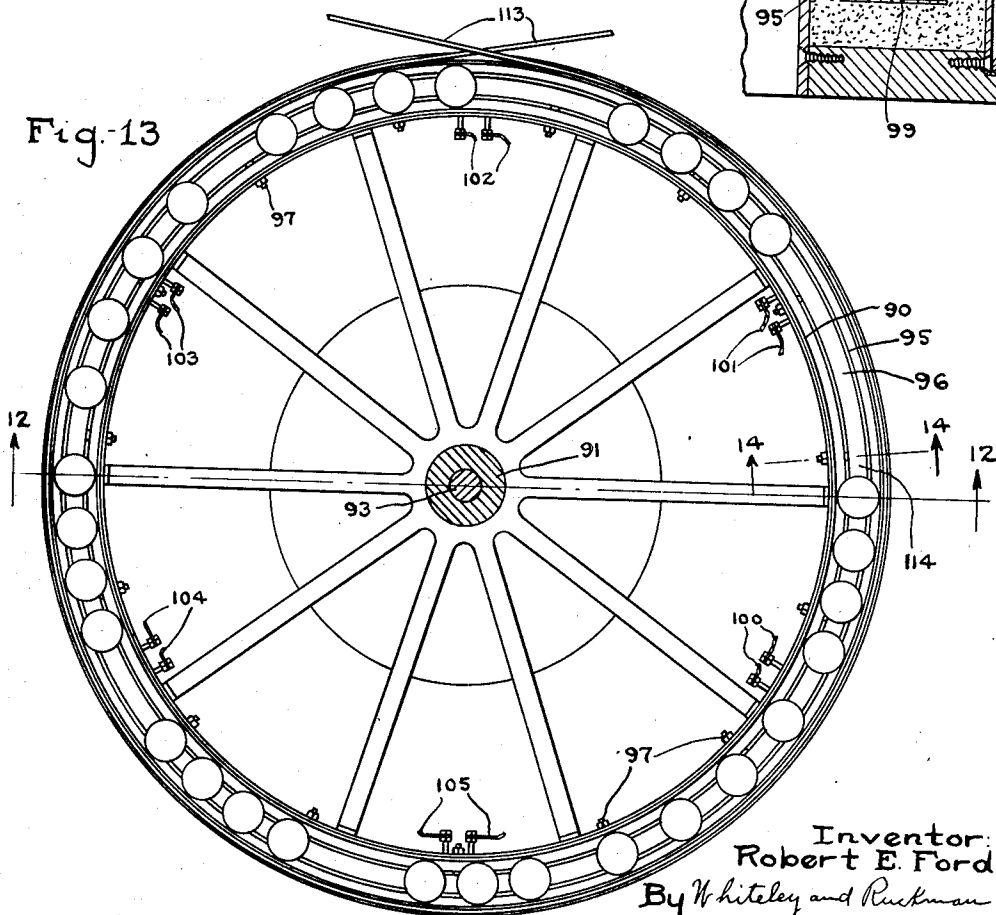
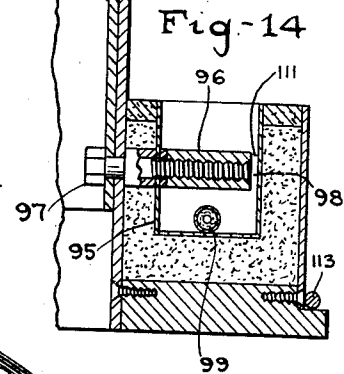
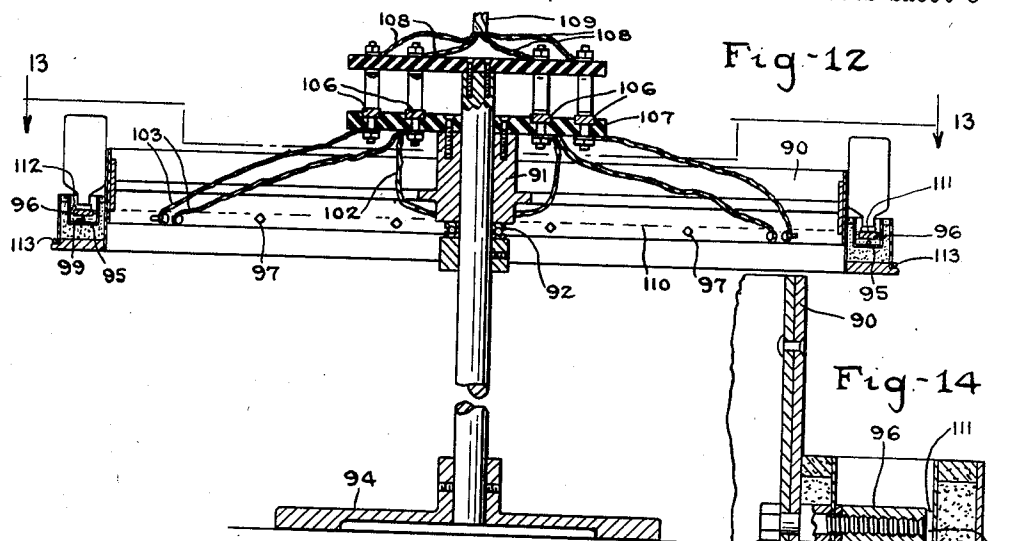
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UNITED STATES PATENT OFFICE

2,177,625

MACHINES FOR APPLYING FILMS TO
POURING ORIFICES OF CONTAINERS

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composed of Allyn K. Ford and Robert E. Ford,
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Original application July 15, 1933, Serial No.
680,598. Divided and this application Febru-
ary 19, 1937, Serial No. 126,547

8 Claims. (Cl. 91-46)

My invention relates to machines for apply-
ing films to pouring orifices of containers. It is
the object of my invention to provide means for
applying to the pouring orifices of containers
from which liquids are to be poured, such as bot-
tles, pitchers, cans and the like, a substance such
as paraffin wax, which will not have any capillary
affinity for the liquid to be poured. The purpose
of applying such a film is to prevent dripping
of the liquid that is poured. This is effected by
reason of the fact that when the container is
restored to containing position the surface ten-
sion of the liquid going back into the container
will be greater than any tendency of the liquid
to cling to the filmed surfaces of the orifice, with
the result that the liquid on the rim of the bot-
tle neck will be drawn back over said surface
and return to the container and none of it will
drip from any part of the orifice. That is, the
prepared or filmed surface will be such that no
part of the liquid being used will cling thereto.
If water were all or any considerable part of the
liquid, the surface would not be wet thereby.

More specifically it is an object of my inven-
tion to provide mechanisms for applying a film
of drip-free material, such as paraffin wax, to the
exposed or outside portions of the rim and neck
of bottles immediately surrounding the pouring
orifice, and to make this drip-free film so thin
and adherent that it will not crack or break away
in the use of the bottle and in the repeated ap-
plication of a stopper thereto, but will remain
permanently attached, so that the container will
continue to be free from dripping over its en-
tire period of use. Such film must be made very
thin and should not enter the interior of the neck
of the bottle, and, above all, should not have
globules or thickened portions which would be
knocked off and destroy the drip-free character
of the pouring orifice.

It is an object of my invention, therefore, to
provide a machine having a receptacle for liquid-
repellant material such as paraffin wax which
may be circular or annular in contour, having
associated with the receptacle means for heat-
ing said material to cause it to melt and have
a high temperature, employing in conjunction
with said receptacle a rotatable member adapted
to dip into the melted wax or other material
during part of its rotation and to be heated

thereby and to move out of said melted material
during a further part of its rotation, said rotat-
able member acting to receive the necks of bot-
tles on the portion out of the melted material and
preliminarily heat said bottle necks and then to
pass through the melted material.

It is a further object of my invention to pro-
vide means for conveying the bottles to and from
the aforesaid rotatable member in such manner
that after taken from the rotatable member op-
portunity for drainage will be effected.

Other objects and advantages of my invention
will appear in connection with the detailed de-
scription thereof and the novel features of my
invention are particularly pointed out in the
claims.

This application is a division of my application
Serial Number 680,598, filed July 15, 1933.

In the drawings, illustrating the features of
my invention,

Fig. 1 is an elevation view of part of a bottle
having my invention applied thereto. Fig. 2 is
a sectional elevation of the neck of the bottle
shown in Fig. 1. Fig. 3 is a longitudinal part
sectional view of a form of the apparatus for
carrying out my invention taken on line 3-3
of Fig. 4. Fig. 4 is a plan view of the apparatus
shown in Fig. 3. Fig. 4a is a fragmentary plan
view of the vertical intermittent bottle shifter
showing a modified carrier construction. Fig. 4b
is a fragmentary elevation view of a portion of
said carrier to show the same construction. Fig.
5 is a sectional elevation view on line 5-5 of
Fig. 4. Fig. 6 is a sectional elevation view on line
6-6 of Fig. 4. Fig. 7 is a sectional elevation
view on line 7-7 of Fig. 4. Fig. 8 is a sectional
elevation view on line 8-8 of Fig. 4. Fig. 9 is a
sectional elevation view taken on line 9-9 of Fig.
4. Fig. 10 is a sectional plan view taken on line
10-10 of Fig. 9. Fig. 11 is a sectional eleva-
tion view on line 11-11 of Fig. 9. Fig. 12 is a
sectional elevation view of another form of ap-
paratus for carrying out my process taken on
line 12-12 of Fig. 13. Fig. 13 is a part sectional
plan view taken on line 13-13 of Fig. 12. Fig.
14 is a sectional elevation view on an enlarged
scale taken on line 14-14 of Fig. 13.

In Figs. 1 and 2 is shown the upper part of a
bottle 11 and a transverse sectional view of the
neck 10 of the bottle after it has had a film of

material applied thereto. This film 12 will be formed about the expanded neck portion 13 as a circumferential film 12, and upon the top of the expanded neck portion at 14, but will not enter the inside of the pouring orifice 15.

In the machine of Figs. 3 to 11 for automatically and rapidly performing the operations to effect the desired application of said film there are two rotating carriers, one, 16, being mounted on a horizontal shaft 17 supported upon frame legs 18 and 19, said shaft having bearings 20 and 21 in transverse frame pieces 22 and 23. The second carrier comprises a horizontal rotatable table 24 of a semiconical shape as indicated at 25 in Fig. 7, which is provided with a surrounding gear 26 and is journaled on a thrust bearing 27 held in a casting 28 for vertical adjustment by means of a threaded hand nut 29, whereby the table 24 may be raised or lowered as desired. The casting 28 is secured to a transverse frame piece 30 by means of a bolt 31 upon which the same is pivoted and a bolt 32 passing through an oblong slot 33 in an ear 34 on casting 28. By means of a set-bolt 35 in Fig. 7 the casting piece 28 may be rocked upon pivoted bolt 31 more or less to place the table 24 more or less at an angle to the vertical for a purpose hereinafter to be stated.

The casting 28 is provided with a table 35 upon which is supported an annular trough member 37 formed above a mass of insulating material 38. The trough member 37 is adapted to hold the wax or other material as indicated at 39 which is kept in a properly fluid and heated condition by means of electrical heating elements 40 served by wires 41. The trough member 37 has secured thereto an annular wall 43 to which is secured in spaced relation a second annular wall 44, being held in position by washer nuts 45, said walls 43 and 44 forming an annular passage 42 as clearly shown in Figs. 3 and 7. And this carrier will, by reason of its contact with the heads of the bottles, and when the annular channel or passageway 42 is filled with bottles, as shown in Fig. 10, move the bottles uniformly along said channel at the speed at which the carrier 24 rotates. If the table is horizontal in position, and with heated wax at a level above the projecting rims on the bottles 46, these portions of the bottles will dip within the melted wax for the entire period of a revolution of the carrier 24, as appears from an inspection of Fig. 7. In some cases, however, it is desirable to keep the bottles in the wax only part of the time, in which case by means hereinbefore described, the carrier and table may be tilted and the bottles then will dip into the wax at one side only and preliminarily heat and drain at the other side.

As clearly appears from Fig. 7, the carrier 16 embodies a multiplicity of pockets 47 each adapted to hold one of the bottles 46, and the carrier 16 moves the bottles 46 in a vertical plane across the channel 42 and above the carrier 24 operative in a horizontal plane. Referring to Fig. 10, two chutes enter the channel 42 from opposite sides to admit the introduction into said channel of a bottle by carrier 16 and the simultaneous withdrawal of a treated bottle on the other side. The introduction chute 48 is formed by wing plates 49 and 50, and the withdrawal chute 51 is formed by wing plates 52 and 53.

Referring to Fig. 3, it will be noted that the width of the top surface 54 of the carrier 16, and also the widths of the plates 55 forming the

pockets 47, is only a little more than one-half as great as the transverse dimension of the bottles to be handled. Also, that the guide plates 49 and 50 at one side and 52 and 53 at the other side of the channel 42 (Figs. 4 and 10) are separated the same distances, sufficient comfortably to receive a bottle across one of its dimensions, but that these plates do not lie in the same vertical planes but plate 49 outside of the channel 42 is positioned close to one side of the vertical plane of carrier 16 and plate 52 inside of a vertical extension of channel 42 is positioned close to the other vertical limit of carrier 16. For this reason bottles moved by carrier 16 are displaced laterally with respect to one another, as clearly indicated by full-line bottle designated 56 and dotted-line bottle designated 57 in Fig. 3.

A guideway formed by side rails 58 and 59 has at its bottom supporting plates 60 and 61 separated at 62 with a plate 63 bridging the gap there. An endless conveyor 64 runs over the plate 61 and forms the bottom of the guideway at that point, and a second endless conveyor 65 overlies plate 60 and discharges upon a receiving plate 66 at its front end immediately in front of the carrier 16, as clearly shown in Figs. 3 and 4.

Power for driving the various instrumentalities is furnished by motor 67 transmitted through belt and pulley arrangement 68 to gear box 69 which operates drive shaft 70, and a cam wheel 71 at one end thereof carrying a cam actuator 72 adapted to engage in slots 73 of a star wheel 74 mounted on shaft 17, which also has on it the carrier 16, which arrangement gives said carrier an intermittent step-by-step rotary motion in a vertical plane. The other end of said shaft 70 has thereon a spur gear 75 adapted to mesh with change speed gearing 76 on shaft 77. Through bevel gearing 78 and spur gears 79, 80 the belt conveyors 64 and 65 are driven at different speeds, conveyor 64 being driven more rapidly than the conveyor 65, whereby bottles loosely stacked in the runway above conveyor 64 will be pushed forward and caused to contact in fixed relation above conveyor 65.

From shaft 77 there is driven by means of bevel gearing 81 a vertical shaft 82 supported by a thrust bearing on a bracket 83 and adapted to be lifted vertically for a purpose hereinafter to be described. Upon the lower end of shaft 82 is a spur gear 84 adapted when in its lower position to mesh with the gear 26 on the horizontal carrier 24, as shown in Figs. 9 and 11. When in operative position the spur gear 84 will be running in the melted wax or other material to be applied to the bottle as shown in Fig. 11. When the machine is out of operation the shaft 82 and the gear 84 will be lifted to take the gear out of said wax.

The operation of these instrumentalities will now be described. Bottles will be stacked loosely in the guideway upon conveyor 64 with the necks of the bottles erected, whereby said bottles will be caused to contact in a row above conveyor 65 and will be moved in contact from said conveyor upon plate 66. The feed of conveyor 65 is timed with the operation of the vertical carrier wheel 16, so that at each operation of carrier 16 a bottle is pushed from the plate 66 upon the carrier 16 to the dotted-line position 57. At the same time the bottle 56, which has come up in a compartment 47 of carrier 16 is pushed to the dotted-line position 85 (Fig. 3), where it rests upon a supporting plate 86. At the next operation the

bottle in the dotted-line position 85 will be pushed from the supporting plate 86 to a rotating delivery table 87, when it will be delivered to any suitable receiving, packing or storing mechanism.

Electric current from wires 41 in heater 40 will have brought the wax 39 in the lower trough 37 to a desired molten state and temperature. At each operation of the vertical carrier 16 bringing down through chute 48 a bottle on the carrier in the dotted-line position 57 of Fig. 3, a bottle will be introduced into the channel 42, where its head will contact with the rotating table 24. Bottles will so continue to be introduced until the entire channel 42 is filled, as shown in Fig. 10, after which a bottle will be withdrawn from its compartment 47 timed with the succeeding operation of vertical carrier 16 to introduce another bottle into channel 42. At a succeeding operation of the vertical carrier 16 the bottles in the channel 42 will have the dotted-line position shown in Fig. 10. That is, a bottle indicated in dotted-lines at 88 will have the forward part only above the carrier top 54 at the moment of actuation of carrier 16, which will take the bottle out of channel 42 in the position on carrier 16 indicated in full lines by bottle 56 in Fig. 3. At the same time, a new bottle coming down through passageway 48 will go with this compartment 47 into the channel 42 and will be removed therefrom by continued rotation of the table 24. In this manner the bottles will be successively fed to the passageway 42 with their thickened neck portions just adapted to dip into the fluid hot wax substance 39, and will remain therein (either for a full revolution or for a part of a revolution, according to the adjustment of the table as horizontal or tilted) during an entire revolution of said table 24. After the bottles have been withdrawn they will be lifted step by step to the upright position of Fig. 3, giving opportunity for melted wax to drain, and then will be discharged upon receiving table 87.

It will be noted that the table 24 has the conical surface 25 any element of which forms an arc of the circle described by the outer edges of the bottles on carrier 16, Fig. 7. This table 24 of solid metal dips into the heated material all the way around, preferably being tipped so that its uptipped portion has its surface continually out of the melted wax while the down-tipped surface dips beneath the surface of the melted wax at its lowest point just sufficiently to carry the rims of the bottles sufficiently dipped in the wax, in practice from one-thirty second to one-sixteenth of an inch. Because, however, the table 24 has its outer edges at all times immersed in the hot wax, the table itself becomes heated.

As the bottles are moved about through a complete revolution of table 24, the first effect (either when the bottles pass immediately into melted wax when the table is horizontal, or when they move on the hot dry part of the table when it is tilted) is to begin to heat the bottle itself and the air within the bottle. This heating of the air has the effect of course of expanding the air, which tends to make it flow out of the neck of the bottle all around the lip thereof, and which positively holds the wax back from contacting with the inside of the neck and prevents the formation of a film of wax on the inside of the bottle where it is not desired. Throughout the entire circuit on the platform or table 24 this heating and expansion of air will continue, small bubbles of air passing out all around the inner

edge of the neck of the bottle so when the bottle leaves the melted wax it will be practically entirely free from a film of wax on the inside of the bottle. The wax forms upon the upper edge of the lip about the neck of the bottle and over the outside for a short distance, but not on the inside of the cylindrical part of the neck, which is very desirable, since it might otherwise interfere with the use of stoppers and also the film would be broken by the employment of stoppers.

Where table 24 is tilted the bottles will come into the plane of vertical carrier 16 partially drained on account of passing up upon a partially-dried surface. Where table 24 is horizontal the bottles will, of course, have the rim of the neck still fully immersed. When the vertical carrier 16 removes the bottles the rim of the bottle continues to contact with the surface 25 of table 24, as shown in Fig. 7. Since the conical surface 25 is hot, and at this point dry, rubbing the said rims in contact with such hot, dry surface removes the excess material or wax on the outer edge of the rim which slowly runs down said hot surface 25 until when that portion of the surface has completed another complete revolution it will again be substantially dry. The bottle lifted to the position shown in Fig. 7 in contact with surface 25 remains in this draining position during the rest between steps, and is further rubbed in the next succeeding step and cools during the next two rests and steps, which will bring the bottle vertical, where it is pushed off on the revolving table 87, where it is fully cooled and the wax completely hardened, the resulting film of wax being exceedingly thin and altogether outside the interior of the neck of the bottle as required.

In practice it has been found that this device will operate satisfactorily as above described. To make certain that bottles will be accurately positioned for introduction into the compartments 47 from the conveyor 65, I may employ the construction shown in Figs. 4a and 4b, wherein cams 147 are provided at the sides of the container portions of the bottle-containing pockets 47 on the vertical rotating carrier 16. It follows that as this cam 147 passes the bottle-holding platform 66 it will hold back the nearest adjacent bottle 46 until a pocket 47 in position to receive a bottle, thus insuring against feeding of untreated bottles off of the carrier 16 to platform 86, and insuring accurate positioning of the bottles in the several succeeding pockets, and securing against breakage.

In the form of device for applying my process illustrated in Figs. 12, 13 and 14, I employ a large wheel-like table member 90, its hub 91 supported on a thrust bearing 92 to rotate about a shaft 93 suitably supported by a pedestal 94 in such manner that the plane of the table is slightly tilted from the horizontal. The outer periphery of the table 90 carries an insulated annular trough member 95 adapted to contain melted wax with a multiplicity of spaced heating elements as hereinafter described. The table is rotated slowly, in practice it requiring about one minute for each complete revolution. Owing to the tilt the annular carrier bar 95 for receiving the edges of the rims of the bottles will have its surface immersed in the wax for a part of said revolution, in practice about one-third, and said surface will be out of the wax for the rest of the period of the revolution. All of the carrier, however, will have its body portion immersed in the heated wax and the surface will be heated to substantially

the temperature of the melted wax throughout the entire circumference thereof. In consequence of this operation the surface out of the wax will be hot and in large part will be dry. The bottles placed upon this surface near the center of the dry portion will be preheated before reaching the wax, thus heating the air within the bottles and starting its expulsion around the rim to prevent inflow of wax to the inside of the bottle neck. The bottles will be moved through the heated wax and then will be carried along the part of the uptilted carrier bar in a draining position for about a third of the revolution with the rim of the bottle in contact with the hot surface of the annular carrier bar. This will result in substantially complete drainage before the bottle reaches the point of withdrawal, which is of course near the same point where it was put on the runway.

An advantageous feature of tilting the wheel table 90 comes from the fact that thereby the melted wax in the annular chamber or trough 95 is given a continuous wave-like current movement through said trough, whereby its temperature is maintained uniform, and there will be no hot spaces over and cold spaces between the heater elements hereinafter described. And, specifically, annular supporting band 96 is held by means of bolts 97 spaced from the walls of the trough as clearly indicated at 98 in Fig. 14, and also at each side in Fig. 12. In the bottom of the annular trough 95 are a series of heating elements 99 supplied with electricity from the lead wires 100, 101, 102, 103, 104 and 105, which wires run to annular contacts 106 on a supporting table 107, said contacts being fed with electrical current from wires 108 carried from electrical cable 109. As shown by dotted line 110, the plane of the trough 95 is at a slight angle to the horizontal, so that if liquid wax therein at one side, as indicated at 111, is even with or slightly below the top of the supporting annular band 96, the wax at the other side, as indicated at 112, will have a suitable depth for immersing the protruding part of the neck of the bottle. By means of suitable power connected with cable or belt 113 surrounding the outside of the trough member 95 the entire mechanism will be driven at a suitable speed. The operator stands in a given position, as at 114, and puts bottles into the trough at one side and withdraws them from the trough at the other side, where they may go to a bottling machine or to packing and storing facilities. The supporting band 96 everywhere overlying wax and heating elements will be very considerably heated, which will gradually heat the bottles, the neck of course being heated first.

I claim:

1. A machine for treating the pouring rims of bottles to render them non-dripping, which comprises an annular receptacle for liquid-repellant material such as paraffin wax, means for heating said material to cause it to melt and have a high temperature, a rotatable disc dipping beneath the surface of said melted wax, and traveling means for delivering bottles successively with their rims in engagement with said disc to be moved thereby.

2. A machine for treating the pouring rims of bottles to render them non-dripping, which comprises an annular receptacle for liquid-repellant material such as paraffin wax, means for heating said material to cause it to melt and have a high temperature, a rotatable disc dipping beneath the surface of said melted wax, an annular

guideway above the outer limits of said disc, and means for delivering bottles successively with their rims in engagement with said disc to be moved along said guideway thereby.

3. A machine for treating the pouring rims of bottles to render them non-dripping, which comprises an annular receptacle for liquid-repellant material such as paraffin wax, means for heating said material to cause it to melt and have a high temperature, a rotatable disc dipping beneath the surface of said melted wax, an annular guideway above the outer limits of said disc, means for delivering bottles successively with their rims in engagement with said disc to be moved along said guideway thereby, and means for withdrawing bottles from said disc and guideway as fresh bottles are delivered.

4. A machine for treating the pouring rims of bottles to render them non-dripping, comprising an annular receptacle containing melted wax, a rotatable disc dipping beneath the surface of said melted wax, and an annular runway above said disc, means for feeding bottles continuously in erect position, and intermittently operative means for taking bottles from said feeding means and delivering them in inverted position upon said disc and into said runway.

5. A machine for treating bottles comprising two members rotatable in vertical and horizontal planes respectively, bottle-carrying means formed on the member rotating in a vertical plane, means to feed bottles thereto whereby said bottles are inverted, means whereby the inverted bottles are transferred to the member rotating in a horizontal plane, means for subjecting the bottle rims only to melted wax during the rotation of said last-named member, and means for restoring the bottles therefrom to the member rotating in a vertical plane.

6. A machine for treating the pouring rims of bottles to render them non-dripping, comprising a receiving table for bottles, a receptacle below the receiving table for holding a body of liquid repellant material such as paraffin wax, means for heating said material to cause it to melt and have a desired high temperature, means for conveying the bottles from the receiving table to the receptacle and for causing them to be inverted while so conveyed, means operative for holding the bottles inverted with its rim dipped into said melted wax for a desired time, and means for causing the bottles to be returned to said conveying means for withdrawal from said melted wax.

7. A machine for treating the pouring rims of bottles to render them non-dripping, comprising a receiving table for bottles, a receptacle below the receiving table for holding a body of liquid repellant material such as paraffin wax, means for heating said material to cause it to melt and have a desired high temperature, means for conveying the bottles from the receiving table to the receptacle and for causing them to be inverted while so conveyed, means operative for holding the bottles inverted with its rim dipped into said melted wax for a desired time, means for causing the bottles to be returned to said conveying means for withdrawal from said melted wax, and means for operating the conveying means so as to hold the bottles in draining position thereon until they have been drained.

8. A machine for treating the pouring rims of bottles to render them non-dripping, comprising a receiving table for bottles, a receptacle below the receiving table for holding a body of liquid

5 repellent material such as paraffin wax, means for heating said material to cause it to melt and have a desired high temperature, means for conveying the bottles from the receiving table to the receptacle and for causing them to be inverted while so conveyed, means operative for holding the bottles inverted with its rim dipped into said melted wax for a desired time, means

for causing the bottles to be returned to said conveying means for withdrawal from said melted wax, and means cooperating with said conveying means to effect wiping of the bottle rims after they have been withdrawn from the melted wax to remove excess wax. 5

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