

W. J. PHELPS.
CAN FILLING APPARATUS.
APPLICATION FILED AUG. 18, 1910.

1,025,717.

Patented May 7, 1912.

3 SHEETS-SHEET 1.

Fig. 2.

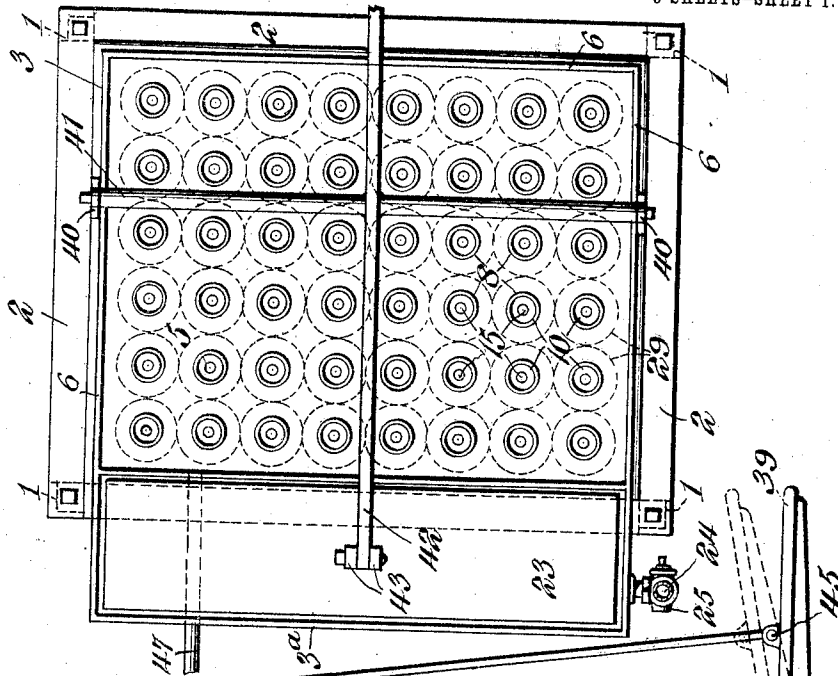
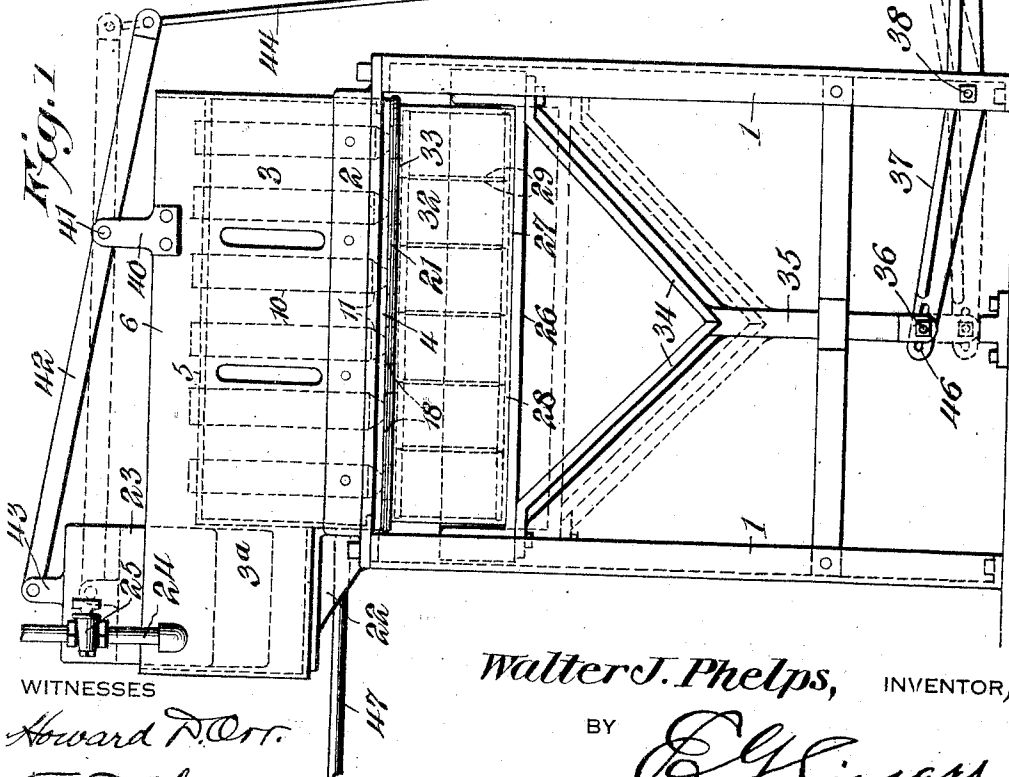


Fig. 1.



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3 SHEETS—SHEET 2.

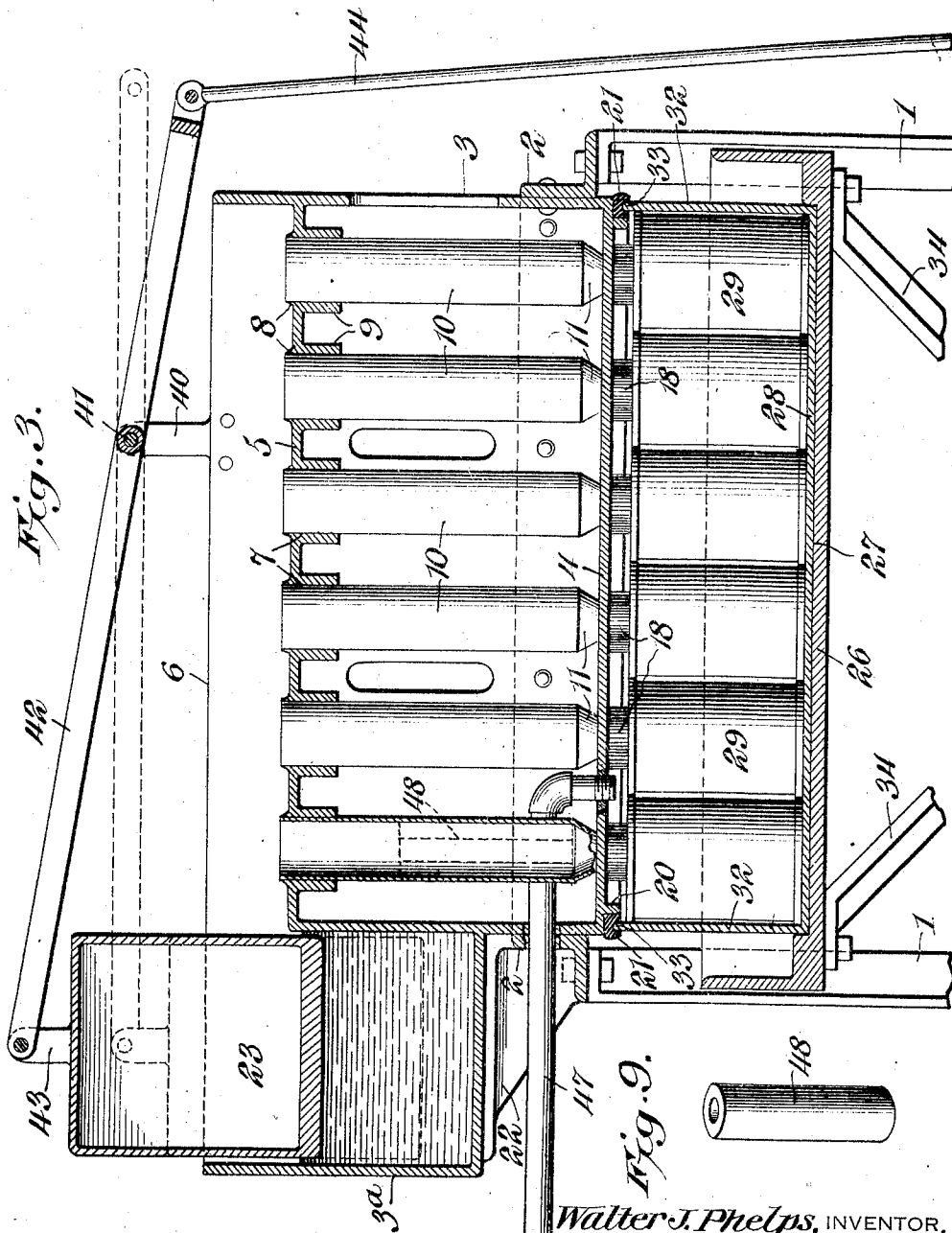


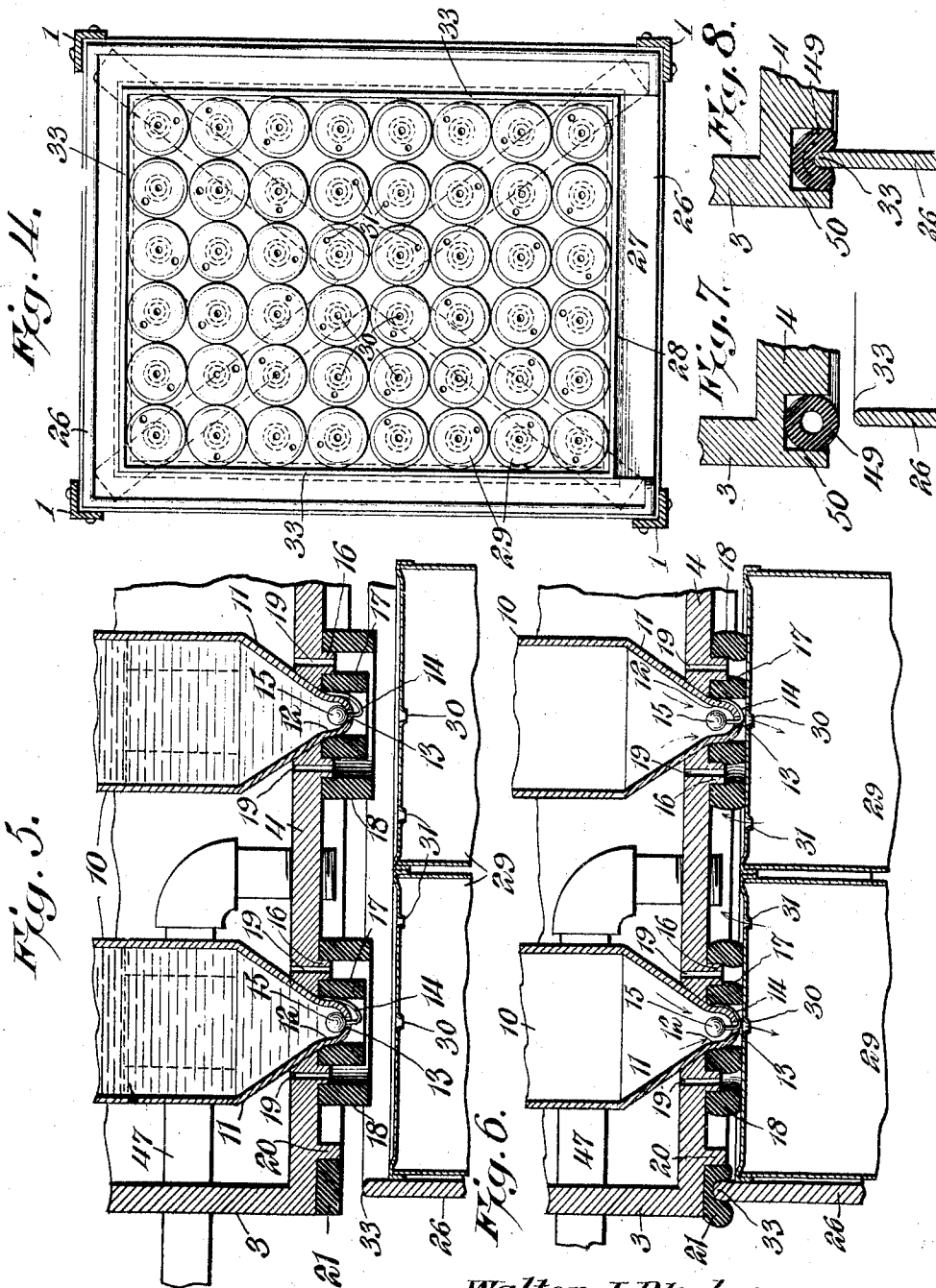
Fig. 9.
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UNITED STATES PATENT OFFICE.

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CAN FILLING APPARATUS

1,025,717.

Specification of Letters Patent.

Patented May 7, 1912.

Application filed August 18, 1910. Serial No. 577,735.

To all whom it may concern:

Be it known that I, WALTER J. PHELPS, a citizen of the United States, residing at Baltimore, State of Maryland, have invented a new and useful Can-Filling Apparatus, of which the following is a specification.

This invention has reference to improvements in machines for filling liquids into cans, and its object is to provide a means whereby the use of a large opening in top of the can to be afterward covered by a cap soldered on the head of the can is avoided.

The present invention contemplates the use of a can already completed and sealed, except that there is provided a centrally located filling perforation in one head of the can and another perforation near the margin of the can head from which it is designed to withdraw the air from the interior of the can to a sufficient extent to cause sub-atmospheric pressure within the can which will cause a more rapid inflow of the liquid through the filling opening than would be the case were gravity alone utilized.

Furthermore, when the attempt is made to introduce a liquid in a can through a small opening there remains on the surface of the can immediately surrounding the opening a drop or globule of the liquid which as soon as the can and filling conduit are separated spreads over the top of the can in the vicinity of the opening and this drop or globule must be removed before the perforations may be sealed by a drop of solder in the usual manner. By the present invention the drop or globule of material which tends to remain on the surface of the cover of the can about the inlet opening or perforation is caused to flow therethrough into the can, so that this amount of material is not wasted as has heretofore been the case, but the surface of the can top is left in a condition requiring no further treatment preparatory to the sealing of the opening with solder.

In carrying out the present invention provision is made for the production of sub-atmospheric pressure within and about the cans during the filling operation except at the filling opening and its immediate vicinity, so that the air pressure on the surface of the liquid flowing into the cans augments the action of gravity whereby a more rapid flow of liquid into the can is caused than would be the case from gravity alone, and,

furthermore, the inrush of air at the filling opening in the can when the contents of the reservoir of material local to the can is exhausted will cause the indrawing of the liquid which otherwise would accumulate on top of the can about the inlet opening.

One embodiment of the invention is illustrated in the accompanying drawings forming a part of this specification, but it will be understood that the invention is by no means limited to the specific embodiment shown, since the invention is susceptible of modification in many details without in any manner departing from the salient features of the invention.

In the drawings:—Figure 1 is an end elevation of a machine constructed in accordance with the present invention. Fig. 2 is a plan view of the structure of Fig. 1. Fig. 3 is a front to rear vertical section through the machine with some parts broken away, the scale being larger than that of Figs. 1 and 2. Fig. 4 is a plan view of the carrier for the cans showing a tray full of cans in place thereon, with the guiding members for the can carrier shown in cross section, the scale being the same as Figs. 1 and 2. Figs. 5 and 6 are detail sections showing different phases in the operation of the can carrier and measuring cups. Figs. 7 and 8 are detail sections showing different phases of operation with a sealing gasket of different structure than shown in Figs. 5 and 6. Fig. 9 is a perspective view of a capacity reducer for the measuring cups.

Referring to the drawings there is shown a support made of four legs 1, preferably of structural steel of angle type, and these legs are bolted to the corners of a rectangular frame 2 which may also be made of angle steel.

The angle members of the frame 2 are so disposed that their upturned flanges are innermost and form a receptacle for a casing 3 open at the sides and at the lower end formed with a web or diaphragm constituting a bottom member 4 extending entirely across the casing, which, in the particular showing of the drawings, is rectangular in general shape. The casing 3 is formed near the other or upper end with a web or diaphragm 5 constituting an inset top or cover for the casing, the side walls of the casing extending above this cover member 5 as shown at 6. The top or cover

member 5 is formed with series of passages 7 with peripheral flanges 8-9 on the respective upper and lower faces of the top member, the passages 7 being thereby elongated, and in these passages are secured the upper ends of measuring cups 10 each open at the said upper end and having a contracted bottom portion 11 formed with a semi-spherical end 12, the bottom of the cups extending through appropriate passages in the bottom member 4 in air tight relation thereto either by soldering or otherwise. The semi-spherical end 12 of each cup is formed with a passage 13 through which there extends a stem 14 carrying within the end 12 of the cup a valve 15 which, in the particular showing of the drawings, is a ball valve. The other end of the stem 14 is continued alongside the outer wall of the end member 12 of the cup, and is secured thereto by solder or otherwise, the construction being such that this stem 14 has a normal tendency to hold the valve 15 in closing relation to the passage 13, but yieldable to a suitable force exerted to move the stem into the cup to an extent to carry the valve 15 away from the opening 13, thus unclosing it.

Formed on the lower face of the bottom member 4 in spaced concentric relation to each cup end 12 is a flange 16, and surrounding each cup end 12 between the same and the flange 16 is a tubular gasket 17 preferably made of soft rubber and of such length that its lower end is substantially coincident with the lowermost extension of the valve stem 14. Applied to the flange 16 exterior thereto and in concentric relation to the gasket 17 is another tubular gasket 18, also made of soft rubber, and having its lower end extending beyond the lower end of the gasket 17 for a purpose which will presently appear. Extending through the flange 16 and adjacent portion of the bottom member 4 of the casing are passages 19 placing the chamber between the outer wall of the gasket 17 and the inner wall of the gasket 18 in constant communication with the space above the bottom member 4. Inset for a short distance from the outer edge of the casing and extending downward from the bottom plate 4 is a flange 20, and secured to the bottom of the casing 3 between the flange 20 and the outer edge of the casing is a gasket 21 preferably of soft rubber, and the relation of the gaskets 17 and 18 to the gasket 21 is such that the lower ends of both of the gaskets 17 and 18 extend normally to a greater distance below the lower face of the bottom 4 than does the corresponding portion of the gasket 21.

The casing 3 is provided with an off set reservoir member 3^a which may be formed integral with the casing, and this reservoir

is depressed with relation to the top member 5 and may be in part supported by brackets 22 formed on or secured to the appropriate angle members of the frame carrying the casing 3. Adapted to the reservoir 3^a is a displacement member 23 of such size that when the reservoir contains a sufficient quantity of liquid the lowering of the displacement member 23 will cause a rise in level of the liquid within the reservoir which will result in the liquid overflowing the depressed top member 5 to an extent to flood the cups 10, filling the latter with the liquid. When the displacement member 23 is raised, the liquid not lodged in the cups will flow back into the reservoir, the cups remaining brimful since the liquid may not escape from the cups because the valves 15 are closed under the particular conditions assumed. The reservoir 3^a may be replenished with liquid as needed through a pipe 24 including a suitable valve 25 and coming from an appropriately large source of liquid supply.

The present invention is well adapted for filling cans with liquids of various kinds, and is particularly well adapted for filling cans with evaporated milk, the machine having been designed for this purpose. It will be understood, however, that the use of the machine is by no means limited to the canning of evaporated milk, and while for convenience of description the liquid to be canned will hereinafter be referred to as milk, this does not preclude the use of the machine for canning any material for which it may be adapted.

There is great economy in canning milk in using cans wherein the only openings to the interior of the can when ready for the reception of the milk are in the form of two small perforations which may be punched in the can at the time the head is formed, so that not only is the likelihood of the entrance of dirt into the can minimized, but the sealing of the can is greatly facilitated, while the expense of sealing is greatly reduced, the danger of improper sealing being almost, if not entirely eliminated. One of the perforations in the head of the can is preferably made central and constitutes the filling perforation. The other perforation is placed near the margin of the head of the can and constitutes the exhaust perforation for air within the can.

The machine is provided with a can carrier 26 of sufficient extent to move freely yet comparatively snugly in the space defined by the angle legs 1. This carrier 26 has a depressed portion 27 adapted to receive a tray 28 of a size to snugly, yet freely, receive a predetermined number of cans 29, each formed with a central perforation 30, and another perforation 31 between the central perforation and the margin of

the can, but usually quite near the margin. The relation between the cans and cups 10 is such that when the tray 28 is placed upon the carrier 26 and positioned thereon by the depressed portion 27 of the carrier, the perforations 30 will be below the gaskets 17 in position to be surrounded by these gaskets when the cans are brought into engagement therewith. The tray 28 is provided with side walls 32 extending above the tops of the cans when in place therein, the tray being of such size that the side walls will engage the gasket 21 when the tray is elevated, and these side walls have their upper edges 33 preferably rounded, so that they may engage and sink in the gasket 21 without damage to the latter, while at the same time providing an extended sealing surface between the edges 33 and the gasket 21.

The carrier 26 is upheld by the divergent ends of converging arms 34 united at their meeting ends to a bar 35 connected at the lower end by a pivot bolt 36 or otherwise to one arm of a treadle 37 having a pivot connection 38 to appropriate legs 1, this treadle extending to that side of the machine remote from the reservoir 21 and there provided with a foot member 39 within reach of an operator.

Erected on opposite sides of the upper end of the casing 3 are brackets 40 formed with journals for the ends of a pivot shaft 41 fast on which is a lever 42 pivotally connected at one end to ears 43 on the displacement member 23, and at the other end pivotally connected to one end of a link 44 continued to the outer end of the treadle 37, as indicated at 45. Since the carrier 26 will move up and down in a straight line while the treadle 37 has the end connected to the carrier moving in an arc because of the pivoted support 38, the pivot bolt 36 is passed through a slot 46 formed in the corresponding end of the treadle. Leading into the casing 3 and extending through the bottom 4 is a pipe 47 which is assumed to be connected to any suitable air exhausting means capable of producing the desired sub-atmospheric pressure.

Reference has been made to the cups 10 as measuring cups, and these cups are designed to each contain a quantity of milk which will fill a corresponding can 29 to within about one-eighth or three-sixteenths of an inch from the top of the can. If it be desirable to fill smaller cans, the working capacity of each cup may be reduced by inserting therein a reducing sleeve 48 shown separately in Fig. 9 and indicated in dotted lines in the left hand cup of Fig. 3.

The normal tendency of the carrier 26 is to move to the lower limit of its travel under the action of gravity, the inner end of the treadle 27 moving downward and the outer end upward, this movement being trans-

mitted by the link 44 to the lever 42 causing a downward movement of the displacing member 23 in the reservoir 3^a, the weight of this displacing member aiding in the movement thereof into the milk assumed to be present in the reservoir 3^a. With the parts in this last named position the milk in the reservoir has been caused to flow therefrom over the top member 5 of the casing 3 to a depth sufficient to overflow into the cups 10, filling the latter to the brim and while the carrier 26 is in the lowermost position, a tray 28 with cans 29 therein is placed on the carrier in the depression 27, being shoved on to the carrier as far as the length of the depression permits, the cans within the tray being then positioned immediately beneath the corresponding outlet ends of the cups.

The operator now depresses the end 39 of the treadle 37, thus raising the carrier 26 and with it the tray 28, and the cans 29 thereon, this movement of the treadle causing a rocking of the lever 42 in a direction to raise the displacing member 23 from the reservoir 3^a and the lowering level of the milk within the reservoir causes the flowing of any milk which may remain on the surface of the top 5 back into the reservoir 3^a.

The upward movement of the carrier 26 ultimately brings the upper edges of the side walls of the tray 28 into engagement with the gasket 21 and before the upward movement ceases, the edges 33 of the side walls of the tray have become embedded in the gasket, this position being shown in Fig. 6. The web or diaphragm 4 therefore constitutes a cover member for the tray or can container 28 when the walls of the latter engage the gasket or sealing member 21. As the cans are raised they are brought into engagement with the gaskets 18 and the latter are compressed, and then the cans reach the gaskets 17 and compress the latter sufficiently to produce air-tight joints. By the time the gaskets 17 are properly seated against the tops of the cans the valves 15 are fully open.

While the operations just described have been taking place, the exhausting apparatus is withdrawing air through the pipe 47 so that as soon as the edges 33 of the side walls of the tray are brought into engagement with the gasket 21 to an extent sufficient to seal these edges, the air within the chamber formed by the bottom 4 of the casing 3 and the tray 28, is exhausting through the pipe 47, so that sub-atmospheric pressure is established in this chamber. All the cans 29 are inclosed in the same chamber, and are subjected to the same sub-atmospheric pressure, the air within the cans escaping through the openings 31 into the chamber to ultimately pass out through the pipe 47. This arrangement permits of a much nearer approach to

a vacuum than though the outer walls of the cans were at all times under atmospheric pressure. Since the valves 15 are now open and the gaskets 17 and 18 are in sealing relation to that portion of the top of the cans immediately surrounding the openings 30, the effect of the sub-atmospheric pressure established within the cans is to accelerate the inflow of milk from the respective cups 10 through the passages 13 to and through the perforations 30, the increased flow being due to the action of atmospheric pressure on the milk exposed at the tops of the cups 10, which are there open to the atmosphere, the flow of milk being commensurate with the action of gravity as augmented by the air pressure due to the sub-atmospheric pressure within the cans. Ultimately the contents of the cups are all directed into the respective cans, and the operator is apprised of this fact by the noise made by the inrush of air. As the carrier is again lowered, the valves 15 close and the gaskets 17 leave the tops of the cans and air at atmospheric pressure flows under the lower edge of each gasket 17 to the opening 30 of the respective can carrying with it any milk remaining on top of the can to the interior thereof, thus leaving the can top and perforation 30 clean. Then the top edges of the tray will pull away from the gasket 21 and the cans leave the gaskets 18 and atmospheric pressure is quickly produced within the cans, each of which still has a shallow air space above the milk, by the inrush of air through the openings in the tops of the can. When the carrier has reached its lowermost position, the tray with the filled cans may be removed and another tray containing empty cans may be placed on the carrier, and the operation may be repeated. The reservoir 3^a having in the meantime been replenished with milk by a proper manipulation of the valve 25, so that when the plunger or displacing member 23 is again lowered into the reservoir, there is a sufficient quantity of milk therein to once more flood the portion of the casing above the depressed top member 5 and fill all the cups 10, the several valves 15 having been moved to the closed position by the resiliency of the valve stems 14.

Instead of using a solid gasket like the gasket 21 of Figs. 1, 3, 5 and 6, a tubular gasket 49 shown in Figs. 7 and 8 may be employed. To accommodate this gasket the flange 20 is replaced by two depending parallel wings 50 of a size to receive and retain the tubular gasket 49, and this gasket will collapse when the edge 33 of the side walls of the tray engage it, the collapsed position being shown in Fig. 8, and this will form a further seal for the chamber composed of the bottom 4 of the casing 3 and the tray 28, such seal being practically resistant

to any reduction of pressure which may be utilized in the operation of the machine.

What is claimed is:—

1. An apparatus for filling liquid into cans each having a filling opening in one end and another opening in the same end spaced from the filling opening comprising a closure for the cans having means for sealing the closure against the entrance of air, an air exhaust conduit communicating with said closure, and liquid supply means having can engaging members individual to the cans for directing liquid thereto, said can engaging members being each provided at the can engaging end with air sealing means in active engagement with the can about the filling opening to the exclusion of the other opening while the filling operation is progressing.

2. In an apparatus for filling liquid into cans each having a filling opening in one end and another opening in the same end spaced from the filling opening, a closure for the cans having means for sealing it against the entrance of air, an air exhaust conduit communicating with said closure, means for placing the cans individually in communication with a source of liquid supply, means for sealing the means communicating with the liquid supply against the action of the exhaust means except through the cans individual thereto, and means other than the liquid supply means for admitting air to the cans at the liquid inlets thereof to the exclusion of the admission of air at the outlets of said cans.

3. In an apparatus for filling liquid into cans each having a filling opening in one end and another opening in the same end spaced from the filling opening, a container for the cans, means for sealing the container against admission of air except through the cans, an exhaust conduit communicating with said container means for directing liquid into the cans, and means other than the liquid directing means for directing air at a greater pressure than the pressure maintained within the container during the filling operation to the filling openings only of the cans.

4. In an apparatus for filling liquid into cans each having a filling opening in one end and another opening in the same end spaced from the filling opening, a container for the cans to be filled, means for sealing the container against the admission of air, an exhaust conduit communicating with said container means for directing the liquid into the cans while in the container and while the latter is in the sealed condition, and means other than the liquid directing means for directing air streams to the filling openings only of the cans while the sealing of the container is maintained.

5. In an apparatus for filling cans with

liquid, a source of liquid supply for each can, a container for the cans movable to bring each can into operative relation to its source of liquid supply, means for sealing the can container against the entrance of air, means other than the liquid supply means for directing air to each can, and an air exhaust conduit in operative relation to the can container when the latter is in the sealed position.

6. In an apparatus for filling cans with liquid, a container for the cans to be filled, means individual to each can for supplying the same with a predetermined quantity of liquid, a sealing means carried by the supply means individual to each can for engaging the can adjacent said individual supply means, means for sealing the container against the entrance of air, and an air exhaust conduit in operative relation to the can container for producing sub-atmospheric pressure within said container while in the sealed condition.

7. In an apparatus for filling cans with liquid, a plurality of open ended pendently arranged measuring cups each provided at the lower end with a valve, a container for the cans to be filled movable to and from the valved ends of the cups, means for sealing the container against the entrance of air, means for sealing the valved end of each cup in operative relation to a respective can, and means for directing air at atmospheric pressure between the last named sealing means and the respective can when the sealing connection between the last named sealing means and the can is broken.

8. In an apparatus for filling cans with liquid, a container for the cans to be filled, means individual to each can for directing liquid to the filling opening of the respective can, means for sealing the container as a whole against the entrance of air at atmospheric pressure, means for sealing the liquid directing means of each can against communication with the interior of the can container except through the can, and means for establishing an air chamber within the container about each liquid directing means, said chamber being in communication with the atmosphere.

9. In apparatus for filling cans, a series of liquid containers, sealing conduits one for each liquid container, a can container of a capacity to hold as many cans as there are liquid containers, said can container, being movable to and from the liquid containers, means for sealing the can container when in sealing relation to the liquid containers, and an exhaust air conduit in communicating relation with the can container when the latter is in the sealed position.

10. In apparatus for filling liquid into cans each provided with an inlet and outlet perforation, a container for the cans, a mem-

ber constituting a cover member for the container, liquid receptacles extending through the cover member, a sealing conduit at the discharge end of each liquid receptacle where projecting through the cover member, sealing means for the can container carried by the cover member and adapted to form a closure for the can container in conjunction with the cover member, means whereby air may be exhausted from the can container when in sealed relation to the cover member, and means for the admission of liquid to the cans when the can container is in the sealed condition.

11. An apparatus for filling liquid into cans each provided with an inlet and outlet perforation, a container for the cans, a member constituting a cover member for the container, liquid receptacles extending through the cover member, a sealing conduit at the discharge end of each liquid receptacle where projecting through the cover member, sealing means for the can container carried by the cover member and adapted to form a closure for the can container in conjunction with the cover member, means whereby air may be exhausted from the can container when in sealed relation to the cover member, means for the admission of liquid to the cans when the can container is in the sealed condition, and means for the admission of air to the inlet opening of each can while sub-atmospheric conditions are maintained within the can container.

12. In an apparatus for filling cans with liquid, a series of pendently disposed liquid containers each provided with a valved outlet, an elastic conduit extending beyond the outlet of each container, an elastic member surrounding and extending beyond the elastic conduit, a container for the cans to be filled, a cover member therefor through which the valved ends of the liquid containers extend, said conduit having means for maintaining the interior of the elastic members surrounding the elastic conduits in communication with the atmosphere, means for sealing the can container against the admission of air when in sealing relation to the elastic members and elastic conduits, and means whereby sub-atmospheric pressure may be established within the can container.

13. In an apparatus for filling cans with liquid, a series of pendently disposed liquid containers each provided with a valved outlet, an elastic conduit extending beyond the outlet of each container, an elastic member surrounding and extending beyond the elastic conduit, a container for the cans to be filled, a cover member therefor through which the valved ends of the liquid containers extend, said conduit having means for maintaining the interior of the elastic members surrounding the elastic conduits in communication with the atmosphere. means

for sealing the can container against the admission of air when in sealing relation to the elastic members and elastic conduits, and means whereby sub-atmospheric pressure may be established within the can container, the elastic members and elastic conduits being proportioned to engage in the order named cans moved toward them and to yield to such movement of the cans to cause the sealing connection with the cans and to then cause opening of the valved ends of the liquid containers.

14. In an apparatus for filling cans with liquid, a series of stationary liquid containers each having a valved discharge end, an elastic conduit at the discharge end of each liquid container, an elastic gasket surrounding and in spaced relation to the elastic conduit and projecting beyond the discharge end thereof, a cover member through which the valved ends of the containers extend and carrying the elastic gaskets, an elastic sealing means carried by the cover member at the edge thereof, and a can container movable to and from the cover member with the walls of the container engaging the sealing means of the cover member when moved toward the latter.

15. In an apparatus for filling cans with liquid, a liquid reservoir, a series of liquid receiving cups each having a valve at its discharge end and in pendent relation to the reservoir, means for causing the filling of the cups with liquid from the reservoir, a

container for cans, a carrier for the container operable to move the container to and from the valved ends of the cups, a treadle connected to the carrier for moving the carrier at will, means controlled by the treadle for causing the flow of liquid to the cups, a cover member for the can container in fixed relation to the valved ends of the cups and through which the said ends of the cups extend beyond the carrier, an elastic gasket surrounding the discharge end of each cup, another elastic gasket surrounding and spaced from each of the first named gaskets and extended to a greater degree toward the carrier, the interior of the last named gaskets being each in communication with the atmosphere, a sealing member carried by the cover member in the path of the edges of the walls of the can container when moved toward the cover member, and an exhaust air conduit extending through the cover member for the production of sub-atmospheric pressure within the can container when its walls are in sealing relation to the sealing means of the cover and cans within the container are in operative relation to the gaskets on the cover member.

In testimony, that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

WALTER J. PHELPS.

Witnesses:

JOHN H. SIGGERS,
LEWIS EBERLY.