K. KIEFER.

FILLING MACHINE.

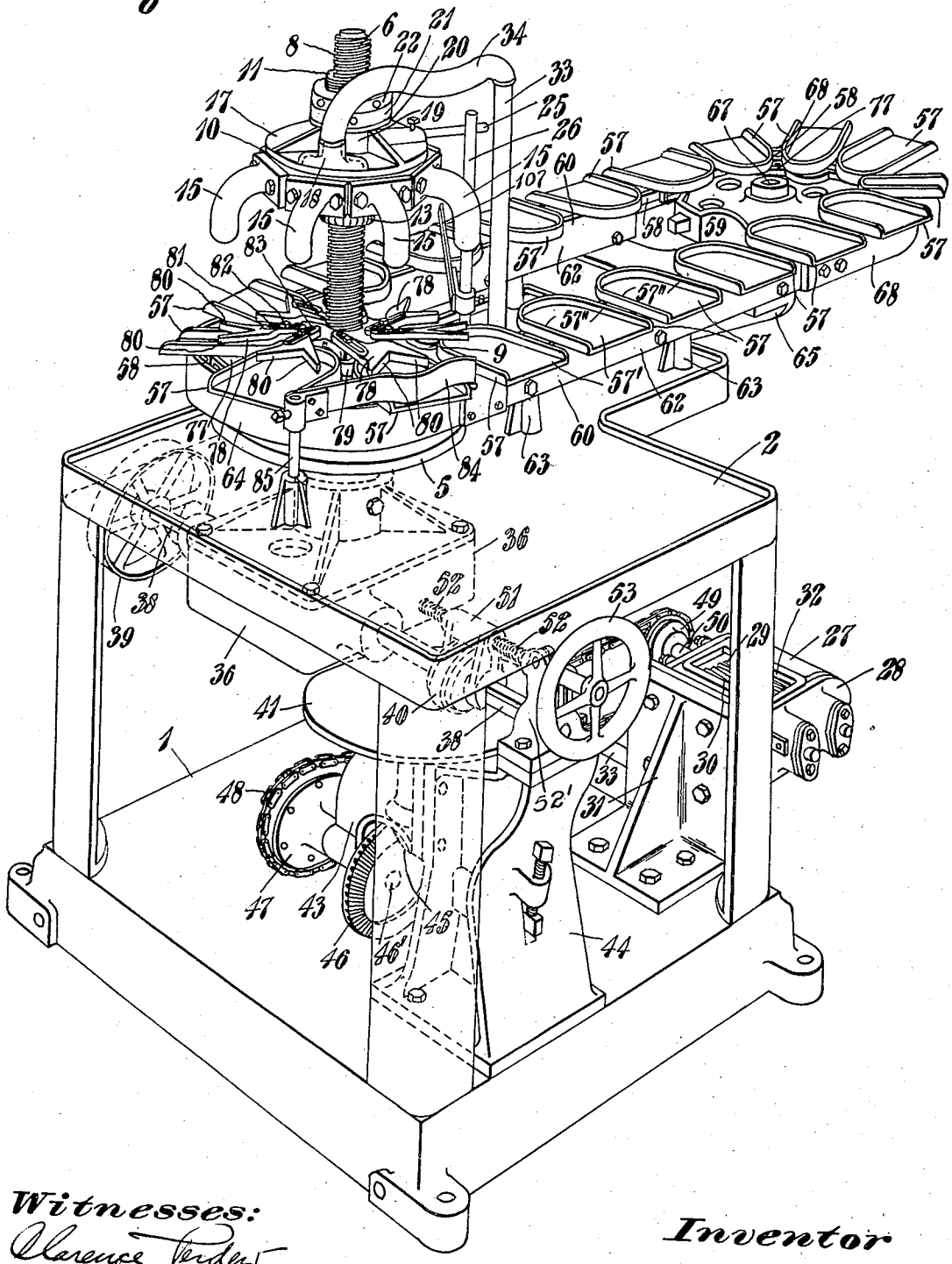
APPLICATION FILED APR. 21, 1917.

1,313,301.

Patented Aug. 19, 1919.

4 SHEETS—SHEET 1.

Fig. 1.



Witnesses:

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4 SHEETS—SHEET 2.

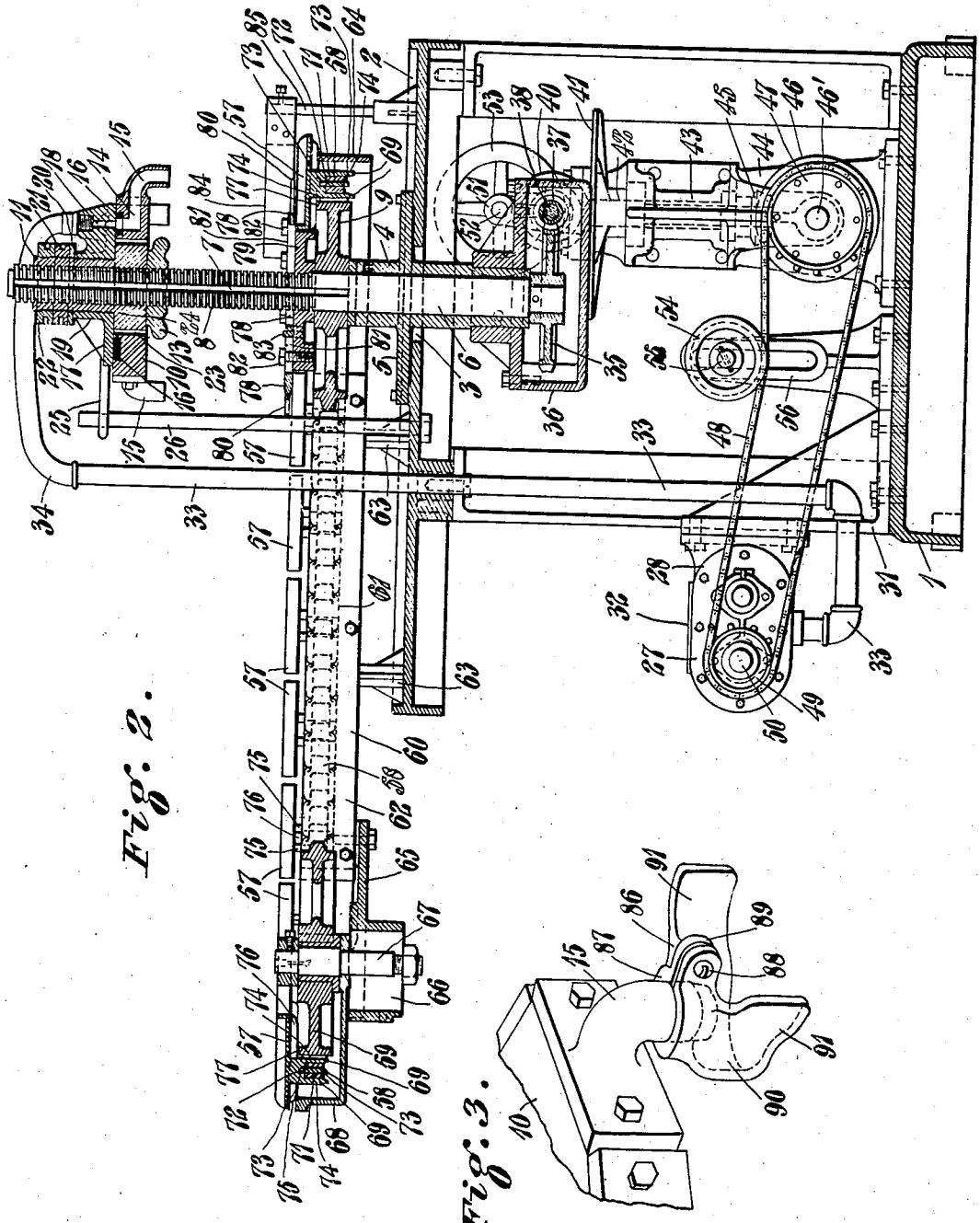


Fig. 2.

Fig. 3.

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4 SHEETS—SHEET 3.

Fig. 4.

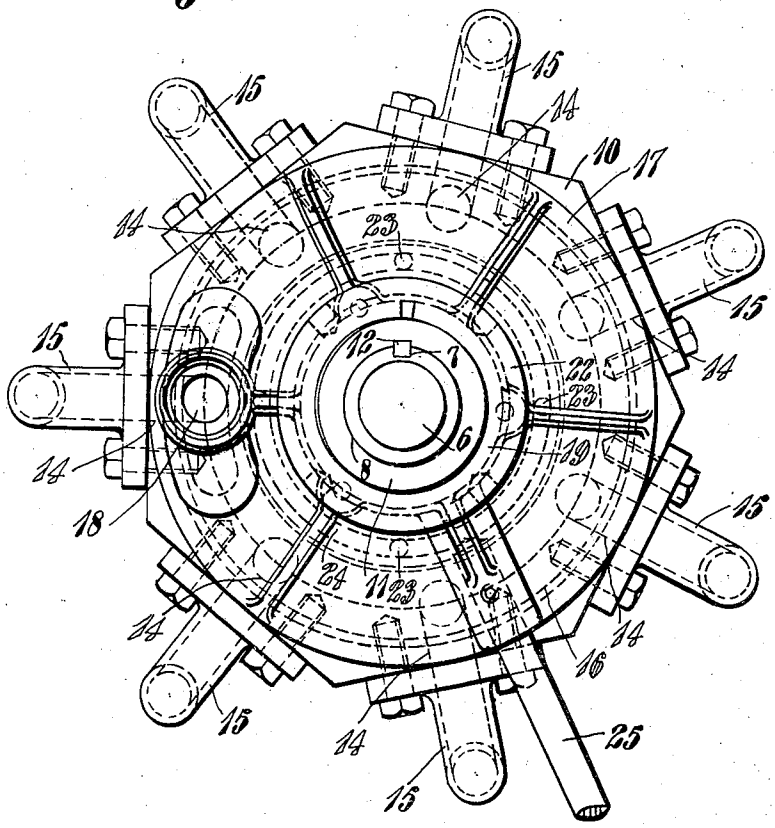


Fig. 5.

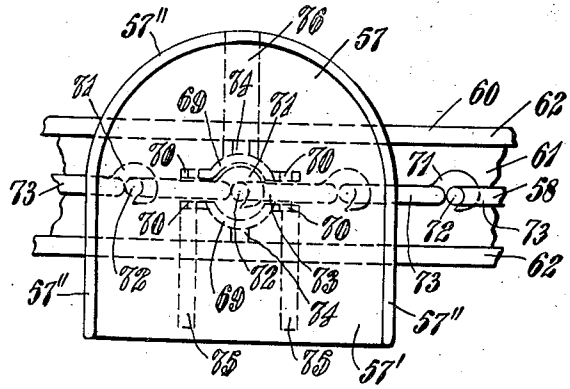
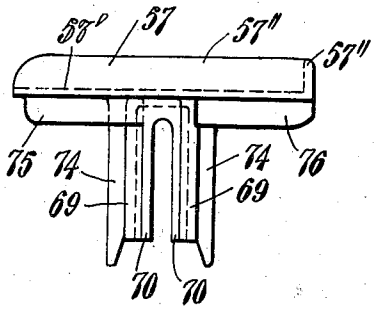


Fig. 6.



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FILLING MACHINE.

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1,313,301.

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4 SHEETS—SHEET 4.

Fig. 7.

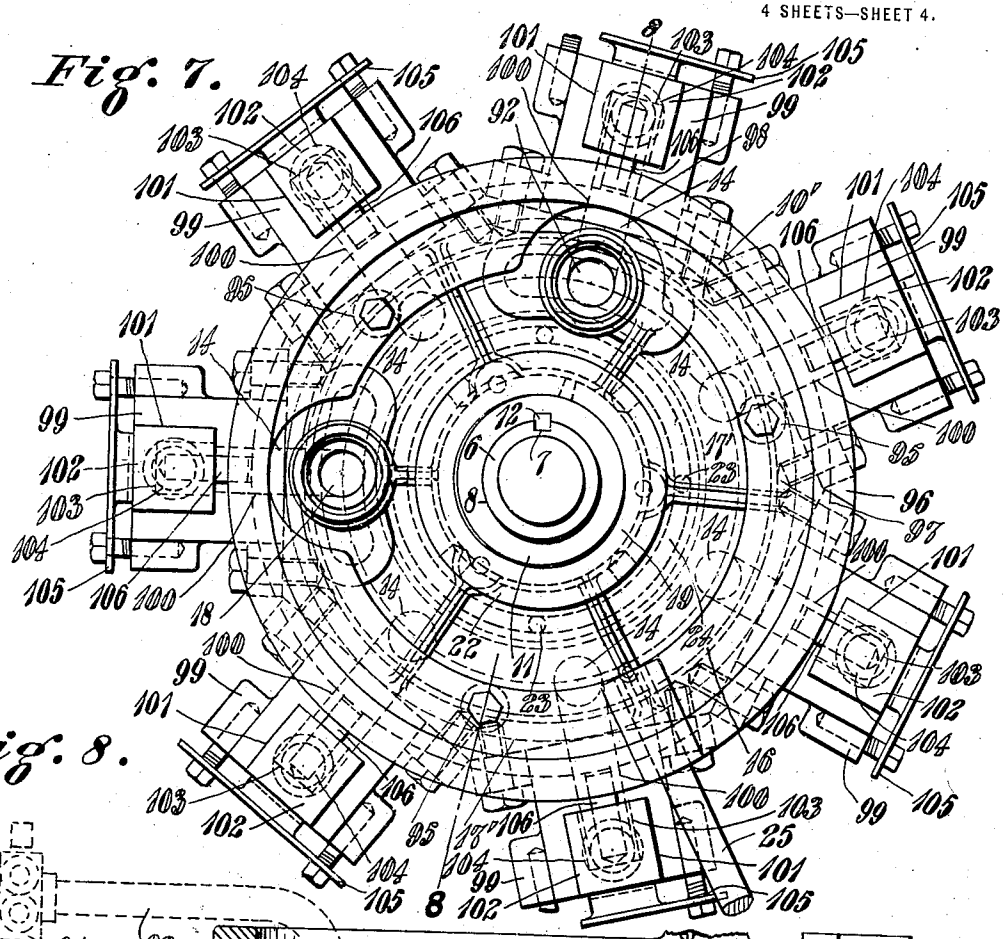
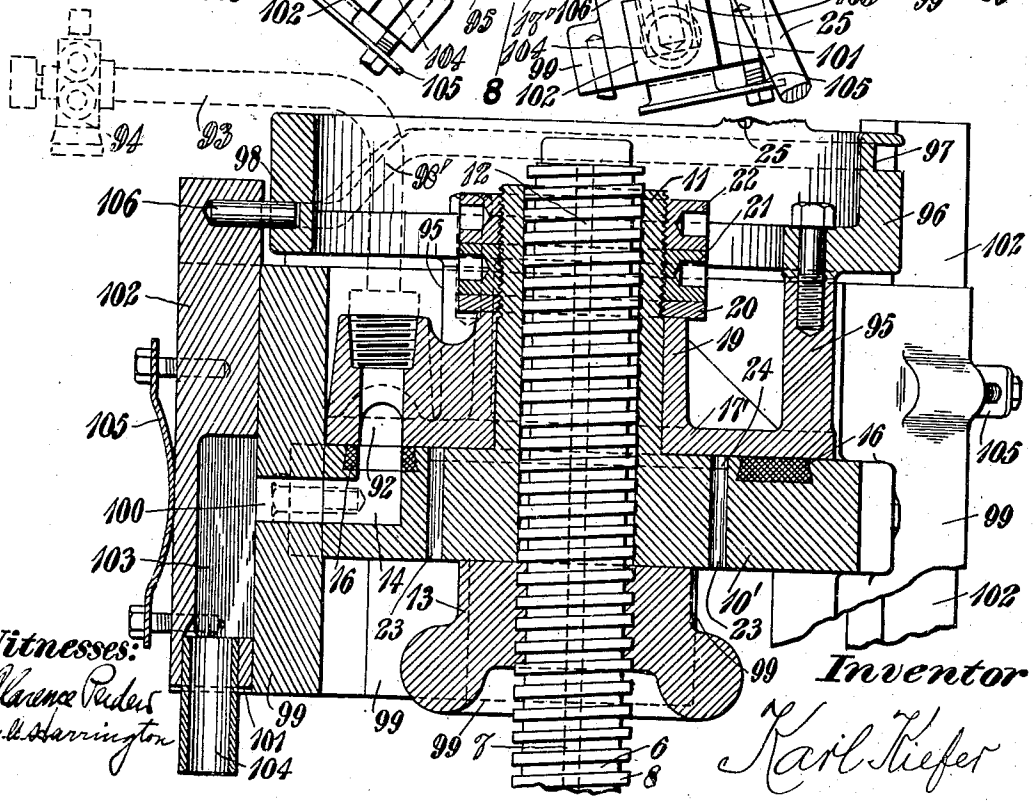


Fig. 8.



Witnesses:

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UNITED STATES PATENT OFFICE.

KARL KIEFER, OF CINCINNATI, OHIO.

FILLING-MACHINE.

1,313,301. Specification of Letters Patent. Patented Aug. 19, 1919.

Application filed April 21, 1917. Serial No. 163,603.

To all whom it may concern:

Be it known that I, KARL KIEFER, a citizen of the United States, and a resident of Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Filling-Machines, of which the following is a specification.

My invention relates to filling apparatus, and more especially to that kind of apparatus used for filling vessels or containers with substances which do not flow readily, but are rather of a semi-fluid or viscous consistency.

The object of my invention is to fill vessels or containers with such substances rapidly and uniformly without waste, deterioration or contamination of the substance.

In the drawing:

Figure 1 is a general perspective view of a filling machine embodying my invention;

Fig. 2 is a longitudinal vertical section on a plane coincident with the center lines of the carrier sprockets;

Fig. 3 is a detail perspective view of a spout attachment;

Fig. 4 is a plan view of the filling head;

Fig. 5 is a plan view of one of the carriers and its chain and guide rails;

Fig. 6 is a detail side elevation of one of the carriers;

Fig. 7 is a plan view of a modified filling head; and

Fig. 8 is a vertical cross section on a plane corresponding to the line 8—8 of Fig. 7.

As I prefer to construct my invention, there is a base 1 supporting a table 2. This table has an opening 3 (Fig. 2) and a bearing hub 4 has a flange 5 bolted down to the top of the table and extends some distance above this flange and also extends below the flange through the opening 3. The main shaft 6 is journaled upright in its bearing hub 4; extending to a considerable distance above the upper end of the hub 4 and being provided with a longitudinal key way 7, as well as with a coarse thread 8, and has the driving sprocket wheel 9, to be referred to later, keyed on it and supporting it on the hub 4.

This threaded upward extension of the main shaft carries the filling head, which comprises the distributing head 10, which, as here shown, is made up of a flat seven-sided body with a central externally-threaded neck 11 extending up from the body with its interior opening continuous and smooth through the body and slidably receiving in its interior said upward extension of the shaft 6 with a suitable spline 12 (Fig. 4) sliding in the key way 7. Below this distributing head a suitable hand wheel 13 travels on the threads 8 and supports the filling head. Thus the distributing head 10 may be adjusted up and down in the shaft 6, but it will always turn with the shaft. The upper side of the distributing head body is made very flat and smooth, and discharge passages or orifices 14 are provided therein, each one of these opening from the upper flat surface and leading down and then radially outward through a respective one of the seven sides of the body. As shown in Figs. 1 to 4, inclusive, spouts 15 are bolted to the respective sides, each with its interior passage or orifice forming a continuation of a respective discharge orifice or passage 14; these spouts being directed downward with their lower openings all in a single circle concentric with the shaft 6. The openings of the discharge orifice or passages in the flat top are also arranged in a single circle concentric with said shaft and preferably in an annular gasket section 16 of soft metal such as Babbitt metal.

Fitting down along the neck 11 is a controlling head 17 which has a flat lower surface adapted to fit the flat upper surface of the distributing head 10 very accurately, and with a circumferentially elongated delivery passage or orifice 18 opening through it in such position that each discharge passage or orifice 14 opening through the upper surface of the distributing head, thus closely contacting with the lower surface of the controlling head, will register with this delivery passage or orifice 18 during relative rotation of the heads. The controlling head has an upstanding hub 19 where it fits around the neck 11 and on top of this hub is a washer 20 screwed down against which is a nut 21 which in turn has a lock nut 22 screwed down against it on the externally threaded neck 11. By this means the controlling head is clamped as tightly as may be desired against the distributing head, with the result that leakage from the delivery orifice 18 out between the heads is minimized; this effect being greatly augmented by providing the soft gasket section 16 before alluded to, and making the con-

trolling head of a good non-corrosive metal, such as bronze.

It being necessary to lubricate the bearing of the controller 17 around the neck 11 and yet to keep the lubricant out of the delivery and discharge orifices, as well as keep the filled substance out of the bearing, I prefer to provide the distributing head body with drain openings 23 down through it radially inward from the gasket section 16, all connected by an annular groove 24 (Fig. 4) which will thus intercept any slight amount of either substance and allow it to pass down below the filling head where it can do no material harm. Such a device is according to my Patent No. 1,022,196 of April 2, 1912.

As the distributing head 10 rotates, it is necessary to hold the controlling head stationary; but as both are clamped together and must be adjusted up and down on the shaft 6, the controlling head is simply provided with a radially outwardly extending spur 25 which engages with a high stud 26 fixed in the table 2 some distance away from the shaft 6.

As hereinbefore alluded to, my present invention is especially for filling substances that do not flow readily, either under the action of gravity or pressure of the atmosphere. Therefore, this machine is provided with means for uniformly forcing the substance out through the orifice 18 to the successively registering discharging orifices. For this purpose I prefer to employ as a forcing means a spiral gear pump 27, such as disclosed in my Patent No. 1,103,053 of July 14, 1914, which comprises an outer casing 28 inclosing a couple of intermeshing spiral gears 29 and 30 (Fig. 1); the casing being bolted to the side of a suitable bracket 31 mounted on the base 1 under the table 2 at the right. The upper side of the pump casing 28 has a large opening 32 which it will be understood may be provided with a hopper or preferably with a pipe communicating with a suitable source of supply of the substance to be filled; and from the lower side of the pump casing 28 leads the conducting pipe 33 which passes in over the base 1 and up through the table 2 (Fig. 2) almost to the height of the main shaft 6. Since the filling head must be adjusted up and down, and this conducting pipe must connect with the delivery orifices 18 in the filling head, the upper end of the pipe 33 communicates with one end of a flexible section of conductor 34, the other end of which is connected with an upwardly extending neck around the delivery orifice 18 in the filling head; said flexible section 34 being long enough to permit the up and down adjustment of the filling head without interfering with the communication through the conductor.

The main shaft 6 has an extension below the bearing hub 4, on which is fixed a worm wheel 35 surrounded by a gear box 36 which is fixed on the lower end of the bearing hub. A worm 37 is fixed on a worm shaft 38, extending from the front to the rear of the machine, with bearings in the gear box 36, and having, where it extends out to the rear of the machine, a pulley 39 fixed on it (Fig. 1) which may be belted to any suitable motive apparatus such as an electric motor, by means of which the entire machine is driven.

It will be seen that by the worm wheel, the main shaft 6 will be rotated and with it the distributing head 10, as above described.

For driving the gear pump simultaneously with the operation of the filling head, the worm shaft 38 has, where it extends toward the front of the machine, a friction wheel 40 splined on it and bearing down against the plane upper surface of a friction disk 41 fixed on an upright shaft 42 that is journaled in a suitable bracket 43 mounted on the rear side of a pedestal 44, which in turn is mounted on the base 1 near the front of the machine under the table 2; said upright shaft 42 having fixed on its lower end a bevel pinion 45 in mesh with a bevel gear 46 fixed on a horizontal shaft journaled in the lower part of the bracket 43, and having fixed on it, to the rear of the bracket, a sprocket wheel 47, around which passes a sprocket chain 48, which also passes around a sprocket wheel 49 fixed on the outwardly extending shaft 50 of the gear 29 of the gear pump 27.

The friction wheel 40 is between the downwardly extending members of a yoke 51 which travels on a horizontal screw 52 journaled in a bearing 52′ (Fig. 1) mounted on the top of the pedestal 44; said screw having fixed on it, out in front of the table 2, a hand wheel 53 for turning it. Thus the friction wheel 40 may be adjusted nearer to or farther from the center of the friction disk 41, so that with a given speed of the motive apparatus and of the main shaft and filling head, the pump 27 may be driven slower or faster. This causes what may be called a fine adjustment of the speed of the pump relative to that of the filling head to determine the exact amount to be put into each container. For greater changes in this relative speed, smaller or larger sprocket wheels may be provided in place of the sprocket wheel 47, and the sprocket chain is adjusted to these different sprocket wheels by an idler wheel 54 journaled loosely on a stud 55 that is adjustable up and down in a stirrup 56 fixed on the top of the base 1 under the table 2, as is clearly shown in Fig. 2.

For carrying the vessels or containers into receiving relation with respective ones of the spouts 15 of the filling head, I prefer to provide an endless system of carriers 57, all mounted on a sprocket chain 58 that passes around the sprocket wheel 9 keyed on the

main shaft 6, as before described, and around an idler sprocket wheel 59 supported as will presently be described. The containers are thus brought to the spouts in a transverse plane *i. e.*, a plane lying across the machine parallel with the plane of the spouts, as is desirable for accuracy and avoidance of spilling and waste.

Extending to the right, with their center lines tangent to the pitch circle of the sprocket wheel 9, at front and rear thereof, are troughs 60, each composed of a bottom bar 61 and flanking guide rails 62 bolted thereto; said bottom bar 61 being secured to pedestals 63 that extend up from the top of the table 2, and which table preferably extends somewhat to the right to support the outermost two of these pedestals 63. A U-shaped outer guide rail 64 has its side parts bolted to the respective outer guide rails 62 of the troughs 60 and extends around the sprocket wheel 9. At the right hand ends of the troughs 60 is the bracket 65 bolted to the under sides of the trough and having a slot 66 extending from left to right and opening upwardly and downwardly, in which is bolted the upright stud 67 with the idler sprocket wheel 59 loosely journaled thereon above the bracket 65. By adjusting this stud 67 inward or outward along this slot 66, the tension on the sprocket chain 58 may be regulated. A suitable guard 68 has its bottom around the stud 67 under the idler sprocket 59 with its rim extending outside the adjacent ends of the troughs 60 as is best seen in Fig. 2.

The chain 58 is an ordinary detachable link sprocket chain and the sprocket wheels 9 and 59 are made to fit it, each sprocket wheel having seven teeth, which is the reason for making the distributing head 10 with seven sides, because it is the purpose to have the carriers 57 come between adjacent teeth of the sprocket wheels and to have these carriers under respective spouts 15 of the distributing head as they travel the semi-circular path at the left of the center line of the main shaft 6. As designed, only every third link of the chain meshes with a sprocket wheel tooth and the sprocket wheels are cut away between their teeth, as shown at the extreme left and right in Fig. 2, thereby leaving a space for overlapping connection of the chain links that are between the links that are meshed with the adjacent teeth.

Between the sprocket wheels, the lower sides of the chain links slide along on the top of the bottom bar 61 of the trough 60 and are thus supported thereby.

Each carrier 57 has downwardly extending lugs 69, each of hollow substantially semi-cylindrical cross-section, with their concave sides toward each other and flanked by wings 70. The substantially cylindrical space defined by these concavities receives the hook 71 of one link with the cross bar 72 of the next link engaged therein, while the wings 70 at respective sides of the lugs 69 closely flank the longitudinal bars 73 of the respective links, as is best seen in Fig. 5. On the middle of the outer convex part of each lug 70 is a rib 74 to bear out against the inner side of the adjacent guide rail 62, and on the under side of the carrier 57 are ribs 75 to bear down on the top of the outer guide rail, and a rib 76 to bear in like manner on the inner guide rail 62, thus slidably supporting the carrier, so that as it is drawn along by the chain it is kept in upright position at all times. As the carrier passes around either one of the sprocket wheels, its inner rib 76 bears on the upper side of the rim 77 of the sprocket wheel and its outer ribs 75 bear on the upper edge of the U-shaped guide rail 64 or of the guard 68, as the case may be.

It will thus be seen that each carrier 57 is very securely mounted on the chain 58, and at the same time, is readily detachable therefrom at any time for the substitution of a carrier of different shape or size or for any other reason. This mounting of the carrier on the chain practically prevents articulation of the two links engaged, but this is no detriment, because the next link in either direction has its full freedom of movement with respect to these two and the chain thus readily passes around the sprocket wheels. As here shown, the carrier 57 itself comprises a flat bottom 57′ with an upstanding rim 57″ at the sides and rear, which latter is substantially semi-circular, and the front edge of the bottom 57′ is left free for the ready placing and removal of the containers. It will be understood, however, that these carriers may be of any convenient shape.

Where the container is of a diameter to fit fairly closely between the sides and against the back of the rim 57″, the containers will be centered with respect to the spouts 15 by this means.

However, in order to provide for the centering of containers of various sizes, I prefer to provide a series of gages 78 mounted on a disk 79 connected to the main shaft 6 immediately above the sprocket wheel 9, and each one adapted to extend out over a respective carrier 57 as the carrier passes around the semi-circular path.

Accordingly there will be, as the machine is here designed, seven of these gages, as seen in Fig. 1. Each gage 78 comprises radially outwardly diverging arms 80 over the carrier 57 and a slotted shank 81 lying along the top of the disk 79 parallel to a radius through the junction of the arms 80, which shank is bolted to the disk 79 by a bolt 82 passing down through its slot as

well as held from lateral displacement by a dowel pin 83 in the top of the disk 79 and engaging in said slot. This slotted shank is disposed away from the radius far enough to allow its inner end to pass to one side of the main shaft 6, thus giving greater range of inward or outward adjustment of the gage.

To cause containers to move in between the diverging arms 80 as they start around their semi-circular path, a flat spring 84 has one end fixed on an upwardly projecting stem 85 on the table 2 to the left of said path and extending to the right therealong, and presenting one of its flat sides inward and preferably being suitably curved to allow the approaching container to slide readily inside the spring 84 and be pushed into position between the arms 80, due to the resiliency of the spring 84, which position the container will then keep during the remainder of its travel, in receiving relation with the respective spout 15 over the carrier 57 that the container is on. It will be seen that the radial adjustment of the gages 78 permits them to center containers of various diameters or shapes, and it will also be understood that gages of different shapes may be substituted in accordance with the requirements in handling containers of different shapes.

A great many of the containers in which substances are placed by this machine have wide mouths; but it is also frequently desirable to use containers with comparatively narrow mouths or necks, as, for instance, ordinary bottles. Also such containers of the same lot are liable to vary in the shapes of their bottoms or of their necks, so that the centering of the body of the container by the means just described, or any equivalent means, is not sufficient to insure just the proper relation of the mouth of the container to the respective spout 15.

For overcoming this difficulty I prefer to provide a mouth-centering attachment 86, as shown in Fig. 3, which comprises a hub 87 split at one side to slip upon and be clamped to the spout 15 by a screw 88 passing through ears 89 at opposite sides of the split of the hub and, extending downwardly from this hub 87, a semi-circular rear wall 90 from which lips 91 diverge forwardly. Thus the attachment has a wide opening in front to receive the container top or neck, so that when used in conjunction with the spring 84 or equivalent means, the container will be forced inward so that its top or neck fits snugly inside the concavity of the semi-circular rear wall 90, which is made concentric with the spout opening and of the proper radius to produce this effect with any given container; it being understood that different sized attachments may be put on for containers with materially different sized tops or necks. It will also be understood that this attachment may be used in conjunction with the gages 78, since the spring 84 will press the bodies of the containers against the gages and also press the tops of the containers over against the attachment 86.

From the foregoing description it will be understood that the pump 27, driven simultaneously with the driving of the main shaft 6 which actuates both the filling head and the carriers, will deliver the substance to the filling head at any uniform rate, according to the adjustment of the friction wheel 40 and the size of the sprocket wheel 47, with the result that the containers brought around at equal intervals will receive through the discharge orifices, registering with the delivery orifices at the same equal intervals, equal quantities of the substance. This is a greatly desired result in most instances.

However, as before alluded to, containers, especially those made of glass or the like, vary in shape so that when an equal quantity of substance is put in each one of the containers of a given lot, the substance reaches a higher level in some than in others. Thus, while the containers have equal quantities of substance, they do not appear alike, and this lack of uniformity in appearance is regarded by some users as less desirable than a lack of uniformity of substance. Therefore, I have provided a modification of my invention which will insure that the containers will all be turned out with the substance at uniform height, even though their contents vary slightly.

This modification is shown in Figs. 7 and 8, it being understood that it all resides in the filling head, the other parts of the machine being as shown in the preceding figures and as has been described. Thus, there is the main shaft 6 with the hand wheel 13 threaded thereon, supporting the distributing head 10′, which, except for the different location of the bolts which hold, on the respective ones of the seven sides, attachments in place of the spouts 15, is the same as in the preceding example. The controlling head 17′, however, has, in addition to the delivery passage or orifice 18, a suction passage or orifice 92 spaced a suitable distance around from but being in every way like the discharge passage or orifice 18.

From this suction passage or orifice 92 a suitable conductor 93 leads to a suitable suction-creating apparatus 94 (only shown diagrammatically in Fig. 8.)

This controlling head also has columns 95 which support the cam 96 made up of an upright annular shell at the bottom of which is an inwardly extending annular flange by which it is bolted to the columns 95 concentric with the main shaft 6. In the outer surface of its annular shell this

cam 96 has a groove 97 which runs around at a uniform height, except for a short distance on either side of the suction orifice or passage 92, where it has a low part 98 with suitable inclined parts leading to and from it; it being understood that it is the suitable inclination of these parts that governs the angular distance of the suction passage from the discharge passage. The spur 25 is here mounted on the top of this cam 96 and it will be understood that the stud 26 will be extended up accordingly.

Instead of the spouts 15, each of the seven sides of the distributing head has mounted on it an attachment comprising a body 99 with a passage or orifice 100 forming a continuation of the respective discharge orifice of the distributing head and opening outwardly into an upright groove 101 in which a spout-head 102 slides up and down with a recess 103 in its inner side and a spout 104 leading down from the bottom of said recess 103 to discharge the substance into the container. A suitable resilient holder 105 presses the spout head 102 against the inner side of the groove 101 at all times, yet allowing said head to slide freely. In the inner side of the upper part of the spout head 104 is fixed a pin 106 that extends into the slot 97 of the cam 96.

With this construction, when the distributing head 10′ rotates along with the main shaft 6, and the controlling head 17′ is held stationary, the spout-heads 102, with their spouts 104, will be held up by the pin 106 riding in the uniformly high part of the groove 97. But after they pass the delivery passage 18 they will be forced down on account of the pin 106 passing into the low part 98 of the groove 97, so that the spout 104 will be projected down into the substance that has just been discharged into the container, and when the discharge passage 14 registers with the suction passage 92, the suction-creating apparatus 94 will draw the substance out of the container down to the level of the spouts 104. The filling head having been adjusted to the proper height on the main shaft 6 to bring the lower ends of its spouts 104 to the desired level, it will be seen that all containers will thus be left with substance to the same level. The recesses 103 in the spout-heads 102 are made long enough to communicate with the continuous passages 100 and 14 at all times, whether the spout-head and spout are raised or lowered. As the hub continues to revolve, the spout-head and spout will of course be raised again into the uniformly high part of the groove 97, permitting the container to pass, with the carrier 57, off at a tangent to the semi-circular path that it has been traveling; and it will be understood that the suction passage will be so located that the spout will be entirely out of the container before the latter can begin its travel at a tangent. A diverting guide bar 107 (Fig. 1) preferably has one end fixed to the stud 26 and extends to the rear over the carriers 57 at a proper angle to divert the containers off their carriers onto a table or any other receiving means, not herein shown.

Having fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a filling machine the combination of a carrier for containers, with controlling and discharging elements, and a rotary force pump coöperating with said controlling device.

2. In a filling machine the combination of a carrier for containers, with controlling and discharging elements and a force pump substantially free from pulsations.

3. In a filling machine the combination with a carrier for containers, with controlling and discharging elements, a rotary pump coöperating with said controlling device, with means for regulating the speed of said rotary pump.

4. In a filling machine the combination of a continuous moving bottle carrier, of controlling and discharging elements coöperating with said container carrier, of a pump connected to said controlling element, the latter to apportion equal amounts of the output of the pump to the discharging elements, the discharging elements to move synchronously with the container carriers.

5. In a filling machine the combination of a continuously moving carrier for containers moving around an axis during the filling operation, discharging elements moving synchronously with the container carrier around the same axis, controlling elements connected by a closed conduit to the source of supply and arranged to control the filling of the containers within the time equivalent to the moving of an individual container carrier into the place of the preceding one.

6. In a filling machine, a carrier for containers, a controlling element connected by a closed conduit to a source of supply, a series of orifices moving synchronously with such containers for a time after filling operation which is substantially longer than the filling operation itself.

7. In a filling machine, controlling and discharging elements relatively rotatable in a transverse plane, supply means communicating continuously with said controlling elements during the relative rotation of said elements, a sprocket chain composed of links having interengaging parts, means for driving said sprocket chain in substantially a single transverse plane, and a carrier having a downwardly extending part fitting over said interengaging parts of said chain and carried by said chain to carry a con-

tainer into receiving relation with said discharging element during said relative rotation.

8. In a filling machine, controlling and discharging elements relatively rotatable in a transverse plane, supply means communicating continuously with said controlling element and driven during the relative rotation of said elements, means for varying the ratio between the rate of supply from said supply means and the rate of relative rotation of said elements, a sprocket chain composed of links having interengaging parts, means for driving said sprocket chain in substantially a single plane substantially parallel to the plane of relative rotation of said elements substantially throughout its travel, and a carrier having a downwardly extending part fitting over said interengaging parts of said chain and carried by said chain to carry a container into receiving relation with said discharging element during said relative rotation, whereby different ones of said carriers may be mounted on said chain in accordance with the variations of said ratio.

9. In a filling machine, controlling and discharging elements relatively rotatable in a transverse plane, forcing means communicating with said controlling element and driven simultaneously with the relative movement of said elements, carrying means to carry containers successively into receiving relation with said discharging element, and means for varying the relative speeds of operation of said forcing means and said carrying means.

10. In a filling machine, controlling and discharging elements relatively rotatable in a transverse plane, forcing means communicating with said controlling element and driven simultaneously with the relative rotation of said elements, an endless system of carriers traveling entirely in substantially a single transverse plane, to carry containers successively into receiving relation with said discharging element, and means for varying the relative speeds of operation of said forcing means and said carrying means.

11. In a filling machine, controlling and discharging elements relatively rotatable in a transverse plane, forcing means communicating with said controlling element and driven simultaneously with the relative rotation of said elements, a transversely driven element, a carrier detachably mounted on said element to carry a container into receiving relation with said discharging element during said relative rotation, and means for varying the relative speeds of operation of said forcing means and said carrying means.

12. In a filling machine, relatively movable controlling and discharging elements, forcing means communicating with said controlling element and driven simultaneously with the relative movement of said elements, carrying means to carry containers successively into receiving relation with said discharging element, a direct operative connection between said carrying means and one of said elements, and a variable speed operative connection between said direct operative connection and said forcing means.

13. In a filling machine, relatively rotatable controlling and discharging elements, forcing means communicating with said controlling element and driven simultaneously with the relative rotation of said elements, an endless system of carriers to carry containers successively into receiving relation with said discharging element, a shaft with which said carriers and one of said elements rotate, and a variable-speed operative connection between said shaft and said forcing means.

14. In a filling machine, a distributing head having a discharge orifice, a controlling head having a delivery orifice, said heads being relatively movable, means comprised in said machine to cause the relative movement of said heads whereby said discharge orifice intermittently communicates with said delivery orifice, and forcing means communicating with said delivery orifice and driven simultaneously with the relative movement of said heads.

15. In a filling machine, a distributing head having a discharge orifice, a controlling head having a delivery orifice, said heads being relatively rotatable, means comprised in said machine to cause the relative movement of said heads whereby said discharge orifice intermittently communicates with said delivery orifice, and forcing means communicating with said delivery orifice and driven simultaneously with the relative rotation of said heads.

16. In a filling machine, a distributing head having a plurality of discharge orifices, a controlling head having a delivery orifice, said heads being relatively movable, means comprised in said machine to cause the relative movement of said heads whereby said discharge orifices successively communicate with said delivery orifice, and forcing means communicating with said delivery orifice and driven simultaneously with the relative movement of said heads.

17. In a filling machine, a distributing head having a plurality of discharge orifices, a controlling head having a delivery orifice, said heads being relatively rotatable, means comprised in said machine to cause the relative movement of said heads, whereby said discharge orifices intermittently communicate with said delivery orifice, and forcing means communicating with said delivery orifice and driven simultaneously with the relative rotation of said heads.

18. In a filling machine, a distributing head having a discharge orifice, a controlling head having a delivery orifice, said heads being relatively movable, whereby said discharge orifice intermittently communicates with said delivery orifice, forcing means communicating with said delivery orifice, and means for driving said forcing means and causing the relative movement of said heads simultaneously at different relative speeds.

19. In a filling machine a distributing head having a discharge orifice, a controlling head having a delivery orifice, said heads being relatively rotatable, whereby said discharge orifice intermittently communicates with said delivery orifice, forcing means communicating with said delivery orifice and means for driving said forcing means and causing the relative rotation of said heads simultaneously at different relative speeds.

20. In a filling machine, a distributing head having a plurality of discharge orifices, a controlling head having a delivery orifice, said heads being relatively movable, whereby said discharge orifices successively communicate with said delivery orifice, forcing means communicating with said delivery orifice, and means for driving said forcing means and causing relative movement of said heads simultaneously at different relative speeds.

21. In a filling machine, a distributing head having a plurality of discharge orifices, a controlling head having a delivery orifice, said heads being relatively rotatable, whereby said discharge orifices intermittently communicate with said delivery orifice, forcing means communicating with said delivery orifice, and means for driving said forcing means and causing the relative rotation of said heads simultaneously at different relative speeds.

22. In a filling machine, a distributing head having an orifice, a spout movable up and down on said distributing head but continuously in communication with said orifice, a controlling head having a delivery orifice and a suction orifice, said heads being relatively movable, and said machine comprising means to move said spout up and down, whereby said spout successively communicates with said delivery orifice when up, and with said suction orifice when down, forcing means communicating with said delivery orifice and driven simultaneously with the relative movement of said heads, and suction-creating means communicating with said suction orifice.

23. In a filling machine, a distributing head having an orifice, spouts movable up and down on said distributing head, but continuously in communication with respective ones of said orifices, a controlling head having a delivery orifice and a suction orifice, said heads being relatively rotatable, and said machine comprising means to move said spouts up and down, whereby said spout successively communicates with said delivery orifice when up, and with said suction orifice when down, forcing means communicating with said delivery orifice and driven simultaneously with the relative rotation of said head, and suction-creating means communicating with said suction orifice.

24. In a filling machine, a distributing head having a plurality of orifices, spouts movable up and down on said distributing head but continuously in communication with respective ones of said orifices, a controlling head having a delivery orifice and a suction orifice, said heads being relatively movable, and said machine comprising means to move said spouts up and down, whereby said spouts successively communicate with said delivery orifice when up, and with said suction orifice when down, forcing means communicating with said delivery orifice and driven simultaneously with the relative movement of said heads, and suction-creating means communicating with said suction orifice.

25. In a filling machine, a distributing head having a plurality of orifices, spouts movable up and down on said distributing head but continuously in communication with respective ones of said orifices, a controlling head having a delivery orifice and a suction orifice, said heads being relatively rotatable, and said machine comprising means to move said spouts up and down, whereby said spouts successively communicate with said delivery orifice when up, and with said suction orifice when down, forcing means communicating with said delivery orifice and driven simultaneously with the relative rotation of said heads, and suction-creating means communicating with said suction orifice.

26. In a filling machine, a distributing head having a discharge orifice, a controlling head having a delivery orifice, said heads being relatively movable, means comprised in said machine to cause the relative movement of said heads whereby said discharge orifice intermittently communicates with said delivery orifice, forcing means communicating with said delivery orifice and driven simultaneously with the relative movement of said heads, and means to carry containers successively into receiving relation with said discharge orifice during said relative movement.

27. In a filling machine, a distributing head having a downwardly opening discharge orifice, a controlling head having a delivery orifice, said heads being relatively rotatable in a transverse plane, means comprised in said machine to cause the relative movement of said heads whereby said

discharge orifice intermittently communicates with said delivery orifice, forcing means communicating with said delivery orifice and driven simultaneously with the relative rotation of said heads, and an endless system of carriers traveling entirely in substantially a single transverse plane, to carry containers into receiving relation with said discharge orifice during said relative rotation.

28. In a filling machine, a distributing head having a plurality of discharge orifices, a controlling head having a delivery orifice, said heads being relatively movable, means comprised in said machine to cause the relative rotation of said heads whereby said discharge orifices successively communicate with said delivery orifice, forcing means communicating with said delivery orifice and driven simultaneously with the relative movement of said heads, and means to carry containers successively into receiving relation with respective ones of said discharge orifices during said relative movement.

29. In a filling machine, a distributing head having a plurality of downwardly opening discharge orifices, a controlling head having a delivery orifice, said heads being relatively rotatable in a transverse plane, means comprised in said machine to cause the relative rotation of said heads whereby said discharge orifices intermittently communicate with said delivery orifice, forcing means communicating with said delivery orifice, and driven simultaneously with the relative rotation of said heads, and an endless system of carriers traveling entirely in substantially a single transverse plane, to carry containers into receiving relation with respective ones of said discharge orifices during said relative rotation.

30. In a filling machine, a distributing head having an orifice, a spout movable up and down in said distributing head but continuously in communication with said orifice, a controlling head having a delivery orifice and a suction orifice, said heads being relatively movable, and said machine comprising means to move said spout up and down, whereby said spout successively communicates with said delivery orifice when up and with said suction orifice when down, forcing means communicating with said delivery orifice and driven simultaneously with the relative movement of said heads, suction-creating means communicating with said suction orifice, and means to carry containers successively into receiving relation with said spout during said relative movement.

31. In a filling machine, a distributing head having an orifice, a downwardly opening spout movable up and down on said distributing head but continuously in communication with said orifice, a controlling head having a delivery orifice and a suction orifice, said heads being relatively rotatable in a transverse plane, and said machine comprising means to move said spouts up and down, whereby said spout successively communicates with said delivery orifice when up, and with said suction orifice when down, forcing means communicating with said delivery orifice and driven simultaneously with the relative rotation of said heads, suction-creating means communicating with said suction orifice, and an endless system of carriers traveling entirely in substantially a single transverse plane to carry containers into receiving relation with said spout during said relative rotation, at such a height that said spout enters the respective container when said spout is down.

32. In a filling machine, a distributing head having a plurality of orifices, spouts movable up and down on said distributing head but continuously in communication with respective ones of said orifices, a controlling head having a delivery orifice and a suction orifice, said heads being relatively movable, and said machine comprising means to move said spouts up and down, whereby said spouts successively communicate with said delivery orifice when up, and with said suction orifice when down, forcing means communicating with said delivery orifice and driven simultaneously with the relative movement of said heads, suction-creating means communicating with said suction orifice, and means to carry containers successively into receiving relation with respective ones of said spouts during said relative movement.

33. In a filling machine, a distributing head having a plurality of orifices downwardly opening spouts movable up and down on said distributing head but continuously in communication with respective ones of said orifices, a controlling head having a delivery orifice, and a suction orifice, said heads being relatively rotatable in a transverse plane and said machine comprising means to move said spouts up and down, whereby said spouts successively communicate with said delivery orifice when up, and with said suction orifice when down, forcing means communicating with said delivery orifice and driven simultaneously with the relative rotation of said heads, suction-creating means communicating with said suction orifice, and an endless system of carriers, traveling entirely in substantially a single transverse plane to carry containers into receiving relation with respective ones of said spouts during relative rotation, at such a height that said spouts enter the respective containers when said spouts are down.

34. In a filling machine, an upright shaft, a filling head mounted on said shaft for ro-

tation therewith and for adjustment up and down thereon, a pump, a flexible conductor from said pump to said filling head, a carrier rotating with said shaft to successively carry containers into receiving relation with said filling head, and a variable-speed operative connection between said pump and said shaft.

35. In a filling machine, an upright shaft, a filling head mounted on said shaft for rotation therewith and for adjustment up and down thereon, a pump, a flexible conductor from said pump to said filling head, a sprocket wheel fixed on said shaft below said filling head, an idler sprocket wheel, a sprocket chain passing around said wheels, carriers mounted on said chain to successively carry containers into receiving relation with said filling head, and a variable-speed operative connection between said pump and said shaft.

36. In a filling machine, relatively movable controlling and discharging elements, forcing means communicating with said controlling element and driven simultaneously with the relative movement of said element, carrying means to carry containers successively into receiving relation with said discharging element, a direct operative connection between said carrying means and one of said elements, and an operative connection between said direct operative connection and said forcing means, comprising means for coarser adjustment and means for finer adjustment of the speed of said forcing means relative to the speed of said carrying means and said one of said elements.

37. In a filling machine, relatively rotatable controlling and discharging elements, forcing means communicating with said controlling element and driven simultaneously with the relative rotation of said elements, and endless system of carriers to carry containers successively into receiving relations with said discharging element, a friction disk having geared connection with said forcing means, said geared connection comprising an element interchangeable with an element of different size, and a friction wheel bearing on said disk and adjustable thereacross and having geared connection with said shaft.

38. In a filling machine, controlling and discharging means, carrying means for bringing containers successively into receiving relation to said controlling and discharging means, supply means, means for adjusting said controlling and discharging means relatively to said carrying means and supply means, and an adjustable connection whereby said supply means communicates continuously with said controlling and discharging means during the continuous relative movement of said elements and during the adjustment of said controlling and discharging means relatively to said carrying means and supply means.

39. In a filling machine, continuously relatively movable intermittently communicating controlling and discharging elements, carrying means for bringing containers successively into receiving relation to said discharging element, supply means, means for adjusting said elements relatively to said carrying means and supply means, and an adjustable connection whereby said supply means communicates continuously with said controlling element during the continuous relative movement of said elements and during the adjustment of said elements relatively to said carrying means and supply means.

40. In a filling machine the combination of a carrier for containers, with controlling and discharging elements, a rotary pump coöperating with said controlling element and means to vary the output of said rotary pump.

KARL KIEFER.

Witnesses:
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