No. 711,781. Patented Oct. 21, 1902.

S. C. MILLER.

BOTTLE FILLING MACHINE.

(Application filed Oct. 11, 1900.)

(No Model.) 2 Sheets—Sheet 1.

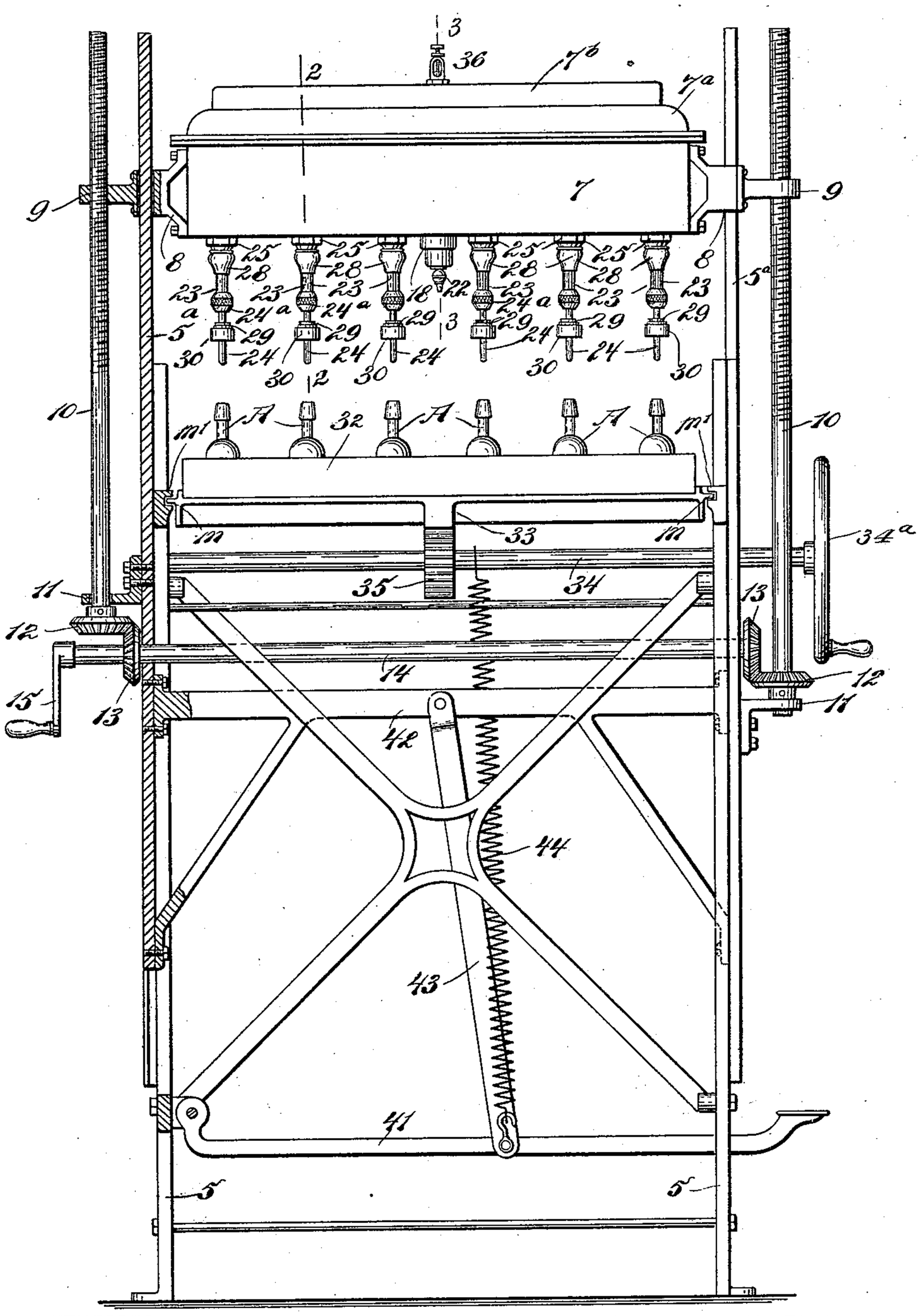

Fig. 1

WITNESSES:

J. A. Brophy

Wm. P. Patton

INVENTOR

Samuel C. Miller.

BY Munn & Co.

ATTORNEYS

No. 711,781. Patented Oct. 21, 1902.

S. C. MILLER.

BOTTLE FILLING MACHINE.

(Application filed Oct. 11, 1900.)

(No Model.) 2 Sheets—Sheet 2.

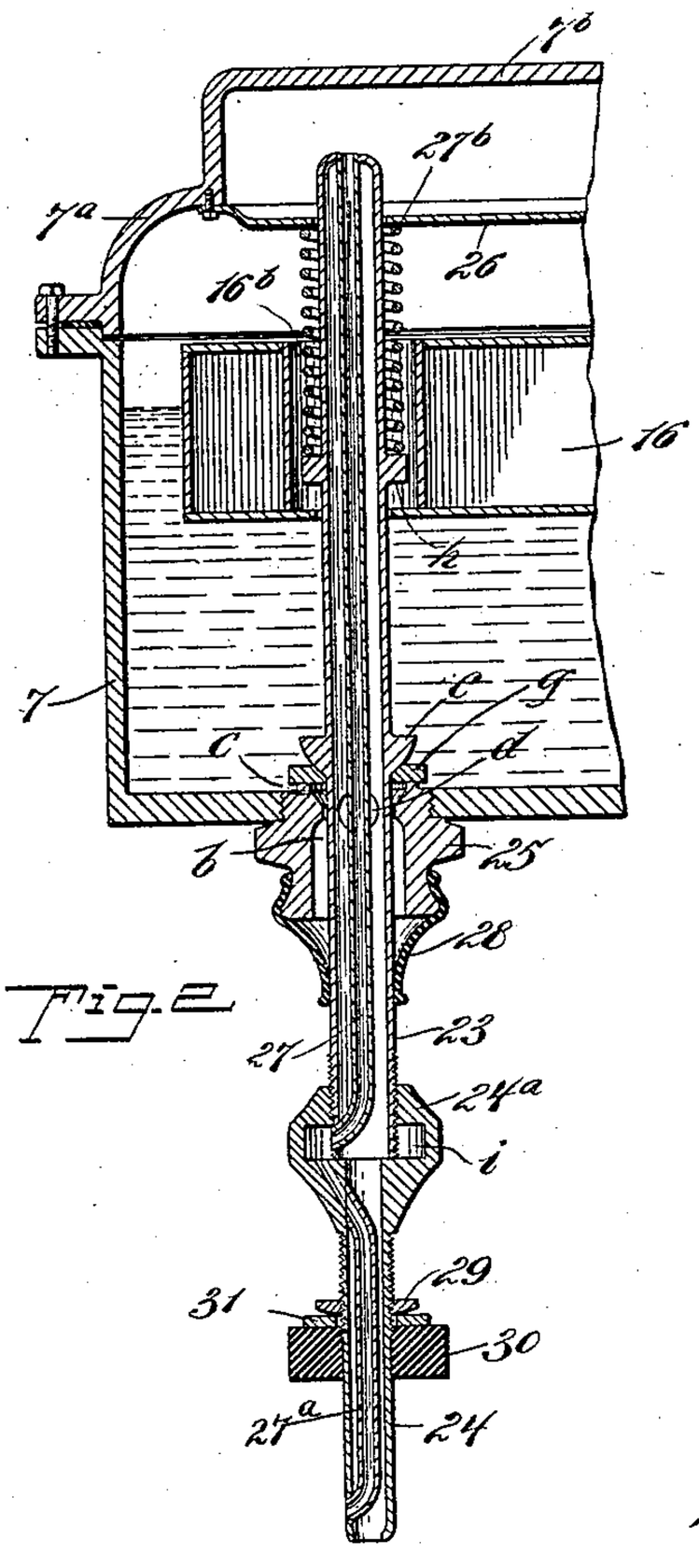

Fig. 2

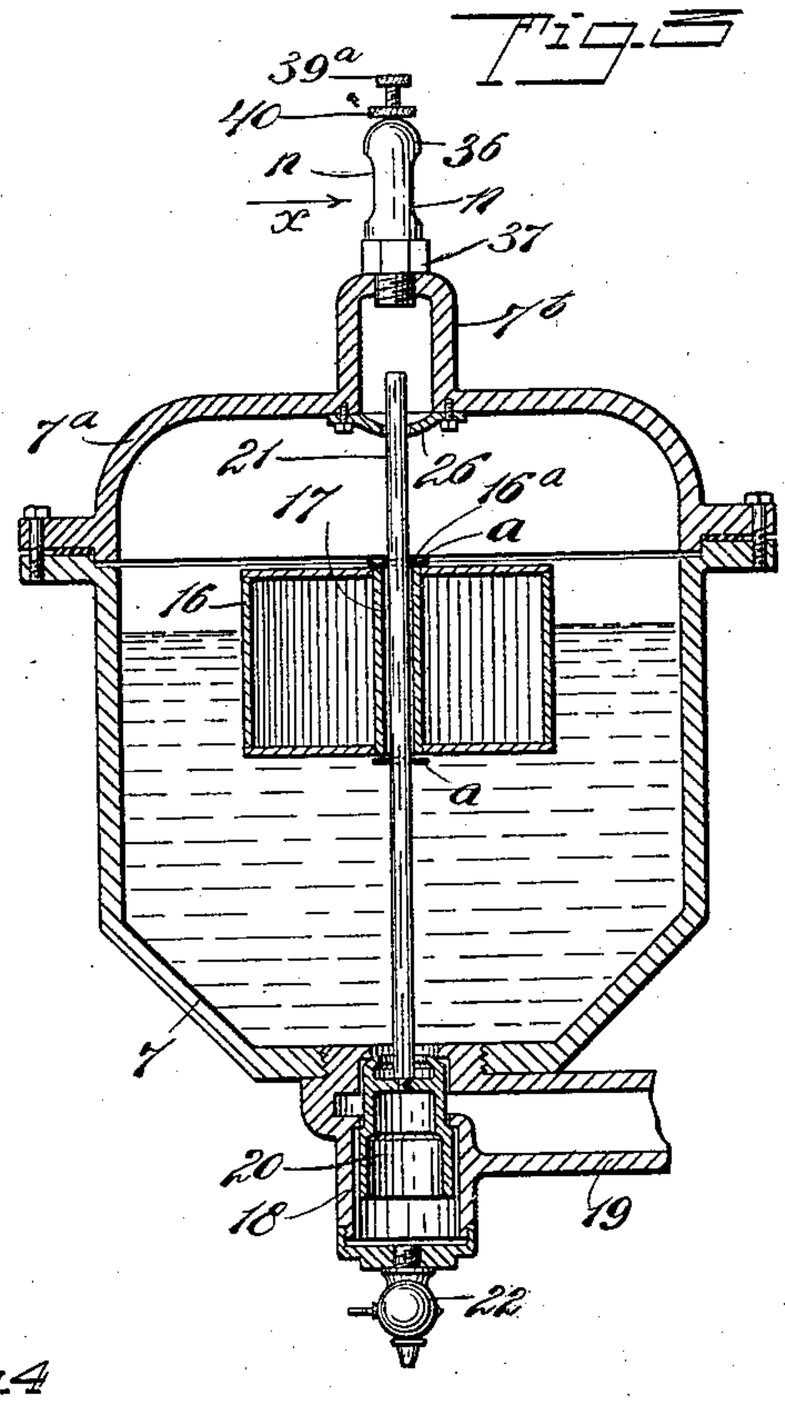

Fig. 4

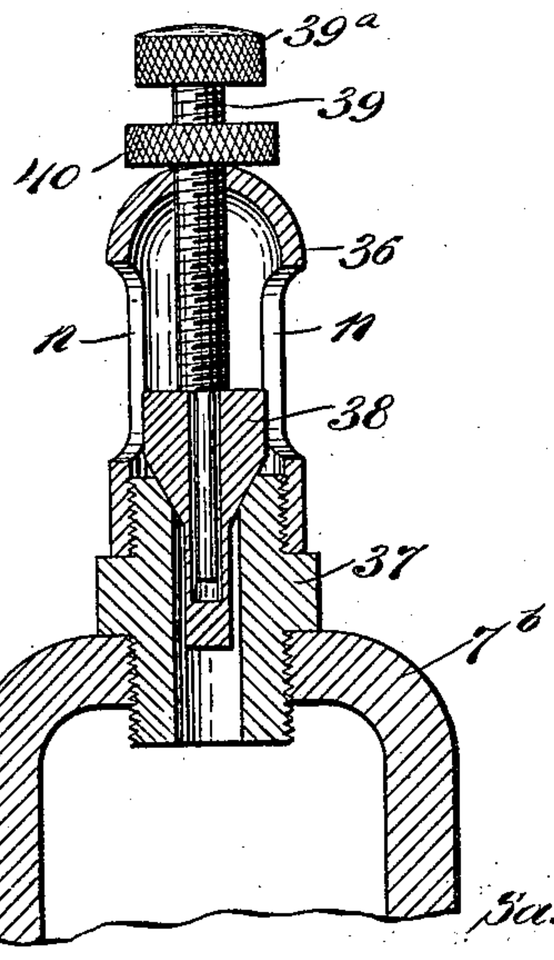

Fig. 3

WITNESSES:

J. A. Boophy

Wm. L. Patton

INVENTOR

Samuel C. Miller.

BY Munn & Co

ATTORNEYS.

UNITED STATES PATENT OFFICE.

SAMUEL C. MILLER, OF LOUISVILLE, KENTUCKY.

BOTTLE-FILLING MACHINE.

SPECIFICATION forming part of Letters Patent No. 711,781, dated October 21, 1902.

Application filed October 11, 1900. Serial No. 32,718. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL C. MILLER, a citizen of the United States, and a resident of Louisville, in the county of Jefferson and State of Kentucky, have invented new and useful Improvements in Bottle-Filling Machines, of which the following is a full, clear, and exact description.

This invention relates to a class of bottle-filling devices employing a filling-tank, tubes depending therefrom to enter the necks of a number of bottles, and having means for escape of air from the bottles as liquid in graduated quantity is introduced within the bottles.

The object of this invention is to provide features of improvement on the bottle-filling machine of my invention, patented to me July 17, 1900, and numbered 654,016, which simplify the construction and render more efficient in service the said patented bottle-filling machine.

The invention consists in the novel construction and combination of parts, as is hereinafter described, and defined in the appended claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a partly-sectional front elevation of the improved bottle-filling machine. Fig. 2 is an enlarged transverse sectional view substantially on the line 2 2 in Fig. 1. Fig. 3 is an enlarged sectional view substantially on the line 3 3 in Fig. 1; and Fig. 4 is an enlarged sectional side elevation of a detail of the machine, the location of which is indicated by the arrow *x* in Fig. 3.

The features of the improvement comprise more efficient and reliable means for vertically adjusting the liquid-holding tank above the bottles to be filled, an advantageous change in construction of the upper portion of the liquid-holding tank and the details therein which cheapens construction and facilitates the relative adjustment of other parts located at the lower side of the tank, an improved construction of the bottle-filling tubes which enables the exchange of filling-nozzles of different sizes on each tube, an improved air-tight connection between the liquid-holding tank and each filling-tube depending therefrom which permits said tubes to receive vertical adjustment without objectionable friction where they are connected to the tank, an improved means for jointing the body of each filling-tube upon the tank at the bottom of the latter which permits self-centering of the tube in an air-tight manner, and an improved means for holding the elastic joint on each filling-tube, whereby to adjust said joint for height to suit bottles of different dimensions.

In the drawings, which show an application of the details of improvement upon my patented bottle-filling machine, 5 indicates an upright rectangular frame having a longitudinally central guide-bar 5^a held to slide vertically at each side thereof. An elongated liquid-holding tank 7 is held to slide upon the guides 5^a by the loose engagement therewith of the oppositely-positioned bracket-boxes 8, that extend outwardly at each end of the tank, as clearly shown in Fig. 1. The boxes 8 have each a nut 9 secured upon the outer side of the same, which nuts have threaded engagement with the upright screws 10, that are loosely engaged with perforated lugs 11, projecting from the outer sides of the guides 5^a.

Upon the lower ends of the screws 10 bevel-gears 12 are secured, which mesh with similar gears 13, mounted upon a shaft 14, held to rotate transversely in a horizontal plane in the guides 5^a free of the frame 5, as shown in Fig. 1, said shaft having a crank-handle 15 on one end, that by rotation simultaneously rotates the upright screws 10 in the same direction, which will correspondingly elevate or lower the tank 7 in an obvious manner, and, as before indicated, this is one feature of the present improvement.

The tank 7 has a detachable cover 7^a secured on its upper end, and from this cover a dome-like formation 7^b extends upwardly, it being preferably integral with the main portion of the cover and has a length nearly equal thereto, but of much less width, as represented in Figs. 1 and 3. In the tank 7 a float 16 is located, which may extend nearly the length of said tank, and at or near the longitudinal center of the float an upright liquid-tight passage 16^a is formed therethrough by the tubular formation 17, which

is joined at its ends to the upper and lower walls of the float, as shown in Fig. 3.

At the lower side of the liquid-holding tank 7 a valve-cage 18 is secured, comprising a cylindric box, from which laterally projects a liquid-supply pipe 19, and in this box a valve 20 of suitable form is held to slide vertically, having a stem 21 engaging its upper end and thence passing upwardly through the passage 17 in the float 16. The stem 21 is loosely secured to the float 16 by cross-pins *a* or other means, so that the valve 20 will be elevated or depressed in unison with the rise and fall of the float in the tank, and it will be apparent that by this arrangement of parts the influx of liquid into the tank 7 may be automatically controlled. A discharge-faucet 22 is secured on the lower side of the valve cage or box 18 and affords a controlled outlet for discharge of liquid from the tank 7 when it is to be entirely emptied, if this is desired. It is to be understood, however, that this device for controlling the introduction of liquid into the tank 7 is shown, described, and claimed in Letters Patent No. 654,016, granted to me July 17, 1900, for a bottle-filling machine.

In my patented bottle-filling apparatus a series of filling-tubes are shown held in parallel vertical planes and suitably spaced apart, so as to be located partly in the liquid-holding tank and depending therefrom for engagement of their lower ends within the necks of bottles to convey liquid from the tank into the bottles. Furthermore, the filling-tubes have each an air-escape pipe held therein which is designed to afford a passage for air from the bottle about to be filled with liquid up into the upper portion of the tank or, more specifically, into a cup-like depression formed in the cover of the tank 7 for each filling-tube to enter, these depressions each having a concaved cover held over the same. The provision of the separate cup formations, into which the upper ends of the filling-tubes entered, has been found to be expensive in manufacture, and they have been supplanted by the single dome-like formation 7^b, which will accommodate the upper ends of all the filling-tubes when the latter are in place, as will now be described. The several similar filling-tubes as now constructed are each formed in two parts, comprising a main tube 23 and a nozzle-piece 24. Each filling-tube 23 extends through a gland 25, projected from the lower side of the tank 7 and at spaced distances apart thereon, the axes of said tubes being in the same vertical plane and the bodies thereof projecting through liquid-tight tubular passages 16^b, formed in the float 16, it being preferred to construct said float of sheet metal in box form and liquid-tight, containing sufficient air to adapt it for floatage on the liquid introduced within the tank 7. In the improved construction there is a guide-bar 26 provided to support the upper ends of all of the filling-tubes 23, the latter having a loose engagement within suitably-spaced perforations in the guide-bar. The upper end of each gland is screwed into a threaded aperture in the lower wall of the tank 7, as shown in Fig. 2, and is axially perforated to receive the body of the filling-tube 23, which passes loosely through it. The bore *b* in each gland 25 is cupped at the upper end, as shown at *c* in Fig. 2, and a perforation *d* is formed in the wall of the filling-tube 23, which will normally have free communication with the cupped counterbore *c*.

A collar *e* is formed or secured upon each filling-tube 23 at a point which will locate it above and near to the bottom wall of the tank 7 when the filling-tubes are not in service for transfer of liquid from the tank into bottles. Between the collar *e* and an annular seat formed upon the upper end of each gland 25 around the cupped formation *c* therein an annular disk valve *g* is positioned, this valve having a seat adapted to receive and form a liquid-tight joint with the collar *e*, that is convexed on the lower side to coact with the valve and provide a ball-joint where these parts have contact. A circumferential flange *h* is formed or fixed on the exterior of each filling-tube 23, said flanges being located between the upper ends of the filling-tubes and the collars *e*. A spiral spring 27^b is mounted upon each filling-tube 23 and seats upon the flange *h*, the upper end of each spring having sufficient pressure against the lower side of the guide-bar 26 to enforce a seated engagement of the disk valve *g* upon the upper end of the gland 25, and thus prevent escape of liquid from the tank 7 into and through the filling-tube below the disk valve. It will be seen that the provision of the disk valve *g*, having a ground-ball joint between it and the collar *e*, adapts said parts to coact and practically provide a liquid-tight joint should the filling-tubes 23 vary slightly from a vertical position, and thus renders the apparatus more perfect in operation than that afforded without the employment of the disk valves, and it is to be understood that said valves are features of the present improvement.

The filling-tubes employed in my patented bottle-filling machine were continuous or, in other words, had integral filling-nozzles on their lower ends. This was found to be inconvenient in practice in case it was desired to fill small and large bottles or bottles that had necks which were of different caliber, as this necessitated the removal of the entire filling-tubes when the filling operation was to be changed from one kind of bottles to another having a different-sized neck. To obviate this deficiency, I now provide the detachable nozzle 24, before mentioned, for each main filling-tube 23. As shown in Fig. 2, the lower end of a filling-tube 23 is externally threaded, and upon this threaded portion of the tube is screwed the enlarged coupling-head 24^a, that is formed or secured upon the upper end

of the tubular nozzle 24. A chamber *i* is formed in the coupling-head 24ª, having a true bottom surface upon which the true lower end of the filling-tube 23 may be impinged and form a liquid-tight joint therewith, said chamber having a diameter sufficient to afford an annular space around the end of the filling-tube when it is thus seated upon the lower surface of the chamber *i*, as explained.

The air-escape pipe, which in my patented filling device is continuous in each filling-tube from points near the ends of the same, in the present construction is formed in two pieces 27 and 27ª, that are respectively introduced within the filling-tube 23 and nozzle-tube 24. As shown in Fig. 2, the section 27, that is placed in the filling-tube 23, extends longitudinally therethrough, and at the upper ends of the nozzle-tube and air-escape pipe therein the latter is joined to the nozzle-tube by fixture of its end in an aperture of less diameter than said tube, produced by turning a flange on its end inward or by other means. The lower end of the air-escape pipe-section 27 is laterally bent and passes through the side of the filling-tube 23 near its lower extremity, having free communication with the annular space around said lower end of the filling-tube 23 when it is seated up on the bottom of the chamber *i*. The section 27ª of the air-escape pipe is held in the nozzle-tube 24 by an engagement of its bent ends with the side wall of the nozzle-tube near upper and lower ends thereof.

As shown in Fig. 2, the lower bent portion of the air-escape pipe 27ª passes through the wall of the nozzle-tube 24 and is secured therein by any suitable means; but the upper end of said pipe taps the lower portion of the coupling-head 24ª and registers with a perforation therein, which extends into the chamber *i* near its circular side wall. It will be evident that when the nozzle-tube 24 is fully screwed upon the lower end of the filling-tube 23, so as to produce a liquid-tight joint between them at their point of engagement, a continuous passage for air is afforded, extending from a point near the lower end of the nozzle-tube 24 to the interior of the dome extension 7ᵇ on the tank-cover 7ª, thus adapting the vent-pipe to convey air from a bottle up into said dome-like formation of the cover when liquid is passing from the tank 7 into a bottle to fill it. It should be explained that the valve-stem 21 of the inlet-valve 20 passes loosely through the guide-bar 26 and is supported thereby.

It will be seen that the nozzle-tubes 24 may be of any desired diameter within practical limits, and thus adapt the bottle-filling machine for filling large or small bottles by simply changing sets of nozzles that are to be provided in such number of each dimension as will supply each filling-tube with a nozzle having a proper delivering capacity and that will freely enter the necks of bottles that are to be filled.

The bodies of the glands 25 are each formed with a taper on the lower portion thereof to receive an elastic joint-sleeve 28, adapted to fit closely thereon at the upper end of said sleeve and at the lower end of the same closely contract upon the body of the filling-tube, as shown in Fig. 2. As the diameter of the lower portion of each gland 25 is considerably greater than that of the filling-tube, which is loosely held therein, the joint-sleeve 28, which engages with said parts, necessarily converges toward the lower end. Sufficient length is given to the coniform-shaped joint-sleeves 28 to permit a limited sliding movement of each filling-tube in the gland 25, through which it passes, such movement causing the joint-sleeve to yield outwardly without affecting the air-tight connection of the ends of the joint-sleeve with the gland and filling-tube, so that an air-tight connection is thus formed between the gland and filling-tube which is devoid of friction. The provision of the elastic joint-sleeves in lieu of a packed joint-nut that is employed in the construction of my patented filling apparatus is a feature of novelty which is much cheaper to manufacture and gives improved results in service.

The body of each nozzle-tube 24 is threaded externally below the coupling-head 24ª and upon it the jam-nut 29 is screwed. Upon the nozzle-tubes 24 below the jam-nuts 29 an elastic disk 30 is located upon each nozzle-tube and held in place by its constriction thereon. Between the jam-nut 29 on each nozzle-tube and the elastic disk 30 a metal washer 31 is introduced. The lower surface of each jam-nut 29 is convex and has bearing upon the upper face of the washer 31, which adapts the washer to maintain full contact with the elastic disk below it if the disk is inclined slightly by contact with the upper end of a bottle that is not true or perfectly level.

A tray 32 is held to slide horizontally on the stationary frame 5 below the series of depending nozzle-tubes 24 by ledges *m*, projecting oppositely from the sides of the tray, these ledges having loose engagement with grooved guides *m'*, fixed on the machine-frame in the same horizontal plane. A toothed rack 33 extends longitudinally on the lower side of the tray 32, and on a transversely-positioned shaft 34 a pinion 35 is secured, which meshes with the rack 33. The shaft 34 is journaled in the sides of the frame 5 and projects therefrom at one end, whereon a crank-wheel 34ª is secured, and by manipulation of the crank-wheel in either direction the tray 32 may be correspondingly slid endwise to change the position of rows of bottles A placed in the tray, so as to bring successive rows thereof below the series of filler-nozzles 24.

In the operation of the improved filling apparatus it has been found that if bottles hav-

ing considerable capacity are to be filled a considerable amount of air will pass from the bottles up the air-escape pipes into the tank 7 and occupy room in the tank, which will prevent a free entrance of liquid therein unless provision is made for removal of this excess of air as it accumulates. To this end an air-escape valve has been devised and is a feature of the present improvements. The air-escape valve is clearly shown in Fig. 4 and comprises an elongated body or case 36, screwed at its lower end upon the upper portion of the valve-seat block 37, which at the lower end is screwed into the upper side of the dome extension 7^b on the tank-cover 7^a. The valve-seat block 37 is axially perforated, and at the upper end thereof said perforation is cupped to form a valve-seat, whereon the coniform lower portion of the valve 38 is normally seated. The upper end of the case 36 is preferably contracted to give it a dome-like shape, and said top is perforated and threaded therein for the reception of a set-screw 39, which near its lower end seats upon the valve 38, a diametrically-reduced lower portion of the set-screw passing down through an axial perforation in the valve 38 and substantially air-tight therein, which adapts the set-screw to hold the valve true upon its seat. The case 36 is apertured, as shown at *n* in Fig. 4, for the free escape of air that passes up into the case when the air-pressure in the tank 7 becomes abnormal and the valve 38 is lifted thereby. A jam-nut 40 is mounted upon the threaded body of the set-screw 39 and is located thereon near the head 39^a of the set-screw, the jam-nut by enforced engagement with the top of the case 36 serving to retain the set-screw at any point of adjustment with regard to the valve it engages.

The guides 5^a extend down on the frame 5 and slide vertically thereon, this slidable frame portion carrying the screws 10 and parts connected therewith for support and rotation of the screws, and, as before explained, the tank 7 is adjustable on the guides by means of the screws. On the stationary portion 5 of the machine-frame a treadle-lever 41 is pivoted by one end and extends across the machine-frame, so as to project the foot-piece on its free end outside at one side of the frame for the reception of foot-pressure. A cross-bar 42 is firmly connected at its ends with the slidable portions 5^a of the machine-frame, and a link-bar 43 is jointed at its ends, respectively, upon the cross-bar and treadle-lever 41, as shown in Fig. 1. The slidable frame portions 5^a are held in elevated adjustment by a spring or springs 44, connected at one end with the transverse shaft 34 and at the other end to the treadle-lever 41 near its longitudinal center. Of course the normal elevation of the guides 5^a by means of the spring 44 maintains the tank 7 in an uppermost position, so that the depression of the treadle-lever 41 by foot-pressure on its outer end will serve to lower the tank 7 and correspondingly depress the nozzles 24, and it may be explained that this arrangement of parts is not claimed as new, it being a portion of my patented filling-machine.

Assuming that the tank 7 is supplied with liquid to be bottled, the operation is as follows: A row of bottles A, held in the tray 32, is arranged immediately below the series of filling-nozzles 24. The treadle-lever 41 is now depressed, which will lower the tank 7 and enter each nozzle-tube within the neck of a bottle that is beneath it, the elastic disks 30 having contact with the upper edges of the bottle-necks when the nozzles are sufficiently inserted therein and serving to seal the joints between the bottle-necks and nozzles. As the tank 7 is further depressed by pressure on the treadle-lever the filling-tubes 23 will be slid upwardly against stress of the springs 27^b and unseat the collar *e* from over the disk valve *g*, thus permitting liquid from the tank 7 to pass into the filling-tubes 23 and down the same, this entrance of the liquid being through the perforations *d* in the filling-tubes. As the liquid flows into the bottles A the air contained in the bottles will pass up therefrom through the air-escape pipes 27 27^a into the upper portion of the tank 7, and in case air-pressure becomes greater than it should be for the efficient operation of the apparatus the air-escape valve, before described, will automatically act to remove surplus air from the tank. The nozzles 24 extend down into the bottle-necks far enough to afford room therein for the introduction of corks in their upper portions after the bottles are filled, and it will be obvious that the filling operation will be continued until the rising of the liquid in the bottle-necks serves to cover the lower ends of the air-escape pipes with the liquid, which will arrest the flow of liquid from the nozzles. The treadle-lever is now permitted to rise sufficiently to relax compression of the springs 44 and permit the expansion of the springs 27^b to seat the collars *e* over the disk-valves *g*, so that liquid-pressure from the tank 7 will be arrested, at the same time allowing the stress of the spring or springs 44 to elevate the tank 7 into normal position. When the disks 30 are unseated from the bottle-necks and while the nozzle-tubes 24 are still in the bottles A, the pressure of air passing from the tank 7 down through the air-escape pipes 27 27^a expels the small amount of liquid held in suspension in the lower ends of the nozzles 24, this being transferred to the liquid in the necks of the bottles, which prevents waste of the liquid by dripping of the same from the ends of the nozzle-tubes and clears the pipes 27 and 27^a for the free upward passage of air during the next filling operation.

As I have already mentioned, there may be a number of sets of the filling-nozzles 24 of different diameters, all having coupling-heads thereon which will screw upon the threaded lower ends of the filling-tubes 23, so that a wide range of work may be effected by use of the

bottle-filling machine as perfected by the present improvements.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a bottle-filling machine, a main filling-tube, a detachable nozzle having a coupling-head, and an air-vent pipe arranged within the nozzle and opening at one end through the wall of the nozzle near the lower end thereof, the other end of said air-vent pipe opening into a chamber in the coupling-head.

2. In a bottle-filling machine, a main filling-tube, a detachable nozzle having a chambered coupling-head arranged for engagement with the lower end of the filling-tube and an air-vent pipe arranged within the nozzle, the lower end of said air-vent pipe passing through the wall of the nozzle near the lower end thereof and the upper end of said air-tube engaging an opening in the lower portion of the coupling-head communicating with the chamber in said coupling-head.

3. In a bottle-filling machine, the combination with the liquid-holding tank, of a series of filling-tubes each comprising a main tube extending within the tank, a detachable nozzle having a coupling-head arranged to screw on the lower end of the filling-tube, the said coupling-head being provided with a chamber forming an annular space around the lower end of the filling-tube, and an air-pipe made in two sections carried respectively by the main filling-tube and the nozzle each section communicating with the annular space in the coupling-head, the section carried by the main filling-tube extending upward through the same and opening into the liquid-holding tank.

4. In a bottle-filling machine, the combination with the supported liquid-holding tank, and a valve-controlled supply-pipe for said tank, of a float located within the tank for controlling the supply of liquid thereto, a series of upright filling-tubes in said tank and extending through tubular passages formed in the float, and a bar extending lengthwise in the tank and provided with perforations to receive and support the upper ends of the filling-tubes.

5. In a bottle-filling machine a tank for holding liquid, a plurality of filling-tubes each comprising a main tube, a filling-nozzle, a chambered coupling-head on the nozzle, and an air-pipe in two sections carried respectively by the main tube and the nozzle and having communication with each other in the chamber of the coupling-head, the section carried by the main filling-tube opening into the upper part of the liquid-holding tank.

6. In a bottle-filling machine, a liquid-holding tank, a series of glands depending therefrom and axially perforated the bore in each gland being cupped at its upper end, and an annular seat formed on the upper end of the gland around the cupped formation, a filling-tube passing loosely through each of said glands and having a perforation in its wall normally in communication with the cupped portion of the bore in the gland, each filling-tube having a collar thereon convex on the lower side, and a disk valve fitting loosely on the filling-tube between the said collar and the annular seat on the gland and adapted to be seated on the said annular seat, the disk valve having a concave upper seat corresponding to the convex face of said collar and engaged thereby, and arranged to control the escape of liquid from said tank through the perforation in the filling-tube.

7. In a bottle-filling machine, a main filling-tube, a detachable nozzle having a coupling-head arranged to screw on the lower end of the filling-tube, the said coupling-head being provided with a chamber having a bottom surface forming a seat for the lower end of the main filling-tube, the said chamber being of such diameter as to form an annular space around the end of the filling-tube, an air-pipe made in two sections and arranged respectively within the filling tube and nozzle, each section communicating with the annular space in the coupling-head.

8. In a bottle-filling machine, the combination with the tank, the valve for controlling the supply of liquid, and the float held on the valve-rod and provided with a series of tubular passages, of the upright filling-tubes extending through the tubular passages in the float and supported at their upper ends, as set forth.

9. In a bottle-filling machine, the automatic air-discharging valve for removing excess of air from the liquid-holding tank, comprising a laterally-apertured case, a valve-seat block screwed on the lower end of the case, a coniform valve on the seat-block, and a set-screw having a stem passing through the valve and a shoulder on the lower portion of the set-screw and bearing upon the valve.

10. In a bottle-filling machine, the automatic air-discharging valve, comprising a laterally-apertured case, a valve-seat block screwed on the lower end of the case, a coniform valve controlling an axial passage in the valve-seat block, a set-screw bearing upon the valve, and a jam-nut on the set-screw, contacting with the top of the case.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

SAMUEL C. MILLER.

Witnesses:
S. B. JOHNSON,
JNO. WELLER.