May 20, 1952 A. GRAHAM-ENOCK 2,597,791

MACHINE FOR FILLING AND CAPPING BOTTLES AND LIKE CONTAINERS

Filed Sept. 29, 1948 5 Sheets-Sheet 1

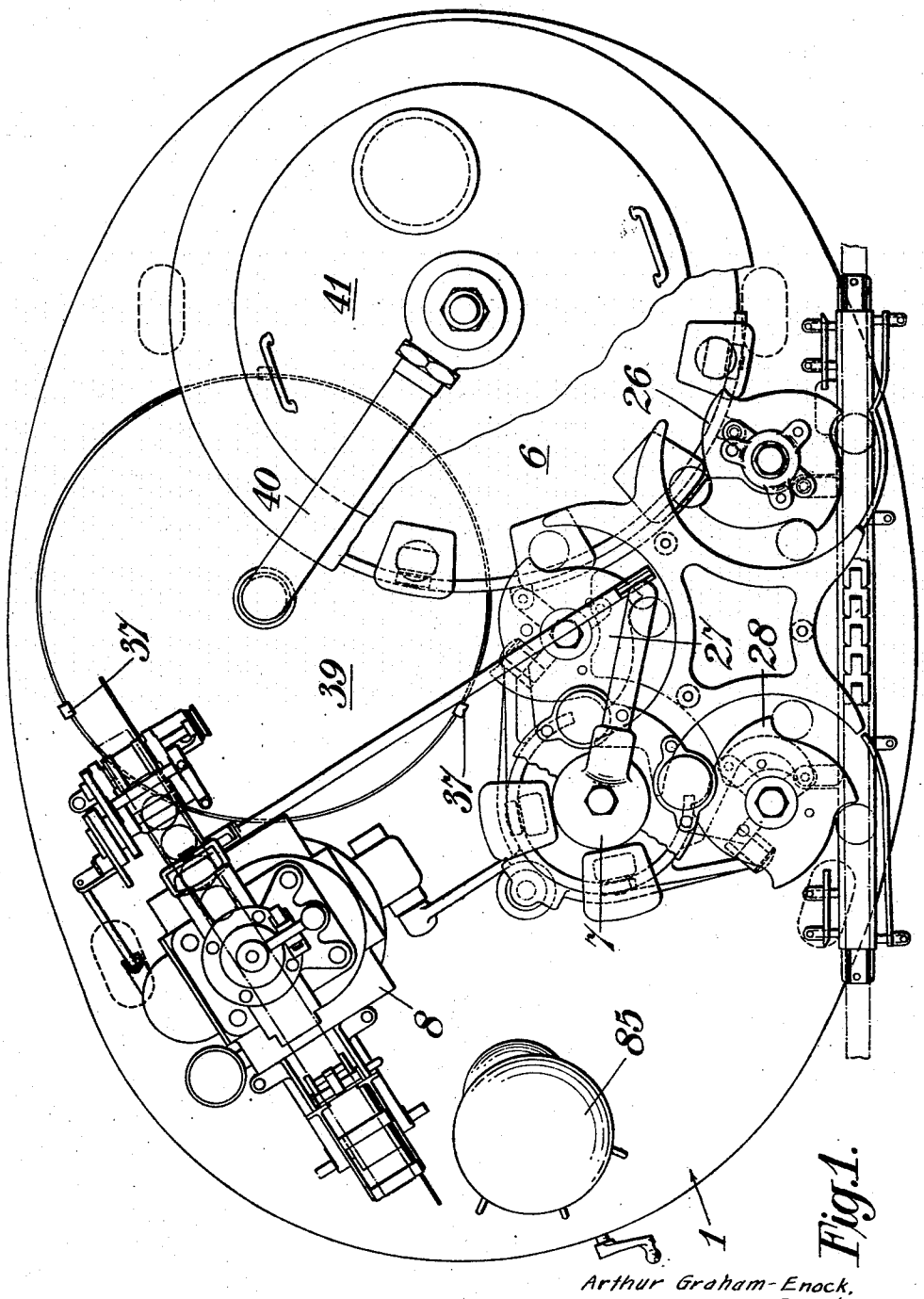


Fig. 1.

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Filed Sept. 29, 1948 5 Sheets-Sheet 2

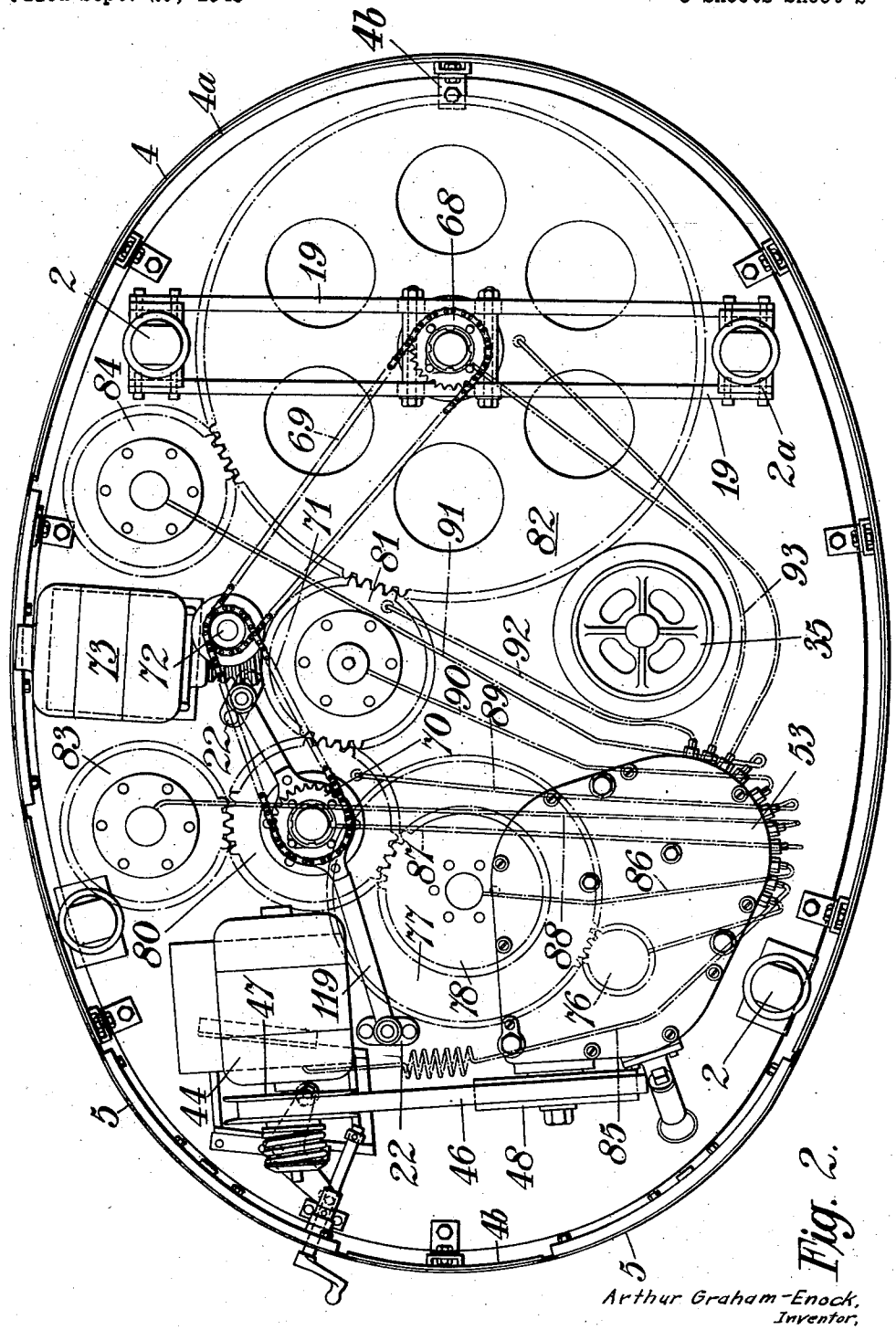


Fig. 2.

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MACHINE FOR FILLING AND CAPPING BOTTLES AND LIKE CONTAINERS

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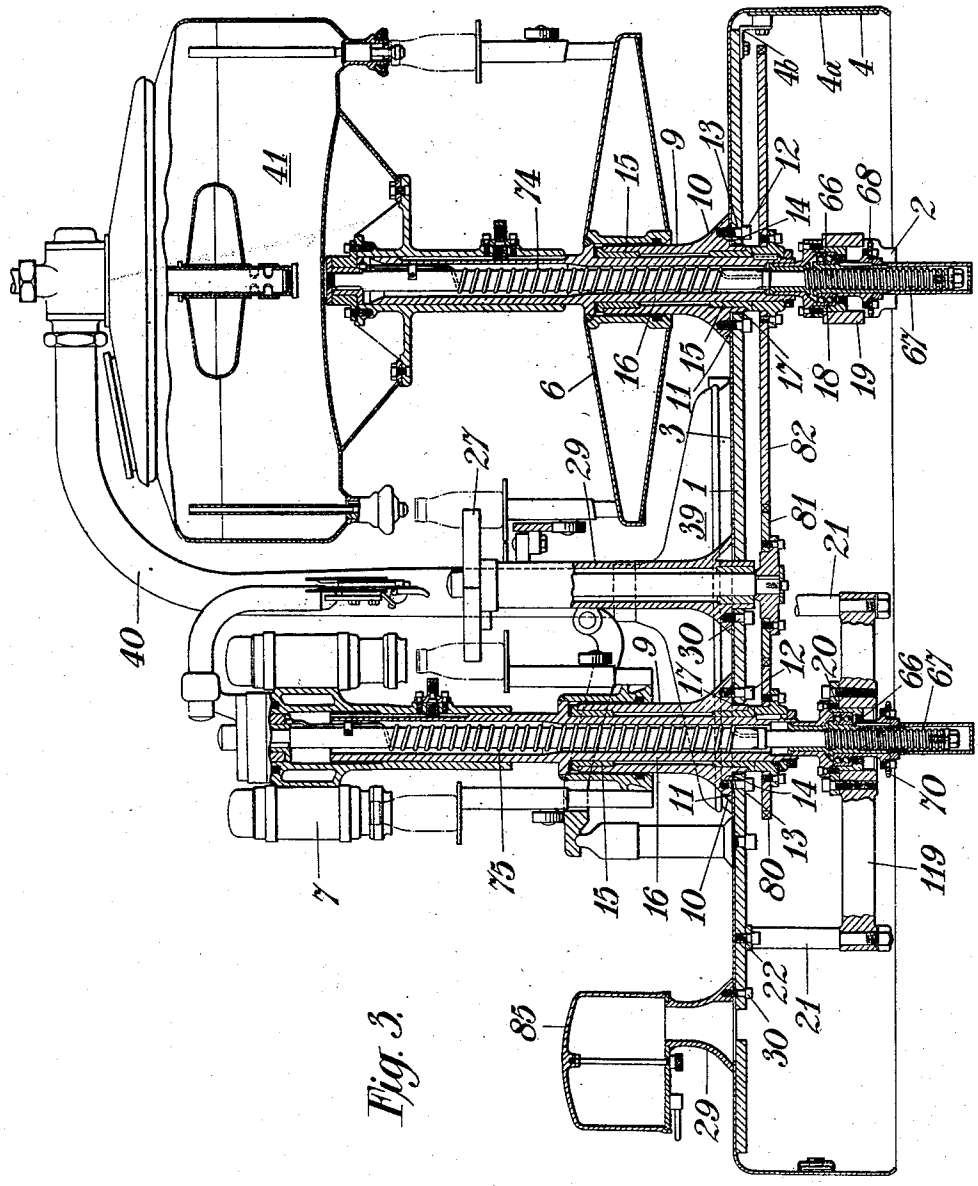


Fig. 3.

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MACHINE FOR FILLING AND CAPPING BOTTLES AND LIKE CONTAINERS

Filed Sept. 29, 1948 5 Sheets-Sheet 4

Fig. 4.

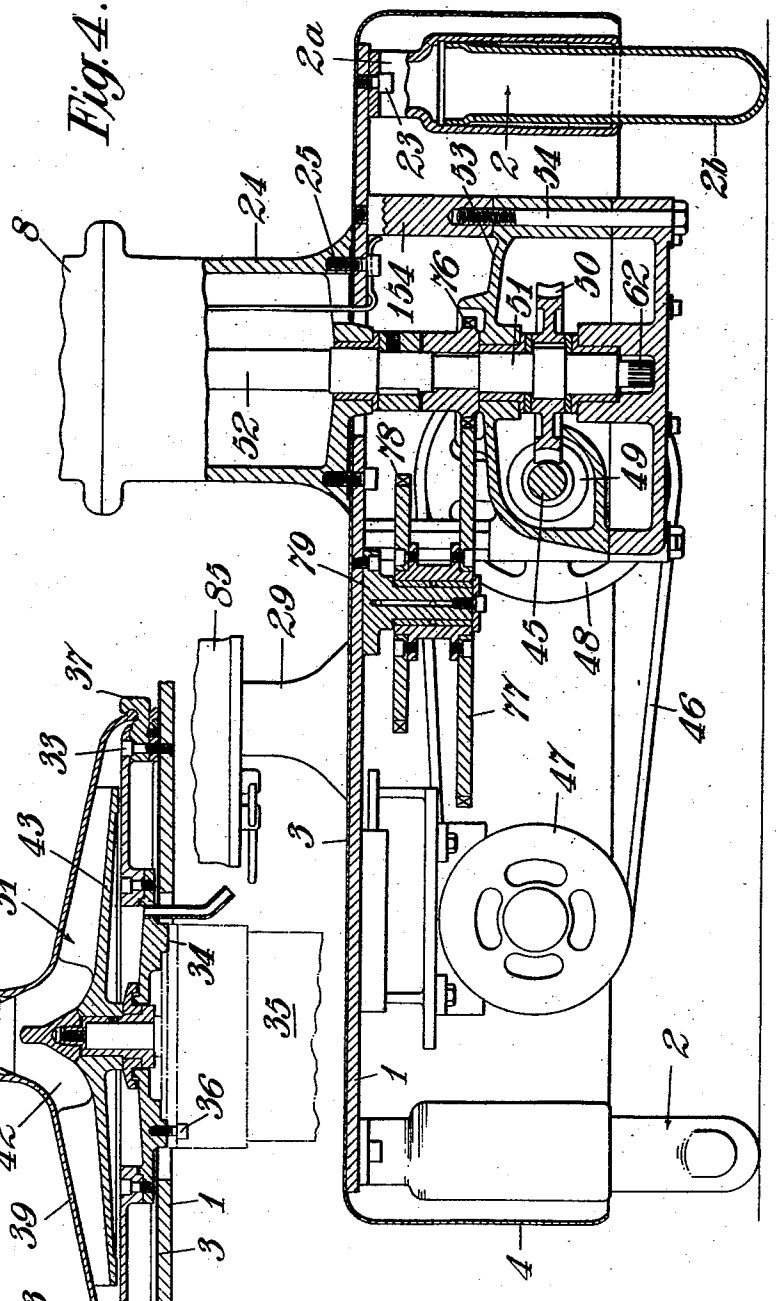


Fig. 5.

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MACHINE FOR FILLING AND CAPPING BOTTLES AND LIKE CONTAINERS

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Fig. 6.

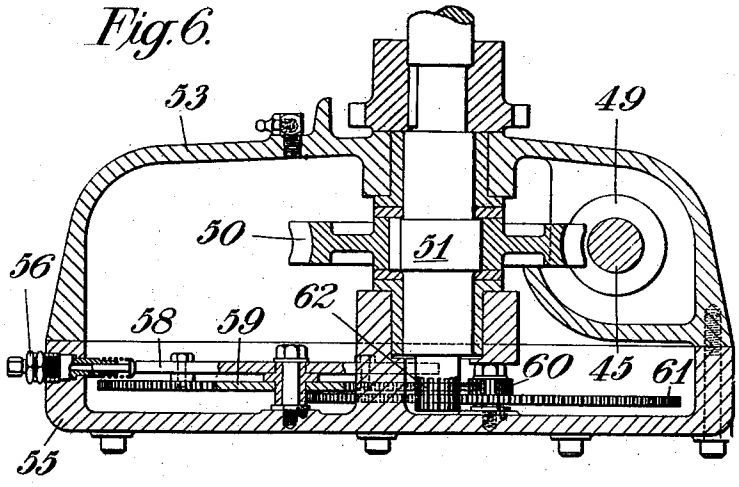


Fig. 8.

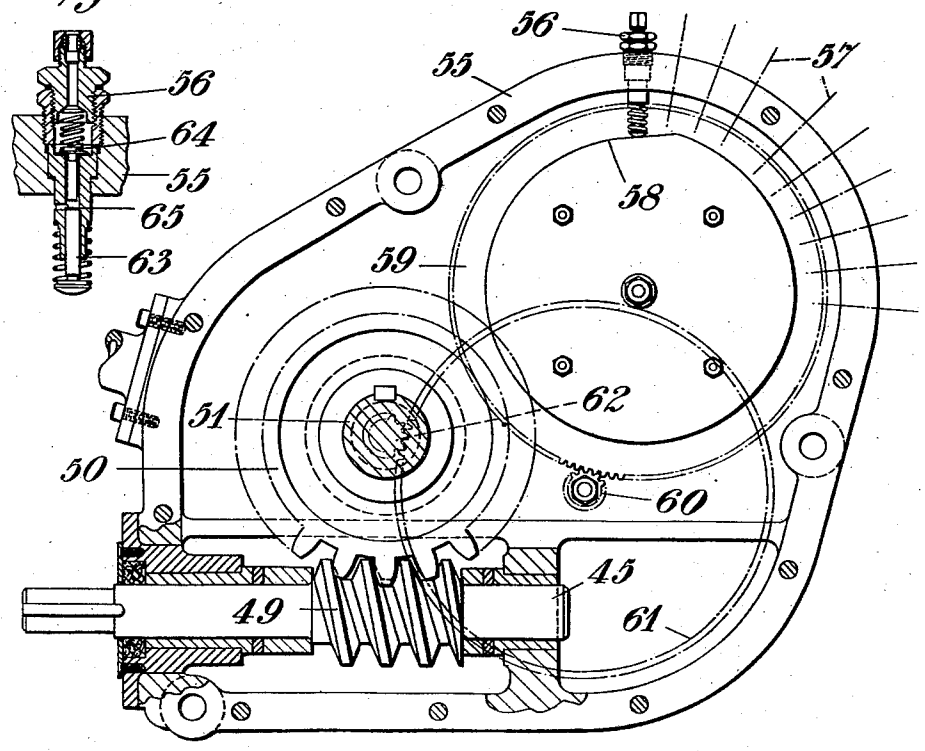


Fig. 7.

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Patented May 20, 1952

2,597,791

UNITED STATES PATENT OFFICE

2,597,791

MACHINE FOR FILLING AND CAPPING BOTTLES AND LIKE CONTAINERS

Arthur Graham-Enock, London, England, assignor to Graham-Enock Manufacturing Company Limited, London, England

Application September 29, 1948, Serial No. 51,778
In Great Britain October 24, 1947

8 Claims. (Cl. 226—75)

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This invention relates to machines for filling bottles and like containers and more particularly milk bottling machines of the type incorporating a rotary vacuum filling and capping mechanism.

An object of the invention is to provide various improvements in bottle filling and capping machines of the type referred to above.

According to one feature of the present invention the vacuum producing means, which have usually comprised a separate unit, are mounted upon the same base or support which carries the bottling and capping mechanism, such base or support preferably being of oval shape in plan.

According to another feature, the base or support comprises a plate of substantial thickness providing a rigid element which is provided with a sheet metal covering or top having a depending skirt of substantial depth which encloses the operative mechanism and gearing for driving shafts extending through apertures in the base for driving or controlling the various units supported by the base.

These shafts are supported in bearings carried by brackets or pedestal elements which are flared at the bottom to provide a seating surface which seats upon the base and is bolted thereto by stud bolts.

According to another feature the various units are oiled by a pressure distribution system comprising a series of pipe lines each having a pump, said pumps being actuated by rotary cam means, the pipe lines which convey lubricant to the filling and capping units being coiled to provide flexibility for accommodating the adjusting displacement of parts of said units.

In the accompanying drawings:

Figure 1 is a plan of the complete bottling and capping machine showing the various units all located on the same base;

Figure 2 is an inverted plan showing various driving arrangements which are suspended from the base;

Figure 3 is a part sectional elevation showing the mounting of the bottling and capping units and the construction of the base;

Figure 4 is a sectional elevation showing the mounting of the cap forming unit and the main drive;

Fig. 5 is a sectional elevation of the vacuum producing means and its attachment to the base;

Figures 6 and 7 are elevation and plan showing the arrangement for oiling the working parts of the machine; and

Figure 8 is a section of an oiling pump.

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In carrying the invention into effect according to one convenient mode by way of example, the base comprises a metal foundation plate 1 of oval shape and of substantial thickness, say about ⅛". The plate is supported upon a number of legs 2 which are adjustable in length for levelling up the machine. The legs comprise a part 2a secured to the plate from beneath by studs 23, and a part 2b telescoping into and screwed to the part 2a.

The plate 1 is covered on its upper surface by a thin sheet metal—e. g. stainless steel-sheet 3 which extends downwardly at its edge to form a skirt 4 of substantial depth. The skirt 4 is strengthened by a backing plate 4a secured to the plate 3 by angles 4b. The covering sheet 3 may be secured to the foundation plate 1 in any suitable way so as to leave the top surface free from obstruction, such as bolt or rivet heads. Flush fitting doors 5 are provided in the skirt 4 for access to various parts of the mechanism.

At appropriate positions the various units of the bottling and capping equipment, such as the bottling unit 6, capping unit 7 and cap forming unit 8, are mounted and secured to the base. For this purpose each unit 6, 7 and 8 is provided with a hollow pedestal or bearing element 9 which at its lower end 10 is splayed out to form a seating surface 11 which seats upon the covering sheet 3 of the plate 1 and is bolted thereto by studs 12 which extend upwardly through holes 13 in the plate and sheet and into tapped blind holes 14 in the splayed out part 10.

The pedestals 9 are provided with bearing bushes 15 for the hollow actuating shafts 16 of the units which shafts extend downwardly through apertures 17 in the base plate 1 where they are keyed to appropriate driving gear wheels.

The bottling unit 6 is provided with supplementary supporting means which comprise a bearing element 18 carried by a pair of spaced bars 19 which extend across the width of the base and are bolted at their ends to the fixed portions 2a of oppositely disposed supporting legs 2. By this means the weight of the bottling unit 6 which includes a substantial quantity of milk when in operation is not wholly taken by the base plate 1.

The capping unit 7 is partly supported by a crosshead 119 which supports the bearing element 20. The crosshead is suspended from the plate 1 by depending posts 21 secured to the plate from beneath the studs 22.

The cap forming unit 8 is similarly mounted

upon the base 1 by a hollow pedestal 24 splayed at the bottom which is secured to the plate by studs 25.

In addition to the bottling unit 6, capping unit 7 and cap forming unit 8, bottle feeding and transfer wheels 26, 27, 28 and control 85 are also supported from the base 1 by hollow pedestals 29 secured to the base by studs 30 screwed in threaded holes in the splayed lower end of the pedestals. These pedestals 29 are provided with bearing bushes for the shafts for driving the wheels.

The vacuum producing means or fan 31 is mounted upon the base plate 1 and comprises a ring 32 seated upon the base and secured by stud bolts 33. The ring supports an apertured disc 34 to which the driving motor 35 is hung by studs 36.

At spaced points around the periphery of the ring 32 cover securing lugs 37 are provided which are located in slots in the ring and are secured by the bolts 33. The lugs 37 are of hook shape to engage the beaded ring 38 of the cover 39 to which a conduit 40 is secured, such conduit being connected to the tank 41 of the bottling unit 6.

The peripheries of the ring 32 and cover 39 are spaced to provide an outlet for air into the impeller chamber 42 formed between the ring and cover. An impeller 43 is located in the chamber 42 and is driven by the motor 35.

The driving mechanism for the bottling unit 6, capping unit 7, cap forming unit 8 and the feeding and transfer wheels 26, 27, 28 comprises a motor 47 which drives a worm shaft 45 through belt 46 and pulleys 47, 48. The worm 49 meshes with a worm wheel 50 on the lower end of a shaft 51 which drives the shaft 52 of the cap making unit 8.

The worm gear 49, 50 is located within a box or casing 53 suspended from the base plate 1 by the bolts 54 and pillars 154 which are screwed to the plate 1.

The box 53 is formed in two parts by a horizontal division, the parts being secured together by the bolts 54.

The box or casing 53 is sealed and forms a sump for a supply of lubricating oil. In one wall 55 of the casing at the lower part thereof a series of pumps 56 is provided only one of which is shown, the position of the others being indicated by the dot and dash lines 57. Each pump is coupled to a pipe line for conveying lubricant to the part to be lubricated. The wall 55 is concentric with the axis of a rotary cam element 58 which is driven by gearing 59, 60, 61 located within the box 53 from a pinion 62 on the lower end of the shaft 51. As the cam 58 rotates the pumps 56 are successively operated to force lubricating oil to the appropriate part.

The pumps 56 are adapted to deliver a metered quantity of lubricant but do not cause circulation. Each pump 56 comprises a spring returned reciprocating plunger 63 which on its working stroke opens a non-return valve 64 whereby a quantity of oil is delivered into the pipe line. At each stroke the plunger 63 passes and covers a port 65 open to the oil supply.

The pipe lines to the various parts which include pumps 56 are indicated by the dotted lines at 85, 86, 87, 88, 89, 90, 91, 92 and 93.

It will be appreciated that certain parts of the bottling and capping units 6 and 7 have to be displaced vertically according to the size of bottle being filled. Thus the tank 41 with the filling valves have to be vertically adjusted. Such vertical adjustment is effected by nut and screw mechanism 66, 67 by sprocket and chain gearing 68, 69, 70, 71 from sprockets on a shaft 72 driven from an elevating motor 73. These displaceable parts of the units incorporate rotary parts which have to be lubricated and in order to accommodate the displacement the pipe lines 74, 75 to the upper parts of the bottling and capping units 6 and 7 are helically coiled so as to extend and contract and thus accommodate the adjusting displacements.

The shaft 51 has keyed thereon a gear wheel 76 meshing with a gear wheel 77 secured to a gear wheel 78. The gear wheels 77 and 78 are mounted for rotation on a stub shaft 79 depending from the base plate 1. From the gear wheel 78 a drive is imparted to the bottling unit 6 by gears 80, 81, 82, the gear 81 also driving the transfer wheel 27. The feeding wheel 26 is driven by a gear 83 from gear 80. The transfer wheel 28 is driven by gear 84 from gear 82.

The various units supported by the plate or base includes the vacuum producing unit in addition to the bottling means, capping mechanism, bottle handling mechanism and controlling switch mechanism whereby the whole forms a self-contained equipment all of said units being located within the perimeter of the oval base.

The details of construction and the operation of the various units forms no part of the present invention and accordingly no detailed description of such units is considered necessary.

I claim:

1. A bottle filling and capping machine comprising a base, a rotatable vacuum filling mechanism mounted on the base and including a milk tank, a rotatable capping mechanism mounted on the base, means for conveying bottles to the filling mechanism, means for conveying filled bottles from the filling mechanism to the capping mechanism, vacuum producing means mounted upon and above the base and comprising a ring secured on the base, an apertured disc concentric with the ring and secured thereto, a motor suspended from the disc and extending through an aperture in the base, a shaft driven by said motor and extending upwardly through the aperture in the disc, a dished cover located above the ring and forming a chamber therewith, the cover being peripherally spaced from the ring, an impeller located in the chamber and mounted on said shaft, said cover having a sleeve, and a conduit engaging said sleeve and connecting the vacuum producing means with the milk tank.

2. A bottle filling and capping machine as claimed in claim 1 wherein spaced hook lugs are secured to the ring and engage the periphery of the cover.

3. A bottle filling and capping machine of the type described comprising a base supporting the filling and capping units and the vacuum producing unit wherein the base comprises a flat metal plate of substantial thickness, a thin sheet metal covering the flat plate and extending downwardly from the periphery thereof to form a continuous skirt portion of substantial depth which encloses the operative mechanism for said units, said plates being supported by a plurality of legs secured to said flat plate, said skirt having one or more flush fitting doors giving access to said operating mechanism.

4. A bottle filling and capping machine as claimed in claim 3 having a bottle filling unit, a bottle capping unit, a cap making unit and

rotary transfer wheels, said units and wheels being operated by shafts extending through the base and operatively connected to said operative mechanism, said shafts having bearings in pedestals having flared seating surfaces engaging the base and secured to the base from below the base.

5. A bottle filling and capping machine as claimed in claim 3 wherein the filling unit is provided with supplementary supporting means comprising spaced bars, the ends of which are secured to a pair of said legs, said bars supporting a bearing member of said unit extending through the base.

6. A bottle filling and capping machine as claimed in claim 3 wherein the capping unit is provided with supplementary supporting means comprising a crosshead suspended beneath the base by end posts depending from the base, said crosshead supporting a bearing member of said unit extending through the base.

7. A bottle filling and capping machine of the type described wherein the filling and capping units are supported by means incorporating hollow members, said units being adjustable vertically to accommodate different sizes of bottles,

means for lubricating said units comprising pumping means located beneath the base, the delivery of the pumping means being connected to pipe lines located within said hollow members and including coiled sections to permit said adjustment.

8. A bottle filling and capping machine of the type described wherein the rotary units of the machine mounted on the base are supported by hollow pedestals, means for lubricating said units comprising pumping means located beneath the base, the delivery of the pumping means being connected to pipe lines extending through said hollow pedestals to the part to be lubricated.

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