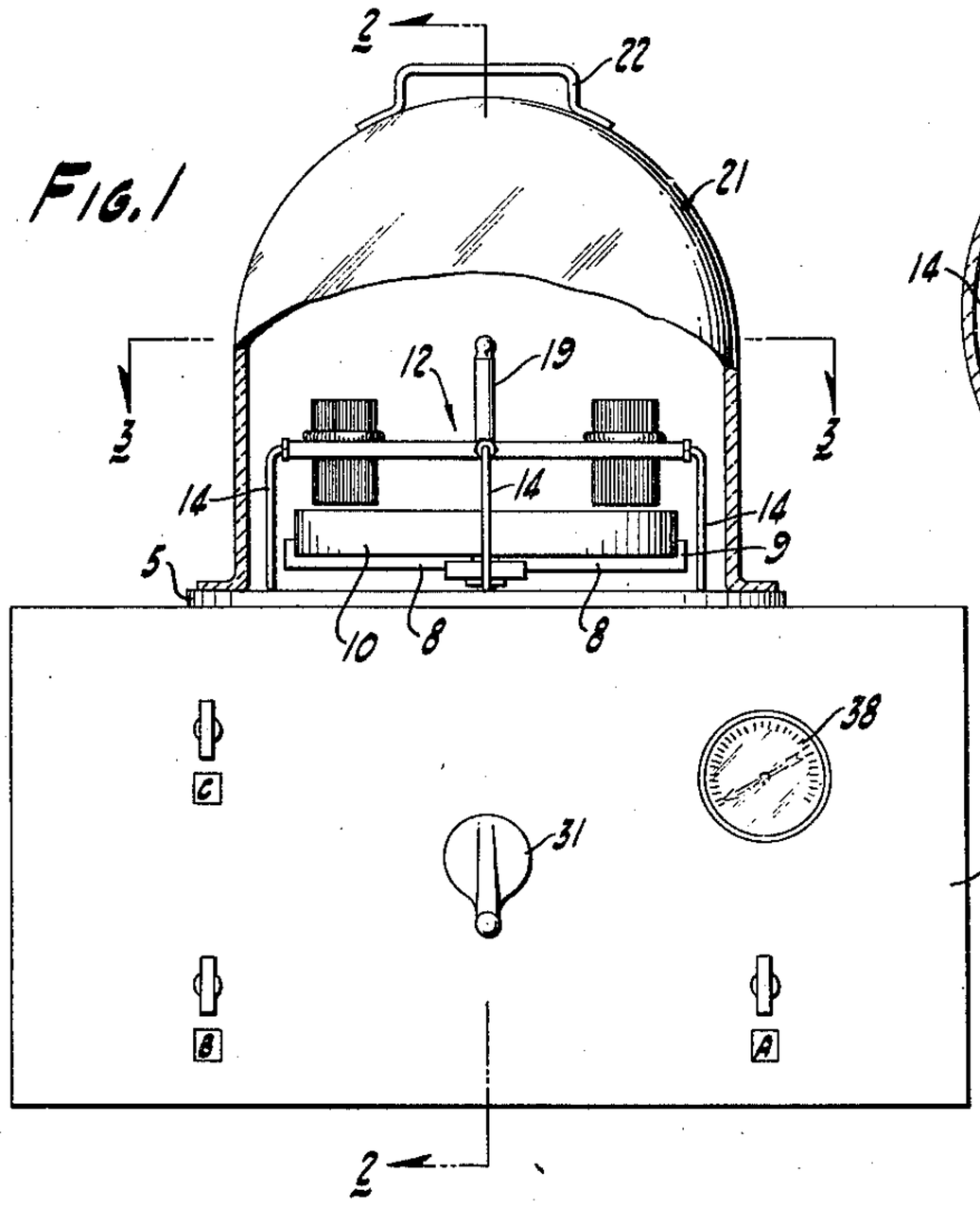
March 6, 1951 B. EMERY ET AL 2,544,416

AMPOULE FILLING MACHINE

Filed Dec. 22, 1947

FIG. 1



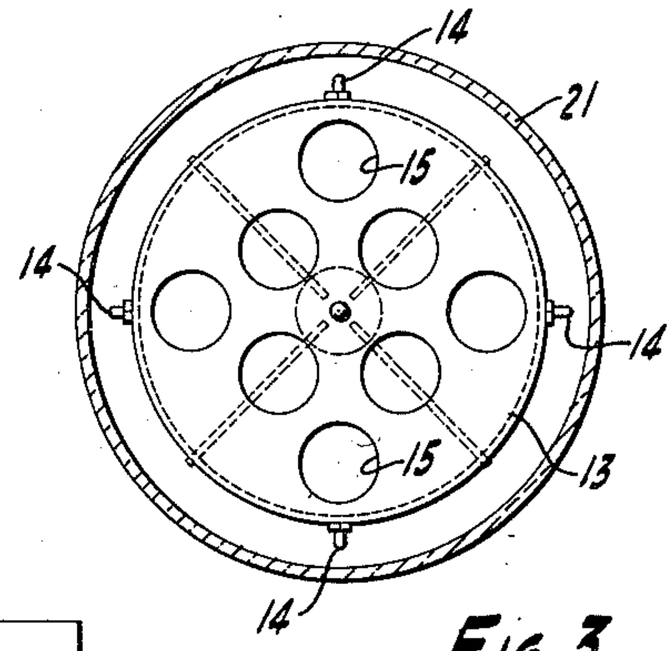


FIG. 3

FIG. 4

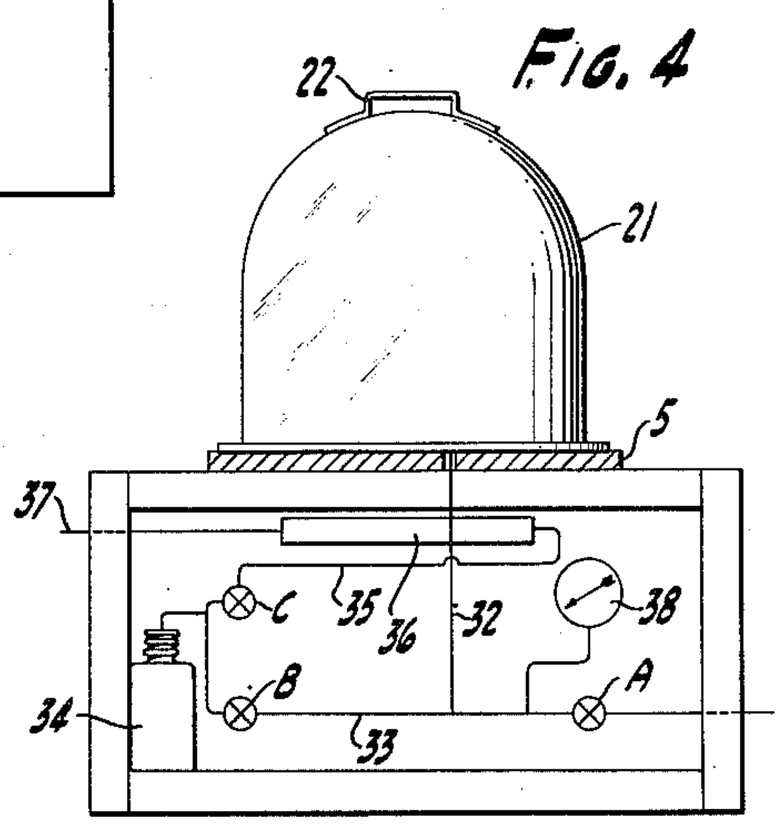


FIG. 2

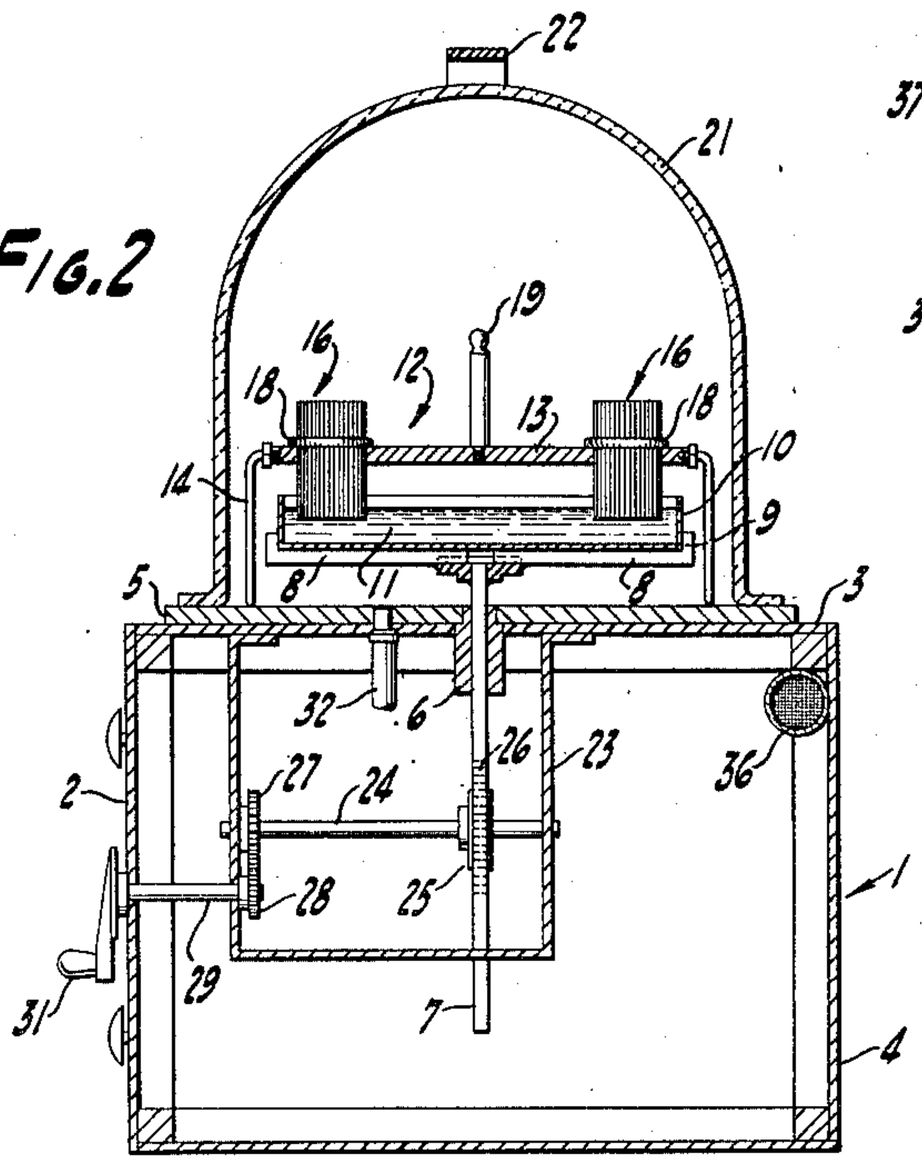
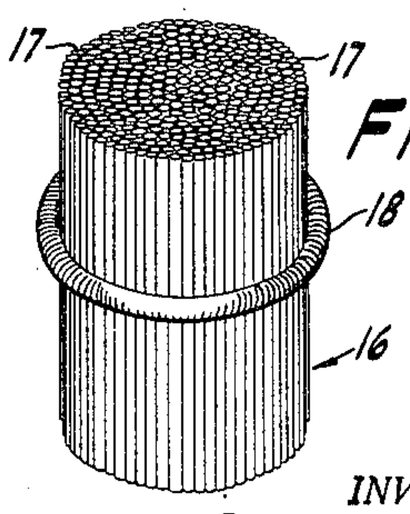


FIG. 5



INVENTORS
BYRON EMERY
WAYNE L. ELDER
BY Mellin and Hanscom
ATTORNEYS

Patented Mar. 6, 1951 2,544,416

UNITED STATES PATENT OFFICE

2,544,416

AMPOULE FILLING MACHINE

Byron Emery, Hayward, and Wayne L. Elder, Richmond, Calif., assignors to Cutter Laboratories, Berkeley, Calif., a corporation of California

Application December 22, 1947, Serial No. 793,160

4 Claims. (Cl. 226—116)

1

This invention relates to, and in general has for its object the provision of a machine for filling vials with a predetermined quantity of vaccine such as, for example, smallpox vaccine.

More specifically, the object of this invention is the provision of a filling machine wherein a pan containing the vaccine is enclosed under a bell jar with one or more inverted vials supported immediately above the pan, and wherein means are provided for evacuating the bell jar and vials, then immersing the lower open ends of the vials in the vaccine, and finally subjecting the bell jar and its contents to a predetermined differential pressure by connecting the bell jar with a sealed flask containing air under atmospheric pressure.

The invention possesses other advantageous features, some of which with the foregoing will be set forth at length in the following description where that form of the invention which has been selected for illustration in the drawings accompanying and forming a part of the present specification is outlined in full. In said drawings, one form of the invention is shown, but it is to be understood that it is not limited to such form, since the invention as set forth in the claims, may be embodied in a plurality of forms.

Referring to the drawings:

Fig. 1 is a front elevation of a machine embodying the objects of our invention with a portion of its bell jar broken away, better to illustrate its construction.

Fig. 2 is a vertical mid-section taken on the line 2—2 of Fig. 1.

Fig. 3 is a horizontal section of the bell jar taken on the line 3—3 of Fig. 1.

Fig. 4 is a diagrammatic illustration of the vacuum system forming part of our machine.

Fig. 5 is a perspective view of a number of vials held in a cylindrical bundle by a coil spring retainer and ready for filling.

The machine shown in these various figures comprises a rectangular cabinet 1 including a control panel 2, a top 3, and a rear wall 4. Mounted on the top 3 is a table 5 and associated with these members is a bearing 6. Journaled in the bearing 6 is a shaft 7 and mounted on the upper end thereof are four radially extending arms 8 having upwardly bent outer ends 9 which together serve as a support for a pan 10 containing a body 11 of vaccine.

Seated on the table 5 is a rack generally designated by the reference numeral 12, and consisting of a disc 13 supported by feet 14. Formed throughout the area of this disc is a number of holes 15 for the reception of bundles 16 of vaccine vials 17 having closed upper ends. The vials 17 are held in cylindrical bundles each of a diameter slightly less than the diameter of the holes 15, by coil springs 18, these springs also serving as means for suspending the vial bundles from the disc 13. Threaded to the disc 13 concentrically therewith is a hand grip or handle 19.

2

Surrounding this assembly and seated on the table 5 is a bell jar 21 provided at its upper end with a handle 22. In accordance with standard practice an air tight seal between the peripheral flange of the bell jar and the table 5 is obtained by coating the lower face of the flange with a film of grease.

Mounted within the cabinet 1 is a U-shaped bracket 23, and journaled thereto is a shaft 24. Keyed to the shaft 24 intermediate its ends is a pinion 25 arranged to mesh with a rack 26 formed on the shaft 7 intermediate its ends. Also keyed to the shaft 24 is a gear 27 arranged to mesh with a pinion 28. Journaled in the instrument panel 2 and the bracket 23 is a drive shaft 29 provided at its outer end with a crank 31, the pinion 28 being fastened to the inner end of this shaft. It will be seen that as a result of this construction the pan 10 can be raised and lowered by simply turning the crank 31 in the proper direction.

Mounted within the cabinet 1 is a small pipe 32, one end of which extends through the table 5 and communicates with the interior of the bell jar 21, and the other end of which communicates with a pipe 33. The pipe 33 communicates at one end through a valve A with a suitable source of vacuum, and at its other end through a valve B with a jar 34 and with a valve C. The valve C is in turn connected through a pipe 35 and an air filter 36 with an intake 37 of atmospheric air. Communicating with the pipe 33 is a pressure gauge 38 mounted on the control panel 1.

The operation of the machine above described is briefly as follows:

With the bell jar 21 and rack 12 removed, the pan 10 is partially filled with the desired vaccine. The rack 12 is loaded with bundles of inverted vials and placed in position over the pan 10. At this stage the pan 10 should, of course, be in its lowermost position so that the lower ends of the vials are well above the vaccine level. This having been done, the control panel should be checked to be certain that valves B and C are in their closed positions. Following this, the bell jar 21 is sealed over the table 5, and the valve A opened so as to partially evacuate the bell jar and each of the vials 17.

In the meantime the valve C has been opened a sufficient length of time to completely fill the jar 34 with filtered air under atmospheric pressure.

With the bell jar partially evacuated and the jar 34 under atmospheric pressure, the pan 10 is elevated so that the lower open ends of the vials 17 are well below the level of the vaccine.

Following this, and with the valves A and C in their closed positions, the valve B is opened to permit air under atmospheric pressure from the jar 34 to flow into the bell jar 21 and to increase the pressure thereunder by a fixed, although not necessarily known amount. This increase in pressure will, of course, result in forcing vaccine up into each of the vials 17. Finally, the pan 10 is lowered so that the vaccine therein clears the lower ends of the vials and the valve C is opened, whereupon the vaccine is forced farther up each vial, due to the fact that it is under the influence of atmospheric pressure. The bell jar can then be removed and each vial flame sealed.

By resorting to this expedient, it becomes readily possible to uniformly fill each vial with a substantially predetermined quantity of vaccine without regard to exact degree to which the bell jar is evacuated. The important factor is that by the use of the jar 34, the differential pressure by which the vials are filled is always substantially constant, regardless of the degree to which the bell jar is initially evacuated. This differential pressure, of course, depends upon the ratio between the volumetric capacity of the bell jar 21 and of jar 34, and can be readily varied by the use of jars 34 of different sizes.

We claim:

1. A machine of the character described comprising: a table; a bell jar seated on said table; a pan disposed over said table within said bell jar; a rack suspended over said pan and arranged to hold a vial in inverted position within the confines of said pan; means for effecting relative vertical movement between said pan and said rack; means for partially evacuating said bell jar and said vial; and means for introducing into said bell jar a predetermined volume of air under a predetermined pressure.

2. A machine of the character described comprising: a table; a bell jar seated on said table; a pan disposed over said table within said bell jar; means for supporting a vial in inverted position within said bell jar over said pan; means for elevating said pan over the lower open end of said vial; means for partially evacuating said bell jar and said vial; and means for introducing into said bell jar a predetermined volume of air under atmospheric pressure.

3. A machine of the character described comprising: a table; a bell jar seated on said table; a pan disposed over said table within said bell jar; a rack seated on said table, said rack being arranged to support a vial in inverted position over said pan; means for elevating said pan to a level wherein its upper edge is above the lower open end of the vial; means for partially evacuating said bell jar and said vial; and means for introducing into said bell jar a predetermined volume of air under a predetermined known pressure.

4. A machine of the character described comprising: a table; a vertical shaft extending through said table; a pan supported on the upper end of said shaft; a rack seated on said table, said rack being arranged to support a bundle of inverted vials over said pan; a bell jar seated on said table over said pan and rack; means associated with said table for elevating said shaft and said pan; a container mounted beneath said table; means for connecting said bell jar with a source of reduced pressure; and means for selectively establishing communication between said container and a source of air under atmospheric pressure and between said container and said bell jar.

BYRON EMERY.
WAYNE L. ELDER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,345,347	Chaney	July 6, 1920
1,679,386	Tenney	Aug. 7, 1928