

Oct. 6, 1953

S. J. BUSBY

2,654,523

APPARATUS FOR VACUUM FILLING OF CONTAINERS

Filed July 7, 1949

3 Sheets-Sheet 1

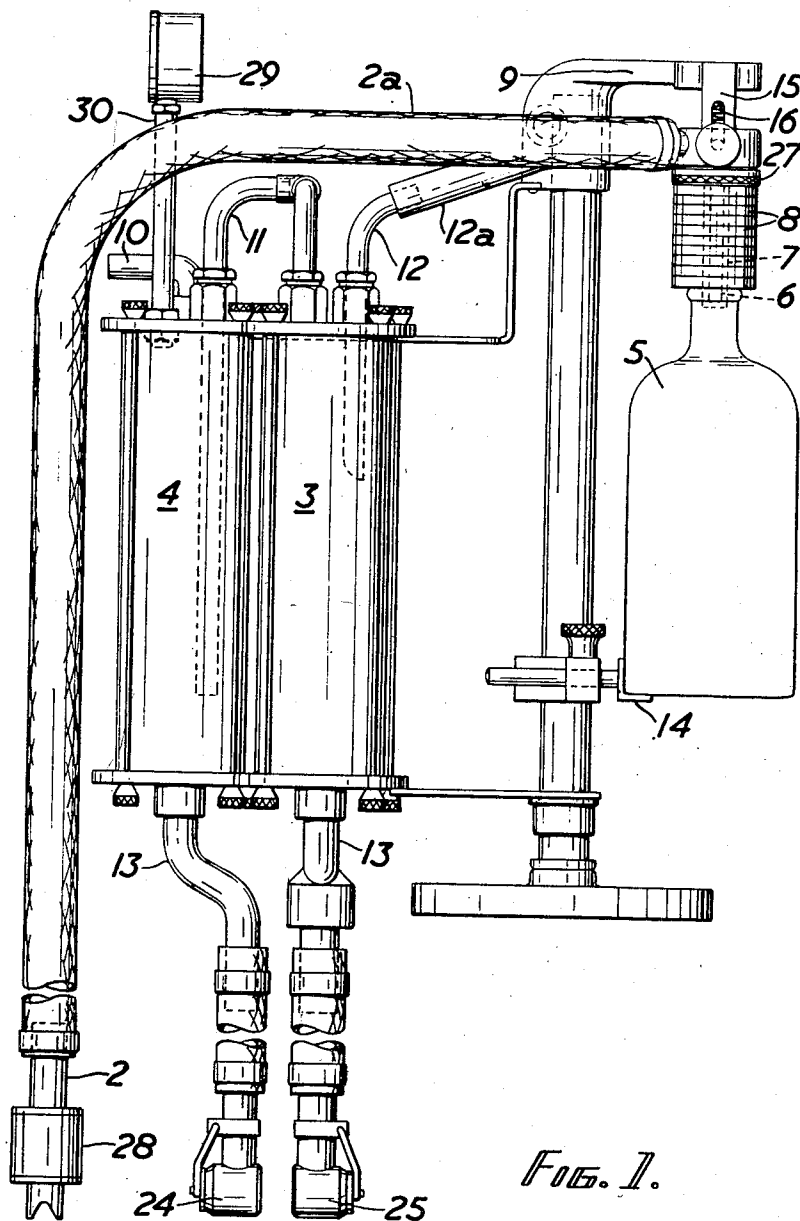


FIG. 1.

STANLEY JOHN BUSBY

Inventor

By *Fredrick E. Hays*
Attorney

Oct. 6, 1953

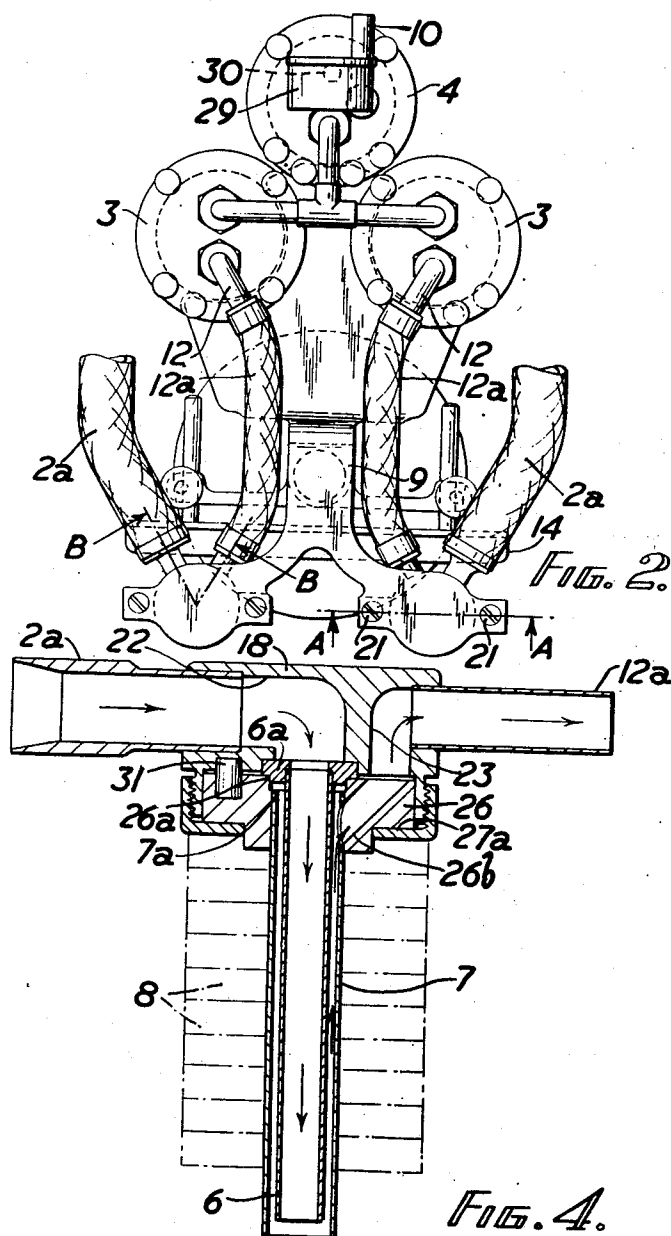
S. J. BUSBY

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3 Sheets-Sheet 2



Inventor
STANLEY JOHN BUSBY
By *Richard E. Hays*
Attorney

Oct. 6, 1953

S. J. BUSBY

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3 Sheets-Sheet 3

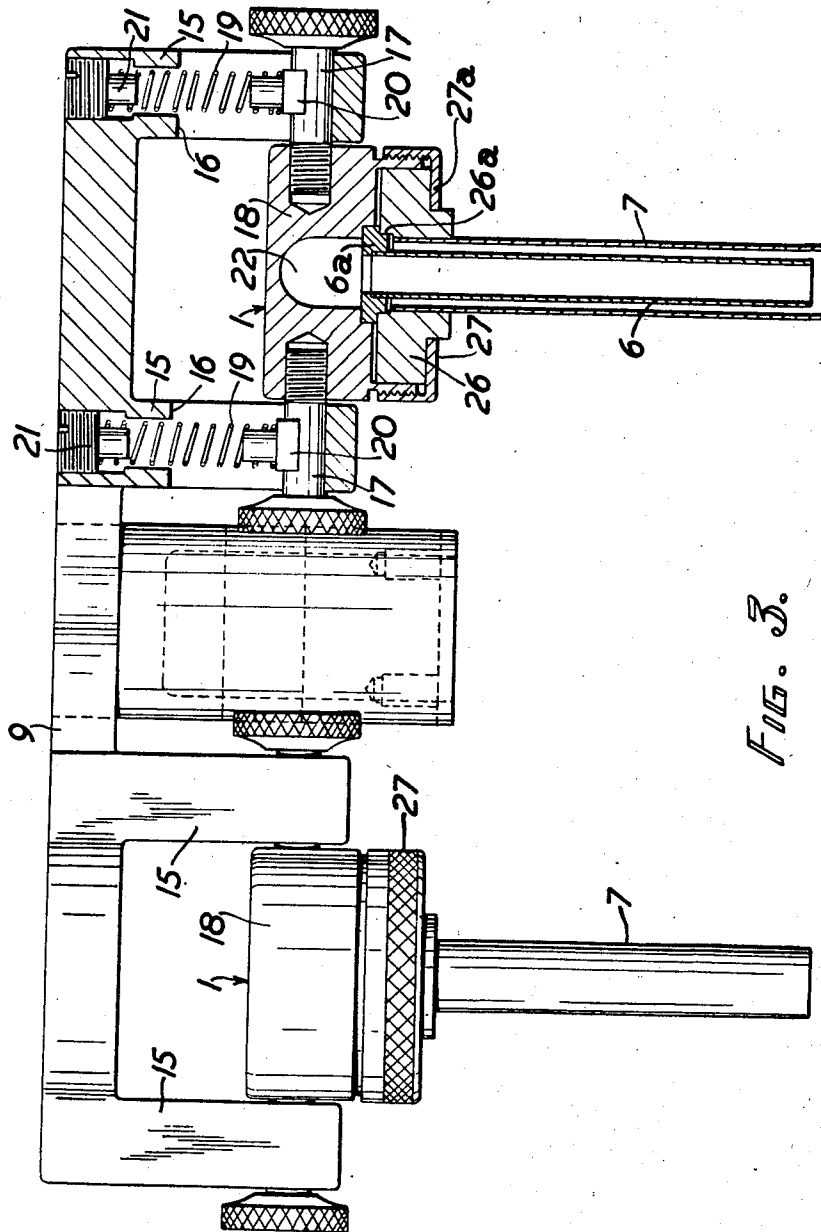


FIG. 3.

Inventor
STANLEY JOHN BUSBY

By *Fredrick L. Ham*
Attorney

UNITED STATES PATENT OFFICE

2,654,523

APPARATUS FOR VACUUM FILLING OF CONTAINERS

Stanley John Busby, London, England

Application July 7, 1949, Serial No. 103,394
In Great Britain July 9, 1948

4 Claims. (Cl. 226-116)

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This invention relates to vacuum bottle or like receptacle filling machines and has for its object to provide an improved vacuum filling head arrangement for such machines.

In machines of this type in the operation of filling a receptacle, such as, for example, a bottle, the bottle is placed or supported on a platform and its mouth is applied to a filling head against which it is sealed by a resilient washer. A vacuum pipe and a liquid feed pipe project downwardly from the filling head into the bottle. In order to facilitate attachment or removal of a bottle on the filling head and to allow for the flexing of vacuum and liquid supply tubes above the filling head it is necessary to mount the filling head so as to be movable relative to the bracket on which it is supported.

According to one feature of the present invention a vacuum filling machine of the type described comprises at least one filling head pivotally supported about a transverse axis in such manner that it can rotate freely without restraint when engaged by the mouth of a bottle or other receptacle to be filled. The invention also comprises an improved form of the filling head itself which comprises a casing, a spigot member, an outer tube secured at its upper end in the spigot member, and an inner tube disposed concentrically within the outer tube and having at its upper end an outwardly projecting flange received between the casing and the spigot member, and means for drawing together the casing and spigot member to clamp between them the flange of the inner tube, the co-operating surfaces of the spigot and flange being flat and perpendicular to the axis of the tubes.

The accompanying drawings illustrate an improved vacuum filling machine embodying the features of the present invention.

In the drawings:

Figure 1 is a general side elevation of a double-headed vacuum filling machine,

Figure 2 is a plan view of the machine shown in Figure 1,

Figure 3 is a front part section of the filling head mounting arrangement on the line A-A of Figure 2,

Figure 4 is a section through a filling head on the line B-B of Figure 2.

Referring firstly to Figures 1 and 2 of the drawings there is shown a vacuum bottle filling machine comprising a pair of filling heads 1 connected to a common liquid supply tube 2 by a flexible pipe 2a and a pair of overflow chambers 3, which in turn communicate with a reserve overflow chamber 4 connected to an evaporating

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pump by a pipe 10. Figure 1 shows a bottle 5 supported beneath one of the filling heads on a bracket 14 so that its neck encloses an inner liquid feed pipe 6 and an outer concentric vacuum pipe 7. Sealing contact is maintained by the lowermost of a stack of rubber washers 8. The filling heads are supported in a bracket 9 in a manner which will be later described.

In the operation of filling a bottle a partial vacuum is applied through the pipe 10 to the reserve overflow chamber 4, as by means of an electrically driven pump. This partial vacuum is transferred first to the overflow chambers 3 and then to the vacuum pipe 7 in the filler head through tubes 11 and 12 and a flexible coupling 12a. The reduced pressure thus created in the bottle 5 causes liquid to enter it by way of the supply pipe 2a and the feed pipe 6. Filling of the bottle continues until the liquid level reaches that of the end of vacuum pipe 7 whereupon excess liquid enters the first overflow chamber 3 through tube 12 and, subsequently, should the bottle not be removed, will fill this chamber and overflow in turn into the reserve overflow chamber 4 by way of tube 11. This arrangement effectively prevents entry or splashing of liquid into the main vacuum supply pipe 10. All three overflow chambers are provided with liquid return tubes 13 leading to the bulk liquid container (not shown). These tubes are arranged so that as soon as a bottle is removed from the filling head the consequent loss of vacuum in the overflow chamber permits any liquid which may have accumulated therein to flow back by gravity to the bulk container through automatic relief valves 24 and 25. A valve 28 is fitted on the liquid supply tube 2 to prevent re-entry of liquid to the bulk container after filling of a bottle has been effected. A pipe 30 extending from the top of the reserve overflow chamber 4 is connected to a vacuum pressure gauge 29. The level to which a particular bottle is filled is adjusted by varying the number of spacing washers 8 surrounding the pipe 7. Bottles of different sizes may be accommodated on the filling heads by adjusting the position of base supporting brackets 14.

Referring now also to Figure 3, each end of the bracket 9 upon which the two filling heads are supported is provided with a pair of downwardly extending supports 15, each having a vertical guide slot 16. These slots accommodate the shanks of trunnions 17 which are screwed inwardly into the casing 18 of each filling head. The filling heads are thereby permitted to rock freely about their pivotal axes and to be ver-

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tically movable to an extent determined by the depth of the guide slots 16. As here shown the top of each support 15 is bored to receive a coil spring 19 for biasing the filler head downwardly. The lower end of the spring engages over a bearing block 20 shaped to the surface of the associated trunnion 17 the upper end of the spring being retained by a shouldered screw 21 recessed into the upper face of the bracket 9. The heads of the trunnions 17 are knurled to facilitate removal and assembly. It will be observed that the springs 19 do not oppose rotation of the filling head, but are for the purpose of allowing the filling head to yield resiliently in a vertical direction, so that it can accommodate itself to the mouths of bottles of slightly different heights.

The construction of an individual filling head is shown in Figures 3 and 4, and comprises a hollow casing 18 bored with a liquid feed passage 22 leading to its centre and a vacuum feed passage 23, disposed at an angle thereto.

The lower part of the casing 18 receives a spigot member 26 having a central bore 26a and an oblique bore 26b, the casing and the spigot member being held together by a cap 27 adapted to be screwed onto the casing 18 and having an annular flange 27a engaging an annular recess in the lower face of the spigot member, thereby drawing it towards the casing 18.

The upper surface of the spigot member 26 registers with the casing 18 so that the central bore 26a is in alignment with the inner end of the feed passage 22 and the oblique bore 26b is similarly in alignment with the inner end of the vacuum passage 23. By this arrangement the feed and vacuum passages 22 and 23 are connected respectively with the pair of concentric pipes 6 and 7 supported by the spigot member 26. The smaller diameter or feed pipe 6 is inserted in the large diameter or vacuum pipe within which it is supported by an upper flange 6a. The vacuum pipe 7 is sweated, or otherwise attached at its upper end to the spigot member 26. The wall of the vacuum pipe is drilled opposite the adjacent end of the oblique bore 26b. The arrows in Figure 4 indicate the paths by which liquid enters a container being filled and by which air is extracted to cause such entry to take place.

When the casing 18 and the spigot member 26 are drawn together on rotation of the cap 27, their flat opposed surfaces abut the upper and lower surfaces respectively of the flange 6a on the inner or feed pipe 6 which is thereby tightly clamped between these parts so as to provide a precision leak proof coupling between the casing 18 and the spigot member 26.

It is important that the casing 18 and the spigot member 26 are correctly aligned so as to ensure that the passages in the casing register with the bores in the spigot member. For this purpose a dowel 31 may be formed on the upper surface of the spigot member 26 so as to register in a corresponding recess in the casing 18. Alternatively registration may be effected by means of a rib or key cut in one of the opposed faces adapted to engage a groove or keyway cut in the other opposed face.

The fact that all the abutting surfaces are flat has the advantage that these can be easily and accurately machined to the precision limits required and also offer greater resistance to wear, disfigurement or breakage through casual handling.

It will be understood that this invention is not limited to the particular machine described and

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illustrated, many modifications being possible. For example, the connections of the two concentric tubes in the filling head may be reversed, liquid being supplied through the outer tube and the partial vacuum being applied to the inner tube.

What is claimed is:

1. In a vacuum filling machine for filling liquid into containers, a filling head comprising a casing including a central orifice, a feed passage for liquid leading to said orifice and a vacuum feed passage; a vacuum tube extending from the casing and communicating with said vacuum feed passage; a feed tube disposed concentrically within the vacuum tube spaced therefrom and communicating with the liquid feed passage; a pair of trunnions laterally extending from opposite sides of the filling head; a support frame secured to the machine and having two depending arms each including a vertical bearing slot, each of said trunnions being slidably extended into a respective one of said slots thereby providing for rocking movements of the filling head about the trunnions and vertical displacement of the filling head relative to the support frame; and yieldable means biasing the filling head toward a position in which the trunnions thereof occupy the lowermost positions in the slots.

2. In a vacuum filling machine for filling liquid into containers, a filling head comprising a casing including a central orifice, a feed passage for liquid leading to said orifice and a vacuum feed passage; a vacuum tube extending from the casing and communicating with said vacuum feed passage; a feed tube disposed concentrically within the vacuum tube spaced therefrom and communicating with the liquid feed passage; a pair of trunnions laterally extending from opposite sides of the filling head; a support frame secured to the machine and having two depending arms each including a vertical bearing slot, each of said trunnions being slidably extended into a respective one of said slots thereby providing for rocking movements of the filling head about the trunnions and vertical displacement of the filling head relative to the support frame; bearing blocks slidably fitted in each slot and abutting against the upper side of the respective trunnion; and a loaded spring fitted in each slot between the respective bearing block and the upper end of the respective slot for biasing the trunnions toward the lower ends of the slots.

3. In a vacuum filling machine for filling liquid into containers, a filling head comprising a casing including a feed passage for liquid and a vacuum feed passage, a spigot member, a vacuum tube supported by the spigot member and depending therefrom, a feed tube for liquid disposed within the vacuum tube so as to form a channel between the said two tubes and supported by the spigot member, the said spigot member including a passage connecting said channel with said vacuum feed passage and a passage connecting the liquid feed tube with said liquid feed passage, a clamping cap having an opening for passage of the vacuum tube therefrom, the said cap covering the spigot member and being secured to said casing for holding the spigot member in position relative to the casing; a pair of trunnions laterally extending from opposite sides of the filling head; a support frame secured to the machine and having two depending arms each including a vertical bearing slot, each of said trunnions being slidably extended into a respective one of said slots thereby pro-

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viding for rocking movements of the filling head about the trunnions and vertical displacements of the filling head relative to the support frame; and yieldable means biasing the filling head toward a position in which the trunnions thereof occupy the lowermost positions in said slots.

4. In a filling machine according to claim 3, a shouldered flange clamped in position between the spigot member and the casing and secured to the liquid feed tube.

STANLEY JOHN BUSBY.

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References Cited in the file of this patent
UNITED STATES PATENTS

Number	Name	Date
2,145,765	Huntley -----	Jan. 31, 1939
2,347,858	Weeden -----	May 2, 1944
2,461,326	Kantor et al. -----	Feb. 8, 1949

FOREIGN PATENTS

Number	Country	Date
324,946	Great Britain -----	Feb. 30, 1930
354,300	Germany -----	June 7, 1922
604,615	Great Britain -----	July 7, 1948