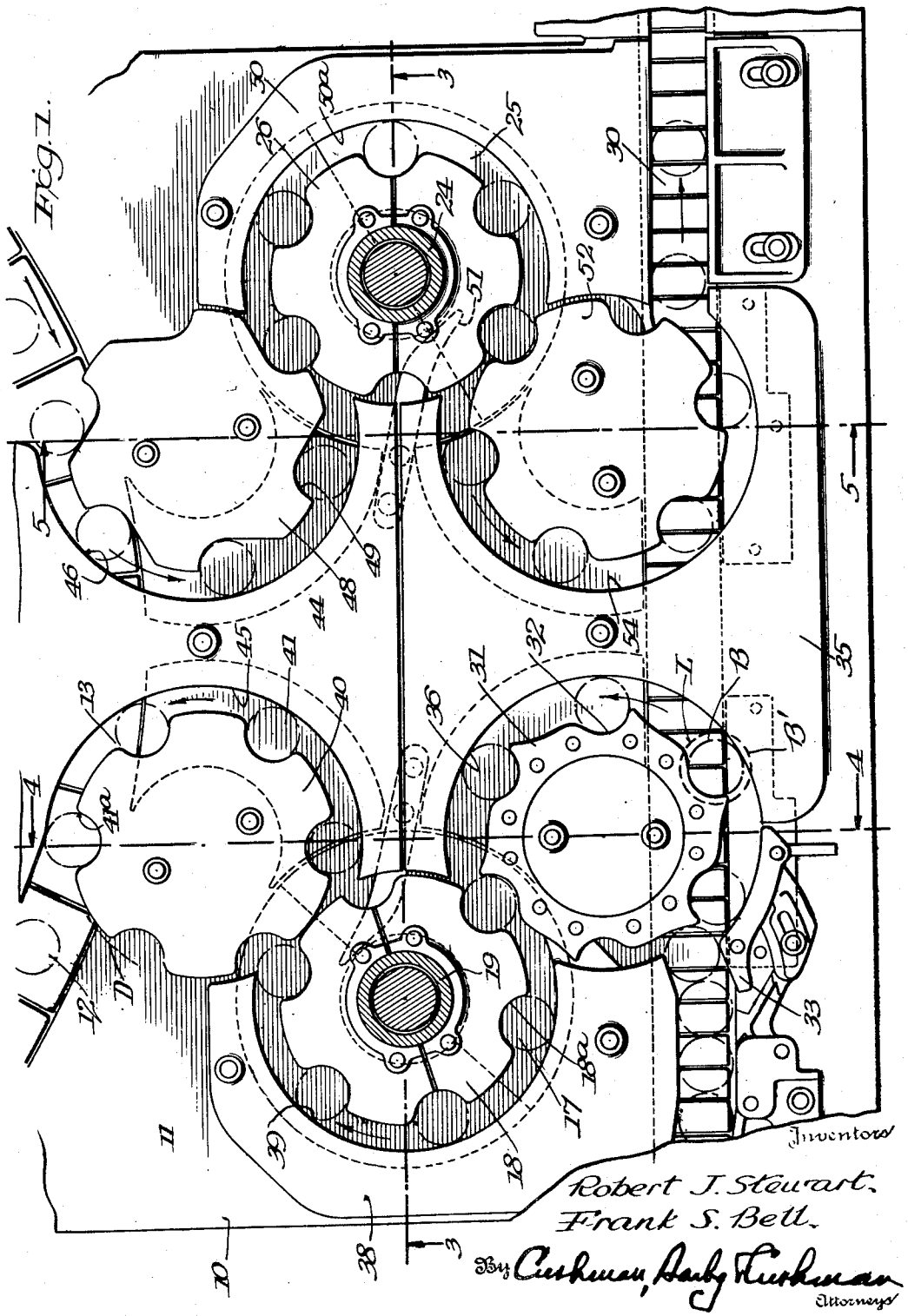
April 22, 1941. R. J. STEWART ET AL 2,239,120

FILLING MACHINE

Filed Sept. 29, 1937 6 Sheets-Sheet 1



April 22, 1941. R. J. STEWART ET AL 2,239,120

FILLING MACHINE

Filed Sept. 29, 1937 6 Sheets-Sheet 2

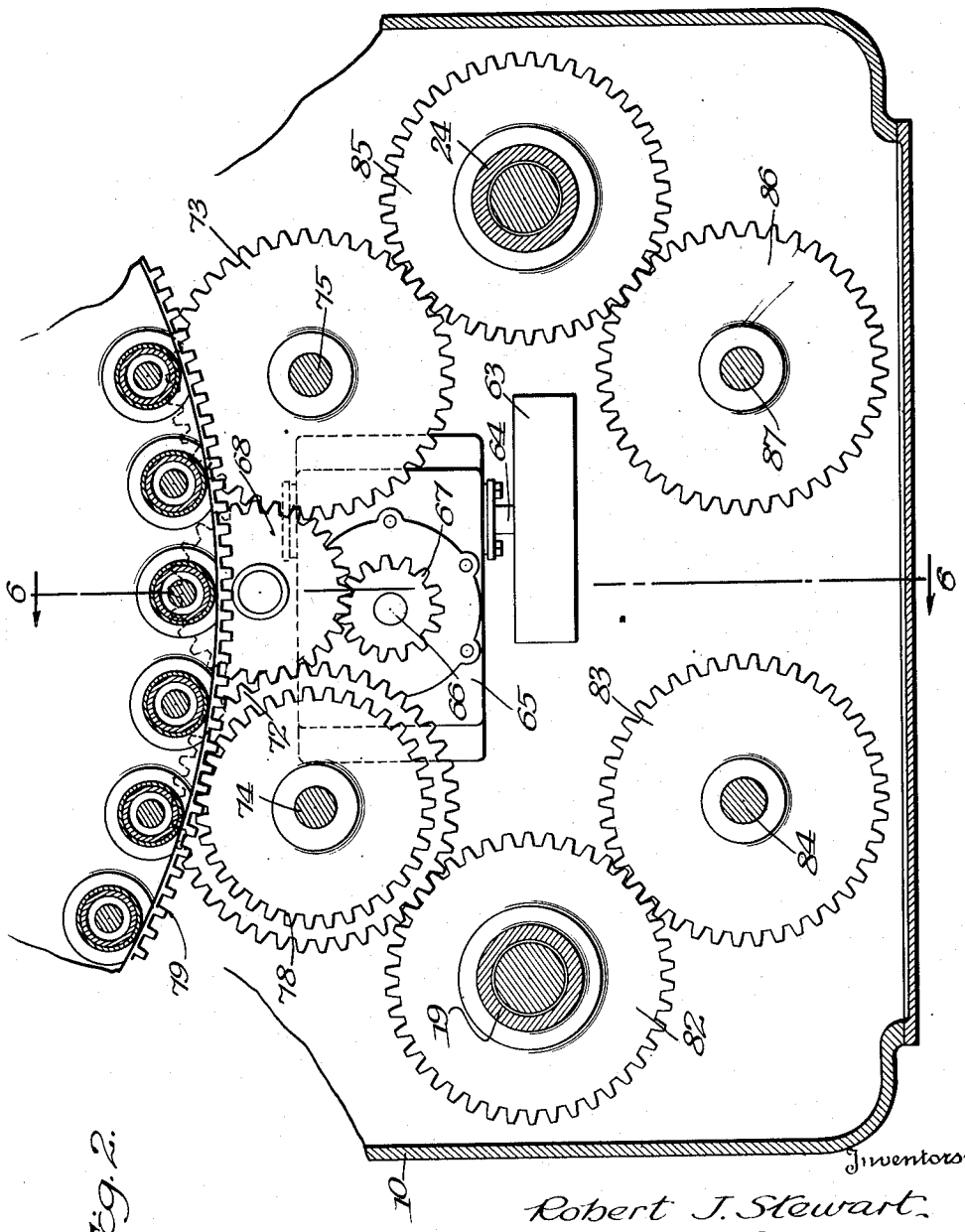


Fig. 2.

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FILLING MACHINE

Filed Sept. 29, 1937 6 Sheets-Sheet 3

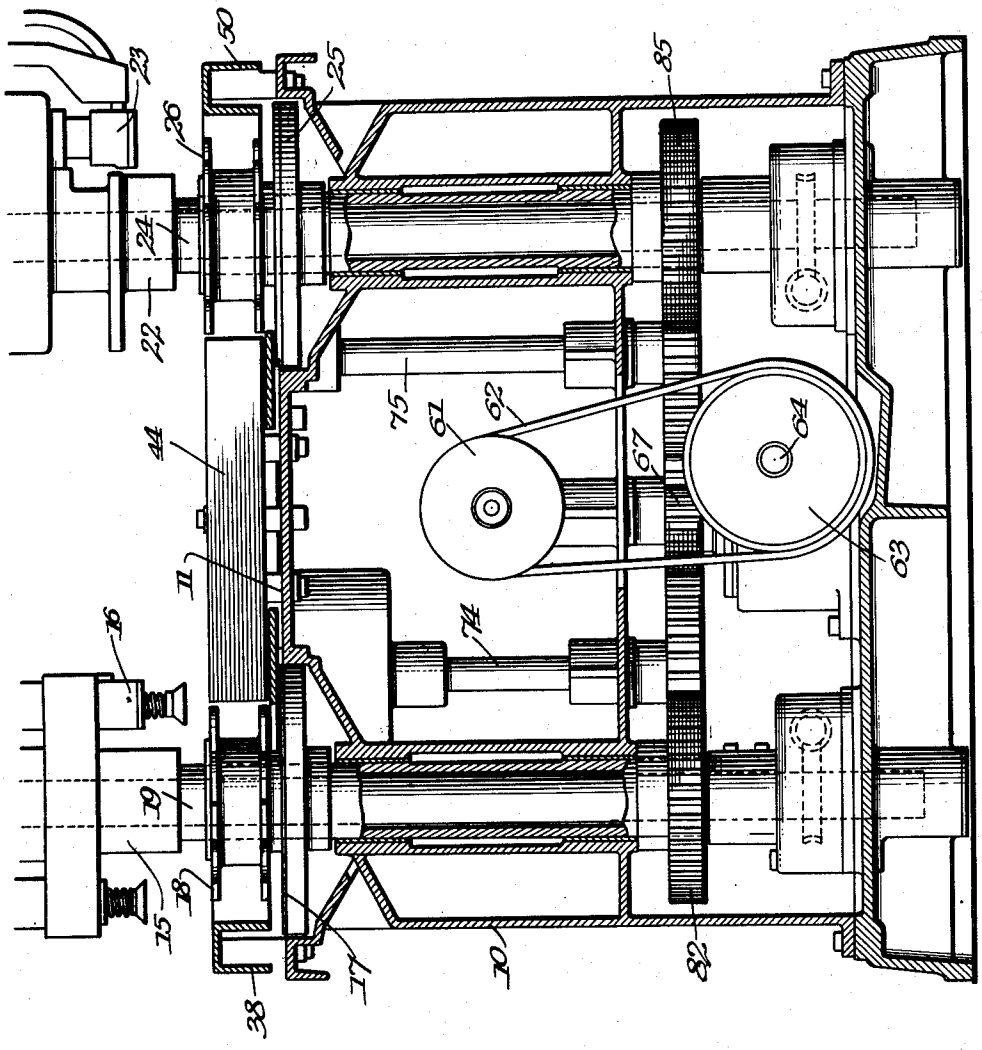


Fig. 3.

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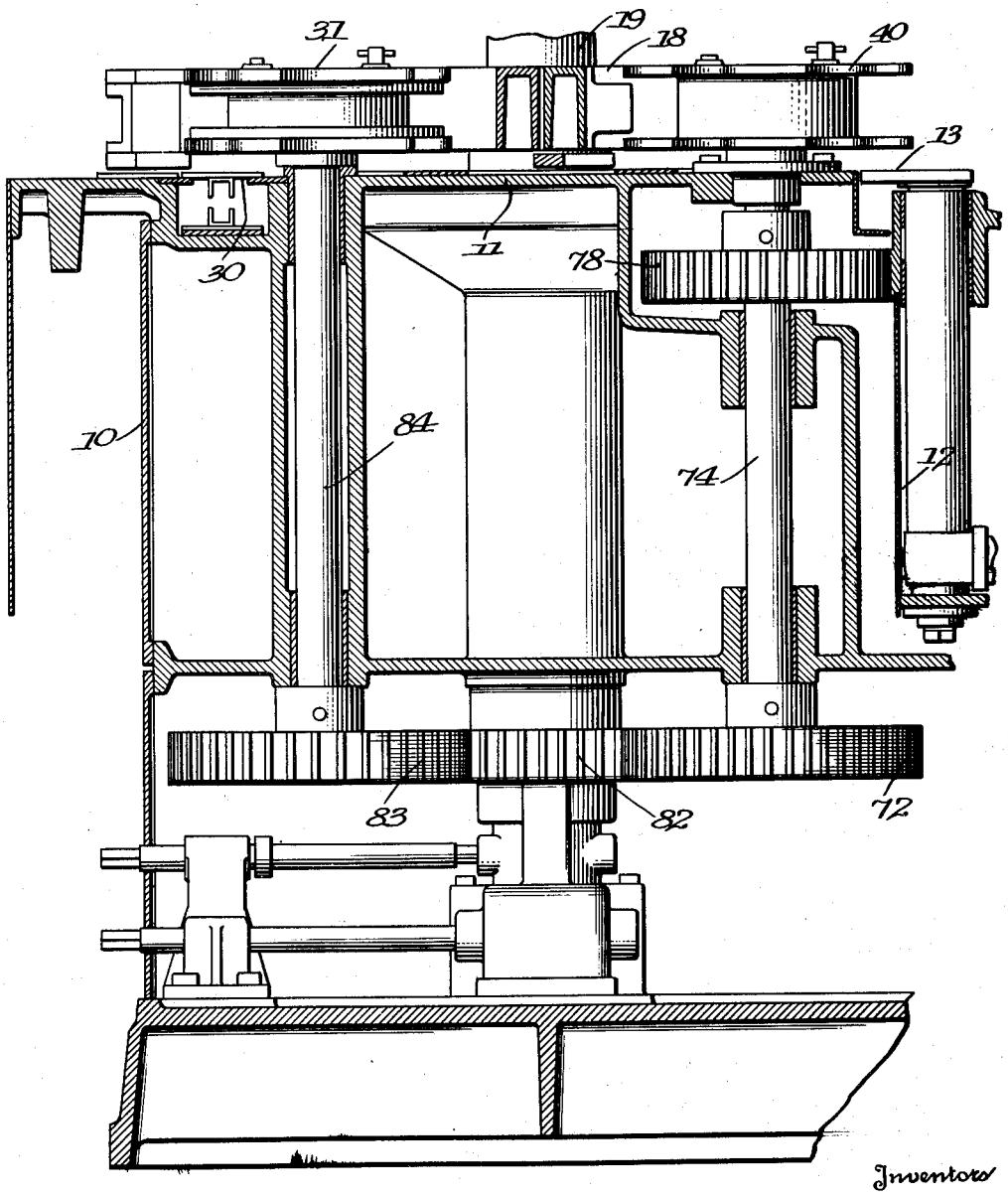
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April 22, 1941. R. J. STEWART ET AL 2,239,120

FILLING MACHINE

Filed Sept. 29, 1937 6 Sheets-Sheet 4

Fig. 4.



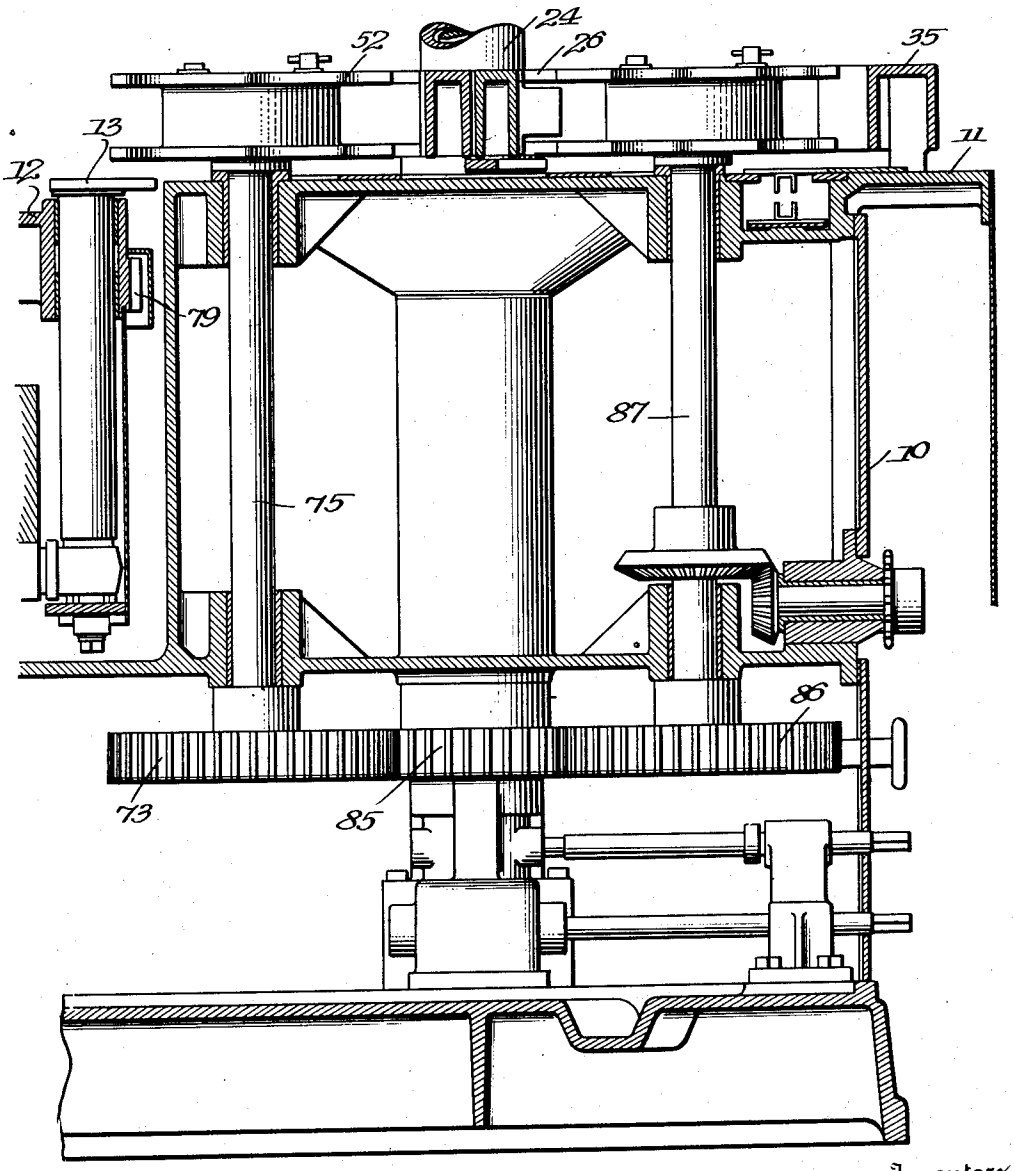
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FILLING MACHINE

Filed Sept. 29, 1937 6 Sheets-Sheet 5

Fig. 5.



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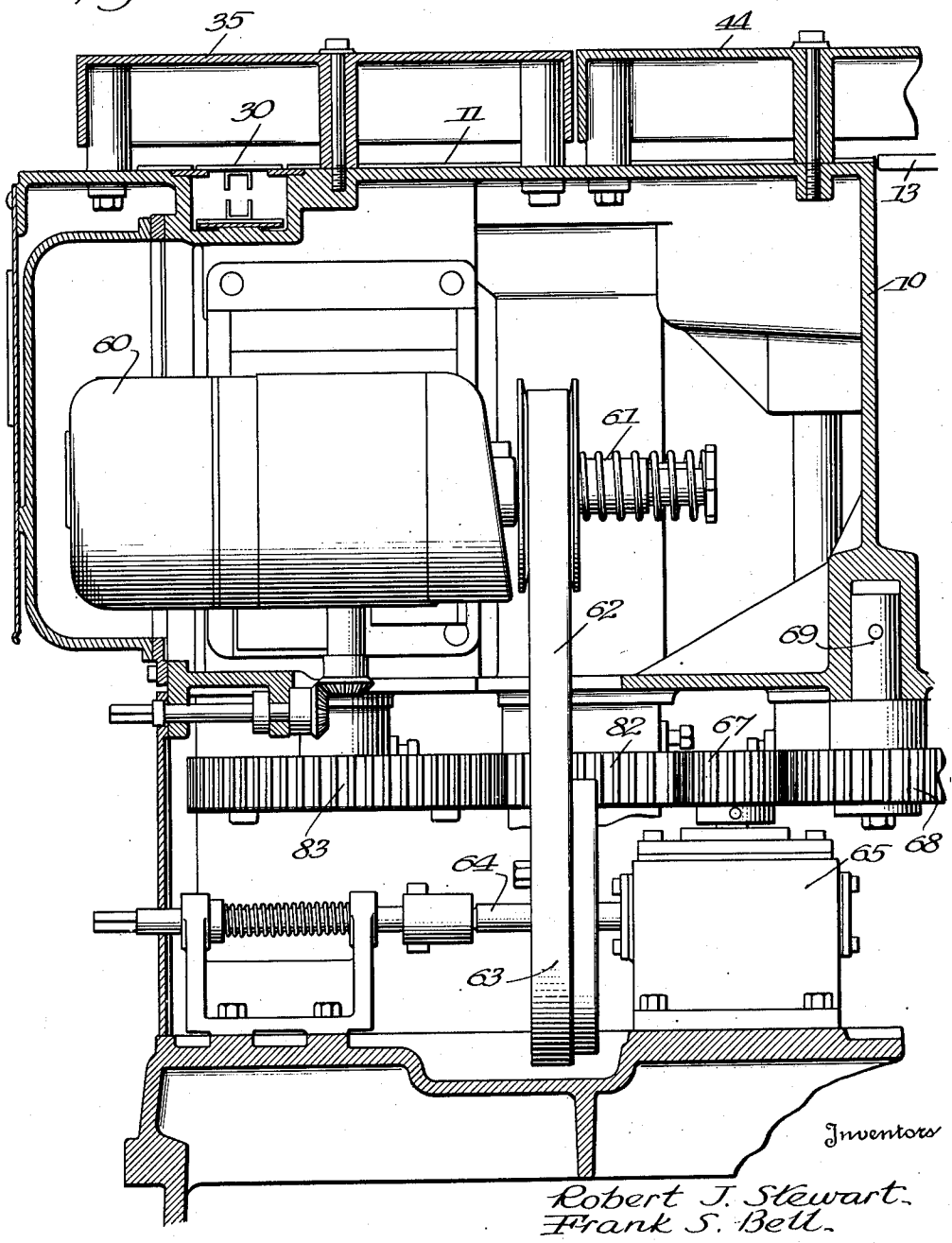
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FILLING MACHINE

Filed Sept. 29, 1937 6 Sheets-Sheet 6

Fig. 6.



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UNITED STATES PATENT OFFICE

2,239,120

FILLING MACHINE

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Application September 29, 1937, Serial No. 166,403

4 Claims. (Cl. 226—75)

The present invention relates to filling machines of the type for filling bottles or other containers with liquids such as carbonated beverages.

The invention particularly relates to filling machines of high production capacity, such as usually comprise a stationary table and a rotary filling table adjacent the same, the stationary table being provided with a syruping mechanism and a crowning mechanism. In such machines, suitable means must also be provided on the stationary table to move containers from the syruping mechanism to the rotary filling table, and also to remove filled containers from the latter to position them beneath the crowning mechanism.

It is highly desirable that all of the mechanisms for handling the containers be so arranged and designed that the container will be smoothly moved through the machine, that is, with no jarring or vibration of the containers such as would result in breakage of the containers, or disturbance of their contents.

The principal object of the present invention is to provide a filling machine wherein all of the container handling elements, including the elements for performing an operation upon the container, are so arranged that jarring of the containers will be eliminated, and the path of travel of the container will at no time be sharply changed.

Filling machines of previous designs including rotatably movable syruping and crowning mechanisms have been provided with a single dial for moving containers such as bottles from the syruping mechanism to the filling table and for subsequently removing containers from the filling table to the crowning mechanism. The use of a single dial for accomplishing these movements of the container is unsatisfactory because of the fact that it results in a sharp change of direction of travel of the container at the moment that the container is positioned upon the filling table, and also at the moment that the container is removed from the filling table. This sharp change of direction of movement caused by contact of the container with an element moving in a direction opposite to the direction of movement of the container is very apt to chip or otherwise mar, or even upset the containers. In fact, in filling machines of the type wherein a single dial is relied upon to position and remove containers with respect to the filling table, it is necessary to provide upstanding container engaging elements on the container supports of the filling table to insure that the containers will not be overturned during transfer with respect to the filling table. The fact that filled and uncapped containers have their direction of travel sharply changed at the time that they are removed from the filling table is also a serious defect of single transfer dial filling machines because the contents of the containers are very apt to be agitated, with resultant foaming and loss of a portion of the contents of the bottle or other container.

The filling machine of the present invention includes rotary syruping and crowning mechanisms and a rotary dial to remove containers from the syruping mechanism and position them upon the filling table, and a second dial to remove containers from the filling table and position them adjacent the crowning mechanism. By this arrangement, the movement of the containers through the machine is smooth and there are no sharp changes in the direction of movement of the container. In particular, the arrangement of the mechanisms is such that there is no sharp change of direction of the movement of the containers when either moving upon or leaving the filling table.

Another important object of the invention is to provide a filling machine wherein the drive for the various mechanisms is centralized, resulting in economy of space and a greater smoothness of performance of the machine.

Other objects and advantages of the invention will be apparent from the following specification and drawings wherein:

Figure 1 is a plan view of the stationary work table of the machine with the upper portions of the syruping and crowning mechanisms removed and including a portion of the filling table;

Figure 2 is a diagrammatic view showing the manner of driving the various elements of the machine;

Figure 3 is a vertical sectional view on the line 3—3 of Figure 1;

Figure 4 is a vertical sectional view on the line 4—4 of Figure 1;

Figure 5 is a vertical sectional view on the line 5—5 of Figure 1; and

Figure 6 is a vertical sectional view on a line generally corresponding to the line 6—6 of Figure 2.

The numeral 10 designates the stationary work table of the machine, including a top surface 11 over which the bottles or other containers are moved during their passage to and from the rotary filling table 12. Only a small portion of the rotary filling table 12 is indicated in the drawings, this table being of the same general construction as that described and claimed in the

patent of Huntley and Stewart for Filling machine, No. 2,145,765, issued January 31, 1939, and being provided with vertically movable bottle supports or platforms 13, each bottle support having a filling head, not shown, vertically aligned therewith.

A rotary syruping mechanism 15 is journaled in the stationary table 10, the syruping mechanism including a plurality of vertically reciprocable syruping heads 16 of the type disclosed in the Huntley and Stewart application. The syruping mechanism also includes a rotary table 17 flush with the upper surface 11 of the work table 10, and a rotary dial 18 having container pockets therein aligned with the syruping heads 16. The syruping mechanism includes a hollow shaft 19 suitably journaled for rotation in the base portion of the work table 10. Suitable mechanism such as described in the above mentioned Huntley and Stewart application is provided to enable the syruping heads of the syruping mechanism to be positioned at various heights with respect to the surface of the work table so that bottles of different heights may be handled in the machine.

The crowning mechanism 22 includes a plurality of crowning heads 23. A hollow shaft 24 rotatable in the work table 10 supports the crowning mechanism and carries a rotary table 25 flush with the upper surface 11 of the stationary work table and on which the bottles are supported during crowning. A dial 26 is also carried by the hollow shaft 24 above the rotary table 25 to align the bottles with the crowning heads 23. The crowning mechanism 22, like the syruping mechanism 15, is vertically adjustable to enable it to operate upon bottles of various heights.

As best shown in Figure 1, a straight line conveyor 30 extends across the front portion of the work table 10. In the operation of the machine, bottles to be filled are positioned upon the straight line conveyor and move into the filling machine from the left (Figure 1). A rotary infeed dial 31 provided with pockets 32 removes the bottles from the straight line conveyor 30 and conducts them through an arcuate course as indicated by the arrows in Figure 1 to position them upon the rotary table 17 of the syruping mechanism 18. The infeed dial 31 preferably includes bottle engaging flanges formed of fibre to prevent any marring of the incoming empty bottles. A suitable gate mechanism 33 of the type described in the patent of Wiltie I. Gladfelter for Bottle handling machine and control therefor, No. 2,013,144, issued September 3, 1935, is provided adjacent the infeed dial 31 to insure that bottles will be properly delivered to this dial and so that the machine will be automatically stopped in the event that any jamming of the bottles should occur.

The bottles are retained in the pockets 32 of the infeed dial 31 by a guide plate 35 secured to the upper surface 11 of the work table 10, guide plate 35 including an arcuate edge 36 which encircles the portion of the path of travel through which bottles move with the infeed dial 31. The bottles moving with the infeed dial 31 will be delivered to the table 17 of the syruping mechanism 15 and positioned in one of the pockets 18a of the syruping dial 18, the bottle then moving with the syruping mechanism through an arcuate path and being syruped during such movement.

In order to insure that the bottles will be retained in the syruping mechanism 15, a guide plate 38 is provided on the upper surface of the work table 10, this plate including an arcuate edge 39 conforming to the path of movement of bottles with the syruping mechanism.

A transfer dial 40 including pockets 41 is positioned between the syruping mechanism 15 and the rotary filling table 12, this dial, in cooperation with a stationary guide arm 40a secured to the work table 10, serving to remove bottles from the pockets 18a of the syruping mechanism and properly position them upon the bottle supports 13 of the filling table. As will be observed from the arrows in Figure 1, a bottle moving with the transfer dial 40 toward and upon a bottle support 13 of the filling table will be moving in the same direction as the filling table. There will thus be no sharp change of direction of movement of the bottle at this moment and all possibility of the bottle being overturned will be obviated. In view of this, the bottle supports 13 need include no upstanding shoulder or bottle engaging arms to prevent upsetting of the bottle, as is necessary in the usual types of filling machines. The bottles are retained in the transfer dial 40 by a guide plate 44 secured to the work table 10 and including an arcuate portion 45 which surrounds the portion of the path of travel of the dial 40 over which bottles move. Guide plate 44 extends out over the path of movement of the bottle supporting platforms 13 of the rotary filler 12 so that the bottles will be properly guided into position on the platforms by the cooperation of the dial 40 and the guide plate.

The bottle positioned upon a support 13 of the filling table 12 will move about with the filling table to be filled in the manner described in said application of George J. Huntley and Robert J. Stewart, and, when the filling is completed, will again come adjacent the stationary table 10 and in contact with a right hand arcuate portion 46 of the guide plate 44. A second transfer dial 48 provided with bottle engaging pockets 49 is provided to remove the bottles from the bottle supporting platforms 13, dial 48 cooperating with an arcuate edge 46 of the guide plate 44 to remove the bottles and to transfer them to the rotary table 25 of the crowning mechanisms 22. It will be noted that the bottles are removed from the filling table 12 by a movement which is substantially a continuation of their movement with the filling table. In other words, the direction of movement of the bottles will not be sharply reversed as is the case with types of filling machines now used.

The bottles will be crowned during their movement with the crowning mechanism 22, and will then be removed from the table 25 and dial 26 of the latter mechanism by an outfeed dial 52 provided with pockets 53 and which is substantially surrounded by an arcuate edge 54 of the guide plate 35. By the cooperation of the guide plate 35 and outfeed dial 52, each bottle will be positioned upon the outfeed end of the straight line conveyor 30 to be removed from the machine. A guide element 51 secured to the upper surface 11 of the work table 10 extends beneath the crowner dial 26 to guide bottles from that dial to the outfeed dial 52.

The arrangement whereby the above described elements of the present machine are rotated is as follows:

As best shown in Figure 6, a driving motor 60 is mounted in the stationary table 10, preferably adjacent the front and central portion thereof.

Motor 60 is provided with a pulley 61, preferably of the frictional change-speed type, and which serves to drive a belt 62 also moving about a pulley 63 on the shaft 64 of a speed reduction unit 65 mounted in the central and rear portion of the work table base. As shown in Figure 2, the speed reduction unit 65 has a vertical drive shaft 66 extending upwardly therefrom and having a drive pinion 67 secured thereto. Pinion 67 meshes with an idler pinion 68 fixed to a stub shaft 69 suitably journaled in the framework of the stationary table 10 and which meshes with pinions 72 and 73 fixed to the shafts 74 and 75, respectively. Shaft 74 carries the transfer dial 40 and shaft 75 carries the transfer dial 48, and, as will be observed from Figure 2, the idler gear 68 is between these two shafts. Shaft 74 carries a pinion 78 adjacent its upper end and which meshes with a large ring gear 79 carried adjacent the edge of the filling table 12.

The hollow shaft 19 of the syruping mechanism has a pinion 82 secured adjacent its lower end, which pinion meshes with the pinion 72 on the dial shaft 74 and pinion 82 also meshes with a pinion 83 on the vertical shaft 84 which carries the infeed dial 31. The crowning mechanism 22 is driven from the pinion 73 associated with transfer dial 48, a pinion 85 on the hollow shaft 24 of the crowning mechanism meshing with pinion 73. Pinion 85 of the crowning mechanism in turn drives the pinion 86 secured to the shaft 87 which carries the outfeed dial 52.

It will be observed from Figure 2 that the shafts or axes of rotation of the syruping and crowning mechanisms, the two transfer dials and the rotary filler 12 are arranged along a substantially V-shaped figure, with the filling table shaft or axis at the apex of this figure and with the driving gear 67 of the speed reduction unit 65 positioned substantially centrally within the V-shaped figure. It will also be observed that the shafts 84 and 87 of the infeed and outfeed dials 31 and 52, respectively, form a substantially symmetrical polygonal figure, with the drive shaft 66 of the speed reduction unit positioned substantially centrally of this figure.

All of the various dials of the present machine are removable from their shafts so that dials of different diameters and with different size pockets may be substituted therefor to handle containers of various sizes. The dials 18 and 26 of the syruping and crowning mechanisms, respectively, are diametrically split as best shown in Figure 1 in order that they will be removable. The guide plates 38, 44 and 50 are also replaceable by plates adapted to cooperate with dials of different diameters. At B, in Figure 1, there is indicated a bottle of the size intended to be handled by the guide plates and dials illustrated in the assembly of Figure 1. This bottle is represented as moving along an arcuate line L which is equi-distant from the innermost point of the pockets of the dials and the guiding edges of the guide plates. If the dials and guide plates are replaced by other dials and guide plates adapted to handle a large bottle, for example, as represented by the dotted lines B' in Figure 1, it is only necessary that the pockets of the substituted dials and the guiding edges of the substituted guide plates also be equi-distant from the center line L of the path of travel of the bottles.

It will be noted that the relation of the various bottle handling elements is such that the pockets thereof will, in effect, intermesh when a bottle is between them. The rear or pushing corner 41a of each pocket 41 on the transfer dial 40 is of such curvature that with the transfer dial 40 and the filling table 12 rotating at their proper speeds, and with the path of movement of the pushing edge 41a diverging along a line D from the path of movement of a platform 13, a bottle being transferred from the dial 40 will be positioned with its vertical axis substantially in alignment with the vertical axis of the filling nozzle positioned above that bottle supporting platform. Since the dial 40 and the platform will be moving in the same direction at this moment, there will be no possibility of the container being over-turned, and flush top bottle platforms may thus be used in the machine, an arrangement which has been impossible with previous high speed filling machines. The elimination of the guide shoulder ordinarily used on the bottle platforms of course removes another element against which containers have previously had to contact when moving through a filling machine.

The above-mentioned smooth handling of containers, coincidental with the provision of paths of proper length about the syruping and crowning mechanisms, is brought about by the fact the axes of the syruping mechanism 15 and the crowning mechanism 22 are on a line which would extend parallel to a line tangential to the filling table 12, while the transfer dials 40 and 48, as well as the infeed dial 31 and outfeed dial 52, are arranged in pairs on other lines extending parallel to the above-mentioned lines. It is further contributed to by the fact that all of the dials, including the syruping and crowning mechanism dials or spiders, move the containers through arcuate paths which preferably have equal radii.

It will be understood that the invention is not limited to the details of construction shown in the drawings, and that the example of the use of the machine which has been given does not include all of the uses of which it is capable; also that the phraseology employed in the specification is for the purpose of description and not of limitation.

We claim:

1. In a filling machine, a rotary filling table, a stationary table, rotary syruping and crowning mechanisms, a pair of rotatable dials to respectively move containers from the syruping mechanism to the filling table and to move containers from the filling table to the crowning mechanism, said rotary table, mechanisms and dials being mounted on vertical shafts arranged along a substantially V-shaped figure with the table shaft at the apex thereof, a vertical drive shaft within said figure, means to drive the dial shafts from the latter shaft, means to drive the table from a dial shaft, and means to drive each of said mechanisms from the adjacent dial shaft.

2. In a filling machine, a rotary filling table, a stationary table, rotary syruping and crowning mechanisms, a pair of rotatable dials to respectively move containers from the syruping mechanism to the filling table and to move containers from the filling table to the crowning mechanism, a second pair of dials to respectively deliver containers to the syruping mechanism and to remove containers from the crowning mechanism, said rotary table, mechanisms and dials being mounted on vertical shafts arranged at the apices of a symmetrical polygonal figure, a vertical drive shaft positioned substantially centrally within

said figure, means to drive said transfer dial shafts from said drive shaft, means to drive said rotary table from one of said transfer dial shafts, and means to drive said mechanisms and said infeed and outfeed dials from said transfer dial shafts.

3. In a filling machine, a rotary filling table, rotary syruping and crowning mechanisms, said syruping and crowning mechanisms being positioned on a line parallel to a line extending tangentially of the filling table, a pair of rotatable dials to respectively move containers from the syruping mechanism to the filling table and from the filling table to the crowning mechanism, said dials being positioned on a line between and parallel to said two first-mentioned lines, a second pair of dials to respectively deliver containers to the syruping mechanism and to remove containers from the crowning mechanism, said second pair of dials being positioned on a line parallel to all of said other lines and outwardly, with respect to the filling table axis, from all of said other lines, the corresponding dials of each pair being positioned on parallel lines normal to all of said lines whereby the transfer movement of containers between said dials and mechanisms and to and from the filling table will not involve any marked change of direction of movement.

4. In a filling machine, a rotary filling table, rotary syruping and crowning mechanisms, said syruping and crowning mechanisms being positioned on a line parallel to a line extending tangentially of the filling table, a pair of rotatable dials to respectively move containers from the syruping mechanism to the filling table and from the filling table to the crowning mechanism, said dials being positioned on a line between and parallel to said two first-mentioned lines, a second pair of dials to respectively deliver containers to the syruping mechanism and to remove containers from the crowning mechanism, said second pair of dials being positioned on a line parallel to all of said other lines and outwardly, with respect to the filling table axis, from all of said other lines, the corresponding dials of each pair being positioned on parallel lines normal to all of said lines, the arcuate paths of movement of the containers about all of said dials and mechanisms having like radii whereby the transfer movement of containers between said dials and mechanisms and to and from the filling table will not involve any marked change of direction of movement.

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