

Jan. 5, 1971

H. E. INMAN

3,552,095

MANUAL CAPSULE FILLING APPARATUS

Filed April 18, 1968

2 Sheets-Sheet 1

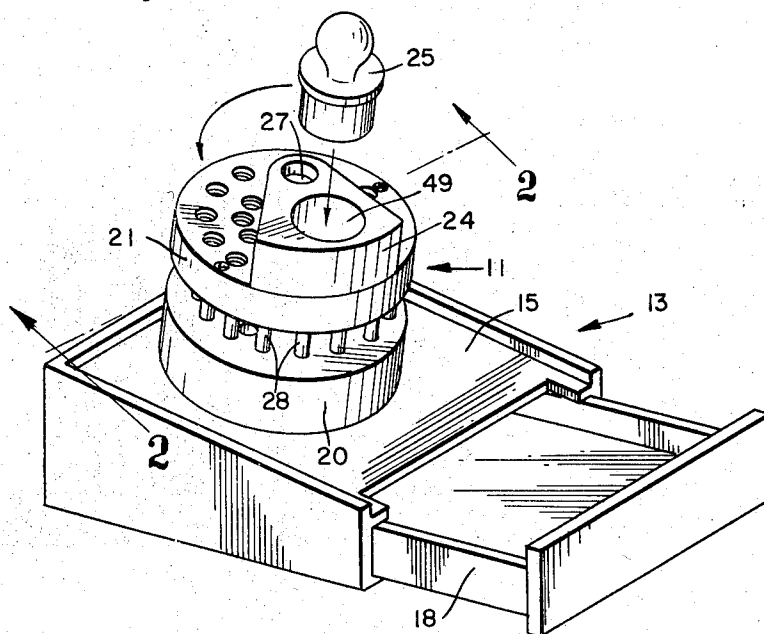


Fig. 1

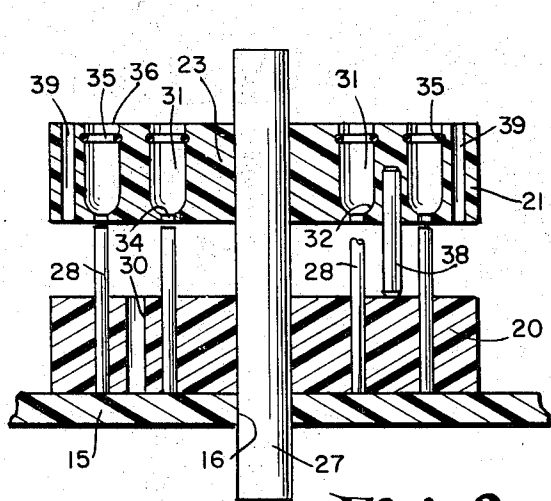


Fig. 2

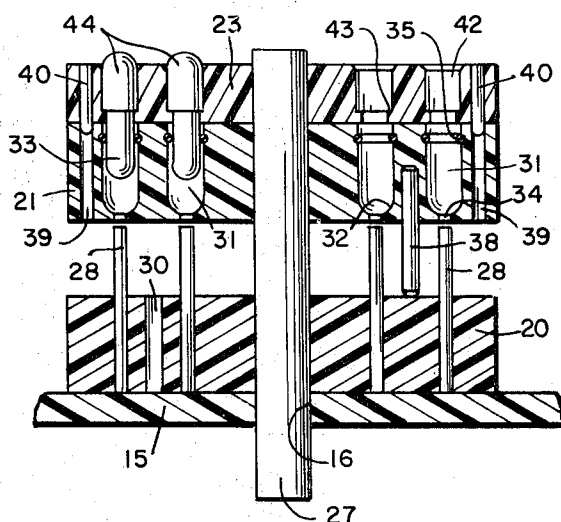


Fig. 3

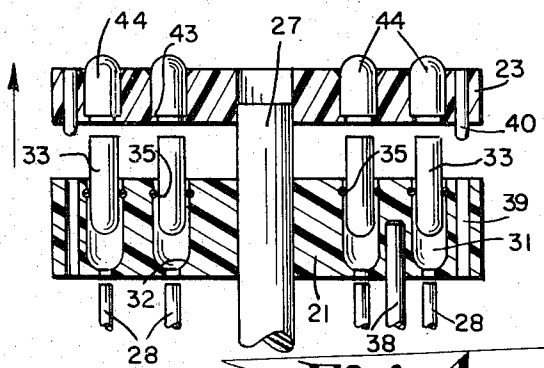


Fig. 4

INVENTOR
HARRY E. INMAN

BY

Robert L. Inman

ATTORNEY

Jan. 5, 1971

H. E. INMAN

3,552,095

MANUAL CAPSULE FILLING APPARATUS

Filed April 18, 1968

2 Sheets-Sheet 2

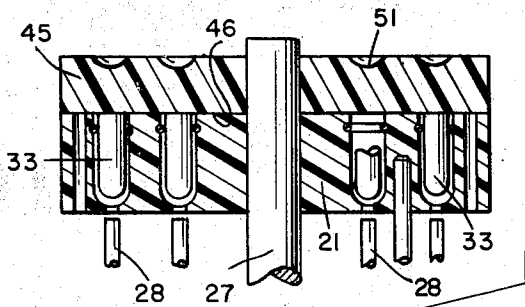


Fig. 5

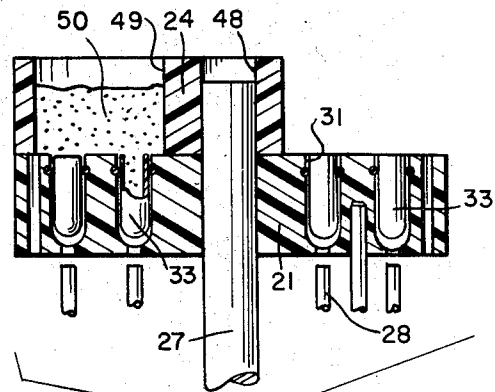


Fig. 6

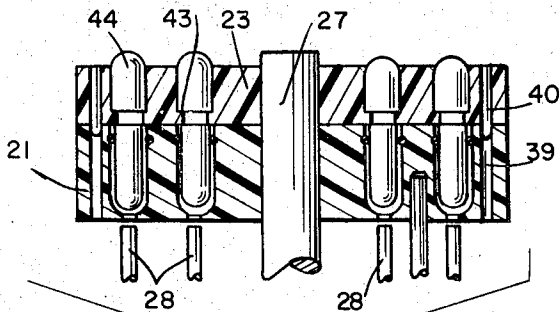


Fig. 7

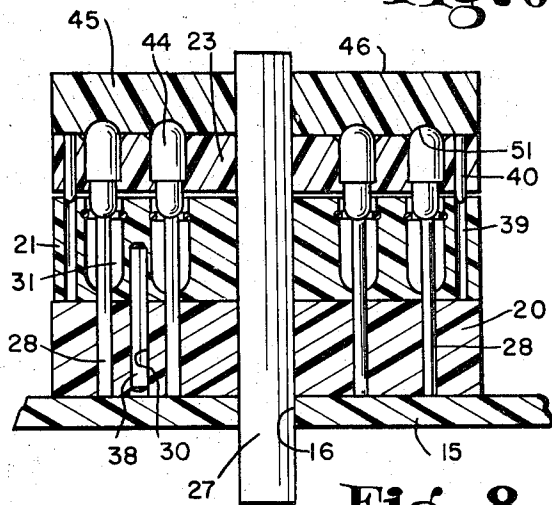


Fig. 8

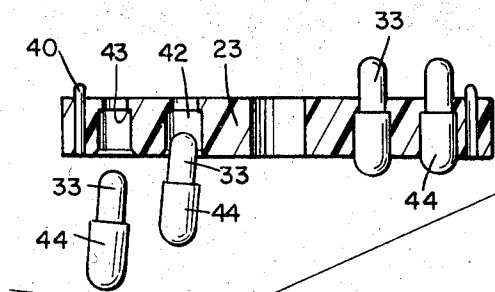


Fig. 9

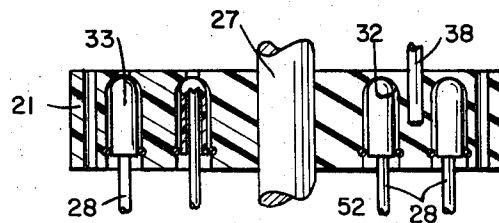


Fig. 10

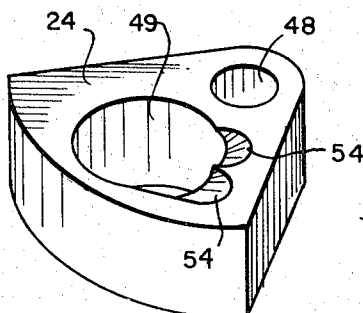


Fig. 11

INVENTOR
HARRY E. INMAN
BY *Robert A. Swanson*
ATTORNEY

1

3,552,095

MANUAL CAPSULE FILLING APPARATUS
Harry E. Inman, Indianapolis, Ind., assignor to Eli Lilly
and Company, Indianapolis, Ind., a corporation of
Indiana

Filed Apr. 18, 1968, Ser. No. 722,255

Int. Cl. B65b 67/00

U.C. Cl. 53—390

5 Claims

ABSTRACT OF THE DISCLOSURE

A manual filling apparatus designed for rapid separation of pharmaceutical capsule sections through the use of two plates having cavities for receiving the capsule sections with means therein for removably retaining the sections while a medicament is put into the exposed open ends of half of the capsule sections and a plurality of rods positioned to enter into the cavities containing the filled sections and reassemble them with the remaining empty capsule sections.

BACKGROUND OF THE INVENTION

Medicinal preparations are being increasingly dispensed in gelatin capsules. These capsules are comprised of a body section and a cap section. Each section is of a substantially cylindrical configuration and has a rounded closed end and an open end. The body section is normally slightly smaller in diameter than the cap section. Both sections are slightly tapered along their sidewalls, converging toward their closed ends. Thus, the body section, with its open end passing through the open end of the cap section, may be securely telescoped within the cap section.

Although there are many automatic filling apparatus for filling capsules, there is an occasional need for manual apparatus which will easily fill capsules in quantities of twenty or more within a matter of minutes. Generally, such manual filling apparatus has comprised a pair of discs supporting only the body of a capsule. The caps in such apparatus are removed by hand, the bodies are filled with powder and then the caps are replaced on the bodies by hand. Not only is this objectionable from the standpoint of time involved, it also involves handling the capsules which must be maintained in a sanitary condition.

SUMMARY OF THE INVENTION

The apparatus of this invention broadly comprises a base plate, a body section plate and a cap section plate. These three plates are arranged to stack on each other, and then empty assembled capsules are inserted into cavities defined by the body section plate and cap section plate. The body section plate has a gripping means in each cavity. The cap section plate has a restriction in each cavity for supporting the larger diameter of the cap. Thus, removal of the cap section plate from the body section plate quickly separates the capsules and exposes the capsules' open ends for introducing the medicament. The cap section plate is then replaced on top of the body section plate, and means is introduced into the underneath surface of the body section plate to close the capsule sections and eject the assembled and filled capsules.

It is therefore one object of this invention to provide a new and improved manual capsule filling apparatus. Another object of this invention is to provide capsule filling apparatus which minimize the amount of handling of the capsules. Another object of this invention is to provide an improved apparatus which quickly removes the cap sections from the body sections and then readily

2

places them back in their positions on the body sections. Other objects and advantages of this invention will be apparent upon reading the following description in connection with the drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view of the capsule filling apparatus of this invention minus the cap section plate.

FIG. 2 is a view in cross section along line 2—2 of FIG. 1 illustrating the apparatus in its beginning position.

FIG. 3 is a similar cross-section view but with the cap section plate added and capsules introduced therein.

FIG. 4 is a cross-section view of the body section and cap section plates illustrating how the caps are removed from their bodies.

FIG. 5 is a view in cross section of the body section plate with an additional plate used for leveling the capsule bodies.

FIG. 6 is a view in cross section of the body section plate and a hopper device for filling the capsule bodies.

FIG. 7 is a view in cross section of the cap section plate containing caps being replaced onto the body section plate containing filled bodies.

FIG. 8 is a view in cross section of the filled bodies being assembled onto the caps.

FIG. 9 is a view of the cap section plate in an inverted position to permit removal of the filled capsules.

FIG. 10 is a cross-section view of the body section plate illustrating a method for seating the capsule bodies more deeply into their cavities prior to being filled.

FIG. 11 is an inverted perspective view of the hopper device used for filling the capsules' bodies.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIGS. 1 through 3, the capsule filling apparatus 11 of the invention is shown positioned on a collector tray 13. It is to be understood that tray 13 is not necessary in each instance to manually fill the capsules by the apparatus of this invention. Tray 13 has an inclined top surface 15 with a central aperture 16 for reasons to be explained hereinafter. A drawer 18 is slidably mounted within the tray and serves to collect excess medicament that overflows from apparatus 11 during the filling operation.

Apparatus 11 has a base plate 20, a body section plate 21, a cap section plate 23, a hopper device 24 and a tamper element 25. Base plate 20 as shown in FIG. 2 has an integrally connected spindle 27 which extends upwardly as well as downwardly through the plate. The diameter of spindle 27 is such that it is easily received through the central aperture 16 on the tray's inclined surface 15. Thus, base plate 20 is removably positioned on the top of the tray in a manner that prevents it from accidentally sliding on the tray's inclined surface.

Base plate 20 is circular and may be formed from a variety of materials including metals and plastics. However, it has been found in general that plastic material will suffice and is particularly desirable for its properties of light weight and ease in cleaning, as well as being economical. Mounted into the base plate are a plurality of metal rods 28 arranged in a pattern corresponding to the desired arrangement for the capsules. One or more apertures 30 are also formed in the base plate.

Body section plate 21 is also circular and has a plurality of cavities 31 formed in two concentric circular patterns. Each cavity has a bottom end 32 formed in substantially the same configuration as the end of the capsule body to be filled. A small passageway 34 is formed at the end of each cavity and is of a diameter adapted for closely receiving a rod 28. Means for releasably gripping a capsule

body 33 in each cavity 31 is provided in a particular embodiment by the use of a resilient O-ring 35 which is embedded within the cavity toward its open end 36.

Supporting means in the form of one or more spacing posts 38 is fixed onto the body section plate. Spacing post 38 is of a diameter to closely fit within aperture 30. As shown in FIG. 2, the body section plate has been raised to a spaced position from the base plate and maintained in this spaced relationship by permitting spacing post 38 to rest on the top surface of the base plate. The length of this member is such that it permits the body section plate to freely rotate slightly above the ends of rods 28. A pair of apertures 39 are formed in the body section plate 21 for the purpose of receiving alignment pins 40 which are mounted in cap section plate 23.

Cap section plate 23 is also circular and has a plurality of cavities 42 arranged in a pattern identical to those in the body section plate. Each cavity 42 has a restriction which in the particular illustration comprises an annular shoulder 43. Thus, a cap 44 when inserted into cavity 42 will not pass through the cap section plate and instead will rest on an annular shoulder 43.

In operation the base plate with the body section plate and cap section plate rotatably mounted on spindle 27 are positioned in a spaced relationship with spacing post 38 resting on the surface of the base plate as shown in FIG. 3. Empty capsules which are normally sold in an assembled form are inserted into the cap section plate and body section plate with the bodies 33 positioned downwardly. As shown in FIG. 3, the bodies are gripped in their respective cavities 31 by an O-ring 35.

When all of the cavities have been filled with capsules the cap section plate 23 may be manually removed from spindle 27 as shown in FIG. 4. This step causes separation of the caps from the bodies inasmuch as the bodies are retained by O-rings 35 and the caps are seated on shoulders 43. With the removal of the caps the bodies are now held in an extending and upright position in the body section plate. Before the medicament which may be in a powder or granular form is introduced into the bodies, it is desirable that the open ends of the bodies are made flush with respect to the top surface of the body section plate. Referring to FIG. 5, a circular leveling plate 45 having a flat surface 46 is positioned over spindle 27 to cause the capsule bodies to be pushed downwardly into their respective cavities 31.

With the capsule bodies now flush a medicament may be added. In the illustration of FIG. 6 this is accomplished by a hopper device 24 having a bore 48 adapted for rotary movement on the end of spindle 27. A powder receiving hole 49 is defined in the hopper and may be filled with powder 50. The hopper is then rotated about spindle 27; and inasmuch as hole 49 extends over portions of both concentric rings of cavities 31, powder will be permitted to drop into the exposed body sections 33. Depending upon the nature of the medicament, it may be desirable to use tamper element 25 to occasionally force the powder from hole 49 into the bodies. It is apparent that this filling operation can be rapidly accomplished by one or more rotations of the hopper containing powder. Excess powder will fall onto inclined surface 15 of the collector tray and may be scraped off into drawer 18.

With the bodies now filled, the caps 44 may be replaced. This is accomplished by mounting the cap containing plate 23 onto spindle 27 as shown in FIG. 7. Throughout this operation the body section plate 21 has remained spaced from the base plate with rods 28 being out of contact with the body sections. Referring to FIG. 8, the body section plate 21 and cap section plate 23 are rotated until spacing post 38 drops into its aperture 30. Upon the entry of spacing post 38 into its aperture, rods 28 will extend into the body section cavities and push the filled bodies into their caps. In order to prevent accidental discharge of the caps during this assembly operation, it may be

desirable to position leveling plate 45 onto spindle 27 to cause the plate to rest flush with the cap section plate. Otherwise, as the bodies are pushed into caps 44 the caps will tend to be pushed out of plate 23 prior to complete assembly of the capsule. It may also be desirable to provide one surface of plate 45 with recesses 51 which will receive the curved ends of the caps. In this manner the bodies will be more gently pushed into the caps inasmuch as the caps will be permitted to travel a short distance into their respective recesses 51. Uniform length of the assembled capsules will also be more consistent.

After the caps have been assembled on the filled bodies, plates 45 and 23 may be removed from spindle 27. It is to be noted that plate 23 now contains the filled and assembled capsules. The capsules may be discharged by inverting plate 23 as shown in FIG. 9. Thus, in the particular illustration, twenty or more capsules may be disassembled, filled and reassembled in a matter of seconds with a minimum amount of handling by the operator.

The amount of medicament in each capsule is generally controlled by the length of the capsule body. However, inasmuch as the capsule cap has a curved closed end, there will be a void at this end when the cap and body are assembled. This void is sometimes used for increasing the amount of dosage in each capsule by simply filling it with additional powder. Referring to FIG. 10, this may be readily accomplished by forcing the capsule bodies into their cavities 31 until they are seated at the curved end of the cavities. This is quickly accomplished by taking the body section plate and inverting it over base plate 20 whereby base plate rods 28 extend into the bodies and seat them against the bottoms of the cavities. As shown in FIG. 10, the bodies are now spaced a small distance from the surface of the body section plate; and, consequently, a void 52 is formed which will be filled with medicament when the plate is upright in the position of FIG. 6. The caps will telescope over the bodies capturing the powder in voids 52 and thereby the medicament in each capsule is increased.

Referring to FIG. 11, hopper 24 may have a pair of recessed and tapered surfaces 54 adjacent one side of hole 49. These surfaces are placed on the trailing side of the hole as the hopper is rotated in a counter-clockwise motion. Consequently, surfaces 54 provide a tamping or compressing effect on the powder to provide further assurance that each body section is completely filled with powder.

It is apparent that the apparatus of this invention may be used with a variety of capsule sizes by providing additional body section plates and cap section plates identical to those illustrated in the drawing but having different diameters and lengths. Base plate 20 with rods 28 will be capable of handling a variety of capsule sizes.

The materials used to construct this apparatus are limited only to the extent of costs and compatibility with the medicament used in filling the capsules. Thus, various plastics and metals or combinations thereof may be used. If plastic is used for the several plates they may be machined or molded. Rods 28 and spacing post 38 will normally be formed from metal. Furthermore, although the illustrated embodiment is based on circular plates and a rotary action, rectangular plates and a linear action may be readily adopted.

Although only one embodiment of this invention has been illustrated and described, other modifications may be made without departing from the spirit of the invention and the scope of the appended claims.

I claim:

1. A manual filling apparatus for filling capsules with finely divided particles wherein each of the capsules consists of a body section telescoped within a cap section, each of said sections having a closed end and an open end, said apparatus comprising in combination:

a base plate having a plurality of upwardly extending and parallel pins,

5

a body section plate having a plurality of body cavities arranged in a pattern congruent with said pins and in coaxial alignment therewith, each of said cavities having means therein for releasably gripping a capsule body section with its open end upwards,

a cap section plate removably mounted on said body section plate and having a plurality of cap section passages coaxial with said body section cavities, each of said passages having an internal restriction less than the diameter of said cap section and greater than said body section for removably containing a cap section with its open end downward, and

spacing means cooperating between said base plate and said body section plate to selectively position said pins into and out of said body section cavities to effect telescoping of said body sections into said cap sections, said spacing means comprising a post downwardly extending from said body section plate adapted to selectively rest on the top surface of said base plate or extend into an aperture in said base plate.

2. A manual filling apparatus for filling capsules with finely divided particles wherein each of the capsules consists of a body section telescoped within a cap section, each of said sections having a closed end and an open end, said apparatus comprising in combination:

a base plate having a plurality of upwardly extending and parallel pins,

a body section circular plate rotatably mounted on a spindle upwardly extending from said base plate and having a plurality of body cavities arranged in a circular pattern congruent with said pins and in coaxial alignment therewith, each of said cavities having means therein for releasably gripping a capsule body section with its open end upwards,

a cap section circular plate removably and rotatably mounted on said spindle above said body section

6

plate and having a plurality of cap section passages congruent with said body sections cavities, each of said passages having an internal restriction less than the diameter of said cap section and greater than said body section for removably containing a cap section with its open end downward, and

spacing means cooperating between said base plate and said body section plate to selectively position said pins into and out of said body section cavities to effect telescoping of said body sections into said cap sections.

3. A manual filling apparatus for filling capsules as defined in claim 2 in which said means in each of said body cavities for releasably gripping a capsule body section comprises a resilient O-ring embedded therein.

4. A manual filling apparatus for filling capsules as defined in claim 3 in which said spacing means comprises a post downwardly extending from said body section plate adapted to selectively rest on the top surface of said base plate or extend into an aperture in said base plate.

5. A manual filling apparatus for filling capsules as defined in claim 4 in which said internal restriction in said cap section passage comprises an annular shoulder.

References Cited

UNITED STATES PATENTS

803,145	10/1905	Winchester	53—390X
1,567,639	12/1925	Eastman	53—390
2,322,169	6/1943	Smith	141—240X
2,742,749	4/1956	McGuire	53—281X

TRAVIS S. McGEHEE, Primary Examiner

R. L. SPRUILL, Assistant Examiner

U.S. Cl. X.R.

141—247