This invention is directed to a novel method of and means for sealing and or marking soluble capsules, which may be made of gelatin or other suitable material, and used for taking medicine and drugs.

Many drugs and medicines are sold in the form of individual doses contained in individual gelatin capsules. When the medications are taken, the capsule is swallowed and dissolves due to the heat and moisture of the body. There capsules are cylindrical in shape and are composed of two sections, each having a rounded end which fit into one another, in overlapping relation. Due to the fact that the capsules are taken internally, the two sections cannot be sealed with metal or any foreign material. The sealing is similarly complicated since there is not much space and due to the nature of the capsule, it is difficult to make effective markings for identification and information use. Therefore, the capsules are generally sold unsealed and there is no assurance that the manufactured product has not been tampered with with respect to either quantity or quality or possibly exposed to some impurity. In other words, medicines and drugs sold in these capsules are one of the few products sold and marketed without a sealed container and without the manufacturer's marking such as trademark or identification marks. This is a very bad situation to exist especially in the medical field where people are forced to rely on the reputation of the manufacturer and pharmacist.

The present invention consists in a novel method of and means for sealing and or marking soluble capsules by heat and pressure. The invention generally comprises a pair of heated elements, as jaws, one or both of which have a marking die. The jaws exert just enough pressure and are heated to the optimum temperature so that they will engage the capsule on the larger and smaller overlapping portions of the capsule so that the two portions will be effectively cramped and heat sealed together. The operation of the jaws provides an indented band portion encircling the capsule. Suitable information may be impressed within this band portion by means of suitable marking dies inserted within the jaws. The same type jaws may be used separately or at the same time to mark another part of the capsule. Automatic capsule feeding and ejecting means are also provided and all of the various operations are synchronized with a set of cams mounted on a common drive shaft.

More particularly, the capsules are fed from a hopper or other feeding device to an indexing wheel which feeds them one at a time to the crimping position. A stopping plate holds the capsule in position until the jaws engage, and when the jaws are retracted, the capsule is ejected by an air blast. The operation of the indexing wheel, the stop plate and the jaws have a definite time sequence of operation which is determined by a plurality of synchronizing cams.

Accordingly, one object of the invention is to provide a novel method of and means for sealing and marking soluble capsules.

Another object of the present invention is to provide a novel method of and means for sealing soluble capsules.

Another object of the present invention is to provide new and improved capsule sealing and marking apparatus comprising a pair of heated elements, one or both having marking dies and associated capsule feeding and ejecting means.

Another apparatus which is suitable for carrying out my method of and means for sealing and marking soluble capsules is represented in the accompanying drawings:

Figures 1A, 1B and 1C show capsules before and after sealing and marking, and the jaws which make the seal.

Figure 1A shows a typical capsule comprising two overlapped portions a and b.

Figure 1B shows the jaws in symbolic form, and.

Figure 1C shows the capsule after it has been cramped, sealed and marked by the jaws.

Figure 2 shows a front view of the apparatus.

Figure 3 shows a top view of the apparatus.

Figure 4 shows a sectional view taken along the line 4-4 of Figure 2.

Figure 5 is a cam sequence diagram.

Referring to Figures 2, 3 and 4, there are shown several views of the apparatus for carrying out my method. It is mounted on a main frame member 30 which supports the various elements. The sealing jaws are shown at 10 and 10'. The capsules are fed from a hopper 31 or other source down the feed tube 1 and into one of the holes 32, 33 etc. of the feeder wheel 2. The purpose of the feeder wheel is to feed the capsules to the jaws one at a time and in a certain time sequence. The feeder wheel has a number of holes equally spaced apart, and it rotates to the next hole periodically thereby delivering one capsule at a time to the vertical tube 34 which feeds the capsules to the sealing position. A fixed plate 22 is located between the feeder wheel 2 and the upper end of the vertical tube 34. This plate 22 is shaped to support the capsules within the wheel 2 until the capsules reach a position over the said vertical tube 34. The capsules drop from the wheel 2 past the plate 22 and into the tube 34 and are stopped in proper position by the stop plate 7. The jaws 10 are then actuated to heat and seal the capsule. The stop plate 7 is then moved to its other position causing the large aperture 61 to come under the capsule and the capsule is blown or drops out the bottom of the tube 35. The jaws 10, 10' are heated to proper temperatures by heating coils 11, 11'. The current through the coils may be controlled by suitable means (not shown).

The purpose of the indexing wheel 2 is to feed the capsules one at a time to the sealing and or marking position leaving the upper portion of the tube 34 free of capsules. If the tube 34 were filled with capsules, it would be practically impossible to operate the stop plate 12 without shearing the capsules in half.

The capsules fall down the tube 34 by gravity but if desired for faster operation, they may also be assisted by a continuous air blast through the air tube 6.

There are three main functions which must be syn-
chronized namely, the movements of the indexing wheel 2, the jaws 10—10', and the stop plate 7.

These operations are all synchronized by means of cams mounted on common drive shaft 40 which is driven by means of the motor 19 connected thereto. The indexing wheel 2 is driven by means of cam 17, cam follower 17' which is connected to shaft 41 which is spring loaded against the cam by means of spring 41', the cam 17 as shown in Figure 3 has one high portion for each revolution. The cam shaft 41 has connected to it a link 42 comprising a small arm 43 which is pinned through a slot in the shaft 41. The arm 43 is connected to member 45, Figure 4, which turns the shaft 45 connected thereto. The shaft 45 is connected to wheel 2 through a clutch 46 of the type which is operative in one direction of rotation, for instance, a conventional sprag type override clutch. Alternatively a pawl and ratchet or other equivalent could be used.

The operation, therefore of the indexing wheel movement is as follows:

The cam 17 drives the cam shaft 41 which turns the wheel 2 through the sprag clutch 46. Suitable wheel indexing means are provided for the wheel 2, in that the wheel 2 has a number of indexing grooves 50—51 etc. which are adapted to be engaged by the spring loaded indexing stop 5 so that the wheel 2 will stop in the proper position to discharge a capsule down the tube 34.

The left and right hand jaws 10 and 10' are similarly driven by cams 16 and 15. Cam 16 actuates cam follower 16' which is connected to cam shaft 52, which is spring loaded by spring 52'. The cam shaft 52 is connected to the jaw positioning shaft 53 by means of the bracket 54. The cam shafts and positioning shafts 53 slide through holes in the main frame bracket 9.

The right hand jaw 10' is similarly actuated by cam 15, cam follower 15' and cam shaft 55 which is spring loaded by spring 55' against the frame member 28. The stop plate 7 is similarly actuated by cam 14, cam follower 14' and cam shaft 56 which is spring loaded by spring 56'. The stop plate 7 has a small hole 60 and a large hole 61. The purpose of the large hole is to eject the capsules down the tube 35. The small hole 60 is necessary when the stop plate is in its other position (not shown) to provide a passage to permit the air from the air blast tube 6 to go through the tubes 34 and 35.

The sequence of operations will be described in connection with the cam sequence diagram of Figure 5. Referring to Figure 5, the upper two lines of the diagram show that both left and right jaws close together for about 120° of rotation of the drive shaft. The next line of Figure 5 shows that the stop plate 4 is open for approximately 80° of rotation, and that it opens somewhat before the jaws open.

The fourth line of Figure 5 shows that the feeder wheel arrives at the index position just as the stop plate closes so that a capsule is delivered from the feeder wheel during the portion marked "index" so that the capsule will fall down against the closed stop plate 12. Note that the jaws are open at this time. The next operation is the closing of the jaws during the "closed" portion of lines 1 and 2 of Figure 5. Then the stop plate opens and shortly thereafter, the jaws open allowing the capsule to be ejected down the tube 35.

One of the advantages of the present invention is that the indexing wheel delivers only one capsule at a time so that there is only one capsule in the tube 34 at any one time. If the tube 34 were filled with capsules, it would be practically impossible to operate the jaws and stop plate without fouling and damaging the capsules.

If desired the capsules may be sealed without marking, or marked without sealing. Different size jaws may be inserted as desired. Various other modifications will occur to those skilled in the art.

I claim:

1. Capsule treating apparatus comprising a pair of heated jaws adapted and shaped to crimp together the telescoped portions of said capsule by instantaneously softening the outer portion and leaving a crimp in the inner portion, capsule feeding means comprising a pair of capsules, an index wheel adapted to feed said capsules one at a time from said hopper to said jaws, and means to hold said capsule in position for said jaws to close on it.

2. Capsule treating apparatus comprising a pair of heated jaws adapted and shaped to crimp together the telescoped portions of said capsule, capsule feeding means comprising a hopper for capsules, an index wheel connected to said hopper and adapted to feed said capsules one at a time to said jaws, and means to hold said capsule in position for said jaws to close on it, and means to drive and synchronize said index wheel and said capsule holding means comprising a plurality of cams mounted on a common drive shaft said cams being connected to drive said index wheel and said holding means through a plurality of cams.

3. Apparatus as in claim 2 wherein said jaws are provided with markings dies adapted to impart suitable markings on said capsules at the same time they are crimped.

4. Capsule treating apparatus comprising capsule crimping means including a pair of heated jaws, capsule feeding means and adapted to feed said capsules one at a time to said jaws and capsule ejector means connected to remove said capsules.

5. Capsule treating means comprising a pair of jaws adapted and shaped to crimp together the telescoped portions of said capsule, capsule feeding means comprising a hopper for capsules, and index wheel connected to said hopper and adapted to feed said capsules one at a time to said jaws, and means to drive and synchronize said index wheel and said capsule stop plate means comprising a plurality of caps mounted on a common drive shaft said caps being connected to drive said index wheel and said holding means through a plurality of caps mounted on a common shaft.

6. Treating apparatus for medical capsules having telescoped portions comprising a pair of heated jaws adapted and shaped to crimp together the telescoped portions of said capsule, capsule feeding means comprising a hopper and feed capsule, an index wheel connected to said hopper and adapted to feed said capsules one at a time to said jaws, and a stop plate to hold said capsule in position for said jaws to close on it, and means to drive and synchronize said index wheel and said capsule stop plate means comprising a plurality of caps mounted on a common drive shaft said caps being connected to drive said index wheel and said holding means through a plurality of caps mounted on a common shaft.

7. Apparatus as in claim 5 wherein said jaws are provided with markings dies adapted to impart suitable markings on said capsules at the same time they are crimped and sealed.

8. Capsule treating apparatus comprising capsule crimping means including a pair of heated jaws, capsule index wheel feeding means and adapted to feed said capsules one at a time to said jaws and capsule ejector means connected to remove said capsules.

9. The method of treating a filled soluble two-member capsule having closed ends and intermediate telescoped tubular portions, consisting in applying local heat and pressure around the said telescoped tubular portions for sealing their contacting surfaces to each other.

10. The method of treating a filled soluble two-member capsule having closed ends and intermediate telescoped tubular portions, consisting in applying local heat and pressure around the said telescoped tubular portions for crimping and sealing their contacting surfaces to each other.
12. The method of treating a filled soluble two-member capsule having closed ends and intermediate telescoped tubular portions, consisting in applying local heat and pressure around the said telescoped tubular portions for crimping and sealing their contacting surfaces to each other, and for simultaneously marking the capsule.

13. Apparatus for treating a filled soluble two-member capsule having closed ends and intermediate telescoped tubular portions, comprising heated jaws shaped and operable to apply local heat and pressure around the said telescoped tubular portions for sealing their contacting surfaces to each other.

14. Apparatus for treating a filled soluble two-member capsule having closed ends and intermediate telescoped tubular portions, comprising heated jaws shaped and operable to apply local heat and pressure around the said telescoped tubular portions for sealing their contacting surfaces to each other and for simultaneously marking the capsule.

15. Apparatus for treating a filled soluble two-member capsule having closed ends and intermediate telescoped tubular portions, comprising heated jaws shaped and operable to apply local heat and pressure around the said telescoped tubular portions for crimping and sealing their contacting surfaces to each other.

16. Apparatus for treating a filled soluble two-member capsule having closed ends and intermediate telescoped tubular portions, comprising heated jaws shaped and operable to apply local heat and pressure around the said telescoped tubular portions for crimping and sealing their contacting surfaces to each other, and for simultaneously marking the capsule.

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