Sept. 14, 1954 R. P. SCHERER ET AL 2,688,775

METHOD OF BRANDING GELATINE CAPSULES

Filed May 3, 1952

Fig. 1

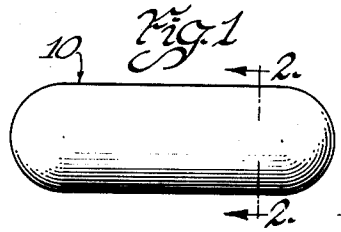


Fig. 2

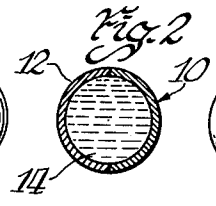


Fig. 9

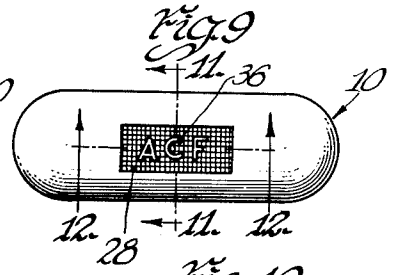


Fig. 3

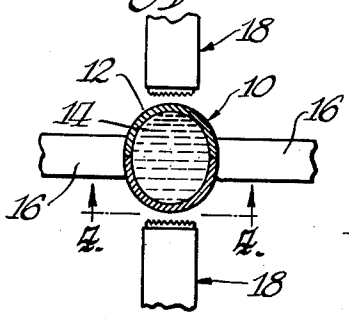


Fig. 4

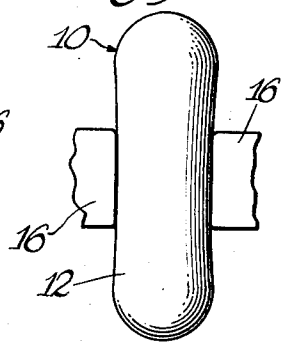


Fig. 10

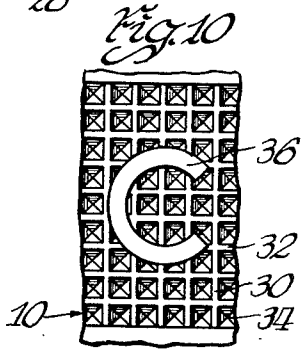


Fig. 5

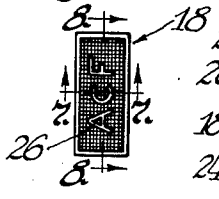


Fig. 6

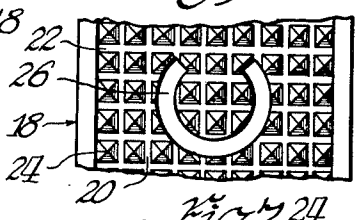


Fig. 11

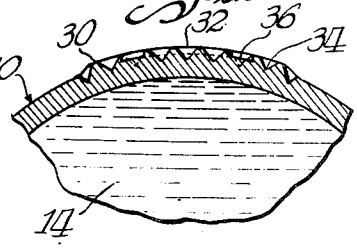


Fig. 8

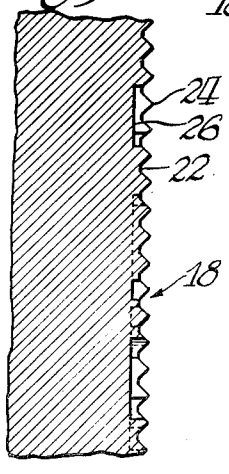
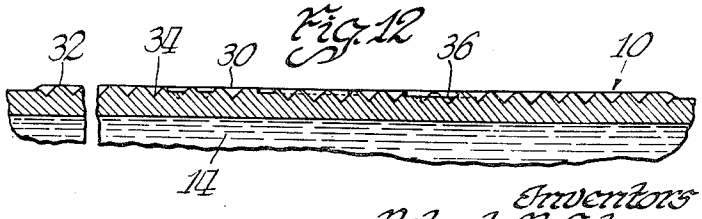


Fig. 7



Fig. 12



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Attys.

Patented Sept. 14, 1954

2,688,775

UNITED STATES PATENT OFFICE

2,688,775

METHOD OF BRANDING GELATIN CAPSULES

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Application May 3, 1952, Serial No. 285,984

12 Claims. (Cl. 18—56)

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This invention relates to a method of branding a filled gelatine capsule or like container by application of a stamp thereagainst.

The filled gelatine capsules herein referred to are those conventional in the pharmaceutical art. As is well known, such capsules may be prepared by any one of several conventional methods, for instance, according to the method described as follows:

A gelatine mass is first provided comprising gelatine, water and, by way of a plasticizer, a polyhydric alcohol, in particular, glycerin, sorbitol or the like. The compositions may be prepared by placing the gelatine in a pony mixer, a Hobart mixer or in any other suitable mixer, adding the plasticizer and milling the resulting mixture to form a paste. Water is then added and the milling continued until a fluffy mass is obtained. This mass is then transferred to a melter, kept under a more or less complete vacuum and heated until a smooth, fluid mass is obtained. This fluid mass may then be used for the manufacture of capsules. By way of examples, we tabulate hereinbelow the compositions of a number of gelatine compositions suitable for capsule making:

Composition No.	Gelatin	Glycerin	Sorbitol	Water
	Percent	*Percent*	*Percent*	*Percent*
1	45.000	12.450		42.460
2	40.968	15.428		43.604
3	39.060	19.057		41.883
4	37.530	22.135		40.335
5	36.000	25.080		38.920
6	34.605	27.787		37.608
7	27.000	47.500		25.500
8	36.360		25.370	38.270

It should be noted that in the above table each nonaqueous ingredient has been tabulated by weight on a dry basis, so that the tabulated water content is a measure of the added water together with the water contents of the nonaqueous ingredients.

Filled gelatine capsules may be prepared from a plastic gelatine mass such as those disclosed hereinabove by forming the composition into two plastic sheets and marginally welding two such sheets together around a drop or globule of liquid which will form the content of the resulting capsule, as described in the patent to Robert P. Scherer, No. 1,970,396. Immediately after such a capsule has been formed, the wall or shell thereof still contains the water content (30 to 45%) of the gelatine mass from which the capsule has been made. For this reason, the capsules are relatively weak when first made. To make

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the capsules stronger, they are, therefore, dehydrated, as by exposure to dry warm air or to acetone or to some other agent capable of extracting water from the capsule wall or shell. After such dehydration (which reduces the water content to from 10 to 15% of the original water content), the manufacturing process has been completed and the capsules are considered to be in finished or final form.

The capsules in question are generally circular in transverse gross section. The capsules may have a rounded or globular shape or may be more or less elongated or tubular, having rounded ends. In such tubular capsules, the cross sectional area between the capsule ends may be more or less uniform, or the capsules may taper toward their ends or may even be formed with constricted necks at their ends.

The wall or shell thickness of conventional gelatine capsules ranges typically, say, from 0.015 to 0.030 inches and may average about 0.0225 inches. In view of the thinness of the walls or shells of these capsules, it is impractical to form indented or recessed letters or line figures in the surface thereof.

No one has heretofore been able to form letters or other line figures in relief on the surface of conventional filled gelatine capsules by stamping, impressing or other methods involving surface deformation of the walls or shells of such capsules.

The difficulties confronting any person attempting the forming of letters or other line figures in relief on the surface of gelatine capsules are due to the nature of conventional gelatine capsules.

The gelatine mass making up the wall or shell of a gelatine capsule can be made plastic by raising the temperature of this wall or shell. There is, for any given gelatine mass, a minimum temperature at which the gelatine mass is initially rendered capable of plastic deformation (as the temperature of a capsule shell or wall is raised).

But the temperature at which the gelatine mass is rendered fluid or at least offers very little resistance to deformation exceeds the above noted minimum temperature by only a very limited range. It is practically impossible to raise a capsule as a whole to a temperature within the indicated range and then to stamp the desired letters or line figures into the capsule surface in relief, for when the whole capsule has been raised to a temperature within the indicated range the whole capsule is very weak or flaccid and, therefore, offers no resistance to the compressive force

exerted against the capsule on such stamping. In other words, the capsule would then be deformed or would lose its original shape, as by being flattened out.

No methods are available for heating only the capsule surface area on which the letters or line figures are to be formed, except the method of applying a heated stamp or die against this surface. But if the stamp or die is hot enough to make possible enough surface deformation to form letters or line figures in sufficiently high relief for easy visibility without exerting compressive force against the capsule to an extent causing breakage of the capsule, then the heat of the die will usually cause the die to perforate the wall or shell of the capsule, forming an aperture therethrough which renders the capsule useless. It will readily be understood that such an aperture or perforation will easily be formed whenever the whole thickness of the capsule wall or shell (ordinarily about 0.0225 inch) is rendered plastic. Thus, if forming of letters or other line figures in relief is to be done on a gelatine capsule surface by forceful application thereagainst of a hot die or stamp, it is necessary to confine the plasticizing of the capsule shell or wall (by heat transfer from the stamp or die) to only a surface layer of the wall or shell of the capsule. But, for a number of reasons, it has heretofore been found exceedingly difficult and practically impossible, in the application of a hot stamp or die against the surface of a gelatine capsule, to heat only a superficial layer thereof to within the above noted plastic temperature range. Application of the hot stamp or die must be continued at least for a definite period of time in order to render the surface layer sufficiently plastic. Because of the thinness of the capsule wall or shell and the relatively narrow temperature range forming the transition between the hard or solid form and the fluid form of the gelatine mass, perforation of the capsule wall or shell will occur very shortly after the above noted minimum period of time has expired. Further, gelatine capsules are never of identical shape, even within one and the same lot or batch of capsules, so that the hot die or stamp will not heat uniformly the capsule area to which it is applied, with the result that if this total area is to be raised to the required temperature, some parts thereof will be raised to a still higher temperature, which may easily cause perforation of the capsule wall or shell.

It is, therefore, an important object of the present invention to provide a convenient method of branding gelatine capsules by forming letters or other line figures in relief on the surface of a gelatine capsule without deforming the whole capsule and without causing perforation of the capsule wall or shell.

Other and further objects and features of the present invention will become apparent from the following description and appended claims as illustrated by the accompanied drawings showing, diagrammatically and by way of an example, the embossing of a capsule according to the method of the present invention. More particularly:

Figure 1 is a side elevational view of a conventional gelatine capsule;

Figure 2 is a cross sectional view taken along the line 2—2 of Figure 1;

Figure 3 is a view similar to Figure 2 but showing the capsule as clamped between two jaws of a clamp, with the two dies in position to be applied against opposed central capsule areas;

Figure 4 is an elevational view taken along the line 4—4 of Figure 3;

Figure 5 is an enlarged elevational view showing the end surface of one of the dies of Figure 3;

Figure 6 is a fragmentary greatly enlarged view of the end surface also illustrated in Figure 5;

Figure 7 is a greatly enlarged fragmentary cross sectional view taken along the line 7—7 of Figure 5;

Figure 8 is a greatly enlarged fragmentary cross sectional view taken along the line 8—8 of Figure 5;

Figure 9 is an enlarged elevational view of a capsule as branded by the use of the dies illustrated in Figure 3;

Figure 10 is a greatly enlarged fragmentary side elevational view showing part of the branded area of the capsule of Figure 9;

Figure 11 is a greatly enlarged fragmentary cross sectional view taken along the line 11—11 of Figure 9; and

Figure 12 is a greatly enlarged fragmentary cross sectional view taken along the line 12—12 of Figure 9.

According to the present invention, letters or other line figures are formed in relief on the surface of a gelatine capsule by forceful application thereagainst of a hot die or stamp having a terminal surface toothed in the manner of a file or a rasp, the letters or other line figures to be formed on the capsule surface being formed on this terminal die surface in deep intaglio and being spaced from the edges of the terminal surface. The teeth of the terminal die or stamp surface may take the form of corrugations, elongate ridges alternating with grooves being formed in the die surface by milling. Or, if desired, each of the above noted elongate ridges may be divided into a series of aligned tooth-like projections, as by milling or scoring the die surface along lines extending transversely with respect to the above noted ridges, whereby a grid pattern is formed on the die surface. Or, the teeth may take the form of ridges extending as concentric circles or as a spiral over the die surface.

When a hot die or stamp shaped as described in the preceding paragraph is forcefully applied against the surface of a gelatine capsule, the surface layer of the capsule wall or shell is rapidly heated to within the above noted temperature range. The serrations of the terminal die or stamp area enter readily into the capsule wall or shell so that, after such entrance, heating of the capsule wall or shell portion opposed to the die or stamp effectively and rapidly takes place over an area of actual contact (as between the die or stamp and the opposed capsule wall or shell portion) which is greater than the cross sectional area of the die or stamp and also is greater than the thereto opposed capsule wall or shell area. The above noted efficient and rapid heat transfer affects only the outermost layer of gelatine mass in the capsule wall or shell that is initially contacted by the terminal die surface. Heat-plasticized gelatine mass fills the grooves between the teeth on the die surface after such initial contact, so that thereafter any further heat transfer to deeper layers in the capsule wall or shell must take place over an area equal only to the cross section of the die and through this heat-plasticized gelatine mass, which does not conduct heat very rapidly, if the

temperature of the die or stamp is maintained at a level within or only slightly above the above noted temperature range.

The capsule surface areas opposed to the letters formed in deep intaglio on the terminal die or stamp area are not contacted at all by the die or stamp and therefore are not rendered plastic.

A capsule branded with letters or other line figures in relief according to the present invention will present a circumscribed area or shield having indentations generally slightly depressed with respect to the rest of the capsule surface. The outline of this shield corresponds to the outline of the terminal die or stamp surface. The shield area is toothed, the tooth pattern corresponding to the grooves between the teeth on the terminal die or stamp surfaces. The letters or other line figures rise higher than the bottoms of the indentations in the corrugated or gridded or otherwise toothed shield surface to the level of the capsule surface outside the shield, being spaced from the outline of the shield.

Referring now to Figures 1 and 2 of the drawing, a conventional elongate tubular gelatine capsule to be embosed is indicated generally with reference numeral 10. A capsule wall or shell 12 encloses a liquid 14 filling the capsule 10.

As shown in Figures 3 and 4, the capsule 10 is grasped when it is to be embossed and thereby slightly compressed or flattened between opposed jaws 16 of an appropriate clamp. The axes of the jaw 16 extend transversely with respect to the longitudinal axis of the capsule 10. As a result, the capsule parts outside the jaws 16 bulge and are thereby rendered more rigid and resistant against compression in a direction parallel with respect to the plane of capsule flattening. After the capsule 10 has been clamped between the jaws 16, branding is effected by forcefully applying against the bulging sides of the capsule 10 a pair of opposed dies 18 extending generally transversely to but in the same general plane as the jaws 16. Both dies 18 have terminal or end surfaces formed to effect branding of the thereto opposed capsule surface areas, as described in detail hereinbelow. Further, each die 18 supports the capsule 10 against the compressive force exerted by the other die. However, if desired, only one of the two dies 18 may have a terminal surface shaped so as to perform a branding function. In such event, the other die 18 is formed with a plane or slightly curved end surface and will then only perform the function of supporting the capsule 10 against the force exerted by the other die 18.

The dies 18 shown in the drawing have a cross section formed as a rectangle with rounded corners for forming on the capsule 10 a shield of corresponding outline. As noted elsewhere, the dies may be otherwise shaped cross sectionally, to form shields having other outlines.

The configuration of the terminal surfaces of the dies 18 is illustrated in Figures 5 to 8. As there shown, the terminal die surface is generally plane although the surface may also be curved so as to conform more closely with the opposed capsule surface. Further, the terminal die surface is toothed or serrated. More particularly, the terminal die surface may be scored to form therein a plurality of parallel grooves 20 extending generally parallel to the longitudinal axis of the cross section of the die 18. The terminal die surface is further scored to form therein a plurality of additional grooves 22 extending generally transversely with respect to the grooves 20. Thus, teeth 24 are formed by the intersecting grooves 20 and 22. Intaglio letters 26 are also recessed into the terminal surface of the die 18 spaced from the edges thereof.

The grooves 20 and 22 are suitably 0.005 inches deep, while the letters 26 are preferably about 0.020 inches deep. The dies 18 are forced about 0.001 to about 0.002 inches into the capsule wall or shell and held there, the total time of forceful application of the die against the capsule ranging from 0.01 to 0.5 seconds, the preferred time being about 0.05 seconds. The die is raised to a temperature ranging from 100° to 300° F. The higher portion of this temperature range is preferred for capsules made from gelatine masses containing relatively small amounts of plasticizer, while the lower portion of this range is preferred for capsules made from gelatine masses containing relatively large amounts of plasticizer. At die temperatures below 100° F. or at impression times less than 0.01 seconds, the gelatine mass is not sufficiently plastic to permit branding, while at temperatures in excess of 300° F. or at impression times longer than 0.5 seconds, the letters are formed with such ragged outlines as not to be readily readable.

The branded capsule is illustrated in Figures 9 through 12. As there shown, the capsule 10 has formed on its surface (over the area contacted by a die 18) a shield 28 having an outline conforming with the edge of the terminal surface of the die 18. The surface of the shield 28 is gridded, being formed with a plurality of parallel ridges 30 intersecting another set of parallel ridges 32 formed, respectively, by the die grooves 20 and 22. A plurality of indentations 34 are formed in the interspaces between the ridges 30 and 32. Letters 36 rise higher than the bottoms of the indentations 34 inside the margin of the shield 28.

The deepest points of the indentations 34 may be from about 0.001 to about 0.002 inches below the original surface level of the capsule area opposed to the die 18, while the tops of the letters 36 extend flush with or slightly above the said original surface level.

From the preceding disclosure it is apparent that the toothed surface of the die 18 initially contacts the surface of the capsule at a plurality of spaced limited areas defined by the edges or points of the teeth on the die surface. As the die is forced deeper into the surface layer of the capsule these areas of contact progressively expand until they merge over the whole capsule area opposed to the die, with the exception of that portion of the capsule area opposed to the intaglio letters formed in the die surface. This expansion of the contact areas does not take place in the plane of initial contact but outside this plane at progressively increased distances away from the areas of initial contact in a radially outward direction from the capsule. In other words, the expanding contact areas slope away from the initial contact areas so that adjacent contact areas, when ultimately merging, extend angularly with respect to each other. The heat-plasticized gelatine mass exposed to compressive force in front of these sloping and intersecting die surfaces readily flows radially of the capsule into the spaces defined by the indentations between the teeth formed in the die surface.

In the drawings, the dies are shown as having a generally rectangular cross sectional form with rounded corners, and these dies are impressed

into an elongate tubular capsule. It should be understood that the cross sectional form of the dies may vary considerably. For instance, the cross sectional shape of the die may be round, square, diamond shaped, oval, perfectly rectangular or otherwise contoured. Dies having elongate cross sectional shapes are preferred for embossing elongate capsules. Dies having square or diamond shapes or round cross sectional shapes are preferred for branding round or globular capsules. Further, one or more letters or numerals or other line figures may be branded on the capsules. Many other details of procedure may be varied within a wide range without the departing from the principles of this invention, and it is, therefore, not our purpose to limit the patent granted on this invention otherwise than necessitated by a scope of the appended claims.

We claim:

1. A method of branding a line figure in relief on the surface of a gelatine capsule, said method comprising applying diametrically opposed forces to central capsule areas in the first and third capsule quadrants to hold said capsule clampingly while bulging central capsule areas in the second and fourth capsule quadrants, while said capsule is thus clampingly held supporting a central bulged capsule area in the second capsule quadrant against radially outward displacement, and while said central bulged area is thus supported applying concurrently to a central bulged capsule area in the fourth quadrant both heat and a compressive force, the heat being applied so as to render plastic only a surface layer of the capsule area being heated and said compressive force being applied over all of said heated area except over a part thereof having a configuration corresponding to the said line figure whereby heat-plasticized gelatine mass in said surface layer is caused to be displaced to define said line figure on said capsule surface.

2. A method according to claim 1 in which said concurrent application of heat and compressive force is effected by means of a single rigid medium.

3. A method according to claim 1 in which said concurrent application of heat and compressive force is effected by means of a single rigid medium formed with a toothed surface for contacting the capsule area to be heated.

4. A method according to claim 1 in which said concurrent application of heat and compressive force is effected by means of a single rigid medium having a toothed surface for contacting the capsule area to be heated and plastically deformed, said toothed surface being recessed in conformance with said line figure.

5. A method according to claim 1 in which said concurrent application of heat and compressive force is effected by means of a single rigid medium having a surface formed with alternating ridges and grooves for contacting the capsule area to be heated and plastically deformed, said surface being recessed in conformance with said line figure.

6. A method according to claim 1 in which said concurrent application of heat in compressive force is effected by means of a single rigid medium having a surface formed with intersecting grooves defining a plurality of spaced projections for contacting the capsule area to be heated and plastically deformed, said surface being recessed in conformance with said line figure.

7. A method according to claim 1 in which said rigid medium initially contacts said capsule at spaced limited areas within the capsule area to be heated, the said contact areas thereafter being progressively expanded into progressively larger areas of contact which ultimately merge to cover the whole capsule area to be heated with the exception of said portion thereof defining said line figure.

8. A method according to claim 4 in which said rigid medium is maintained at a temperature ranging from 100° to 300° F. when initially applied to said capsule.

9. A method according to claim 4 in which said rigid medium is applied against said capsule for from 0.01 to 0.5 seconds.

10. A method according to claim 4 in which said rigid medium while at a temperature of from 100° to 300° F. is applied against said capsule for from 0.01 to 0.5 seconds.

11. A method according to claim 7 in which the said expansion of said initial contact areas is effected at a progressively greater distance from said initial contact areas in a direction outward from said capsule.

12. A method according to claim 7 in which said rigid medium while at a temperature of from 100° to 300° F. is applied against said capsule for from 0.01 to 0.5 seconds.

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