

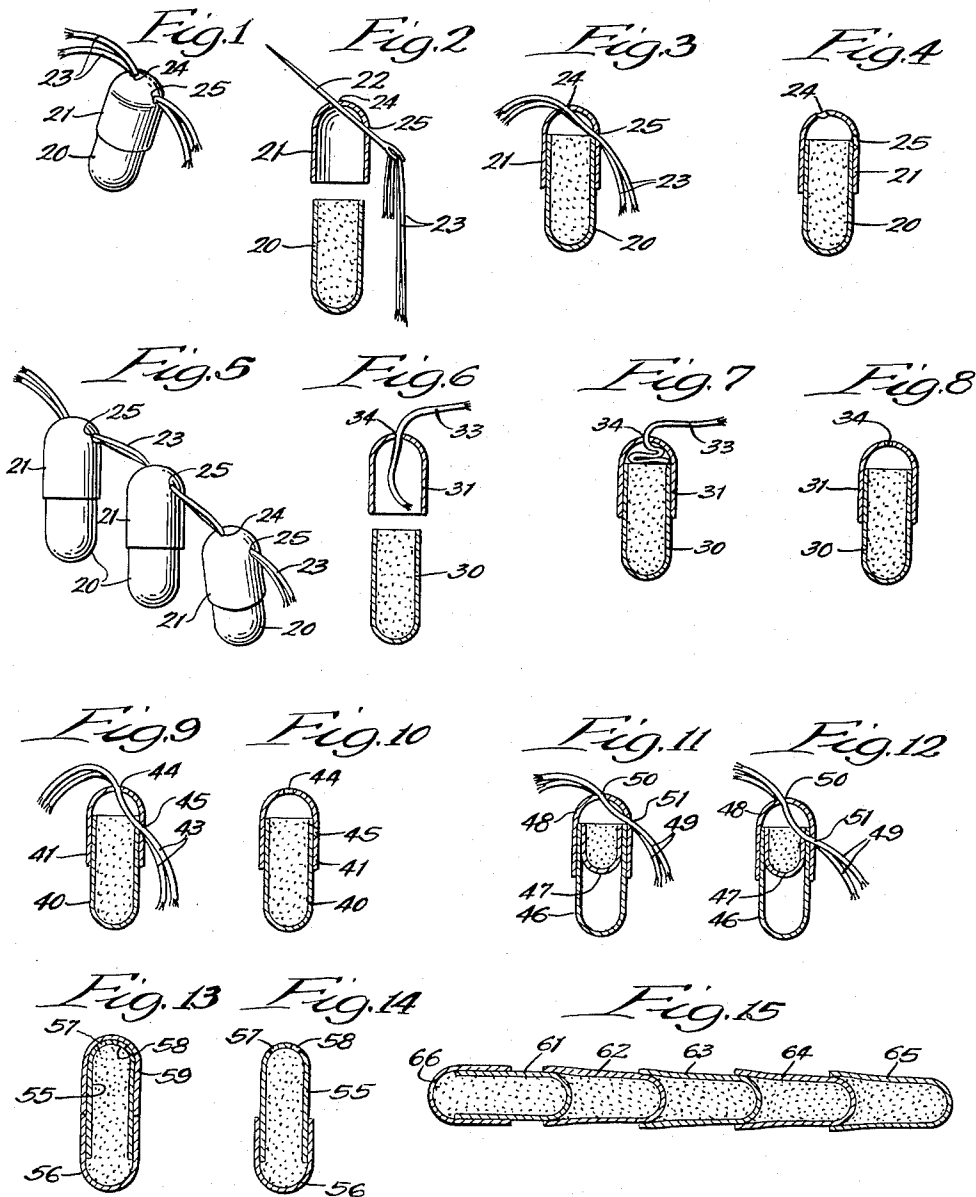
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POWDER CONTAINER

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POWDER CONTAINER

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This invention relates to powder containers and more particularly to capsules for holding medicinal powder intended for use in a powder dispenser.

The powder containers herein disclosed and claimed are particularly adapted for use with a powder dispenser of the type described in the co-pending joint application of myself and Robert J. Weimer, Serial No. 82,816, filed March 22, 1949.

In that application we have described fully a novel powder dispenser with which medicinal powder can be administered, directly to the area to be treated, in successive puffs of air which pass through the dispenser and in so doing entrain the powder from the capsule or other container in which the powder is confined within the dispenser.

In that application we have stated that an ordinary capsule, formed of gelatin or other suitable material, may be used in our dispenser by removing the cap and depositing the container member in the dispenser with its open end exposed to the air stream. We have pointed out therein, however, that when an ordinary capsule is employed the rate of discharge of the powder is relatively great, and, for slow discharge of powder, it is preferable that a capsule be used wherein the cap, rather than being removed, is left on and provided with one or more small perforations.

Manufacture and distribution of such capsules packed with medicinal powder poses the serious problem of providing a satisfactory means of placing the apertures in the capsule during the manufacturing stage and at the same time prevent leakage of powder from the packed capsules prior to the time they are inserted into the dispenser by the ultimate consumer. It is obviously most undesirable to leave to the ultimate consumer the task of perforating the capsule. If the consumer is left to perforate the capsule with a pin or other common instrument, he is not likely to provide apertures of optimum size or correct location. If a special perforating tool be included in the capsule package, there is considerable danger that the consumer will injure himself during the perforating operation, especially since the users will frequently be persons entirely inexperienced in handling tools.

Accordingly, it will be seen that a pre-perforated capsule which will hold powder without leakage and at the same time be readily usable in a powder dispenser is most desirable and greatly needed if the full possibilities of our novel

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powder dispenser are to be realized. It is to the satisfaction of that need that my present invention is directed.

It is an object of my invention to provide a powder-containing capsule particularly adapted for use with my novel powder dispenser hereinafore mentioned. Another object of my invention is to provide a powder-containing capsule which is pre-perforated during the manufacturing or packing operation and provided with an effective and inexpensive temporary closure to insure retention of the powder until it is ready for use. Still another object of my invention is to provide, in a pre-perforated powder container, an inexpensive temporary closure which will secure the powder against leakage and at the same time be readily removable by the user when it is to be inserted in a dispenser.

A still further object of my invention is to provide a pre-perforated capsule for containing medicinal powder wherein a temporary closure is provided which at once seals the perforations or apertures and at the same time locks together the two pieces of the capsule, preventing their accidental separation. Another object of my invention is to provide a capsule of size convenient for handling which is nonetheless adapted to provide a small measured dose of medicinal powder for use in a powder dispenser. Still another object of my invention is to provide a multi-cell capsule containing a plurality of doses of medicinal powder which may be consumed one at a time without affecting the security of storage of the unused doses. Other and additional objects and advantages of my invention will appear as the specification proceeds.

My invention is illustrated, in several embodiments, by the accompanying drawing, in which—

Figure 1 is a perspective view of one form of capsule embodying my invention; Fig. 2, a view in section of a capsule similar to that shown in Fig. 1, illustrating a convenient means of manufacture; Fig. 3, a view in section of a completed capsule similar to the type shown in Fig. 1; Fig. 4, a view of the capsule of Fig. 3 after the temporary closure has been removed therefrom and the capsule is ready for insertion in a powder dispenser; Fig. 5, a perspective view of three capsules of the Fig. 1 type as they might be formed in a manufacturing operation; Fig. 6, a sectional view of a modified form of capsule embodying my invention, shown in process of assembly; Fig. 7, a sectional view of the Fig. 6 capsule after assembly and before use; Fig. 8, a sectional view of the Fig. 7 capsule after the temporary closure has

been removed and the capsule is ready for insertion in a powder dispenser; Fig. 9, a sectional view of another modified form of my invention, in which the temporary closure seals off the apertures and in addition binds the two parts of the capsule together; Fig. 10, a sectional view of the capsule of Fig. 9 after removal of the temporary closure; Fig. 11, a sectional view of another modified form of my invention which is particularly adapted for administration of small, measured doses of medicinal powder; Fig. 12, a sectional view of the capsule similar to that of Fig. 11 but wherein the temporary closure member performs also the function of binding the capsule together; Fig. 13, a sectional view of still another modified form of my invention; Fig. 14, a sectional view of the Fig. 13 capsule after removal of the temporary closure; and Fig. 15, a sectional view of a multi-cell capsule particularly adapted for use with my novel powder dispenser heretofore mentioned.

In Figs. 1-4 inclusive, I have shown a capsule, which may be made of gelatin or other suitable material, comprising a pair of telescoping members 20 and 21. In packing the capsule, the inner member 20 may be filled with powder and the cap member 21 pressed over it to form a closed capsule, as shown in Fig. 3. If desired, some powder may be poured into element 21 before it is pressed down over element 20, so as to produce a more completely-filled capsule.

Either before or after cap 21 is fitted over member 20, the needle 22, carrying threads 23, may be passed through the cap, thus forming therein two apertures denoted respectively 24 and 25. The threads 23 are left in the cap 20, where they form an effective closure and sealing means for the apertures 24 and 25.

For best results, threads 23 should be formed of yarn, twine, or some other form of fibrous thread having considerable elasticity, so as to insure that they will expand to close off the apertures 24 and 25.

When the capsule is removed from its package by the consumer who desires to employ it in my powder dispenser, he need merely pull out threads 23 and deposit the capsule in the dispenser.

I have found that when two apertures are used in the capsule, best results are obtained when one of the apertures is placed somewhat lower on the cap than the other, although my dispenser will effectively remove the powder when the two apertures are symmetrically situated on the cap 21.

The closure thus provided by the use of threads 23 is fully effective to prevent powder leakage from the capsule, is extremely inexpensive, and in mass production, may be inserted into capsules mechanically by well-known sewing machine manufacturing techniques.

It will be understood that while I have shown, in Figs. 1-4, a capsule wherein the temporary closure is formed of two threads, one or any desired number of threads may be used. Similarly, my choice of two apertures is illustrative only, and, according to the requirements of the particular powder being packed, any desired number of apertures may be provided and additional threads inserted for temporary sealing.

Fig. 5 shows three capsules of the Fig. 1 type as they might appear after threading by a mechanical sewing apparatus; as desired, the threads therein shown as joining several capsules may be cut between capsules before packing, so that the individual capsules are packed sepa-

ately for distribution or the capsules may be left joined together, as shown in Fig. 5. If the latter course is followed, the user need not perform any cutting operation on the threads; he can simply pull off the end capsule when he is ready to use it and leave the others threaded together until they in turn are to be consumed.

In Figs. 6-8 I have shown another form of my invention which is particularly adapted for use with medicinal powders which are to be administered at a very slow rate or in extremely limited quantities. In this form of my invention, I provide means whereby my temporary closure can be used with only a single small aperture in the cap member of the capsule.

In Fig. 6 a capsule is shown before assembly; it comprises a container member 30 and a cap member 31, designed to fit snugly over member 30. A thread 33 has been passed through a small aperture 34 in the cap member 31 prior to its being fitted over member 30. The formation of aperture 34 and the insertion of thread 33 therein may be accomplished by a needle operation such as that illustrated in Fig. 2 with respect to the Fig. 1 embodiment of my invention. Just as with the other form of my invention heretofore described, this threading operation can readily be accomplished by mechanical means, the threading being passed through a large number of caps at a single operation and the thread thereafter severed between each pair of caps.

The cap 31 is, in the assembly of the capsule, pressed snugly over container member 30 after container member 30 has been filled with powder, as shown in Fig. 7. A portion of thread 33 is thereby confined within the capsule, while the other end of the thread hangs outside the capsule.

When the user desires to employ the capsule in a powder dispenser, he pulls on the free end of thread 33 and removes it entirely from the capsule, leaving aperture 34 open. When the capsule is placed in the powder dispenser, the contents of the capsule are exhausted through aperture 34, as fully described in the heretofore-mentioned co-pending application, Serial No. 82,816.

Figs. 9 and 10 show another form of my invention wherein the thread or threads which provide a temporary closure also function as a means of preventing the two parts of the capsule from being accidentally separated. The capsule therein shown comprises a container member 40 and a cap member 41, formed of gelatin or other suitable material and adapted to telescope together snugly. Threads 43 pass into the capsule through aperture 44 in the top of cap member 41 and thence out through aperture 45, which is positioned on the side of the capsule on a portion of the wall at which members 40 and 41 overlap. Thus aperture 45 passes through both cap member 41 and container member 40 with the result that threads 43, when inserted in the capsule, not only provide temporary closure means, as in the other forms of my invention, but also bind or sew the capsule together so as to prevent the cap and container members from being accidentally separated before they are ready for use.

When the capsule is to be used in a powder dispenser, the threads 43 are removed by the user and the powder is thereupon exhausted through the apertures 44 and 45.

Figs. 11 and 12 illustrate a form of my in-

vention particularly adapted for the administration of medicinal powder in minute doses. In this form of my invention, a very small medicine-carrying compartment is provided, so that in packing dosage may be conveniently regulated, and at the same time the overall size of the capsule is kept large enough to permit convenient handling and to avoid danger of loss or dropping, which is likely to occur with an extremely small capsule. Thus this form of my invention is decidedly superior to the obvious technique of only partially filling a standard-size capsule when a small dose is to be administered, since with my invention the small medicine-carrying compartment can be made of the proper size for receiving the dose to be administered and it can thus be filled with powder, and the time-consuming and expensive step of measuring the powder before pouring it into the capsule is avoided.

Fig. 11 shows a typical example of such a capsule; it comprises an outer container member 46, and inner medicine-carrying compartment 47, which may be made as small as desired in length but having cross section adapted to telescope snugly within container member 46, and an outer cap member 48 adapted to telescope snugly over container member 46. In the Fig. 11 form of my invention, threads 49 are passed through apertures 50 and 51 in cap 48, so that closure during packing and transportation is conveniently provided as in the other forms of my invention already described.

Fig. 12 shows a modified form of the Fig. 11 capsule in which aperture 51 has been placed sufficiently far down the side of the capsule to pass through the walls of all three components of the capsule—namely, compartment 47, container member 46, and cap 48. Thus, in this form of the invention, the threads 49 which seal off the apertures 50 and 51 also sew together and maintain in proper relative position the three members which collectively form the powder capsule and secure them against accidental separation prior to use.

Figs 13 and 14 show a form of my invention in which an auxiliary cap member is provided for effecting temporary closure of a perforated capsule. In this form of my invention, the capsule proper comprises a container member 55 and a cap member 56, formed, as in the other embodiments of my invention, to telescope snugly together. A pair of apertures are provided in the end of container member 55; these are denoted respectively 57 and 58. In the drawing, they are shown as symmetrically disposed at the end of member 55; it will be understood that they can be placed at any desired position thereon. Likewise, any desired number of apertures may be provided. Normally it is most convenient, in the preparation of such medicinal powder capsules, to form the apertures by perforation after the powder has been packed into the capsule, although member 55 may be pre-perforated prior to packing if desired.

Over the perforated end of member 55 a closure member 59 is placed. Closure member 59 may be designed to have the same internal diameter as member 56, so that it too will telescope snugly over member 55 and provide a closed powder container, as shown in Fig. 13. When the capsule is ready for use in a powder dispenser, closure member 59 is removed by the user, and the resulting capsule, as shown in Fig. 14, is

ready to discharge its contents in the powder dispenser.

To insure that closure member 59 may be more readily removable than cap member 56, a suitable adhesive may, if desired, be employed to join the abutting surfaces of members 55 and 56.

Fig. 15 shows a multi-dose capsule which is well adapted for use in packing a capsule with powder for a course of treatments, in which the patent is provided with several doses of powder to be administered by use of the powder dispenser in separate doses and at different times. This form of my invention comprises a master capsule formed of container member 61 and cap member 66, formed to fit snugly together. Telescoped over the closed end of container member 61 is a second and similar container member 62; similarly container member 63 is telescoped over the closed end of member 62. Container member 64 is in the same manner telescoped onto the closed end of member 63, and container member 65 is telescoped onto the closed end of member 64. I have in the drawing shown a capsule comprising five distinct powder-containing members; a lesser number may obviously be used in a capsule constructed according to the same principle, and, if desired, a still greater number may be used. It will be understood that each of the individual container members 61-65 inclusive will be supplied with the appropriate quantity of powder before being telescoped onto its neighbor element.

When this capsule is to be used, the patient can simply remove the container element most distant from cap member 66, insert that element in the powder dispenser, and return the remainder of the multiple capsule to its box until the next dose of powder is to be administered. This form of capsule is adapted only for use with medicinal powders in which the rate of administration can be relatively rapid, since the open-ended container will have its contents discharged quite rapidly by the powder dispenser. A great many applications exist, however, in which rapid administration is desirable, and accordingly this form of my invention has great practical utility. It will be understood that when all the telescoped capsules have been removed except container 61, cap 66 will be taken off before container member 61 is inserted in the dispenser.

While I have in this specification described certain embodiments of my invention in considerable detail for purposes of illustration, it will be understood that many variations therein can be made by persons skilled in the art without departing from the spirit of my invention as defined in the claims appended hereto.

I claim:

1. A capsule for holding medicinal powder comprising a container member and a cap therefor, one of said members containing a pair of small apertures, and a thread removably passed through said apertures successively, the ends of said thread being outside the capsule, the thread being operative to seal off said apertures and prevent the escape of powder therethrough.

2. A gelatin capsule for holding medicinal powder comprising a container member and a cap therefor, one of said members containing a pair of small apertures, and a thread removably passed through said apertures successively, the ends of said thread being outside the capsule, the thread being operative to seal off said aper-

tures and prevent the escape of powder there-through.

3. A capsule for holding medicinal powder comprising a container member and a cap therefor, one of said members containing a pair of small apertures near its end portion, one of said apertures being appreciably nearer the end than the other, and a thread removably inserted through said apertures operative to seal them off and prevent the escape of powder there-through.

4. A gelatin capsule for holding medicinal powder comprising a container member and a cap therefor, one of said members containing a pair of small apertures near its end portion, one of said apertures being appreciably nearer the end than the other, and a thread removably inserted through said apertures operative to seal them off and prevent the escape of powder there-through.

5. A capsule for holding powder comprising a container member and a cap member telescopically joined together, a pair of small apertures in said capsule, one of which passes through the overlapping walls of the container and cap member, and a thread removably passed successively through said apertures operative to seal them off to prevent escape of powder and to sew together the container and cap member.

6. A gelatin capsule for holding powder comprising a container member and a cap member telescopically joined together, a pair of small apertures in said capsule, one of which passes through the overlapping walls of the container and cap member, and a thread removably passed successively through said apertures operative to seal them off to prevent escape of powder and to sew together the container and cap member.

7. A capsule for receiving a measured small dose of medicinal powder comprising an outer container member having an open end, an inner container member of smaller capacity formed to telescope snugly within the open end of the outer

container member, a cap member formed to telescope snugly over the open end of the outer container member, a pair of small apertures in the capsule communicating with the interior of the inner container member, and a thread removably passed successively through the apertures operative to seal them off and prevent the escape of powder therethrough.

8. A capsule for receiving a measured small dose of medicinal powder comprising an outer container member having an open end, an inner container member of smaller capacity formed to telescope snugly within the open end of the outer container member, a cap member formed to telescope snugly over the open end of the outer container member, a pair of small apertures in the capsule communicating with the interior of the inner container member, one of which passes through the overlapping walls of the container members and the cap member, and a thread removably passed successively in the apertures operative to prevent the escape of powder therethrough and to sew together the container members and the cap member to prevent their relative movement prior to removal of the thread.

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