May 13, 1958 A. A. LANGER 2,834,456

FRANGIBLE TABLET PACKAGING

Filed July 18, 1955 2 Sheets-Sheet 1

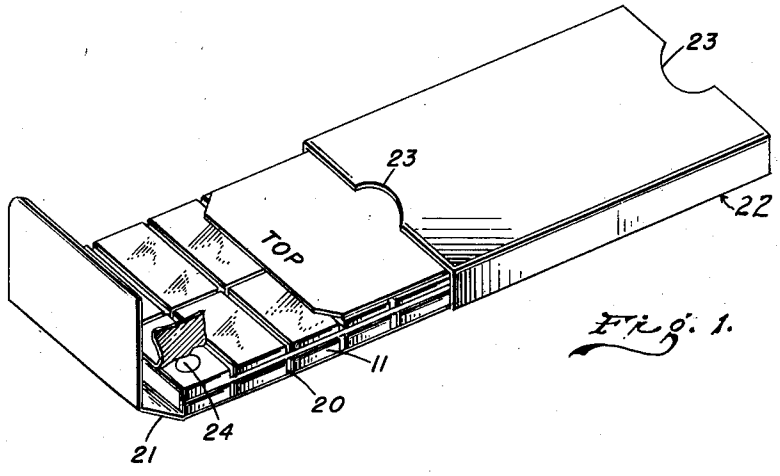


Fig. 1.

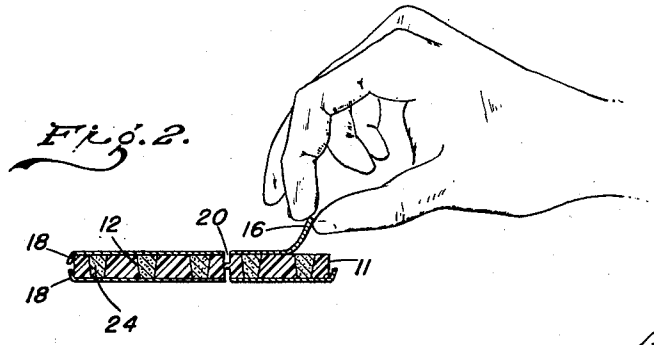


Fig. 2.

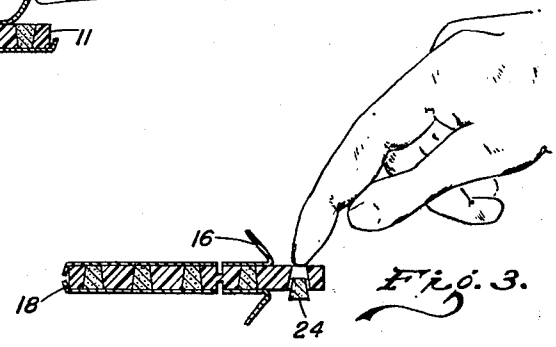


Fig. 3.

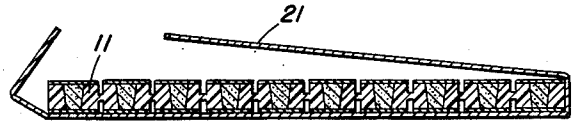


Fig. 4.

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FRANGIBLE TABLET PACKAGING

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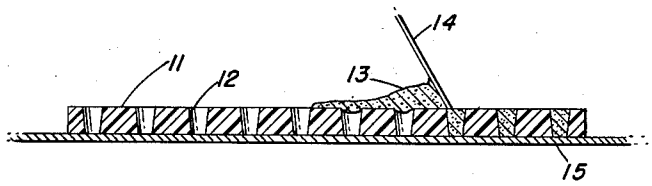


Fig. 5.

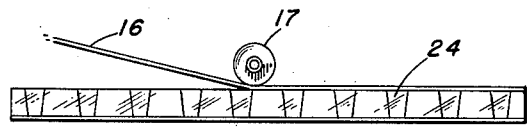


Fig. 6.

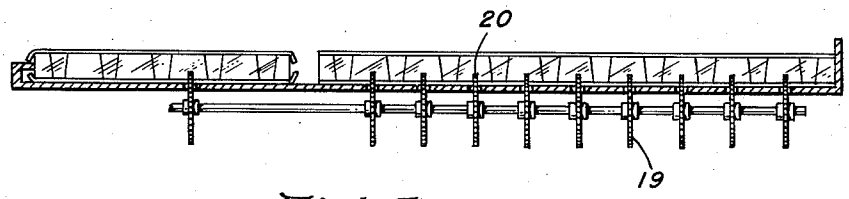


Fig. 7.

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FRANGIBLE TABLET PACKAGING

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2 Claims. (Cl. 206—42)

This invention relates to a package containing a plurality of individual frangible tablets.

In the packaging of tablets, particularly for pharmaceutical purposes, the problem of counting the number of tablets so that the purchaser will receive the proper number is an expensive and time-consuming operation. There is always the problem of whether some of the counted articles have been removed from the package and the problem of insuring that too many tablets are not present because in many instances the medical profession require that the specified counts be present, neither more nor less.

In many instances tablets which are to be dissolved in liquids are necessarily somewhat fragile. When powders are sufficiently compacted with binding agents so that they are sufficiently sturdy to withstand handling and shipping, the tablets are so solid that solution is unduly delayed. Additionally, binding agents and coating materials unduly increase the bulk of the item sold and introduce components which may be undesirable.

In the past frangible tablets have been produced by forming a solvent wet powder into a desired form and permitting the solvent to evaporate. In many such instances the tablets so formed are rapidly soluble and are very satisfactory for immediate use but are so fragile that if packed under normal shipping conditions, they are broken to a powder before time for use. Such powder tablets frequently are called soluble tablets or triturate tablets or frangible tablets. The term frangible tablets will be hereafter used to describe the present products. Because the tablets are porous and designed to absorb water rapidly and to go into solution quickly, the tablets are unusually sensitive to moisture in the air. In some instances the frangible tablets may be of materials which are inactivated by moisture, or solubilization may be adversely affected, or the tablets may discolor. The divisibility of packaging into sub-units also has presented an inadequately-treated problem. Efforts have been made to package sub-units, but it is difficult to decide how many units should be in each sub-package when flexibility of merchandising operations is desired.

These and other disadvantages and problems may be overcome by forming a thick mold sheet from an inexpensive inert material which has a series of apertures in the sheet, filling the apertures with coalesced powdered material which is too frangible to be shipped in commerce unsupported and covering the filled apertures with an inert flexible stripable moisture resistant protective sheet. The filled mold sheet may be marked by scoring grooves so that the filled package may be broken into a desired number of units. Conveniently the cover sheet overhangs the mold sheet so that the edge of a protective sheet may be easily grasped with the fingers and removed. The individual tablets may be ejected from the mold sheet by finger pressure. The filled mold sheet may be placed in an envelope or more conveniently in a slide cover which is then placed in a sleeve.

By way of illustrating, the accompanying drawings illustrate certain embodiments of my invention:

Figure 1 shows a package of the present invention.

Figure 2 illustrates the removal of the cover sheet.

Figure 3 illustrates the removal of a frangible tablet.

Figure 4 shows a section through the tablet-filled mold sheet.

Figure 5 shows the mold sheet being filled.

Figure 6 shows the cover sheet being fastened to the mold sheet.

Figure 7 shows the mold sheet being notched with saw-cut slots.

The mold sheet **11** is preferably formed of a cheap inert sturdy light insoluble taste- and odor-free non-corrosive material. Plastics are particularly advantageous in meeting these requirements. If a mold sheet is to be broken, it is particularly convenient to use a brittle material, such as polystyrene. For some purposes, a particularly resistant material is required and flexibility is an advantage, in which instances polyethylene makes an excellent mold sheet. Other plastics, such as phenol-formaldehydes, polyesters, polyacrylates, and other materials possessing similar characteristics may be used. In the inner plastic mold sheet are a number of apertures **12**. The apertures may be formed in the mold sheet during a molding operation or may be cut, punched, bored or drilled in the mold sheet later. The apertures may be circular in cross-section or may have other desired shapes, for instance conical for dental cones. It is particularly convenient to use a forming die for the mold which forms the apertures when the mold sheet is manufactured. Because most plastics are easily machinable, the apertures can be formed on a multiple drill press rapidly and economically. Particularly for tablet compositions which shrink on drying, cylindrical apertures may be used. However, a tapered aperture is preferred because a tapered aperture is easier to form and fill; and at the time of use, releases the tablet more easily. With a slight taper in the aperture, once a tablet is loosened, it will drop out of the large end of the aperture very easily. A mold releasing agent may be used to aid in ejection.

The number and location of the apertures in a sheet is selected for purposes of convenience in use. It is convenient that the number in each sheet be a standard commercially utilized number. Conveniently the apertures may be arranged in a 5 x 10 relationship, giving 50 tablets per sheet, or in a 6 x 8 relationship, giving 4 dozen tablets per sheet. Smaller or larger numbers and other configurations may be used as desired.

As shown in Figure 5, the apertures may be filled with a moistened mix of powdered material **13**. For example, small apertures were filled by a mixture per aperture of 40 milligrams of lactose and 40 milligrams of chlortetracycline hydrochloride, both powdered, moistened with 20%, volume on weight, of 80% ethanol to form a flowable moistened powder. The powder was readily compressible and when compressed, adhered to itself. The mix, the moistened powder **13**, was filled into the apertures **12** by using a doctor **14**, with the mold sheet supported on a plate **15**. The powder was compressed into the apertures and scraped off level filled therewith. The filled mold sheets were dried at room temperature under vacuum for four hours. The filling was adherent to the mold sheet and the thus formed frangible tablets **24** remained in position in the mold sheet. With other materials, other concentrations of alcohol or other solvents, such as water, chloroform, ether, other alkanols, or ketones may be used. The moistening solvent must be one towards which the mold sheet is inert.

After drying the mold sheet containing the frangible tablets, it is covered with an adherent protective cover sheet **16** of inert flexible strippable material on both the top and the bottom surfaces. The cover sheet may be coated with either a thermo-sensitive or pressure-sensitive

adhesive or may be a sheet which itself is thermo- or pressure-sensitive. Conveniently a latex base pressure-sensitive coated cover sheet may be used. The cover sheet may be of a plastic, but conveniently is of a metallic foil, such as aluminum foil or tin foil, because such foils are extremely moisture resistant. Non-toxic pressure-sensitive latex type metallic foil tapes are readily obtainable on the commercial market. The cover sheet may be rolled by a roller **17** onto the faces of the mold sheet. Preferably the cover sheet should be of such size that the edges of the cover sheet slightly overhang the mold sheet forming tabs **18** which permit the gripping of the cover sheet to remove it as shown in Figure 2.

Conveniently the mold sheet and the protective cover sheets may be partially severed to form zones of weakness so that the mold sheet may be broken into separate units containing a desired number of tablets. For flexible plastic materials the scoring may be done with knives. For the more brittle plastic materials, such as polystyrene, saw slots may be used. As shown in Figure 7, a gang-saw may be used to notch one or both sides of the mold sheet to form zones of weakness. Conveniently a mold sheet having ten rows of five tablet-containing apertures each may be notched with nine zones of weakness between the ten rows and longitudinally between the second and third tablet in each row. When so slotted, as shown in Figure 1, the frangible tablets are present in groups of two or three, each of which groups has a tab **18** to permit the easy removal of the protective cover sheets.

For commercial sale the mold sheet and its protective cover sheets form a slide about which is wrapped a slide cover **21**. The slide cover may conveniently be of cardboard of such length and folds as to wrap about the mold sheets and cover all but the edges. The slide and slide cover may then be encompassed by a sleeve **22**. The sleeve may have thumb notches **23** therein to aid in pressing the slide and slide cover out of the sleeve for use. The face and other surfaces of the sleeve and the various surfaces of the slide cover may have instructions or identification indicia or trademarks thereon .

In commercial use the proportions of the various elements may vary over wide ranges depending upon the size of the tablets which are desired and the number which are conveniently packaged together.

The convenience of being able to handle a known number of tablets and to easily break off a counted number renders this type of package very convenient. The flexible strippable cover sheets protect each individual tablet up until the moment of its use, so that losses, which have previously occurred when containers have been opened, are guarded against and even the most delicate of frangible tablets, which are extremely susceptible to moisture damage, may be safely stored and shipped. Because the protection is so adequate, more fragile tablets than have previously been practical for shipment in commerce may be used and smaller tablets may be used because reinforcing diluents are unnecessary.

I claim:

1. A package containing a plurality of frangible tablets comprising: a thick rigid mold sheet of inert plastic material having top and bottom planar faces, said sheet having therein spaced uniformly-tapered-wall apertures extending therethrough from the top face to the bottom face of said plastic mold sheet, a tablet of coalesced powdered material, too frangible to be shipped in commerce without support, in each of said apertures and adhering to the tapered-wall of said aperture, said tablet extending from the plane of the top face to the plane of the bottom face of said mold sheet, and an adherent protective cover sheet of inert, flexible, strippable material covering the tablet filled cavities and adherent to the top and bottom surfaces of said inert plastic mold sheet, said inert plastic mold sheet and said adherent protective sheets being partially severed into divisible segments by breakable zones of weakness, so that selected numbers of tablets in the protective inert plastic mold sheet, still protected by the adherent protective sheets, may be separated.

2. The package of claim 1 in which a portion of the adherent protective cover sheets extend beyond the inert plastic mold sheet on each separable segment so that the adherent protective cover sheets may be readily removed.

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