

March 5, 1957

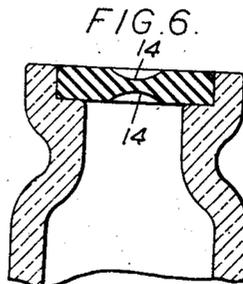
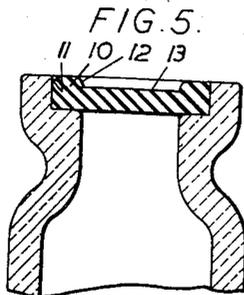
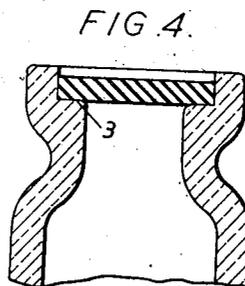
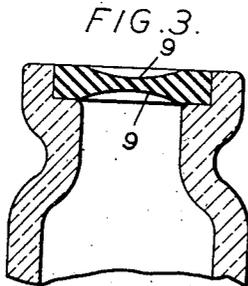
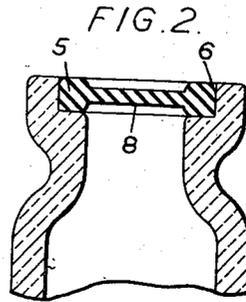
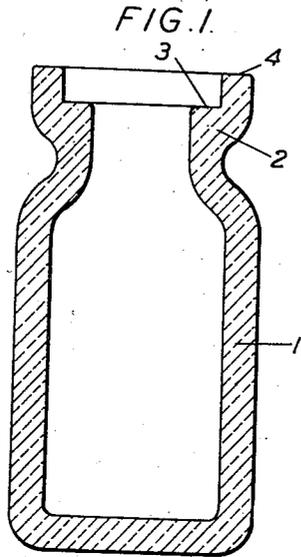
J. L. WINFIELD

2,783,908

CLOSURES FOR BOTTLES, VIALS AND THE LIKE

Filed Feb. 9, 1954

2 Sheets-Sheet 1



Inventor
JOHN LESLIE WINFIELD

By *Lacon & Jones*
Attorneys

March 5, 1957

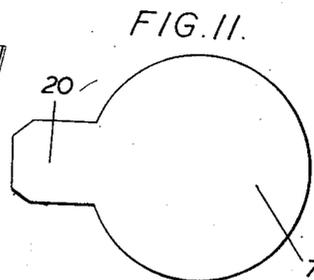
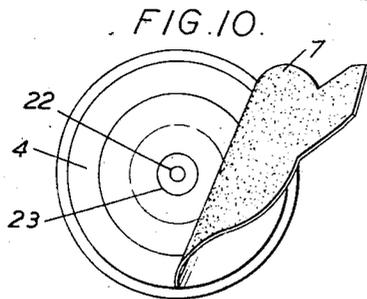
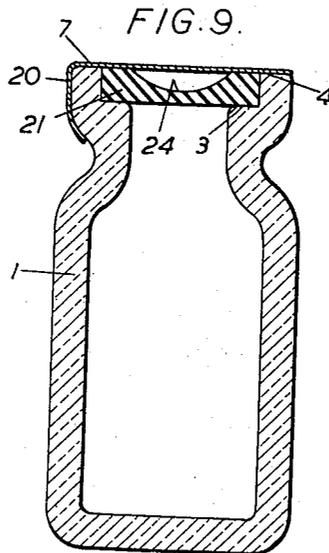
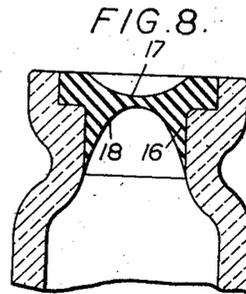
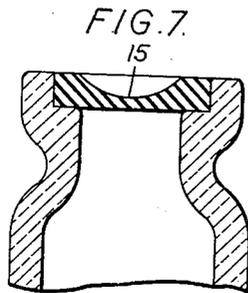
J. L. WINFIELD

2,783,908

CLOSURES FOR BOTTLES, VIALS AND THE LIKE

Filed Feb. 9, 1954

2 Sheets-Sheet 2



Inventor
JOHN LESLIE WINFIELD

By *Beacon & Thomas*
Attorneys

2,783,908

CLOSURES FOR BOTTLES, VIALS AND THE LIKE

John Leslie Winfield, South Harrow, England, assignor to Glaxo Laboratories Limited, Greenford, England, a British company

Application February 9, 1954, Serial No. 409,173

Claims priority, application Great Britain February 13, 1953

2 Claims. (Cl. 215—37)

This invention is concerned with improvements in or relating to closures for bottles, jars, vials and like containers, and more particularly, although not exclusively to such containers as are intended to carry substances where it is of great importance that moisture should be as far as possible completely excluded from the contents of the container.

It is, for instance, extremely important that moisture should be excluded from contact with antibiotic preparations such as penicillin and its salts since activity will be lost as a result of such contact. Many of these antibiotic preparations are administered by injection and it is usual for them to be packed in vials or other containers under sterile conditions, which containers have closures or stoppers through which the needle of a syringe can be inserted to withdraw a dose without removing the closure. It is known to provide closures for such vials or containers of rubber in the form of conventional stoppers having a shoulder which abuts against the upper surface of the neck of the container. In order to reduce the possibility of moisture entering the container it has hitherto been the practice to provide an annulus of channel section, of aluminium for instance which surrounds the junction of the stopper and the neck of the container, the sides of the channel engaging over the upper edge of the stopper and a shoulder on the neck of the container respectively. In the manufacture of such closures it has been necessary to use only specially selected rubber mixtures which have the minimum porosity and which at the same time, will not flake or fragment when pierced by a hypodermic needle, and which will not form a core or plug in the bore of the needle. Such special rubber mixtures are costly and closures of the above mentioned variety are not entirely satisfactory in excluding moisture from the contents of the container, since penetration does take place either through the rubber itself or between the said annulus and the vial or stopper and thence between the neck of the container and the shoulder of the stopper.

It is an object of the present invention to provide an improved closure for glass bottles, jars, vials and like containers which compares favourably in price with those hitherto known for comparable purposes and which at the same time substantially completely excludes moisture from the contents.

According to the present invention therefore, we provide a glass bottle, jar, vial or like container, which is substantially completely moisture-proof and which comprises a shoulder or seating within the neck of the container, and a stopper member disposed on said seating and of such dimensions that it is flush with or lower than the top edge of said neck characterised by the provision of a disc or the like of metallic foil adhesively secured to the upper surface of said neck.

The said metallic foil is preferably aluminium foil and we prefer to use an aluminium foil backed with a heat sealing adhesive composition which is known per se. We have found that a very suitable adhesive for this

purpose is a thermoplastic adhesive based upon polyisobutylene and rosin, and we prefer to use such an adhesive known under the trademark "Telstic." We have found that this adhesive which has been known for other sealing purposes, and which has the advantage of being completely impervious to moisture, is also capable of making a moisture tight seal directly on glass. It has not however hitherto been convenient to use it for the purpose now proposed owing to the difficulties of mass producing a cap portion having a disc and skirt, as would be necessary for known stoppers and containers, without such cap adhering to one of the die parts, by which it is formed due to the heat of stamping, making the adhesive tacky.

Since, according to this invention the stopper does not extend above the top of the container neck, but is at most flush therewith this manufacturing difficulty is overcome and the foil may be simply stamped out in flat discs of a diameter equal to the outer diameter of the container neck to which they are applied in the presence of heat. We prefer to provide such foil discs with a tongue or flap adapted to lie down the side of the neck and which serves as a tear off strip. If desired we may use foils or other metals than aluminium such as tin or lead and a separate application of a suitable adhesive may also be used.

Owing to the metallic foil used to provide the effective seal against moisture it will be appreciated that a wider choice of materials is available for the stopper as critical considerations of porosity no longer arise. We prefer to use rubber or a rubber composition for the stopper and in selecting the material for the stopper it is important only that the material should be inert to the intended contents of the container and should not flake or fragment or form a core when pierced e. g. by a hypodermic needle.

The shoulder or seating in the neck of the container preferably forms substantially a right angle with the bore of the neck and preferably extends right around the inside of the neck, it will be apparent however that the shape, size and extent of the shoulder or seating may be varied provided that it serves to retain the stopper and prevent the latter from being pushed into the container, and that it is of sufficient depth in relation to the dimensions of the stopper to prevent the latter from being pulled out when a hypodermic needle is withdrawn from the stopper.

The stopper itself will be of a diameter such as will make a tight fit in the neck of the container. Various cross sections of stopper may be employed according to this invention. Thus to facilitate entry of a hypodermic needle through the stopper the latter may be of reduced thickness over the whole or part of the central area thereof and may have a concavity or recessed portion in the outer surface, and may also have a corresponding recessed portion on the underside as well. If desired the stopper may have an annular rim or edge of greater thickness than that of the central portion thereof. We may also provide the stopper in the form of a disc of uniform thickness, or again the underside of the stopper may have a plug-like extension adapted to extend downwardly into the neck. It will however be understood that in all cases the dimensions of the stopper will be so selected that it will not protrude above the top edge of the neck of the container. We may in some cases radius off the upper edge of the stopper to allow for slightly oversize stoppers and to facilitate proper adhesion between the foil disc and the edge of the container.

If desired we may mark a target area on the centre part of the stopper to indicate where a needle should be inserted. We prefer to shape the stopper so that its outer

3

surface at the centre is spaced inwardly from the plane of the upper edge of the neck of the container so that whilst the foil disc will adhere to the top of the container and in some cases the peripheral portion of the stopper, it will not adhere to the central area.

In order that the invention may be well understood some preferred embodiments thereof by way of example only will now be described with reference to the accompanying drawing in which:

Figure 1 is a section through a vial suitable for an antibiotic preparation.

Figures 2 to 8 each show a section through the neck of the vial of Figure 1 with a different form of stopper therein.

Figure 9 shows a sectional side view of a vial completely closed in accordance with this invention.

Figure 10 shows a plan view of Figure 9 and

Figure 11 shows a preferred form of foil disc.

Figure 1 shows a glass vial 1 having a neck 2 with a square shoulder 3 extending around the inside. The neck 2 of the vial has a flat upper surface 4. Such vials may conveniently be used for penicillin and other antibiotics and for quantities of say from 5-30 cc. it is only necessary to increase the height of the vial without necessarily varying the dimensions of the neck. We have found that for such vials a depth of shoulder from the edge 4 of $\frac{1}{8}$ " and a radial width of shoulder of $\frac{1}{8}$ " gives satisfactory results although it will be understood that we do not in any way limit the invention to such dimensions.

Figure 2 shows a rubber stopper inserted into the neck of the vial 1. The stopper has a rim 5 adapted to seat on the shoulder 3 and of such thickness that it is just flush with surface 4 when so seated. The edge is radiused as at 6 to facilitate the application to the closure of a foil disc 7 for instance as shown in Figure 11. The central portion 8 of the stopper is of less thickness than the rim 5 to facilitate entry of a hypodermic needle.

Figure 3 shows a modified stopper having recessed portions 9 in the central area on the upper and lower side.

Figure 4 shows a flat disc of thickness less than the depth of shoulder 3.

Figure 5 shows another form of stopper having a rim 10, radiused at 11 and 12 and having a flat recessed central portion 13 on the upper side only.

Figure 6 shows a stopper similar to that of Figure 3 only having small concave recesses 14 on each surface.

The stopper in Figure 7 has a concave recess 15 in the upper surface only.

In Figure 8 a preferred form of stopper is shown having a plug portion 16 extending into the neck of the vial. This stopper has a concave central portion 17 on the upper surface and is hollowed out at 18 on the underside to enable a hypodermic needle to be easily inserted.

Figure 11 shows a disc of aluminium foil 7 having a heat sealing adhesive on its underside which, according to this invention is secured directly to the upper surface 4 of the vials shown in any of Figures 1 to 9. The said disc 7 has a tab 20 to serve as a tear off tab for the closure. We prefer to use a heat sealing adhesive based on polyisobutylene and rosin and preferably we employ an adhesive sold under the trademark "Telstic."

Figure 9 shows the vial 1 completely closed. A stop-

4

per 21 is seated on shoulder 3 and is so dimensioned that it does not extend beyond surface 4. A centre point 22 (see Figure 10) and a target ring 23 are moulded or otherwise marked on the upper surface to indicate where a needle should be inserted. A disc (Figure 11) is applied to the upper surface 4 of the vial and when heated adheres thereto and to the portions of the stopper flush therewith but not to the central portion 24.

The vial is then completely sealed against moisture. As will be seen from Figures 1 and 9 the neck of the vial is preferably of a diameter not greater than that of the base to facilitate packing a number of such vials.

It will be seen that closure means have been provided which, whilst giving a better and more moisture tight seal than those hitherto proposed, are simpler in construction and are less expensive since the fact that the porosity of the stopper is no longer of critical importance, enables a wider range of cheaper compositions to be used, and makes it unnecessary to use the somewhat costly rubber mixes hitherto used. Furthermore variation in batches of rubber becomes relatively unimportant.

It will be understood that we have only described certain preferred embodiments of our invention by way of example and that variations and modifications may be made therein without departing from the scope of the invention. Thus whilst we have described in particular small vials for antibiotics it will be understood that the invention can be applied to larger containers for any substances or contents where the complete exclusion of moisture is of importance.

I claim:

1. A sealed container comprising, a moisture impervious container having a peripherally continuous flat end surface surrounding an open end thereof, an outwardly facing annular shoulder in said container adjacent said open end, a stopper in said open end and seated on said shoulder, said stopper being of self-sustaining but readily pierceable and self-sealing resilient material, said stopper being so dimensioned that no part thereof extends outwardly beyond said end surface, a separate flat sealing disc of imperforate metal foil extending across said open end and said end surface, and a moisture impervious thermoplastic adhesive securing said flat foil disc to said flat end surface, the peripheral edge of at least the major portion of said disc being sealed to said flat end surface.

2. A sealed container as defined in claim 1 in which said thermoplastic adhesive comprises polyisobutylene and rosin.

References Cited in the file of this patent

UNITED STATES PATENTS

711,146	Yerby	Oct. 14, 1902
1,630,867	Smith	May 31, 1927
1,683,313	Stewart	Sept. 4, 1928
1,814,650	Waite	July 14, 1931
2,305,744	Sonnenberg	Dec. 22, 1942
2,373,847	Osborne	Apr. 17, 1945

FOREIGN PATENTS

411,081	Germany	Mar. 14, 1925
325,629	Great Britain	Feb. 27, 1930
368,818	Great Britain	Mar. 9, 1932