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Complete Specification Left, 6th Sept., 1906—Accepted, 31st Dec., 1906

PROVISIONAL SPECIFICATION.

“Improvements in and connected with Bottle Stoppers.”

I, HEINRICH RUDOLF, of 84B Alt Moabit, Berlin, Kingdom of Prussia, German Empire, Manufacturer, do hereby declare the nature of this invention to be as follows:—

5 My invention has reference to bottle stoppers provided with a packing ring of india rubber or the like and has for its purpose to provide a stopper of such type, in which a perfect closure of the bottle is obtained by a convenient manipulation of the stopper and the rubber disc, as hereinafter to be described.

10 Hitherto rubber discs have been used, for the purpose of making joint with the bottle, having a large cross section thus requiring a large amount of material of which much was superfluous and without even then producing a perfect closure of the bottle.

15 Now I have found that these disadvantages may be obviated by the employment of a disc or ring of india rubber having comparatively a very small cross-section and by suitably constructing the top or neck of the bottle and the stopper.

In order to make my invention clear, I will refer to the accompanying drawing, in which:—

20 Figure 1 shews in sectional elevation the neck of a bottle provided with a stopper partly in elevation and partly in section made according to my invention, the stopper being raised from or above the mouth of the neck.

Figure 2 is a similar view and shews the stopper just resting on the mouth of the neck of the bottle, and

Figure 3 is also a similar view and shews the bottle completely closed.

25 The stopper *a* conveniently made of porcelain or earthenware, has a conical neck *a*¹ strictly in conformity with the inner surface *b* of the bottle mouth *b*¹. This conical neck is provided at its lower end with a small groove *r* the height and depth of which amount to about 1½ to 2 millimetres. In continuation at this groove, a plunger or shank *c* is formed having about the same external diameter as the internal diameter of the adjacent part of the bottle neck when
30 closed, thus producing a very small passage for the liquid between that head *c* and the adjoining part of the bottle neck.

A rubber ring *d* is placed in the groove *r* having when properly mounted, a cross section of about 1½ millimeters in height and 4½ millimetres in breadth.

35 As aforesaid the depth of the groove *r* is 1½ millimeters, therefore the india-rubber ring when placed therein, projects about 3 millimeters beyond the outside of the shank *c*.

40 Owing to the strict accordance between the surface *b*¹ and the conical neck *a*¹ and owing to the fact that, a distance of ½ millimeter only exists between these parts, the ring having a thickness of 1½ millimeters is pressed closely and uniformly around and against the edge *o* of the stopper, and the closure is effected at that place essentially.

For obtaining this result it is furthermore necessary that the stopper should be forced on to the mouth of the bottle by a force acting in alignment with the axis of the bottle and the stopper, and this can be carried into effect by

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using a spring bail. Therefore, for obtaining a good closure the following requirements must be essentially fulfilled:

The bottle neck adjacent to the place of closure must be similar to the shape of the stopper, the groove should be of small dimensions only (about 2 millimeters at the most) and the rubber disc *c* must also be of small dimensions, *viz.* 5
a thickness of 2 millimeters at the utmost when in compression, and a breadth of 4 to 5 millimeters, for any enlargement of these dimensions would have an injurious influence upon the closure of the stopper and the joint of the stopper with the bottle neck would be extended beyond the jointing edge *o*, to those 10
places lying in a higher plane, whereby difficulties in pressing down the stopper would ensue.

The breadth of the surface of the joint has no influence upon the exactness of the closure.

It is sufficient to provide an edge evenly tight, which is ensured by the shape of the stopper and the bottle mouth, as well as by the small dimensions of the rubber ring, as described and illustrated. 15

The bail device *e* which does not form part of my invention and can be of any convenient construction is connected to the middle of the stopper, thereby ensuring the uniform pressure of the rubber ring between the jointing edge *o* of the stopper, and the adjacent part of the neck of the bottle. 20

Dated this Twenty fourth day of March 1906.

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Chartered Patent Agents.

COMPLETE SPECIFICATION. 25

Improvements in and connected with Bottle Stoppers.

I, HEINRICH RUDOLF, of 84B Alt Moabit, Berlin, Kingdom of Prussia, German Empire, Manufacturer, do hereby declare the nature of this invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:— 30

My invention has reference to bottle stoppers provided with a packing ring of india rubber or the like and has for its purpose to provide a stopper of such type, in which a perfect closure of the bottle is obtained by a convenient manipulation of the stopper and the annular rubber disc or ring, as hereinafter to be described. 35

Closure devices of this type are known in which packing rings are used of a round or rectangular cross section, these rings being received in half circular or rectangular recesses or grooves provided in the taper body of the stopper or other convenient closure. Other known devices for closing bottles, more especially sterilising bottles, are fitted with a packing ring or two combined 40
packing rings of a large rectangular cross section, which is or are received in grooves at the bottom of a taper plug the stopper or plug being depressed on to a small taper seating surface at the top of the bottle neck with the rubber or other ring like a cushion between them and therefore liable to lateral movement under the influence of the internal pressure of the bottle in one direction and 45
impact upon the stopper in the other direction.

The chief feature of the present invention consists therein, that a ring of india-rubber or the like material of extremely small thickness and breadth is arranged near the lower end of a relatively large tapering seating surface of the bottle neck. It will easily be seen that such a thin layer of india-rubber or 50

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the like will be very suitable and easily fills up all the irregularities unavoidably present in the seating surface of the bottle and in its stopper. Owing to the large seating surface and the thin packing layer the stopper will not be mounted on the packing ring as on a cushion, as heretofore, and will not be liable to lateral movements for according to this invention the stopper is fixedly mounted as though in a solid bearing and thereby is surely prevented from lateral movements, even if subjected to a high inner pressure. A further considerable advantage of my packing ring having such small cross sectional dimensions is a saving of much material.

For cases, bottles, boxes, jars and the like for preserves and the like the internal and external diameters of the ring would of course be larger.

Another feature of the invention is a plug extension on the taper stopper the extension being also arranged to fit the bottle neck.

In order to make my invention clear, I refer to the drawings filed with the Provisional Specification, in which:

Figure 1 shows in sectional elevation the neck of a bottle provided with a stopper partly in elevation and partly in section made according to my invention, the stopper being raised from or above the mouth of the neck.

Figure 2 is a similar view and shows the stopper just resting on the mouth of the neck of the bottle, and,

Figure 3 is also a similar view and shows the bottle completely closed.

The stopper *a* conveniently made of porcelain or earthenware has a conical neck *a'* strictly in conformity with the inner surface *b* of the bottle mouth *b'*. This conical neck is provided at its lower end with a small groove *r* the height and depth of which amount to about $1\frac{1}{2}$ to 2 millimetres. In continuation at this groove a plunger or shank *c* is formed having about the same external diameter as the internal diameter of the adjacent part of the bottle neck when closed, thus producing a very small passage for the liquid between that head *c* and the adjoining part of the bottle neck.

A rubber ring *d* is placed in the groove *r* having, when properly mounted, a cross section of about $1\frac{1}{2}$ millimetres in height and $4\frac{1}{2}$ millimetres in breadth.

As aforesaid the depth of the groove *r* is $1\frac{1}{2}$ millimetres, therefore the india-rubber ring when placed therein, projects about 3 millimetres beyond the outside of the shank *c*.

Owing to the strict accordance between the surface *b'* and the conical neck *a'* and owing to the fact that, a distance of $\frac{1}{2}$ millimeter only exists between these parts, the ring having a thickness of $1\frac{1}{2}$ millimetres is pressed closely and uniformly around and against the edge *o* of the stopper, and the closure is effected at that place essentially.

For obtaining this result it is furthermore necessary that the stopper should be forced on to the mouth of the bottle by a force acting in alignment with the axis of the bottle and the stopper, and this can be carried into effect by using a spring bail. Therefore for obtaining a good closure the following requirements must be essentially fulfilled:

The bottle neck adjacent to the place of closure be similar to the shape of the stopper, the groove should be of small dimensions only (about 2 millimetres at the most) and the rubber ring *d* must also be of small dimensions, *viz.* a thickness of 2 millimetres at the utmost when in compression, and a breadth of 4 to 5 millimetres, for any enlargement of these dimensions would have an injurious influence upon the closure of the stopper and the joint of the stopper with the bottle neck would be extended beyond the jointing edge *o*, to those places lying in a higher plane, whereby difficulties in pressing down the stopper would ensue.

The breadth of the surface of the joint has no influence upon the exactness of the closure.

It is sufficient to provide an edge evenly tight, which is ensured by the shape

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of the stopper and the bottle mouth, as well as by the small dimensions of the rubber ring, as described and illustrated.

The bail device *e* which does not form part of my invention and can be of any convenient construction is connected to the middle of the stopper, thereby ensuring the uniform pressure of the rubber ring between the jointing edge *o* 5 of the stopper, and the adjacent part of the neck of the bottle.

Having now particularly described and ascertained the nature of my invention, and in what manner the same is to be performed, I declare that what I claim is:—

1. A bottle, jar and like stopper, comprising in combination a porcelain or 10 the like plug having a tapering middle part provided near its lower end with a small annular recess or groove and with a cylindrical bottom part the tapering and cylindrical parts only slightly differing in dimensions from those of the opening of the receptacle which is tapered also, a rubber ring mounted in said 15 groove and having a maximum thickness of about 2 millimeters and a breadth of about 4 to 5 millimeters, for the purpose of obtaining a small tightening zone around the lower edge of the tapered middle part and for saving rubber material, and a locking device for the stopper.

2. The combination of the improved stopper and locking bail both constructed 20 and operating as shown on the drawings.

Dated this 6th day of September 1906.

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Fig. 1.

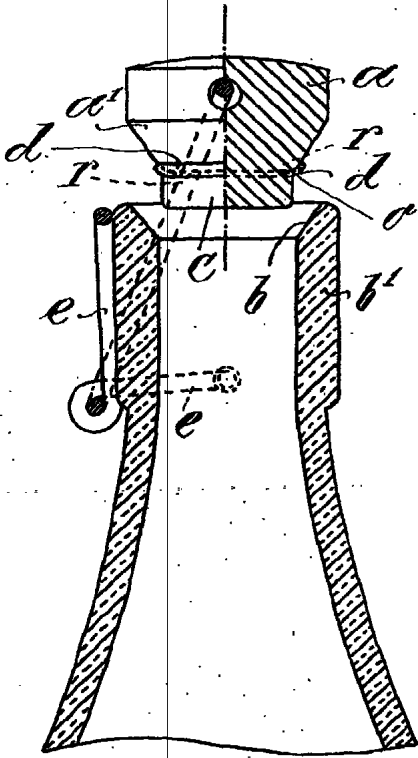


Fig. 2.

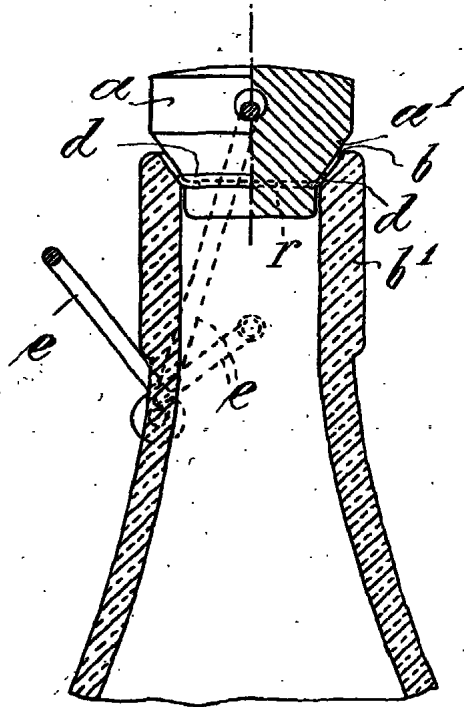
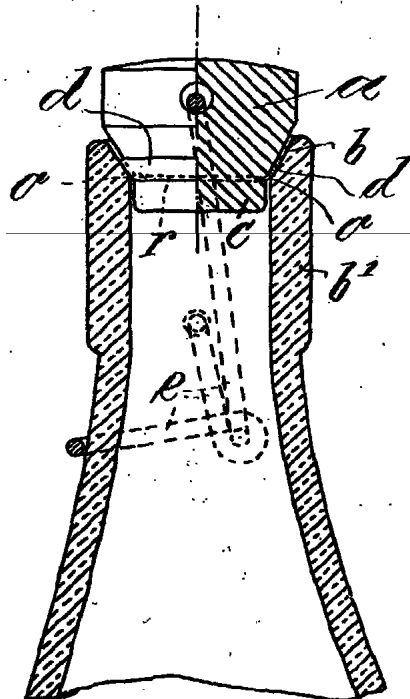


Fig. 3.



[This Drawing is a reproduction of the Original on a reduced scale.]