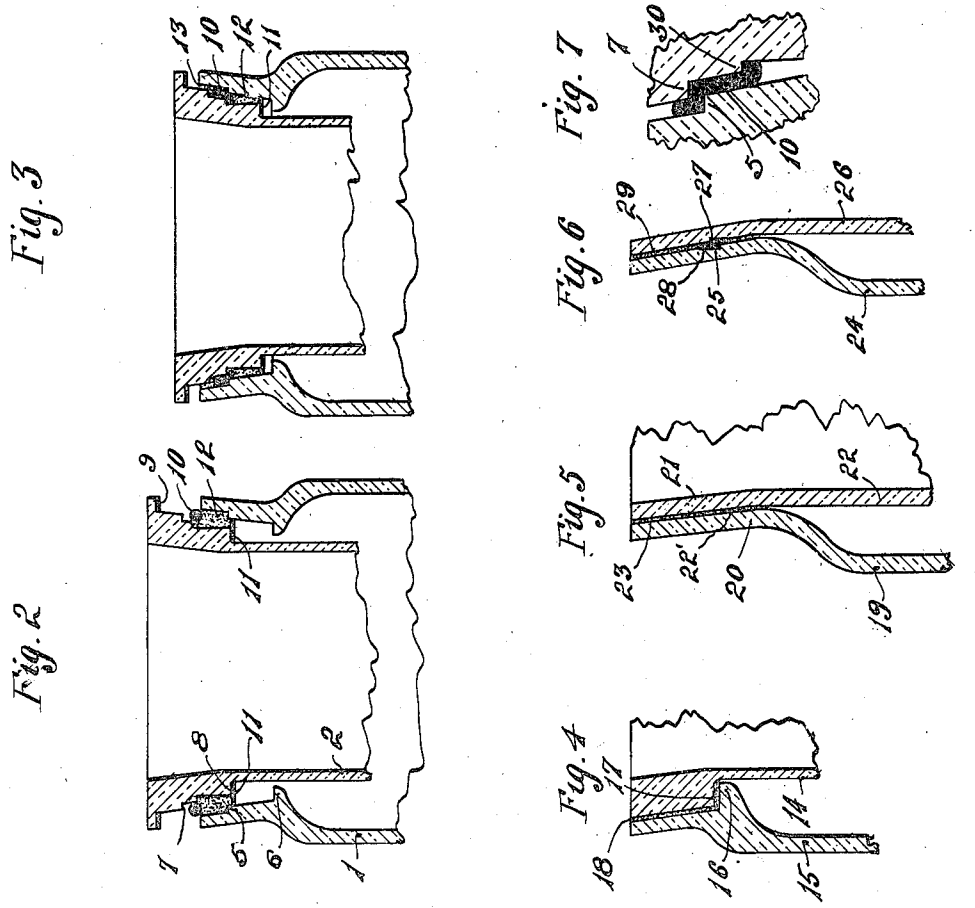
J. J. ENGEL.

VACUUM BOTTLE.

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1,199,772. Patented Oct. 3, 1916.



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JOHN J. ENGEL, OF PITTSBURGH, PENNSYLVANIA.

VACUUM-BOTTLE.

1,199,772. Specification of Letters Patent. Patented Oct. 3, 1916.

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To all whom it may concern:

Be it known that I, JOHN J. ENGEL, a citizen of the United States, residing at Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Vacuum Bottles, of which the following is a specification.

The invention relates to vacuum bottles, and has for its primary objects; the provision of an improved bottle, (1) which may be cheaply constructed, (2) which is stronger than the one-piece bottle as heretofore made, (3) which requires no support for the inner shell aside from the support at the neck or top, and (4) which has a secure and enduring seal between the inner and outer shells. Certain embodiments of the invention are illustrated in the accompanying drawings, wherein—

Figure 1 is a vertical section through my improved bottle, Figs. 2 and 3 are sections of the upper portion of the bottle in two stages of the assembling operation, Figs. 4, 5 and 6 are partial sections illustrating modifications, and Fig. 7 is an enlarged section showing a portion of the seal in the construction of Fig. 1.

In the construction of Fig. 1, the reference numeral 1 indicates the outer glass shell, 2 the inner glass shell, and 3 the glass cork from which the air has been exhausted and which is provided with a coating 4 of cork to insure a tight joint between the cork and the inner shell or casing 2.

As indicated in Figs. 2 and 3, the upper portion of the outer shell 1 is provided with a pair of inwardly projecting annular shelves 5 and 6, while the inner shell is provided with a pair of opposing shelves or shoulders 7 and 8, the purpose being to secure a tight joint between the inner and outer shells as hereinafter set forth.

Resilient seals in the form of rubber bands 9, 10 and 11 are employed, and after the air has been exhausted from the vacuum chamber containing the shells and while the parts are in the position illustrated in Fig. 2, the liquid or plastic cement 12 is applied. At this time the same vacuum exists between the two shells as that of the vacuum chamber, and the inner shell is pressed down to the position indicated in Fig. 3 and more liquid cement 13 is applied above the seal 10, and the application of this cement is continued until the inner shell is forced down to its final position as indicated in Fig. 1.

The joint between the two shells is thus provided with three rubber seals 9, 10 and 11, and two seals of cement 12 and 13, the cement being of such a character that it subsequently hardens, securely cementing the two shells together, and providing an air-tight seal.

The use of the cement is advantageous in that it not only adds to the security of the seal but also serves to protect the rubber seals 10 and 11 from the air. The resiliency of the rubber is thus retained for a much greater period and a perfect seal is insured as long as such resiliency endures. The rubber seals insure against a leakage of air while the cement seals are hardening, and gives a joint which is more perfect than that which can be secured with a cement seal alone, since it has been found to be almost impossible to secure a lasting seal with cement only. Another advantageous incident to the use of the rubber seals is that the inner shell is yieldingly supported and less liable to break than if such rubber seals were not used. The upper rubber seals also serve to protect the cement seals from the action of air and water.

The band or seal 10 is preferably circular in cross-section as indicated in Fig. 2, and when the inner shell is pressed into final position as indicated in Fig. 1, this band is deformed by the opposing shoulders 5 and 7 to the cross-section shown in Fig. 1, thus giving a very perfect seal. An additional small shoulder 30 is also preferably employed below the shoulder 7 as shown best in Fig. 7, such shoulder serving to pull down a portion of the rubber below the shoulder 5. The pressure of the air upon the inner shell tends to hold such shell in the position indicated in Fig. 1 during the period in which the cement is hardening, and the rubber seals as thus held under compression prevent any downflow of air or cement between the shells. The inner and outer shells can be thoroughly annealed before the assembling operation so that the bottle produced is strong and serviceable. The support of the inner shell at its upper end is such that no additional supports are required between the two shells below their upper ends and as a result the bottle is not

subject to the loss of efficiency due to the use of the usual pads or supports placed between the inner and outer shells.

Fig. 4 illustrates a modification in which the joint between the inner and outer shells 14 and 15 is simplified, there being only a single supporting shelf 16 and one rubber seal 17 above which the liquid or plastic cement 18 is applied.

In the construction of Fig. 5 the inwardly projecting support by the outer shell 19 is provided by the inclined end portion 20 which opposes the inclined portion 21 of the shell 22. Between these opposing portions is provided the rubber seal 22′ and the cement seal 23.

Fig. 6 illustrates a modification of the structure of Fig. 5 in which the outer shell 24 is provided with a recess 25, and the inner shell 26 is provided with a recess 27. The rubber seal 28 fits in these recesses, being deformed by the sharp corners thereof, and a cement seal 29 is applied thereabove. Other modifications involving the same principle of invention might obviously be made.

What I claim is:

1. In combination in a vacuum bottle, an outer glass shell having a neck provided on its inner surface below the upper edge thereof with an inwardly projecting supporting portion, an inner glass shell having an open neck provided on its outer surface below the upper end thereof with a projecting portion opposing and lying above the said supporting portion, and a resilient seal interposed between said opposing portions.

2. In combination in a vacuum bottle, an outer glass shell having a neck provided on its inner surface below the upper edge thereof with an inwardly projecting supporting portion, an inner glass shell having an open neck provided on its outer surface below the upper end thereof with a projecting portion opposing and lying above the said supporting portion, a resilient seal interposed between said opposing portions, and a layer of cement between the two necks above the resilient seal forming a permanent seal and cementing the opposing surfaces of the necks together.

3. In combination in a vacuum bottle, an outer glass shell having a neck provided on its inner surface below the upper edge thereof with an inwardly projecting supporting portion, an inner glass shell having an open neck provided on its outer surface below the upper end thereof with a projecting portion opposing and lying above the said supporting portion, and a resilient seal interposed between said opposing portions, the inner shell being entirely supported at its neck.

4. In combination in a vacuum bottle, an outer glass shell open at its upper end and having a supporting portion on the surface of such upper end, an inner glass shell in the outer shell open at its upper end and having a supported portion on its outer surface below such upper end opposing the said supporting portion, a resilient seal between the supporting and supported portions, a filling of cement above said seal and a second resilient seal between the two shells above the cement.

5. In combination in a vacuum bottle, an outer glass shell having an inwardly projecting annular shoulder at its upper end, an inner glass shell fitting in the outer shell and provided with an annular shoulder lying above and opposing the first shoulder and also having another annular shoulder below both of the other shoulders, and a resilient seal compressed between the two shells at the seal, such seal having its upper edge opposite the upper shoulder on the inner shell and its lower edge below the lower shoulder.

JOHN J. ENGEL.