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A. SIMONS

METHOD OF MAKING SEAMLESS CONTAINERS

Filed May 18, 1928

Fig. 1.

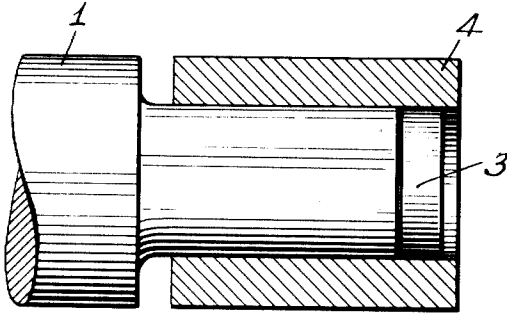


Fig. 2.

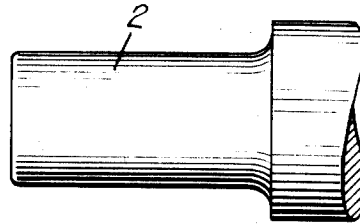


Fig. 3.

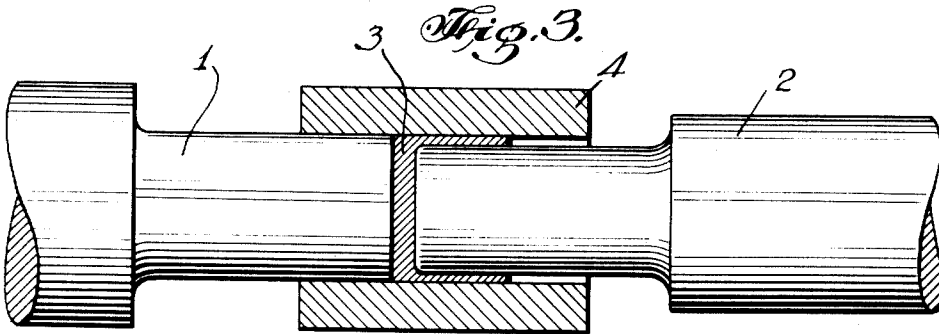
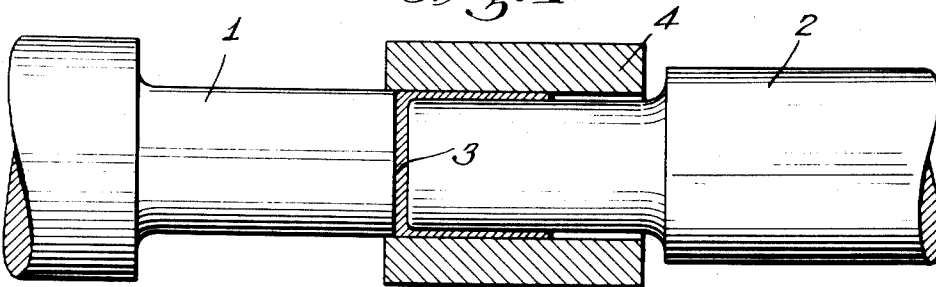


Fig. 4.



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METHOD OF MAKING SEAMLESS CONTAINERS.

Application filed May 18, 1928. Serial No. 278,701.

My invention relates to a new and improved method of making seamless containers, such as tubes or the like and a new and improved seamless container.

5 One of the objects of my invention is to provide a new and improved method of making seamless tubes of the kind used for making containers for toothpaste and various similar products.

10 Another object of my invention is to provide a new and improved extrusion process for producing such seamless containers which shall require the use of much smaller working pressures than have hitherto been
15 deemed necessary.

Another object of my invention is to provide a new and improved extrusion process for making seamless containers in which the metal is positively actuated in the direction
20 of the longitudinal axis of the container which is being formed.

Another object of my invention is to provide a metallic seamless container of improved structure.

25 Other objects of my invention will be set forth in the following description and drawings which illustrate a preferred embodiment thereof, it being understood that the above general statement of the objects of my invention is intended merely to generally explain the same and not to limit it in any
30 manner.

Fig. 1 is a diagrammatic elevation illustrating how a disc of metal is held in proper
35 position to be extruded.

Fig. 2 is a side elevation of the plunger used for extruding the metal.

Fig. 3 is a side elevation diagrammatically illustrating an intermediate stage in the operation of the method.
40

Fig. 4 is a view similar to Fig. 3 showing the last stage in the operation of the method.

Heretofore in making seamless containers or tubes, it has been customary to extrude
45 a disc of metal located within a die, by forcing a plunger against the said disc. This plunger was spaced from the annular wall of the die, so that the metal was compressed and would flow longitudinally upon the
50 plunger, thus making a seamless container. The method utilized for making a tube was substantially the same save that the die and plunger were designed so as to open the central part of the disc which was being extruded, or else an annular metal body was
55 extruded, while the central opening in said an-

ular body of metal was prevented from closing. In order to be effective these prior methods required the use of very high working pressures so that the plunger had to be
60 actuated with a force as high as 150 tons per square inch. This rendered the extrusion operation uncertain because fine adjustments could not be maintained when the parts of the press were subjected to such tremendous
65 working stresses. In such prior methods the pressure exerted by the plunger had to cause the metal disc to flow laterally and to also cause the flowing metal to flow parallel to the axis of the plunger. While it required a
70 relatively low pressure to merely compress the disc of metal to cause it to flow laterally, it required very great pressure to cause the flowing metal to then move in a direction
75 parallel to the axis of the plunger, especially if the container or tube had a thin wall. According to my invention the pressure of the plunger is only utilized for causing the metal to flow laterally, and the laterally flowing
80 metal is then positively actuated in a longitudinal direction, namely, in a direction parallel to the axis of the plunger.

The operation of the new method is illustrated in connection with the manufacture of a seamless tube having a closed end, although it is equally applicable for the manufacture of seamless tubes open at both ends thereof.

As shown in Fig. 1, a disc 3 made of any suitable metal such as aluminum, zinc or the
90 like, is held in position at the end of an abutment member 1 which may be secured to any suitable support. An extrusion tube 4 is slidably mounted upon the member 1. A
95 plunger 2 is operated by any suitable mechanism so as to compress the disc 3 and cause the metal thereof to flow laterally. The wall of the plunger 2 has a slight clearance with respect to the inner wall of the member 4,
100 this clearance being sufficient to allow for the thickness of the extruded tube. The members 1 and 2 are preferably held vertically with the member 2 above the member 1, although this is not essential for the purposes
105 of my invention.

The member 2 is forced against the disc 3 with sufficient pressure to cause the metal of the disc 3 to flow laterally. At the same time, the member 4 is slid upon the member 1 so
110 that the laterally flowing metal is engaged by the inner wall of the member 4 and is positively moved longitudinally as illustrated in

Fig. 3. This longitudinal movement of the member 4 with respect to the members 1 and 2 is continued until the laterally flowing metal has been extruded to form a container of the desired length. Instead of keeping the member 1 stationary, it could also be moved in a direction parallel to the direction of movement of the plunger 2. While this is being done, the member 1 could be caused to move a little more slowly than the member 2 so as to cause the metal disc 3 to be extruded.

The pressure exerted upon the disc 3 need only be sufficient to cause it to flow laterally, because the longitudinal movement of the metal is positively caused by the member 4.

Likewise, a superior and durable container is secured because the fibres of the metal at the edge of the closed end thereof are curved to follow the contour of the tube, instead of being highly compressed at this point to form a very sharp angle.

It will be noted that the laterally flowing metal of the disc 3 is positively actuated or assisted to flow in a longitudinal direction after it has spread out in a direction perpendicular to the line of pressure, in contradistinction to prior methods in which the longitudinal flow was caused by the pressure exerted on the disc in a direction perpendicular to said longitudinal flow.

It is preferable to move the member 4 with considerable velocity in a direction opposite to the direction of movement of the plunger 2 so that the said member 4 is moved in the same direction as the longitudinally flowing metal. It is preferable to move the member 4 with the same velocity as the longitudinally flowing metal, so that said longitudinally flowing metal will not be retarded by any friction thereof with the inner wall of said member 4. Indeed it is advantageous to have the velocity of the member 4 exceed the velocity of the extruded metal so that the extruded metal will have its flow facilitated. However, I do not wish to limit my invention to any par-

ticular velocity of the member 4, because even if the member 4 moves more slowly than the longitudinally flowing metal, the longitudinal movement of said flowing metal will be assisted, thus enabling a lower pressure to be utilized than if the member 4 were kept stationary. The plunger 2 and the inner wall of the member 4 may be lubricated to facilitate the longitudinal flow of the metal. Likewise, this lubrication enables the member 4 to be readily stripped from the formed article upon the third stroke of the apparatus. Upon this third stroke, the member 4 is removed from the container, leaving it upon the plunger 2 from which it can be afterwards removed.

It is to be understood that whenever I refer to a disc of metal, I include a perforated disc as well as an imperforate disc and that I also include any slug or block of metal which can be extruded to make any shape or form of seamless container or tube.

The completed article may be cylindrical, it may have an irregular cross section or it may have a cross section of any desired polygonal contour.

I claim:

1. A method of extruding a disc of metal which consists in pressing the same to cause the metal thereof to flow laterally and to then flow in a direction opposed to the line of pressure on said disc; while positively assisting the flowing metal to flow in said opposed direction.

2. A method of extruding metal which consists in compressing a metal member to cause the metal thereof to flow laterally and to then flow in a direction opposed to the line of pressure, and simultaneously positively assisting the laterally flowing metal to move in a direction substantially perpendicular to the line of lateral flow, and opposed to said direction.

In testimony whereof I affix my signature.

ABRAHAM SIMONS.