A. B. STARR.

METHOD OF MANUFACTURING CONTAINERS.

APPLICATION FILED MAR. 6, 1914.

1,161,795. Patented Nov. 23, 1915.

Fig. 1.

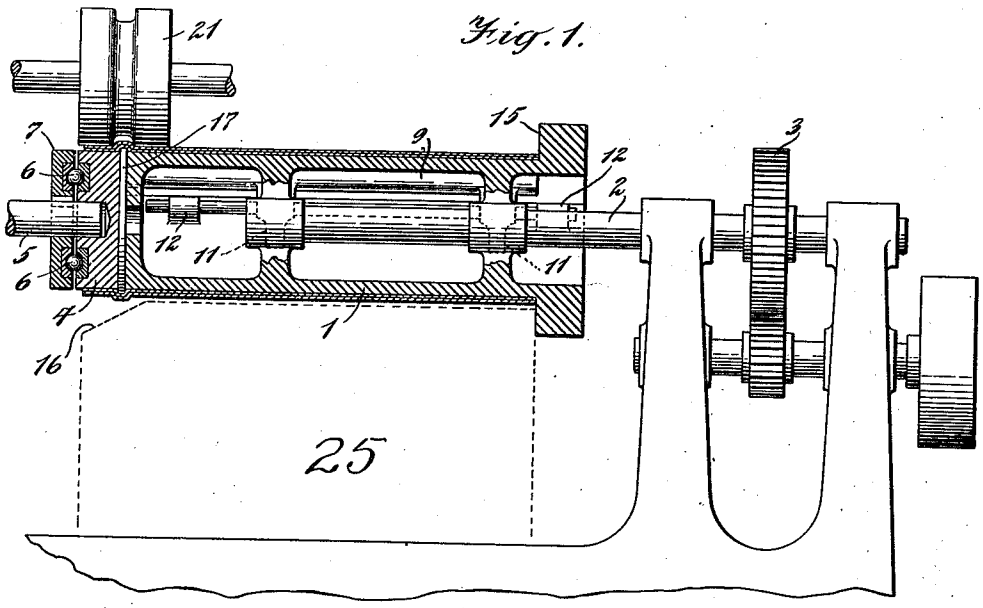


Fig. 3.

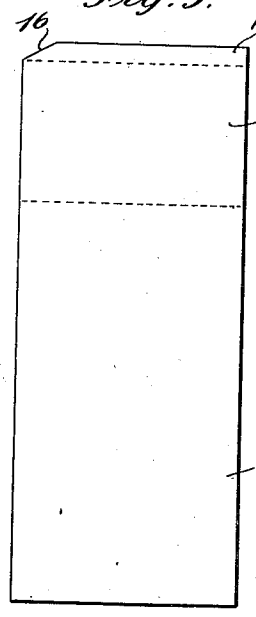


Fig. 2.

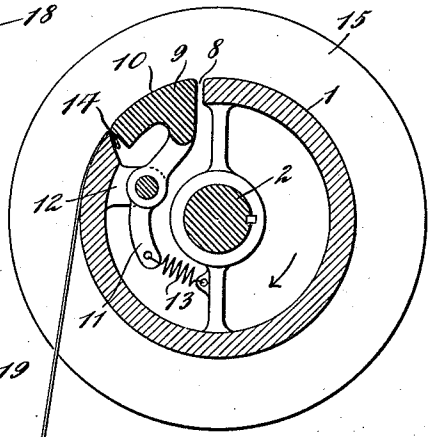
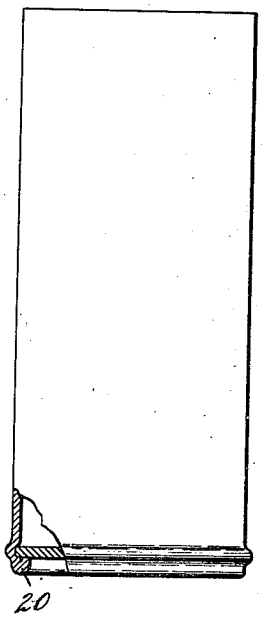


Fig. 4.



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UNITED STATES PATENT OFFICE.

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METHOD OF MANUFACTURING CONTAINERS.

1,161,795. Specification of Letters Patent Patented Nov. 23, 1915.

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To all whom it may concern:

Be it known that I, ALDEN B. STARR, a citizen of the United States, residing at the city of New York, in the borough of Manhattan and State of New York, have invented certain new and useful Improvements in Methods of Manufacturing Containers, of which the following is a full, clear, and exact description.

This invention relates to the manufacture of packages, containers, or boxes, and has special reference to methods of making such articles from sheet material, particularly paper and pasteboard, and generally from sheet material of any kind, such as metal, celluloid, and so forth.

The object of the invention is to provide a method by which the manufacture of such containers may be economically conducted and at the same time produce an article which shall be strong and adapted to securely hold liquid or dry contents. The form of container for which my invention is best adapted is one in which the side wall is cylindrical or tubular and in which the end wall or bottom consists of a disk inserted and secured within the internal diameter of the cylinder or tube. Large quantities of such containers are now being manufactured by a method which consists in forming the cylindrical side wall first and thereafter applying the end wall or bottom which is held in place by grooves or beads which have been previously formed in the cylindrical body and against or between which the edges of the bottom are held. These separate steps in the making of the parts of the container and their subsequent assembly, involve an expense which my invention is designed to avoid.

In its broader aspects, therefore, my invention consists in simultaneously forming the side wall of the container and attaching thereto the bottom or end wall.

More specifically, the invention consists in winding a strip of sheet material upon itself so that its layers will be superposed until the desired thickness is obtained, such winding being applied to or against the edge of the disk-like bottom or end wall, which is in the meantime being held in a position generally transverse to the winding axis or mandrel, a pressure or tension being exerted upon the winding sheet such that the edge of the bottom or end wall will be caused to displace the material of the winding sheet so as to form an internal annular groove in which the edge of the bottom or end wall will find a secure seat. The sheet material to form the side wall is preferably of paper in a damp or moistened condition so that it will yield to the lateral resistance of the end disk and readily conform thereto and furnish the seat described.

My improved method may be realized by means of a variety of machines or apparatus but I have shown in the accompanying drawing, in conventional form, only one form of apparatus which might be used for the purpose.

In the drawings, Figure 1 is a longitudinal section of a mandrel and coöperating parts showing a partially formed container thereon; Fig. 2 is a transverse section of the mandrel; Fig. 3 is a plan of one of the sheets of the material out of which the side wall of the container is made; and Fig. 4 is a side elevation with a portion broken away of the finished container.

Referring to the drawing, 1 indicates a hollow mandrel mounted upon and to turn with a shaft 2 which may be driven by gearing 3, or in any other manner.

4 indicates a disk or head supported upon the end of a non-rotating spindle 5 and having a thrust antifriction bearing 6 against a disk 7 secured to the spindle, such bearing and support permitting the disk to rotate independently of the spindle. The disk 4 is mounted adjacent to one end of the mandrel 1 concentric therewith and has the same external diameter as the mandrel. The disk and spindle 5 are supposed to be movable in an axial direction toward and away from the end of the mandrel, at the will of the operator, it thereby coöperating with the head of the mandrel to form a clamp. The side of the mandrel is preferably provided with a longitudinal slot 8 of considerable width, say, approximately 45 degrees of the entire surface of the mandrel and extending throughout its length. In this slot is placed a longitudinal bar 9 which nearly, but not quite, fills the entire width of the slot, and which has an outer concentric surface 10 projecting slightly beyond the surface of the mandrel. This bar is mounted upon arms 11 pivoted to suitable supports 12 inside of the mandrel, the arms being acted upon by springs 13 which normally hold

one edge of the bar 9 against one lip of the slot 8 forming at that point clamping jaws 14 extending the length of the mandrel. The end of the mandrel remote from the disk 4 is provided with a flange 15 which serves as a guide in the winding operation.

Fig. 3 shows the blank sheet or strip of paper out of which the side wall of the container is to be formed. This strip is to be wound upon the mandrel, one turn over another, until the proper thickness of side wall is obtained. For this purpose the length of the strip is made to agree with the number of turns required; its width is equal to the final length of the finished container. A small triangular piece is removed from one corner of this sheet, as indicated at 16, for a purpose which will hereinafter appear.

For the ordinary form of container to which this detailed description refers, the bottom or end wall is a circular disk of heavy paper or pasteboard which is stamped or otherwise formed. Before the winding operation commences, one of these disks, indicated by 17, is clamped concentrically between the disk 4 and the head of the mandrel. The external diameter of the mandrel is substantially the same as the internal diameter of the finished container, and this disk 17 is of slightly greater diameter, say, for instance, $\frac{1}{16}$th of an inch, than the diameter of the mandrel or the internal diameter of the container of which it is to form a part. Therefore, when the disk 17 is clamped in place upon the mandrel, its edge projects annularly beyond the surface of the mandrel and also beyond the surface of the disk 4 which is of the same diameter externally as the mandrel. With the disk 17 thus in place upon the mandrel, the forward end of the sheet, Fig. 3, is presented to the mandrel so that the cutaway corner 16 will be presented opposite and extend across the edge of the disk 17, the opposite corner of the sheet being against the flange 15 as indicated by the dotted lines 25. The bar 10 in the mandrel is swung on its pivot in any suitable way to open the jaws 14 and admit the edge of the sheet, after which the bar is allowed to swing back to clamp the edge of the sheet and hold it during the winding operation. By cutting away the corner of the sheet as at 16, the edge of the disk 17 does not prevent the admission of the edge of the sheet between the clamping jaws 14 and the winding operation is permitted to begin without any crimping or distortion of the sheet. It is to be understood that before the sheet is presented to the winding mandrel it is moistened in some suitable manner to soften it and permit it to yield locally to such stresses as it may be subjected to in the winding operation. This moistening may be done with water or with the glue which is commonly applied to these sheets to hold the various layers of the winding together. In Fig. 3 the section indicated by 18, which is a sufficient part of the length to make the first turn around the mandrel, is supposed to be dampened with water, while the remainder of the sheet indicated by 19 and the narrow strip 19′ is treated with a moist glue which serves the double purpose of softening the sheet and rendering it adhesive so that the layers as they are superposed upon the winding mandrel will be secured together. The object in using plain water upon the first turn of the sheet is obviously to prevent the sheet from adhering to the mandrel. The glued strip 19′ projects through the jaws 14 of the mandrel and becomes operative at the completion of the winding operation, as will be explained.

With the edge of the sheet secured in the mandrel as above described, the winding operation is begun by simply rotating the mandrel and allowing the sheet to be wound up thereon. In this winding operation a certain tension is put upon the sheet by any suitable means and since the left-hand edge of the sheet extends beyond the disk 17, the sheet will be pressed firmly against the edge thereof. By reason of the tension under which the sheet is wound and its moist condition, the projecting edge of the disk 17 will displace or stretch that portion of the material of the sheet immediately opposite the edge of the disk, causing an annular groove to be formed therein into which the edge of the disk will become seated as the winding is built up. When the sheet has been fully wound upon the mandrel with its layers duly secured together by the glue, the inner edge 19′ of the sheet is released from the jaws 14 by any suitable means acting upon the arms 11, and while the container is held stationary the mandrel is rotated a number of times to rub down the glued edge 19′ against the inner surface of the container where it will adhere. The outer surface of bar 9 which projects slightly beyond the surface of the mandrel, will form a bulge in the side of the container which will be removed when the mandrel with the bar is rotated while the container is held stationary as described. This smoothing out operation will, at the same time, slightly increase the diameter of the container and facilitate its removal from the mandrel. The container may then be removed from the mandrel by first withdrawing the disk 4 and its supporting parts and then sliding the container axially off from the mandrel. As the material of the side wall dries, it shrinks and becomes set so that the edge of the disk 17 will be firmly embedded and secured therein. By means of any suitable curling die brought into action before the container is removed from the mandrel, or afterward, the extreme edge of the container outside of

the bottom or end may be curled inward for additionally securing the disk, as seen at 20 in Fig. 4.

In order to improve or emphasize the form of the groove in which the edge of the disk 17 becomes seated, a forming die comprising one or more rollers such as shown at 21, may be pressed against the outer surface of the sheet while it is being wound, at a point directly opposite the edge of the disk 17. These rollers may be provided with a groove into which the edge of the disk 17 will force the layers of the sheet, the latter being thereby given the form of a true bead on the outside of the finished container. The use of such forming dies in connection with my invention is optional and depends somewhat upon the nature of the material of which the container is made. Such dies would be especially useful when the container is made of sheet metal such as tin, since the tension during the winding operation would not sufficiently displace the tin to afford a definite groove for the end disk. In making these containers of sheet metal, it is of course not contemplated that more than one thickness would be used for the side wall.

I wish to further point out that while I have specifically described the formation of a cylindrical container, my invention is equally applicable to a container of rectangular or other irregular cross-section. A square box with round corners might readily be formed according to this method, either from paper or its equivalent, or metal, and I therefore do not wish to be limited to any particular form of container in any construction which may be placed upon the claims which follow.

The end or bottom disk 17 may be perfectly flat as illustrated, or it may be slightly arched. Likewise it may be mounted in the mandrel at right angles to the axis thereof, as shown, or slightly tilted with respect thereto, the term "transversely to the axis" used in the appended claims being understood as approximately at right angles thereto.

I claim:—

1. The method of making containers which consists in wrapping sheet material which is eventually to become the side wall of the container, facewise against the edge of a disk which is located a short distance from one edge of the side wall sheet and which is eventually to become an end wall of the container, said side wall sheet being meanwhile supported and maintained parallel to the axis on each side of the disk, and during said wrapping operation pressing the two parts together to cause the edge of the disk to displace the material of the side wall and form a seat therein for the disk.

2. In the method of producing a container comprising a tubular member having a disk non-adhesively secured in the bottom thereof, the steps which comprise wrapping one or more complete turns of sheet material facewise around a disk which is spaced from but adjacent one side edge of the sheet to produce a tubular member having the disk positioned therein at a short distance from its bottom edge and simultaneously molding a groove in the sheet into which is fitted the edge of the disk as the tubular member is formed to thereafter prevent the displacement of the disk after the tubular member is completed.

3. In the method of producing a paper container comprising a tubular member having a disk non-adhesively secured in the bottom thereof, the steps which comprise wrapping a plurality of complete turns of relatively thin paper facewise around a disk spaced from but adjacent one side edge of the sheet to produce a tubular member having the disk positioned therein at a short distance from its bottom edge and simultaneously molding a groove in the sheet into which the edge of the disk is fitted as the tubular member is formed to thereafter prevent the displacement of the disk after the tubular member is completed.

4. In the method of producing a paper container comprising a tubular member having a disk non-adhesively secured in the bottom thereof, the steps which comprise first taking a relatively long, narrow sheet of paper and moistening one face thereof for its entire length with glue with the exception of a sufficient length of the strip at one end to form a complete turn around a disk, and then wrapping the sheet of material thus treated facewise around the disk, which is spaced from but adjacent one side edge of the sheet to produce a tubular member having the disk positioned therein at a short distance from its bottom edge and simultaneously molding a groove in the sheet into which the edge of the disk is fitted as the tubular member is formed, and in then securing the inner free edge of the sheet to the inner wall of the completed tubular member.

5. In the method of producing a container comprising a tubular member having a disk non-adhesively secured in the bottom thereof, the steps which comprise wrapping one or more turns of a sheet of material around the edge of the disk and simultaneously pressing the portion of the sheet surrounding the edge of the disk against the same with sufficient force to cause it to mold a groove in the tubular member as it is formed, which receives the edge of the disk and rigidly holds it against displacement.

6. In the method of producing a container comprising a tubular member having a disk non-adhesively secured in the bottom thereof, the steps which comprise wrapping a

turn of sheet material facewise around the edge of the disk and simultaneously pressing the portion of the sheet surrounding the edge of the disk against the latter with sufficient force to cause it to mold a groove in the tubular member as it is formed, which groove receives the edge of the disk, and in then wrapping additional turns of the sheet material around the tubular member thus formed in the same manner until the walls of the groove formed therein are of sufficient strength to rigidly secure the disk in the tubular member without the aid of an adhesive.

7. In the method of producing a container comprising a tubular member and a disk non-adhesively secured in the bottom thereof, the steps which comprise wrapping a strip of sheet material facewise against the edge of the disk which is positioned a short distance from one side edge of the sheet and simultaneously pressing the portion of the sheet surrounding the edge of the disk against the latter with sufficient force to displace that portion of the sheet surrounding the disk to form a groove in the tubular member thus formed intermediate the ends thereof, into which the edge of the disk is fitted as the tubular member is produced.

8. In the method of producing a paper container comprising a disk non-adhesively secured in the bottom thereof, the steps which comprise wrapping a turn of a relatively thin sheet of paper around the edge of the disk and simultaneously pressing the portion of the sheet surrounding the edge of the disk into contact with the latter to cause the said portion of the sheet to be displaced, molding a groove for the edge of the disk in the tubular member thus formed, and in continuing wrapping additional turns of the tubular member thus formed while exerting a pressure on it as before until the walls of the tubular member are of the requisite strength and the walls of the groove sufficiently strong to securely hold the disk against displacement.

9. In the method of producing a paper container comprising a tubular member having a disk non-adhesively secured in the bottom thereof, the steps which comprise moistening one face of a relatively long sheet of paper with glue for its entire length with the exception of a sufficient length at one end thereof to form one complete turn of a disk, and in moistening this length with water, then wrapping the sheet thus treated facewise around the edge of the disk and simultaneously pressing the portion of the sheet surrounding the disk against the latter with sufficient force to cause the said portion of the sheet to be displaced to form a groove which receives the edge of the disk, and in continuing the wrapping of the sheet around the tubular member thus formed while exerting pressure upon it as before until the walls of the tubular member are of the requisite strength and the walls of the groove sufficiently strong to rigidly hold the disk against displacement, and in then securing the inner free end of the sheet of material to the inner wall of the container.

In witness whereof I subscribe my signature in the presence of two witnesses.

ALDEN B. STARR.

Witnesses:

WALDO M. CHAPIN,

JOSEPH BUCKLEY.