Oct. 18, 1927. 1,645,931

H. E. RUCKERT ET AL

METHOD AND APPARATUS FOR MAKING PAPER PLATES AND THE LIKE

Filed Jan. 12, 1925 2 Sheets-Sheet 1

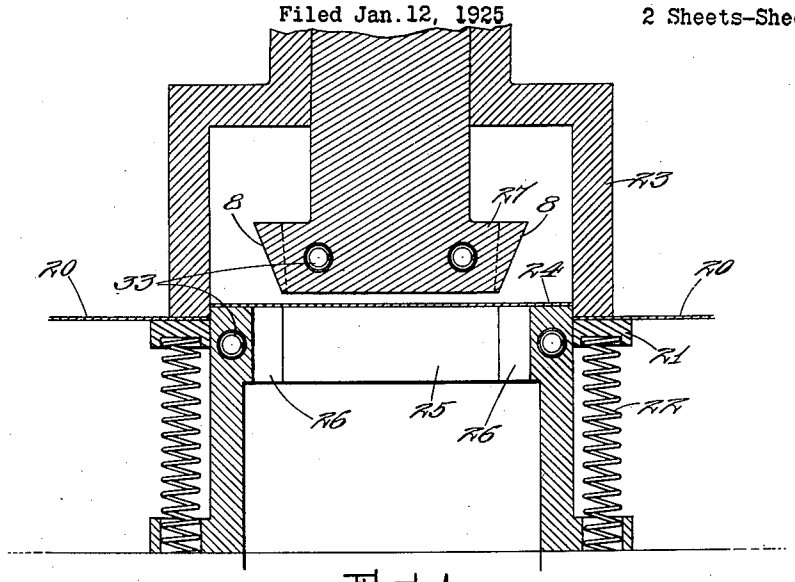


Fig. 1.

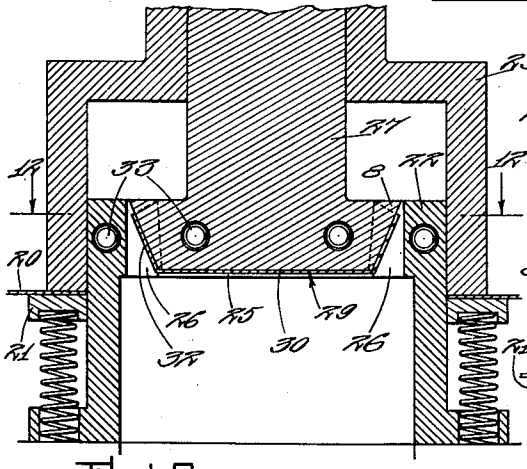


Fig. 2.

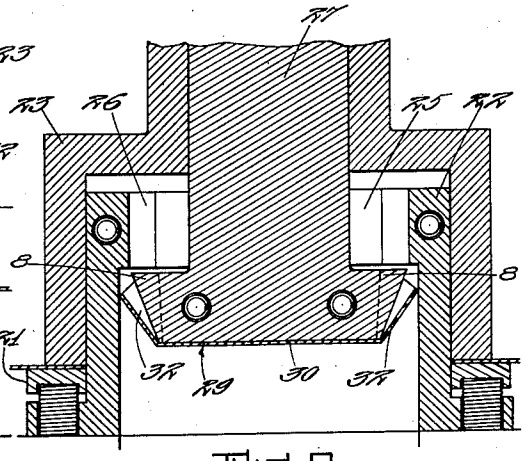


Fig. 3.

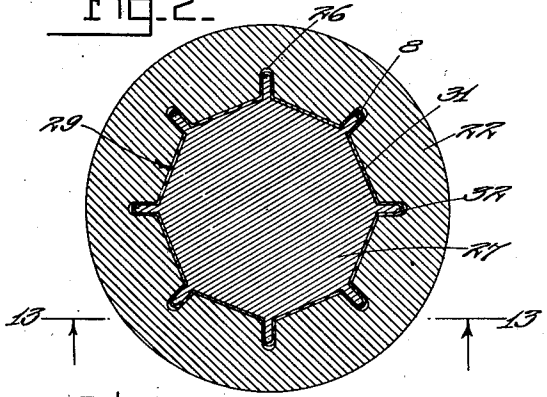


Fig. 12.

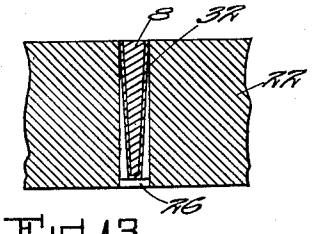


Fig. 13.

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METHOD AND APPARATUS FOR MAKING PAPER PLATES AND THE LIKE

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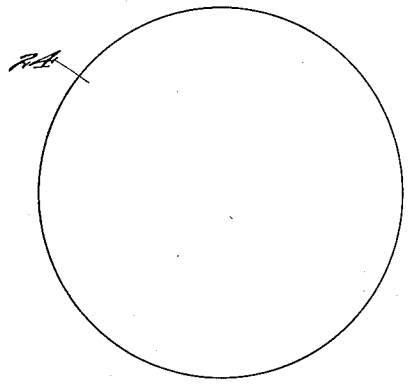


Fig. 4.



Fig. 5.

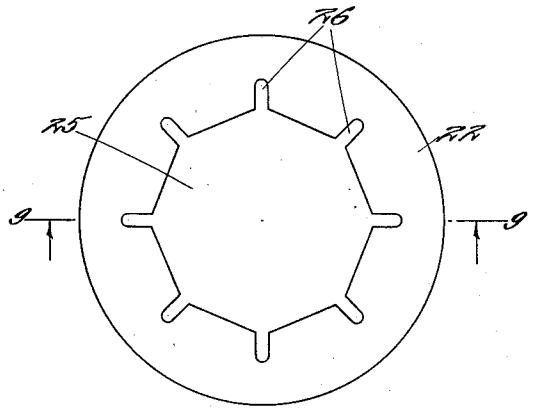


Fig. 8.

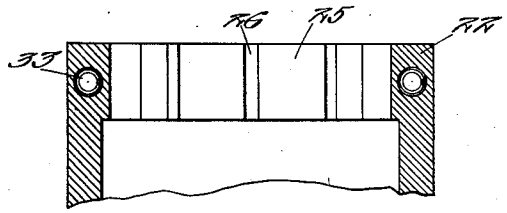


Fig. 9.

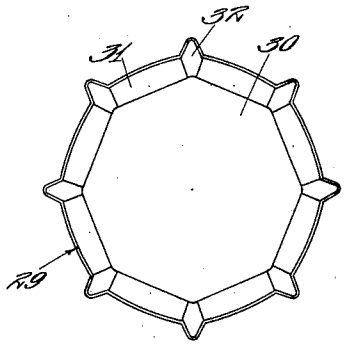


Fig. 6.

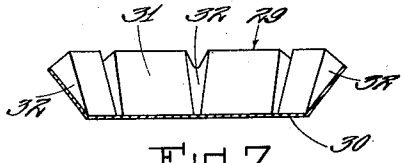


Fig. 7.

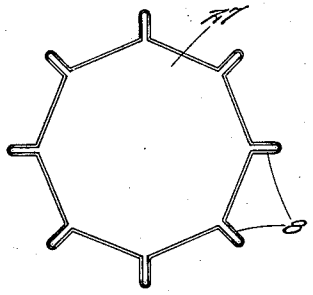


Fig. 10.

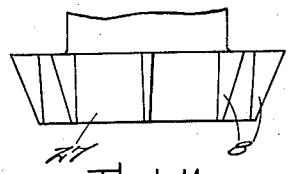


Fig. 11.

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UNITED STATES PATENT OFFICE.

HARRY E. RUCKERT AND BERNARD M. FINE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNORS, BY MESNE ASSIGNMENTS, TO SANITARY PRODUCTS CORPORATION OF AMERICA, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF VIRGINIA.

METHOD AND APPARATUS FOR MAKING PAPER PLATES AND THE LIKE.

Application filed January 12, 1925. Serial No. 1,785.

This invention relates to the manufacture of plates, dishes, and the like from paper or other sheet material and has for its object the production of a folded, as distinguished from a molded plate, which, while entirely suitable for the uses to which such articles are put, may nevertheless be manufactured more rapidly, and therefore at less cost, than has heretofore been possible in the case of goods of this general class.

The foregoing and other objects of the invention will best be understood from the following description of the production of a plate in accordance therewith as illustrated in the accompanying drawings. It will be understood, however, that the particular constructions and operations hereinafter described in connection with the drawings aforesaid have been chosen for illustrative purposes merely, and that the invention, as defined by the claims hereunto appended, may be otherwise embodied and practiced without departure from the spirit and scope thereof.

In said drawings:

Figs. 1, 2 and 3 are simplified vertical sectional views of apparatus operating in accordance with the invention to produce a plate embodying the same, showing the parts in the blanking-out, forming, and delivering positions, respectively.

Figs. 4 and 5 are a plan and an edge view, respectively, of a blank from which a plate is made, showing the same after the blanking-out and before the forming operation.

Figs. 6 and 7 are a plan view and a side elevation, respectively, of the finished plate.

Fig. 8 is a plan view of the combined blanking-out punch and forming die.

Fig. 9 is a section on the line 9—9, Fig. 8.

Figs. 10 and 11 are a bottom plan view and a side elevation, respectively, of the plunger which co-operates with the forming die.

Fig. 12 is a section on the line 12—12, Fig. 2.

Fig. 13 is an enlarged detail section on the line 13—13, Fig. 12.

Referring to Fig. 1, the web or sheet 20 of paper or other stock is passed or fed by any suitable means, not shown, over a yieldingly supported stripper plate 21 surrounding a stationary, blanking-out punch and forming die 22 which co-operates with a complementary blanking-out die 23 which is periodically depressed by any suitable means, not shown, to punch blanks 24 from said sheet or web. As herein shown, and in accordance with the preferred form of plate produced, the blanks 24 are circular in shape (see Fig. 4), and each blank, as it is punched from the stock, remains upon and is supported by the upper surface of the combined punch and forming die 22. Said die is formed with an opening 25 extending entirely therethrough, said opening being of a size smaller than the blank 24 and of a shape corresponding to the desired outline of the base of the finished plate. Preferably, and as herein shown, said opening is of regular polygonal form with outwardly or radially disposed notches 26 at each of its angles and is of substantially constant cross-sectional area throughout. Co-operating with the opening 25 in the die member 22 is an implement in the form of a plunger 27 of a size and shape substantially to fit the opening 25 in the die 22 with the clearance necessary to receive the stock, as hereinafter more fully explained. The plunger 27 is provided at suitably spaced points about its periphery with radial fins or projections 8 to enter the notches 26. The plunger 27 is also of substantially constant cross-sectional area throughout, except as hereinafter explained, while the projections or fins 8 are of triangular form with their apices at the bottom or free end of the plunger.

In the forming operation, the plunger 27 descends from the position shown in Fig. 1 into the position shown in Fig. 2, and the blank 24 supported on the combined punch and die 22 is forced into the cavity or opening 25. During this operation, the marginal portions of the blank 24 are turned or folded upwardly about the plunger upon lines defined by the lower edges of the latter, the resulting surplus material being received in the notches 26 into which it is forced or guided by the fins 8. As the plunger 27 continues to move downwardly into the position shown in Fig. 3, the folded blank is forced entirely through the opening 25, and the resilience of the material causes the upwardly folded marginal portions of the blank to spring outwardly to a certain extent, so that, when the plunger again rises, engagement of the upper edges of said portions with the

lower face of the die 22 causes the folded blank to be disengaged from said plunger, should it tend to stick thereto, and to be delivered through the bottom of the apparatus to any suitable receiving receptacle or mechanism, not shown.

It will be seen that the operation above described is a folding, as distinguished from a molding operation, the marginal portions of the blank being merely folded upwardly about the lower end of the plunger, and the resulting surplus material being taken care of by guiding the same into natural folds at spaced points about the periphery. The plate formed by the folded blank, and designated as a whole at 29, as shown in Figs. 6 and 7 is of regular frustro-pyramidal form and comprises a base 30, formed by the minor polygon of the frustum, upwardly flaring, substantially plane sides 31 forming obtuse angles with one another, and substantially triangular folds 32 connecting adjacent sides, said folds being of maximum width at the upper edge of the plate, and being disposed with their apices at the base 30.

The plunger 27, while of substantially constant cross-sectional area throughout, as above stated, is preferably slightly tapered from top to bottom, so as to provide for slightly less clearance between itself and the walls of the opening 25 at its upper end than at its lower, the fins 8 being similarly tapered, as shown most clearly in Fig. 13. The clearance afforded at the lower end of the plunger is amply sufficient to receive the full thickness of the stock operated upon, while that afforded at the upper end is slightly less than the normal or initial thickness of the stock, thereby resulting in a compression of the sides 31 and folds 32 adjacent their upper edges to consolidate and strengthen said edges as well as to set the creases between the sides 31 and folds 32 at said edges. This operation is facilitated by heating the dies, so that the action, as the plate is forced through the opening 25, is that of ironing the upper edge of the plate to consolidate the same and set the folds. By way of illustration, electric resistance coils 33 are shown for this purpose, although any other suitable heating means, such as a steam jacket or a burner, may be employed if preferred.

From the foregoing, it will be noted that the folds 32 are formed by a true folding operation as distinguished from a molding or crimping operation. As the blank is carried downwardly through the opening 25 and the marginal portion or sides thereof turned or folded up, these upturned sides at spaced intervals are drawn by projections 8 gradually between the upper edges of the side walls of the notches or channels 26 and are hence folded in a progressive manner to provide triangular folds 32 having greater depth and width at the top of the fold than at the bottom.

Having thus described our invention, we claim:—

1. An apparatus for making articles from sheet material comprising cooperating relatively movable members having means for folding upwardly the marginal portion of a blank, and also having means for gradually folding during the relative movement of said members intermediate parts of said upturned marginal portions and compressing a part only of each fold.

2. An apparatus for making articles from sheet material comprising a pair of relatively movable folding members, one thereof shiftable through an opening in the other to fold upwardly a marginal portion of a blank, one of said members having spaced upright folding walls and the other having a projection adapted to carry a part of said marginal portion between said walls to form a fold, said projection being wedge shaped to compress a portion of said fold.

3. An apparatus for making articles from sheet material comprising a pair of relatively movable folding members, one thereof shiftable through an opening in the other to fold upwardly a marginal portion of a blank, one of said members having spaced folding walls and the other having a tapered projection of greater thickness at the top than at the bottom and cooperating with said folding walls to form a fold in said marginal portion of the blank.

4. The herein described method of making plates and the like from paper and similar sheet stock which consists in folding a blank about the end of a punch by passing said punch through a complementary opening in a die while permitting the free upward folding of certain marginal portions of said blank and guiding other marginal portions, between said first named portions, into outwardly directed folds.

In testimony whereof we affix our signatures.

HARRY E. RUCKERT.
BERNARD M. FINE.