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2,251,243

ART OF PULP MOLDING

Filed June 16, 1937

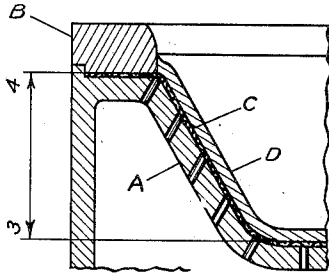


Fig. 1.

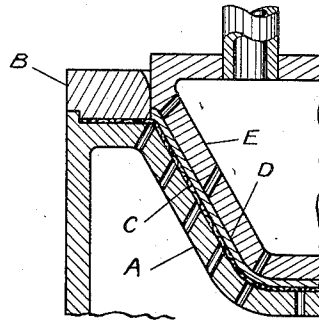


Fig. 2.

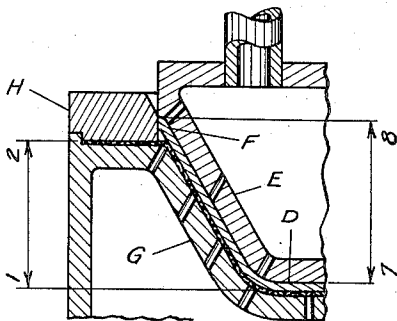


Fig. 3.

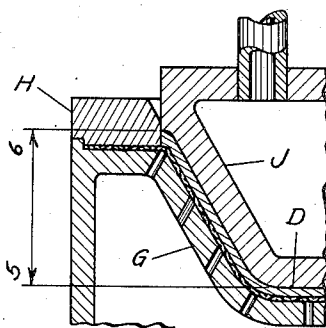


Fig. 4.

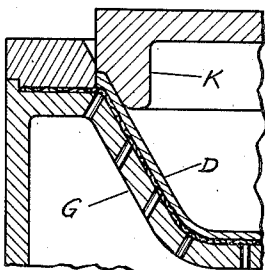


Fig. 5.

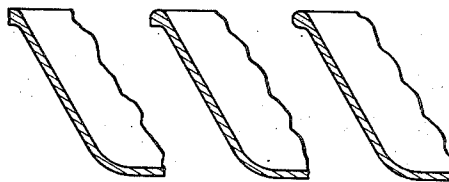


Fig. 6.

Fig. 7.

Fig. 8.

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UNITED STATES PATENT OFFICE

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ART OF PULP MOLDING

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banking association of the United States of
America, as trustee

Application June 16, 1937, Serial No. 148,544

2 Claims. (Cl. 92—56)

This invention relates to a method of and apparatus for producing molded pulp articles having a reinforced edge of minimum cross-sectional area and of maximum rigidity and stiffness, and to the article produced by such method and apparatus.

For certain types of molded pulp articles, such as drinking cups or containers, it is desirable, from the standpoint of utility and appearance that the container shall have a reinforced edge of minimum cross-sectional area and maximum rigidity comparable to the beaded or rolled edge obtained in a paper cup.

In the conventional methods of producing molded pulp articles, however, there is little if any more pulp deposited at the edge than in the wall or body of the article so that when the article is finished the pulp sheet is no stronger at its edge than at its wall or body. Hence, if any additional strength stiffening or reinforcement is wanted at the edge it is customary to make the edge of some special shape such as an angular or channel shape which for many types of containers is objectionable on account of bulk and appearance.

In carrying out my invention I obtain an edge of minimum cross-sectional area and maximum rigidity or stiffness with the minimum of operations and equipment and without the necessity of forming the edge in some channel or angular shape. Such edge may be rounded or made in any reasonable sectional shape.

In the accompanying drawing:

Figs. 1-4, inclusive, illustrate in partial section successive steps in the preferred method of practicing my invention.

Fig. 5 illustrates an additional step in the nature of a variation which may be employed if desired, and

Figs. 6, 7 and 8 are fragmentary sections on an enlarged scale through the edge and wall of molded pulp articles produced in accordance with my method and showing several of the many various possible shapes of reinforced edges which may be obtained by my method.

Referring to Fig. 1 wherein I have illustrated the first step in my method, the article D is formed from a liquid pulp mixture on a foraminous forming die A of conventional type having the usual forming die ring B which defines the edge of the molded pulp article and clamps and holds the usual perforated screen C in place.

After the article D has been formed on the forming die and properly drained, but while still containing a large percentage of moisture, it is

transferred by any appropriate mechanism to a holding or vacuum die G (Fig. 3).

Conveniently, such transfer may be accomplished by means of a transfer die E (Fig. 2) which removes the wet article D from the forming die A and places it in the holding die G which holding die may be heated if desired and is foraminous whereby vacuum may be maintained thereon to hold the article transferred to it and to enable further moisture to be removed from the article during drying.

Transfer die E is foraminous and means are provided for applying vacuum and air as may be required for transferring the article from forming die A to holding die G.

The depth of the holding die G between points 1-2 (Fig. 3) is somewhat less than the corresponding depth 3-4 (Fig. 1) of the forming die A, this difference in depth representing the amount of additional stock required to form the reinforced edge on the article. Thus when the article is transferred to the holding die G the edge of the article extends an appreciable distance beyond the upper limit of dimension 1-2 as indicated at F, Fig. 3, along the side of the vacuum die ring H.

The next step is to contact the article in holding die G by die J (Fig. 4) which may be a heated finishing die for drying the article between it and holding die G.

The dimension 5-6 on finishing die J is somewhat less than the corresponding dimension 7-8 on the article D which is the length to which the article is molded so that when finishing die J is properly seated on the article D it forces or reshapes the pulp at F into a compacted fixed shape which is determined by the shape of the edge of dies J and G. The density of the reshaped edge is determined by the amount of pulp at F which is allowed for reforming and by the pressure applied by die J which pressure may be maintained during the drying of the article.

In other words by taking advantage of the additional stock at F which is obtained by decreasing the depth of the finished article from that of the original molded article, sufficient material is provided to form a solid compacted edge which is of greater density and/or section and of better appearance than would be possible to obtain through the ordinary conventional molding and drying method.

This reformed or reshaped edge may be as shown in Fig. 6 or may be varied as shown in Figs. 7 and 8 which are intended to suggest some

of the many possible shapes which may be obtained by my method.

As a variation of my preferred method I may reform the article edge by the use of a reforming die K (Fig. 5). After the article edge is reformed by die K, said die is withdrawn from die G and the article may then be dried in the conventional manner by heated die J which is of complementary shape to the article with the reformed edge.

I claim:

1. In the method of die-molding and die-drying and interiorly smooth finishing a fibrous pulp container for foods and beverages having a side wall terminating in an open mouth provided with a reinforced edge, the steps which comprise suction-forming from an aqueous fibrous pulp mixture a sheet of molded fibrous pulp on a female foraminous forming die to approximately the desired finished article shape, transferring the wet article from said forming die by means of a male transfer die of complementary shape to the forming die to a foraminous female holding die of the same shape as the forming die but of less depth whereby to provide surplus pulp at the edge section of the wet formed article for subsequent compacting and reshaping while on said holding die, compressing the wet article on the holding die with a male drying and finishing die of complementary shape to the holding die but having its article engaging edge so shaped as to reform the edge section of the wet article to a generally beaded shape which is of greater sectional area and density than the adjacent wall of the article, and drying

and interiorly smooth finishing the wet article with its reshaped edge between the holding die and the drying and finishing die under mechanical pressure and with heat applied by at least one of said dies.

2. In the method of die-molding and die-drying and interiorly smooth-finishing a fibrous pulp container for foods and beverages having a side wall terminating in an open mouth provided with a reinforced edge, the steps which comprise suction-forming from an aqueous fibrous pulp mixture a sheet of molded fibrous pulp on a female foraminous forming die to approximately the desired finished article shape, transferring the wet article from said forming die by means of a male transfer die of complementary shape to the forming die to a foraminous female holding die of the same shape as the forming die but of less depth whereby to provide surplus pulp at the edge section of the wet formed article for subsequent compacting and reshaping while on said holding die, compressing the wet article on the holding die with an edge-reshaping die to reform the edge section of the wet article to a generally beaded shape which is of greater sectional area and density than the adjacent wall of the article and drying and interiorly smooth-finishing the wet article with its re-shaped edge between said holding die and a male drying and finishing die of complementary shape to the wet article with its re-shaped edge under mechanical pressure and with heat applied by at least one of said last-named pair of dies.

WALTER H. RANDALL.