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R. E. HALL

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METHOD OF FELTING FIBROUS RECEPTACLES

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Fig. 3.

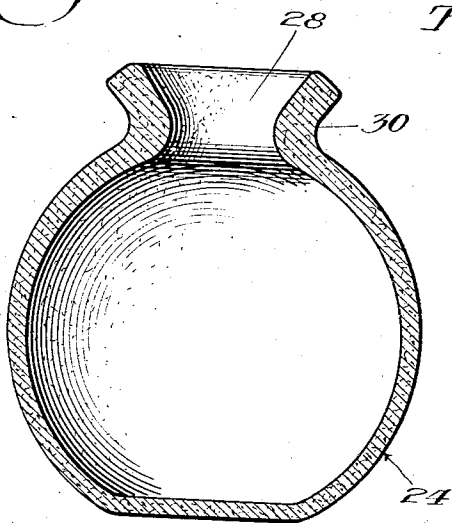


Fig. 1.

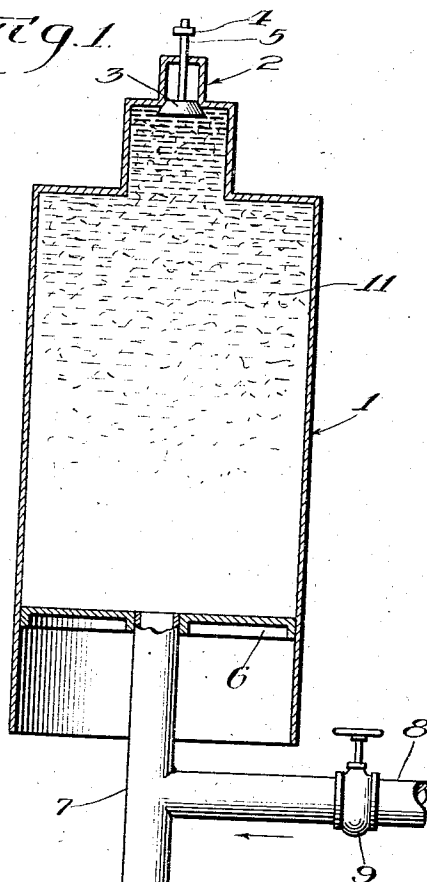
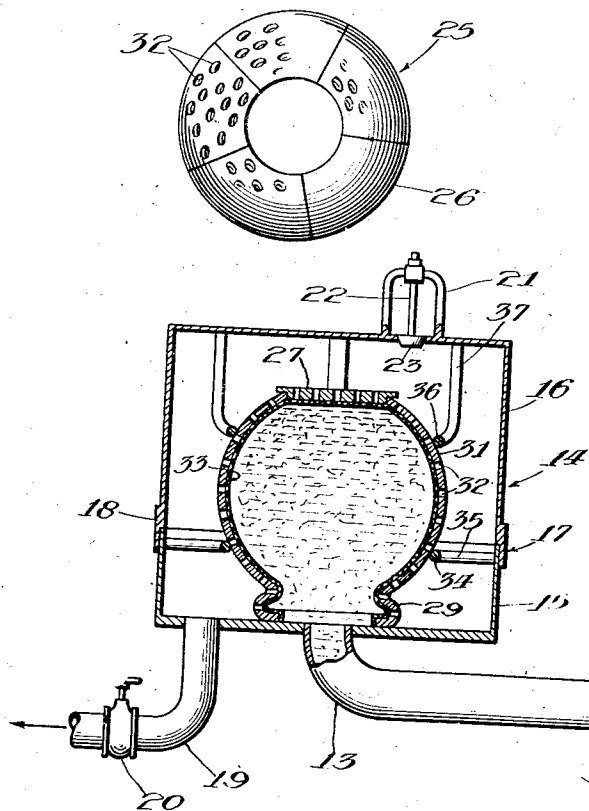


Fig. 2.



Inventor:
Richard E. Hall.
By Frank A. Belknap
Att'y.

UNITED STATES PATENT OFFICE

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METHOD OF FELTING FIBROUS
RECEPTACLES

Richard E. Hall, Olean, N. Y., assignor, by means
assignments, to Arvey-Ware Corporation, a cor-
poration of Delaware

Application February 16, 1931, Serial No. 516,151

1 Claim. (Cl. 92-54)

This invention relates to improvements in a method and means of felting fibrous receptacles, and refers specifically to a method of forming a fibrous receptacle, having a relatively thick wall, by utilizing vacuum in felting said receptacle.

The utility, objects and advantages of my invention will be apparent from the accompanying drawing and following detailed description:

In the drawing, Fig. 1 is a vertical elevational view partly in section of suitable apparatus for carrying out my invention.

Fig. 2 is a top plan view of a form utilizable in conjunction with the apparatus shown in Fig. 1.

Fig. 3 is a vertical sectional view of the product of my invention.

Referring in detail to the drawing, 1 indicates a vat or tank which may be provided at its upper portion with a vent 2. A tappet valve 3 may be operatively disposed in said vent and is adapted to close said vent in an upwardly direction. A lug 4 may be mounted upon the upper end of shank 5 of the valve 3 to limit the downward travel of said valve. The lower end of the vat 1 may be provided with a closure 6 which, if desired, may be adjustable with respect to the height of the tank 1; that is, the volume of said tank may be varied by moving the closure upwardly or downwardly.

It is to be understood, of course, that the drawing herein shown is purely diagrammatic and is not intended to show the detailed construction of the apparatus for carrying out my invention.

A pipe 7 may connect into the tank 1 and may enter said tank through the closure 6. A pipe 8, controlled by valve 9, may connect into the pipe 7 at an intermediate portion thereof. A valve 10 may be interposed in the pipe 7 and is adapted to control the flow of fibrous pulp 11 through said pipe. The lower end of pipe 7 may be suitably bent, as shown at 12 and 13, and may connect into a felting receptacle 14.

The receptacle 14 may be constructed in a plurality of separable portions, said receptacle having a lower portion 15 and an upper portion 16 which may be mounted upon said lower portion, as shown best at 17. It is desirable that the receptacle 14 be maintained air-tight, and to accomplish this result a shoulder or band 18 may be mounted upon the lower edge of the upper portion 16 and may be adapted when said upper portion is positioned upon the lower portion 15 to over-lap the abutting edges of the upper and lower portion of said receptacle. A pipe 19 may connect into the receptacle 14, and may be connected at its opposite end to a vacuum pump or the like (not shown). The withdrawal of fluid from the receptacle 14 through

the pipe 19 may be controlled by valve 20 interposed in said pipe.

A standard 21 may be mounted upon the top of the upper portion 16 of the receptacle 14 and may serve as a guide for the stem 22 of tappet valve 23. The valve 23 may be so disposed as to close downwardly.

To felt a fibrous receptacle, such as that shown at 24 in Fig. 3, a form 25 may be utilized. Said form may be constructed in the plurality of parts or segments 26 which may be adapted to define the lateral walls of the receptacle 24. The base of the receptacle 24 may be formed or defined by a disc element 27 which may be operatively positioned with respect to the ends of the segments 26. The opposite ends of the segments 26 are discontinuous; that is, they do not meet, and said ends may be so formed that when operatively positioned to form the vase or receptacle 24, provide an aperture 28 in said vase. The form 25 at this open end may be distended and may take the shape of an annular bead 29. It can readily be seen that by this latter construction the neck 30 of the vase or receptacle 24 may be formed.

The segments 26 and the disc 27 comprising the form 25 may be constructed of any suitable material 31 which may be impervious to moisture, such as a metallic material, and said material may be apertured, as shown at 32. The inner surface of all of the segments 26 and the disc 27 may be lined with a screen 33.

The form 25 comprising the segments 26 and disc 27 may be positioned within the receptacle 14 and may be so disposed therein as to form a receptacle or vase 24 in an inverted position; that is, the annular bead 27 of the form 25 will be disposed at the lower end of the form and the disc 27, which is adapted to form the base of the vase 24, will be disposed at the upper end of the form. The form 25 may be positioned within the receptacle 14 so that the pipe 13 may connect directly into the interior of the form, and the segments comprising the form may be maintained in assembled position by means of a ring 34 supported by brackets 35, which in turn are mounted upon the interior of the lower portion 15 of the receptacle 14. An upper ring 36 supported by brackets 37 mounted upon the upper portion of the receptacle may also be provided to maintain the segments 26 in assembled position.

In carrying out my invention, a pulp solution may be passed through the pipe 8 from a suitable source of supply, and from said pipe may travel through pipe 7 to the interior of the tank 1. Upon the initial introduction of pulp into said tank, the vent 2 will be open, and will permit the air contained within the tank to

escape. When the level of the pulp 11 reaches the valve 3, said valve will be carried upwardly and will close vent 2. At this period, valve 9 may be closed and valve 10 may be opened, permitting pulp 11 to pass downwardly by gravity through pipe 7 to the interior of the form 25. The level of the pulp within the tank 1 is thereby lowered, and the valve 3 opens, permitting the ingress of air into said tank. As the pulp fills the interior of the form 25, the air within the receptacle 14 will be compressed and hence valve 23, which maintains its closed position by gravity, will open and permit a release of the pressure within the receptacle 14.

The valve 20 in the line 19 may be opened and a condition of vacuum may be established within the receptacle 14. In this manner the carrier of the fibrous material comprising the pulp 11, which is usually water, is withdrawn through the screen 33 of the form 25 and through the apertures 32 in the walls of said form. It can readily be seen that the fibers carried by the water will thereby be deposited upon the surface of the screen 33. This action may be carried on until all of the water carrier of the fibrous material passes through the form, or until a suitable thickness of fibers have been deposited upon the screen. As the pulp level within the form 25 lowers, air may be drawn through the pipe 13, producing an agitation which washes the excess heavy pulp from the bottom part 17, tending to compact the fibers upon the screen and to remove the moisture or water therefrom.

As the level of the pulp within the form recedes below the level of the neck-forming bead 29, air drawn through the vent 2 may bubble upwardly through the bend 13 of the pipe 7 and the bubble arising at the surface of the pulp, which is at this period adjacent the bead 29, will throw relatively small increments of pulp upon the inner walls of the bead. In this manner an increased deposit of fibers may be formed at the neck of the receptacle which is found desirable in the finished product. Of course, it can be seen that the receptacle must preferably be felted in an inverted position, as shown.

It has heretofore been proposed to utilize apparatus somewhat similar to that described for the felting of fibrous receptacles or the like, but instead of utilizing the negative pressure of vacuum, a positive pressure is established within the form 25. In other words, as the pulp from the tank 1 passed into the form 25, a fluid, such as air under pressure, is imposed upon said pulp and the carrier of the fibers, comprising the pulp solution, that is, the water is ejected through the foraminated surface of the form until all of the water is removed.

An inherent feature, which invariably accompanies this process is that the lower portion of the resulting vase or fibrous receptacle formed is weakened by cracks or fissures which are present upon the inner surface of said lower portion. To avoid this disadvantageous feature, the walls of the fibrous receptacle so formed must of necessity be made exceptionally thin, said walls never exceeding a thickness of one quarter of an inch.

By utilizing my process, a fibrous receptacle or vase may be constructed with walls of substantially any desired thickness. Consequently, I may make large vases that will be exceedingly rugged and strong.

By the use of positive pressure very frail

fibrous articles are constructed which must of necessity limit the size of the resulting product.

By the use of negative pressure or vacuum, substantially any waste paper stock, such as newspaper stock, may be utilized successfully, thereby decreasing the cost of the resulting product.

As has been hereinbefore described by the use of positive pressure a neck of desirable dimensions cannot be produced upon the receptacle, but by the use of vacuum, in the manner described, a fibrous receptacle having a neck of any desired thickness may be produced.

When a suitable formation of fiber has been built up upon the screen 33, the upper portion of the receptacle 14 may be raised and the form 25 and deposited fibrous vase 24 may be removed from the receptacle 14. The form comprising the segments 26 and the base 27 may then be removed from the vase 24 and the vase may be then subjected to a drying action. Of course, it is to be understood that the vase, instead of being dried subsequent to its removal from the form, may be dried within the form and removed after it reaches a dried state.

Inasmuch as the outer surface of the vase is formed adjacent the inner surface of the form, said outer surface may be in a more or less smooth condition and to finish said surface requires relatively short period of sanding. The product of my invention may be sanded and smoothed to a very fine finish and the surface thereof will not be pitted. The reason for this is that the outermost fibers of the vase lie in planes substantially parallel to the plane of the screen, and hence when the surface of the article is finished, inasmuch as said surface is free from fibers disposed in a haphazard manner, sanding of said surface will not result in the tearing of said fibers and the consequent disruption of the intertwined fibers.

After the surface of the vase has been sanded, the same may be treated with, or impregnated with, sulphur at a temperature of approximately 290° F. This treatment hardens and vitrifies the vase. In addition, the treatment with sulphur increases the weight of the article which more closely simulates crockery or earthenware. The outside of the vase may then be buffed and colored or treated with a solution of glue, whiting, glycerin and water and a suitable lacquer may subsequently be applied.

By the expression "relatively thick wall" as used in the specification and claim, is meant, a wall or base of a receptacle exceeding in thickness one quarter of an inch.

I claim as my invention:

A method of forming a fibrous receptacle having a relatively thick wall which comprises, passing a predetermined quantity of pulp solution of water and fibrous material into a closed zone displacing the air therein, passing said entire predetermined quantity of said solution downwardly from said closed zone under the influence of gravity, and upwardly through the mouth of a second enclosed zone and completely filling said latter zone while maintaining atmospheric pressure within said first mentioned closed zone, removing the water from said solution through the surfaces defining said second enclosed zone by establishing a condition of vacuum external to said zone, and depositing the fibres of said solution upon the inner portion of said defining surfaces.