Sept. 8, 1931. E. L. PERRY 1,822,058

METHOD AND MACHINE FOR MAKING ARTICLES OF PULP

Filed Oct. 6, 1928 2 Sheets-Sheet 1

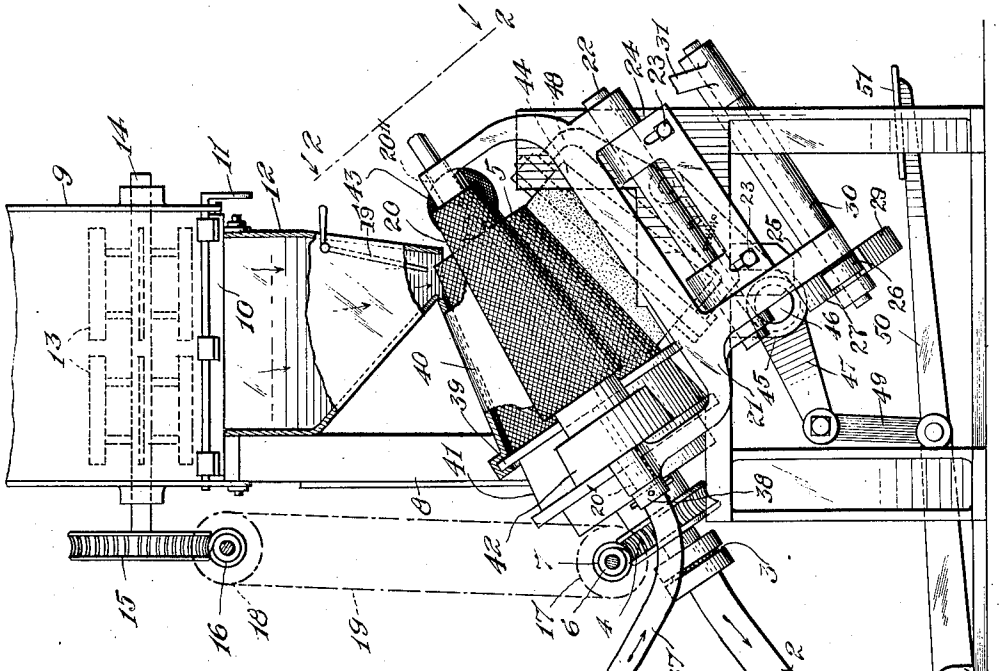


Fig. 1

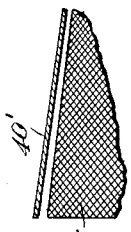


Fig. 6

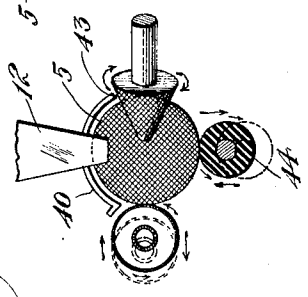


Fig. 2

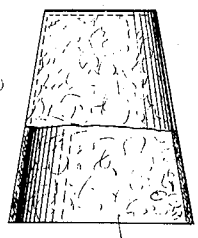


Fig. 7

INVENTOR
Eugene L. Perry,
BY
Geo. D. Richards
ATTORNEY

Sept. 8, 1931. E. L. PERRY 1,822,058

METHOD AND MACHINE FOR MAKING ARTICLES OF PULP

Filed Oct. 6, 1928 2 Sheets-Sheet 2

Fig. 3

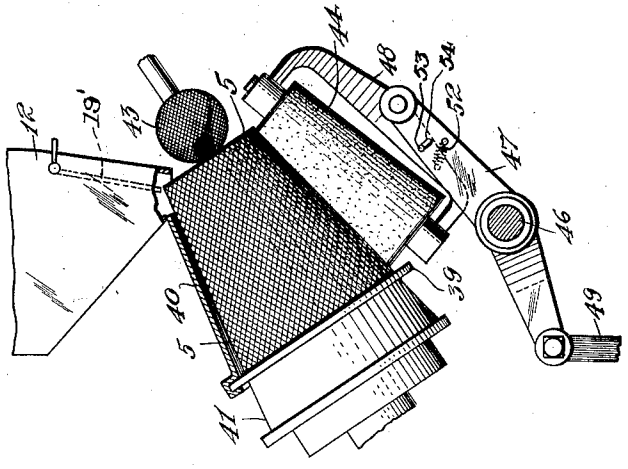



Fig. 4

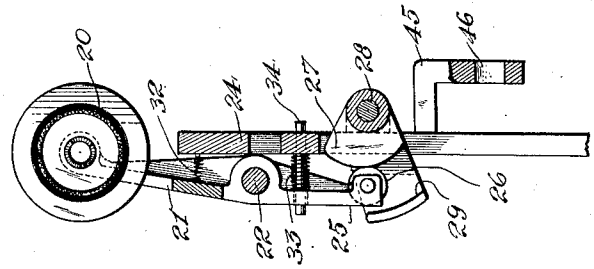
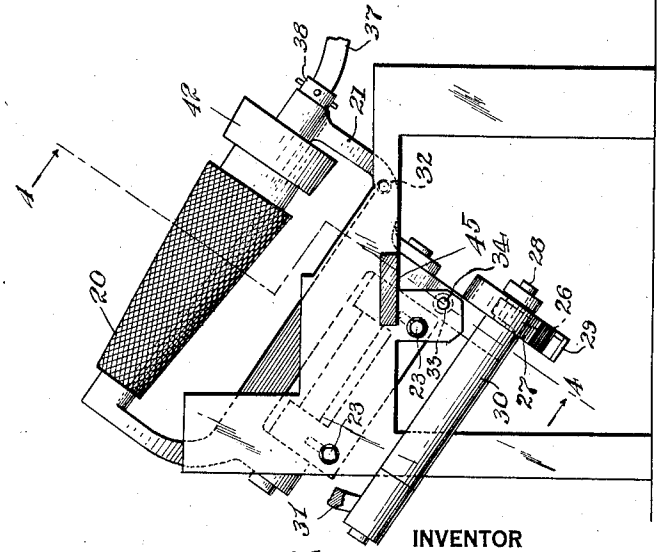



Fig. 5




INVENTOR
Eugene L. Perry,
BY
George D. Richards
ATTORNEY

Patented Sept. 8, 1931 1,822,058

# UNITED STATES PATENT OFFICE

EUGENE L. PERRY, OF WEST ORANGE, NEW JERSEY, ASSIGNOR TO WILBARTON WARE, INC., OF KEARNEY, NEW JERSEY, A CORPORATION OF NEW JERSEY

## METHOD AND MACHINE FOR MAKING ARTICLES OF PULP

Application filed October 6, 1928. Serial No. 310,893.

The present invention relates to apparatus and method for making articles from fibrous pulp; and the invention relates, more particularly, to apparatus and method for making tubes, containers, and so on in one piece from fibrous pulp such as paper pulp. And the materials and products of the invention are useful in the arts generally.

Various objects and advantages of the invention will be obvious from the following particular description of one form of mechanism embodying the invention and method of operation thereof or from an inspection of the accompanying drawings; and the invention also consists in certain new and useful features of construction and combinations of parts hereinafter set forth and claimed.

The present invention consists in new and novel methods of operation of machinery for making of containers from fibrous pulp and of new and original arrangements and combinations of steps in the process hereinafter described and more particularly set forth in the claims. The invention further consists in new and novel arrangements and combinations of parts in pulp handling machinery as hereinafter set forth and claimed.

In the accompanying drawings there is shown for purposes of illustration one form of apparatus embodying the invention, in which:—

Figure 1 is an elevation view, in part broken away, of a pulp forming machine;

Figure 2 is a part view taken at the line 2—2 of Figure 1, in part section;

Figure 3 is an elevation view in part showing a foraminated pressure roll of the invention, and operating mechanism thereof;

Figure 4 is a view taken along the line 4—4 of Figure 3;

Figure 5 is an elevation view of the forming roll and a solid pressure roll, and operating mechanism for the latter;

Figure 6 is a part section view of a modified form of the apparatus of Figs. 1 to 5; and

Figure 7 is a view, in part broken away, of a basket made on the modified form of apparatus.

In all the above described views like characters of reference are employed to indicate corresponding parts.

Referring now to the drawings, reference character 1 indicates a suction pump having an upwardly inclined suction pipe 2 which serves as a support on which is mounted the ball bearing set 3 the movable upper part of which latter carries a worm pinion 4 and, above that, a frusto conical or basket shaped hollow, foraminated forming roll 5 having tapering sides and a flat end. Said forming roll 5 is connected for suction from said pump 1, to pipe 2, bearing set 3, and the other connecting parts. A shaft 6, driven by means not shown, carries a worm 7 which engages and drives said pinion 4 to rotate said forming roll 5 in clockwise direction as indicated in Fig. 2.

A standard 8 carries a pulp tank 9 which has a discharge gate 10, operated by handle 11, and a chute 12 which extends and narrows from said gate 10 to the upper end of the lateral side of said forming roll 5 at which latter said chute 12 terminates in spaced apart relation. In said pulp tank 9 is a set of stirring paddles 13 mounted on and driven by the shaft 14 which in turn is driven by the pinion 15 and worm 16 which are connected to said driving shaft 6 by the gears 17, 18 and chain 19, diagrammatically shown. A baffle 19′ is provided in said chute 12 to control flow of pulp to different parts of roll 5.

Alongside said forming roll 5 is a frusto-conical, hollow, foraminated pressure roll 20 which is carried on axial trunnions 20′, 20″ by the yoke 21 which latter is in turn carried, pivotally, by a shaft 22 on which said yoke 21 can be rotated to move said pressure roll 20 toward and from said forming roll 5. Said shaft 22 is carried by a pair of bearings 23, 23 adjustably mounted to a supporting frame 24. A downwardly extending arm 25 on said yoke 21 carries at its lower end a roller 26 which is in operative relation to a cam 27 carried by a shaft 28 and downwardly movable therewith to apply pressure on said arm 25, through roller 26, to move said yoke

21 and said pressure roll 20 toward said forming roll 5 (see Fig. 4). Said shaft 28 also carries a second cam member 29 which is concave and is adapted upon upward movement to engage the end of said arm 25 on its outer face and move it inwardly whereby said pressure roll 20 is moved away from said forming roll 5. Said shaft 28 is extended through a bearing 30, fixed to said frame 24, beyond which it carries an operating handle 31. A tension spring 32 between yoke 21 and frame 24 and a compression spring 33 between arm 25 and frame 24 tend to move said pressure roll 20 and hold the same against said forming roll 5. Said spring 32 is attached to both the yoke 21 and frame 24, and spring 33 is held in place by a central stud 34 fixed on said frame 24 and passing through an opening in arm 25, having sufficient clearance to permit of the angular movement of the latter about said shaft 22. The interior of said forming roll 20 is connected to the exhaust or pressure side of said pump 1 by the exhaust pipe 35, by-pass pipe 36, flexible hose 37, universal joint 38, and said trunnion 20', which latter is hollow.

Extending from said forming roll 5 at the bottom edge thereof is a radial flange 39 which serves to limit the flow of pulp in that direction, and attached to said standard 8 is a cover or shield 40 which serves to limit the depth of the wet pulp as it flows onto and over said forming roll 5, and said shield 40 extends circumferentially over the upper surface of said forming roll 5 from said radial flange 39 as far as the lower edge of the discharge opening of said chute 12 and in both directions circumferentially for about ninety degrees.

For driving said pressure roll 20 before the pulp on forming roll 5 has attained a predetermined depth and strength and so that the said pressure roll 20 will not drag or tear off the newly applied pulp a pair of cooperating spacing and driving frusto-conical pulleys 41 and 42 are provided one on each of said rolls 5 and 20, respectively. The sum of the radii of said pulleys 41 and 42 at a given point is greater than that of the rolls 5 and 20 projected to that point. This increment can be, and has been used in a practical machine, about one-sixteenth of an inch, so it will be seen that the pulp will be built up to a compacted thickness of at least one-sixteenth of an inch before there is any drag between such pulp and said forming roll 20.

At the flat end of said forming roll 5 is provided a conical, foraminated pressure roll 43 mounted, by means not shown, for movement into and out of pressure applying relation to the end of roll 5.

Below said forming roll 5 is positioned a solid pressure roll 44 in movable relation thereto. For supporting and moving said roll 44 there is provided on said frame 24 an outwardly and then downwardly projecting arm 45 which carries a stub shaft 46 on which is pivoted a lever 47 which at one end carries, pivoted thereto, a yoke 48 between whose ends said pressure roll 44 is mounted for rotational movement. At the other end of said lever 47 is pivoted a connecting rod 49 which connects intermediate the ends of a foot treadle lever 50, which latter is pivoted to the floor at one of its ends and carries a treadle 51 at its other end. The weight of said pressure roll 44 and yoke 48 normally over balances that of said connecting rod 49 and treadle lever 50 so that said roll 44 naturally falls away from said forming roll 5 and maintains said treadle lever 50 in a normally raised position. By depressing said treadle lever 50 said pressure roll 44 can be moved against said forming roll 5 or against a layer of pulp thereon. This roll can be used for compacting a layer of pulp on said forming roll 5, but is provided particularly for applying pressure to the layer of pulp, or container comprises thereby, to loosen the same from the forming roll 5. And for applying pressure thereby, first at the base or small end of roll 5, there is provided a tension spring 52 attached between said lever 47 and the arm of yoke 48 adjacent thereto whereby said roll 44 is normally tilted with its small end nearer roll 5. A pin 53 mounted on yoke 48 and extending through a slot 54 in said lever 47 limits the range of movement of said yoke 48 by spring 52 so that roll 44 will not be brought against lever 47 when they are in their normal positions and pressure against roll 5 keeps roll 44 properly aligned. Said roll 44 is preferably of rubber of a degree of stiffness and resiliency somewhat like that common in mangle rolls and the like.

In the use and operation of the above described apparatus a batch of wet paper pulp is placed in tank 9 with gate 10 closed and paddles 13 set in motion to maintain the pulp in the thoroughly mixed state. Said forming roll 5 will be set in rotative motion with paddles 13. Pressure roll 44 is in its normal position away from forming roll 5 and handle 31 is moved to bring said cams 27 and 29 into the intermediate position shown in Figure 4 in which said spring 32 and 33 are free to act alone to hold said pulley 42 against pulley 41 whereby the pressure roll 20 is held in spaced apart relation at a predetermined short distance from forming roll 5. Pump 5 is set in operation to provide suction on forming roll 5 and pressure on pressure roll 20. Gate 10 is then opened to admit passage of a supply of pulp to the forming roll 5, baffle 19' being moved to keep the pulp at first from flowing to the flat, upper end of forming roll 5. The pulp admitted will flow over forming roll 5 under said shield 40 down as far as radial flange 39 and will be drawn against the mate-

rial of forming roll 5 by the suction through the foraminations thereof and will be moved away from pressure roll 20 by the pressure of air passing through the foraminations thereof. At these first steps, and until the pulp is built up and compacted to a depth as great as or greater than the normal spacing apart of rolls 5 and 20, the compacting of the pulp on forming roll 5 will be done principally by the air suction and air pressure as described. When the pulp is built up to a point near the upper edge of forming roll 5, said baffle 19′ is moved to admit passage of pulp to the flat end of forming roll 5 where it is compacted by suction and by the weight of gravity of pressure roll 43 which rides over it. The gate 10 is then closed to stop the flow of pulp and pressure of roll 20 against forming roll 5 is increased by turning handle 31 to further compact the pulp between rolls 5 and 20 and afterward is turned back to move pressure roll 20 away from forming roll 5. The basket or container formed by the pulp on forming roll 5 is then loosened from that roll by shutting off suction in pipe 2, moving pressure roll 20 from forming roll 5 and bringing pressure roll 44 against the basket, and as said pressure roll 44 is brought up its upper end will be brought in contact first, through the action of said spring 52, whereby said container or basket is loosened from its bottom up or outwardly towards its rim and stretching, splitting, or cracking of the pulp is avoided. After being loosened the basket or container is removed from forming roll 5 and trimmed and dried for use. As soon as one container is removed a new supply of pulp can immediately be fed onto the forming roll and the forming of containers thereon can be practically continuous.

In Figure 6 is shown a modified form of the machine of the invention in which the shield 40′ is spaced further away from the forming roll at the end near the radial flange 39 than at the opposite end. This form of machine is operated substantially the same as is the other, but the basket 55 formed thereon has a side wall which is thicker at the rim or upper edge than at the bottom, and it is made in this form to provide stiffness and strength where required. The pressure roll 20 is adjusted on said frame 24 to have the large end further away from the forming roll 5 to conform to this difference in thickness in the pulp laid down. In some cases the resiliency of the compacted pulp will permit removal of the basket from the forming roll without interference from said shield 40′, but where this difference is excessive in this respect the shield 40′ is moved to permit passage of the thick edge of the basket past its upper part. The pivotal mounting of said pressure roll 44 will permit the latter to adjust itself to the line of the outer face of the basket.

On both forms of the machine the fibers of the pulp are laid somewhat circularly and spirally and are intermatted from one face of the formed wall to the opposite face. This circular and spiral intermatting is produced by the feeding of the wet pulp on the rotating forming roll with the use of the shield 40, or 40′, which lays the fibers down; and the use of the shield 40′ is especially valuable in forming a wall which is thicker at one end than at the other.

What is claimed is:

1. Apparatus for forming fibrous pulp into a wall, comprising a hollow foraminated forming roll, means for applying suction to the interior of said forming roll, a hollow foraminated pressure roll, and means for applying pressure to the interior of said pressure roll.

2. Apparatus for forming fibrous pulp into a wall, comprising a hollow foraminated forming roll, means for applying suction to the interior of said forming roll, a hollow foraminated pressure roll, means for applying pressure to the interior of said pressure roll, and means for supplying pulp to said forming roll.

3. Apparatus for forming fibrous pulp into a wall, comprising a hollow foraminated forming roll, means for applying suction to the interior of said forming roll, a hollow foraminated pressure roll, means for applying pressure to the interior of said pressure roll, and means for supplying pulp between said forming roll and said pressure roll.

4. In pulp machinery; in combination with a forming roll, a pressure roll movable angularly toward said forming roll, and means tending to move one end of said pressure roll in advance of the other end thereof toward said forming roll.

5. In pulp machinery, in combination, a forming roll and a pressure roll movable with respect to each other and adapted to be positioned alongside each other with their axes substantially in the same plane, and means tending to move said pressure roll to bring one end of its axis nearer the axis of the forming roll than the other end thereof.

6. In pulp machinery, in combination, a forming roll, a yoke, a pressure roll carried by said yoke for movement thereon about its axis, a lever supporting and having pivotal connection with said yoke, said pressure roll being movable with said yoke and lever into a position against said forming roll and axially aligned therewith, and a spring between said lever and yoke tending to move the latter to bring one end of said pressure roll nearer said forming roll than the other end thereof.

7. In combination, in machinery for forming articles from fibrous pulp, a forming roll, a shield extending over and curved to conform to the contour of said forming roll and

spaced apart therefrom, and a flange at one end of said shield adapted to prevent passage of pulp thereby, said shield being spaced apart from said forming roll further at said flange than its opposite end.

8. Apparatus for forming fibrous pulp into a wall, comprising a rotatable hollow foraminated forming roll, means for applying suction to the interior of said forming roll, means to flow and spread pulp on the external surface of said forming roll, and a pressure roll in operative relation to said forming roll to compact the pulp applied thereon.

9. Apparatus for forming fibrous pulp into a wall, comprising a rotatable hollow foraminated forming roll, means for applying suction to the interior of said forming roll, means to flow and spread pulp on the external surface of said forming roll, and a hollow foraminated pressure roll in operative relation to said forming roll to compact the pulp applied thereon.

10. A method of forming hollow articles from fibrous pulp, comprising rotating a foraminous forming roll, supplying wet pulp to the external surface of said rotating forming roll while at the same time applying air suction to the interior of the latter, and compacting the pulp supplied to the forming roll surface by rotating a foraminous compacting roll in external contact therewith.

11. In combination, in machinery for forming articles from fibrous pulp, an inclined rotatable foraminous forming roll to receive pulp on its external surface, and a fixed shield concentrically spaced from said forming roll surface to extend partially around the same, and means to deliver pulp intermediate the roll surface and said shield.

12. In combination, in machinery for forming articles from fibrous pulp, an inclined rotatable foraminous forming roll to receive pulp on its external surface, and a fixed shield concentrically spaced from said forming roll surface to extend partially around the same, means to deliver pulp intermediate the roll surface and said shield, a flange around the base of said roll, and a cooperating part on said shield to engage over said flange to prevent flow of pulp beyond the base of said roll.

13. In combination, in machinery for forming articles from fibrous pulp, an inclined rotatable foraminous forming roll to receive pulp on its external surface, and a fixed shield concentrically spaced from said forming roll surface to extend partially around the same, means to deliver pulp intermediate the roll surface and said shield, a flange around the base of said roll, a cooperating part on said shield to engage over said flange to prevent flow of pulp beyond the base of said roll, and a pressure roll movable angularly toward the exposed surface of said forming roll to engage and compact pulp carried on the latter.

In testimony, that I claim the invention set forth above I have hereunto set my hand this 20th day of September, 1928.

EUGENE L. PERRY.