No. 768,308.

PATENTED AUG. 23, 1904.

J. H. RIVERS.

MACHINE FOR FORMING HOLLOW PULP ARTICLES.

APPLICATION FILED AUG. 20, 1903.

NO MODEL.

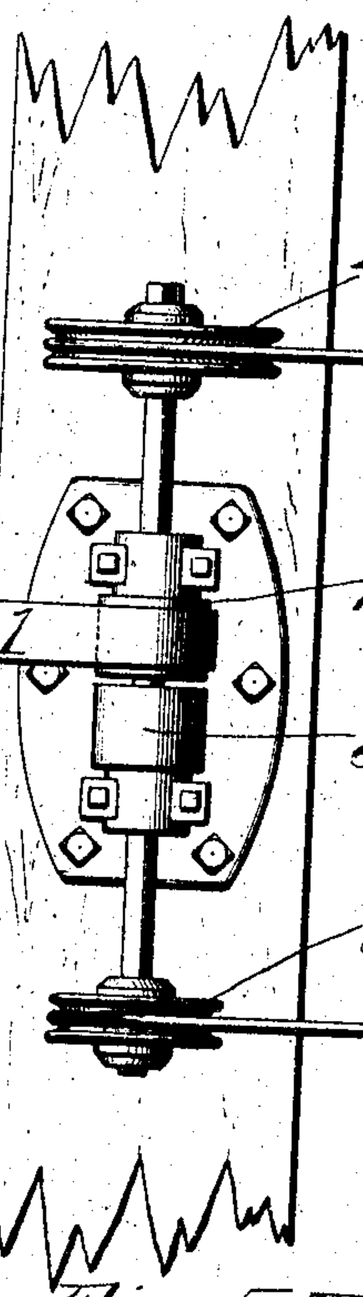


Fig. 1.

Fig. 2.

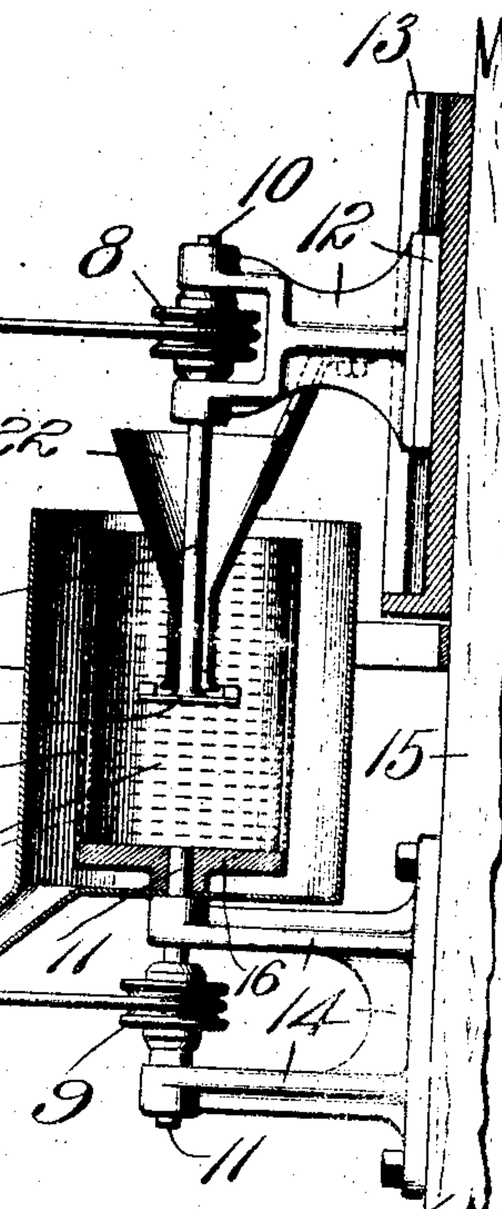


Fig. 3.

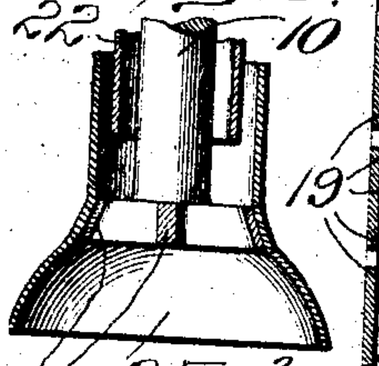


Fig. 5.

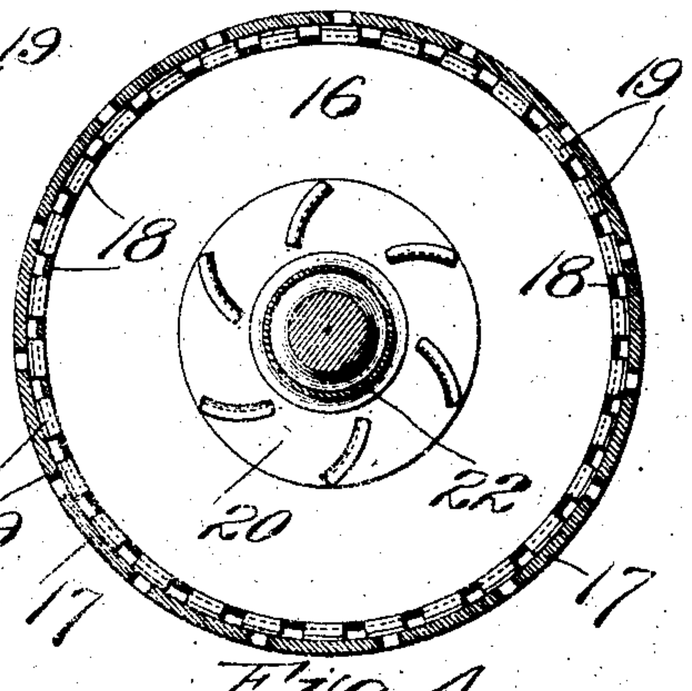
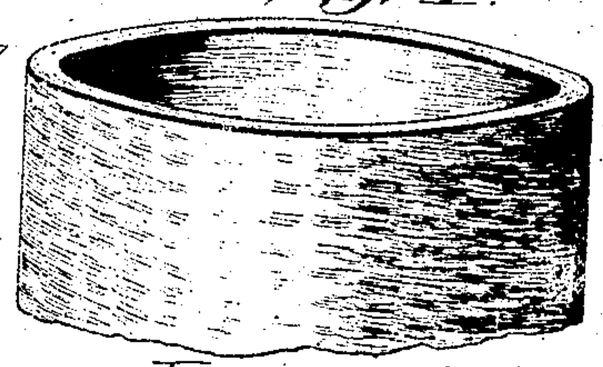


Fig. 4.



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No. 768,308. Patented August 23, 1904.

UNITED STATES PATENT OFFICE.

JULIAN H. RIVERS, OF ST. LOUIS, MISSOURI, ASSIGNOR TO UNITED STATES FIBER STOPPER COMPANY, OF ST. LOUIS, MISSOURI, A CORPORATION OF SOUTH DAKOTA.

MACHINE FOR FORMING HOLLOW PULP ARTICLES.

SPECIFICATION forming part of Letters Patent No. 768,308, dated August 23, 1904.

Application filed August 20, 1903. Serial No. 170,123. (No model.)

To all whom it may concern:

Be it known that I, JULIAN H. RIVERS, a citizen of the United States, residing at St. Louis, Missouri, have invented a certain new and useful Improvement in Machines for Forming Hollow Pulp Articles, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a side elevational view, partly in section, of my improved machine for forming hollow pulp articles. Fig. 2 is an enlarged view of the forming-mold. Fig. 3 is a cross-sectional view on the line 3 3 of Fig. 2. Fig. 4 is a detail view of a portion of a hollow pulp article made by my improved machine, and Fig. 5 is a modified form of distributer.

This invention relates to a new and useful improvement in machines for forming hollow pulp articles; and it consists in the forming-mold, the feeding mechanism, and in the differential speeds between the feeding mechanism and said forming-mold.

Other features reside in the construction, arrangement, and combination of the several parts, all as will be hereinafter described and afterward pointed out in the claims.

In the drawings, 1 indicates a driving-belt which is capable of being placed on fast and loose pulleys 2 and 3, as is well understood. The shaft of these pulleys carries driving-pulleys 4 and 5, which driving-pulleys are of different diameters, said pulleys having mounted thereon belts 6 and 7, which pass over pulleys 8 and 9, arranged on shafts 10 and 11. The shaft 10 is preferably mounted upon a vertically-slidable bracket 12, mounted in guideways 13, whereby the bearing and its carried shaft may be adjusted vertically. Any suitable mechanical means may be employed for moving this bearing up and down, and such movement may be manually or mechanically controlled, as is well understood. The shaft 11 is preferably mounted in a fixed bracket 14, secured to a suitable post or support 15, upon which the guideways 13 are also mounted.

The upper end of shaft 11 carries a head 16, upon which is mounted a perforated hollow cylinder 17. This cylinder 17 is preferably fixed to the head 16, although it may be removable, if desired. Within the cylinder 17 is an inner screening cylinder or mold 18, whose cut tongues are preferably bent outwardly to provide a space between the cylinder 17 and mold 18 for the passage of water, the water finally escaping through the openings in cylinder 17. These tongues, which are indicated at 19, extend in a longitudinal direction, and in operation after the pulp is deposited against the inner face of the mold 18 the said mold and its contained lining of pulp is removed from the cylinder 17, after which the pulp may be slid endwise from the mold 18, the longitudinal disposition of the tongues readily lending themselves to this movement without offering any obstruction. Of course such movement would be in a downward direction, with the cylinder in the position shown in Fig. 2 or in a direction from the free ends of the tongues toward their attached portion.

The pulp and water is distributed throughout the length of the mold 18 by appropriate feeding devices, and it is a feature of my invention to speed up these feeding devices whereby pulp and water are thrown outwardly by centrifugal force at a speed equal to or greater than the circumferential speed of the mold. In this way in addition to the action of centrifugal force upon the pulp fibers deposited against the mold the said fibers are thrown forcibly against the mold and lie in layers or strata which are quite compact. Of course the compactness of the pulp article in the course of formation depends upon the circumferential speed of the mold. Empirically, I have found that where the mold travels two hundred and seventy-five feet per minute the density of the pulp is about ten grains per cubic inch, and where it travels four hundred and seventy-two feet per minute about nine-

teen and one-half grains per cubic inch; seven hundred and eighty-six feet per minute, about thirty-one and one-fourth grains per cubic inch; seventeen hundred and seventy feet per minute, about fifty-four grains per cubic inch; two thousand nine hundred and ninety feet per minute, about seventy-eight grains per cubic inch; four thousand three hundred and eighty-three feet per minute, about ninety-three grains per cubic inch; five thousand eight hundred and thirty-nine feet per minute, about one hundred grains per cubic inch; seven thousand three hundred feet per minute, about one hundred and twelve grains per cubic inch. The pulp and water when introduced into the mold approximate a density of two grains per cubic inch of water. The pulp-fibers and the water are thrown centrifugally against the inner surface of the mold 18, upon which the fibers are deposited, the water passing outwardly through the openings in the cylinder 17 and mold 18. The circumferential speed determines the density of the pulp, and consequently as the density of the cast increases the percentage of water therein diminishes. I have further found that after the pulp has been deposited against the mold it can be dried to some extent by continuing the same or increasing the speed up to within certain limits.

I consider it important in the manufacture of hollow pulp articles in order to avoid rupture or breakage on the inner face of the article to speed up the mold to the point of required density and maintain that speed until the desired thickness of pulp fibers has been deposited upon the mold 18.

The feeding mechanism is preferably in the form of a disk 20 on the lower end of the shaft 10, which disk may have upwardly and outwardly extending curved lips or wings for the purpose of catching and carrying the pulp-water to the periphery of the disk for the purpose of delivering the same with considerable centrifugal force against the mold 18 and in lines slightly tangential. In other words, due to the unequal speeds at which the mold 18 and the disk 20 are driven, the pulp-water will be thrown off tangentially, and this action contributes to the laying of the pulp fibers circumferentially, with the result that a more compact and a stronger structure results. In fact, the hollow pulp cylinder formed by my improved apparatus possesses the characteristic of having its fibers in overlying strata, the individual fibers lying generally in a circumferential direction.

While I have shown a feeding-disk 20 as being driven at a faster speed than the perforated mold 18, it will be obvious that because of the difference in diameters of these two parts their circumferential speed will be approximately the same.

22 indicates a funnel whose mouth surrounds the shaft 10, so as to equally distribute the pulp-water over the disk 20, said funnel being preferably mounted on the bracket 12, so as to be movable therewith and maintain at all times a fixed relation between the lower extremity of the funnel-mouth and the disk 20.

In Fig. 5 I have shown a modified form of distributing-disk in which the shaft 10 carries a bell-shaped distributer 25 on its lower end, the upwardly-extending hollow boss on the same extending above the mouth of the funnel. I have found that this arrangement answers equally as well as the flat disk 20, as the pulp-water is thrown out by the radial webs 26 of the bell against the inner face of the bell and thence outwardly, being discharged from the mouth of the bell in a horizontal direction.

In operation the pulp-water containing a density, preferably, of from two to three grains per cubic inch is fed into the funnel and distributed by the disk 20 upon the perforated mold 18. The driving-belt 1 is operated at the desired speed, and, manually or otherwise, the bracket 12 is raised and lowered, so as to feed the pulp lengthwise the cylinder 18. When the desired thickness of pulp fibers of the required density is deposited upon the mold 18, the bracket 12 is raised so as to permit the removal of the mold 18. I prefer to allow the hollow pulp article to dry in the mold 18, when it can be removed without danger of losing its shape, particularly where it possesses a small density.

To catch the water thrown off by cylinder 17, I surround the same with a shell 23, having a closed bottom and a discharge-spout 24.

I do not in this application claim the process of making hollow pulp articles nor the article itself as an article of manufacture, as the same are shown, described, and claimed in companion applications filed by me of even date herewith, being Serial Nos. 170,121 and 170,122.

I am aware that minor changes in the construction, arrangement, and combination of the several parts of my device can be made and substituted for those herein shown and described without in the least departing from the nature and principle of my invention.

Having thus described my invention, what is claimed as new, and desired to be secured by Letters Patent, is

1. In an apparatus of the character described, the combination with a driving-shaft carrying two pulleys of different diameters, a perforated mold driven by one of said pulleys, and a feeding device movable longitudinally the cylinder driven by the other of said pulleys; substantially as described.

2. In an apparatus of the character described, the combination with a perforated mold, of means for rotating the same, and a pulp-feeding device movable longitudinally

the mold, and means for rotating the feeding device at a speed different from that of the mold; substantially as described.

3. In an apparatus of the character described, the combination with a vertically-arranged rotatable mold having perforated side walls, and a vertically-movable rotatable feeding device acting centrifugally upon the pulp-water to be deposited against the inner face of the mold; substantially as described.

4. In an apparatus of the character described, the combination with a rotatable mold, of a centrifugal feeding device movable in an axial direction in the mold; substantially as described.

5. In an apparatus of the character described, the combination with a rotatable mold having perforated side walls, of a centrifugal feeding device, said mold and feeding device having a relative longitudinal movement, and means for supplying the pulp-water upon the feeding device; substantially as described.

6. In an apparatus of the character described, the combination with a rotatable mold having perforated side walls, of a rotating disk movable in a longitudinal direction relative to the mold, and a pipe for supplying pulp-water to the disk, said pipe being concentric to said disk; substantially as described.

7. In an apparatus of the character described, the combination with a perforated rotatable mold, of a disk movable in the mold, projections on the disk, and a supply-pipe; substantially as described.

8. In an apparatus of the character described, the combination with a perforated rotatable mold, of a winged distributing-disk movable in the mold, and a supply-pipe for delivering pulp-water upon the winged disk; substantially as described.

9. In an apparatus of the character described, the combination with a rotatable mold having perforated side walls, of a distributing element capable of relative longitudinal movement with respect to the mold, means for rotating said element in its various positions in the mold, and a feeding device for supplying pulp-water to the distributing element in its different positions; substantially as described.

10. In an apparatus of the character described, the combination with a rotatable mold having perforated side walls, of a rotatable distributing element movable longitudinally the mold, and means for supplying pulp-water to the distributing element, said supply-means being movable with the distributing element, so that the point of supply bears the same relation to the distributing element in the various positions of the latter; substantially as described.

11. In an apparatus of the character described, the combination with a movable bracket, of a shaft journaled in said bracket, means for driving said shaft, a disk arranged upon the end of said shaft for distributing pulp-water centrifugally, and a supply-tube for the pulp-water surrounding the shaft and having its discharge end in proximity to the disk, said supply-tube being secured to the bracket; substantially as described.

12. In an apparatus of the character described, the combination with a movable bracket, of a shaft journaled therein and having a winged disk at its lower end, and a funnel whose mouth surrounds the shaft so as to discharge the pulp-water upon the disk, said funnel being secured to the bracket; substantially as described.

13. In an apparatus of the character described, the combination with a rotatable head, of a perforated cylinder 17 arranged thereon, and a removable cylinder 18 arranged in the cylinder 17, said cylinder 18 having bent tongues to provide openings and spacing means; substantially as described.

14. In an apparatus of the character described, the combination with a rotatable head 16, of a perforated cylinder 17 mounted thereon, and a cylinder 18 removably mounted on the cylinder 17, said cylinder 18 having tongues 19; substantially as described.

15. The herein-described mold for paper-pulp comprising a shell having tongues bent outwardly therefrom; substantially as described.

16. The herein-described mold comprising a shell having longitudinally-disposed tongues struck up from the body portion of the shell; substantially as described.

17. The herein-described mold comprising a shell having outwardly-bent tongues struck up from its body portion, said tongues being arranged in longitudinal rows; substantially as described.

In testimony whereof I hereunto affix my signature, in the presence of two witnesses, this 13th day of August, 1903.

JULIAN H. RIVERS.

Witnesses:
GEORGE BAKEWELL,
LENORE WILSON.