M. P. CHAPLIN.

APPARATUS FOR MOLDING ARTICLES FROM PULP.

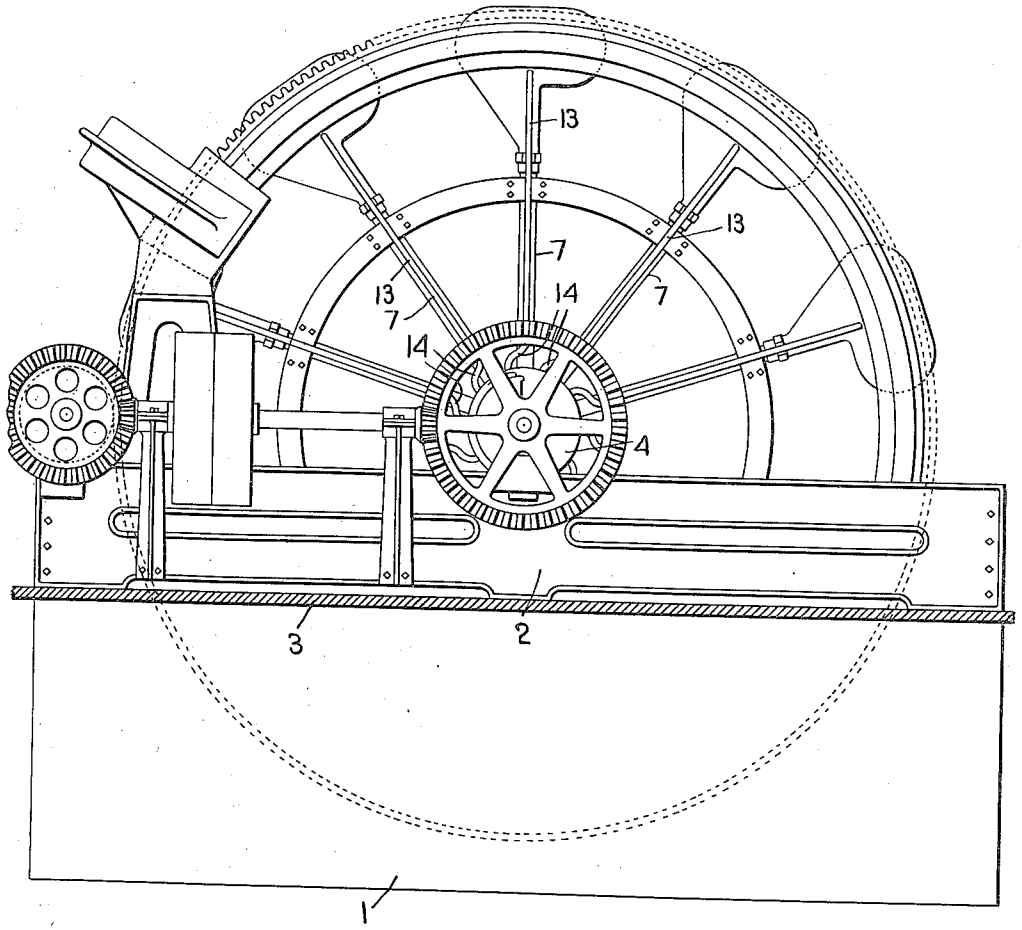
APPLICATION FILED NOV. 11, 1913.

1,184,420.

Patented May 23, 1916.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses.
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2 SHEETS—SHEET 2.

Fig.2.

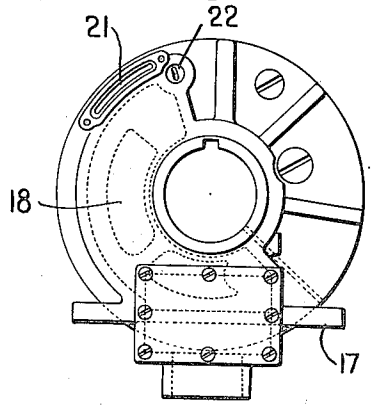


Fig.3.

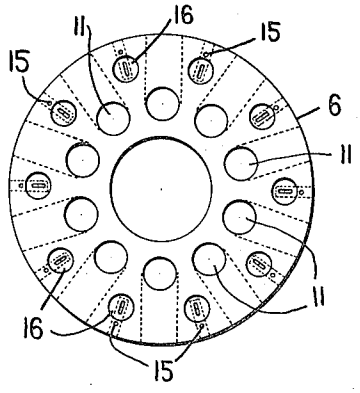


Fig.4.

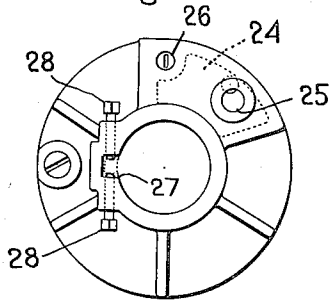


Fig.5.

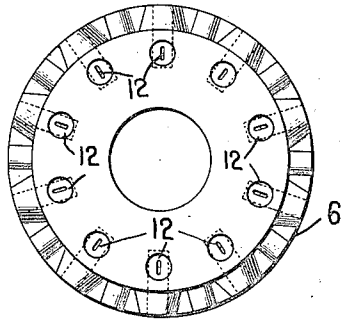


Fig.6.

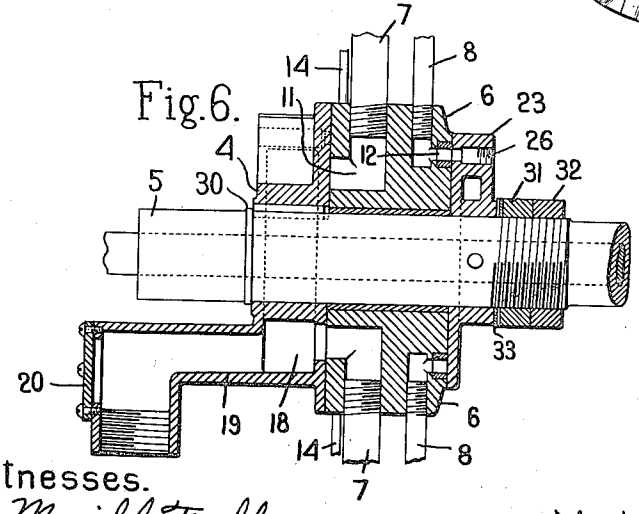
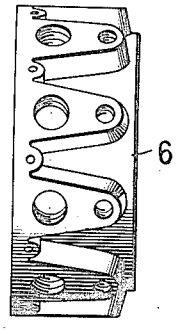


Fig.7.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR MOLDING ARTICLES FROM PULP.

1,184,420. Specification of Letters Patent. Patented May 23, 1916.

Application filed November 11, 1913. Serial No. 800,394.

To all whom it may concern:

Be it known that I, MERLE P. CHAPLIN, citizen of the United States, residing at Fairfield, county of Somerset, State of Maine, have invented an Improvement in Apparatus for Molding Articles from Pulp, of which the following description, in connection with the accompanying drawing, is a specification, like characters on the drawing representing like parts.

This invention is for an improvement in machines or apparatus for molding articles from pulp, such as has been made the subject of previous patents granted to Martin L. Keyes, among which are Patents #759,616, dated May 10, 1904, #788,138, dated April 25, 1905, reissue #12,911, dated Jan. 12, 1909. Machines of this type comprise a mold having nesting faces between which the article is formed, a vat to contain pulp, means to dip one of said mold faces, which will be referred to hereafter as the receiving mold face, into the pulp, means to apply suction to said face while it is immersed in the pulp, whereby a layer of pulp is deposited on said face, and means to thereafter close the faces of the mold together and press the pulp into an article of the desired shape.

In the particular embodiment of the invention illustrated in these patents the molds are carried upon arms projecting radially from a hub, revolubly mounted upon a shaft which extends across the top of the vat. The molds comprise a receiving member fixed to the mold carrying arms, and a compressing mold member pivotally attached to the mold carrier. The arms connecting the mold members to the hub are hollow and adapted to be connected with means for exhausting the air therefrom, as will hereafter more fully appear. During the rotation of the carrier the fixed mold member or receiving face is immersed in the pulp and suction is applied thereto, whereby a layer of pulp is deposited thereon. During the continued movement of the mold carrier, the pivoted mold member or compressing face is closed against the fixed member, and the layer of pulp is compressed between said mold faces to form the article. During the further movement of the mold carrier the mold faces are separated and at the same time a blast of air is forced through the receiving mold face, thereby loosening the formed article and transferring it to the compression mold face.

As pointed out in Patent #759,616, it has been found essential that all of the water should be drawn from the fixed mold member before the air is admitted to said members for blowing off the molded article, because if any water remains in said member the blast of air will blow said water through the perforated face and soften the article to such a degree that it cannot be effectively handled. In the device shown in said patent a draining chamber communicated with the interior of the fixed or receiving mold member and was so shaped that by the time the mold reached the position in which the members were to be separated all the water in the draining chamber would have a tendency to run off by gravity. It also included a valve mounted in the fixed mold member and communicating with the atmosphere, the said valve being open during the compressing operation, and while the said mold member was still connected with the vacuum, so that the water in said mold member and draining chamber would be swept out by the vacuum before the compressed air is introduced to discharge the molded article from the fixed mold member.

As set forth in Reissue Patent #12,911 this arrangement had some objectionable features, in that the valve in the fixed mold member was carried upon every rotation through the vat and became more or less plugged with pulp. Frequently pulp and other foreign matter would be drawn into the valve causing injury to the vacuum system or if blown by the compressed air from the hollow arm onto the mold face, or articles being molded would cause injury to the molded article. This objection was largely obviated by the improved device disclosed in the Reissue Patent #12,911 in which means were provided for supplying a draft of air to the mold member without carrying thereinto any pulp or foreign matter. This was secured by providing a separate air pipe connecting the air chamber in the back of the fixed mold member with a port in the hub of the mold carrier and by providing the stationary coöperating collar with a port open to the atmosphere, through

which communication could be made with the port of the air pipe at the desired time, namely, while the fixed mold member was still in communication with the vacuum and before the compressed air has been admitted to the fixed mold member. In the construction shown in the Reissue Letters Patent #12,911, however, the suction and the compressed air were both supplied through the hollow arms leading to the receiving mold members at different periods in the revolution of the mold carrier.

In the operation of machines in which the air is first exhausted to the hollow arms leading through the receiving mold members and compressed air thereafter supplied for the purpose of releasing the molded article from the receiving mold member, some water, pulp, etc., remains in the hollow arm, accumulates gradually until the arm is partially filled, whereupon a succeeding blast of compressed air will loosen the same and project it against the molded article. In the present invention this difficulty is overcome by providing means independent of the hollow arm 17 for supplying compressed air to the chamber at the rear of the receiving mold member. This is accomplished in the preferred form of invention illustrated herein by arranging the separate air pipe which connects the chamber in the back of the fixed mold member to communicate through a port in the hub which will deliver to said pipe the supply of compressed air necessary to release the molded article from the receiving mold member. By this arrangement only suction upon the receiving mold member is applied through the hollow arm leading to said member and any residue of pulp or the like which is drawn toward the hub will be retained in the pipe or in the vacuum chamber with which it communicates and will not be projected upon the molded article.

Machines of the character disclosed in said patents the hub, in addition to carrying the hollow arms leading to the receiving mold members, also carried a series of arms leading to the compressing mold members. These hollow arms were provided with ports which communicated with a vacuum chamber in a collar upon the hub for the purpose of creating a suction through said receiving mold face at the time the molded article was loosened from the receiving mold face to cause the molded article to adhere to the compression face. The pivoted arm was then swung down and the molded article removed by a transferring device to a suitable drier. The hollow arm was connected with a port in the hub which communicated with a compression port in the collar at the period in its revolution in which it was desired to deliver the molded articles from the compressing face. It is found in practice to be desirable to adjust the point in the rotation of the mold member at which the compressed air is admitted to the compression face for the purpose of loosening the molded article so that it may be received and removed by the delivery mechanism and to this end means are provided in the present construction for rotarily adjusting the collar which coöperates with the compressed mold member in order that the amount of compressed air supplied may be regulated to the size of the article to be discharged or other conditions necessary to coördinate the action of the compression mold member and the delivery mechanism.

Other features of the invention reside in means for securing the hub and collars upon the shaft, and in means for providing for the ready access to the interior of the hub.

The nature of the invention will more fully appear from the accompanying description and drawings, and will be particularly pointed out in the claims.

The drawings illustrate as much of the apparatus of the type disclosed in the aforesaid patents as is necessary for an understanding of the invention here involved, and show in detail the particular improvements which are the subject of the subjoined claims.

In the drawings: Figure 1 is a side elevation of the apparatus for molding articles from pulp, shown in a somewhat conventional form for the purpose of illustrating the general arrangement of the parts. Fig. 2 is a front end elevation of the collar on the shaft looking toward the machine as positioned in Fig. 1. Fig. 3 is a view showing the end of the hub of the mold carrier, which is toward the front in Fig. 1. Fig. 4 is a front elevation of the collar on the shaft at the rear side of the hub. Fig. 5 is a view of the opposite end of the hub to that shown in Fig. 2, and which coöperates with the collar shown in Fig. 4. Fig. 6 is a vertical cross section of the hub of the mold carrier and collars. Fig. 7 is a side view of the hub showing the position of the recesses, in which the radial hollow mold arms and the air pipes leading to the molds are secured.

The apparatus in which this invention is embodied is similar to that illustrated in the above mentioned patents and it is therefore unnecessary to describe the same in detail.

The pulp vat 1 is suspended from suitable frame 2 resting upon the floor 3, so that the vat may extend below the same. The frame 2 is provided at one side with a supporting bracket not shown, and at the other side with a collar 4, in which is mounted a hollow shaft 5 which is secured from rotation. The hub 6 of the mold carrier is mounted to rotate freely on the shaft 5, and is provided with radial hollow arms 7 and 8 leading respectively from ports on oppo-

site sides of the hub to the respective mold members 9 which pass through the compression device 10, as in the device disclosed in Patent #788,138, but differs from that device in that the hollow arm leading to the receiving mold face, is adapted to open only to the vacuum chamber through the port 11. The hollow arm 8 which leads to the compressing mold face communicates with a port 12 which is adapted to communicate alternately with the vacuum and compressed air ports in the same manner as in the patent aforesaid.

In addition to the hollow arm 7, which supports and communicates with the mold receiving member, an air passage is provided, which is shown herein as small pipe 13, which enters back of the fixed or receiving mold member, extends down along the hollow arm 7 of the receiving member and terminates near the hub 6. A flexible tube 14 extends from the end of the tube 13 to the hub and leads to ports 15 and 16 opening at the face of the hub 6. The ports 15 and 16 are of different sizes and are adapted to register respectively with an opening leading to the atmosphere, and with a compression port in the collar 4, as will be herein described.

The collar 4 is provided with a base plate 17, adapted to be secured to the frame 2 aforesaid, and contains a vacuum chamber 18. It has a lateral extension 19, which is preferably bent at right angles so as to provide an easily accessible connection for a pipe leading to a suitable air exhausting mechanism, not shown. An opening is made in the elbow, formed in the lateral extension in order that access can be had to the interior of the collar and hub, and this opening is provided with a cover 20 which may be secured to said arm by screws, bolts, or other suitable fastenings.

The vacuum chamber 18 is so arranged that the port 11 of the receiving member will register with the opening thereof when the receiving mold face is submerged in the pulp, and will be in communication therewith until the mold face has arisen from the pulp and passed the compression device. By this arrangement the liquid pulp is sucked up against the receiving mold face until a layer is supplied thereto, the compression face is then forced against the mold face and since suction is still present in the hollow arm which communicates with the mold receiving face the water will be quickly and readily removed from the layer of pulp by the joint action of compression and suction. The air necessary to permit the free drainage of the water during such action is supplied to the mold face while the suction is being continued through a port in the form of an elongated slot 21 near the periphery of the collar which is adapted to register with the port 15 of the air passage 13 during the passage of the mold through the compressing mechanism, in the manner disclosed in reissued Letters Patent #12,911, to which reference has heretofore been made. In the device disclosed in that patent the molded article was loosened from the receiving face, after the completion of the compression and suction action above described, by a puff of compressed air which was introduced through the hollow arm 7.

In the present invention the compressed air, instead of being admitted to the hollow arm 7, is introduced through the port 22 in the collar 4 into the air pipe or passage 13 and thence directly into the chamber at the rear of the mold face, thus avoiding the wasting of compressed air and also resulting in quicker and more effective loosening of the molded article from the receiving face.

In the machines disclosed in the patents above referred to the molded article is transferred at this point to the compressing mold face and retained thereon by suction applied through the hollow arm 8 which communicates therewith. In the present machine as in those disclosed in the patents aforesaid, suction is applied to this member through a collar 23 which corresponds to the collar 4, and has a flat face abutting the opposite flat face of the hub 6. The collar 23 is provided with a vacuum chamber 24 connected through an inlet 25 to the vacuum apparatus, and also with a port 26, which is connected to the air compressor. These ports are adapted to register in turn with the port 12 in the hub leading to the compressing face and are so arranged that as soon as the molded article has been loosened from the receiving face by a puff of compressed air, as aforesaid, it will be caused to adhere to the compressing face by reason of the port 12 coming into registry with the vacuum port in the collar 23.

After the molded article has been carried to the proper position for its removal which, as shown in the patents above referred to, is in substantially a vertical plane through the axis of the main shaft, a puff of compressed air is supplied to the back of the compression face through the port 26 in the collar 23, port 12 and the hub on the hollow arm 8. At this time the molded article is received upon a sucker carried by delivery mechanism not shown, and removed from the machine.

It is desirable in assembling machines that the relative positions of the ports of the collars 4 and 23 be made adjustable so that suction or compressed air may be applied to the compressing face at the desired instant particularly to permit the introduction of the compressed air at the proper time to release the article from the compressing

face as it approaches the delivery mechanism and to this end the collar 23 is provided with a slot 27 which is adapted to fit loosely over a fin or a key carried by the fixed shaft. Oppositely disposed machine screws 28 are threaded in the collar and engage opposite sides of the fin or key. By screwing one of these screws forward and retracting the other a fine adjustment of the parts may be had so that the relative positions of the ports connecting with the receiving and compressing face respectively may be accurately determined.

In order to take up for the wear which occurs between the flat faces of the hub 6 and the collars 4 and 23, means are provided for tightening the collars against the flat faces of the hubs. This means comprises a collar 30 which may be formed integrally upon the hollow shaft 5 by turning or otherwise, or may be in the form of a ring shrunken upon said hollow shaft. The collar 4 abuts against the shoulder thus formed. At the other side of the hub and collar 23 the hollow shaft is screw threaded and is provided with a pair of lock-nuts 31 and 32 which are adapted to be forced firmly against the outer face of the collar 23. A washer 33 may, if desired, be placed between the collar 23 and the hub 31. By reason of this construction any wear which occurs upon the relatively rotating faces of the hub and collars may be readily taken up and an air-tight connection between the hub and the respective collars thereby may be maintained.

Having fully described my invention what I claim as new and desire to secure by Letters Patent is:—

1. In an apparatus of the class described comprising a pulp containing vat, a traveling mold including a receiving member and a compressing member, means periodically to immerse said receiving member in the pulp to receive the layer of pulp thereon, means to compress said mold members with the pulp layer therebetween, means acting automatically to exhaust the air from said receiving member during immersion and compression, means independent of the exhausting means for supplying compressed air through the rear face of the said receiving mold member after the completion of the compressing action to loosen the molded article from the face of the receiving mold member.

2. In an apparatus of the class described a pulp containing vat, a two-part traveling mold comprising a receiving member and a compressing member, means periodically to immerse said receiving member in the pulp to receive a layer thereon, means to compress said mold members with the pulp layer therebetween, means acting automatically to exhaust the air from said receiving member during immersion and compression, means to admit air to the rear face of said receiving mold member during the compression of the pulp, and means independent of the exhausting means for supplying compressed air through the rear face of said receiving mold member after the completion of the compressing action to loosen the molded article from the face of the receiving mold member.

3. In an apparatus of the class described, a pulp containing vat, a two part traveling mold comprising a receiving member and a compressing member having coöperating perforated faces, means periodically to immerse said receiving member in the pulp to receive a layer thereon, means acting automatically to exhaust the air from said receiving member during and after its immersion, means to compress said mold members with the pulp layer therebetween, a separate air passage communicating with said receiving member, means adapted to open said passage to the atmosphere during the action of said exhausting means, and means to supply compressed air to said air passage on the completion of said action, whereby the molded article is loosened from said receiving face and adapted to be transferred to said compressing face.

4. In an apparatus of the class described, a pulp containing vat, a two part traveling mold comprising a receiving member and a compressing member and coöperating perforated faces, means periodically to immerse said receiving member in the pulp to receive a layer thereon, means acting automatically to exhaust the air from said receiving member during and after its immersion, means to compress said mold members with the pulp layer therebetween, a separate air passage communicating with said receiving member, and having a plurality of ports, means for maintaining said ports normally closed, means for opening one of said ports to the atmosphere during the action of the exhausting means, and means to supply compressed air from another port after the completion of such action.

5. In an apparatus of the class described, a pulp containing vat, a non-revoluble shaft, a mold carrier revolubly mounted thereon, comprising a hub having a series of radially arranged hollow arms fixed thereto, a receiving mold member provided with a perforated face carried by each arm, ports in said hub communicating with said hollow arms, a separate air passage connecting said receiving mold member with said hub, a collar fixed to said shaft provided with a vacuum chamber adapted to communicate with said hollow arms as the ports in the hub pass into registry therewith, a port in said collar adapted to open said air passage to the atmosphere during

the action of the exhausting means upon the receiving mold member, a compressed air port in said collar adapted to supply air to said air passage on the completion of the exhaust, means for exhausting the air from said vacuum chamber, and means for supplying compressed air to said compressed air port.

6. In an apparatus of the class described a rotary hub, connections on the periphery thereof adapted to receiving a series of hollow mold carrying arms, a second series of connections in the periphery thereof located respectively between the members of the first series of connections and adapted to receive pipes for transmitting air to the mold members, a plurality of series of ports on the face of said hub, one of said series being adapted to communicate with said hollow arms, and two of said series being adapted to communicate with said air pipe, substantially as described.

7. In an apparatus of the class described, a fixed shaft, a hub freely revoluble thereon presenting oppositely disposed flat faces, ports in said faces adapted to connect with mold members carried by said hub, a collar having coöperating ports at one side of said hub and provided with a flat face cooperating with the face of said hub, means for rotarily adjusting said collar upon said shaft whereby the timing of the registry of the ports therein with those upon the hub may be varied.

8. In an apparatus of the class described, a fixed shaft, a hub freely revoluble thereon, and presenting oppositely disposed flat faces having ports adapted to connect with hollow receiving and compressing mold members respectively, a collar fixed to said shaft and having ports coöperating with the ports in the hub leading to the receiving mold members, a collar mounted on said shaft and having ports coöperating with the ports on the hub leading to the compressing member, and means for rotarily adjusting said last mentioned collar on said shaft.

9. In an apparatus of the class described, a fixed shaft, a hub freely revoluble thereon, and presenting oppositely disposed flat faces having ports adapted to connect with hollow receiving and compressing mold members respectively, a collar fixed to said shaft and having ports coöperating with the ports in the hub leading to the receiving mold members, a collar mounted on said shaft and having ports coöperating with the ports on the hub leading to the compressing member, and means for rotarily adjusting said last mentioned collar on said shaft, comprising a lug or key projecting laterally from said shaft and loosely entering a slot or keyway in said collar, and oppositely disposed screws threaded in said collar adapted to engage opposite sides of said lug or key.

10. In an apparatus of the class described a fixed shaft, a hub freely revoluble thereon and presenting oppositely disposed faces having ports leading to air passages adapted to connect with hollow receiving and compressing mold members respectively, collars keyed upon said shaft having ports coöperating with the ports in the hub faces leading respectively to the receiving and compressing mold members and means for adjusting the collars longitudinally of the shaft relatively to the faces of said hub comprising an annular shoulder upon said shaft abutting against one of said collars and nuts screw threaded upon said shaft adapted to force said collars tightly in contact with the respective faces of the hub.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

MERLE P. CHAPLIN.

Witnesses:
HARRY L. HOLMES,
C. A. BRADBURY.