(No Model.) 2 Sheets—Sheet 1.

H. PARKER.

MOLD CYLINDER.

No. 550,353. Patented Nov. 26, 1895.

Fig. 1,

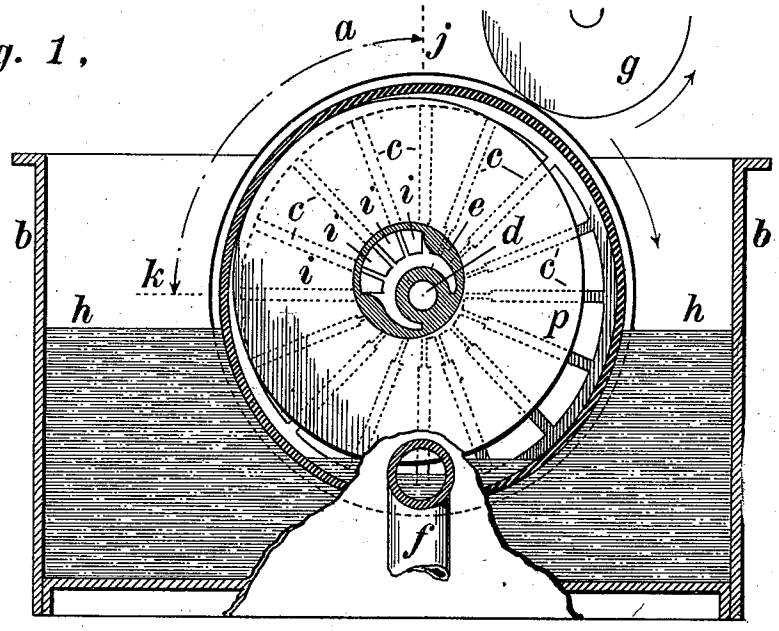
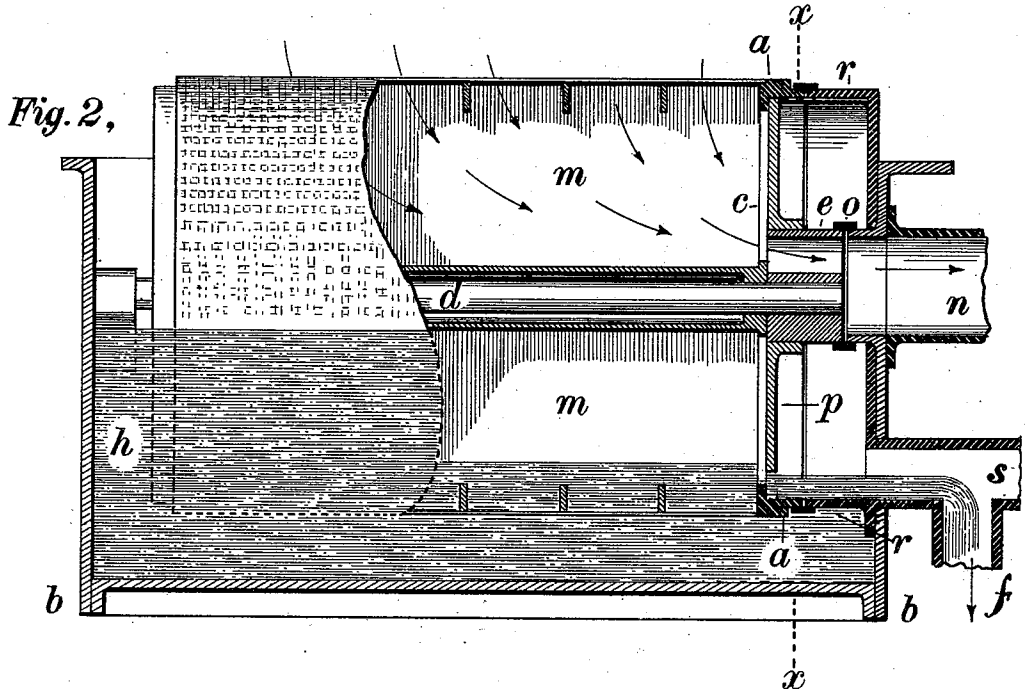


Fig. 2,



WITNESSES:

Willis H. Sargent.

Frank O. French.

INVENTOR

Howard Parker

(No Model.) 2 Sheets—Sheet 2.

H. PARKER.

MOLD CYLINDER.

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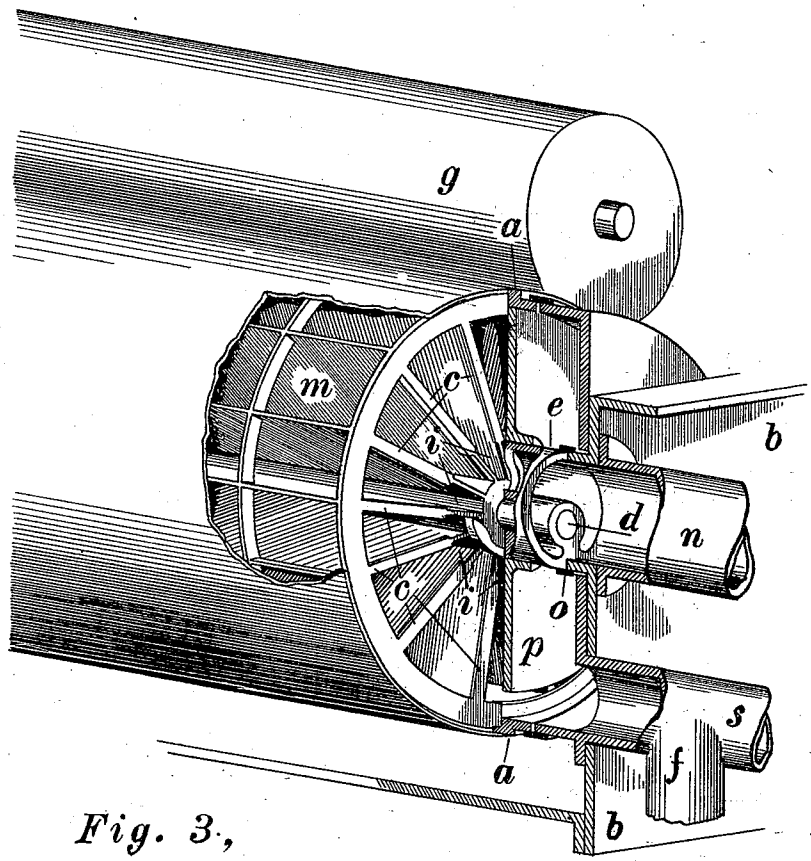

Fig. 3.

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INVENTOR

Howard Parker

UNITED STATES PATENT OFFICE.

HOWARD PARKER, OF ST. JOHNSBURY, VERMONT, ASSIGNOR TO THE VACUUM WET MACHINE COMPANY, OF SAME PLACE.

MOLD-CYLINDER.

SPECIFICATION forming part of Letters Patent No. 550,353, dated November 26, 1895.

Application filed February 24, 1894. Serial No. 501,397. (No model.)

To all whom it may concern:

Be it known that I, HOWARD PARKER, of St. Johnsbury, in the county of Caledonia and State of Vermont, have invented certain new and useful Improvements in Mold-Cylinders, of which the following, taken in connection with the accompanying drawings, is a specification.

This invention relates to the mold-cylinder commonly used in pulp and paper making machinery for removing from the thin pulp the water of suspension which flows through its wire-cloth surface, leaving the wet fiber upon that surface to be carried up and transferred to the couch-roll or felt-apron. My improvements, while not much affecting the free deposit of the layer of pulp upon this peripheral surface, are designed to secure by atmospheric pressure the removal of much of the water from this wet layer while it is being carried up to the couching-line, and to so limit that pressure that it will not act to prevent the free couching at that line of contact with the roll above.

To this end the invention consists in the combination of the mold-cylinder divided into separate longitudinal compartments by means of substantially radial partitions, with a water-outlet chamber communicating with the interior of said cylinder, as usual, to provide for the outflow of water that passes from the pulp-vat into the immersed portion of the cylinder through its foraminous periphery, and an exhaust-conduit and means for placing the compartments of the cylinder in communication therewith during a predetermined portion only of their revolving movement about the axis of the cylinder, said compartments, which are at any time in communication with the exhaust-passage, being then cut off from the water-outlet. These parts are so arranged that the compartments which are in communication with the exhaust-conduit are those that are traveling upward from the surface of the thin pulp in the vat toward the couching-line, and, if desired, the means for controlling communication between the compartments and the exhaust may be so adjusted that the exhaust may begin in a compartment before it rises out from the pulp, thereby increasing the deposit of fiber upon the straining-surface.

In the drawings, Figure 1 is an end elevation with some of the tank broken away and showing the moving parts and a partial section of the exhaust-passage in the line $x\,x$, while the dotted lines show the partitions m m of the cylinder, the same as a section would do. Fig. 2 is a side elevation showing partly a section through the center of the mold-cylinder. Fig. 3 shows in perspective the construction of part of the exhaust-passage and connections.

The mold-cylinder may be, as shown, in substantially the usual relation to the pulp-vat b and water-outlet chamber, the said cylinder turning on a horizontal shaft or axis d in such relation to the level of thin pulp in the vat that the lower portion of the cylinder is immersed in this pulp, the water from which thus strains through the foraminous surface of the cylinder in the usual manner, leaving the pulp fiber deposited thereon as the said surface rises out from the thin pulp in the vat in the rotary movement of the cylinder. As shown, in this instance the cylinder is closed at one end, (the left-hand end, Fig. 2,) preventing the inflow of pulp therethrough into its interior, and at its other (right hand) end is maintained in the usual manner in communication with the water-delivery chamber—that is, the ring a, forming one end of the cylinder, and the ring or flange r, projecting from the water-outlet chamber, have their corresponding edges adjacent, so that a packing-strip applied in the usual way maintains substantially tight connection between the two, so that the thin pulp cannot enter; but the interior of the cylinder to its lowest point opens into the water-delivery chamber and outlet f for the free discharge of the water from said interior. The connection between the end of the cylinder and the water-outlet chamber is maintained above the level to which the thin pulp rises outside and is made practically air-tight, for a purpose to be explained as the description proceeds, making this the preferable construction.

The sectional cylinder in my improved machine may be constructed in any known way,

but, as shown, is made with longitudinal radial partitions reaching from the closed head to the end spider or skeleton head *c*, which divide it into compartments, as indicated by the dotted lines of Fig. 1, while the peripheral surface is supported by light bridges between these partitions.

In order to apply atmospheric pressure to the layer of pulp that is deposited upon the immersed strainer-surface of the cylinder while the said deposited pulp fiber is carried up by the motion of the cylinder from the surface of the thin pulp to the couching-line or point where it is removed therefrom, (that is in substantially the space from *k* around to *j*, Fig. 1,) it is necessary to provide means for placing the compartments that are at any time traveling through this space in the rotary movement of the cylinder in communication with an exhaust-passage, and in order to render the exhaust effective these compartments must at the same time be otherwise closed or shut off from communication with the water-outlet chamber and from the external atmosphere, except through the straining-surface and layer of fibrous pulp thereon, in order that the air-pressure due to the exhaust may be effective only on said layer of fibrous pulp, supported on the said straining-surface or foraminous periphery of said compartments. The means for effecting this result, as herein shown, consist of a flat circular plate or detached head *p*, adapted to fit closely upon the skeleton end *c* of the cylinder that otherwise opens into the water-outlet chamber, said head being of smaller diameter than the open interior of the cylinder and eccentrically supported with relation thereto, so that the portion of greatest eccentricity overlaps a portion of the peripheral end of the cylinder, while the side of least eccentricty does not reach the outer rim of the skeleton end *c*, but leaves an open space outside the detached head *p* for free communication from the compartments on that side to the water-outlet chamber. The said head *p* has a flanged central opening which fits closely upon the outer surface of the end of the exhaust-conduit *e*, which conduit is eccentric to the axis or shaft of the cylinder and supports within it one bearing of this shaft, as shown. The said exhaust-conduit *e* at its end also makes close contact with the end of the cylinder and has an inlet-opening or port in the side of greatest eccentricity, which overlaps the portion of the compartments of the cylinder nearest the axis, thus giving free openings, as shown at *i i*, from the interior of these compartments into the said exhaust-conduit and from all the compartments in turn as they pass the eccentric side in their rotation. The detached head *p* is preferably free to rotate about the end of the exhaust-conduit *e*, turning with the cylinder, against the end of which it is held by the pressure of the air toward the exhausted compartments, there being only comparatively small frictional movement between the end of the cylinder and its detached head as they rotate about their different centers. It is, however, essential only that means be provided for closing the compartments while in communication with the exhaust-conduit, except at the passages through which such communication is afforded, and for opening them, at least while immersed in the pulp, into the water-outlet chamber, so that the water-level inside these compartments may be lower than the level of the thin pulp in the vat, and the inward flow of the water of suspension may cause a free deposit of pulp fiber upon the straining-surface. A loose packing between two sections of the exhaust-conduit is shown at *o*, which would be required in case the cylinder instead of the couch-roll is mounted in yielding bearings, for which mounting this cylinder is well adapted. The shaft *d* of the cylinder turns with it, and the two sections of the exhaust-conduit are so connected that the one next the cylinder, while having some freedom of motion up and down, cannot rotate with the shaft. This exhaust-conduit *e* communicates through its extension *n* with an air-pump, siphon, or strong fan, (not shown,) and I prefer to connect the water-outlet *f* also with a light exhaust through the branch pipe *s*.

In my improved machine it will be understood that the pulp-vat and immersed portion of the mold-cylinder serve their usual functions, and the fibrous pulp is deposited upon the porous peripheral surface of each compartment, while the water of suspension flows toward the open end. At this end, the detached head being held so high by its eccentric mounting, the outlet is open to the lowest level for the free discharge of the waste water. This would give a satisfactory result, and the cylinder would take up its layer of fibrous pulp precisely as though it had no partitions if it moved slowly enough; but if it is turning rapidly the water in the compartments may not have time to flow to the end and is liable to be carried above the level of the thin pulp outside and to tend to flow out through the porous surface and to wash off the pulp deposited thereon. In order to obviate this difficulty, I arrange for a slight vacuum in the compartments as they rise. This can be effected by adjusting the exhaust-passage *e* so that the strong suction-current will begin to act through each compartment just before it rises above the level of the thin pulp outside the cylinder; but it is much more satisfactory to apply a light exhaust by a branch pipe at *s* to the outlet *f*, and to so pack the packing-ring of the cylinder against the corresponding ring *r* of the water-outlet chamber that this exhaust will act through all the compartments which are not closed by the detached head *p*, and experience proves that the pressure due to this light exhaust causes a very uniform layer of pulp to be deposited and held, so that in this particular my im-

proved sectional cylinder proves valuable, loading much better and having the thickness of the deposit easily regulated by varying the exhaust, and for the sake of these advantages it may be used without the strong exhaust which removes the water from the pulp fiber after it is deposited.

When a section carrying the pulp layer upon its curved surface rises above the thin pulp in the vat at *k*, the eccentricity of the outside of the exhaust-passage *e* has already carried the circular plate *p* so far to that side that its edge overlaps the rim of the skeleton head against which it rests and closes that opening into this section. The pulp layer prevents the air entering through the foraminous surface, and when the passage *i* is opened the exhaust through it acts upon a closed compartment, and the weight of the atmosphere presses the water from the wet fiber, which water and any air that leaks in pass off by the exhaust-pipe *e n*. This pressure continues until that section has moved up to the point *j* near the line of couching, when the opening *i* into the exhaust-passage is closed, and the pulp layer, freed from outside unbalanced pressure by the air beginning to enter past the edge of the circular plate *p*, is in condition to be surely transferred when it reaches the couch-roll.

It is plain that the action of the exhausted sectional cylinder will be the same, whether the couching transfers the pulp layer to the couch-roll itself or to an apron passing around it or under it, and that such a cylinder is adapted equally to use in paper-making machines having one or more cylinders, and to wet machines for making pulp sheets for shipment.

It is evident that the mechanism described can be applied to both ends of the cylinder, which would be an advantage if this was very long. It is also apparent that nothing in this construction interferes with the use of the usual dandy-roll.

I am aware that sectional rolls have been proposed mainly for use as rotary suction-boxes for paper-machines, and I make no claim to such rolls; but my device is different from these in construction, connections, relation of parts, and use.

I claim as my invention—

1. The combination of a pulp-vat, a mold-cylinder adapted to rotate therein, having a pervious periphery, and longitudinal internal compartments formed against such periphery, a water-outlet arranged below the axis of the cylinder, an exhaust-conduit arranged above the water-outlet, and an appliance having a solid portion arranged above the axis, and adjacent to those compartments upon which the pulp has been deposited, and establishing communication between such compartments and the exhaust conduit, and also having an open portion adjacent to the water outlet to open communication between such outlet and the compartments next to it, substantially as described.

2. The combination of the pulp-vat *b*, and the rotary mold-cylinder therein, having a foraminous periphery, and separate internal longitudinal compartments formed against this periphery, and closed at one end, with a water-outlet *f*, and a conduit *s*, communicating with a light exhaust, and a detached head *p*, fitting the cylinder, and means for supporting the said head eccentrically to the cylinder, whereby it is adapted to cover and close compartments above the axis, and to uncover a certain number of those below and establish communication between them and the said conduit and water-outlet, substantially as described.

3. In combination with a pervious cylinder, having internal longitudinal compartments formed against its curved surface, and closed at one end, a detached head *p*, mounted eccentrically, to cover and close a predetermined number of such compartments at the other end, and an exhaust conduit *e*, also eccentric with the cylinder, and communicating with said compartments when closed, as herein set forth.

4. The combination of the pulp-vat *b*, and the rotary mold-cylinder therein, having separate longitudinal compartments formed within its foraminous periphery, closed at one end against ingress from the pulp-vat, with a water-outlet, and exhaust-conduit at the other end of the cylinder, and a detached head *p*, in an opening of which the exhaust conduit ends, of which head the portion above the axis of the cylinder has more surface than the portion below, whereby it is adapted to cover and close said compartments during a certain portion of their upward movement, as they revolve about the axis of the cylinder, and place them in communication with the exhaust, while during the remainder of their movement, and when submerged in the vat, they are in open communication with the water-outlet, substantially as set forth.

5. In combination with the pulp-vat *b*, and the foraminous periphery and closed head of the mold-cylinder therein, the partitions *m*, *m*, forming internal, longitudinal compartments, and reaching to the skeleton end *c*, the detached head *p*, fitting this skeleton end, but eccentric with it, an exhaust-conduit *e*, and a water-outlet *f*, the said exhaust conduit being eccentric with the cylinder and arranged to communicate at the ports *i*, *i*, with a certain number of such compartments as in the rotation of the cylinder are emerging from the vat, while the said head, by reason of its eccentricity, uncovers such compartments as are submerged in the vat and leaves them in open communication with the water-outlet, substantially as and for the purpose set forth.

5. The combination of a pulp-vat, a mold-cylinder adapted to rotate therein, having a

pervious periphery, and longitudinal internal compartments formed against such periphery, a water-outlet arranged below the axis of the cylinder, an exhaust-conduit arranged above the water-outlet, and an appliance having a solid portion arranged above the axis, and adjacent to those compartments upon which the pulp has been deposited, and establishing communication between such compartments and the exhaust conduit, and also having an open portion in the plane of the water-outlet, to open communication between such outlet and the compartments next to it, and in connection with the water outlet a light exhaust, as described.

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

HOWARD PARKER.

Witnesses:
C. H. HORTON,
E. A. SILSBY.