B. F. BARKER.

Machine for Molding Paper Pulp.

No. 166,447. Patented Aug. 10, 1875.

Fig: 1.

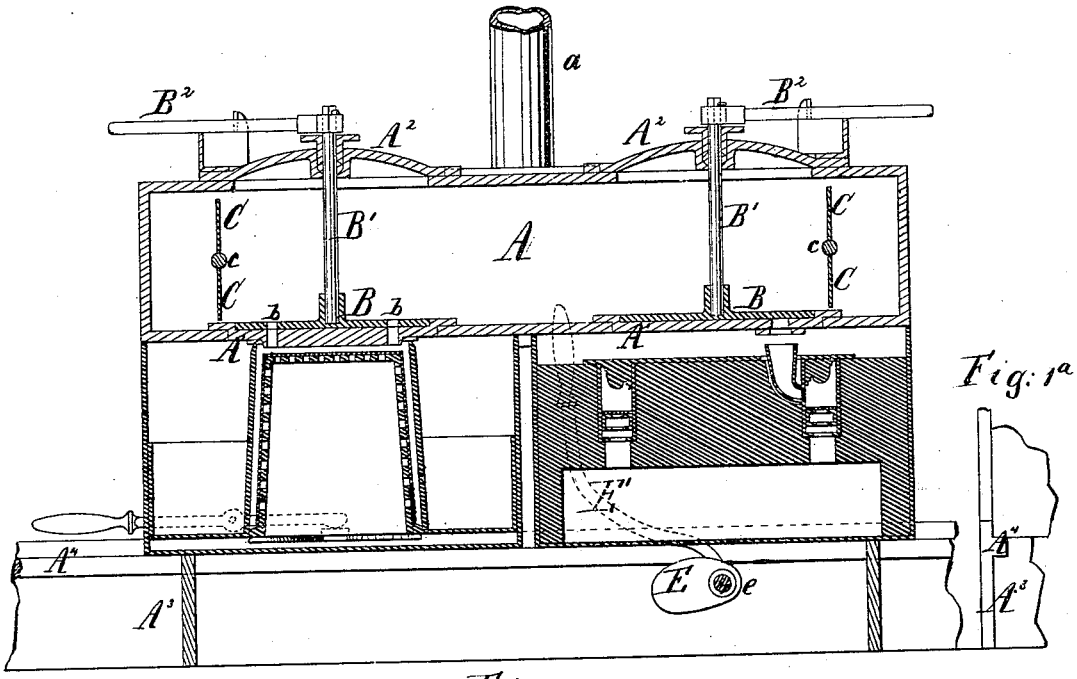


Fig: 1ª

Fig: 2.

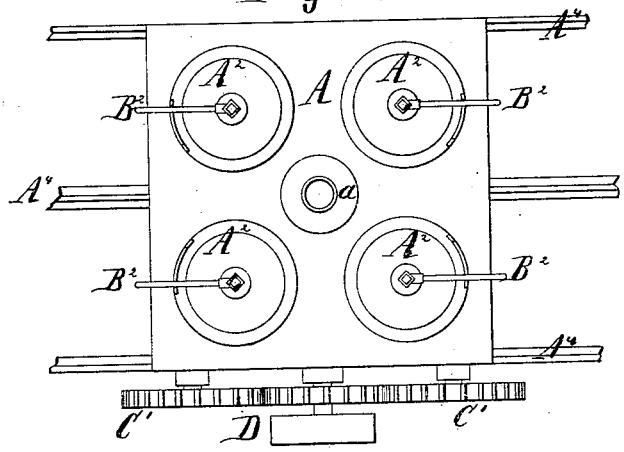
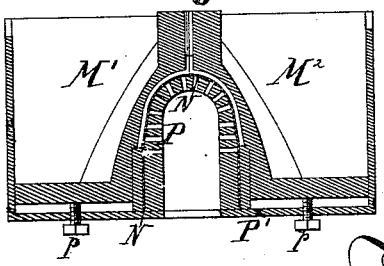


Fig: 3.



Witnesses:

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UNITED STATES PATENT OFFICE.

BENJAMIN F. BARKER, OF CURTISVILLE, ASSIGNOR TO HIMSELF AND J. BARKER & BROTHERS, OF PITTSFIELD, MASSACHUSETTS, AND GEORGE W. WILLIAMS, OF HARTFORD, CONNECTICUT.

IMPROVEMENT IN MACHINES FOR MOLDING PAPER-PULP.

Specification forming part of Letters Patent No. **166,447**, dated August 10, 1875; application filed June 29, 1875.

To all whom it may concern:

Be it known that I, BENJAMIN F. BARKER, of Curtisville, Berkshire county, State of Massachusetts, have invented certain new and useful Improvements relating to Molding Articles of *Papier-Maché*, of which the following is a specification:

The paper-pulp, previously prepared of a proper consistency, is forced into the molds either by its own gravity from an elevated tank, or by the action of a powerful pumping apparatus. One side of each mold is made of solid metal, or analogous close material, and the other of wire-gauze, or the like permeable material, properly supported by ribs of metal or other strong material, to hold it exactly to the proper form. I provide convenient means for introducing the molds into recesses connected with a suitably-valved chest adapted to receive a considerable number of the molds at once, with provisions for admitting and cutting off the flow of the pulp to each at will. The chest is provided with agitators, which maintain the pulp in a proper fluid condition. The pulp entering the molds from this chest becomes densely compacted by the pressure of the fluid above.

The water and the thinnest portions of the pulp escaping through the wire-gauze may be rejected as waste, or may, by suitable means, be conveyed around and mingled with the pulp above.

Thus conditioned, the molds become in a short time filled with densely solid *papier-maché*. When a sufficient time has been allowed to render this certain, the valve is tightly closed to prevent the escape of any appreciable quantity during the absence of the mold, and the mold is removed and opened.

The sprues or the passages through which the pulp was admitted to the mold will be found also filled with more or less compacted material; but this may be smoothly removed by any suitable cutting-tool.

The article corresponds exactly to the interior of the mold, and may be dried without further treatment; or it may be powerfully compressed between dies in the ordinary manner, either immediately or after a more or less complete drying.

To operate economically, a number of chambers or spaces for the molds are provided under or adjacent to a single capacious chest, and duplicate molds are in readiness, so that as soon as one is removed from its connection with the chest, another is in readiness to take its place. Thus operated, the period during which the valve which prevents the flow of pulp is closed need be only sufficient to allow a mold to be withdrawn and another to be instantly introduced.

By providing a sufficient number of such molds of suitable construction, time may be afforded to partly or entirely dry the molded article by the application of heat to the mold. I propose to do this by the application of steam directly to the outer surfaces of the solid sides of the molds.

I propose to saturate the *papier-maché* with sizing, or with chemicals, to induce a proper water-proof condition, or to induce other desired conditions. I can also use my apparatus in duplicate, transferring the molds from a first chest, in which they are filled with the *papier-maché*, to a second, in which they are exposed to the chemicals.

A valve may be provided in the descending pipe to be closed before the mold is removed; but I esteem it preferable to maintain a uniform pressure on the pulp in the interior of the chest, and to make the valves which control its exit therefrom operate tightly.

I introduce and remove the molds easily without any severe friction against the adjacent side of the chest. After a mold has been introduced and brought to the right position, so that the aperture or apertures in the mold shall coincide exactly with the corresponding aperture or apertures in the adjacent face of the chest, I bring the surfaces tightly together by means of a cam or the like, and this tight contact is maintained during the whole period while the mold is being filled and the water and thin pulp is dripping away therefrom. After a sufficient time, the valve in the chest is closed, and the cam or the like is operated to liberate the mold from its tight contact with the chest. It may then be removed easily. I provide ways on which the molds are traversed, and provide packing around

the apertures in the chest, to increase the tightness of the fit against the mold.

It is not necessary that the molds shall be all of the same size or character. Supposing there are four valves, and, consequently, provisions for supplying four molds from a single chest of pulp, it may be better for miscellaneous manufacturing to provide one of the places with only one aperture, another with two, placed at a certain distance apart, and the others with two or more apertures differently located relatively to each other. Then the molds, whether they be for round articles, as buckets, or for long articles, as toy boats, being made in corresponding sets suitably marked to avoid confusion, are provided with apertures arranged to match exactly with the similarly-marked compartment of the chest. I make a removable bonnet in the top of the chest over each valve, through which the valve may be removed. I also make the surface of the bottom of the chest, adjacent to the mold, in a separate piece, to allow of more convenient fitting and repairs of the valves.

The accompanying drawings represent a chest with four valves, and with the corresponding agitators and adjuncts.

Figure 1 is a section of the machine. Fig. 1ª is a part of an edge view. Fig. 2 is a plan view on a smaller scale. Fig. 3 shows a cross-section through a mold different from either one shown in Fig. 1.

Similar letters of reference indicate corresponding parts in all the figures.

A is the body of the chest, and A^1 the removable portions thereof, which are adjacent to the molds. A^2 are the removable bonnets in the top of the chest. B represents a valve, and *b* an aperture therein. B′ is the shaft which operates the valve. It extends up and out through a stuffing-box in the bonnet A^2. B^2 is a lever, which is allowed to be vibrated within definitely fixed limits. C C are agitators mounted on shafts *c*, which extend through stuffing-boxes in the chest. They are turned by the wheel D, which receives motion from a steam-engine or other suitable power, (not represented,) and drives the shaft *c* by means of pulleys or gear-wheels C′. The chest is supplied with pulp under a high pressure through the pipe *a* from a reservoir at an elevation of fifty feet, more or less. The chest is supported on a framing, A^3, which is formed with accurately-planed ways, A^4, to facilitate the traverse of the molds. The molds may slide on these ways A^4, or may be equipped with wheels to run more easily thereon; but in the latter case care must be taken to secure strong wheels and axles or bearings therefor, so as to endure the strongest pressure. E E are cams of an eccentric or other suitable form, fixed on a shaft, *e*, mounted in bearings in the framing A^3, and operated by a hand-lever, E′. When the mold has been thrust in and brought to its proper position over the shaft E, the lever E′ is operated, and the mold is lifted a little by the cams E, and caused to form a tight contact with the packing around the aperture or apertures in the chest.

In molding pails I can, by making the upper face of the mold open and providing a large ring of packing, mold the bottom of the pail by the surface A^1 of the chest itself. This mode of molding has some advantages where large numbers of pails or analogous articles are to be produced rapidly. For other more ordinary cases the mold should be made in a sufficient number of parts. Fig. 3 represents means by which I adjust the molds to produce the molded articles in different thicknesses, as desired. M^1 M^2 represent the two parts which form the solid side of the mold. N is a wire-gauze construction stamped up or otherwise brought to the desired form, and supported by a strong backing, P, of perforated cast-iron or other suitable material. This backing P is, in turn, supported on a stout piece, P′, which partially incloses the parts M^1 M^2, and holds the several parts of the mold in their proper position. Adjusting-screws *p* gage the elevation of the parts M^1 M^2 relatively to the part N. They thus gage the thickness of the toy boat or other article molded.

Many modifications may be made in various parts of the apparatus by any good mechanic. Thus, for example, instead of the eccentric cams E to raise the molds, there may be a lever pivoted in the bottom of an inclosing-case, in which the mold is mounted, and operated by a toggle-lever or analogous provision on the side of the box. I believe there is no limit to the modifications of which the molds may be susceptible.

I claim as my invention—

1. In combination with the chest A, valves B, framing A^3 A^4, and molds M N, the means E, substantially as described, for bringing the molds into tight contact with the chest, and releasing them therefrom, as herein specified.

2. The chest A, having the connection *a*, in combination with the agitator C and series of valves to allow the application and removal of molds, as and for the purpose specified.

In testimony whereof, I have hereunto set my hand this 22d day of June, 1875, in the presence of two subscribing witnesses.

BENJ. F. BARKER.

Witnesses:

H. J. DUNHAM,

H. M. BANALL.