

June 17, 1924.

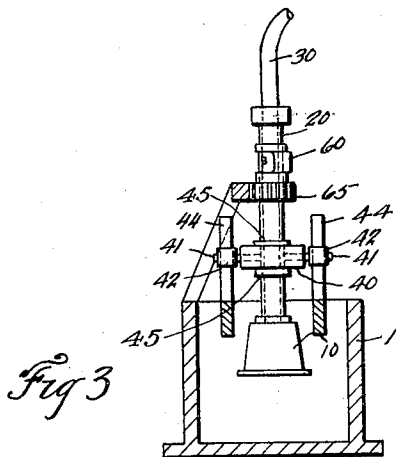
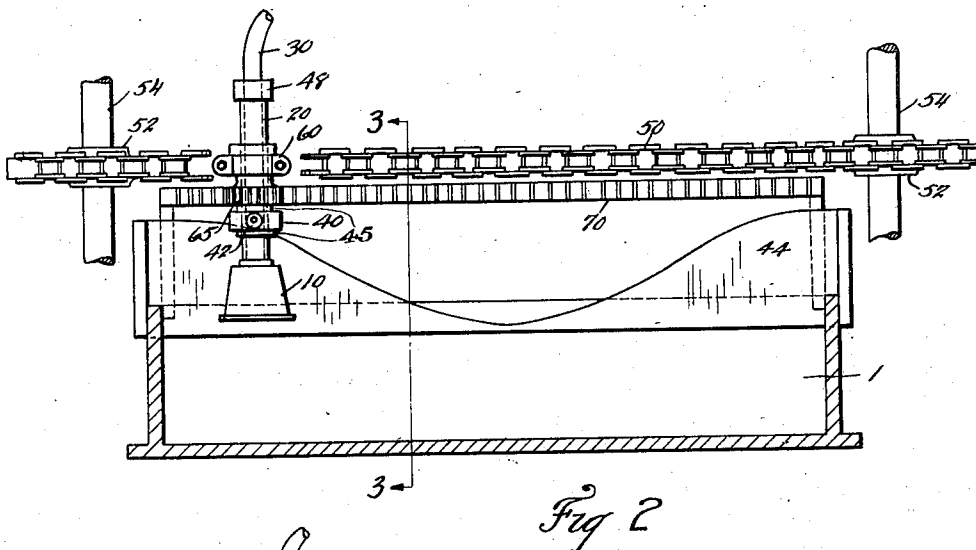
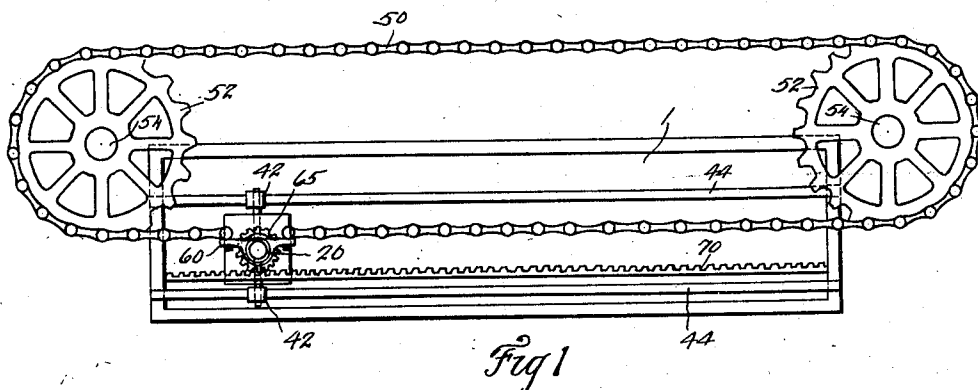
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D. KELLEHER ET AL

PULP MOLDING MACHINE

Filed June 6, 1919

2 Sheets-Sheet 1



INVENTORS
Daniel Kelleher, and
Albert R. Goldnick,
By *Baker Macklin*, ATTORNEYS

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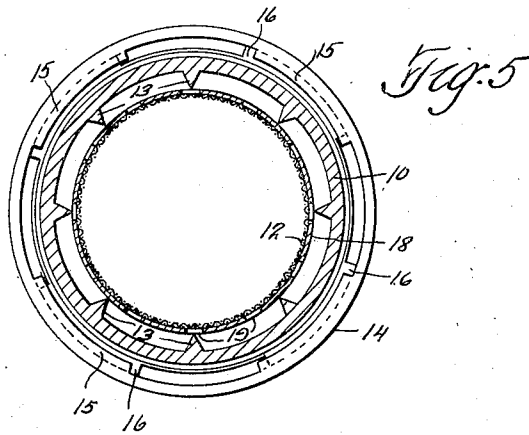
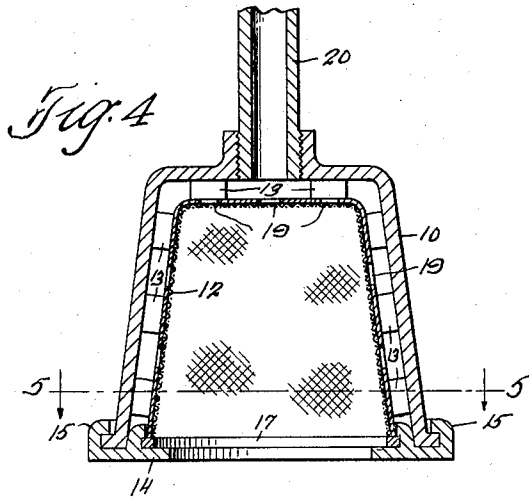
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2 Sheets-Sheet 2



INVENTORS
*Daniel Kelleher and
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UNITED STATES PATENT OFFICE.

DANIEL KELLEHER, OF KAMMS, AND ALBERT R. GOLDRICK, OF CLEVELAND, OHIO,
ASSIGNORS, BY DIRECT AND MESNE ASSIGNMENTS, TO THE HAZELETT STORAGE
BATTERY COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

PULP-MOLDING MACHINE.

Application filed June 6, 1919. Serial No. 302,110.

To all whom it may concern:

Be it known that we, DANIEL KELLEHER and ALBERT R. GOLDRICK, citizens of the United States, residing at Kamms and Cleveland, respectively, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Pulp-Molding Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to an apparatus for forming directly from a fibrous pulp solution seamless articles of paper, particularly those in the nature of receptacles. A more specific object is to arrange a simple, effective device for moving a mold for forming the article through a container of the fibrous pulp solution in such a manner that unusual results are accomplished because of certain peculiar motions given the container while in the solution and during which time suction is applied to draw the fibrous material to the mold. Still another object is to provide a time interval after the withdrawal of the mold from the solution during which continued application of the suction has a drying effect, at the same time pressing the fiber tightly against the walls of the mold. The use of the apparatus shown herewith and forming the subject matter of the present application accomplishes most unexpected results in the forming of such receptacles. This invention is hereinafter fully set out in the description which refers to the drawing illustrating an embodiment of our apparatus.

In the drawings, Fig. 1 is a plan of our apparatus; Fig. 2 is a side elevation showing a section of the same; Fig. 3 is a sectional end elevation of the apparatus; Fig. 4 is a detail of the mold and its immediately associated parts in the nature of an axial section; Fig. 5 is a detail of the mold in the nature of a horizontal section there-through.

Describing the apparatus shown by the use of reference characters, 1 indicates a tank or vat adapted to contain fibrous pulp solution. As shown the vat 1 is a comparatively long rectangular structure opening upwardly, whereby a mold 10 may be moved downwardly into the vat and longitudinally along the same and then up-

wardly therefrom having traversed the length of the vat. This mold member 10 is shown as carried on a tube 20 to which leads a suitable flexible tubular connection 30, through which suction vacuum is applied to the interior of the mold 10.

The tube or pipe 20 and mold 10 are supported on a block 40 rotatably embracing the tube and having laterally projecting trunnions 41 on which are mounted rollers 42 adapted to ride on parallel cam rails 44. Above and below the block 40 are shown collars 45 rigid with the tube 20 whereby the vertical movement of this tube is governed by the block and cam rails, while permitting it to rotate freely as desired. The upper end of the tube 20 is provided with swivel connection 48 to which leads a rubber hose 30.

The longitudinal progress of the mold is accomplished by the use of the sprocket chain 50 running over sprocket wheels 52 on vertical shafts 54 suitably mounted adjacent to the ends of the tank or vat 1. On the chain are loop members 60 rotatably embracing a reduced portion of a pinion 65 adapted to be splined to the tube 20. A rack indicated at 70 is suitably carried above the vat and so positioned with relation to the chain that as the gear 65 comes opposite the rack it engages and meshes therewith, thus rotating the mold 10.

The operation of the mechanism so far described is as follows: The material in the tank is circulated by a method ordinarily used in paper making. Suitable power being applied to one of the shafts 54 the chain is moved carrying the mold around with it and as the mold goes over the left end of the vat 1, the pinion 65 engages the rack 70 and starts the rotation of the mold. The rollers 42 on the block 40 come on the parallel rails between which the sides of the block slidably fit, and the sloping surfaces of these rails allow the mold to descend by gravity into the tank, which is the position indicated in solid lines in Fig. 2. Thus the mold is turned as it enters the solution by a downward movement, and continues to rotate on its own axis as it travels through the tank and until after it has been raised therefrom by the upwardly extending portion of the cams at the opposite end of the tank.

During the operations above described a paper article is formed in the mold 10 by application of the suction thereto and a convenient construction of this mold for co-
 5 operating with the movement thereof in the vacuum tank, and for producing a receptacle or article, as illustrated in Figs. 4 and 5. Here a substantially bell-shaped member is shown as threaded at its upper end to the
 10 tube 20 which connects with the interior of the bell. Mounted within the bell is a pervious cup 12 which may be constructed of woven wire or like material surrounded by a sheet metal cup having openings. These
 15 are positioned, held central and prevented from distortion by the action of the vacuum by projections 13 extending inwardly from the bell and each preferably having a line point contact with the outer sides of the
 20 sheet metal cup. A bottom plate 14 is secured to the bell by means of overhanging flanges at 15, extending only part way around the circumference at the lower end of the bell, whereby the plate is removable
 25 by giving it a partial turn. A similar upwardly turned lip on the lower edge of the pervious member 12, may be engaged by overlapping tongues 16, and made removable by provision of alternating tongues and cut-
 30 away portions. Thus the plate 14 is held to the bell by a bayonet lock action and the mold 12 is held to the plate by a similar arrangement. Accordingly both these mem-
 35 bers are readily movable and separable. We have found that the entering of the mold into the solution of fibrous material while turning it causes a layer of material to adhere to the inner wall of the mold
 40 member 12 by reason of the suction surrounding this member 12, and that the layer thus formed is much more durable and of a tougher nature than where either of the movements of the combination applied to the bell are omitted.
 45 As the mold passes around on the opposite reach of the chain the plate 14 and paper article formed on the member 12 may be removed and a similar plate and mold mem-

ber 12 inserted by hand; obviously any convenient number of molds may be mounted on this plate and the operation may be made continuous for the production of large numbers of such articles of various shapes and sizes.

Having thus described our invention what we claim is:—

1. In an apparatus for making paper articles from pulp solution, the combination of a long narrow tank containing pulp solution, an endless conveyer arranged above the tank, a removable foraminous mold and a vacuum casing therefor arranged upon the conveyer with their openings disposed downwardly, means for rotatably supporting the casing upon the conveyer above the tank, means for rotating the casing including a rack disposed longitudinally of the tank and coacting with a gear mounted on an extension of the mold casing, and means for lowering and raising the mold into and out of the tank in a vertical direction during the rotation thereof.

2. A paper vessel making machine comprising a removable foraminous mold with the opening thereof disposed downwardly, a conveyer, means for supporting the mold on the conveyer including a vacuum casing and a roller support with rollers thereon, raising and lowering cams cooperating with the rollers to move the mold vertically, a container for fibrous pulp solution disposed beneath the conveyer whereby the mold may be moved longitudinally in the tank, means for applying suction around the outside of said mold whereby the fibrous pulp in the solution within the container will be deposited on the mold and quick detachable means for maintaining the mold within the casing whereby the mold may be removed therefrom with the fibrous material deposited thereon.

In testimony whereof we hereunto affix our signatures.

DANIEL KELLEHER.
 ALBERT R. GOLDRICK.