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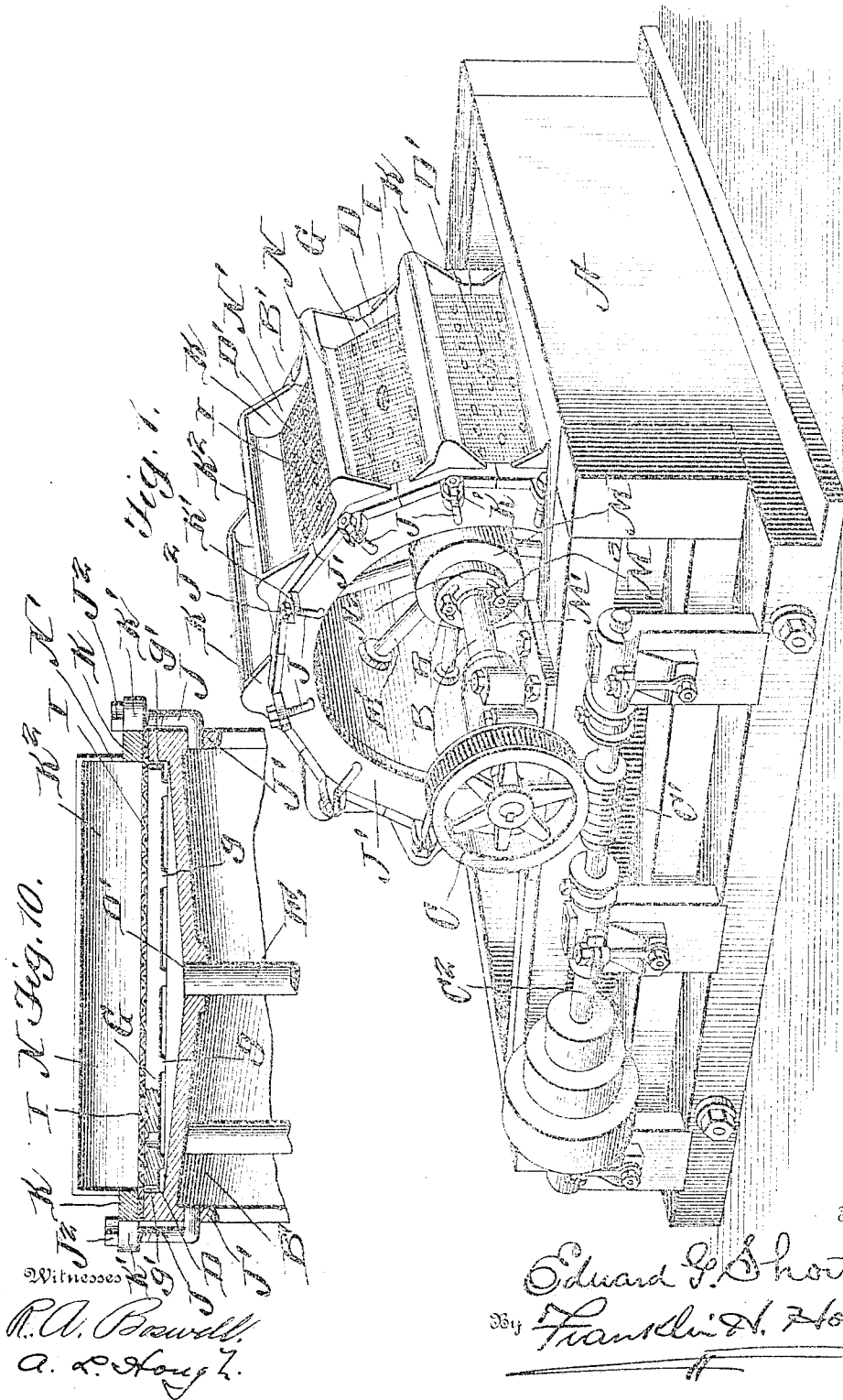
PATENTED MAY 1, 1906.

E. G. SHORTT.

PNEUMATIC FILTER.

APPLICATION FILED DEC. 20, 1905.

4 SHEETS--SHEET 1.



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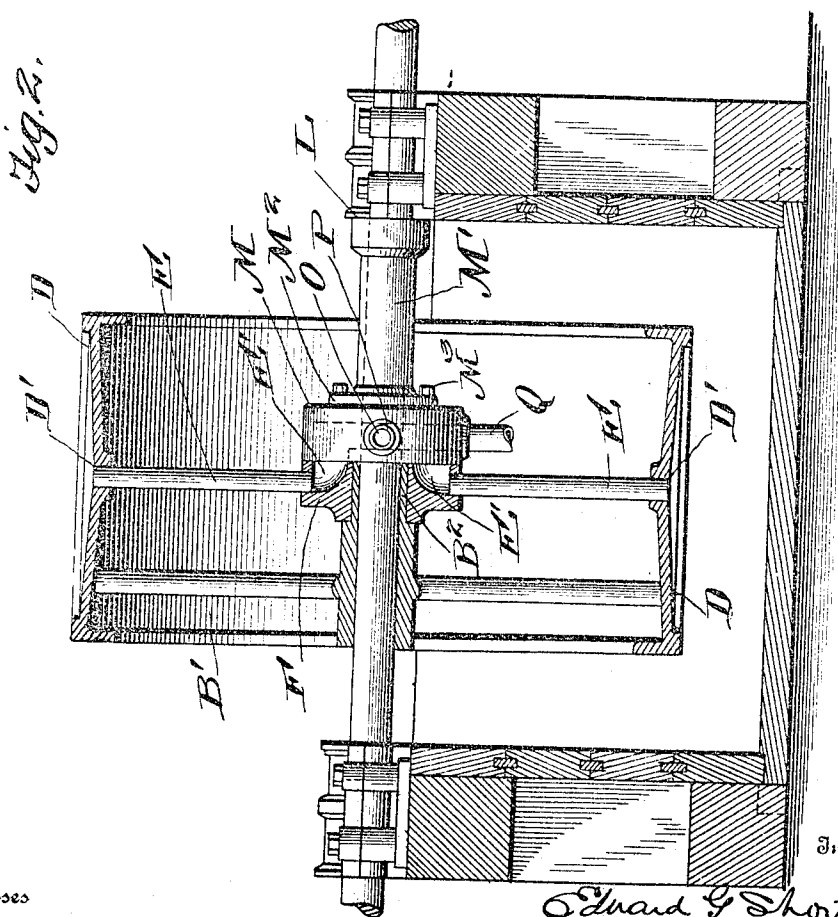
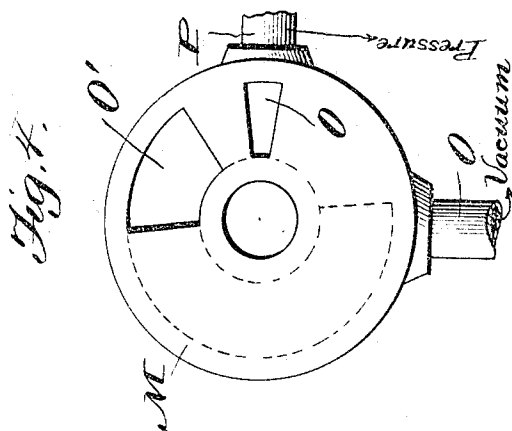
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4 SHEETS—SHEET 2.



Witnesses

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Inventor

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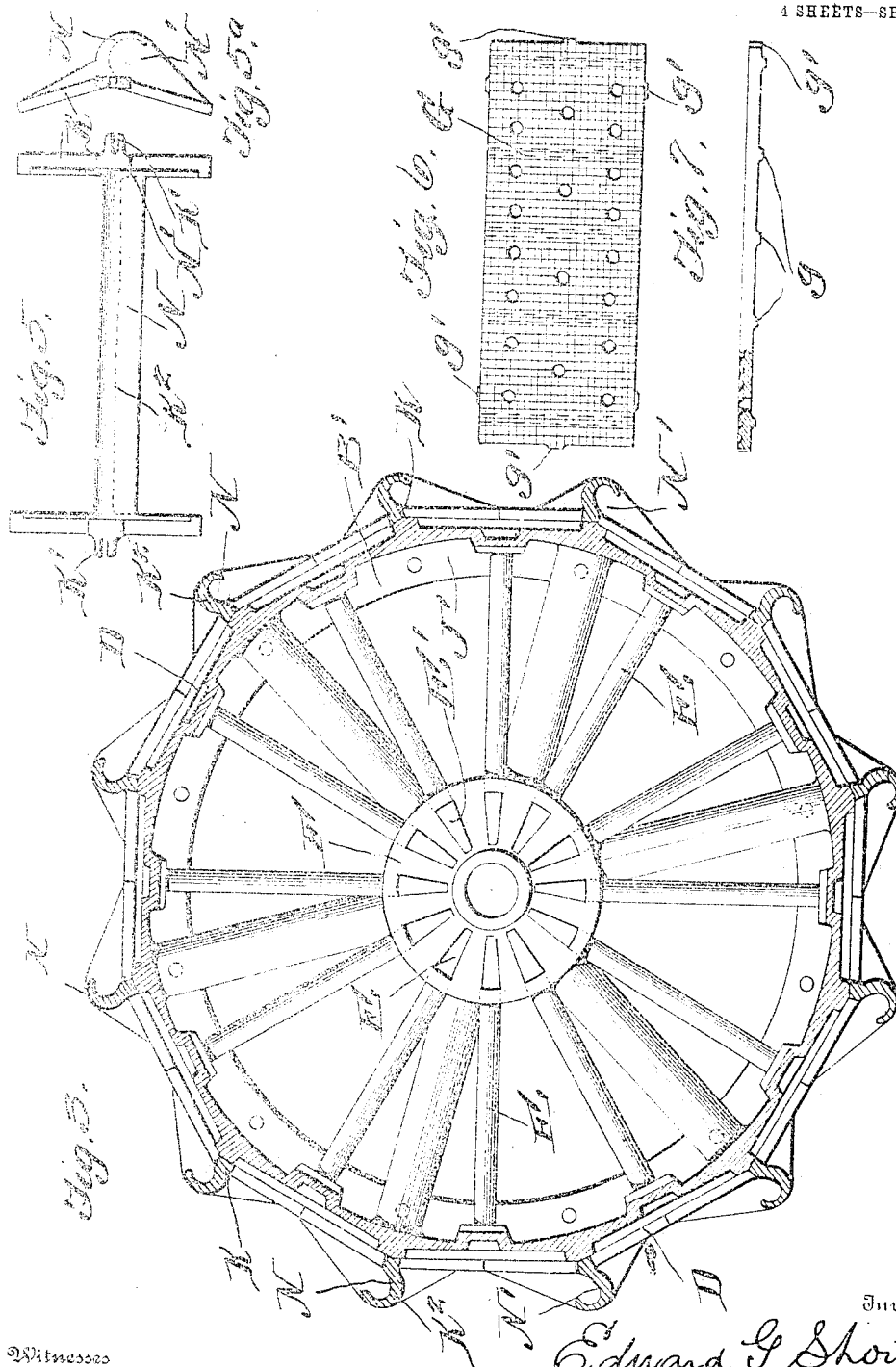
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4 SHEETS—SHEET 3.



Witnesses

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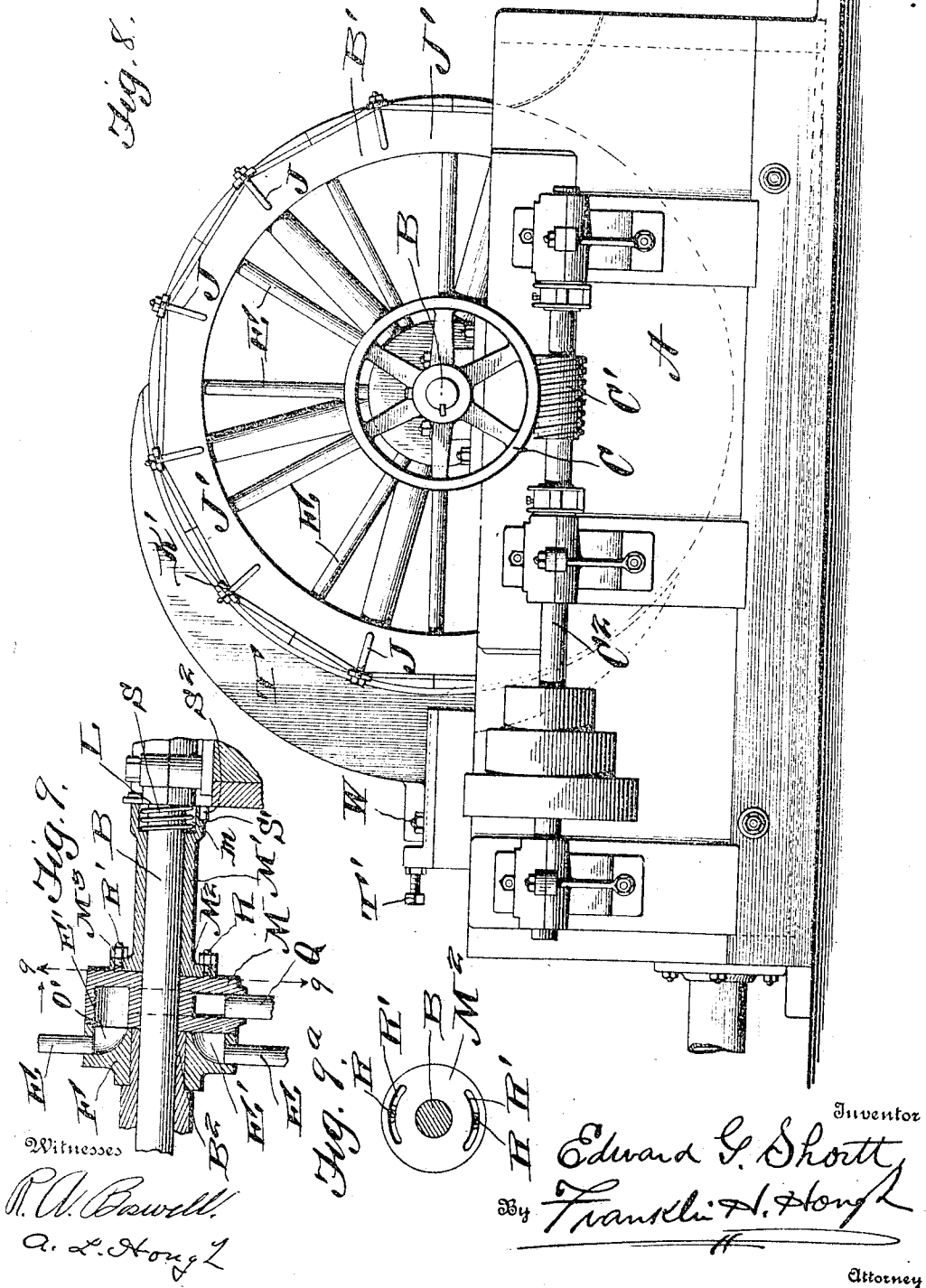
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4 SHEETS—SHEET 4.



UNITED STATES PATENT OFFICE.

EDWARD G. SHORTT, OF CARTHAGE, NEW YORK, ASSIGNOR OF ONE-HALF
TO THE NEW YORK LIME COMPANY, OF CARTHAGE, NEW YORK, A
CORPORATION OF NEW YORK.

PNEUMATIC FILTER.

No. 819,179.

Specification of Letters Patent.

Patented May 1, 1906.

Application filed December 20, 1905. Serial No. 292,611

To all whom it may concern:

Be it known that I, EDWARD G. SHORTT, a citizen of the United States, residing at Carthage, in the county of Jefferson and State of New York, have invented certain new and useful Improvements in Pneumatic Filters; and I do hereby declare the following to be a full, clear, and exact description of the invention, 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, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to new and useful improvements in pneumatic filter-presses especially adapted for use in the manufacture of hydrated lime in which it is necessary in order to produce a satisfactory product to thoroughly slake every minute particle of the lime, and to accomplish this the calcined lime-rock is mixed with sufficient water to make a saturated solution, after which the lime is relieved of its excess of moisture and afterward subjected to a moist-air drier, thus bleaching and further slaking by hot moisture any particles which might pass through the lime-water unslaked.

To accomplish the purpose of getting rid of the excess of water which has been added to the lime for the purpose of slaking is the object of the present invention; and it consists of a rotary carrier having pockets about its circumference adapted to receive the lime-water as the carrier rotates in a tank and in the provision of means whereby each pocket may be thrown into communication with a vacuum-chamber during a certain interval in the rotary movement of the carrier, whereby a large percentage of the moisture of the lime solution in the pockets may be extracted and at a predetermined moment bringing a blast of air against the cake of semiplastic lime after the action of the vacuum upon the same has been cut off and for the purpose of loosening the cake from the pocket.

My invention comprises various mechanical constructions and arrangements of parts, which will be hereinafter fully described and then specifically defined in the appended claims.

I illustrate my invention in the accompanying drawings, which, with the letters of

reference marked thereon, form a part of the present application, and in which—

Figure 1 is a perspective view of my improved pneumatic filter-press. Fig. 2 is a transverse vertical section through the rotary carrier and the tank in which said carrier rotates. Fig. 3 is an enlarged view, in side elevation, of the carrier. Fig. 4 is a detail view showing the arrangement of the ports whereby the various pockets about the rotary carrier may be thrown into communication with a vacuum and with air-pressure ducts. Fig. 5 is a detail view of one of the sections applied to the circumference of the carrier for the purpose of holding screen-cloths over the pockets, said view showing in top plan view one of the buckets which dips the lime solution and causes the same to fill the pocket as the carrier rotates. Fig. 5^a is an end view of the detail shown in Fig. 5. Fig. 6 is a top plan view of one of the perforated plates which are positioned in the various pockets about the circumference of the carrier. Fig. 7 is an edge view through one of said plates, a portion of said plate being shown in section to illustrate the corrugated surface thereof. Fig. 8 is a side elevation of a slight modification of my invention in which I provide a stationary means for retaining the lime solution in the pockets until each pocket of the carrier rises to a horizontal position, at which moment communication is had between said pocket and the vacuum-chamber. Fig. 9 is a sectional view through a hollow shaft adapted to be held to a shell through which communication is had with the recessed hub of the carrier. Fig. 9^a is a face view of the flanged end of said hollow shaft, and Fig. 10 is an enlarged detail section through one of the pockets of the carrier and through the corrugated plate and canvas strainer held thereover.

Reference now being had to the details of the drawings by letter, A designates a tank adapted to hold the lime solution, and B is a shaft mounted in suitable bearings upon the tank and shown as provided with a gear-wheel C, driven by means of a worm C' upon the shaft C', which may be driven from any suitable source of power. Fixed to said shaft B is a rotary carrier B', which has formed about its circumference a series of pockets D, which in the present instance are shown as

being rectangular in outline and of slight depth, each pocket having an opening D' in the center thereof and each pocket having the bottom thereof slightly inclined toward said outlet-opening D', and through which opening the excessive moisture is withdrawn from the pocket in a manner presently to be described. An open-ended passage E is fixed in each aperture D', and the inner end of each passage communicates with a radial passage-way E', formed in the hub on which is mounted upon a reduced portion of the hub B' of said carrier.

G designates a perforated plate having corrugations upon the upper surface thereof, as shown clearly in Figs. 6 and 7 of the drawings, and said plate is provided with feet g, and upon its edges project lugs g'. Said plate is made substantially the shape of each pocket and of somewhat smaller area than the pocket, leaving a slight space between the edges thereof and the marginal edge of each pocket to allow the excess of water to be withdrawn from the pocket. The object of said feet upon the plate is for the purpose of raising the plate a short distance from the bottom of the pocket in order to further facilitate the withdrawal of the water held in the lime solution. Each pocket is provided with a plate of the construction shown and described, and each plate is held in position within the pocket by means of countersunk screws H.

I designates a screen-cloth, there being one for each of said pockets, and each screen is placed over the marginal edges about each pocket and is securely held over the pocket and plate positioned within the latter by means of the angled clamps K, detail views of which are illustrated in Figs. 5 and 5^a of the drawings. Upon examination of said figures it will be noted that each of said clamps is provided with a recessed lug K' opposite the ends of the cross-piece K² of the clamp and provided for the purpose of receiving the threaded end of an angle-bolt J, the angle of each bolt entering an aperture in the side rim J' of the rotary carrier, and said bolts are held in the position shown by means of nuts J², which are fitted upon the threaded ends thereof and bear against the outer faces or said lugs.

In the construction shown in Figs. 1 and 3 of the drawings will be seen a series of buckets N, which are made integral one with each clamp K and extending between and connected to the parallel ends of each clamp. Each bucket has a closed end N', which extends substantially the length of one of the angled end pieces of each clamp, and the marginal edge of each end is tapered, as shown clearly in the drawings, and provided to assist in holding the lime solution in the bucket and allowing the same to flow freely into the pockets without running over the ends thereof as the carrier brings in suc-

cession the various pockets to horizontal positions filled with the lime solution.

Referring to Figs. 2 and 4 of the drawings will be seen a chest M, which is cylindrical outlined and has two ports therein, (designated, respectively, by letters O and O'.) Q designates a flexible pipe which is adapted to afford means of communication between a vacuum-chamber (not shown) and the port O', and P designates a flexible pipe communicating between a pressure-chamber (not shown) and the port O at a certain interval during the rotary movement of the carrier, whereby as one or another of the recesses E', after having been cut off from communication with the port O' and the vacuum-chamber, will come in registration with the port O, thus allowing air under pressure to act upon the cake of semiplastic material which has been formed in each pocket by the withdrawal of a large percentage of the moisture from the material during the time that the pocket is in communication with the vacuum through the passage E, port O', and pipe Q. In order to hold the adjacent faces of the hub F and the chest M in contact with each other, I provide a tubular shank portion M', one end of which is fastened to the chest M, and its other end is chambered, as at m, to receive a spring S, which bears between the inner end of said chambered portion m and the box L. Said shank portion is slotted, as at S', adapted to fit over a lug S² upon said box L. The inner end of said shank portion M' has a flange M² with oppositely-disposed curved slots R', through which the bolts R, which are fixed to the chest M, pass, and nuts M² are fitted to the threaded ends of said bolts, thus affording means whereby the chest M may be adjusted to bring the ports O and O' into their proper positions in order to allow the different passage-ways E' to be brought into communication either with the vacuum-chamber or with the air-pressure chamber at the proper time to effect the result sought.

Referring to Fig. 8 of the drawings will be seen a slight modification in my apparatus in which I provide a semicylindrical shoe or guide member T, which is mounted to have a horizontal movement upon the frame of the tank, and by means of a set-screw T' said member may be moved horizontally to adjust the position thereof adjacent to the rotary carrier. The flanges upon said member are provided with slots through which bolts W pass, thereby affording guiding means for said member as it is moved toward or away from the rotary carrier. In said modification the buckets N (shown in Figs. 1 and 3 of the drawings) are dispensed with and the marginal edges of the cross-pieces K² are adapted to contact with, or nearly so, the concaved surface of said member T during a rotary movement of the carrier in the act of re-

maintaining the solution in the various pockets about the circumference thereof. By reference to Fig. 8 it will be noted that the lower end of said member T extends down into the tank, which is adapted to contain the solution, and as the carrier rotates toward the lower end of said member said member serves to retain the solution in the pockets until the pockets thus filled assume in succession horizontal positions, at which time communication is opened with the vacuum-chamber to withdraw a large percentage of the excess of moisture from the solution, which will leave the residue in the shape of a cake of semi-plastic material.

The operation of my apparatus is very simple and will be readily understood when considered in connection with the foregoing and with the accompanying drawings and is as follows: A perforated and corrugated plate is positioned in each of said pockets and a screen-cloth fitted over each pocket and held in place by means of the bucket-carrying clamps. The carrier is made to rotate, and each bucket as it dips down in the solution will raise a sufficient quantity of the latter to fill a pocket, it being designed to have each bucket hold just enough of said solution to fill a pocket. As the carrier rotates with the various buckets, raising each a supply of the solution, a pocket will be filled from each bucket as each of the latter assumes a horizontal position, the solution running out by gravity upon the screen and into the pocket. As the port in the chest M, which communicates with the vacuum, comes in registration with one or more of the passage-ways E' in the hub of the carrier, which would take place after the pockets of the carrier are rising from the surface of the solution in the tank to horizontal positions, the effect of the vacuum will be exerted upon the contents of the pockets during a partial rotary movement of the carrier, extracting the excess of moisture from the solution, and after the filled pocket passes its horizontal position communication with the vacuum is cut off, and afterward the communication is opened between the passage-way thus shut off from the vacuum and the pressure-chamber, thus affording means for loosening the cake from the screen over the pocket, and any suitable means may be provided for receiving the cakes of semiplastic material as they are loosened from the canvas or screens.

Where the form of apparatus illustrated in Fig. 8 is utilized, the operation is substantially the same as in the other form, excepting that the lime solution is held in the pockets by means of the concaved cylindrical member T, thus insuring means whereby the lime solution will not slop over the edges of the pockets while being conveyed.

While I have described my apparatus as being especially adapted for use in the manu-

facture of hydrated lime, it will be understood that I do not confine the apparatus for any special use, as obviously it may be applied in treating various solutions.

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

1. A pneumatic filter-press comprising a rotary carrier having a series of pockets about its circumference, a tank in which said pockets dip, a concaved shield extending over a portion of said carrier and adapted to retain the material within the pockets during a partial rotary movement of the carrier and means for subjecting the contents of each pocket to the action of a vacuum and also to the action of air under pressure at different moments during the rotary movement of the carrier, as set forth.

2. A pneumatic filter-press comprising a rotary carrier having a series of pockets about its circumference, a tank in which said pockets dip, a concaved shield extending over a portion of said carrier and adapted to retain the material within said pockets during a partial rotary movement of said carrier, each of said pockets having an opening in the bottom thereof, a recessed hub to said carrier, passages communicating between said openings and recesses, and means for bringing each of said recesses into communication with a vacuum and with an air-pressure duct at different intervals during the rotary movement of the carrier, as set forth.

3. A pneumatic filter-press comprising a rotary carrier having a series of pockets about its circumference, a tank in which said pockets dip, a concaved shield extending over a portion of said carrier and adapted to retain the material within said pockets during a partial rotary movement of said carrier, each of said pockets having an opening in the bottom thereof, a recessed hub to said carrier, passages communicating between said openings and recesses, and adjustable means for bringing each of said recesses into communication with a vacuum and with an air-pressure duct at different intervals during the rotary movement of the carrier, as set forth.

4. A pneumatic filter-press comprising a rotary carrier having a series of pockets about its circumference, a tank in which said pockets dip, a concaved shield extending over a portion of said carrier and adapted to retain the material within said pockets during a partial rotary movement of said carrier, each of said pockets having an opening in the bottom thereof, a recessed hub to said carrier, opened passages communicating between each pocket and a recess of said hub, a stationary chest having ports opening through the face thereof, adapted to communicate with said recesses, one of said ports adapted to communicate with the vacuum and the other with a pressure-chamber, as set forth.

5. A pneumatic filter-press comprising a rotary carrier having a series of pockets about its circumference, a tank in which said pockets dip, a concaved shield extending over a portion of said carrier and adapted to retain the material within said pockets during a partial rotary movement of said carrier, each of said pockets having an opening in the bottom thereof, a recessed hub to said carrier, open-ended passages communicating between each pocket and a recess of said hub, a stationary chest held yieldingly against the recessed face of said hub and provided with ports opening through the face thereof, adapted to communicate with said recesses, one of said ports adapted to communicate with the vacuum and the other with a pressure-chamber, as set forth.

6. A pneumatic filter-press comprising a rotary carrier having a series of pockets about its circumference, a tank in which said pockets dip, a concaved shield extending over a portion of said carrier and adapted to retain the material within said pockets during a partial rotary movement of said carrier each of said pockets having an opening in the bottom thereof, a recessed hub to said carrier, open-ended passages communicating between each pocket and a recess of said hub, a stationary chest held yieldingly against the recessed face of said hub and provided with ports opening through the face thereof, adapted to communicate with said recesses, one of said ports adapted to communicate with the vacuum and the other with a pressure-chamber, and means for adjusting said chest with reference to the recessed hub, as set forth.

7. A pneumatic filter-press comprising a rotary carrier having a series of pockets about its circumference, a tank in which said pockets dip, a concaved shield extending over a portion of said carrier and adapted to retain the material within said pockets during a partial rotary movement of said carrier the bottom of each pocket having an opening therein, a hub to said carrier having recesses formed therein, passages communicating between said recesses and the openings in said pockets, a stationary chest having ports opening through the face thereof and adapted to register with the recesses in said hub, whereby communication may be had between each recess and a vacuum, and a pressure-cylinder at different moments during the rotary movement of the carrier, and a hollow yielding sleeve adjustably secured to said chest, as set forth.

8. A pneumatic filter-press comprising a rotary carrier having a series of pockets about its circumference, means for automatically filling said pockets as the carrier rotates, the bottom of each pocket having an opening therein, a hub to said carrier having recesses formed therein, passages communicating between said recesses and the openings in said

pockets, a stationary chest having ports opening through the face thereof and adapted to register with the recesses in said hub, whereby communication may be had between each recess and a vacuum, and a pressure-cylinder at different moments during the rotary movement of the carrier, and a hollow yielding shaft, one end of which has a flange with elongated slots therein, bolts secured to said chest and passing through said slots, and nuts upon said bolts, as set forth.

9. A pneumatic filter-press comprising a rotary carrier having a series of pockets about its circumference, means for automatically filling said pockets as the carrier rotates, each of said pockets having an opening in the bottom thereof, a shaft on which the carrier is mounted, the hub of said carrier having series of recesses formed therein, open-ended passages, each communicating between an opening in the pocket and one of said recesses, a stationary chest having ports opening through the face thereof and adapted to register with said recesses whereby each recess may be thrown into communication with the vacuum and with an air-pressure chamber at different moments during the rotary movement of the carrier, a hollow shaft fixed at one end to said chest, its other end being recessed, a spring seated in said recess and adapted to hold the chest tightly against the recessed face of said hub, as set forth.

10. A pneumatic filter-press comprising a rotary carrier having a series of pockets about its circumference, means for automatically filling said pockets as the carrier rotates, and means for subjecting the contents of each pocket to the action of a vacuum and also to the action of air under pressure at different moments during the rotary movement of the carrier, a corrugated plate positioned in each pocket, means for holding the plates in the pockets, a strainer over each pocket, and means for holding the strainers upon the carrier, as set forth.

11. A pneumatic filter-press comprising a rotary carrier having a series of pockets about its circumference, means for automatically filling said pockets as the carrier rotates, and means for subjecting the contents of each pocket to the action of a vacuum and also to the action of air under pressure at different moments during the rotary movement of the carrier, a corrugated plate positioned in each pocket, means for holding the plates in the pockets, a strainer over each pocket, a series of plates, and means for holding said plates upon the carrier, as set forth.

12. A pneumatic filter-press comprising a rotary carrier having a series of pockets about its circumference, a bucket positioned adjacent to each pocket and affording means to fill the latter as the carrier rotates, and means for subjecting the contents of each pocket to the action of a vacuum and also to the action

of air under pressure at different moments during the rotary movement of the carrier, as set forth.

13. A pneumatic filter-press comprising a rotary carrier having a series of pockets about its circumference, means for automatically filling said pockets as the carrier rotates, and means for subjecting the contents of each pocket to the action of a vacuum and also to the action of air under pressure at different moments during the rotary movement of the carrier, a corrugated plate positioned in each pocket, means for holding the plates in the pockets, a strainer over each pocket, a series of plates and means for holding said plates upon the carrier, and a bucket carried by each plate, as set forth.

14. A pneumatic filter-press comprising a rotary carrier having a series of pockets about its circumference, means for automatically filling said pockets as the carrier rotates, and means for subjecting the contents of each pocket to the action of a vacuum and also to the action of air under pressure at different moments during the rotary movement of the carrier, a corrugated plate positioned in each pocket, means for holding the plates in the pockets, a strainer over each pocket, means for holding the strainers upon the carrier, each clamp having slotted lugs projecting from the ends thereof, and means engaging said lugs for holding the clamps upon the carrier, as set forth.

15. A pneumatic filter-press comprising a rotary carrier having a series of pockets about its circumference, means for automatically filling said pockets as the carrier rotates, and means for subjecting the contents of each pocket to the action of a vacuum and also to the action of air under pressure at different moments during the rotary movement of the carrier, a corrugated plate positioned in each pocket, means for holding the plates in the pockets, a strainer over each pocket, means for holding the strainers upon the carrier, each clamp having slotted lugs projecting from the ends thereof, bolts having angled ends fitted in holes in the rim of the carrier and positioned in the slots of said lugs, nuts fitted upon the threaded ends of said bolts, as set forth.

16. A pneumatic filter-press comprising a rotary carrier having a series of pockets about its circumference, means for automatically filling said pockets as the carrier rotates, and means for subjecting the contents of each pocket to the action of a vacuum and also to the action of air under pressure at different moments during the rotary movement of the carrier, a corrugated plate positioned in each pocket, means for holding the plates in the pockets, a strainer over each pocket, a series of clamps and means for holding said clamps upon the carrier, a bucket carried by each clamp, each bucket having an end which extends beyond the marginal edge of the bucket, as set forth.

17. A pneumatic filter-press comprising a rotary carrier having a circumference made up of a series of flat portions, each of which is recessed forming a pocket, means for subjecting the contents of each pocket to the action of a vacuum and also to the action of air under pressure at different moments during the rotary movement of the carrier, a series of clamps having angled ends adapted to fit over the marginal edges of the pockets, a corrugated plate mounted in each pocket, a screen held by said clamps over each pocket, and means for automatically filling the pockets as the carrier rotates, as set forth.

18. A pneumatic filter-press comprising a rotary carrier having a circumference made up of a series of flat portions, each of which is recessed forming a pocket, means for subjecting the contents of each pocket to the action of a vacuum and also to the action of air under pressure at different moments during the rotary movement of the carrier, a series of clamps having angled ends adapted to fit over the marginal edges of the pockets, a corrugated plate mounted in each pocket, a screen held by said clamps over each pocket, a bucket formed integral with each of said clamps and positioned along the marginal edge of each pocket, as set forth.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

EDWARD G. SHORTT.

Witnesses:

A. F. MILLS,
J. T. JONES.