

No. 773,834.

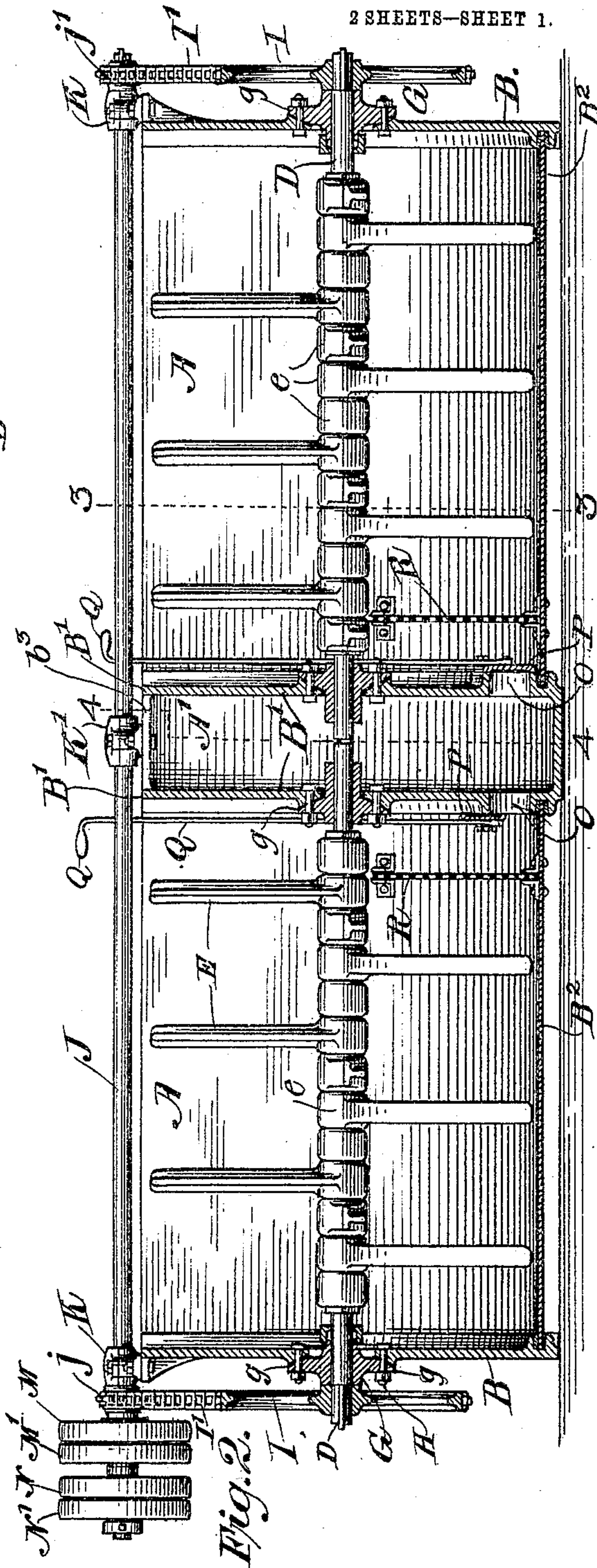
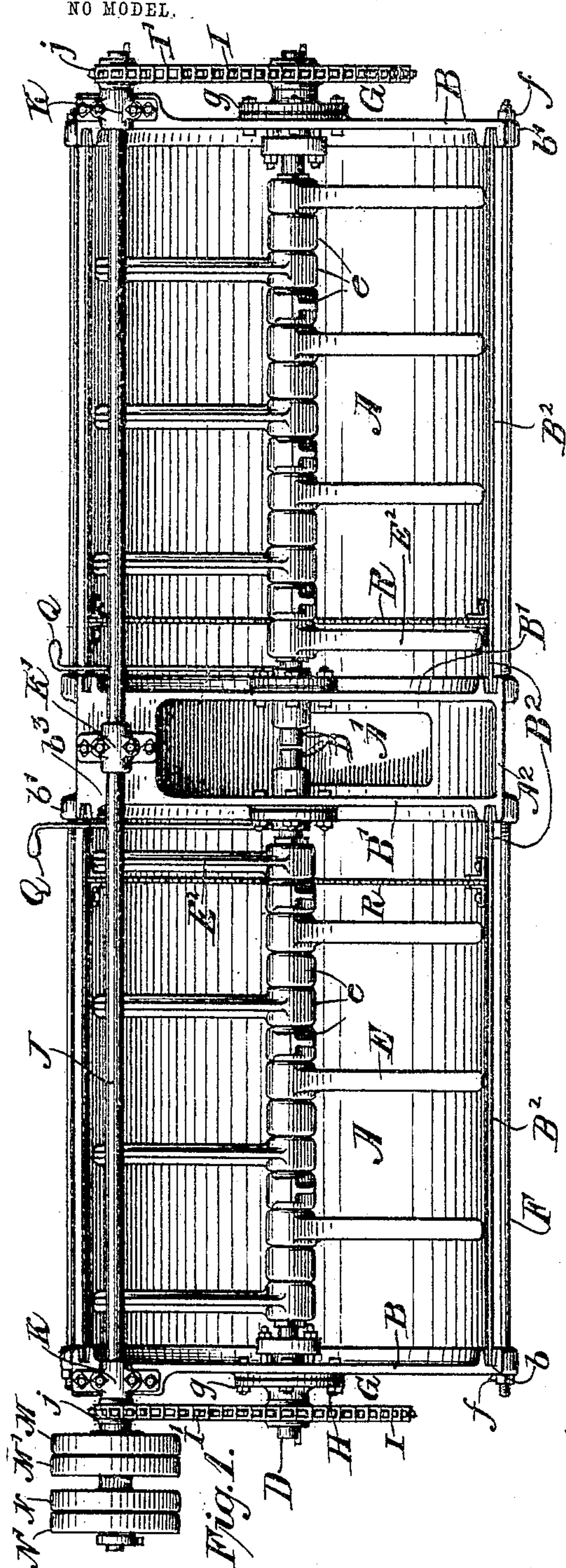
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APPARATUS FOR SLAKING LIME.

APPLICATION FILED FEB. 6, 1902.

NO MODEL.

2 SHEETS—SHEET 1.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR SLAKING LIME.

SPECIFICATION forming part of Letters Patent No. 773,834, dated November 1, 1904.

Application filed February 6, 1902. Serial No. 92,912. (No model.)

To all whom it may concern:

Be it known that I, BRUCE CLARK WHITE, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain
5 new and useful Improvements in Apparatus for Slaking Lime; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters
10 of reference marked thereon, which form a part of this specification.

This invention relates to an apparatus for slaking lime by mixing the same with water.

The machine herein shown as embodying
15 my invention is more especially intended to afford a continuous supply of slaked lime and water in a semifluid state or as "milk of lime" in readiness for mixture with pulverized ores or concentrates preparatory to pressing the same in molds to form blocks or briquets; but a like apparatus may be employed
20 for preparing lime for making mortar or for other like uses.

The invention consists in the matters hereinafter set forth, and pointed out in the appended claims.

In the accompanying drawings, illustrating my invention, Figure 1 is a plan view of an apparatus embodying the same. Fig. 2 is a
30 central vertical longitudinal section thereof. Fig. 3 is a cross-section taken on line 3 3 of Fig. 2. Fig. 4 is a cross-section taken on line 4 4 of Fig. 2. Fig. 5 is a detail longitudinal section showing the main driving-shaft of the
35 apparatus, showing the driving-pulleys therefor and the bearing adjacent thereto. Fig. 6 is a detail section taken on line 6 6 of Fig. 4, showing one of the gates for discharging the material from one of the mixing-receptacles
40 of the apparatus. Fig. 7 is a face view of the valve shown in Fig. 6, the same being a section on line 7 7 of said figure. Fig. 8 is a detail section through one of the bearings of one of the mixing-shafts. Fig. 9 is a detail section taken on line 9 9 of Fig. 8, showing the
45 parts of the bearing in elevation. Fig. 10 is a detail section of the joint between one of the cast-metal end walls and the sheet-metal shell of one of the receptacles.

50 The apparatus is herein shown as of double

construction, the same embracing two separate tanks, compartments, or mixing-receptacles A A and an intermediate receiving compartment or chamber A', into which the contents of both the exterior or end compartments 55 may be discharged. Said exterior compartments consist each of two end walls—namely, an outer wall B and an inner wall B'—which are made of cast metal, and sheet-metal shells B² B², which extend between and are connected 60 at their end margins with the end walls B' B', said end walls B' B' at their inner ends of the receptacles forming the walls of the intermediate chamber A', the sides and bottom of which are formed by a wall A², which is cast 65 integral with the inner end walls B' B'.

The bottoms of the two compartments or receptacles A A are concave or semicylindric, and extending longitudinally through each receptacle is a horizontal shaft D, provided with 70 radial stirring-arms E. Said shafts extend at their ends through and are supported by bearings attached to the end walls B B' of the two compartments or receptacles.

One feature of my invention embraces the 75 construction by which the sheet-metal intermediate parts or shells B² of the receptacles are joined or connected with the cast-metal end walls B B' thereof. Said cast-metal end walls are provided each on its inner face with 80 a marginal inwardly-facing groove b, into which the end margin of the adjacent end of the shell B² extends, and the end walls B B' at opposite ends of the said shells are connected with each other by means of longitudinally- 85 arranged tie-bolts F, which extend through outwardly-projecting lugs b' on the margins of the end walls. The groove b is made considerably wider than the edge of the shell B², so that it will freely receive the edge of said 90 shell even though the same be rough or unfinished or more or less irregular, as would be the case where the shell is made by bending a piece of sheet metal as received from the makers and without the same being accurately 95 finished. To make a tight joint between the walls of said groove b and the edge of the sheet-metal shell, the groove b is filled at either side of the shell with a filling or packing b² of lead or other easily-fusible metal or com- 100

pound, which may be packed or hammered into the groove after being run therein in a molten state. In placing the parts together the ends of the shell will be inserted in the
 5 grooves of the cast-metal heads and the tie-rods F then inserted, and by means of the nuts f' on the ends of the tie-rods the end walls will be drawn toward each other, so as to bring the ends of the shell firmly against the
 10 bottom of the grooves. The metal packing will then be inserted in the grooves at the sides of the shell. The construction described affords a strong and rigid connection of the parts, by which stiffness and rigidity is given
 15 to the structure as a whole and perfectly water-tight joints are formed between the heads and the shell. An advantage of this construction is that it enables the receptacles to be cheaply constructed with little labor and with-
 20 out any tool-finishing either of the heads or the shell, so that the receptacles may be cheaply constructed.

As a means of attaching the stirrer-arms E to the shafts D said shafts in their parts be-
 25 tween the end walls of the receptacles are made square in cross-sectional form, and the said arms E are provided with hubs e, having square apertures adapted to receive the square portion of the shaft. Said arms E and their
 30 hubs are all alike, and the arms are arranged to project in four different directions from the shaft by arranging them suitably upon the shaft. Said shafts are supported at their ends in the end walls B and B' by means of bear-
 35 ings G, which are secured to the said end walls and serve to close the openings formed in the end walls for the passage of the shaft. For this purpose the hubs are provided with circular outwardly-extending flanges g, which
 40 overlap the adjacent edges of the end walls and are secured thereto by means of bolts H, extending through the overlapping parts of the end walls and the said flanges. Provision for the adjustment of said bearings so that
 45 they may be brought accurately in line with the shaft is made by making the contact-surfaces of the flanges g convex and those of said end walls concave, thereby making the joints between the said flanges and the end walls in
 50 the nature of ball-and-socket joints, the bolt-holes for the bolts H in the flanges g being made slightly larger than the bolts to admit of the necessary shifting of the bearings with respect to the end walls in adjusting the same.
 55 By making provision for angular adjustment of the said bearings with respect to the end walls I am enabled to bring said bearings accurately in line with the shafts and to thereby insure exact fit of the shafts within said
 60 bearings notwithstanding that the said end walls may not be accurately located with respect to each other, it being obvious that receptacles made for the purpose described will be of somewhat heavy and rough construction
 65 in order that they may be cheaply made and

that by providing adjustment for the bearings in the manner described accurate work in the construction of the receptacles themselves is rendered unnecessary. In assembling
 70 the parts if the bearings are found to be not accurately in line with the shafts said bearings can be readily adjusted to the shafts and the bolts holding them in place then tightened to form water-tight joints between the bear-
 75 ings and the end walls.

In order to provide water-tight joints between the shafts and the bearings G on the outer end walls B, packing-joints, Figs. 8 and 9, are provided, consisting of glands E', sur-
 80 rounding the shafts inside of the bearings and secured to said bearings by means of bolts g', having screw-threaded engagement with the bearings and provided with nuts by which the glands may be drawn toward the bear-
 85 ings. Said glands are shown as provided with recesses to contain packing material, into which recesses the cylindric ends of the bearings enter, as is common in such devices.

For driving the shafts D the same are provided outside of the heads B with
 90 sprocket-wheels I, and a driving-shaft J is arranged longitudinally above the top of the receptacle and is provided at its ends with sprocket-wheels j, over which are trained
 95 chain belts I', which engage the sprocket-wheels I. Said counter-shaft J is shown as mounted at its ends in bearings K K, attached to horizontal flanges on the upper edges of the end walls B B, and at its center in a bear-
 100 ing K', attached to the horizontal flange or web b', Fig. 1, which is cast integral with the upper margins of the intermediate end walls B' B' and with the part A' which connects the same.

The two compartments A A of the machine
 105 are intended to be used in alternation, the slaked lime being drawn from one compartment, and in order to enable the shaft and stirring-arms in one compartment to be driven while those in the other are disconnected
 110 from the driving devices I employ separate driving devices for the two shafts, as follows: The sprocket-wheel j at one end of the machine is not directly attached to the shaft J, but is secured to a sleeve L, which surrounds the
 115 shaft outside of the bearing K, as clearly shown in Fig. 5. Attached to said sleeve L is a belt-pulley M, and on that shaft, adjacent to and outside of the same, is a loose pulley or idler M', to which the driving-belt may be
 120 shifted from the pulley M when it is desired to disconnect the sleeve L and the mixing-shaft driven thereby from the driving power. On the said shaft J, outside of the fast and loose
 125 pulleys M and M', are located two other pulleys, N and N'. The pulley N is rigidly affixed to the shaft, and the pulley N' is free to turn thereon, so that by shifting the belt from the pulley N to the idler N' the shaft J may be disconnected from the driving de-
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vices. By the use of these devices the shaft D at either side of the machine may be started into or thrown out of operation at any time at the will of the operator.

5 Provision is made for the delivery of the slaked lime from either compartment A to the intermediate compartment A', consisting of discharge-openings O, Figs. 2, 4, 6, and 7, formed in the intermediate end wall B' near
10 the lower margin of the same. For opening and closing said discharge-opening a valve is provided, which consists, as herein shown, of a valve-plate P, connected with the wall B' by means of a pivot-stud *p* on the wall en-
15 gaging a lug or projection *p'*, which extends outwardly from one side of the valve-plate. Said stud supports the valve-plate in such manner that it may swing in a vertical plane and serves to hold the said plate in contact
20 with an annular raised seat *o*, Fig. 6, formed around the margin of said opening. The valve-plate is located at the side of the wall B' adjacent to the receptacle A, so that the pressure of the liquid in the receptacle tends
25 to keep the valve-plate against its seat. For actuating the valve P an actuating-rod Q is pivoted to the outer face of said valve-plate, at a point some distance from the pivot thereof, the said rod extending upward to the open
30 top of the receptacle and being provided with a handle by which it can be moved endwise for opening and closing the valve.

The casting forming the central compartment A' is provided in its bottom with a discharge-opening B³, adapted for the attachment of the suction-pipe of a pump or a delivery-pipe by which the material is conducted away from the machine to the point where the material is used.

40 In the lower part of each of the compartments A is located a transverse perforated partition or screen R, the same being arranged parallel with and a short distance from the inner end wall B' of said compartment.
45 The purpose of said perforated partition or screen is to prevent the passage to the discharge-opening O of stones, unslaked pieces of lime, or other insoluble material which may be delivered to the receptacles with the
50 lime.

In connection with the perforated screen or partition R in each compartment A, I provide on the end of the shaft D adjacent to the partition B' a stirrer-arm E², which is so arranged that it will pass between the said partition and the end wall B', the purpose of this construction being to insure that the liquid slaked lime which fills the space between the partition and the said end wall shall be kept
55 constantly stirred up or agitated until delivered to the discharge-opening O, it being obvious that in the absence of such stirrer-arm operating in the space referred to the slaked lime within said space would remain
65 quiescent during the action of the stirrer-

arms upon the material in the main part of the compartment, so that the lime in such space would be liable to become solidified or accumulated in the bottom thereof. By keeping said fluid lime in said space constantly
70 stirred up through the action of the stirrer-arm referred to the lime is kept constantly in condition for discharge through said opening O.

In the operation of the apparatus described
75 the lime to be slaked, together with a suitable quantity of water, is delivered to the receptacles A A, and through the turning of the shafts D and the stirrer-arms E thereon the lime is thoroughly mixed with the water, so as to
80 make what is known as "milk of lime." When the lime in one of the compartments is suitably slaked and mixed, the discharge-opening O of that compartment is opened and the fluid in the receptacle will be discharged
85 therefrom through the central compartment A' and its opening B³. The two compartments are intended to be used in alternation, so that a constant supply of the milk of lime may be provided, as would be required, for
90 instance, when the lime is used as a binding material for making blocks or briquets from pulverized ores or concentrates, the lime in such case being delivered to a mixing device, wherein it is continuously mixed with the
95 material to be pressed into blocks or briquets, and carried from said mixing device to the press or molding machine. In such case the mixing and slaking operation will be carried
100 on in one compartment while the slaked lime is being withdrawn from the other one, so that a continuous supply will be provided by the machine.

I claim as my invention—

1. A machine for slaking lime comprising
105 two end compartments and an intermediate compartment, the same consisting of two exterior end walls, two intermediate end walls which are cast integral with each other and form the intermediate compartment of the
110 receptacle, and sheet-metal shells interposed between and connected at their end margins with said exterior and intermediate end walls.

2. A machine for slaking lime comprising a receptacle provided with end walls, a rota-
115 tive shaft extending endwise through said receptacle and provided with stirring-arms, said end walls having openings for the shaft, and bearings for the shaft which are attached to the end walls and close the openings in the
120 same; the end walls and bearings having convex and concave contact-surfaces whereby said bearings may be adjusted to bring them into alinement with the shaft.

3. A lime-slaking machine comprising two
125 connected receptacles, shafts within said receptacles provided with stirring-arms, a driving-shaft mounted on the receptacles and extending longitudinally thereof, gearing connecting one end of said driving-shaft with
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one of the stirrer-shafts, a sleeve adapted to
turn freely on the opposite end of said driv-
ing-shaft, gearing connecting said sleeve with
the other of said stirrer-shafts, and driving
5 means for separately actuating said driving-
shaft and the said sleeve.

In testimony that I claim the foregoing as

my invention I affix my signature, in presence
of two witnesses, this 4th day of February,
A. D. 1902.

BRUCE CLARK WHITE.

Witnesses:

C. CLARENCE POOLE,
WILLIAM L. HALL.