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H. R. LOGAN.
CRUSHING MORTAR AND SEPARATOR.
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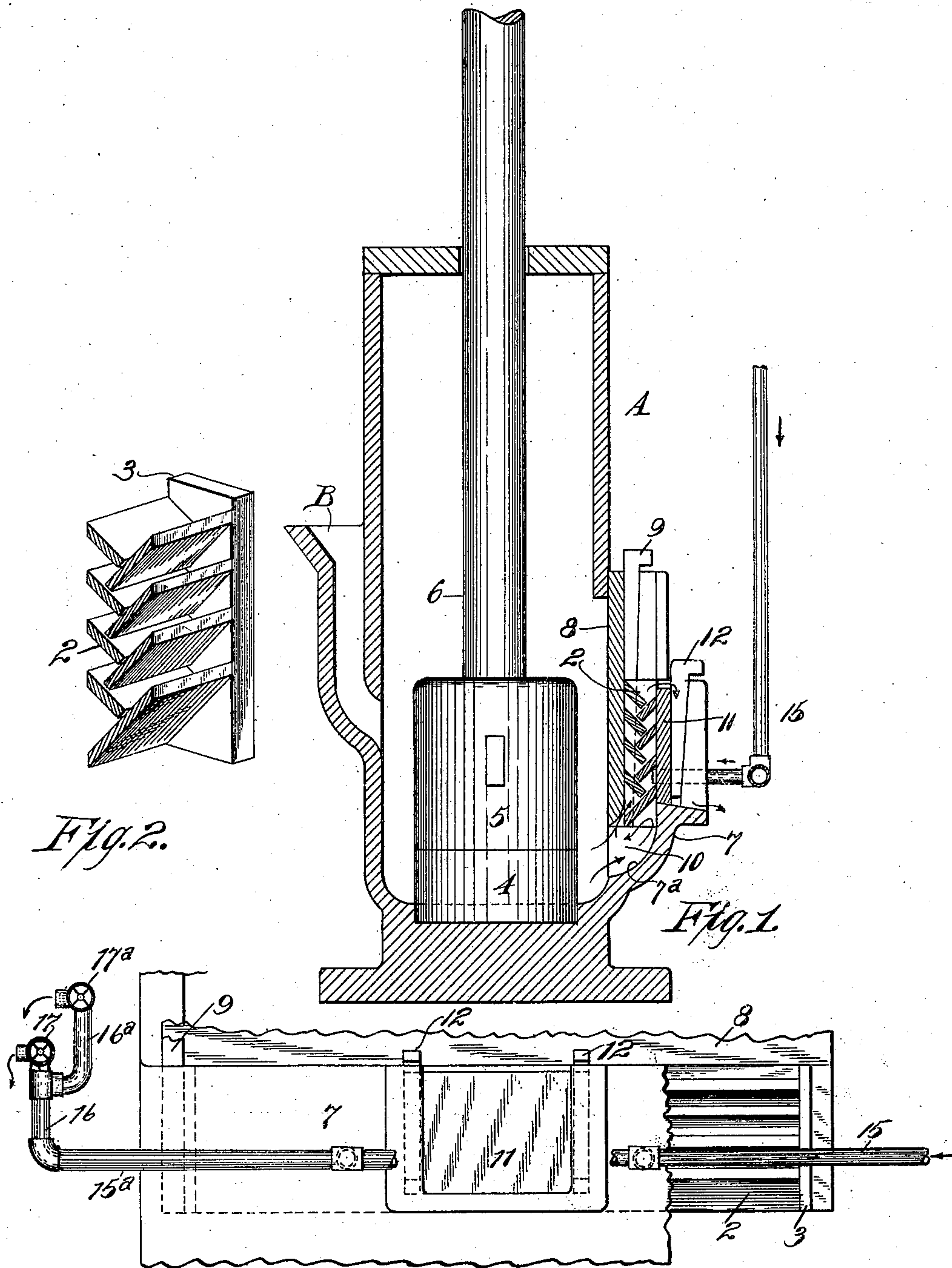


Fig. 2.

Fig. 1.

Fig. 3.

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CRUSHING MORTAR AND SEPARATOR.

No. 847,016.

Specification of Letters Patent.

Patented March 12, 1907.

Application filed September 17, 1906. Serial No. 334,961.

To all whom it may concern:

Be it known that I, HUGH R. LOGAN, a citizen of the United States, residing at Carson, in the county of Ormsby and State of Nevada, have invented new and useful Improvements in Crushing Mortars and Separators, of which the following is a specification.

My invention relates to improvements in ore and the like crushing-mortars in which rising-and-falling stamps serve to crush the ore which is delivered into the mortar, and in conjunction therewith of a device for separating that portion of the ore which is sufficiently pulverized from the part which needs more crushing and in a means for regulating the discharge of the ore.

My invention consists in the combination of parts and in details of construction, which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a vertical section of a mortar, showing my device. Fig. 2 is an enlarged view of the separating device. Fig. 3 is a plan view, partly broken away.

In apparatus of this character it is customary to employ screens of wire or punched metal having meshes sufficiently fine to allow the ore which has been pulverized to the proper fineness to pass through, the remainder being arrested by striking against the screens and falling back into the mortar, where it is subjected to further action of the stamps, when it will pass into the screen. Such devices are expensive and troublesome, because the splash of the particles of ore against the screen-surface will break such surface up in a short time and make it necessary to renew the screens frequently.

In my invention I have shown a device consisting of a series of inclined plates 2, so fixed with relation to each other that the lower edge of each plate stands in sufficiently close relation with the upper surface of the oppositely-inclined plate below, thus forming a series of zigzag channels from top to bottom. These plates are of such length as to substantially extend from end to end of the mortar and may be secured to end plates 3, by which they are supported in proper position, and if required intermediate plates might be fixed between the ends to support the plates 2 against undue springing.

A is a mortar of any suitable description, having a feed-opening B, dies 4, fixed in the bottom of the mortar, and stamps 5, which are fixed to the lower ends of stamp-stems, as

at 6, and are raised and allowed to drop upon the dies by the usual cam or equivalent mechanism. (Not here shown.)

Upon the opposite side of the mortar from the feed-opening B is an opening which extends from end to end of the mortar and has considerable width vertically. At a short distance in front of the mortar-front and this opening is a plate 7, which is cast with the main portion of the mortar, and this has an opening formed centrally of the plate 7, this opening forming the ultimate discharge. In the front of the first-named opening is fixed a board or plate 8, which may be conveniently held by wedge-shaped keys 9, driven into the channels in which the ends of the board 8 fit, thus forcing the board closely against the inner sides of the channels and substantially closing the main opening in the mortar-front to a point near the bottom, where this board may be supported upon lugs at each end, as at 10.

The portion 7 of the front of the mortar has the lower interior surface curved into a cylindrical segment, as shown at 7^a, and the bottom of the board 8 is correspondingly curved, so that between the two curvatures a curved channel is formed through which the ore is forcibly ejected by the splash caused by the falling of the stamp 5 upon the die 4. In line with this opening is fixed the structure including the oppositely-inclined plates 2, previously described, this structure also resting upon the lugs 10 and secured in place by the wedging action of the keys or in other suitable manner. When in place, it will be seen that the lowermost plate 2 will be in such line that the splash directed through the curved channel previously described will move up this plate and through the slot between this and the next inclined plate. A sufficient quantity of water is constantly admitted into the mortar to mix with the ore, the splash being regulated in any suitable or desired manner, and as the ore is crushed the thin pulp that is ready to be delivered passing through these zigzag channels will eventually arrive at the top of the separating device. The final discharge-opening, which is made through the plate 7 and which lies in front of the main mortar-opening, has a board 11 fitted into it and secured by keys or equivalent device, as at 12. The upper edge of this board is fixed at such height that when the level of the material within the mortar has reached this height

the constant impact and splash of the ore will have gradually raised the level of the portions to be discharged, and it arises through the slots between the inclined plates 2 until it arrives at a point where it can flow over the upper edge of the board 11. The discharge is thus regulated and made constant. The attrition caused by the constant operation of the stamps gradually wears the dies 4 down, and as the surface of these dies forms practically a level for the ore within the mortar as these dies wear down the level of the ore will gradually be decreased. Therefore in order to maintain the discharge over the board 11 at a constant height above the tops of the dies 4 this board may either be made to slide downwardly or boards of different heights may be substituted, so that a constant level of the upper edge with relation to the top of the die will be maintained.

In order to insure the discharge of the pulverized ore or slime through the slotted structure 2, I have shown a water-inlet pipe 15, which opens into the lower part of the mortar, as shown in Fig. 3. From the opposite side of the mortar connection is made through a pipe 15^a with upturned sections 16 16^a, each having a separate discharge and controlling cocks 17 17^a. These cocks are located at different heights.

Water being admitted into the mortar serves to moisten the ore and to make as thin a pulp or slime of the pulverized ore as may be desired, and this is carried up through the slots of the inclined plates 2 by the pressure and flow of the water, which is determined by the opening or closing of the cock 17 17^a. When the cock 17 is opened, the discharge of water will take place over the board 11 with such pressure and force as is due to the height of this discharge-cock above the upper edge of the board. Thus the finest slimes will be discharged, and the heavier material not acted upon by a current of sufficient force to move it will fall back and remain within the mortar until by repeated passages between the dies and stamps it will be pulverized as fine as required. If a coarser product is desired, the cock 17 may be closed and a higher one, 17^a, may be opened. There will then be a greater pressure of water within the mortar and a correspondingly-stronger current to carry the pulp upwardly through the openings between the inclined plates. In this manner the fineness of the discharged product may be very accurately regulated.

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

1. An ore-separating attachment for crushing mortars said attachment including op-

posed series of oppositely-inclined plates fixed vertically one above the other and having their lower ends overlapping and separated to form a vertically-disposed tortuous channel for the discharge of the crushed material.

2. The combination with a mortar having a side delivery-opening and a vertical passage connecting at its lower end therewith, of a series of opposed oppositely-inclined plates in said passage for giving a tortuous course to the crushed material delivered thereinto through said opening, the front wall of said passage forming a dam over the top edge of which the crushed material is delivered from the uppermost of said plates.

3. The combination with a mortar having an upwardly-curved extension from the lower portion of its front wall, opposed walls separated from each other to form a passage for the crushed material delivered over said extension, and plates fixed to each of the walls and inclined inwardly and downwardly and having their lower ends overlapping whereby the passage is made tortuous, the lowermost of said plates receiving the splash of the ore and directing it upwardly to the succeeding plate, said front wall having a top overflow above the level of the uppermost of said plates.

4. The combination with a mortar having a discharge-opening in its front of spaced members forming substantially a vertical passage which communicates with said opening, a series of oppositely-inclined plates in said passage forming a tortuous passage for the crushed material, over the top edge of the outermost of said spaced members said material is discharged, and means for producing a variable pressure in the passage for regulating the flow therethrough and the final discharge of the material.

5. The combination with a mortar having an opening in the lower part of its front, and spaced plates forming substantially a vertical passage which connects with said opening, the outermost of said plates being removably secured and forming a dam over the top edge of which the material is delivered from said passage, means in said passage forming a tortuous passage for said material, a pipe by which water is supplied to the mortar under pressure, and discharge-pipes and cocks whereby the flow of material through said passage may be increased or diminished.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

HUGH R. LOGAN.

Witnesses:

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