

(No Model.)

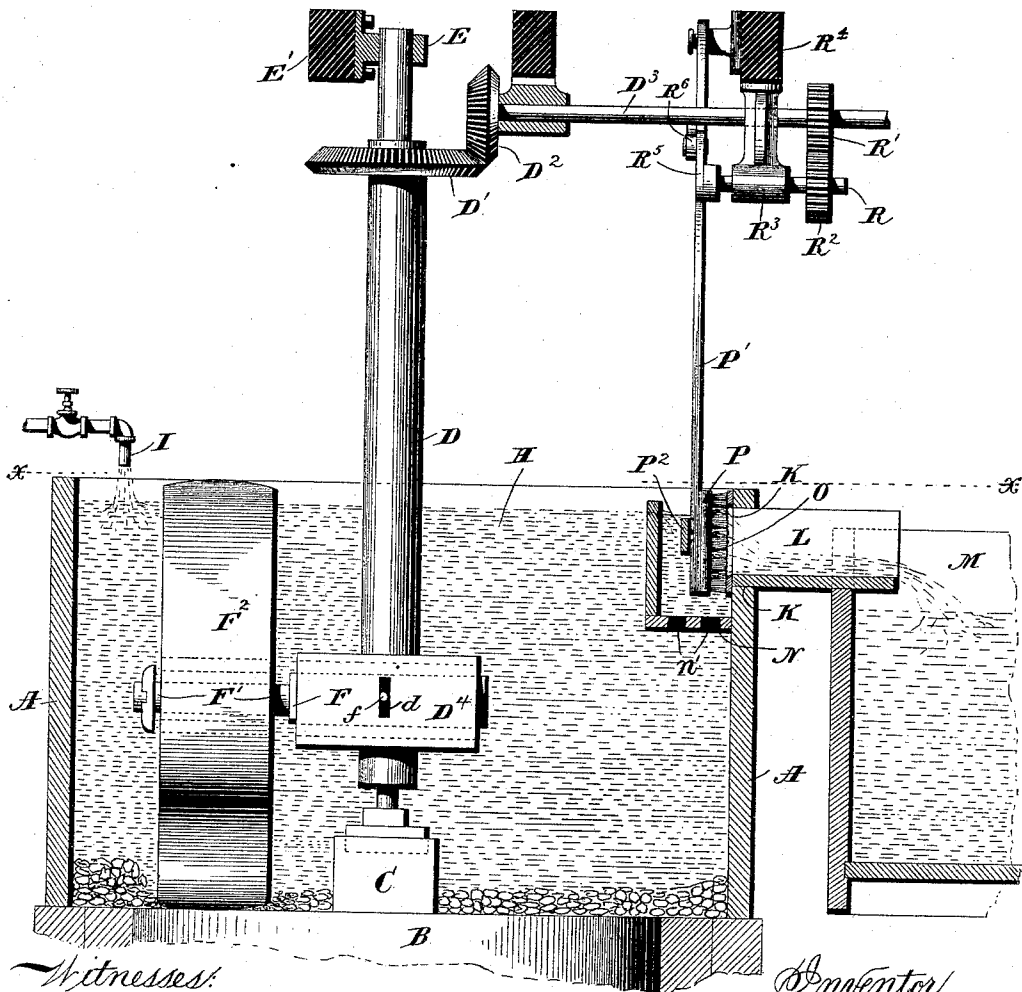
H. C. HIGGINSON.
CHASING MILL.

3 Sheets—Sheet 1.

No. 487,146.

Patented Nov. 29, 1892.

Fig. 1.



Witnesses:
Jas. C. Hutchinson.
Henry C. Hazard.

Inventor.
Henry C. Higginson
by *Richard A. Russell*
his attorney

(No Model.)

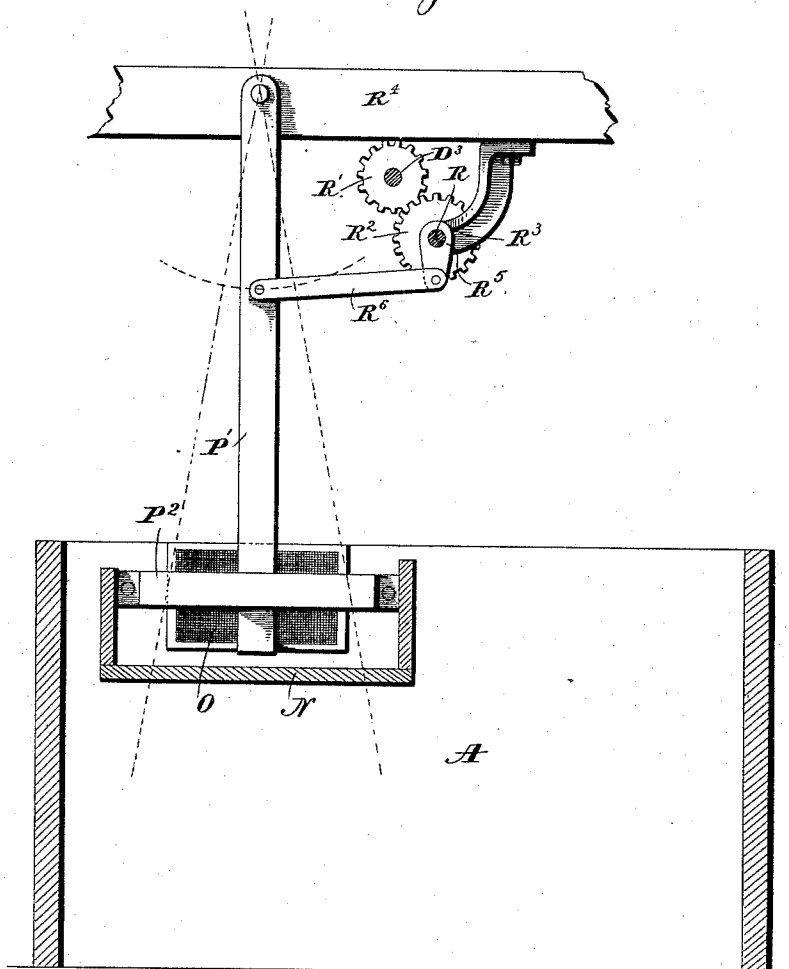
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Fig. 2.



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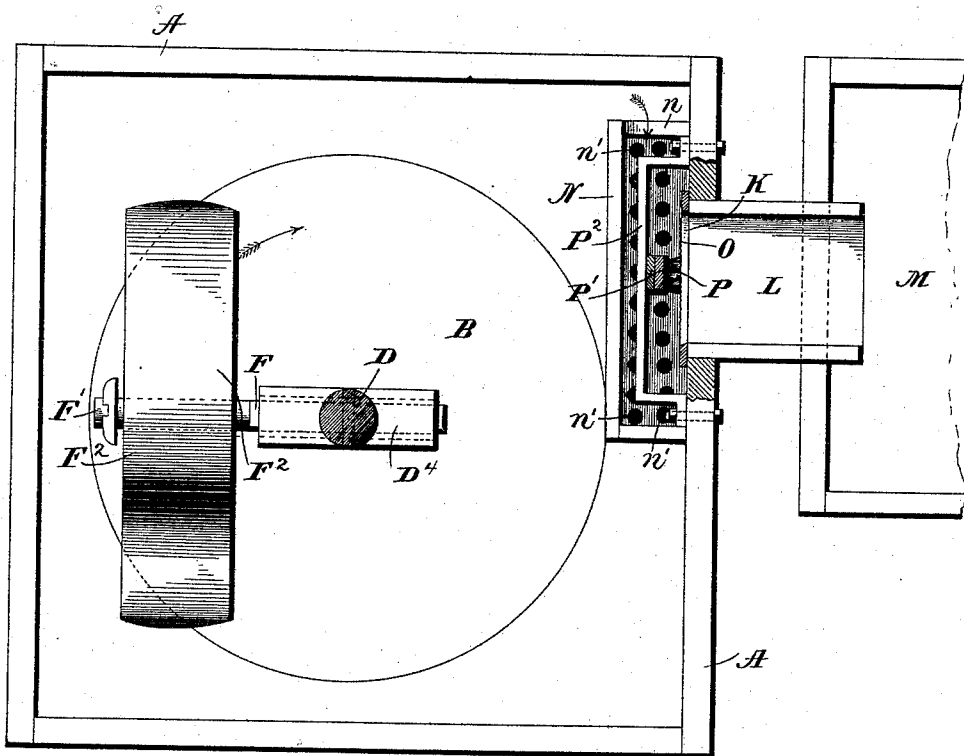
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Fig. 3.



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UNITED STATES PATENT OFFICE.

HENRY CUSHING HIGGINSON, OF NEWBURG, NEW YORK.

CHASING-MILL.

SPECIFICATION forming part of Letters Patent No. 487,146, dated November 29, 1892.

Application filed May 19, 1891. Renewed October 28, 1892. Serial No. 450,196. (No model.)

To all whom it may concern:

Be it known that I, HENRY CUSHING HIGGINSON, of Newburg, in the county of Orange, and in the State of New York, have invented certain new and useful Improvements in Chasing Mills; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which—

10 Figure 1 shows a view, partly in vertical section and partly in elevation, of my chasing-mill with a portion of one of the settling-tanks; Fig. 2, a similar view of the mill with the plane of section at right angles to that of Fig. 1 and the crushing-wheel and the means for driving the vertical shaft removed; Fig. 3, a view of a horizontal section on line $x x$ of Fig. 1.

Letters of like name and kind refer to like parts in each of the figures.

The object of my invention has been to provide an improved mill of the kind known as a "chasing," in which one or more crushing-wheels rolling over a suitable bed are used to crush the material placed upon the latter; and to this end my invention consists in the mill and the parts thereof, constructed, arranged, and combined as hereinafter specified.

The particular kind of chasing-mill to which my invention specifically relates is that in which the crushing wheel or wheels work upon the material within a tank of water, so that as said material becomes finely pulverized it is mixed with the water and is carried over thereby from the crushing-tank to suitable settling receptacles or tanks, which being successively reached by the water will receive and retain as a deposit from the latter successively finer and finer grades of the product produced by the crusher. Such mills have heretofore been used for the manufacture of whiting or paris-white; but they have always from their construction and operation necessitated the use of a large number of settling-tanks.

In making my present invention I have had in view the production of apparatus for making the substance above named, which, while operating as rapidly as the mills heretofore used to crush and mix the pulverized mate-

rial with the water, will require a less number of settling-tanks to produce a certain quantity of the finest grades of whiting from a given quantity of raw material.

In order to facilitate the separation of the fine particles of material held in suspension in the water and to make unnecessary the use of a large number of settling-tanks, as indicated above, I interpose between the body of water in the crushing-tank and the settling receptacles or tanks certain mechanism, which I will hereinafter describe.

In the drawings, A designates the tank within which the crushing is to be done, while B designates the bed upon which the material is to be crushed. Such bed, which is shown as circular, but can be of any other desired shape so that it is large enough to extend out beyond the circular path of the outer portion of the crushing wheel or roller that may be used, as hereinafter set forth, is made of stone or other hard material.

Upon a suitable step C on the central portion of the bed is supported the lower end of the upright rotary shaft D, which at its upper end is journaled in a bearing E on a beam E'. Below such bearing there is fixed on the shaft a bevel gear-wheel D', which meshes with and is driven by the correspondingly-shaped gear D² on the driving-shaft D³, which itself is to be connected with and driven by any desired form of motor or actuating device. Near its lower end the shaft is provided with the horizontal hollow cross-head D⁴, preferably, but not necessarily, having the passage through it rectangular in cross-section. As shown, it is in such section an oblong with the longest diameter an upright one. Fitting between the sides of such passage is the squared bar F, which is of such height as to be capable of rocking up and down to a certain extent within the passage.

In each side of the cross-head D⁴ is a vertical slot d , which is engaged by a pin f on the bar.

In the apparatus shown in the drawings one end of the bar beyond the cross-head is provided with a cylindrical extension forming an axle F' to enter the central axle opening in the crushing wheel or roller F², preferably

made of stone and weighted, if desired. Such wheel or roller rests and rolls with its whole weight upon the bed B or any material placed on the latter. The bar F, connected, as it is, with the shaft D, does not act in any way to take or support any of such weight, but simply has to force the wheel or roller onward, so that it will roll over and crush any material placed below it. The rocking connection between the shaft and bar serves to allow for any rising and falling of the wheel or roller as the material acted upon varies in thickness. The tank, which of course should be water-tight, is when in use kept filled with a body of water H, as shown, a supply-pipe I being provided, through which the water can be continuously run in as desired.

At K, in the upper part of one of the tank sides, is the outlet, which, opening into a suitable trough or conduit L leading to the first settling-tank M, serves to allow the overflow of water filled with particles of the crushed material held in suspension. An outlet situated, as set forth above, so as to draw only from the upper part of the body of water within the crushing-tank has been used in whitening or paris-white machines, as heretofore made, and is not by itself new with me; but in such machines I have found that the disturbance and stirring up of the water by the crushing wheel or wheels will cause particles of material too coarse for use to be carried out through such outlet into the settling-tanks. This is the reason why so many different settling-tanks had to be employed in connection with the old machines. Several of such tanks were needed merely to separate out the coarser particles, which were not fine enough for the desired best grades of product. This separating of the coarser particles outside of the crusher-tank not only made necessary the use of an objectionable number of tanks, but involved a waste of time in securing the settling of the too-coarse portions of the material, an expenditure of time and labor in clearing the first tanks of such portions, and a diminution in the amount of the finer grades of product secured in the settling-tanks, such diminution being caused by a certain portion of the finer particles settling with and among the coarser ones.

To avoid the above-stated objections to the old machines, as heretofore made and used, with the open outlet leading from the crusher-tank to the settling ones, I attach to that part of the tank-casing which contains the outlet K a dam N, which on the side away from the line of travel of the crushing wheel or roller has its upper edge cut down or lowered, as shown at *n*, so that the water in the upper part of the crushing-tank can flow over it on its way to the said outlet K. This dam is preferably made, as shown, in the form of a part box consisting of three sides and a bottom and having its open outer side closed by the tank-wall. Except at *n*, the upper edge

of the box is carried up above the level of the liquid in the crushing-tank, so that the wheel or roller F², as it rolls around, cannot swash such liquid over the box-top into its interior.

In the bottom of the box or casing forming the dam are perforations *n' n'*, through which liquid and the coarser particles of material, which it is not desirable to have reach the settling-tanks, can pass.

Over the outlet K, I place a screen O, which can be made of wire cloth or netting or of a perforated plate of sheet metal, as desired, with its meshes or perforations fine enough to keep back the particles of material which are too coarse for use while allowing the passage of the finer particles with the water in which they are held in suspension. To keep this screen clear and prevent it from being clogged, so that the passage of the water and fine particles will not be impeded, I provide a brush P, attached to a swinging arm P', so that it will rub back and forth over the inner face of the screen as the arm is swung. A guide P², attached to the casing, as shown, engages the inner side of said arm, so as to guide the latter in its movements and hold the brush up to its work on the screen.

I do not limit myself to any particular form of brush, but contemplate using any desired kind of the same, whether it has bristles, fine wires, or other material in place of and to act like bristles.

For automatically swinging the arm to carry the brush back and forth across the screen-face I contemplate using the gearing shown in the drawings, consisting of a shaft R, which is driven from shaft D³ by a gear-wheel R' on the latter meshing with a corresponding gear R² on the former shaft. On the shaft R, which is supported in the pendent bearing R³, which is attached to any suitable beam or support R⁴, is a crank-arm R⁵, which is connected by link R⁶ with the swinging brush-carrying arm P', so that as shaft R revolves said arm P' will be swung back and forth in the manner and for the purpose indicated hereinbefore.

While I have shown and described only one crushing wheel or roller, it will be understood that two or more can be used instead, connected with the upright shaft in the same way as the one shown or otherwise, as desired, without involving any departure from my invention. I desire it also to be understood that while I have set forth the machine or apparatus as applicable to the manufacture of whitening or paris-white it can be used, also, for the crushing of ore and other substances which are to be treated in the same way as the material from which whitening is made—that is, by crushing in water, carrying off in the latter the finer particles, and settling or separating them in settling-tanks.

The operation of my machine is, briefly, as follows: The crushing-tank is by means of

the water-supply pipe kept filled with water up to a point where the latter can run over the lower portion *n* of the edge of the dam *N*, but not over the rest of said edge. The chalk stone is thrown into the tank and falling to the bottom thereof is crushed upon the bed *B* by the crushing wheel or roller *F*² rolling over it. As such wheel or roller travels around within the tank, driven by the bar *F* and revolving upright shaft *D*, it not only crushes and pulverizes the material on the bed, but by stirring up the water causes the fine particles or powder produced to be mixed with the water, so as to be in suspension therein. As more water is run into the tank through the supply-pipe a portion of the upper part of the body of water already in the tank, which part usually holds in suspension the finest particles of material, flows over the lower part *n* of the dam edge to and through the screen *O* and outlet *K*, from which it passes to the settling tanks or receptacles. Other portions of the water containing the crushed material in suspension also enter the space within the casing forming the dam through the openings *n' n'*. The coarser particles resulting from the crushing action of the roller which may be carried upward by the disturbance of the water with which they are mixed, and which in the machines as heretofore made and used with the open outlet, would get out through the latter, as indicated hereinbefore, are caught and held back by the screen. The brush driven by the vibrating arm over the inner face of the screen keeps the openings in the latter clear and unlogged by the particles too coarse to pass through them. As they are removed from the screen by the brush such particles tend to work down through the openings *n' n'* back into the body of the crushing-tank again. As only the finer particles flow out through the screen with the water and reach the settling-tanks obviously none of the latter will, as heretofore, be needed to receive the portions of material which are too coarse to form part of the desired fine grades of product. There will then be necessary only so many settling-tanks as there are grades of the fine marketable product to be separated from each other.

By my machine or apparatus constructed and operating as described I can produce a more even and better quantity of the finest grades of whiting and a greater quantity of the finest grades from a given quantity.

The saving of time and labor and consequently in expense secured by keeping the coarse particles within the crushing-tank and doing away with the use of those of the settling-tanks heretofore employed for separating the too-coarse from the fine material coming with the water from the crushing-tank has been found to be great.

While I have described the crushing-tank as supplied with water, I do not intend to limit

myself to the use of such liquid, but contemplate, where desired, using any other one which may be better suited to any particular material upon which my mill may be used.

Having thus described my invention, what I claim is—

1. In a mill, in combination with a tank containing liquid and the crushing mechanism working therein, a chamber communicating with the body of the tank so that liquid can flow into it from the latter, the outlet-opening only reached by the liquid after it has passed through the chamber, and a screen across the outlet, substantially as and for the purpose described.

2. In a mill, in combination with a tank containing liquid and the crushing mechanism working therein, means for supplying the liquid to the tank, an outlet from the latter, a screen across the outlet, and a dam separating the outlet from the body of the tank, having an inlet through which liquid from the upper part of the tank can flow over the dam on its way to the outlet, substantially as and for the purpose shown.

3. In a mill, in combination with a tank containing liquid and the crushing mechanism working therein, means for supplying the liquid to the tank, an outlet from the latter, a screen across the outlet, the dam having a portion of its upper edge made lower than the rest to allow the flow of liquid from the upper part of the tank to the outlet, a brush to engage the inner face of the screen, and means for moving it back and forth over such face, substantially as and for the purpose described.

4. In a mill, in combination with the tank containing liquid and the crushing mechanism working therein, means for supplying the liquid to the tank, an outlet from the latter, a screen across the outlet, and the dam consisting of a casing with open top covering that part of the tank side in which the outlet is situated, having in its bottom apertures to place its interior in communication with the body of the crushing-tank, substantially as and for the purpose specified.

5. In a mill, in combination with the tank containing a body of liquid and the crushing mechanism working therein, means for supplying the liquid to the tank, an outlet from the latter, a screen across the outlet, the dam consisting of a casing with open top covering the part of the tank side in which the outlet is situated and having an inlet through which liquid from the upper part of the liquid-body in the tank can flow, and openings in its bottom, a screen-clearing brush within the casing, a movable arm carrying brush, and means for moving it to carry the brush over the inner face of the screen, substantially as and for the purpose specified.

6. In a mill, in combination with the tank containing liquid and the crushing mechanism working therein, means for supplying the

liquid to the tank, an outlet from the latter,
a screen across the outlet, the dam consisting
of a casing with open top dividing the outlet
from the rest of the tank interior and hav-
5 ing an inlet for the liquid from the tank, the
swinging arm, the guide engaging the latter,
the screen-clearing brush on the arm, the ro-
tary shaft having a crank-arm, a link connect-
ing the latter with the brush-arm, and suitable
10 gearing to drive the shaft as the crushing

mechanism is operated, substantially as and
for the purpose described.

In testimony that I claim the foregoing I
have hereunto set my hand this 23d day of
April, 1891.

HENRY CUSHING HIGGINSON.

Witnesses:

E. E. ROOSA,

DANIEL E. POPE.