No. 803,506. PATENTED OCT. 31, 1905.

J. REANEY, JR.

PROCESS FOR HYDRATING LIME.

APPLICATION FILED JUNE 12, 1905.

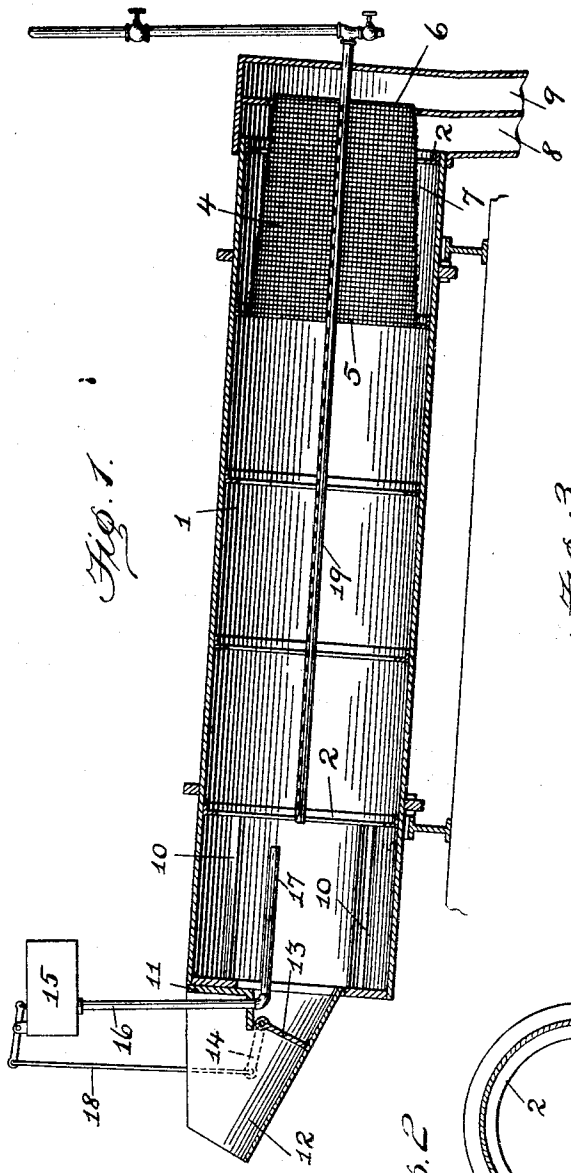


Fig. 1.

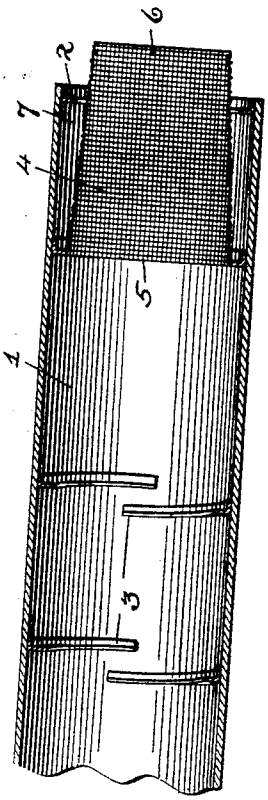


Fig. 3.

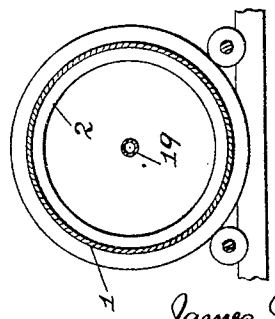


Fig. 2.

Witnesses

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PROCESS FOR HYDRATING LIME.

No. 803,506. Specification of Letters Patent. Patented Oct. 31, 1905.

Application filed June 12, 1905. Serial No. 264,809.

To all whom it may concern:

Be it known that I, JAMES REANEY, Jr., a citizen of the United States, residing at Sherwood, in the county of Baltimore and State of Maryland, have invented certain new and useful Improvements in Processes for Hydrating Lime, of which the following is a specification.

My invention relates to a process for hydrating lime, and has for its object to provide a continuous process in which the difference in gravity between the lighter hydrated particles and the heavier unhydrated particles is availed of so as to retain the latter by reason of their weight to complete their hydration, while the lighter hydrated particles are permitted to escape.

It is a fact that after lime is moistened it begins to slake, and during this slaking operation it expands and increases in bulk, but decreases in weight, and if while this change is taking place the mass is agitated the unhydrated particles, which are heavier than the hydrated particles, will gravitate to the bottom of the mass, while the lighter particles, which are hydrated, or partially so, will work toward the top of the mass, where they may be removed, while the heavier unhydrated particles are retained and further subjected to the hydrating process.

Thus my improved process consists in moistening the mass of quicklime, then agitating the mass to invoke the operation of gravity and cause the heavier unhydrated particles to settle to the bottom of the mass and the lighter hydrated or partially hydrated particles to rise to the surface of the mass, and to then permit the lighter hydrated particles to escape, but retain the unhydrated particles for further treatment.

The accompanying drawings illustrate a machine employed in carrying out the process, in which—

Figure 1 shows a longitudinal section through the cylinder of the machine. Fig. 2 illustrates a vertical cross-section through the same, and Fig. 3 shows a longitudinal section through a portion of a cylinder and illustrates a modified form of inwardly-projecting flanges on the interior of the cylinder having the form of short spirals.

In carrying out the process I preferably employ a revolving inclined cylinder 1, which is provided on its interior with a plurality of inwardly-projecting flanges which may have the form of rings 2 or may be secured to the cylinder with the ends split and spaced apart to form short spirals, as seen at 3. These flanges serve as abutments at intervals in the length of the cylinder and form compartments which act to retard the movement of the mass in passing from the higher toward the lower end of the cylinder. At the lower end the cylinder is provided with a cylindrical screen 4, which has its inner end 5 secured within the cylinder and its outer end 6 projecting beyond the lower end of the cylinder. This screen 4 is smaller in diameter than the cylinder 1, so as to provide an annular space 7 between it and the said cylinder. This space also contains rings to impede the passage of the product; but there is a space between these rings and the screen through which the sifted product can pass. A discharging-head is provided at the lower end of the cylinder and screen, and this head has two compartments 8 and 9. The compartment 8 receives the hydrated lime which discharges from the annular space 7 around the screen, while the compartment 9 receives all particles of foreign matter that will not hydrate and which cannot pass through the screen.

At the upper end the cylinder 1 is provided on the inner side with a plurality of flanged plates 10, which extend in a direction lengthwise of the cylinder and serve to agitate and turn the mass over as it is received in the cylinder. A stationary plate or head 11 is also provided at the higher end of the cylinder, which closes the latter, and a chute 12 is provided in said stationary head, and the entrance from the chute to the interior of the cylinder is controlled by a swinging gate 13, having an arm 14 on the exterior of the chute.

Above the chute 12 is a liquid-tank 15, and a pipe 16 extends downwardly from said tank and enters the cylinder 1. The lower end of this pipe is provided with perforations 17, through which the liquid escaping from the tank may be sprayed within the cylinder. A chain or other connection 18 is provided to connect the arm 14 of the gate with the valve mechanism of the tank, so that the opening of the gate to allow a quantity of lime to pass into the cylinder will cause the valve of the tank to be operated to discharge a given quantity of water into the higher end of the cylinder. A steam-pipe 19 enters the lower end

and extends through the cylinder toward the higher end, and said pipe is provided with a plurality of perforations for the escape of steam into the cylinder.

In carrying out the process the quicklime is placed in the chute in regular quantities and discharges therefrom into the higher end of the revolving cylinder. When the gate opens to allow the quicklime to enter the cylinder, the valve in the water-tank is operated so that a given quantity of water is sprayed on the given quantity of quicklime. While the water is thus sprayed on the lime the cylinder is revolved, and the flanged plates 10 agitate and turn the moistened lime over, so that the water will be equally distributed over the lime. While this moistening operation takes place the lime is held in check by the first ring or flange 2, which serves as an abutment and also prevents the water from flowing down the inclined cylinder and by thus retaining the water insures that the given quantity of lime will receive the predetermined quantity of water. Thus in the first compartment the quicklime is moistened by water and steam and as the cylinder revolves the smaller particles will pass over the abutment or ring-flange into the next compartment. In the second compartment the moistened lime begins to slake and as it slakes it swells and increases in bulk, but decreases in weight. In this operation some of the lime particles will undergo a chemical change more quickly than others, and the result is that those particles that are in a more advanced stage or condition toward hydration are lighter in weight than others, and the difference in the weight causes the lighter particles to rise to the surface of the mass during agitation of the latter, and as the second ring-flange serves as an abutment to retard the escape of the mass the latter will back up against this abutment with the heavier particles at the bottom and the lighter and more advanced particles will gradually work over the second ring-flange and escape into the third compartment. In this third compartment further hydration will take place and the particles again separate according to their weight, the lighter hydrated particles working to the surface of the mass and escaping over the abutment, while the heavier particles are retained and subjected to the action of the steam until they change sufficiently in weight to permit them to escape. The number of compartments or flange-abutments may vary according to the character or quality of the lime being treated. At the lower end of the cylinder the hydrated lime will pass over a revolving screen, where it will be sifted to remove any foreign matter or unhydrated particles that may have passed through the machine and which cannot be hydrated, and the finer hydrated particles will sift through the screen, when they may be further retained in the surrounding steam and separated by the action of their different relative weights, the completely-hydrated particles escaping into the compartment 8 of the discharging-head, while the particles or matter that cannot sift through will be discharged at the end of the screen into the compartment 9 of said head. There may be one or more similar screens interposed of any mesh over which the product can be made to pass before escaping from the machine, and thus be reduced to the fineness desired.

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

1. The process of hydrating lime consisting of first moistening the mass then agitating the moistened mass to cause the heavier particles to gravitate to the bottom and the lighter particles to rise to the surface of the mass and then removing the lighter particles from the surface of the mass.

2. The process of hydrating lime consisting of moistening the mass then agitating the moistened mass to cause the heavier unhydrated particles to settle to the bottom of the mass and the lighter hydrated particles to rise to the surface and pass off while the heavier particles are held in check.

3. The process of hydrating lime consisting of moistening the mass then agitating the moistened mass to cause the heavier unhydrated particles to settle to the bottom of the mass and the lighter hydrated particles to rise to the surface and pass off while the heavier particles are held in check and passing the separated hydrated particles over a screen.

4. The process of hydrating lime consisting of moistening the mass, then agitating the moistened mass and holding it in check to cause the heavier particles to settle and the lighter particles to rise to the surface of the mass, then removing the lighter particles from the surface of the mass and again holding them in check while the agitation is continued to permit the heavier particles to settle and the lighter particles to again rise to the surface from which they are removed.

5. The process of hydrating lime consisting of moistening the mass, then holding the mass in check while agitating it to cause the lighter particles to rise to the surface and pass off then again holding these latter particles in check while the agitation is continued to again enable the lighter particles to rise to the surface and pass off, these steps being conducted in a closed receptacle in the presence of steam.

6. The process of hydrating lime consisting of moistening the mass then agitating the moistened mass to cause the heavier unhydrated particles to settle to the bottom of the mass and the lighter hydrated particles to rise

to the surface and pass off while the heavier particles are held in check and passing the separated hydrated particles over a screen and further retaining the separated particles in an atmosphere of steam until thoroughly hydrated and again separating by means of their varying specific gravities.

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

JAMES REANEY, JR.

Witnesses:
HOWARD D. ADAMS,
JACOB FRANCE.