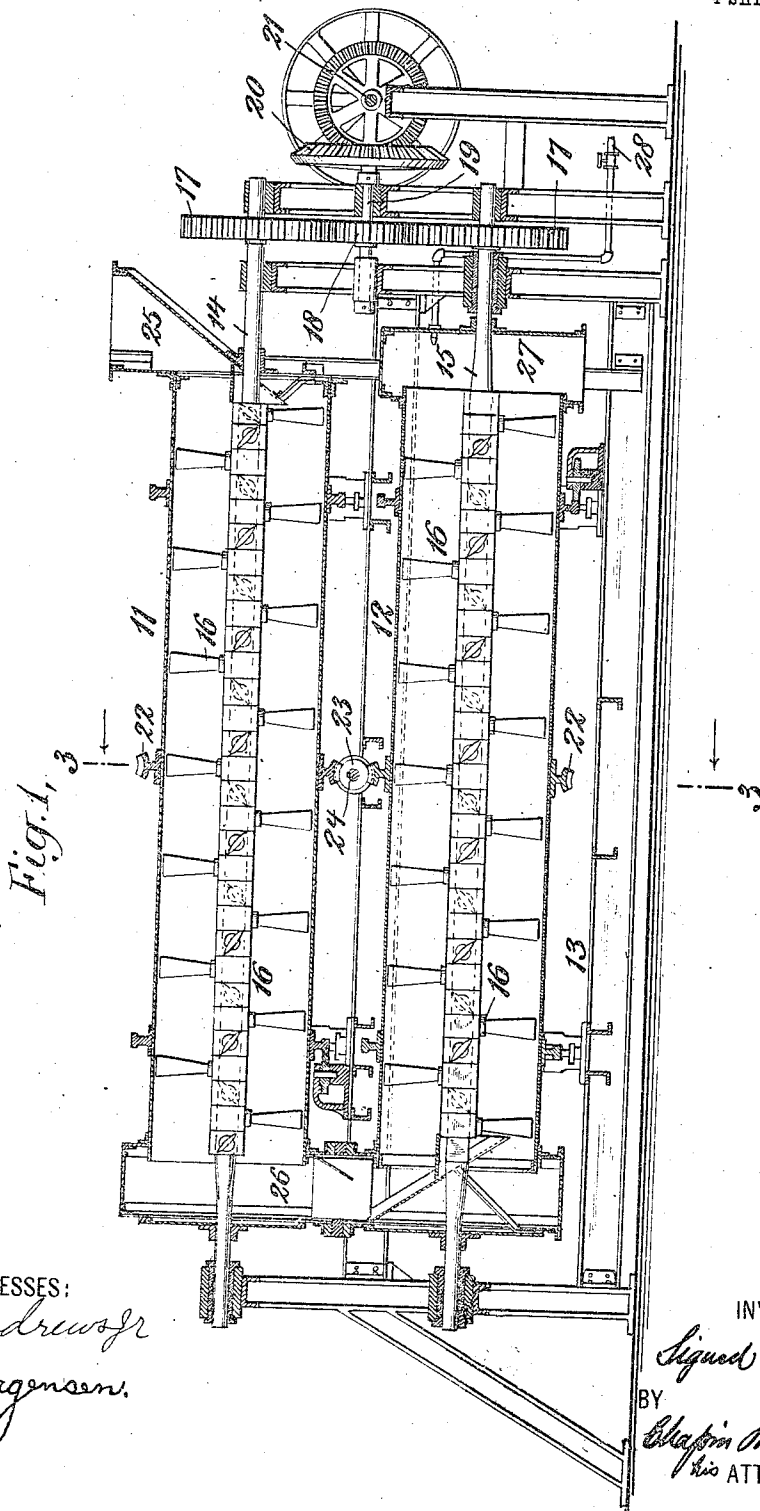


S. WIEBE.
 APPARATUS FOR HYDRATING LIME AND THE LIKE.
 APPLICATION FILED JAN. 15, 1910.

1,060,805.

Patented May 6, 1913

4 SHEETS—SHEET 1.



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Fig. 3,

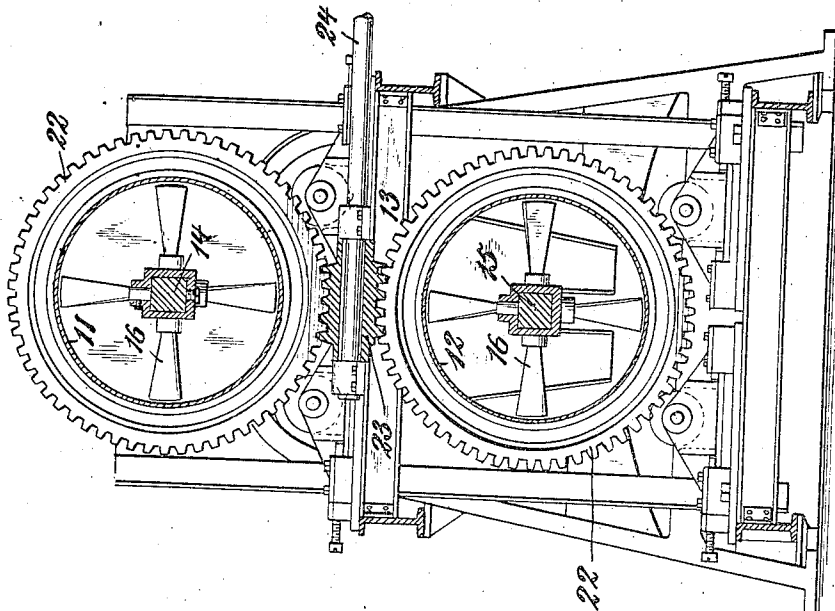
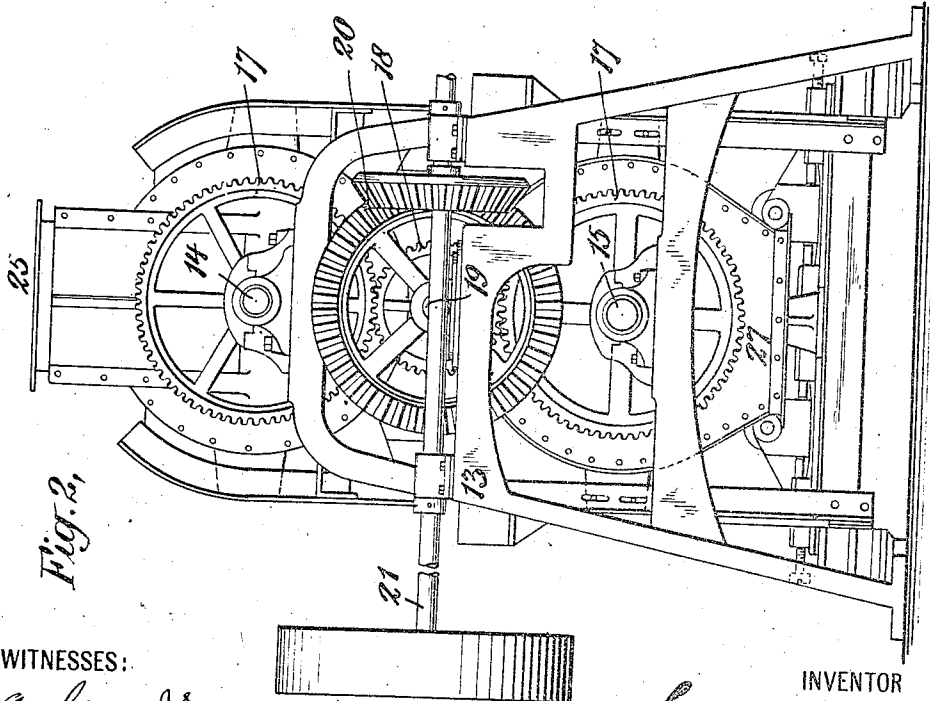


Fig. 2,



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4 SHEETS—SHEET 3.

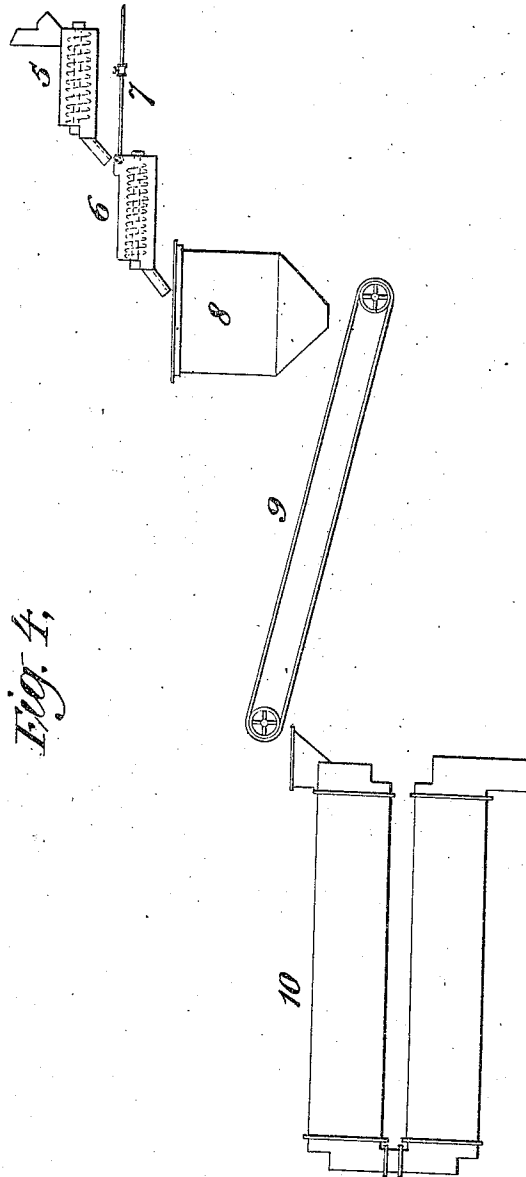


Fig. 4,

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4 SHEETS—SHEET 4.

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Fig. 6.

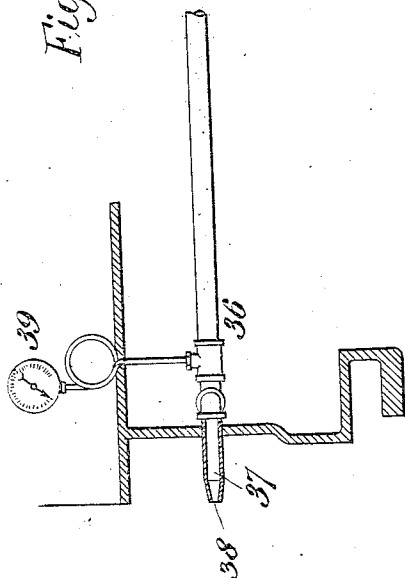


Fig. 7.

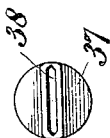
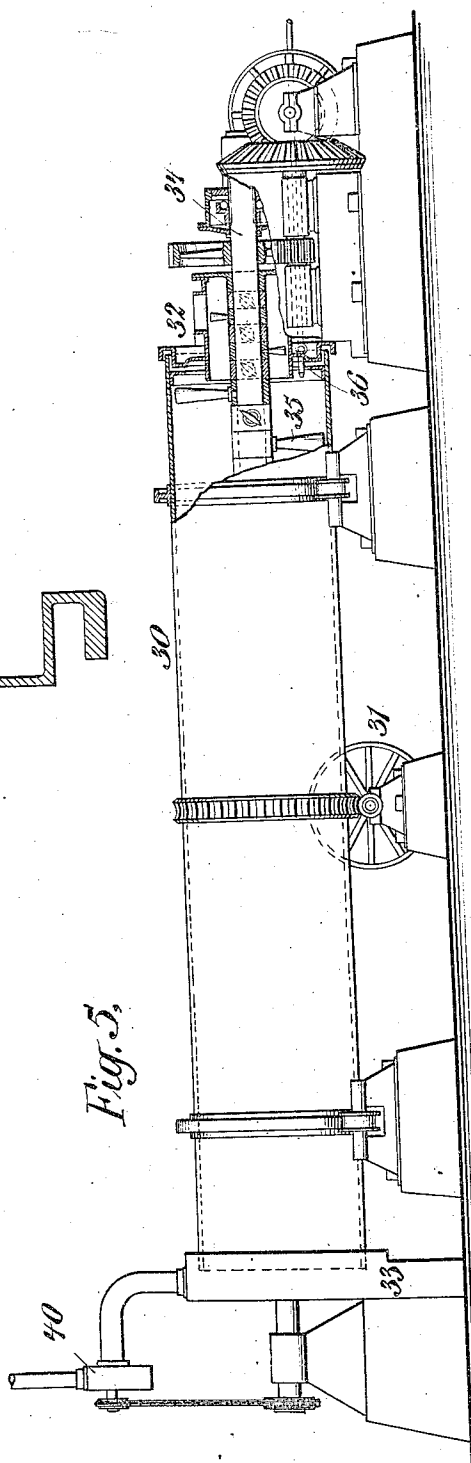


Fig. 5.



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UNITED STATES PATENT OFFICE.

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M. C. HATHAWAY, OF RICHMOND, VIRGINIA.

APPARATUS FOR HYDRATING LIME AND THE LIKE.

1,060,805.

Specification of Letters Patent.

Patented May 6, 1913.

Application filed January 15, 1910. Serial No. 538,231.

To all whom it may concern:

Be it known that I, SIGURD WIEBE, a subject of the Crown of Sweden, and a resident of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Apparatus for Hydrating Lime and the Like, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

My invention relates to hydrating apparatus, and particularly to means for hydrating lime in the manufacture of mortar, cement, and silicate or sand-lime bricks, tiles, or the like.

Probably the most difficult problem to solve in the manufacture of mortar, cement, sand-lime bricks, and the like, is to positively complete the hydration of the lime without setting up the chemical action by which the material sets and hardens. If too little water is employed the hydration is completed after the mortar or cement has been used or the brick or tile has been formed, thereby resulting in disruption and disintegration of the product, while on the other hand if an excess of water is used, chemical actions are set up which result in a hardening before the proper time and at best weaken the action of the lime at the time such action should be strongest. It has been attempted in the past to overcome these difficulties by using too little water in the first portion of the process, allowing the material to partially hydrate in an inclosed vessel for a certain length of time, and thereafter adding sufficient water to complete the hydration, the water being applied in the form of a spray or the like in a mixing vessel and the material thereafter used before the chemical actions above referred to have time to take place. The difficulty with this has been that the water so applied washes the fume of lime from the sand and tends to separate the sand and the lime. This, of course, is highly detrimental to good results and such a system has not proved a success in the past for the reason stated. In a copending application filed coincidentally herewith and serially numbered No. 538,230 I have disclosed a process wherein an inadequate amount of water is first supplied to the lime and sand, the mixture being allowed to stand in a closed vessel for a period long enough for the hydration to

be completed so far as the quantity of water will carry it, and in thereafter supplying the additional moisture required in the form of an aqueous vapor such as steam; and the present application relates to the apparatus in which this process may be carried out.

In order that my invention may be fully understood, I will now proceed to describe an embodiment thereof, having reference to the accompanying drawings illustrating the same, and will then point out the novel features in claims.

In the drawings: Figure 1 is a view in central longitudinal section through a machine constructed in accordance with my invention in which the aqueous vapor is applied. Fig. 2 is an end view of the same. Fig. 3 is a transverse section therethrough upon the plane of the line 3—3 of Fig. 1. Fig. 4 is a view in partial side elevation and partial vertical section of an apparatus in which my machine may form a part. Fig. 5 is a view in partial side elevation and partial central vertical longitudinal section through a modified form of the apparatus shown in Figs. 1, 2, and 3. Fig. 6 is a view showing in detail the means for admitting the aqueous vapor. Fig. 7 is a detail end view showing the preferred form of the nozzle thereof.

Referring first of all to Fig. 4 the apparatus consists in a mixer 5 for receiving and mixing lime and sand, or other materials containing an ingredient or ingredients to be hydrated, a wet mixer 6 for receiving the ingredients from the dry mixer, and for receiving water through a supply pipe 7 by which water for the purposes of hydration is admitted. The wet mixer discharges to a storage vessel or silo 8 in which the material rests for the required time,—usually about twenty-four hours,—for the hydrating action to take place. The silo delivers to a conveyer 9 by which the material is elevated and carried to a machine 10 in which the aqueous vapor is applied. One embodiment of this machine is shown in detail in Figs. 1, 2 and 3 of the drawings. It comprises two rotatable cylinders 11, 12 suitably mounted and guided in a stationary framework 13, and rotary mixing and tumbling means comprising two shafts 14, 15 having a plurality of paddle blades 16 thereon. The shafts 14, 15 are rotatively connect-

ed together by means of spur gears 17 and a pinion 18, the latter being mounted upon a counter shaft 19, and bevel gears 20 connect the counter shaft 19 with the drive shaft 21.

The cylinders 11 and 12 are rotated slowly and at a much lower rate of speed than the stirrers, by means of worm gearing including worm gears 22 secured to, and carried by, the said cylinders 11 and 12, and a worm wheel 23 located between them and disposed in mesh with them both. The worm 23 is mounted upon a cross-shaft 24 which is rotated by any suitable means. The upper cylinder 11 is provided with an in-take chute 25 for receiving the material delivered from the conveyer 9, and a cross-over passageway 26 connects the opposite end of the said cylinder 11 with the adjacent end of the cylinder 12. The other end of the cylinder 12 is provided with a discharge chute 27 through which the material is discharged to any suitable receiver, as, for instance, the receiver of a brick press. Aqueous vapor, conveniently in the form of steam, is constantly supplied to the interior of the cylinders 11 and 12 by means of a pipe 28. The steam is caused to fill the entire space inclosed by the cylinders 11 and 12 and the cross-over passage 26 so that the material in being fed through the apparatus is constantly exposed to the action thereof. As stated, the material is fed into the in-take chute 25, thence it passes into the cylinder 11 and is slowly worked along the cylinder by the action of the paddle blades and the rotational movement of the cylinder until it is discharged through the cross-over passage 26 to the cylinder 12. The material thereafter passes slowly through the cylinder 12 until it is discharged through the discharge chute 27. The agitation of the mixture caused by the rotation of the cylinders and the action of the paddle blades causes every particle thereof to be exposed over and over again to the action of the steam, and as the lime, until it is fully hydrated, is highly hygroscopic, the required moisture will be readily absorbed from the steam so as to complete the hydration. I have found in practice that if the apparatus is so constructed and arranged, and driven at such a speed, that the material takes about fifteen minutes to pass from one end to the other, the hydration is thoroughly and uniformly completed, and the material when it reaches the discharge chute 27, is ready for use.

In Fig. 5 I have shown a modified form of the apparatus which may be employed in smaller plants where a smaller product is to be treated. This apparatus consists of

a single cylinder 30 rotated by worm and worm wheel means 31 and provided with an inlet chute 32 and a discharge chute 33, and agitating means comprising a shaft 34 carrying paddle blades 35. In this form of apparatus it will, of course be clear that the material to be treated enters through the chute 32, passes thence through the cylinder 30 while the same is being slowly rotated and the shaft and propeller blades are being rotated at a greater speed, until it is finally delivered through the chute 33. The aqueous vapor is admitted through a nozzle 36, and in Figs. 6 and 7 I have shown the preferred form of nozzle which may be employed in the construction of the apparatus as shown in Figs. 1, 2 and 3, or as shown in Fig. 5. The said nozzle 37 is preferably flattened at the end (see Fig. 7) so as to deliver the aqueous vapor in a thin, flat stream. A pressure gage 39 may be employed to indicate the pressure at which the aqueous vapor is admitted.

In case it should be found necessary or desirable to provide some means for carrying off excess of vapor a pipe or up-take may be provided at the discharge end of the machine at a convenient point in the apparatus, and in addition a blower 40 may be connected if desired.

What I claim is:

1. In apparatus of the class described, the combination with a mixing apparatus, and means for supplying water thereto, of means for receiving and storing material delivered from the mixer, a vessel for receiving material therefrom, means for feeding the material through the vessel, and means for passing a current of aqueous vapor through the vessel in a direction opposite to that of the material being fed therethrough.

2. In an apparatus of the class described, the combination with a dry mixer, a wet mixer and means for supplying water thereto to partially hydrate the material from the dry mixer, a silo for receiving and storing the material delivered from the wet mixer and allowing it to age therein, a vessel for receiving the partially hydrated and aged material from the silo, agitating means within said vessel arranged to feed the material through said vessel in one direction and means for passing an aqueous vapor through said vessel in the opposite direction to thereby complete the hydration of the material.

SIGURD WIEBE.

Witnesses:

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