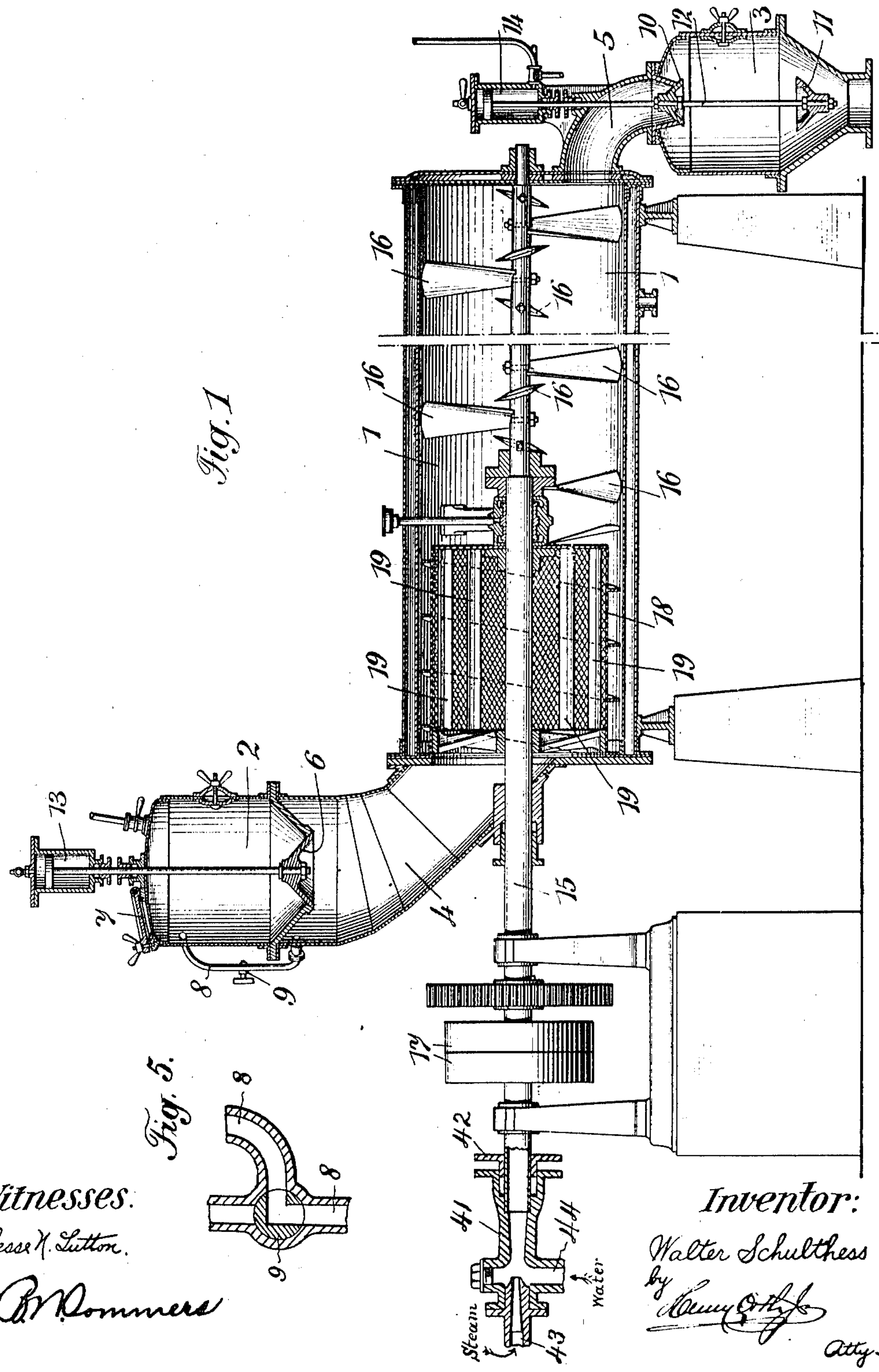
W. SCHULTHESS.

APPARATUS FOR SLAKING LIME.

APPLICATION FILED MAY 12, 1909.

1,001,310. Patented Aug. 22, 1911.

2 SHEETS—SHEET 1.



Witnesses.

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2 SHEETS—SHEET 2.

Fig. 2

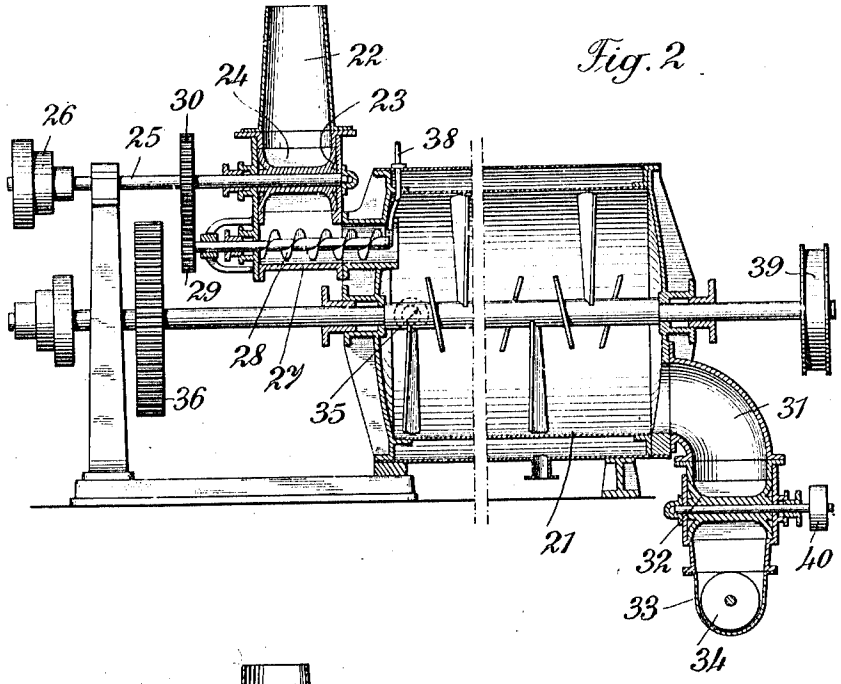


Fig. 3

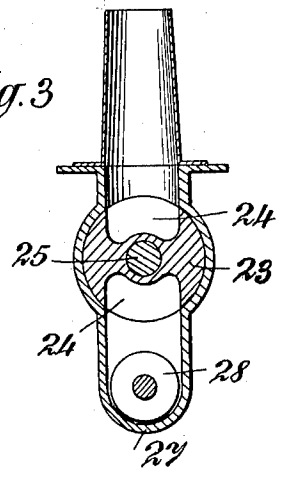
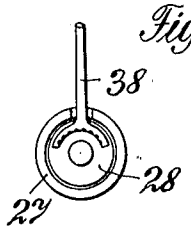


Fig. 4



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APPARATUS FOR SLAKING LIME.

1,001,310. Specification of Letters Patent. **Patented Aug. 22, 1911.**

Application filed May 12, 1909. Serial No. 495,457.

To all whom it may concern:

Be it known that I, WALTER SCHULTHESS, a citizen of the Republic of Switzerland, residing at 37 Boulevard de la Chapelle, Paris, France, have invented certain new and useful Improvements in Apparatus for Slaking Lime; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

According to the method disclosed in United States Letters Patent No. 897,495, lime is slaked first with water and then with steam, the condensation of the latter on the lime being prevented as far as possible. Hitherto it has been impossible, however, to hinder condensation at those periods when the slaking-vessel is being filled or emptied, owing to the escape of steam and the reduction of the steam pressure. In this manner working is disturbed and rendered laborious and expensive.

The subject of my invention is an apparatus by means of which the drawbacks in question are overcome.

My invention is illustrated in the accompanying drawing, in which—

Figure 1 is a longitudinal section of one form of construction of the apparatus. Fig. 2 is a similar view of a modification. Figs. 3 and 4 are details of this modification to be hereinafter referred to. Fig. 5 is a section of a three-way cock employed in the apparatus shown in Fig. 1.

The apparatus shown in Fig. 1 consists of a cylindrical slaking-vessel 1, at the ends of which two vessels 2, 3 are connected by means of bent pipes 4, 5. Communication between the vessel 2, which is destined to receive the lime to be slaked, and the bend 4 is controlled by a conical valve 6 actuated by steam operated mechanism 13. This vessel is also provided with a cover 7, and with a pipe 8 furnished with a three-way cock 9 (Fig. 5); by means of the latter the vessel can be connected either with the slaking-cylinder 1 or with the atmosphere. The vessel 3 is furnished with two conical valves 10, 11 secured to a common rod 12 and actuated by steam operated mechanism 14. One of these valves controls the communication with the slaking-cylinder, while the other controls communication with the atmosphere. For actuating the valves it is preferable to employ steam operated devices whose piston has a long stroke, so as to insure rapid opening of the valves.

The manner of operation of the apparatus is as follows:—The passages between the vessel 2 and slaking-cylinder 1, and between the vessel 3 and the atmosphere are closed by means of the valves, whereupon the cylinder 1 is filled with steam at the desired pressure through an opening 1′ shown in dotted lines. The cock 9 is set so as to bring the interior of the vessel 2 in communication with the atmosphere, and the cover 7 is then opened. The lime to be slaked is now filled into the vessel 2, the cover 7 closed, and the vessel brought into communication with the interior of the slaking-cylinder by turning the cock 9. The valve 6 is then opened by means of its steam actuating-mechanism, and the lime drops upon the inclined plane presented by the wall of the bend 4, sliding thence into the cylinder 1. There it is sprinkled with cold or hot water, which may be fed in, for instance by means of an injector 41 through the hollow perforated shaft 15. The injector is stationary and is connected to the pipe 15 by means of a stuffing-box 42 in which the pipe 15 is free to rotate. Steam is supplied to the injector at 43 and water at 44. The mixing and conveying-blades 16, driven by means of the belt-pulleys 17, agitate and work up the lime, which is slaked by the action of the steam under pressure and is fed to the exit of the cylinder, where it falls into the vessel 3. In order to empty the latter, the valves 10, 11 must be actuated, whereby the passage to the cylinder 1 is opened, while that to the atmosphere is closed. In this manner the slaking-cylinder can be charged and emptied without the pressure of the steam in it being appreciably reduced.

Owing to the employment of steam under considerable pressure various kinds of lime (*e. g.* hydraulic limes), which are otherwise extremely difficult to slake, can be completely slaked in a very short time.

In the construction illustrated in the drawing the slaking-cylinder is shown as being provided with a rotary reticulate drum 18 into which the lime to be slaked slides from the bend 4. It will be found

advantageous to secure longitudinally running angle-iron bars 19 to the interior wall of the drum and to place a number of steel balls of suitable size in the latter, for the purpose of grinding the lime and thus facilitating the slaking.

The modification shown in Fig. 2 is constructed for continuous charging and discharging of the slaking-cylinder. The lime is fed into the cylinder by means of a rotary device 23, above which is a hopper 22 (Figs. 2 and 3). This feed-device 23 consists of a cylindrical shaped member presenting one or more recesses or chambers 24 and keyed to a shaft 25, driven by means of a pulley 26. The device 23 is contained in a housing, the lower part 27 of which accommodates a screw-conveyer 28, geared with the shaft 25 by means of spur-wheels 29, 30. The conveyer 28 feeds the lime from the housing 27 into the slaking-cylinder 21. The discharge passage 31 of the slaking-cylinder is furnished with mechanism similar to that just described, that is to say with a delivery-device 32 and a screw-conveyer 34 contained in a housing 33. The apparatus operates as follows:—After the slaking-cylinder has been filled with steam at the desired pressure by means of the valve 35, the spur-gear 36 is thrown in, whereby the mixing- and conveying-blades are brought into action and the feed-device 23 also set in operation. By means of the gears 29, 30 the feed-device 23 also sets the conveyer 28 in action. The lime to be slaked, in the form of a mixture of powder and broken pieces, is now charged into the hopper 22. The lime will fall into one of the recesses 24 in the device 23, and as the latter rotates, the lime in the recess will be discharged into the chamber 27, while the next recess will receive a charge of lime. At the same time the rotary device 32, driven by means of the pulleys 39, 40 will deliver a corresponding quantity of slaked lime from the cylinder. Steam will not escape from the latter, as the pulverulent condition of the lime insures a steamtight joint of the rotary device. During the time that the recesses in the feed-device 23 are being alternately filled and emptied, the conveyer 28 will transport the lime into the cylinder, where it will be rapidly and completely slaked under the action of the steam, so as to form a dry, extremely finely powdered hydrate of lime. Depending upon the chemical composition of the lime, it may be found of advantage to slightly moisten it. For this purpose a jet-pipe 38, connected with an injector, is provided above the end of the chamber 27, at right angles to the shaft of the conveyer 28; in this manner the lime passing from the chamber 27 can be uniformly sprinkled (Figs. 2 and 4). In order to prevent subsequent moistening of the slaked, dry lime through deposits of water which would render it gritty, it is advisable to construct the slaking-cylinder, and also the vessels, with double walls, communicating through suitable apertures with the interior of the cylinder.

The above-described apparatus can also be employed for slaking the small quantities of burnt lime present in many kinds of cement, and which affect the strength of the latter owing to their subsequent slaking. In this event it is desirable, prior to feeding the material into the slaking-cylinder, to bring the material up to the temperature of the steam to be used in slaking, in order to prevent the formation of deposits of waters on the substance to be slaked.

I claim—

1. In an apparatus for slaking lime, the combination with a closed slaking cylinder, means for supplying steam thereto, and an agitator rotatable therein; of a feeding device to feed the unslaked lime to one end of the cylinder without permitting communication of the interior of the cylinder through the feeding device to the atmosphere, and a discharging device at the other end of the cylinder to receive and discharge the slaked lime without permitting communication of the interior of the cylinder through the discharging device to the atmosphere.

2. In an apparatus for slaking lime, the combination with a closed slaking cylinder, means for supplying steam thereto, and an agitator rotatable therein; of a valved feeding device to feed the unslaked lime to one end of the cylinder without permitting communication of the interior of the cylinder through the feeding device to the atmosphere, and a similar valved discharging device at the other end of the cylinder to receive and discharge the slaked lime.

3. In apparatus for slaking lime by means of steam, a slaking-cylinder, means for supplying steam thereto, a valved vessel, a pipe presenting an inclined wall connecting the vessel with the one end of the cylinder, means for connecting the vessel alternately with the atmosphere and with the cylinder interior, and a valved vessel communicating with the other end of the cylinder, said vessel being adapted respectively to feed the unslaked lime into the cylinder and deliver the slaked lime from it, without appreciable reduction of the steam pressure within the cylinder in either case, substantially as described.

4. In apparatus for slaking lime by means of steam, a slaking-cylinder, means for supplying steam thereto, a valved vessel, a pipe presenting an inclined wall connecting the vessel with the one end of the cylinder, a pipe presenting a three-way cock for connecting the vessel alternately with the atmosphere and the cylinder interior,

and a valved vessel communicating with the other end of the cylinder, said vessels being adapted respectively to feed the unslaked lime into the cylinder and deliver the slaked lime from it, without appreciable reduction of the steam pressure within the cylinder in either case, substantially as described.

5. In apparatus for slaking lime by means of steam, a slaking-cylinder, means for supplying steam thereto, valved vessels one communicating with each end thereof for feeding the unslaked lime into it and delivering the slaked lime from it, without appreciable reduction of the steam pressure within the cylinder in either case, and steam-operated mechanisms for actuating the valves of the vessels, substantially as described.

6. In apparatus for slaking lime by means of steam, a slaking-cylinder, means for supplying steam thereto, valved vessels one communicating with each end thereof, and a rotary device presenting one or more recesses mounted in each of said vessels, whereby the unslaked lime can be fed into the said cylinder and the slaked lime delivered therefrom without appreciable reduction of the steam pressure within the cylinder in either case, substantially as described.

7. In apparatus for slaking lime by means of steam, a slaking-cylinder, means for supplying steam thereto, valved vessels one communicating with each end thereof, a rotary device presenting one or more recesses mounted in each of said vessels whereby the unslaked lime can be fed into the said cylinder and the slaked lime delivered therefrom without appreciable reduction of the steam pressure within the cylinder in either case, and screw-conveyers for transporting the material from the feed-device into the cylinder, and from the delivery-device to the place of discharge, substantially as described.

8. In apparatus for slaking lime by means of steam, a slaking-cylinder, means for supplying steam thereto, valved vessels one communicating with each end thereof, a rotary device presenting one or more recesses mounted in each of said vessels, whereby the unslaked lime can be fed into the said cylinder and the slaked lime delivered therefrom without appreciable reduction of the steam pressure within the cylinder in either case, screw-conveyers for transporting the material from the feed-device into the cylinder and from the delivery-device to the place of discharge, and a water supply pipe entering the cylinder substantially above the exit end of the first said conveyer and directed at right angles to the axis of the latter, whereby the unslaked lime entering the cylinder can be uniformly sprinkled, substantially as described.

In testimony that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

WALTER SCHULTHESS.

Witnesses:

ARTHUR CANTILLANA,

H. C. COXE.