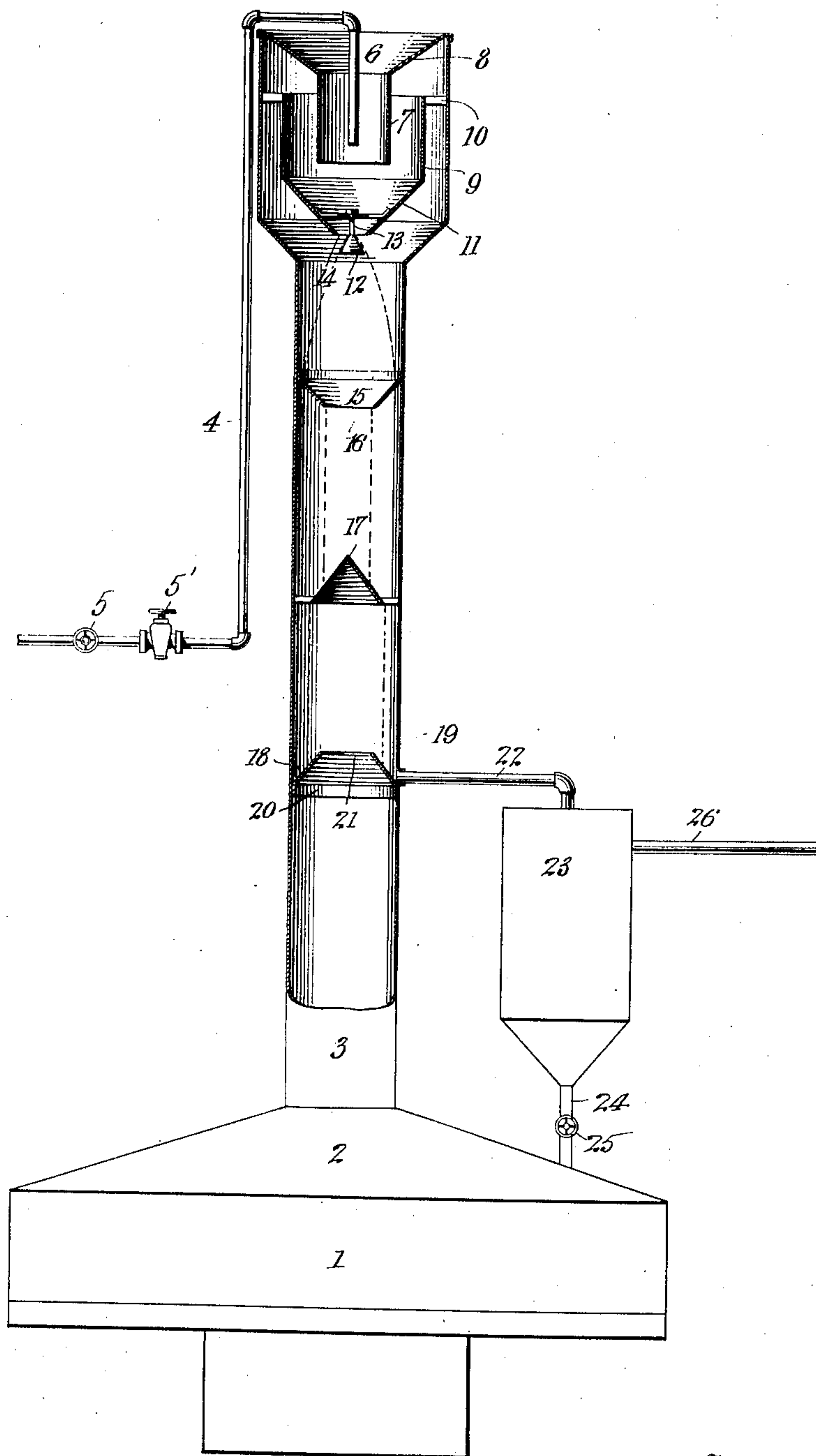


No. 840,076.

PATENTED JAN. 1, 1907.

M. MAURAN.  
APPARATUS FOR HYDRATING LIME.  
APPLICATION FILED JULY 21, 1906.



Witnesses  
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# UNITED STATES PATENT OFFICE.

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## APPARATUS FOR HYDRATING LIME.

No. 840,076.

Specification of Letters Patent.

Patented Jan. 1, 1907.

Application filed July 21, 1906. Serial No. 327,137.

*To all whom it may concern:*

Be it known that I, MAX MAURAN, a citizen of the United States, residing at Niagara Falls, in the county of Niagara and State of New York, have invented certain new and useful Improvements in Apparatus for Hydrating Lime, of which the following is a full, clear, and exact description.

My invention relates to the hydration of lime, and particularly to a form of apparatus by which lime may be hydrated very quickly and economically and without permitting any injurious vapors to escape into the atmosphere.

A further object of the invention is to provide for the complete hydration of all grades and characters of lime, including those bearing quantities of magnesia or other substances which cause the lime to slake slowly under ordinary methods.

With these and other objects in view the invention consists in the construction, in the combination, and in the arrangement of parts and in the method as hereinafter set forth, and finally particularly pointed out in the appended claims.

The drawing illustrates in side elevation, partly in section, a lime-hydrating apparatus embodying the principles of my invention.

As is well known, lime must be hydrated to make it suitable for use in mortar, and this is now extensively done at specially constructed plants or factories equipped to do the work economically. The theory of hydration is very simple, requiring merely the addition of water to the lime; but in practice certain difficulties arise by reason of impurities in the lime, the time required for the hydration, and, perhaps most serious of all, the objectionable escape of volumes of lime-laden vapor into the atmosphere, especially in city communities. In carrying out my invention I aim to overcome these various defects, and particularly the last one, and, furthermore, to increase the economy and general efficiency of the hydration processes and apparatus.

Referring to the drawing, in which like parts are designated by the same reference-sign, 1 indicates a pan in which the lime is hydrated by the addition of water thereto. For this purpose the lime is placed in the pan and the water added, and it is best to have

special stirring and sprinkling mechanism—such, for example, as described in Patent No. 671,621, granted to Henry P. Dodge, dated April 9, 1901. By using such stirring mechanism and by adding the right amount of water the lime may be hydrated into a dry pulverulent mass or powder capable of being packed up in bags for shipment. In this process large volumes of steam or vapor are given off, which are deflected by head 2 into a stack 3. The features thus far described may be of any ordinary or well-known form and constitute no part of my invention except in the combinations hereinafter recited.

The essential principle which I have utilized lies in the cleansing or scrubbing action which a water-spray has on a cloud of vapor. In addition to this principle there is the further action by which the water-spray condenses the vapor and absorbs the waste heat thereof. The practical construction for utilizing these principles embodies an arrangement of baffle-plates within the stack in combination with the source of water-supply. Means are also provided by which the water is finally collected and its heat utilized.

4 designates a water-pipe leading from any convenient source of supply and having a valve 5 and a regulating-cock 5'.

6 indicates the terminal end of the water-pipe, which is conveniently directed axially into the stack through an inverted cone 8, terminating in a tube or cylinder 7.

9 indicates a second tube or cylinder, of larger diameter, partially surrounding the tube or cylinder 7. This tube or cylinder is held in place by stay-rods 10 from the walls of the stack. The lower part of the cylinder 9 is a cone 11, having a mouth 14, below which is suspended a spreader 12 by a stem 13, supported by a cross-bar above the mouth 14 of the cone. The major diameter of the spreader is greater than that of the mouth 14, and water is free to flow through the latter onto the spreader.

At a lower point of the stack I provide a baffle-plate in the form of a cone 15, which has an open vertex 16 and is directed downward like a hopper. 17 indicates another cone directly below the open vertex 16 and pointed upward, so as to shed water falling upon it from the edge of opening 16, and 18



indicates an annular trough conveniently formed by bolting a sheet-metal piece of conical form 19 securely to the stack at 20, so as to form a water-tight joint therewith.

5 The opening 21 in the cone 19 and the disposition of the cone 17, which I shall term a "protecting-cap," are such as to leave a free passage for the vapors passing upward in the stack, and the opening 16 and the space  
10 around the cylinders 7 and 9 are such as to preserve the same freedom of flow.

22 indicates a pipe from the trough 18 to a receptacle 23, where the water from the trough is collected. 24 indicates a pipe connection to  
15 the hydration-pan 1 from this tank or receptacle 23. 25 indicates a valve for controlling the flow, which is manipulated for certain operations of the process, as hereinafter stated.

26 indicates an overflow-pipe for carrying  
20 off the excess of water after the tank 23 is filled.

The method of operation of my invention is as follows: A measured quantity of lime is placed in the pan 1 and a predetermined  
25 quantity of water added. As will hereinafter appear, the amount of water necessary is measured by the capacity of the tank 23. It is found in practice that there is a period of from one to three minutes time before the  
30 lime under treatment commences to hydrate. Therefore the pipe 24 should be of sufficient size to discharge the contents of tank 23 within this time. As soon as the lime in pan 1 commences to hydrate, valve 5  
35 is opened, and the flow of water through pipe 6 is so adjusted by regulating-valve 5' that just enough water passes to fill the tank 23. Valve 5 is closed when a fresh charge of unslaked lime is being placed in the pan 1.  
40 Regulating-valve 5' remains set until it is necessary to readjust it, according to the quality of the lime under treatment, as some limes require more or less water to hydrate them. From this process there is developed  
45 a considerable amount of steam, which passes upward into the stack 3 and issues through the aperture 21 of the cone 19. The vapor then passes around the edges of the protecting-cap 17 and leads successively  
50 through aperture 16, around the cylinder 9, then downward between cylinders 9 and 7, and, if it has not been previously condensed, out through the cylinder 7. In its path, after leaving the orifice 21, the vapor encounters  
55 a shower of water falling from the edges of cap 17 and through which it is obliged to pass. This water which comes from the pipe 6 flows into cone 11 and thence over the spreader 12 in a conical sheet or shower,  
60 which completely crosses the path of the upwardly-moving vapor. At the point 15, where the water would otherwise meet and flow down the walls of the stack, the stream is directed inward and flows from the edges

of the aperture 16 onto the cap 17 in a cylindrical sheet or shower. Finally, the water  
65 flows from the protecting-cap 17 into the trough 18, thus forming a third cylindrical sheet or shower. The lime-laden vapor is therefore forced to pass through the falling  
70 water three times and is each time subjected to a scrubbing which removes more or less of the lime particles in suspension. The vapor is largely condensed by its contact with the water-spray and falls with it into the trough  
75 18. Such of the vapor as is not condensed has its lime particles quite fully removed by the water-spray and also a large amount of heat, so that the water which finally collects in the trough 18 is hot and has almost all of  
80 the lime which would otherwise be wasted and carried into the atmosphere to become a nuisance and menace to the health of the populace. This warm water carrying the hydrate flows into the tank 23, to be used in  
85 hydrating the following charges of quicklime. When the next measure of lime is to be hydrated, the contents of the tank 23 are turned into the drum by opening the valve  
90 25, so that the new lime is hydrated by the warm water collected in the previous operation. The lime that is carried by the water settles to the bottom of tank 23, which is made with a conical bottom, so that the accumulation of lime may be carried by the water  
95 in tank 23 back to the pan 1, leaving the tank 23 clean, so that the amount of water collected by it will always be the required amount. Not only is the waste lime therefore recovered and kept out of the atmosphere,  
100 but the warm water renders the process very much more efficient and complete. Ordinary lime, and particularly lime high in magnesia, will consume much more time in slaking if cold instead of hot water be used.  
105 My process, therefore, not only economizes the lime, but accelerates the hydration as well.

Any lime-vapor that may escape through the water-spray will be condensed upon the  
110 cylinders 7 and 9, which are provided as an extra precaution to secure against any lime getting into the atmosphere. These cylinders are kept in a chilled condition by the water from the pipe 6, which is in close proximity thereto. Water from this pipe becomes  
115 splattered or sprayed upon the cylinders in use, so that the lime-vapors are finally condensed by the contact with the cold walls, if they have not previously been condensed  
120 by the spray.

While my invention has been described in connection with a vertical stack in which the vapors rise naturally, it is obvious that the passage or chamber in which the scrubbing  
125 is done may be horizontal and that pressure may be used to force the vapors through the scouring-water however it may be arranged.



What I claim is—

1. In the process of hydrating lime, the method consisting in adding water to the lime and conducting the lime-laden vapors through a shower of water and then utilizing the water collected from said shower to hydrate fresh bodies of lime.

2. The method of hydrating lime which consists in heating the water by initially bringing it in contact with the vapors from a body of slaking lime and adding this water to subsequent bodies of lime.

3. The method of slaking or hydrating lime which consists in removing the finely-divided lime from the vapors of slaking lime and incorporating the same with the unslaked lime.

4. In an apparatus for hydrating lime, a stack into which the lime-vapors pass, a nozzle for spraying water into said stack, baffle-plates for deflecting the spray through the lime-vapor, a receptacle for collecting the resultant liquor, and means for conducting such liquor into contact with a fresh body of lime for subsequent hydrations.

5. In an apparatus for hydrating lime, a pan in which the lime is hydrated, a stack extending upward from said pan, baffle-plates within said stack by which the lime-vapors are deflected, means for injecting water into the stack to produce a shower through which the vapors pass, means for collecting the water after it has passed through the lime-vapors to cleanse the same,

and means for admitting this liquor into the pan for subsequent hydrations.

6. In an apparatus for hydrating lime, a pan in which the lime is hydrated, a stack extending upwardly therefrom, baffle-plates within said stack for deflecting the vapors out of a perpendicular path, means for injecting a shower of water into the stack through which the vapors pass, a trough within the stack for collecting the water after it has passed through the vapors, a receptacle below the level of said trough, a pipe connecting said receptacle and trough whereby the liquor flows from the trough to the receptacle, and means for conducting the liquor from the receptacle to the pan for subsequent hydrations.

7. In an apparatus for hydrating lime, a pan in which the lime is hydrated, a stack extending upwardly therefrom, baffle-plates within the stack for deflecting the vapors a plurality of times out of a perpendicular path, and means for injecting a shower of water into the stack so as to pass through the vapors a number of times, whereby the vapors are cleansed of lime particles before they issue into the atmosphere.

In witness whereof I subscribe my signature in the presence of two witnesses.

MAX MAURAN.

Witnesses:

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