

No. 654,093.

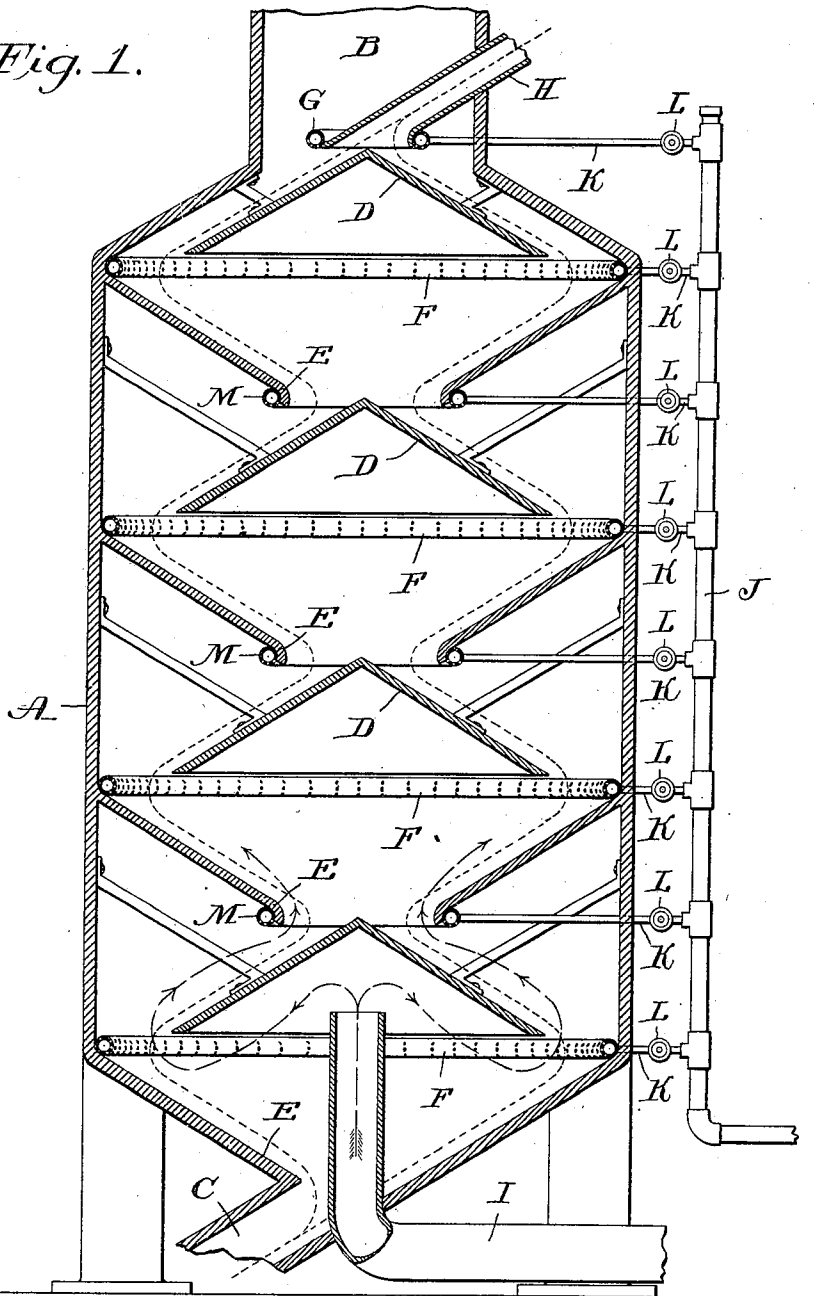
Patented July 17, 1900.

G. S. EMERICK.
DRYING AND COOLING MACHINE.

(Application filed Sept. 29, 1899. Renewed June 16, 1900.)

(No Model.)

Fig. 1.



Witnesses.

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UNITED STATES PATENT OFFICE.

GEORGE S. EMERICK, OF PHILADELPHIA, PENNSYLVANIA.

DRYING AND COOLING MACHINE.

SPECIFICATION forming part of Letters Patent No. 654,093, dated July 17, 1900.

Application filed September 29, 1899. Renewed June 16, 1900. Serial No. 20,541. (No model.)

To all whom it may concern:

Be it known that I, GEORGE S. EMERICK, a citizen of the United States, residing at No. 719 North Fifth street, in the city and county of Philadelphia, in the State of Pennsylvania, have invented a new and useful Improvement in Cooling and Drying Machines, of which the following is a specification.

My invention relates to that class of cooling and drying machinery wherein the material treated passes by gravity over a series of inclined surfaces within a casing; and the object of my invention is to provide a means whereby the material in its passage can be subjected to the drying and cooling action of air and water. I attain this object by the mechanism illustrated in the accompanying drawing, in which the figure is a vertical section of the entire machine.

In the drawing, A is a cylindrical casing provided at the top with the stack B and at the bottom with the outlet C. The interior of the casing is divided by the inverted truncated-cone-shaped partitions E, alternating with the conical deflectors D. The partitions E are attached to and depend from the interior periphery of the casing and are provided with central openings. The deflectors D are of somewhat less diameter than the interior of the casing and are suitably suspended or supported therein in such manner that their apexes are directly beneath and concentric with the openings in the partitions E, with sufficient space around the apexes of the deflectors and between their peripheries and the inner wall of the casing for the passage of material. The pipes F pass around the inner wall of the casing at the junction of the partitions E therewith. These pipes are perforated with one or more rows or sets of holes. The pipes M, similarly perforated, surround the openings of the partitions E.

H is a feed pipe or chute the discharge-opening of which is concentric with the apex of the topmost of the deflectors D. This opening is surrounded by the pipe G, perforated as above described.

I is a pipe the orifice of which is located beneath the lowermost of the deflectors D.

J is a supply-pipe communicating with the

pipes F, G, and M by means of the subsidiary pipes K, controlled by the valves L.

The operation of the machine is as follows:

Material being introduced through the feed-pipe H into the casing A passes successively over the inclined surfaces of the deflectors D and the partitions E, describing a zigzag course from top to bottom of the casing, as indicated by the dotted lines in the drawing. When the machine is employed to dry material, a stream of air is introduced at the bottom of the casing through the pipe I, circulating upward through the casing and, taking the course indicated in part by the broken lines in the drawing, passes out by the stack B at the top of the casing. The descending material and the ascending air-currents thus traverse the same path through the casing, but in opposite directions. When the machine is employed to cool material, such as hot cement-clinker or the like, water is used either alone or in coöperation with the air-currents above described. The water is introduced, by means of the supply-pipe J and subsidiary pipes K, into the perforated pipes F, G, and M and, issuing therefrom, is sprayed upon the hot material and passes downward with the latter over the deflectors D and partitions E, mixing with and cooling it in its descent through the casing.

Under modern methods of cement manufacture the raw material, such as limestone, is burned in rotary cement-kilns, from which it issues in hard lumps in form somewhat resembling coke and in a state of incipient vitrification. In this form it is known as "cement-clinker." The clinker as it issues from the kiln has an extremely-high temperature and requires to be cooled before it can be subjected to the next process, (that of grinding.) If at this stage the hot clinker is passed through my machine in the manner above described, the requisite cooling is rapidly effected through the action of the cold-water sprays, either alone or in conjunction with an ascending air-current. The operation of spraying cold water upon the hot clinker has this further important result—namely, that the sudden cooling produces a quick contraction and consequent disintegration of the

lumps of clinker, breaking them into small pieces, and thus facilitating the subsequent process of grinding. The material leaves the apparatus in a moist condition.

5 If water is introduced only at the top of the casing, its efficiency in taking up the heat of the material is rapidly exhausted, so that by the time the material reaches the middle of the casing the temperature of the water and
10 that of the material is very nearly the same, and no further cooling can therefore take place during the remainder of the journey through the casing. By my introduction of water at successive intervals throughout the
15 casing the material is subjected to the action of cold water at each stage of its descent, and the cooling process is thereby greatly facilitated. Through the independent connection of the pipes G, F, and M with the supply-pipe
20 J by means of the subsidiary pipes K, with their valves L, the supply of water can be regulated and controlled at each point.

By my disposition of the pipes F, G, and M the deflectors D and partitions E offer a practically unobstructed surface to the gravita-

tion of the material, and the pipe-holes through which the water issues cannot become clogged.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination of an inclosing casing, a series of truncated-cone-shaped partitions alternating with a series of conical deflectors placed concentrically therewith, the pipe I for circulating air through said casing, the
35 perforated pipes G, F and M for supplying water to said partitions and deflectors and the supply-pipe J, pipes K and valves L for supplying water to said perforated pipes, substantially as described.

2. The combination in an inclosing casing, of a series of conical deflectors alternating with a series of truncated-cone-shaped partitions, the latter furnished with perforated
45 pipe at their outer and inner peripheries, substantially as described.

GEORGE S. EMERICK.

Witnesses:

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