No. 814,297. PATENTED MAR. 6, 1906.

F. KLEPETKO.

ROASTING FURNACE.

APPLICATION FILED NOV. 6, 1905.

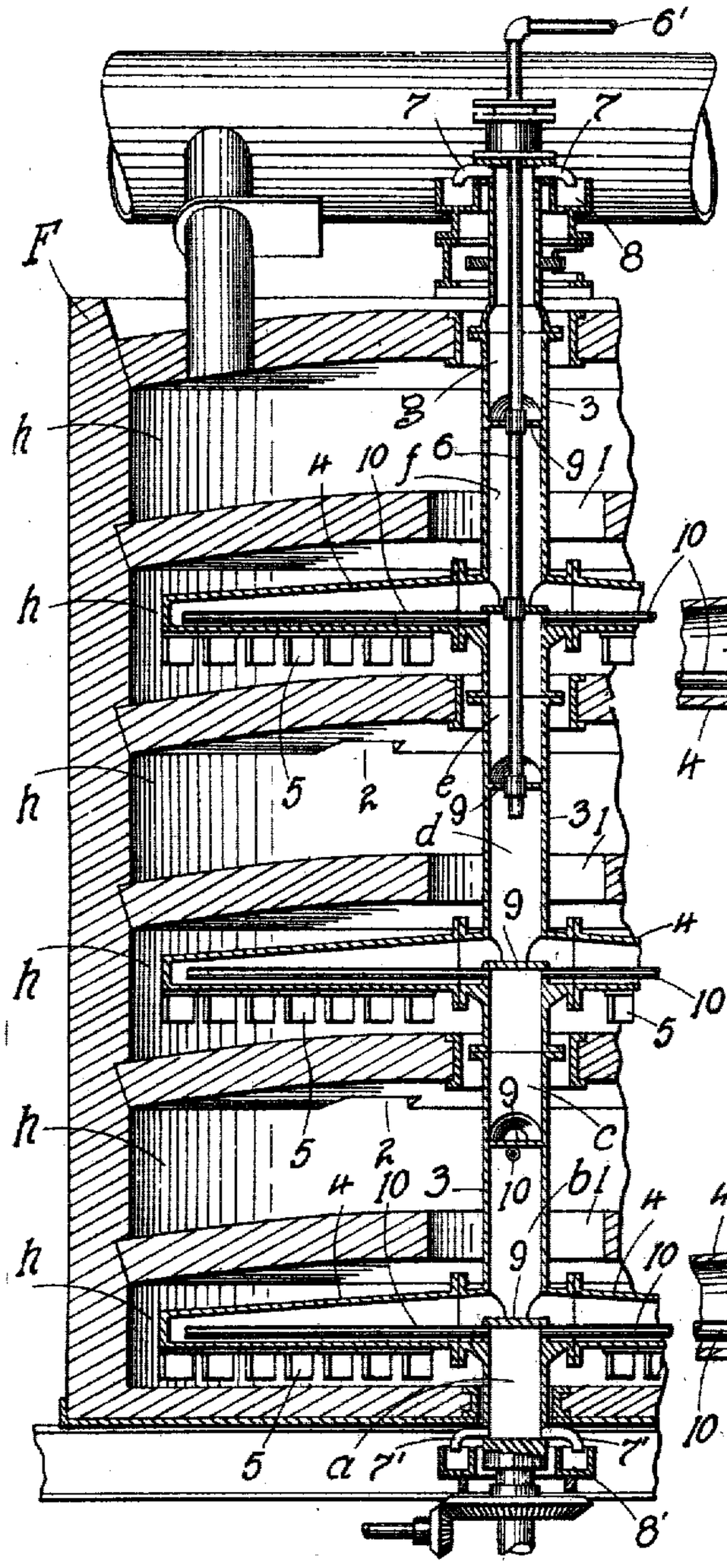

Fig. 1.

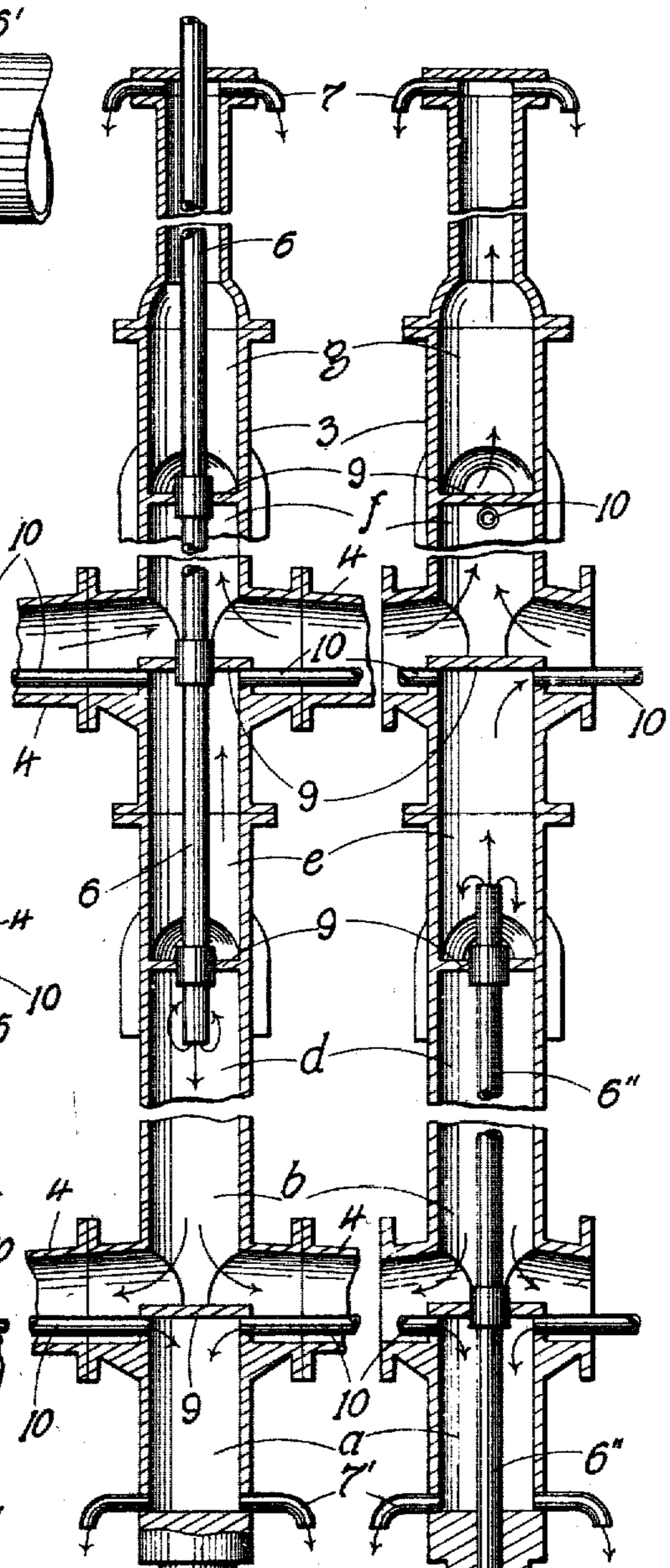

Fig. 3.

Fig. 2.

Witnesses:
Phil. J. Dawn
M. D. Whitcomb

Inventor:
Frank Klepetko
By
Emil Taren
Attorney

UNITED STATES PATENT OFFICE.

FRANK KLEPETKO, OF NEW YORK, N. Y.

ROASTING-FURNACE.

No. 814,297. Specification of Letters Patent. Patented March 6, 1906.

Application filed November 6, 1905. Serial No. 286,041.

To all whom it may concern:

Be it known that I, FRANK KLEPETKO, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Roasting-Furnaces, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention has relation to improvements in roasting-furnaces; and it consists in the novel construction and arrangement of parts more fully set forth in the specification and pointed out in the claims.

In the drawings, Figure 1 is a middle vertical section of a conventional McDougall ore-roasting furnace, partly broken, showing my invention applied thereto. Fig. 2 is an enlarged vertical section of the rabble-shaft and arms, showing one form of cooling mechanism applied thereto; and Fig. 3 is a similar section showing a modification of cooling mechanism.

The present invention is a qualification of the cooling apparatus shown and described in my pending application for Letters Patent for improvements in roasting-furnaces, Serial No. 223,539, filed September 6, 1904, the special object of the present improvement being to introduce the cooling medium into the hollow rabble-shaft at a point where in the majority of cases the furnace is hottest. This point is substantially the middle of the furnace, the upper hearth being cooled more or less by the introduction of the charge and the bottom hearth receiving the material after its fuel contents has been consumed during the roasting operation. Under the conditions here recited the introduction of the cooling medium at the point specified results in the formation of two distinct currents for said medium, one current ascending and the other descending, suitable outlets for the discharge of the cooling medium being located at opposite ends of the rabble-shaft. The shaft being provided with series of hollow rabble-arms, each series extending into its corresponding hearth, and the shaft being divided into distinct compartments communicating with the arms, it follows that the currents referred to will be parallel in opposite directions along the shaft, and so far as the arms are concerned the circulation will be vertically in series through the arms and radially in multiple. The resulting circulation, therefore, (from the point of introduction into the shaft,) through the shaft and arms will be vertically "in parallel" and "in series," and radially "in multiple," all as will more fully appear from a detailed description of the invention, which is as follows:

Referring to the drawings, and particularly to Figs. 1 and 2, F represents the furnace, and *h* the several hearths in which the material is treated, the said material dropping from the upper hearth successively through the several hearths until it is delivered into the delivery-hopper, (not shown,) the hearths being provided, respectively, with the central and marginal openings 1 2 for the passage of the material. Passing through the hearths is the rotatable hollow rabble-shaft 3, from which radiate the series of hollow arms 4, extending into the several hearths, and carrying rakes 5, by which the material is successively fed from one hearth to the hearth immediately beneath it, all as fully understood in the art.

Referring again to Figs. 1 and 2 of the drawings, 6 represents a water-feed pipe, (preferably stationary,) which is located within the shaft, extending to a point substantially the middle of the height or length of the shaft, the latter being provided at opposite ends with outlet taps or nozzles 7 7', respectively, which discharge into annular troughs 8 8', loosely encompassing the shaft 3. The shaft is divided into a series of compartments or chambers *a b c d e f g*, the chambers being separated from one another by the transversely-disposed division walls or partitions 9, occupying a plane slightly above the bottom of the adjacent rabble-arms 4, each chamber having leading therefrom the distributing conduits or pipes 10, which extend into the hollow arms 4 and discharge thereinto. As shown by the arrows in Fig. 2, a portion of the water discharged into the shaft flows outwardly through the series of pipes 10, leading from the compartment *d* into their corresponding rabble-arms, thence flowing inwardly into the next chamber *e* and from this through the next series of distributing-pipes and their corresponding rabble-arms, and so on, till the water reaches the upper outlet pipes or taps 7, where it discharges into the upper trough 8. Another portion of the water discharged from the pipe 6 flows downward through the compartment *d*, thence outwardly through the series of rabble-arms immediately beneath, thence in-

wardly through the distributing-pipes 10 in said arms into the next lower compartment c, and from this through the next series of arms and pipes, and so on, till the water reaches the lower outlet pipes or taps 7′, where it discharges into the lower trough 8′. The pipe 6 receives its supply from the extension 6′, as shown. In lieu of introducing the feed-pipe 6 from the top I may introduce it through the bottom, as shown by feed-pipe 6″ in Fig. 3, the arrows in said figure indicating the course of circulation of the two currents. In either case the circulation through the shaft and arms vertically is in parallel and in series and through the arms radially in multiple, the points of inlet and outlet for the circulating medium being removed a half-length of the rabble-shaft, or a distance corresponding to one-half the height of the furnace. In other words, the circulating medium discharges into the shaft at a point which is removed from the outlet or discharge thereof out of the shaft—a distance equal substantially to one-half the length of the shaft, or one-half the height of the furnace. In the event that the hottest point of the furnace should not be precisely at the middle the introduction of the water at substantially the middle of the shaft will result in the formation of two currents, which will readily adjust themselves according to the temperatures to which they are most likely to respond in the matter of direction and intensity. It is to be understood, of course, that the feed-pipe 6 6″ need not terminate precisely at the center of the length of the shaft, and a slight variation therefrom would not constitute a departure from the invention as long as the formation of two currents flowing parallel in opposite direction through the shaft was insured.

Such features and advantages of construction to which no specific reference is herein made are either well known or covered by the state of the art, and hence no description thereof is necessary. The cooling apparatus need not necessarily be restricted in its application to roasting-furnaces, but may be applied in other furnaces and kindred arts.

Having described my invention, what I claim is—

1. In a rabble apparatus, a hollow shaft, hollow arms radiating therefrom and communicating therewith, and means for introducing a cooling medium initially into the shaft at a point intermediate the length thereof, and allowing the same to circulate into the arms, substantially as set forth.

2. In a rabble apparatus, a hollow shaft, means for introducing a cooling medium into the shaft at a point intermediate the length thereof, and outlet means for the cooling medium at opposite ends of the shaft, substantially as set forth.

3. In a furnace, a hollow rabble-shaft, hollow rabble-arms disposed along and radiating outwardly from the shaft and in communication with the interior thereof, means for circulation through the shaft and arms vertically in parallel and in series, and radially in multiple, and inlet means and outlet means for the circulating medium, substantially as set forth.

4. In a furnace, a hollow rabble-shaft, hollow rabble-arms disposed along and radiating outwardly from the shaft and in communication with the interior thereof, means for circulation through the shaft and arms vertically in parallel and in series, and radially in multiple, and inlet means and outlet means for the circulating medium, the point of discharge of the circulating medium into the shaft being removed substantially a half shaft length from the outlet for said medium substantially as set forth.

5. In a furnace, a hollow shaft, hollow rabble-arms on the shaft, means for circulation through the shaft and arms vertically in parallel and in series, and radially in multiple, means for discharging the circulating medium into the shaft near the center thereof, and means for conducting the circulating medium out of the shaft at opposite ends thereof, substantially as set forth.

6. In a rabble apparatus, a hollow shaft, means for introducing a cooling medium into the shaft at an intermediate point of its length, and means for conducting the circulating medium out of the shaft on either side of the point at which said medium enters the shaft, substantially as set forth.

7. In a furnace having a plurality of hearths, a rotatable hollow shaft passing through the hearths, a series of hollow arms radiating from said shaft and extending into the several hearths, a series of chambers distributed throughout the shaft and communicating with the hollow arms, and a water-feed pipe extending through a portion of the chambers and discharging its water at substantially the middle of the shaft, substantially as set forth.

8. In a rabble apparatus, a hollow shaft, hollow arms radiating therefrom and communicating therewith, means for introducing a cooling medium initially into the shaft at a point intermediate the length thereof, and allowing the same to circulate into the arms, and outlet means for said circulating medium at opposite ends of the shaft, substantially as set forth.

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

FRANK KLEPETKO.

Witnesses:
EMIL STAREK,
J. E. DEAKIN.