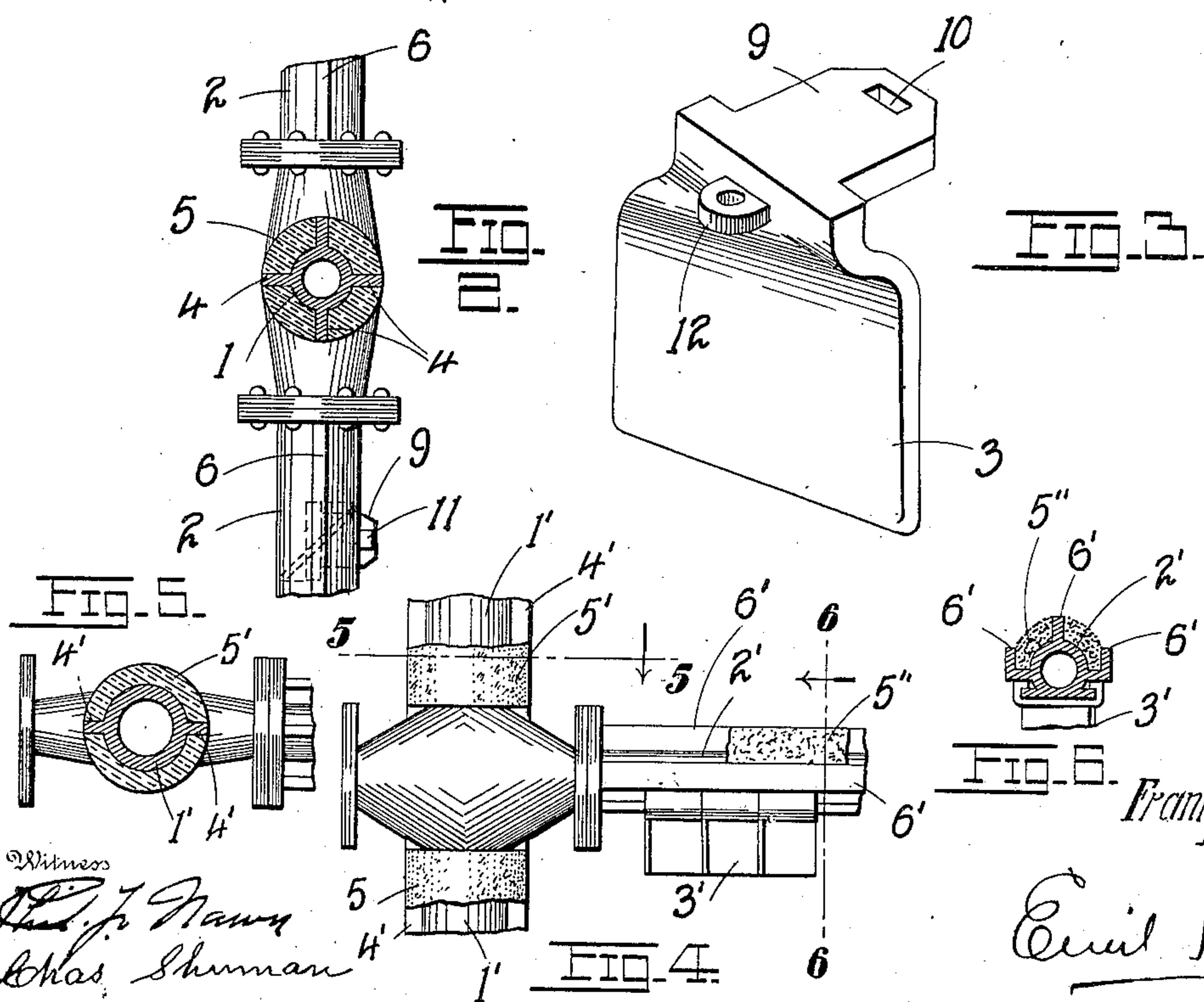
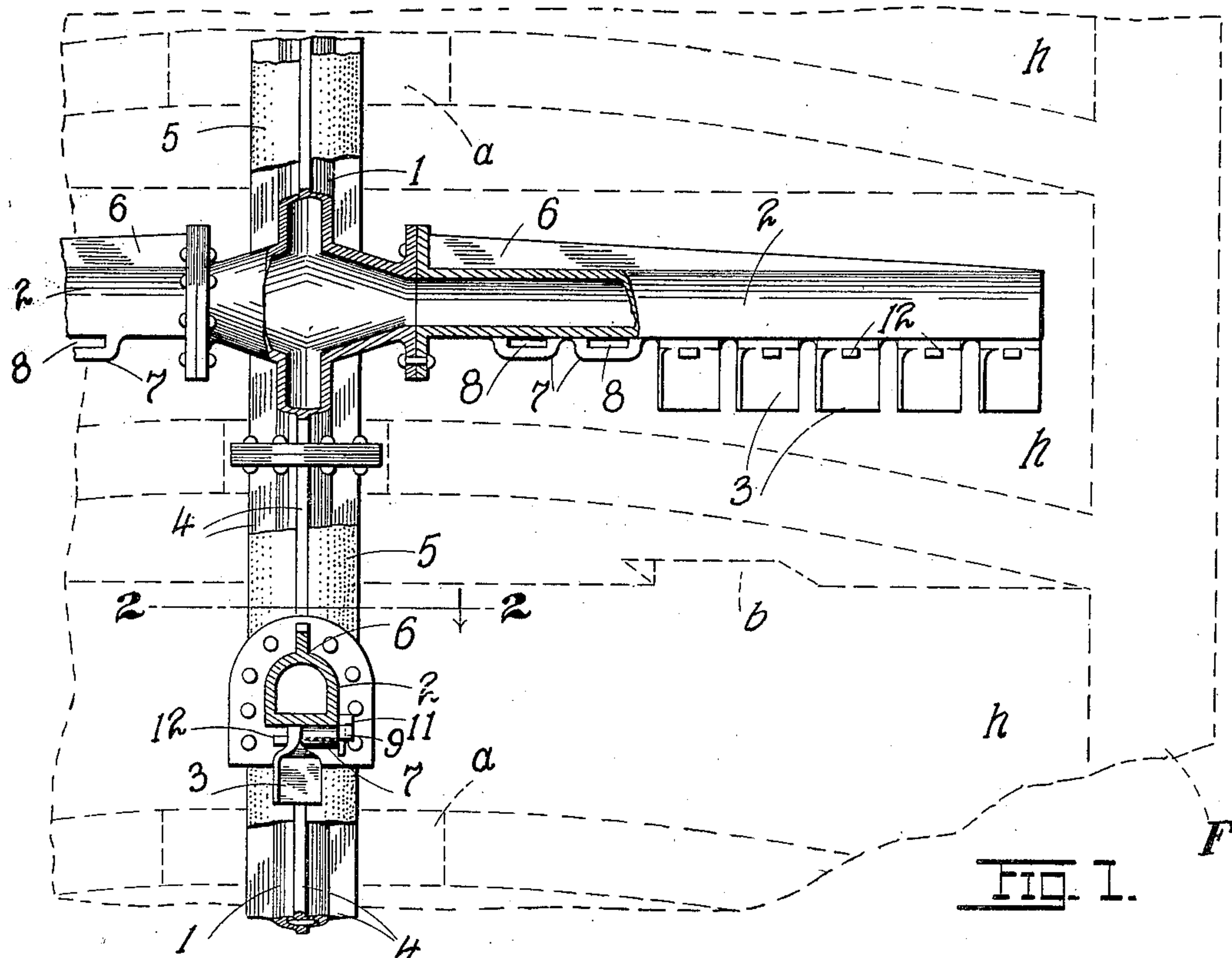


No. 827,547.

PATENTED JULY 31, 1906.

F. E. MARCY.  
ROASTING FURNACE.  
APPLICATION FILED AUG. 14, 1905.



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# UNITED STATES PATENT OFFICE.

FRANK E. MARCY, OF CHICAGO, ILLINOIS.

## ROASTING-FURNACE.

No. 827,547.

Specification of Letters Patent.

Patented July 31, 1906.

Application filed August 14, 1905. Serial No. 274,098.

*To all whom it may concern:*

Be it known that I, FRANK E. MARCY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, 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 details of construction more fully set forth in the specification and pointed out in the claims.

In the drawings, Figure 1 is a part section and part elevation of a portion of a rabble shaft and arms constituting my invention and showing its application to a roasting-furnace. Fig. 2 is a horizontal section taken on the line 2 2 of Fig. 1. Fig. 3 is a perspective of the rake or blade. Fig. 4 is an elevational detail of a shaft and arm, showing a modification of my invention. Fig. 5 is a horizontal section on line 5 5 of Fig. 4, and Fig. 6 is a vertical section on line 6 6 of Fig. 4.

The object of my invention is to so qualify the constructive details of the rabble-shaft and rabble-arms of roasting-furnaces of the rotary type as to make them not only proof against the destructive and deleterious effects of the high temperature to which they are subjected within the furnace-hearths, but to make such shaft and arms in a measure independent of the preserving influences of the cooling medium circulating through them, their capacity against disintegration and destruction being in a measure dependent on their specific construction, as will subsequently more fully appear. In furnaces employing water as a circulating medium for the rabble shaft and arms before the necessary cooling of the rabble apparatus can be effected the water must abstract so large a percentage of heat units from the charge that an undue reduction of temperature results and the roasting becomes incomplete. My present arrangement contemplates not only the interposition of suitable heat-non-conducting material between the parts through which the water circulates and the ore, but the formation of suitable reinforcing ribs or walls on the outside of the shaft and arms to resist the destructive effects of the gases and high temperature of the charge.

A further object is to make special pro-

vision for the equipment of the arms with rakes which may be readily renewed, and the life of the rabble apparatus as a whole may be indefinitely prolonged.

My present improvement necessarily dispenses with a considerable percentage of water to be used as a cooling medium, and hence results in an increased efficiency in the furnaces, being that the temperature in the hearths need not be reduced below the point which is essential to complete roasting and perfect combustion of the fuel contents of the charge.

In detail the invention may be described as follows:

Referring to the drawings, and particularly to Figs. 1 to 3, inclusive, F represents a section of a roasting-furnace in dotted outline, being of a conventional type and well understood. The hearths are represented by *h*, the material or charge dropping from one hearth to the next hearth below through the central and marginal openings *a* and *b*, respectively, as well understood in the art. Passing through the several hearths is the rotatable hollow rabble-shaft 1, from which radiate the series of hollow rabble-arms 2, extending into the several hearths and carrying rakes 3, by which the material is successively fed from one hearth to the hearth immediately beneath, all as fully understood in the art. Circulation through the hollow shaft and arms of a suitable cooling medium (preferably water) may be effected by any of the methods understood in the art, and consequently no attempt is herein made to either show or describe any specific method or construction. Disposed along the peripheral surface of the rabble-shaft are a series of ribs 4, which not only stiffen the shaft, but contribute additional metal for resisting the disintegrating and destructive action of the gases and heat within the furnace, thereby dispensing with the necessity on the part of the water of unduly cooling the parts to insure their integrity and preservation. By not permitting the cooling medium, therefore, to abstract undue quantities of heat units from the charge a more complete roasting is effected, since the temperature at which complete roasting takes place is preserved and maintained throughout the entire roasting operation. To still further prevent an undue abstraction of heat from the charge by the circulating cooling medium, the shaft is



covered with sections or layers of brick-tile 5, asbestos, or equivalent heat-non-conducting material which is interposed between the ribs 4, as shown. Disposed on the rabble-arms 2 and subserving a similar purpose as the ribs 4 in so far as they serve as stiffening constructive features are ribs 6, which for any sagging tendency of the arms are subjected to tension, and hence resist the sagging tendency to an eminent degree. Projecting beyond and below the bottom of the rabble-arm, along one of the longitudinal edges thereof, is a flange 7, (formed, preferably, into a series of scallops to reduce the weight,) which is provided with a series of elongated openings 8 for the passage of the free ends of the tongues 9, forming the tops of the rakes 3, the projecting ends of the tongues being provided with openings 10 for the passage of suitable locking-keys 11. Each blade is provided with an eye or loop 12, by means of which it can be removed from the arm at any time through the medium of a hook at the end of a rod inserted into the furnace. A rake mounted as here indicated cannot possibly drop off the arm in the stopping of the driving machinery by the accidental backlash of the gears by which rotation is imparted to the shaft.

30 In Figs. 4, 5, 6, I have shown a modification in which the shaft 1' is provided with two ribs 4' and tiling-sections 5'. The rabble-arm 2' in this case, too, is shown as having three ribs 6' above the rakes 3', the intermediate spaces between the ribs being filled and packed with layers of ashes 5'' or cinders or any equivalent heat non-conducting material.

40 Obviously the present method of construction, both for the shaft and arms, is susceptible of a variety of modifications not necessary to here illustrate or describe.

Having described my invention, what I claim is—

1. A rabble apparatus comprising a rabble shaft and arms, a layer of heat-non-conducting material disposed about the peripheral surface of the shaft, and about the upper portions of the peripheral surfaces of the arms, and rakes secured to the arms in a plane below the base of the non-conducting layer thereon, substantially as set forth. 50

2. A rabble apparatus comprising a rabble shaft and arms, a layer of heat-non-conducting material protecting the upper portions of the peripheral surfaces of the arms, and rakes disconnected from said layer secured to each arm, substantially as set forth. 55

3. A rabble apparatus comprising a rabble shaft and arms, a layer of heat-non-conducting material disposed about the peripheral surface of the shaft and about the upper portion of the peripheral surface of each arm, and rakes detachably secured to the arms below the base of the layer of non-conducting covering thereof, substantially as set forth. 60

4. In a rabble apparatus, a rabble-arm having a section thereof protected by a permanent layer or covering of heat-non-conducting material, and a series of rakes disposed along the unprotected portion of the arm, substantially as set forth. 70

5. In a rabble apparatus, a rabble-arm having a section thereof protected by a permanent layer or covering of heat-non-conducting material, and a series of detachable rakes disposed along the unprotected portion of the arm, substantially as set forth. 75

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

FRANK E. MARCY.

Witnesses:

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H. N. TAFT.