H. N. THOMSON & W. M. KELLY.

RABBLE ARM AND RAKE.

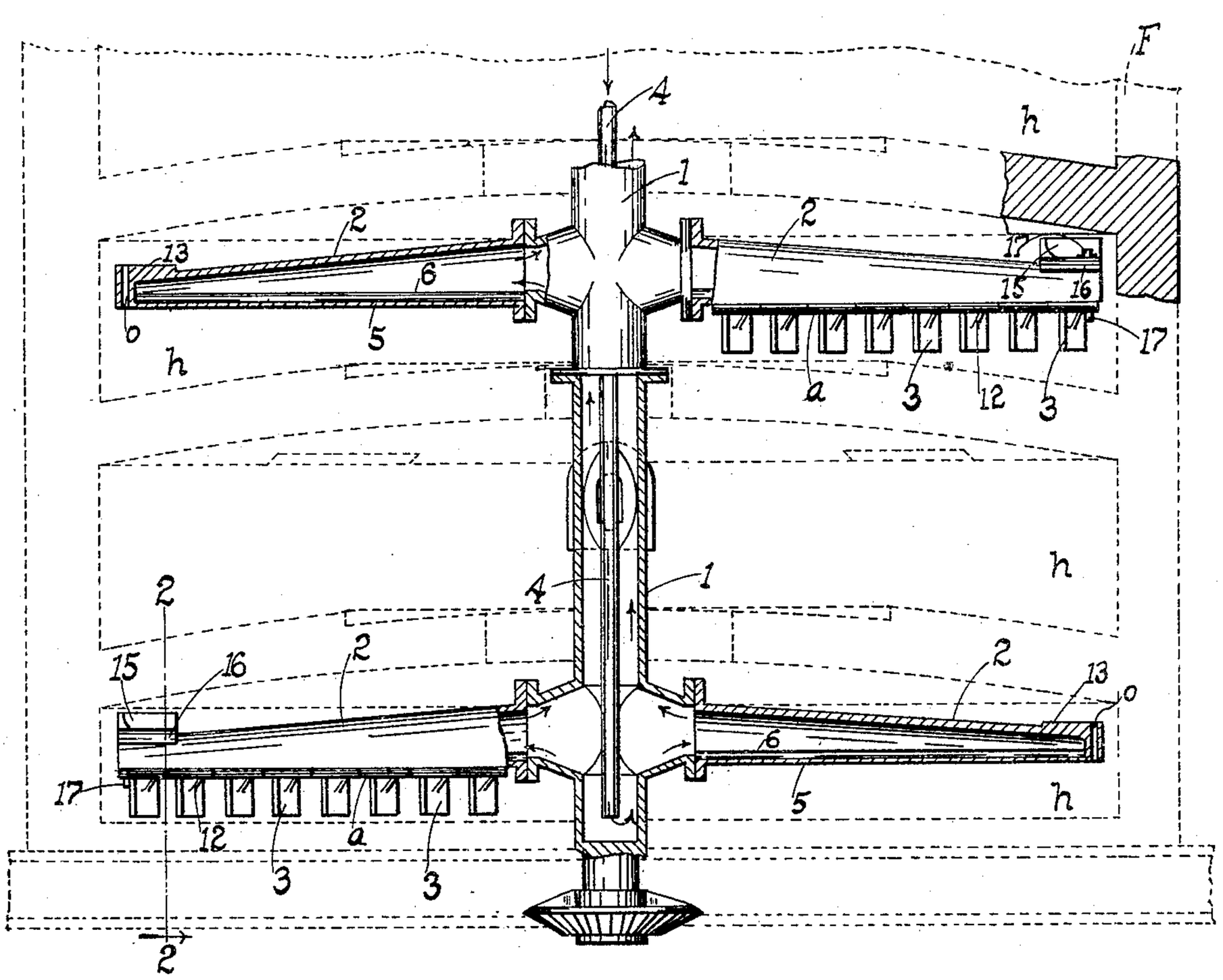
APPLICATION FILED AUG. 16, 1909.

940,488.

Patented Nov. 16, 1909.

2 SHEETS—SHEET 1.

FIG. 1.



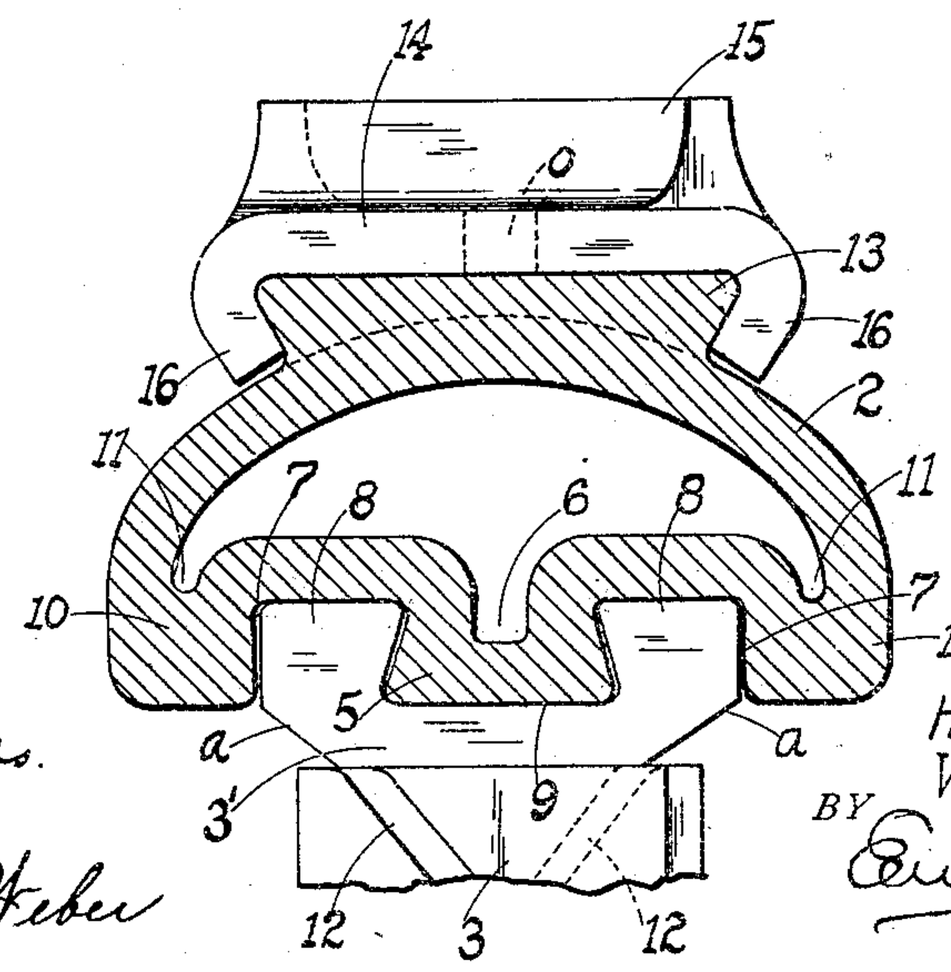


FIG. 2.

WITNESSES:

Harry A. Beines.

Fannie E. Heber

INVENTORS.

Henry N. Thomson and

William M. Kelly.

BY

Ernest Stratton

ATTORNEY.

H. N. THOMSON & W. M. KELLY.

RABBLE ARM AND RAKE.

APPLICATION FILED AUG. 16, 1909.

940,488.

Patented Nov. 16, 1909.

2 SHEETS—SHEET 2.

FIG. 3.

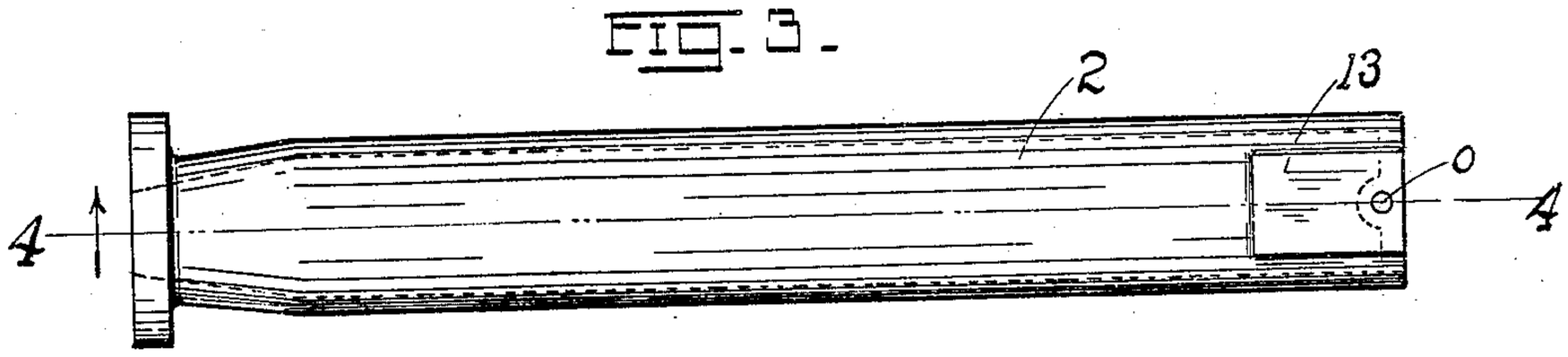


FIG. 4.

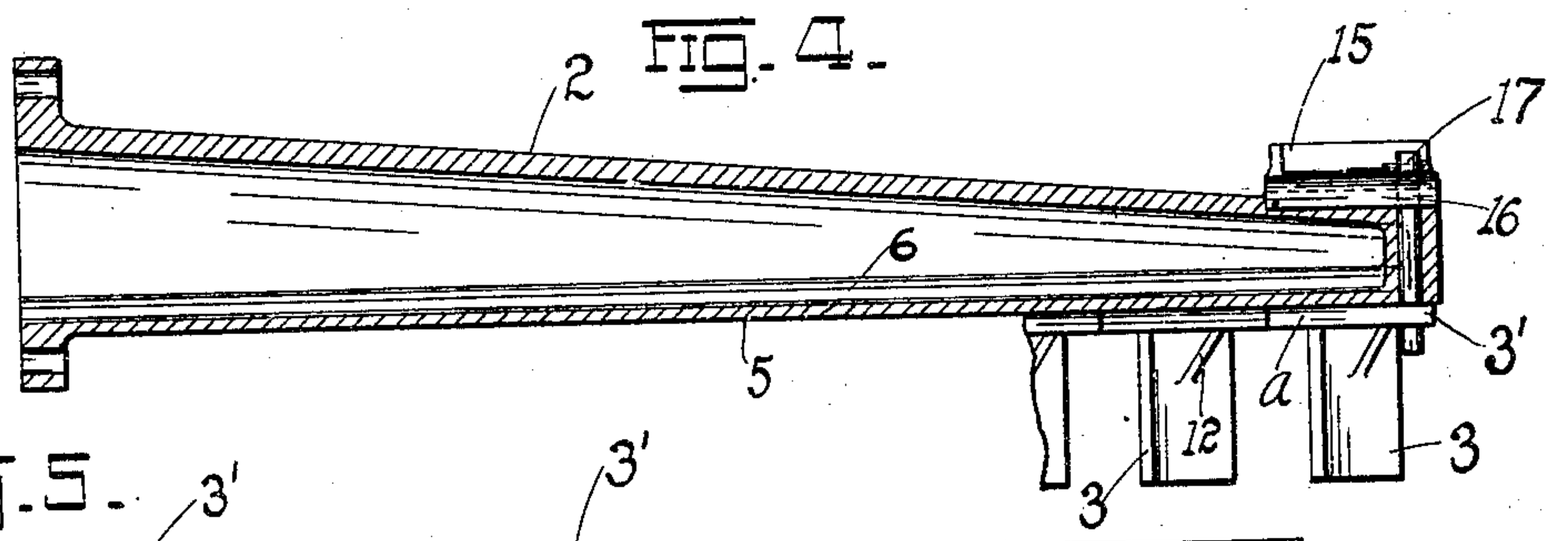


FIG. 5.

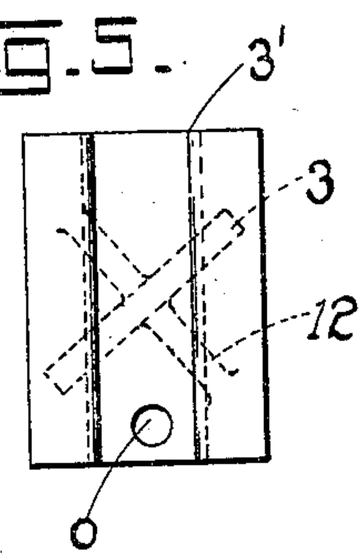


FIG. 7.

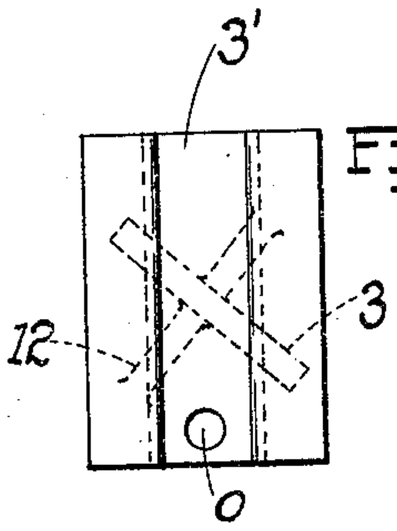
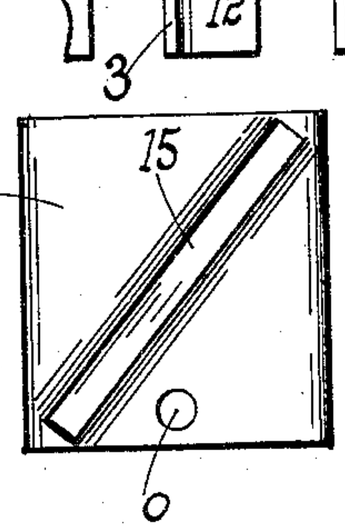


FIG. 10.



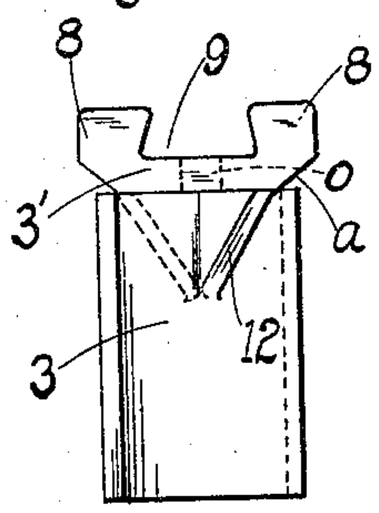


FIG. 6.

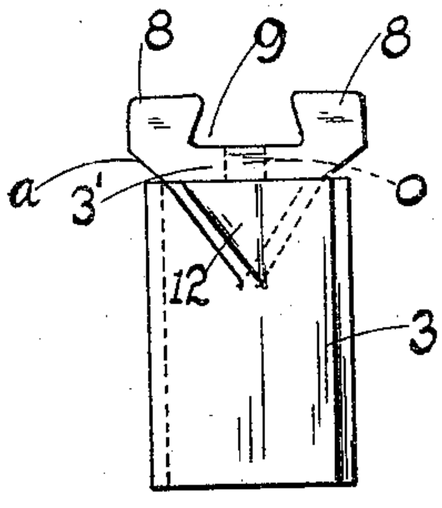


FIG. 8.

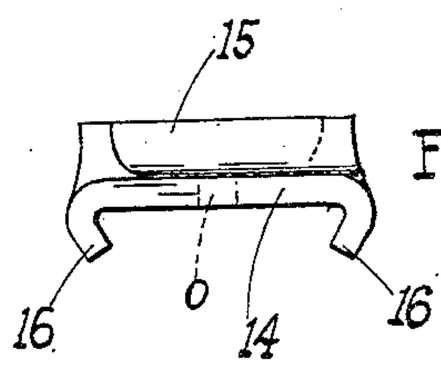


FIG. 11.

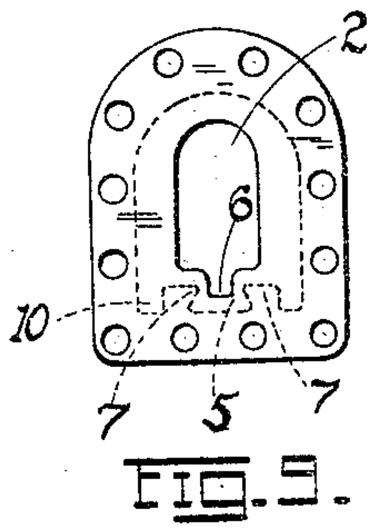


FIG. 9.

WITNESSES:

Harry A. Baines

Fannie E. Heber.

INVENTORS.

Henry N. Thomson and
William M. Kelly.

BY

ATTORNEY.

UNITED STATES PATENT OFFICE.

HENRY N. THOMSON AND WILLIAM M. KELLY, OF ANACONDA, MONTANA.

RABBLE-ARM AND RAKE.

940,488. Specification of Letters Patent. Patented Nov. 16, 1909.

Application filed August 16, 1909. Serial No. 513,156.

To all whom it may concern:

Be it known that we, HENRY N. THOMSON and WILLIAM M. KELLY, respectively a subject of the King of Great Britain and a citizen of the United States, residing at Anaconda, in the county of Deerlodge and State of Montana, have invented certain new and useful Improvements in Rabble-Arms and Rakes, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

Our invention has relation to improvements in rabble-arms and rakes for furnaces; and it consists in the novel construction of parts more fully set forth in the specification and pointed out in the claims.

In the drawings, Figure 1 shows the outline of a conventional form of McDougall ore roasting furnace, with a partly sectional and partly elevational view of our improved rabble-arm and rake; Fig. 2 is an enlarged vertical cross-section of the rabble-arm taken on the line 2—2 of Fig. 1, with roof-scraping blade or rake in end elevation; Fig. 3 is a top plan of the rabble-arm; Fig. 4 is a longitudinal middle vertical section on the line 4—4 of Fig. 3; Fig. 5 is a top plan of the in-feeding rake; Fig. 6 is an end view thereof; Fig. 7 is a top plan of the out-feeding rake; Fig. 8 is an end view thereof; Fig. 9 is an end view of the rabble-arm viewed from the inner flanged end of the arm; Fig. 10 is a top plan view of the roof-scraping blade or rake; and Fig. 11 is an end view thereof.

The present improvement though specially applicable as a rabble mechanism for ore roasting furnaces of the McDougall type, may of course be utilized as a feature of any stirring or rabble apparatus where the necessity arises for keeping such apparatus cool, or at a temperature sufficiently reduced to escape the destructive effects of too great a heat.

The objects of the invention are to provide a hollow rabble-arm affording special facilities for the circulation of the cooling medium (preferably water); to bring the cooling medium in proximity to the rakes thereby cooling the latter; to provide means by which the rakes may be readily attached to the arm, and as readily detached therefrom where occasion for renewal or repair of a rake arises; to provide means for removing accretions from the roof of the hearth over which the arms travel; to provide an arm and rake which will possess rigidity, stiffness and strength, and thereby resist any material tendency to sag under a high temperature; and to provide further and other features of construction, the advantages of which will be best apparent from a detailed description of the invention, which is as follows:—

Referring to the drawings, F represents a roasting furnace of the McDougall type, shown mainly in dotted outline. The hearths of the furnace are represented by *h*, the material or charge dropping from one hearth to the next hearth below as well understood in the art. Passing through the several hearths is the rotatable hollow rabble-shaft 1, from which radiate the series of 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 it. To accomplish the feeding in the manner indicated, the rakes on the arms in one hearth are set at an angle opposite to that of those in an adjacent hearth, all as fully understood in the art.

Into the hollow shaft is inserted a water-feed pipe 4 (this being a common and well known method of introducing the water) which discharges into the bottom of the shaft whence the water circulates through the series of arms, and upward through the shaft. In the present improvement the hollow rabble arm is provided with a top, inwardly and upwardly sloping wall, to facilitate the circulation from the outer end of the arm toward the shaft, though this particular feature is not new, nor is it claimed herein.

The improvements are directed to the following details of construction:—The cross-section of the arm is substantially as shown in Fig. 2, the arm being provided with a central basal dove-tailed stiffening rib 5 in which is longitudinally disposed the water-circulating basin or channel 6, the bottom of the channel being sufficiently depressed below the surfaces forming the bottom of the hollow chamber of the arm, on either side of the rib, to bring the cool inflowing water in close proximity to the rakes suspended from the rib. On opposite sides of the rib 5, along the bottom of the arm are formed dove-tailed grooves 7 which receive the correspondingly shaped tongues or projections

8, formed on the sides of the rake-supporting heads or plates 3′, the rib 5 being in turn received by the dove-tailed groove 9 formed by the tongues 8. This construction leaves the outer sides of the tongues 8 protected against direct contact with the furnace charge and dust, such protection being accorded them by the lower side portions 10, 10, of the arm, by which said tongues are virtually embraced. To effectively cool these portions 10, the sides of the bottom of the chamber of the hollow arm are formed into conducting channels 11, 11, depressed somewhat below the plane of said bottom, such depression reducing the thickness of the metal in the corners of the chamber whereby a more effective cooling results from the water circulating through the arms. The rakes or blades 3 are stiffened by ribs 12, 12 connecting the opposite faces thereof to the rake-heads 3′ as shown. Formed at the upper outer terminal of the rabble-arm is a dove-tailed rib or tongue 13 over which is passed the base plate 14 of the roof-scraping blade or rake 15, the sides of the plate being provided with flanges 16 which embrace the sides of said tongue. The blade 15 serves to remove any accretions which may accumulate on the roof of the hearth during the operation of the furnace. The plate 14, arm 2, and the head 3′ of the outer terminal rake 3 are provided with openings *o* which when the rakes are properly positioned are brought into register and a common locking pin or key 17 is dropped through the opening or passage thus formed, which thus serves not only to hold the roof-scraper in place, but likewise locks the terminal rake 3 of the series against displacement. The remaining rakes of course, are held in position on the rabble arm by the terminal rake locked in the manner indicated.

To remove a broken rake, the pin 17 is withdrawn allowing the rakes to be slipped off their supporting rib 5, when the broken rake may be removed and replaced by a new rake, the remaining rakes remounted, the locking pin 17 reinserted, and the repair is done with a minimum loss of time. The sides of the rake-head 3′, between the rake 3 and the bases of the tongues 8 are beveled or inclined toward the rake as shown at *a*, this allowing free access of the charge to the rake as the arms sweep around the axis of the rabble-shaft, the sides of the rake projecting somewhat beyond the base of the incline.

It will be seen from the drawings, that a substantially even thickness of metal separates the rake-head 3′ and its tongues 8 from the bottom surface of the chamber of the rabble-arm traversed by the outwardly circulating current of water, thereby bringing the water into close and uniform proximity to the entire top of the rake and keeping the latter cool. The central channel or basin 6 is depressed somewhat below the bottoms of the side channels 11 as shown to best advantage in Fig. 2. The facility afforded for the removal of the rakes obviously reduces the amount of breakage.

Having described our invention, what we claim is:

1. A hollow rabble-arm provided with a bottom stiffening rib traversed by an inner longitudinal channel for the flow of a circulating medium, the rib having disposed on each side thereof longitudinal grooves.

2. A hollow rabble-arm provided with a bottom dove-tailed stiffening rib traversed by an inner longitudinal water conducting channel, the rib having disposed on each side thereof longitudinal dove-tailed grooves.

3. A hollow rabble-arm provided with a bottom dovetailed stiffening rib traversed by an inner longitudinal water conducting channel, the rib having disposed on each side thereof longitudinal dove-tailed grooves, in combination with a rake having a head provided with tongues for insertion in said grooves, and with a groove between the tongues for receiving the rib of the rabble-arm.

4. In combination with a hollow rabble-arm provided with a bottom stiffening dove-tailed rib traversed by an inner longitudinal water conducting channel, the rib having disposed on each side thereof longitudinal dove-tailed grooves, a series of rakes having heads engaging said rib and grooves, the bottoms of the sides of the arm embracing the sides of the heads and protecting the same against the furnace charge.

5. In combination with a furnace hearth, a rabble-arm, a series of rakes mounted thereon and detachable therefrom by a longitudinal movement thereof along the arm, an upper terminal roof scraping blade mounted on the arm and movable longitudinally thereon, the blade, arm, and terminal rake of the series being provided with openings adapted to register with one another, and a common locking pin or key passed through such registering openings.

6. A hollow rabble-arm having a chamber for the circulation of a cooling medium, a bottom outer longitudinal rib bounded by grooves on each side thereof, the chamber of the arm being provided with a central longitudinal channel or basin traversing the rib, and with side longitudinal channels beyond the grooves, the several channels being depressed below the plane defining the bottom of the chamber aforesaid.

7. A hollow rabble-arm having a chamber for the circulation of a cooling medium, a bottom outer longitudinal rib bounded by grooves on each side thereof, the chamber

of the arm being provided with a central longitudinal channel or basin traversing the rib, and with side longitudinal channels beyond the grooves, the several channels being depressed below the plane of the bottom of the chamber, and the central channel being depressed relatively below the bottoms of the side channels.

8. In combination with a rabble-arm having a bottom longitudinal outer dove-tailed rib bounded by dove-tailed grooves, in combination with a rake having a head-plate provided with tongues engaging said grooves, the sides of the plate being beveled from the bases of the outer sides of the tongues toward the rake-blade, for the purpose set forth.

9. In combination with a hearth, a rabble-arm extending over the same, a dove-tailed rib formed at the top of the outer end of the arm, and a roof scraper having a base-plate passed over and locked to said rib.

In testimony whereof we affix our signatures, in presence of two witnesses.

HENRY N. THOMSON.
WILLIAM M. KELLY.

Witnesses:
ULYSSES ANDERSON GARRED,
STEWART M. MORRIS.