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F. KLEPETKO.
ROASTING FURNACE.
APPLICATION FILED DEC. 31, 1904.

2 SHEETS—SHEET 1.

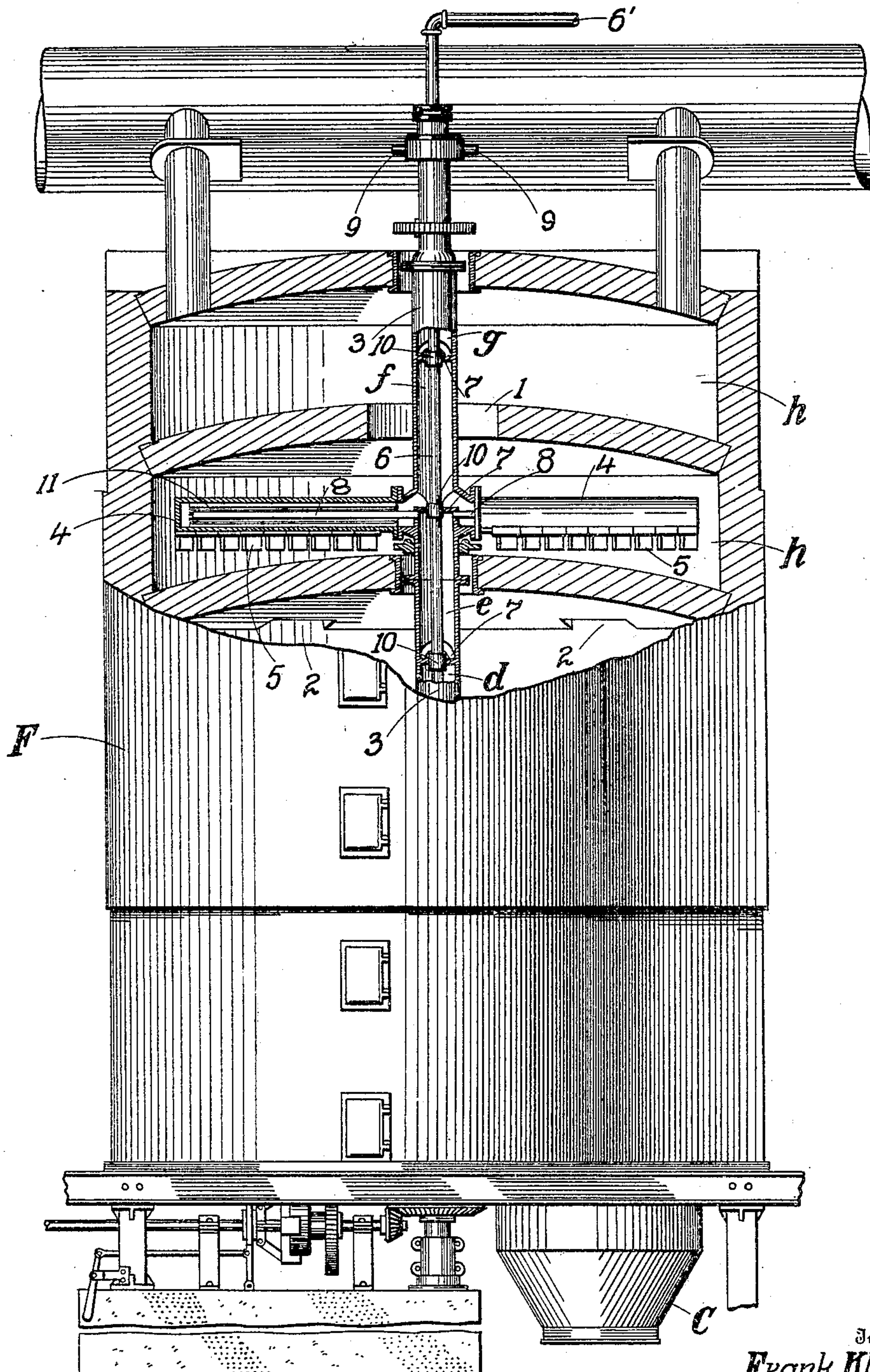


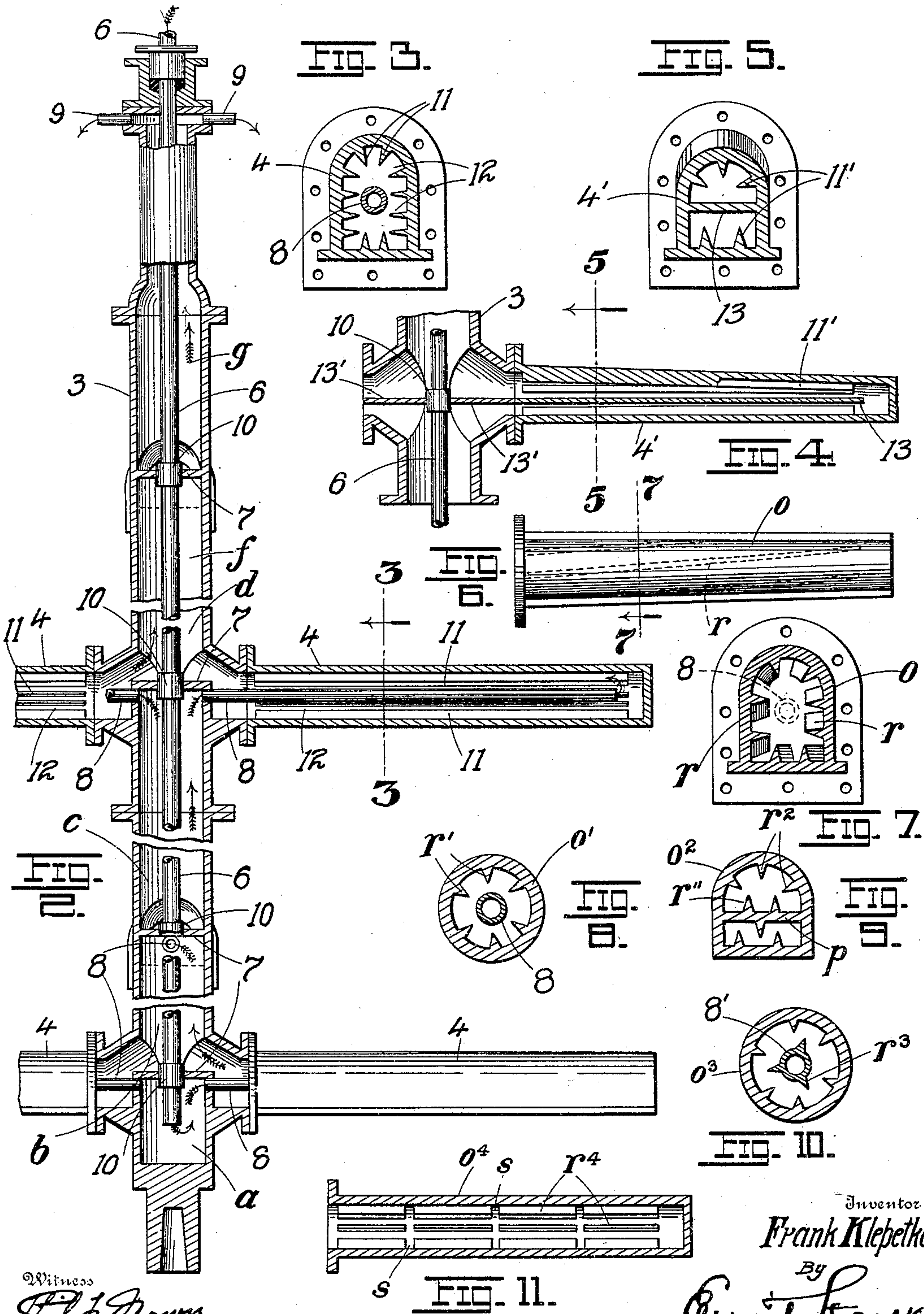
FIG. I.

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2 SHEETS—SHEET 2.



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ROASTING-FURNACE.

SPECIFICATION forming part of Letters Patent No. 792,053, dated June 13, 1905.

Application filed December 31, 1904. Serial No. 239,207.

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 vertical central section of a conventional McDougall ore-roasting furnace, showing my invention applied thereto. Fig. 2 is an enlarged vertical section of the rabble-shaft and arms, showing the cooling mechanism applied thereto. Fig. 3 is a transverse section on line 3 3 of Fig. 2. Fig. 4 is a vertical sectional detail of a modified construction of rabble-shaft and arm. Fig. 5 is a cross-section on line 5 5 of Fig. 4. Fig. 6 is a top plan of a rabble-arm, showing an oblique disposition of the ribs. Fig. 7 is a cross-section on line 7 7 of Fig. 6. Fig. 8 is a cross-section of a cylindrical form of arm. Fig. 9 is a cross-section of an arm, showing a part of the ribs disposed on the faces of the transverse partition thereof. Fig. 10 is a cross-section showing a portion of the ribs disposed on the outer surface of the distributing-pipe leading into the rabble-arm; and Fig. 11 is a longitudinal vertical section of an arm, showing the ribs made up of a series of sections spaced suitable distances apart.

The present invention is an improvement in air cooling devices for the McDougall or similar type of ore-roasting furnace, being a qualification of the construction shown and described in my United States Patent numbered 779,717, dated January 10, 1905, the patented improvement contemplating generically a ribbed construction for the rabble-arms carried by the rabble-shaft. The general disposition of the ribs in said patented improvement is shown transverse to the longitudinal axis of the arm, such specific disposition

being eminently effective for deflecting the currents of cooling medium traversing said arms. This deflection naturally serves to more or less retard the cooling medium in its passage through the arms—an object which while desirable to insure cooling of the arms, yet is one that should not be carried too far, as there would be danger of unduly heating the circulating medium from excessive retardation. So far as the cooling of the rabble-arms is concerned I attain equally as efficient results by the present qualified construction, which while to some extent deflecting and retarding the circulating medium, yet permits its passage through the arms and shaft with greater freedom, at the same time insuring a pronounced contact with the arms, as will be better apparent from a detailed description of the invention which is to follow.

Reviewing so much of the description of the furnace as may be essential to a better understanding of the invention, the latter may be described as follows:

Referring to the drawings, 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 C, 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, all as fully understood in the art.

Referring again to the drawings, and more particularly to Figs. 1 to 3, inclusive, 6 represents an air-feed pipe, preferably stationary, which is located within the shaft, extending to a short distance from the closed bottom of the latter, the lower end of said feed-pipe being open and discharging into the shaft. The pipe receives its supply of air from an extension 6', leading to any suitable blower. (Not shown.) The shaft is

divided into a series of chambers or compartments *a b c d e f g*, the chambers being separated from one another by the transversely-disposed division-walls 7, occupying a plane
 5 above the bottoms of the adjacent rabble-arms 4, each chamber having leading therefrom the distributing conduits or pipes 8, which extend into the hollow arms 4 and discharge thereinto. Under this arrangement
 10 the air forced and discharged into the bottom chamber *a* passes through the lower series of pipes 8 into the bottom rabble-arms, thence passing into the second chamber *b*, and from this through the next series of distributing-pipes and their corresponding rabble-arms, and so on till the current reaches the outlet-nozzles 9, where it discharges into the atmosphere. As seen from the foregoing, the feed-pipe 6 passes through the several
 20 partitions or division-walls 7, and in order that there shall be no leakage at these points a connecting-nipple 10 is placed around the pipe where it passes through the partition, said nipple being turned true and the partition drilled and reamed, making a practically
 25 air-tight joint.

From the foregoing it will be apparent that the cooling medium must take the course indicated by the arrows and that a
 30 positive and even delivery of cool air will result throughout the entire system of rabble-arms. Each rabble-arm must receive its air-current from one chamber before it can deliver it to the next succeeding chamber of the shaft, and the circulation will thus be
 35 uniform and positive at all times. In this particular it will make no difference whether the current is introduced through the top or bottom so long as the remaining features of
 40 construction are not materially disturbed.

In my patent aforesaid the inner walls of the rabble-arms are provided with rib formations, which are distinctively shown as transverse to the axis of the arm. The purposes
 45 of said rib formations are fully set forth in said patent, and while the generic principle of providing the rabble-arms with rib formations is common to both the construction shown in the patent and to the present qualification of that construction in the latter I
 50 dispose the ribs longitudinally and preferably parallel to the longitudinal axis or center of the arm.

One of the forms of the new construction is
 55 shown in Figs. 1 to 3, inclusive, in which 11 represents a series of parallel longitudinally-disposed ribs, with which the inner surface of each rabble-arm is provided, said ribs being formed or cast, preferably, integral with the
 60 arm. As the air is discharged from the conduit 8 into the rabble-arm 4 it is split up by the ribs 11 into a series of individual streams confined in the channels 12, separating the ribs, thus exposing more particles of air to a
 65 corresponding increased area or surface of

contact, and thus more effectively and suddenly cooling the walls of the arms. Once the cooling medium has performed its service it is free to pass onward into and through the rabble-shaft 3 and out through the nozzles 9 into the atmosphere. 70

In lieu of the conduits 8 I may provide the rabble-arms with horizontal partitions 13, as seen in the modified construction of arms 4' in Figs. 4 and 5, the partitions 13 being continuous with the division-walls 13' of the shaft. By terminating the partitions a short distance from the outer ends of the arms I form in the latter two communicating conduits, through which the air is free to circulate. The ribs 11', however, in such modified form are identical with the ribs 11 of the main form already described. 75

The term "longitudinal" as herein used is intended to designate any disposition of rib formation which is substantially lengthwise with the arm, though such disposition may be somewhat oblique to the longitudinal axis of the arm and not necessarily parallel thereto. It is a term as contradistinguished from transverse. Such oblique disposition of ribs I have shown in Figs. 6 and 7, where *r* represents the ribs, and *o* the rabble-arm. While the arm may be of the cross-section shown in Figs. 1 to 7, inclusive, it may be circular, as shown in the form of arm *o'* in Fig. 8, (provided with ribs *r'*), or, in fact, of any convenient form of cross-section. The ribs which in the foregoing views are shown as distributed wholly on the walls of the arm proper may be partially formed on the partition-wall of the arm, as shown in Fig. 9, (where *p* represents the partition and *r''* the ribs thereon, the arm being designated by *o''* and its ribs by *r''*), or, as shown in Fig. 10, a portion of the ribs may be on the pipe 8', the arm *o''* being similar to that in Fig. 8. 85 90 95 100 105

The designation "rib" as herein used is most apt for the formation shown, though it is within the spirit of my invention to include any equivalent formation which is capable of splitting up the current traversing the arm into a series of individual streams and any formation which will offer a larger area of contact to the particles of the cooling medium traversing the arm with a view of effecting a sudden cooling of the metal of which the arms are constructed. This formation, too, need not necessarily be a single continuous rib, but may for the length of the arm be formed of a series of sections *r'*, interrupted at intervals by spaces *s*, as shown in the longitudinal section of rabble-arm *o'* in Fig. 11. In fact, the invention is susceptible of various modifications, as apparent to those skilled in the art. 110 115 120 125

I need not, of course, limit the application of the present furnace to air, as any cooling medium, such as water and the like, may be substituted therefor. 130

Having described my invention, what I claim is—

1. In a furnace having one or more hearths, a hollow rabble-shaft and hollow arms therefor, and ribs formed on the inner surfaces of the rabble-arms and disposed in a general longitudinal direction therewith, substantially as set forth.
2. In a furnace having one or more hearths, a hollow rabble-shaft and hollow arms therefor, and ribs formed on the inner surfaces of the rabble-arms and disposed substantially parallel to the longitudinal axes of the arms, substantially as set forth.
3. In a furnace having one or more hearths, a hollow rabble-shaft and hollow arms therefor, conduits for directing a current of air from the shaft into the hollow arms, and ribs disposed in the path of the currents traversing said arms, said ribs following the general longitudinal dimensions of said arms, substantially as set forth.
4. In a furnace having one or more hearths, a hollow rabble-shaft and hollow arms therefor, and a series of parallel ribs formed on the inner surfaces of the rabble-arms and disposed in a general longitudinal direction therewith, substantially as set forth.
5. In a furnace, a hollow rabble-arm provided with a series of ribs on the inner surface thereof, substantially as set forth.

6. In a furnace, a hollow rabble-arm provided with a series of longitudinally-disposed ribs on the inner surface thereof, substantially as set forth.

7. In a furnace, a hollow rabble-arm, means for inducting therein a current of cooling medium, and a series of longitudinally-disposed ribs located within the arm in the path of the current traversing the same, substantially as set forth.

8. In a furnace having one or more hearths, a hollow rabble-shaft and hollow arms therefor, and suitable longitudinally-disposed formations within the arms in the path of the currents traversing the same, for splitting up said currents and maintaining them in a series of individual streams, substantially as set forth.

9. In a furnace having one or more hearths, a hollow rabble-shaft and hollow arms therefor, and suitable longitudinally-disposed formations within the arms in the path of the currents traversing the same, for splitting up said currents and maintaining them in a series of longitudinally-disposed individual streams, substantially as set forth.

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

FRANK KLEPETKO.

Witnesses:

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F. E. MARCY.