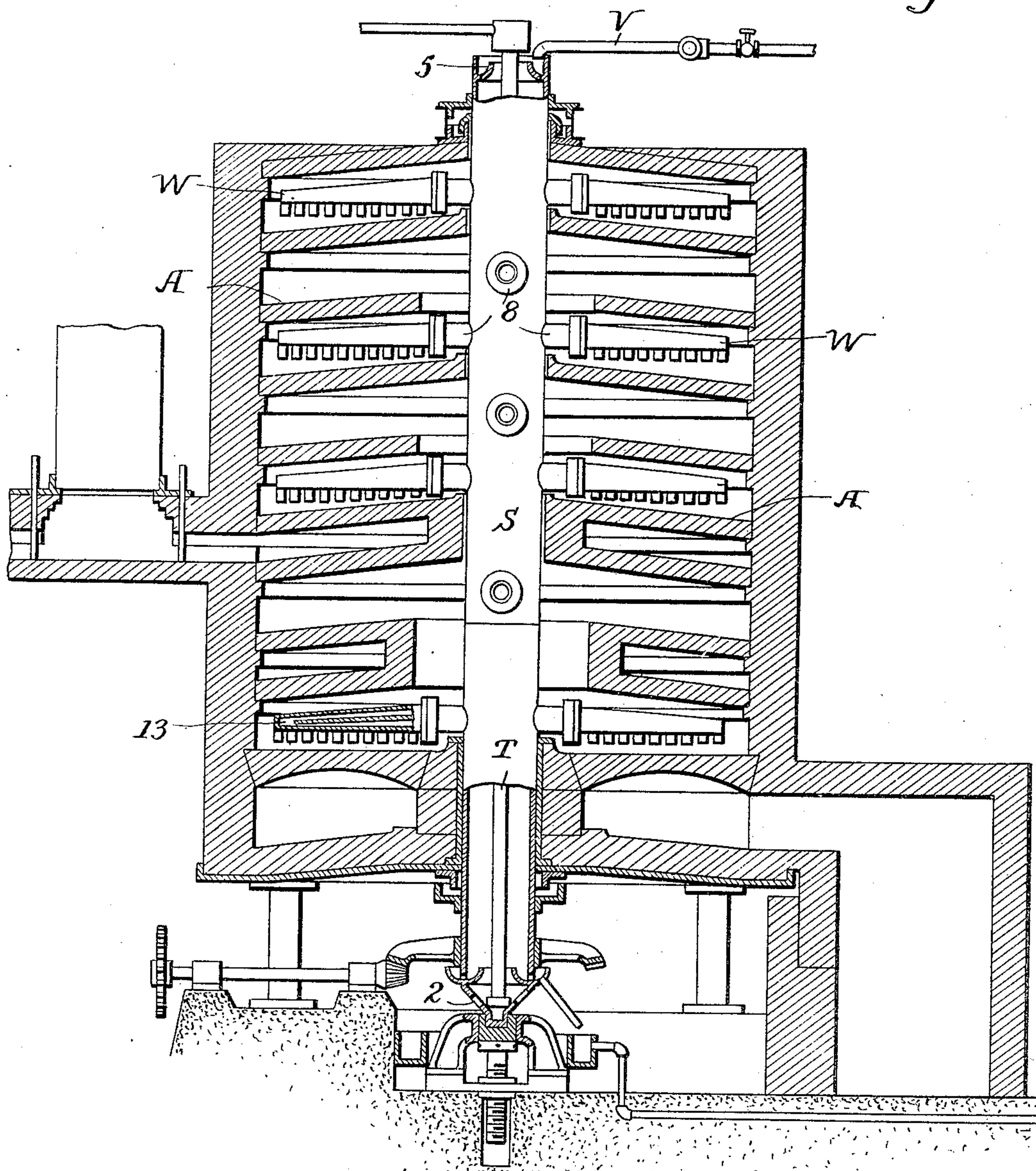


A. R. MEYER.
ROASTING FURNACE.
APPLICATION FILED MAR. 17, 1904.

2 SHEETS—SHEET 1.

Fig. 1.

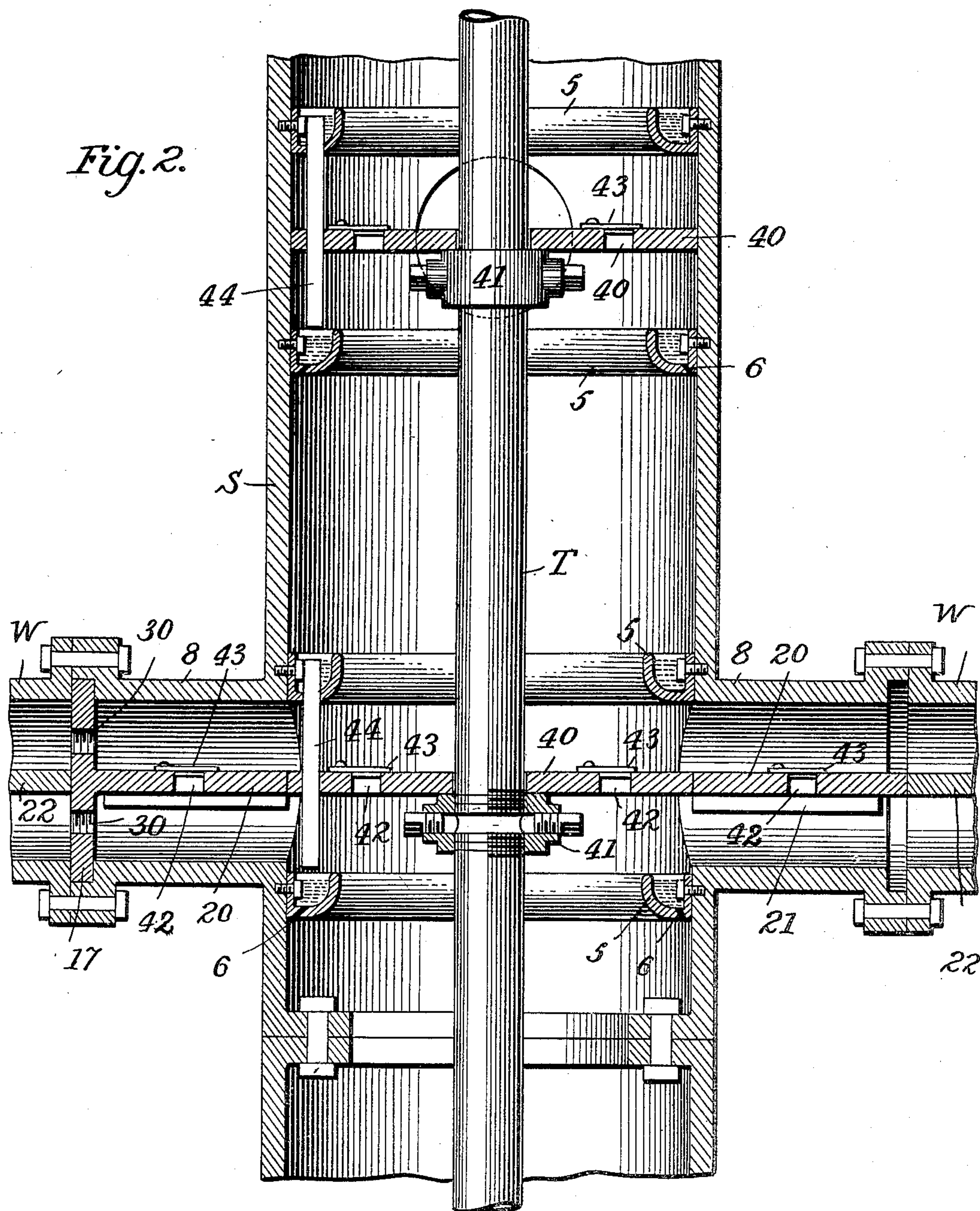


Witnesses
J. G. Strickel
Samuel Gillman, Jr.

Inventor
August R. Meyer
by *James F. Fennell*
Attorney & Counselor

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2 SHEETS—SHEET 2.



Witnesses
J. G. Stinzel
J. M. Gillman Jr.

Inventor
A. R. Meyer
John Freeman Watson
Attorneys

UNITED STATES PATENT OFFICE.

AUGUST R. MEYER, OF KANSAS CITY, MISSOURI, ASSIGNOR TO THE
UNITED ZINC AND CHEMICAL COMPANY, OF KANSAS CITY, MIS-
SOURI, A CORPORATION OF NEW JERSEY.

ROASTING-FURNACE.

No. 804,751.

Specification of Letters Patent.

Patented Nov. 14, 1905.

Application filed March 17, 1904. Serial No. 198,646.

To all whom it may concern:

Be it known that I, AUGUST R. MEYER, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Roasting-Furnaces, of which the following is a specification.

My invention relates to that class of heating or drying apparatus in which the material to be heated is agitated upon platforms or hearths, either stationary or rotating, by means of stirrers carried by arms extending from a pipe or shaft; and my invention consists in means whereby a cooling fluid may be properly directed upward through a hollow shaft and back and forth through hollow arms communicating with the shaft and whereby the shaft may be cooled and the cooling-vapor created and carried through the arms, as fully set forth hereinafter and as illustrated in the accompanying drawings, in which—

Figure 1 is a vertical section, showing part in elevation, of a roasting-furnace embodying my improvements; Fig. 2, an enlarged vertical section of a portion of the apparatus.

In the construction shown the furnace is provided with a series of hearths over which extend the agitating-arms W, carrying stirrer-blades and extending from a central pipe or shaft S, which when intended to rotate rests in a step at the bottom and is driven in any suitable manner. The shaft S is hollow and has air-inlet openings 2 at the bottom and is open or has ports at the top, so that there can be an upward flow of air either under natural draft resulting from the heat imparted from the shaft S or under artificial draft in any suitable manner.

The arms W are hollow and, as shown, are bolted to hollow bosses 8 upon the shaft, and partitions 22 divide the arms longitudinally and are shorter than the arms or have ports 13 near the outer ends.

When the arms are bolted to the bosses 8, the latter are also provided with partitions 20, which may consist of plates resting upon ribs 21, as shown at the right, Fig. 2, or these plates may be combined with or, if desired,

be attached to cover-plates 17, fitting recesses at the outer ends of the bosses and having ports 30 30, one above and the other below the partition. As a result of this arrangement air passing upward through the shaft S flows beneath the partitions outward through the arms and inward over the partitions if the shaft S is obstructed in any way to prevent the air when it reaches the point where the arms are situated from further passing upward.

In order to avoid the necessity of specially constructing the shaft S to secure such obstruction, I provide means whereby the shaft may be readily partitioned if not specially constructed for the purpose, the said means consisting in providing a central rod or shaft T, which for some methods of cooling fluid may be a hollow conductor, and in supporting on the said shaft a series of partitions 40, consisting of disks resting upon supporting-collars 41, bolted to the shaft and so formed as to constitute practically a continuation of the partitions extending through the arms and bosses.

It will be seen that in that class of apparatus not originally constructed for circulating the cooling fluid in the manner described and where the shaft is not provided with partitions the introduction of the shaft T and the plates or partitions 40, supported thereby, and, if necessary, the introduction of partitions into the arms or arms and bosses, will convert the apparatus into one in which the cooling fluid passes from the bottom of the shaft upward and successively back and forth through the different arms until it reaches the top of the shaft, and it will further be seen that in constructing the machine originally for this method of circulating cooling fluid the means illustrated and above described afford a simple and comparatively inexpensive method of construction.

By providing closing-plates 17, which may be arranged in any suitable position to close the communication to a great extent between the shaft and the arms and providing said plates with ports the escape of the cooling fluid in case of the breaking and detachment

of an arm may be prevented by plugging up the ports 30, which are preferably threaded to receive screw-threaded plugs.

It will be evident that the detachment of an arm and closing of the ports 30 would limit to a considerable extent the volume of the cooling fluid that could pass upward, and to avoid this result the partition between the plate 17 and shaft T at any point either in the plates 20 or 40 has one or more ports 42, to which are adapted valves 43, capable of opening upward upon any increase in the force of the air-current. These valves may be of any suitable character, light hinged flat valves being shown.

While for some purposes a current of air or vapor may be directed into the bottom of the shaft for cooling purposes and used alone, I prefer to make use of air charged with vapor or moisture, which not only serves to maintain the arms and shaft at a low temperature, but which may be economically employed and readily regulated, and in order to economically charge the air with moisture, reduce the amount of water required, and aid in cooling the shaft I direct a stream or streams of water so as to flow downward along the inner surface of the shaft, retaining bodies of water at intervals along the shaft, if desired, so that the heat of the shaft is to a certain extent taken up by the water and the latter is evaporated and the air becomes charged with the moisture and carries the same back and forth through the arms.

While different means may be employed for securing this result, I have shown the shaft as provided at the upper end with a gutter 5, into which water is directed from a supply-pipe V, and inclined openings 6 at the bottom of the gutter direct water in streams against the inner face of the shaft, and bodies of water may be retained at intervals in the shaft by multiplying the gutters 5, as shown.

To conduct the water through the partitions, I make use of conducting-pipes 44, which, as shown, extend through the gutters 5 above the partition nearly to the tops of the gutters to constitute overflow-pipes, these gutters not being perforated and the lower ends of the pipes 44 leading the water to the gutters 5 below.

It will be understood that where the arms are not arranged diametrically opposite in the apparatus or where they alternate on opposite sides the construction will be modified accordingly.

Any suitable means may be employed for collecting and discharging any water that passes to the bottom of the shaft. For instance one of the gutters 5 may be arranged opposite ports through which the water flows outward into an outside gutter and from the latter to a suitable tank.

I do not here claim, broadly, passing water to the inner surface of a shaft; nor do I claim the partitioned arms and closing-plates between the shaft and arms and other features set forth and claimed in other applications filed by me, Serial Nos. 198,645 and 198,647, filed March 17, 1904.

Without limiting myself to the construction shown, I claim—

1. The combination in a furnace, of a hollow shaft, a series of hollow arms extending in pairs from the opposite sides of the shaft and communicating with the latter, a rod extending centrally through the shaft, and a series of partitions extending across the shaft between its ends and centrally through the arms and supported in part by said rod, substantially as set forth.

2. The combination of the hollow shaft S, hollow arms, horizontal partitions in said arms, a shaft T within the shaft S, and partition-plates carried by the shaft T in line with the partitions of the arms, substantially as set forth.

3. The combination in a furnace, of a hollow shaft, hollow stirring-arms carried thereby and communicating with said shaft, horizontal partitions dividing the arm and shaft sections, said partitions supported within the shaft by a vertical rod or shaft T, and means for feeding water downward in contact with the inner face of the shaft S and through said partitions, substantially as set forth.

4. The combination in a furnace, of a hollow shaft, hollow stirring-arms carried thereby and communicating with said shaft, horizontal partitions dividing the arm and shaft sections, said partitions supported within the shaft by a vertical rod or shaft T, gutters arranged at intervals within the shaft S, and pipes extending through the partitions between the gutters on opposite sides of the partitions, substantially as set forth.

5. The combination of the hollow shaft S having hollow bosses with partitions therein, hollow arms extending from the bosses and having partitions, a rod or shaft T within the shaft S, and partition-plates supported by the shaft T in line with the partitions of the bosses and arms, substantially as set forth.

6. The combination of the shaft S, its radial hollow arms having partitions, and partition-plates supported within the shaft S and provided with ports and valves, substantially as set forth.

7. The combination of the hollow shaft S, its partitions, hollow arms and partitions therein with ports 40 in said partitions, and valves for closing said ports, substantially as set forth.

8. The combination of the hollow shaft S, its arms having partitions, partition-plates supported centrally within the shaft S, said

shaft extending above and below the partition-plates, and means for admitting a cooling fluid to the bottom and for permitting its escape at the top of the shaft, substantially as set forth.

9. The combination with the hollow shaft S, its partitions and hollow arms having partitions, of means for admitting air to the bottom of the shaft and for supplying water to

flow downward along the inner face of the shaft, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

AUGUST R. MEYER.

Witnesses:

JNO. P. METCALF,
C. M. BUCKLEY.