No. 780,115. PATENTED JAN. 17, 1905.

A. R. MEYER.

ROASTING FURNACE.

APPLICATION FILED MAR. 17, 1904.

3 SHEETS—SHEET 1.

Fig. 1.

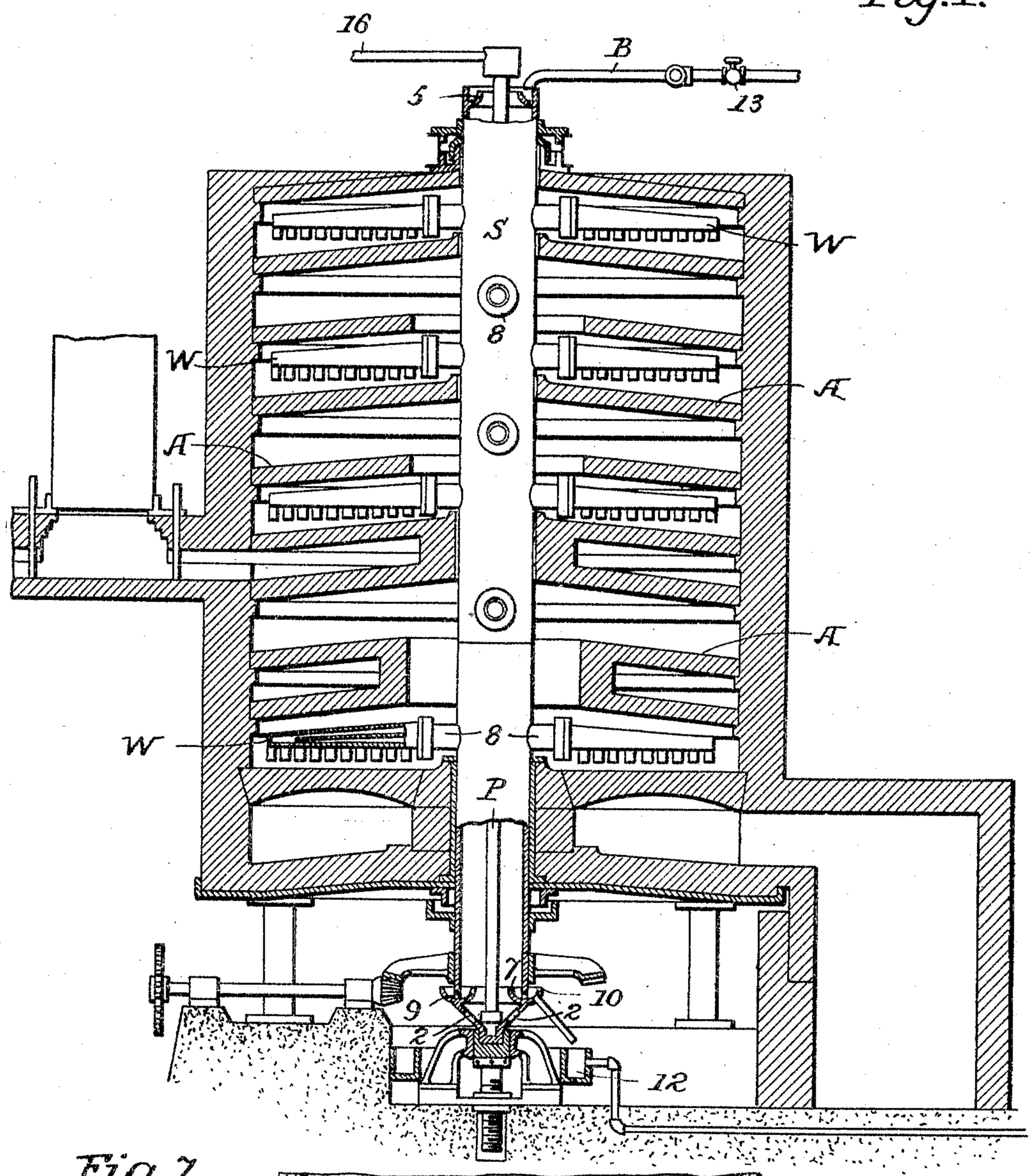
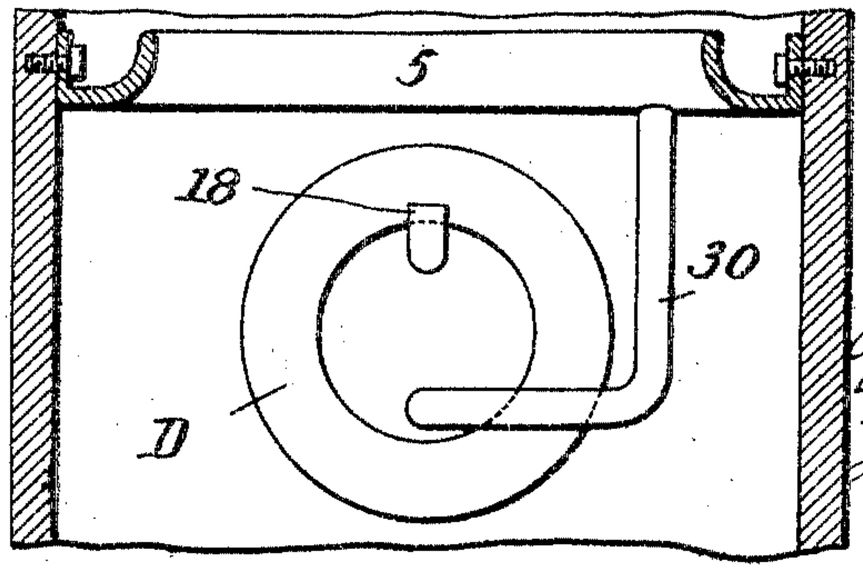


Fig. 7.



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3 SHEETS—SHEET 2.

Fig. 2.

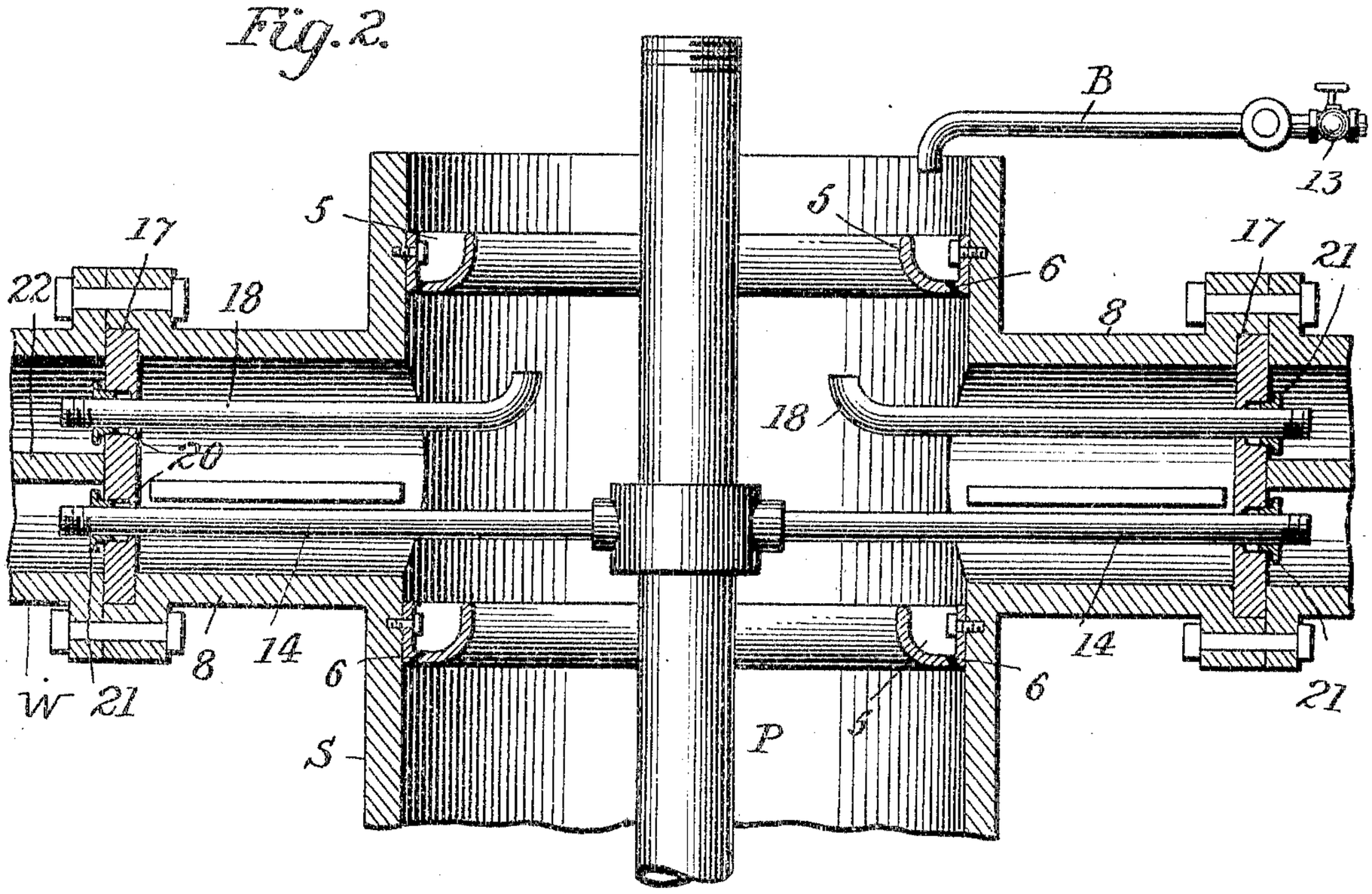
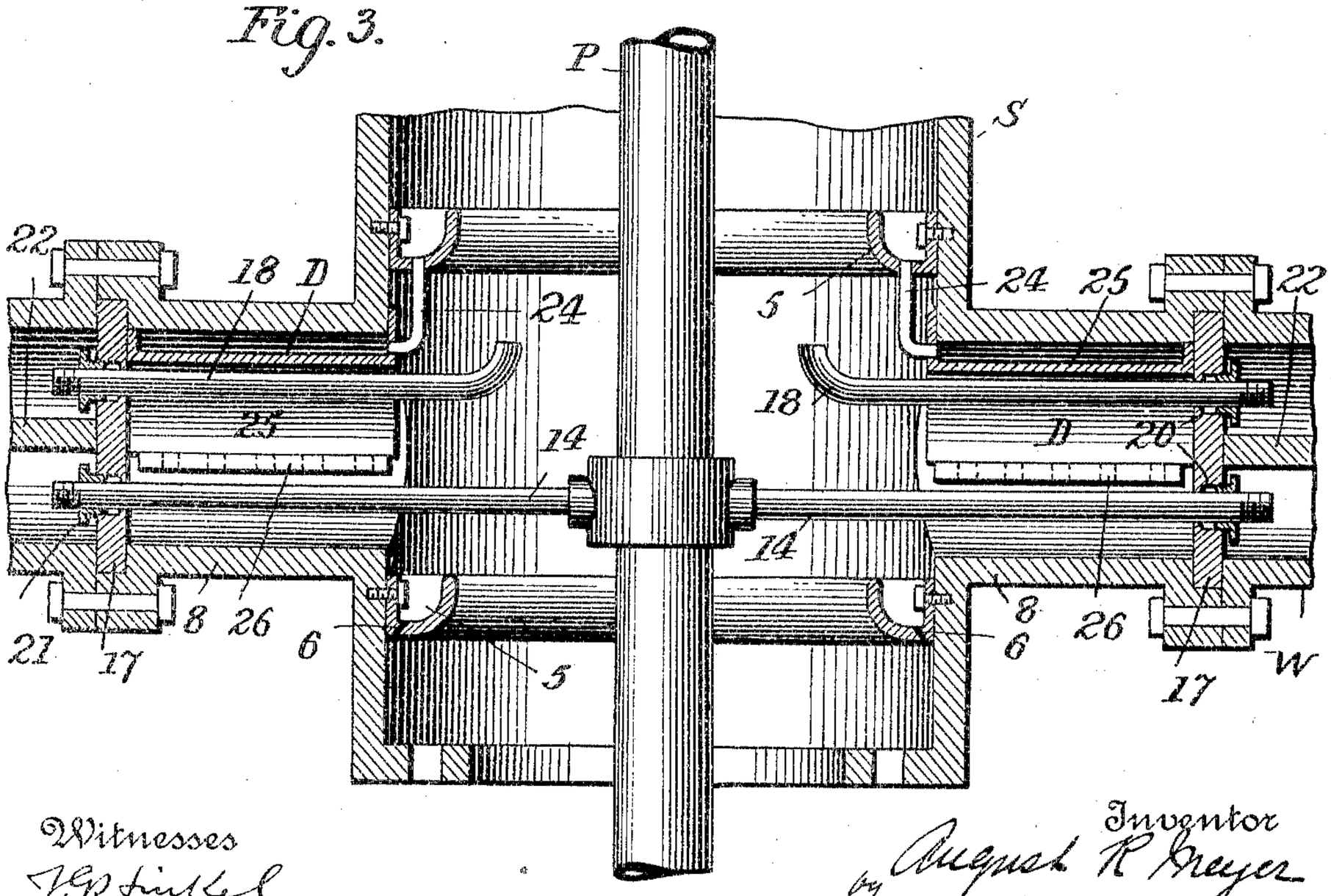


Fig. 3.



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3 SHEETS—SHEET 3.

Fig. 4.

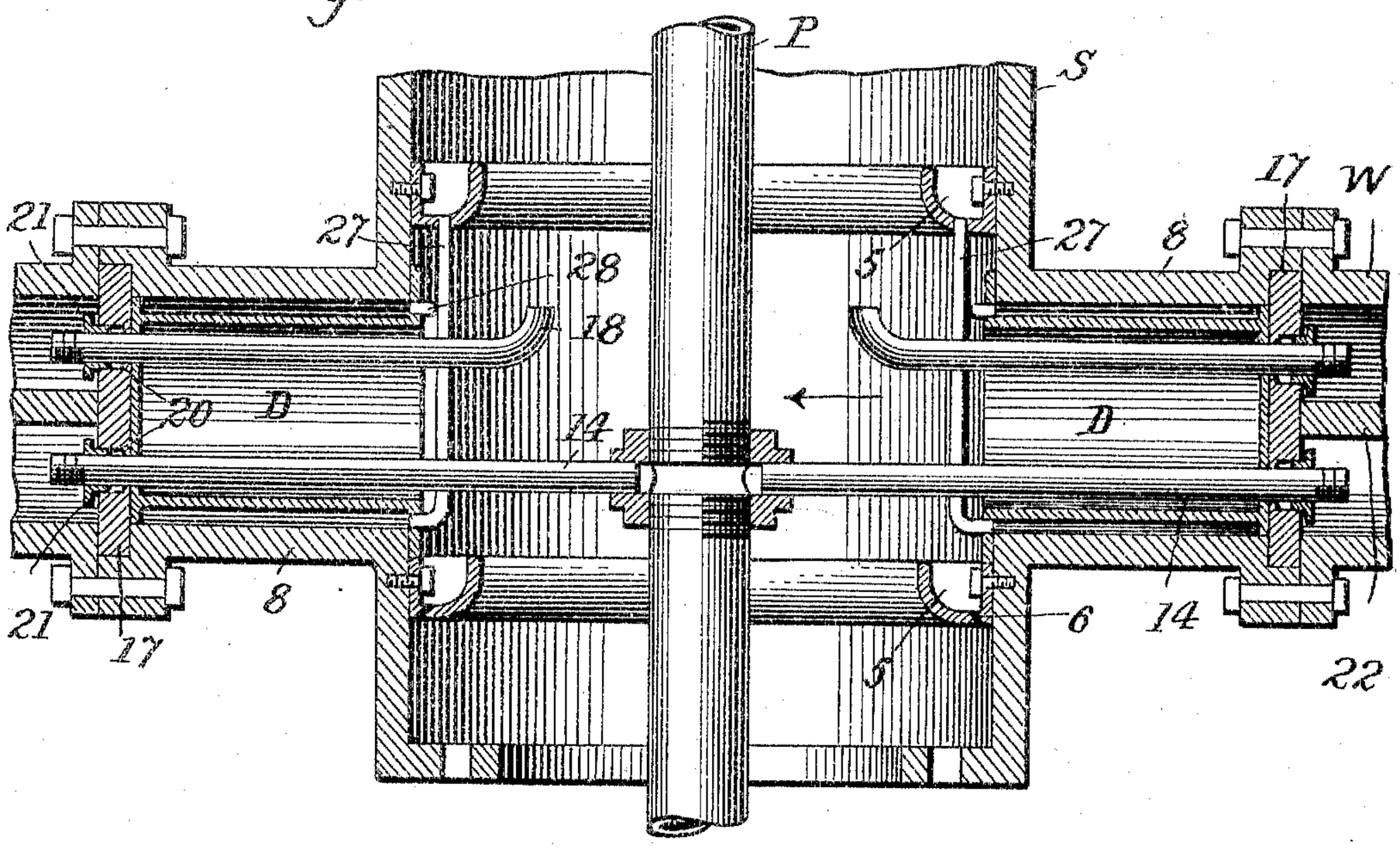


Fig. 5.

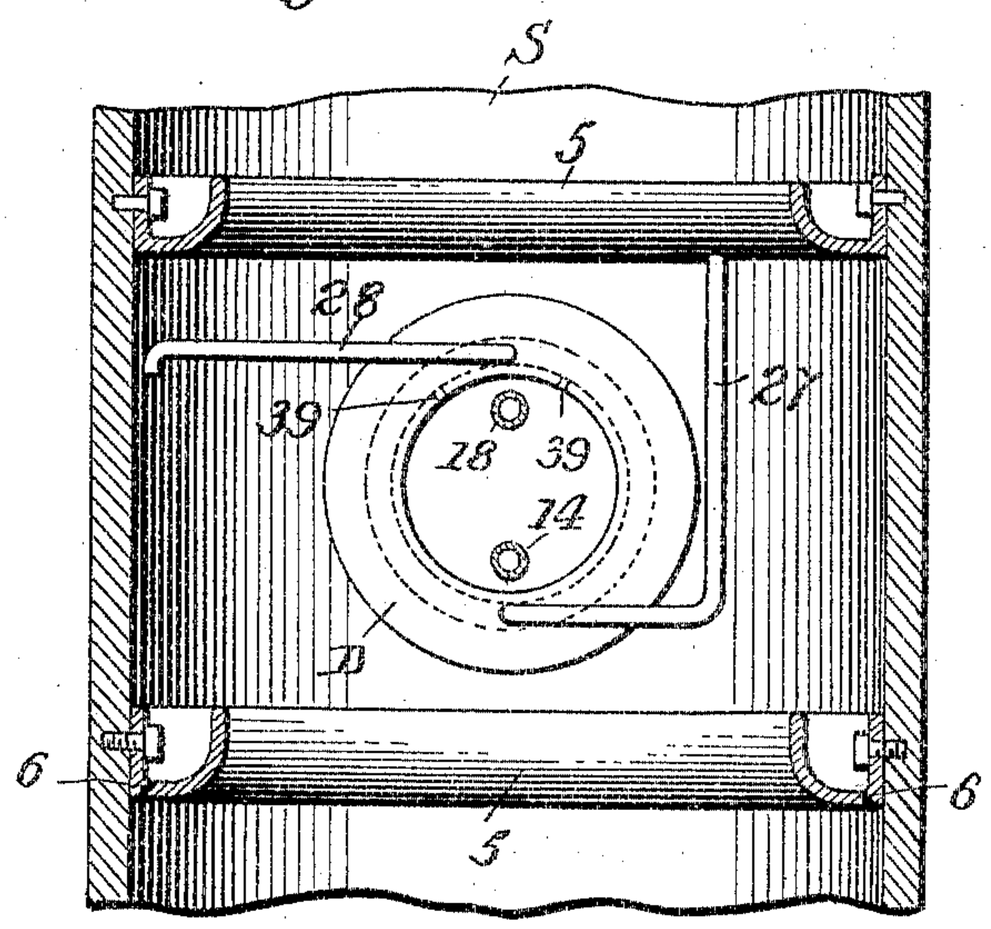
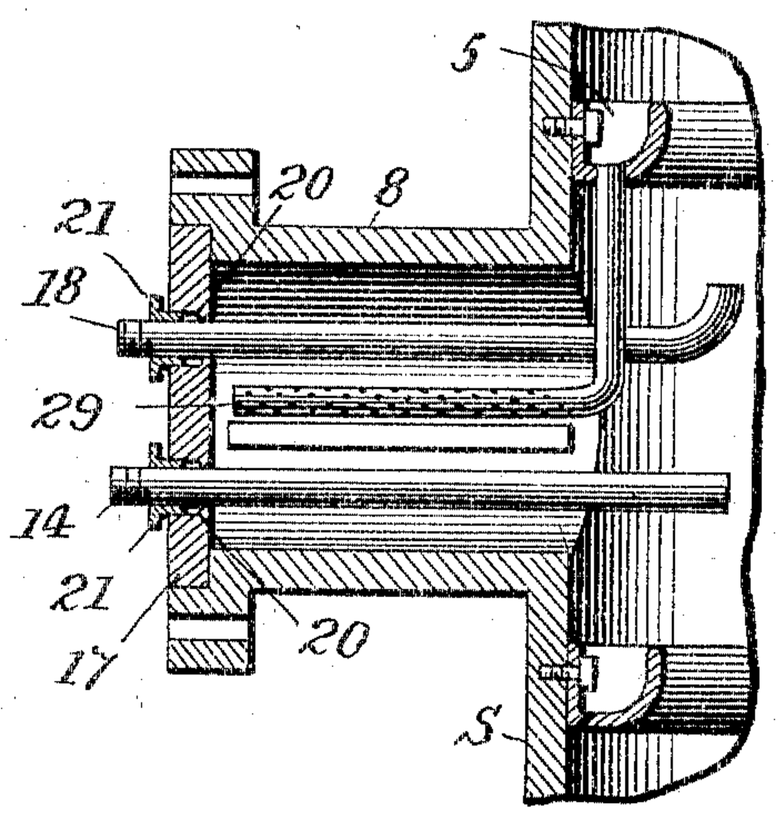


Fig. 6.



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No. 780,115. Patented January 17, 1905.

UNITED STATES PATENT OFFICE.

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

ROASTING-FURNACE.

SPECIFICATION forming part of Letters Patent No. 780,115, dated January 17, 1905.

Application filed March 17, 1904. Serial No. 198,645.

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 roasting-furnaces; and it consists in means whereby to maintain a comparatively low temperature within the shafts supporting the stirrer-arms of such furnaces and within said arms, as fully set forth hereinafter and as illustrated in the accompanying drawings, in which—

Figure 1 is an elevation, partly in section, of a roasting-furnace embodying my improvements; Fig. 2, an elevation, partly in section, on an enlarged scale, of the top portion of the shaft and arms; Fig. 3, a similar view of the lower portion of the shaft and arms; Fig. 4, a view similar to Fig. 3, showing a modification; Fig. 5, a sectional view looking in the direction of the arrow, Fig. 4; Fig. 6, a section through part of the shaft and one of the bosses, illustrating a modification; Fig. 7, a view like that in Fig. 5, showing another modification.

In the apparatus shown the walls of the furnace support platforms or hearths A and through openings in the same extends the hollow shaft S, carrying arms W, which extend over the hearths and are provided with stirrer-blades, and when the shaft is intended to rotate its lower end rests in a suitable step. As shown, the shaft is in connected sections. Near the lower end of the shaft are air-inlet openings 2, the shaft being open at the upper end or provided with ports through which the air can escape. The shaft thus arranged is of course subjected to the heat of the furnace, as also are the arms, and I therefore provide means whereby to prevent injury of the parts from such heat by the use of a suitable circulation of cooling fluid, and more especially by a cooling fluid consisting in part of air charged with moisture. To this end I provide means whereby water may be caused to flow downward along and over the inner face of the heated shaft S, which is thereby kept at the desired low temperature, and I provide for a circulation of air in such manner that the vapor rising from the heating of the water is carried by the air in contact with the shaft and with other parts exposed to heat.

Different means may be employed whereby to cause the desired flow of water down the inside of the shaft and for charging air-currents with moisture resulting from evaporation of the water. I will now describe those which are effective.

The water is introduced at the upper end of the shaft from a supply-pipe B and is discharged into a gutter or receptacle 5, which, as shown, is an annular gutter supported within the shaft near the top of the same. Water might flow over the edge of the gutter after filling the latter and follow the outer contour of the gutter and flow to the inner surface of the shaft. Preferably, however, I perforate the bottom of the gutter to make a series of channels or openings 6, inclined outward, so as to discharge the water from the gutter against the inner face of the shaft. Any number of these gutters may be arranged in succession at properly-disposed intervals within the shaft, so that the water will flow down the side of the shaft successively into and from the gutter in such volume as will maintain the shaft at the proper temperature, and this effect is increased by the upward flow of air charged with vapor resulting from the evaporation of the water. Any water which is not converted into vapor will flow into a gutter 7 near the lower end of the shaft and out through ports 9 to a gutter 10 or otherwise be conducted so as to discharge into a trough or receptacle 12, from which it may pass through any suitable overflow-pipe. It will be seen that by thus passing a stream of water down the inside of the heated shaft S the latter may be kept at a low temperature by the use of a comparatively small body of water, the effect being increased by permitting air to flow

upward through the shaft, so as to become charged with the vapor resulting from evaporation of the water, and it will further be seen that the gutters arranged at intervals tend to hold limited bodies of water along the line of the shaft and still further prevent undue heating, and by regulating the flow of water—as, for instance, by a cock 13 in the pipe B—this temperature may be regulated as required.

The above means of preventing overheating of the shaft and of supplying moisture to an air-current may be employed in connection with different arrangements of arms and different means of preventing the overheating of said arms; but I have shown it in connection with hollow arms into which a current of air alone or air charged with vapor may be passed from branches 14, extending from a supply-pipe P, arranged centrally within the shaft S, any suitable means being employed for introducing the cooling fluid into the said pipe P. For instance, the pipe P may be coupled at the upper end to a supply-pipe 16.

The arms W are shown as bolted to hollow bosses 8, projecting from the shaft S, and preferably each arm is closed at its inner end. As shown, the communication between the interior of each arm and the interior of the shaft S is closed by a plate 17, fitted to a recess in the boss 8, so that the end of the arm bears against the plate and holds it in the recess, and the inlet-pipe 14 extends through an opening in the plate, and a discharge-pipe 18 extends through another opening in the plate inward toward the pipe P, and to prevent leakage the plate 17 may be recessed to form packing-boxes 20, in which the packing is compressed by followers 21, this arrangement securing tight joints, while in case of the breaking of an arm it permits the latter to be detached and the plate 17 to be moved without displacing the branch pipes 14. Preferably in order to secure a better cooling effect each arm has a partition 22, with a port or passage near the outer end, so that the cooling fluid may pass to the arm below the partition from the pipe 14 outward and then back above the partition through the pipe 18 to the interior of the shaft S, where, owing to its heated state, it will flow rapidly upward, being reduced in temperature as it absorbs moisture from the evaporated water and also aiding in heating and evaporating the latter. This further tends to reduce the temperature within the shaft and prevent the pipe P and its contents from being overheated. In order to avoid the overheating of the necks or bosses, I provide means for discharging some of the water which flows downward around the inner part of said bosses. Any suitable means may be employed for thus discharging a portion of the water into such bosses; but, as shown, I arrange a box D inside of each boss 8, and supply the box with water by a branch 24 from the gutter above and discharge the water from the lower edges of said box into the boss. In the construction shown in Fig. 3 each box is formed by a semicircular flanged shell 25, resting at its lower edge upon a perforated rib 26, the openings in which are arranged to discharge the water. In the construction shown in Figs. 4 and 5 the shell is cylindrical, and a branch 27 conducts the water from the gutter above to the lower part of the box, and a branch 28 permits its discharge into the gutter below. In the construction shown in Fig. 6 a pipe 29 is carried from the gutter and is extended along the middle of the bosses and perforated, so that the water will be projected against the inner surface of the bosses. Whichever arrangement be employed the flow of water will greatly reduce the temperature of the bosses and insure that the arms are prevented from becoming overheated. By placing the closing-plates 17 in a position to close the communication between the arms and the shaft S the breaking of an arm will not result in opening this communication except to the limited extent permitted by the pipe 18, and to enable this communication to be readily closed and also in such case to close communication with the pipe 14 I provide means for plugging up the ends of these pipes by threading them to receive caps or plugs. It will also be seen that the removal of the plate 17 affords ready access to the pipe P for the purpose of sealing any joints if there should be any leakage.

Without limiting myself to the construction shown, I claim—

1. A furnace having hearths and a shaft or pipe with stirrer-arms extending over the hearths combined with a water-supply pipe at the top of said shaft, and conduits arranged to direct water from said pipe downward along the inner face of the shaft, substantially as set forth.

2. The combination with the hollow shaft S, its stirrer-arms and water-supply pipe, of a series of gutters at intervals within the pipe to successively receive and discharge the water, substantially as set forth.

3. The combination with the hollow shaft S, its stirrer-arms and water-supply pipe, of a series of perforated gutters at intervals within the pipe to successively receive and discharge the water, substantially as set forth.

4. A furnace having hearths and a shaft or pipe with hollow stirrer-arms extending over the hearths combined with a water-supply pipe at the top of said shaft, conduits arranged to direct water from said pipe downward along the inner face of the shaft, and a fluid-supply pipe within the shaft provided with branches extending into said arms, substantially as set forth.

5. The combination of the hollow shaft having hollow stirring-arms, plates closing the communication between the arms and the

shaft, and means for admitting a cooling fluid to and discharging it from the arms, substantially as set forth.

6. The combination of the hollow shaft having hollow stirring-arms, plates closing the communication between the arms and the shaft, and inlet and outlet pipes extending through said plates, substantially as set forth.

7. The combination of the hollow shaft having hollow stirring-arms, plates closing the communication between the arms and the shaft, and inlet and outlet pipes extending through packing-boxes in said plates, substantially as set forth.

8. The combination of the hollow shaft having hollow stirring-arms, plates closing the communication between the arms and the shaft, and inlet and outlet pipes extending through said plates, the inlet-pipes in communication with a supply-pipe within the shaft, substantially as set forth.

9. The combination with the hollow shaft S, of stirrer-arms closed at the inner ends and with horizontal partitions with ports near the outer ends, and means for admitting cooling fluid to the arms below the said partitions and for discharging it from above the partitions, substantially as set forth.

10. The combination with the hollow shaft S, of stirrer-arms closed at the inner ends and with horizontal partitions with ports near the outer ends, a supply-pipe within the shaft, branches extending therefrom to carry a cooling fluid to the arms below the partitions, and outlet-pipes from the arms above the partitions, substantially as set forth.

11. The combination with the hollow shaft S, of stirrer-arms closed at the inner ends and with horizontal partitions with ports near the outer ends, bosses on the shaft, a supply-pipe within the shaft, branches extending therefrom to carry a cooling fluid to the arms below the partitions, and means for directing water along the inner face of the shaft and into the bosses, substantially as set forth.

12. The combination of the hollow shaft, its stirrer-arms, closed at the inner ends and with horizontal partitions and ports, a supply-pipe within the shaft, branches extending therefrom to the arms below the partitions, outlet-pipes 18, boxes D with discharge-openings, and means for supplying water to said boxes, substantially as set forth.

13. The combination of the hollow shaft, its stirrer-arms, closed at the inner ends and with horizontal partitions and ports, a supply-pipe within the shaft, branches extending therefrom to the arms below the partitions, outlet-pipes 18, boxes D with discharge-openings, gutters at intervals in the shaft, and tubes extending from the gutters to said boxes, substantially as set forth.

14. The combination with the shaft S having hollow bosses, of hollow arms fitted detachably to said bosses, plates confined between the arms and bosses and closing the inner ends of the arms, and means for supplying cooling fluid to and conducting it from the arms through the closing-plates, substantially as set forth.

15. The combination with the shaft S having hollow bosses, of hollow arms fitted detachably to said bosses, plates confined between the arms and bosses and closing the inner ends of the arms, packing-boxes supported by said plates, and inlet and outlet pipes extending through said boxes, substantially as set forth.

16. The combination of the hollow shaft S having recessed bosses, closing-plates fitted to said recesses, hollow arms secured to the bosses and confining said plates, and means for conducting a cooling fluid to and from the arms through said plates, substantially as set forth.

17. The combination of the shaft S with air-inlets at the bottom and outlets at the upper end, and means for passing water downward along the inside of said shaft, substantially as set forth.

18. The combination of the shaft S with air-inlets at the bottom and outlets at the upper end, means for passing water downward along the inside of said shaft, and means adjacent to the bottom of the shaft for conducting the water from the inside to the outside thereof, substantially as set forth.

19. The combination of the shaft S with air-inlets at the bottom and outlets at the upper end, means for passing water downward along the inside of said shaft, a gutter adjacent to the bottom of the shaft, openings communicating therewith, a tank arranged outside the shaft, and means for conducting water from the openings to the tank, 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.