

No. 821,500.

PATENTED MAY 22, 1906.

A. E. JOHNSON.
WATER COOLED GRATE.
APPLICATION FILED DEC. 2, 1904.

2 SHEETS—SHEET 1.

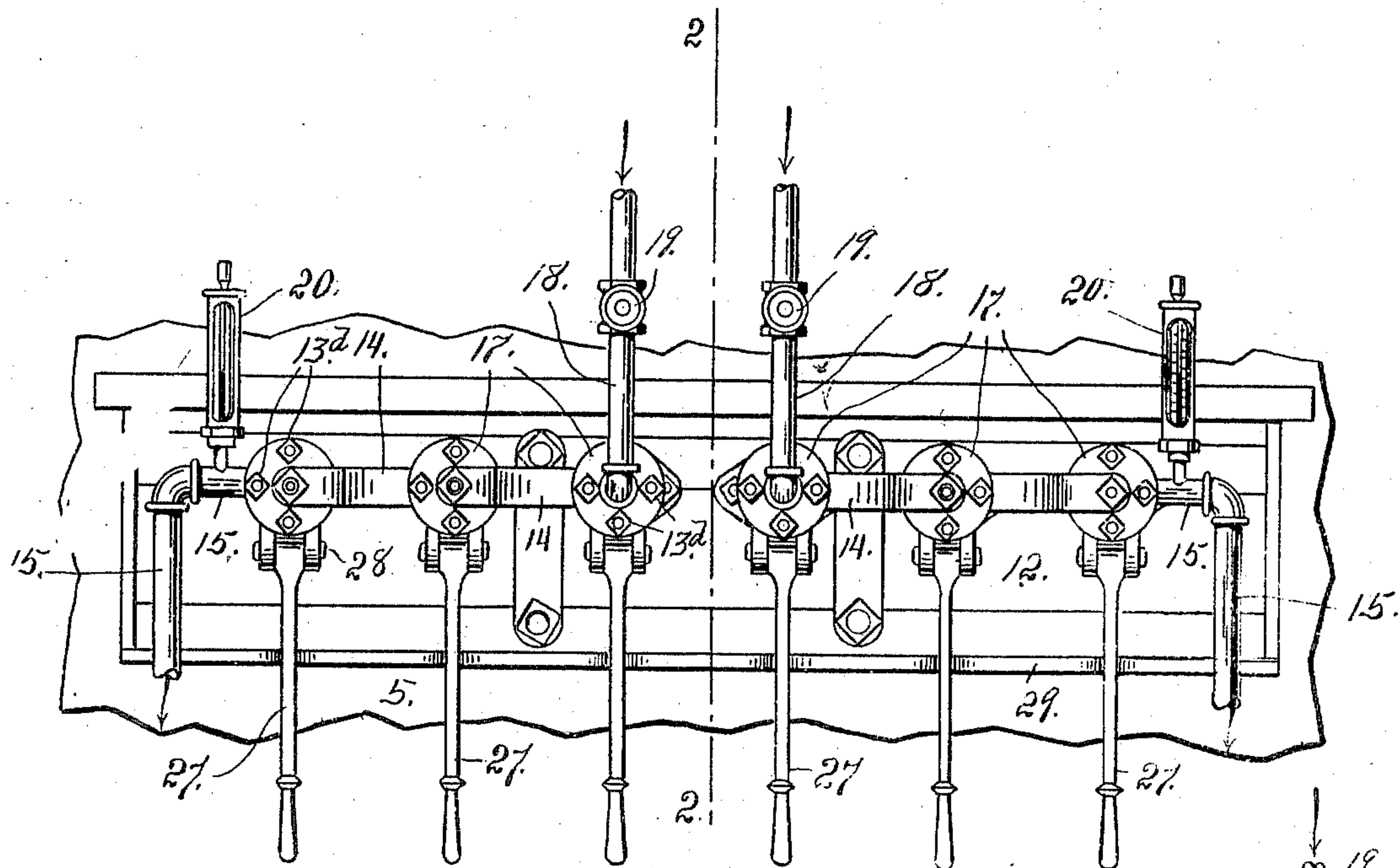


Fig. 1.

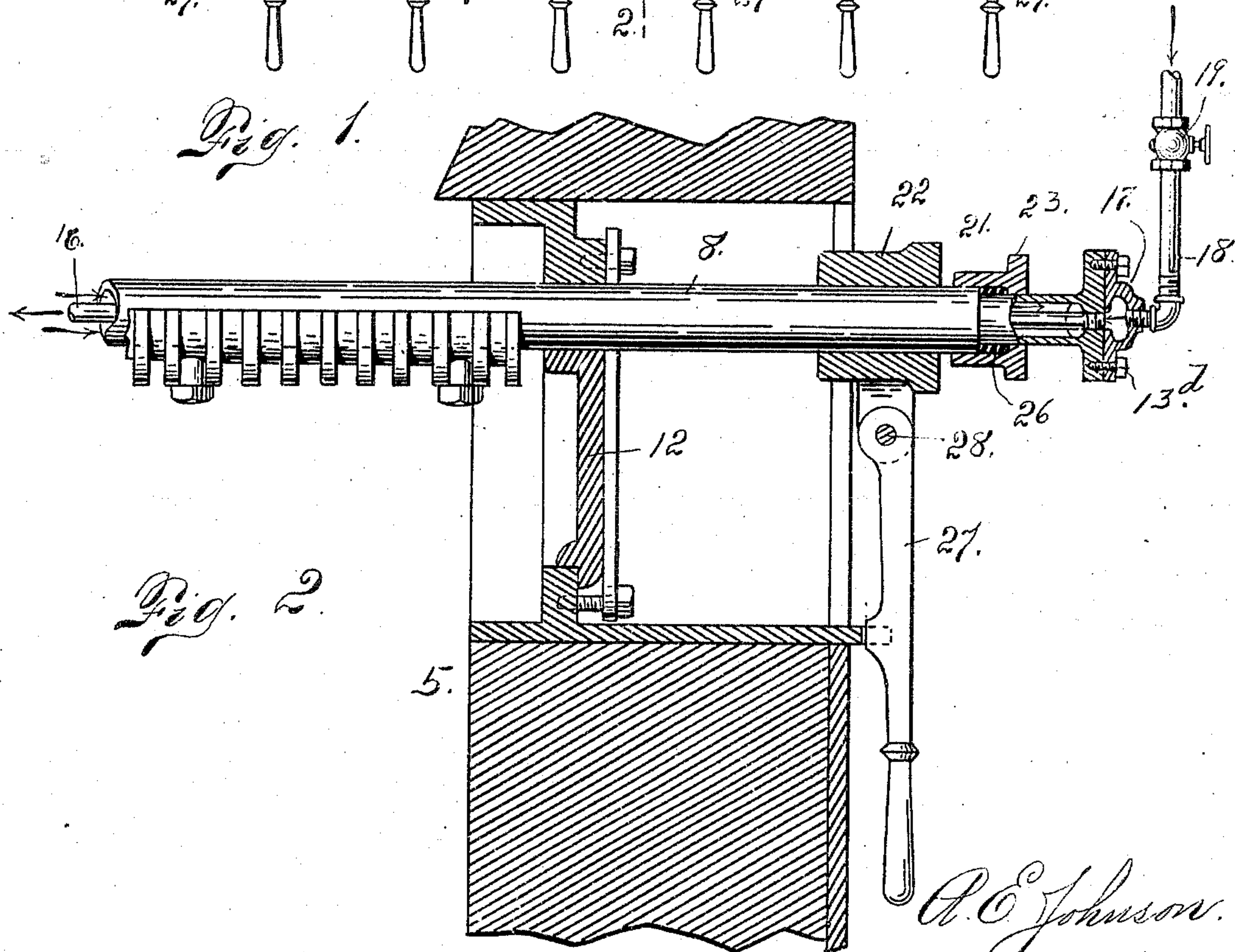


Fig. 2.

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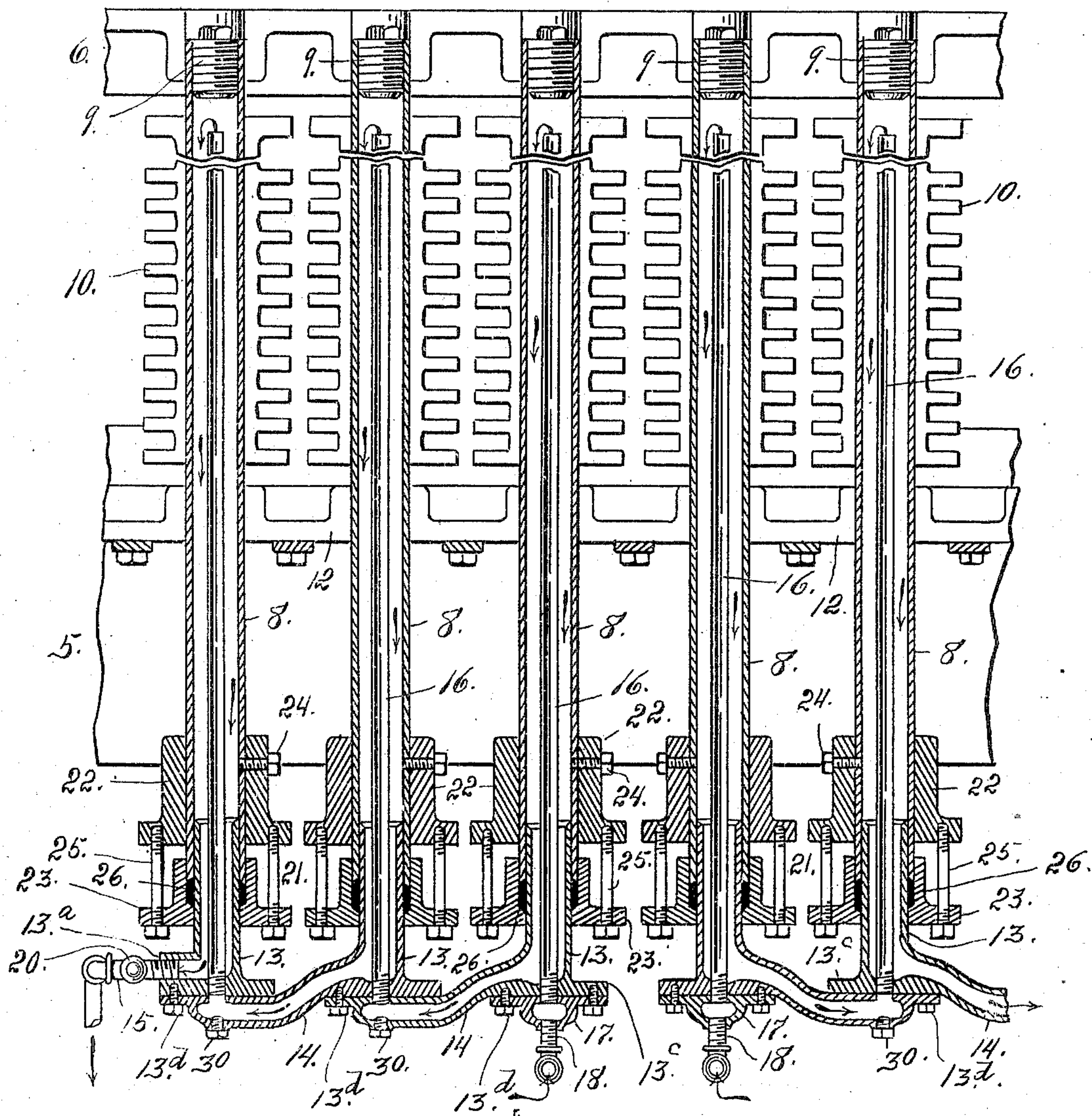


Fig. 3.

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UNITED STATES PATENT OFFICE.

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WATER-COOLED GRATE.

No. 821,500.

Specification of Letters Patent.

Patented May 22, 1906.

Application filed December 2, 1904. Serial No. 235 254.

To all whom it may concern:

Be it known that I, ALFRED E. JOHNSON, a citizen of the United States, residing in the city and county of Denver and State of Colorado, have invented certain new and useful Improvements in Water-Cooled Grates; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in water-cooled grates of the class set forth in Patent No. 778,749, issued to me December 27, 1904.

In my present invention I provide means for introducing cooling-water or other fluid preferably to the two centrally-located bars of the grate and forming such a connection between these bars and the other bars that the cooling-water flows from the central bars into and through the hollow bars on each side, whereby there are but two discharges of water from the entire grate, the arrangement being such that the discharged water may be carried upwardly, cooled, and reused. This is the chief distinction between the grate covered by the aforesaid patent and my present construction, since in the construction of the patent there is an individual discharge from each of the grate-bars. Inasmuch as the discharged water is not exposed as it leaves the grate-bars, in order that its temperature may be ascertained I provide a thermometer or suitable temperature-indicating device at each side of the grate, the said device being connected with the conduits, leaving the outer bars on opposite sides. In this way the thermometer will indicate the temperature of the water, and thus indicate the condition of the material on the grate.

Having briefly outlined my improved construction, as well as the function it is intended to perform, I will proceed to describe the same in detail, reference being made to the accompanying drawings, in which is illustrated an embodiment thereof.

In the drawings, Figure 1 is a fragmentary front view of a furnace equipped with my im-

proved construction of grate. Fig. 2 is a fragmentary section taken through the same, showing one of the grate-bars in place. Fig. 3 is a horizontal section taken through a number of the grate-bars.

The same reference characters indicate the same parts in all the views.

Let the numeral 5 designate the front wall, and 6 the rear wall, of the fire-box or fuel-receptacle of a furnace or other apparatus where it is desirable to have a water-cooled grate. In the front and rear walls of this fire-box, which walls may be of any suitable construction, is mounted a number of hollow revoluble bars 8, whose rear extremities are closed by screw-plugs 9. These hollow grate-bars are provided with fuel-supporting devices 10, having fingers projecting in opposite directions for the purpose of supporting the fuel upon the grate and for the further purpose of breaking up the clinkers as the grate-bars are agitated. These grate-bars protrude from the forward supporting-plates 12 in front, and into these forward ends are inserted short pipes 13, provided with laterally-extending branches 14, which lead to the adjacent hollow grate-bars to allow the water to circulate from one bar to the other. The outer extremity of each branch 14 is secured to the adjacent end of the pipe 13 of the next bar, and so on until the extreme bar on each side is reached, where the short pipe 13 is provided with a short lateral extension 13^a, communicating with a conduit 15, through which the water may be carried by means of suitable pressure to any desired elevation in order to reuse it for cooling the grate or other purposes.

Passing through each short pipe 13 and extending inwardly nearly to the rear extremity of each hollow grate-bar 8 is an open-ended pipe 16. The outer extremity of each pipe 16 communicates with the outer extremity of a lateral branch or extension 14 of the pipes 13 except in the case of the pipes 13, where the water is originally introduced to the grate. In this case the outer extremity of the pipe 16 enters a hollow plate 17, into which the cooling-water is discharged from a downwardly-extending pipe 18, controlled by a valve 19. The pipes 18 for introducing water to the grate may lead from the receptacle (not shown) located any desired dis-

tance above to which the discharge-pipes 15 lead or from an original water-source, as may be desired. To each branch pipe 15 is attached a thermometer 20 for indicating the temperature of the cooling-water as it leaves the grate.

Attention is called to the fact that each hollow plate 17 is secured to the head or flange extremity 13^c of the pipe 13 by means of bolts 13^d. To each hollow grate-bar 8 is secured a stuffing-box 21, composed of two members 22 and 23. The member 22 is secured to the hollow grate-bar by a bolt 24, while the members 22 and 23 are connected by bolts 25. The members 22 and 23 surround the outer extremity of the hollow grate-bar 8. A suitable packing material 26 is interposed between the outer extremity of the hollow grate-bar and the member 23, said packing material surrounding the short pipe 13 in order to make a water-tight joint.

To the member 22 of each stuffing-box is pivotally connected, as shown at 28, an operating-lever 27, which normally engages a recess formed in a rack-plate 29. When it is desired to shake any grate-bar, the operating-lever is pulled outwardly from engagement with the rack, when the grate-bar may be rotated for the purpose of breaking up the clinkers or freeing the ash on the grate or for both purposes, according to the necessities of the case.

From the foregoing description the use and operation of my improved grate will be readily understood. All that is necessary in the use of the grate is to turn on a suitable quantity of water by opening the valves 19 of the supply-pipes 18, whereby the water enters the two centrally-located pipes of the grate and passes therefrom to the other pipes in succession in opposite directions and finally escapes through the outlet-pipes 15, as heretofore explained. The thermometers will indicate the temperature of the water, and therefore to some extent the condition of the material on the grate.

Attention is called to the fact that I do not limit the invention to the exact construction shown in the drawings; but that illustrated is deemed thoroughly practicable. Of course the number of pipes to which the water is delivered may be varied according to the size of the grate, and consequently the number of hollow bars with which it is provided. It is also evident that the water may be originally introduced to a single centrally-located bar and the said bar connected with the bars on both sides, whereby the water may be made to flow in both directions from the single centrally-located bar.

The lateral extensions of the pipes 13 are provided with openings normally closed by screw-plugs 30. These openings are located directly opposite the open extremities of the pipes 16, and the screw-plugs may be re-

moved in order to give access to the pipes 16 when for any purpose such access may be necessary, as in case a pipe 16 should become clogged up or stopped.

Having thus described my invention, what I claim is—

1. A grate composed of hollow revoluble bars, long open-ended stationary water-pipes located within the bars, means for introducing water to one of the said pipes, and short stationary pipes each entering the extremity of a hollow grate-bar at one end of the grate and surrounding the corresponding extremity of the water-pipe therein, the said short pipes having lateral extensions, each long water-pipe after the one through which the water enters the grate, communicating at one end with the corresponding lateral extension of one of said short pipes, and at its other end with the interior of the grate-bar.

2. A grate composed of a number of hollow revoluble bars, long open-ended water-pipes within the bars and protruding from their extremities at one end of the grate, short stationary pipes each entering the end of a grate-bar at one end of the grate and surrounding the extremity of the water-pipe therein, and means for introducing water to one of the pipes within the hollow bars, the short pipes having lateral extensions, each long water-pipe after the one through which the water enters the grate, communicating at one end with the adjacent lateral extension of one of said short pipes, and at its other end with the interior of the grate-bar.

3. A grate composed of a number of hollow revoluble bars, long open-ended water-pipes located within the bars and protruding therefrom at one end of the grate, short stationary pipes each entering the extremity of a grate-bar at one end of the grate, surrounding the protruding extremity of the water-pipe therein and communicating with the grate-bar, means for forming a water-tight joint between the short pipes and the hollow revoluble bars, the short pipes having lateral extensions, each long water-pipe after the one through which the water enters the grate, communicating at one end with the adjacent lateral extension of one of said short pipes, and at its other end with the interior of the grate-bar.

4. A grate-bar composed of a number of hollow revoluble bars, short stationary pipes entering the forward extremities of the respective bars and communicating with the latter, long open-ended pipes located in the hollow bars, and means for delivering cooling fluid to the forward extremity of one of the pipes within the bars under sufficient pressure to cause the fluid to flow through a number of open-ended pipes in succession and back through the hollow bars, the short stationary pipes having lateral extensions, each long open-ended pipe after the one through

which the water enters the grate, communicating at one end with the adjacent lateral extension of one of said short pipes, and at its other end with the interior of the grate-bar.

5. A grate composed of a number of hollow revoluble bars, short stationary pipes entering the forward extremities of the bars and communicating therewith, the short pipes having lateral extensions, long pipes located within the hollow bars, and means for delivering a cooling fluid to one of the pipes within the hollow bars under sufficient pressure to cause the fluid to circulate through the bars, each long pipe within a hollow bar after the one through which the fluid enters the grate, communicating at one end with the adjacent lateral extension of one of said short pipes, and at its other end with the interior of the grate-bar.

6. A grate composed of a number of hollow revoluble bars, short stationary pipes each entering the forward extremity of a bar and communicating therewith, the short pipes being provided with protruding lateral extensions, long open-ended water-pipes located within the hollow bars, and means for delivering water under pressure to one or more of the water-pipes within the hollow bars, each long water-pipe after the one through which the water enters the grate, communicating at one end with the adjacent lateral extension of one of said short pipes and at its other end with the interior of the grate-bar.

7. A grate composed of a number of hollow revoluble bars, short stationary pipes each entering the forward extremity of a bar and communicating therewith, the short pipes being provided with protruding lateral extensions, long open-ended pipes located within the hollow bars, means for introducing water to one of the long open-ended pipes under such pressure that the water is made to travel through the grate-bars, each long water-pipe after the one through which the water enters the grate, communicating at one end with the adjacent lateral extension of one of said short pipes, and at its other end with the interior of the grate-bar.

8. A grate composed of hollow revoluble bars, long stationary water-pipes located within the bars and protruding therefrom at one end of the grate, short stationary pipes each entering a grate-bar at one end of the grate and surrounding the protruding extremity of the water-pipe therein, the outer extremity of each short pipe being expanded to form a plate, the short pipes having lateral extensions connected with the plates of the adjacent short pipes, the said plates having openings to allow the lateral extensions to communicate with the long water-pipes of

the grate-bars, the short pipes communicating with the grate-bars which they enter, each long water-pipe after the one through which the water enters the grate, communicating at one end with the adjacent lateral extension of one of said short pipes and at its other end with the interior of the grate-bar.

9. A grate composed of a number of hollow revoluble bars, long water-pipes located within the grate-bars, their forward extremities protruding from the grate-bars, short stationary pipes each entering the forward extremity of a grate-bar, surrounding the protruding extremity of the long water-pipe therein, and communicating with the grate-bar, the short pipes having plates at their forward extremities, the short pipes being also provided with lateral extensions connected with the plates of adjacent short pipes except where the water is originally introduced, the plates of the last-named pipes having openings forming a communication between the lateral extensions of the short pipes and the forward extremities of the long water-pipes within the hollow bars, the extensions of the short pipes having closable openings in line with openings of the plates with which they are connected, and a number of supply-pipes for introducing water to a corresponding number of the water-pipes within the hollow bars, hollow plates attached to the plates of the stationary pipes and surrounding the long water-pipes where the water is introduced, the supply-pipes being connected with the hollow plates, each long water-pipe after the one through which the water enters the grate, communicating at one end with the adjacent lateral extension of one of said short pipes and at its other end with the interior of the grate-bar.

10. A grate composed of a number of sets or series of hollow grate-bars, a long open-ended fluid-pipe extending into each bar of the grate, means for introducing cooling fluid to one pipe of each series of grate-bars, short pipes each entering a hollow grate-bar at one end of the grate and surrounding the corresponding extremity of the fluid-pipe therein, each long fluid-pipe of each set or series of hollow bars after the one through which the water enters the grate, communicating at one end with the adjacent lateral extension of one of said short pipes of the same set or series of grate-bars and at its other end with the interior of the grate-bar.

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

ALFRED E. JOHNSON.

Witnesses:

DENA NELSON,
IDA E. O'BRIEN.