

No. 685,444.

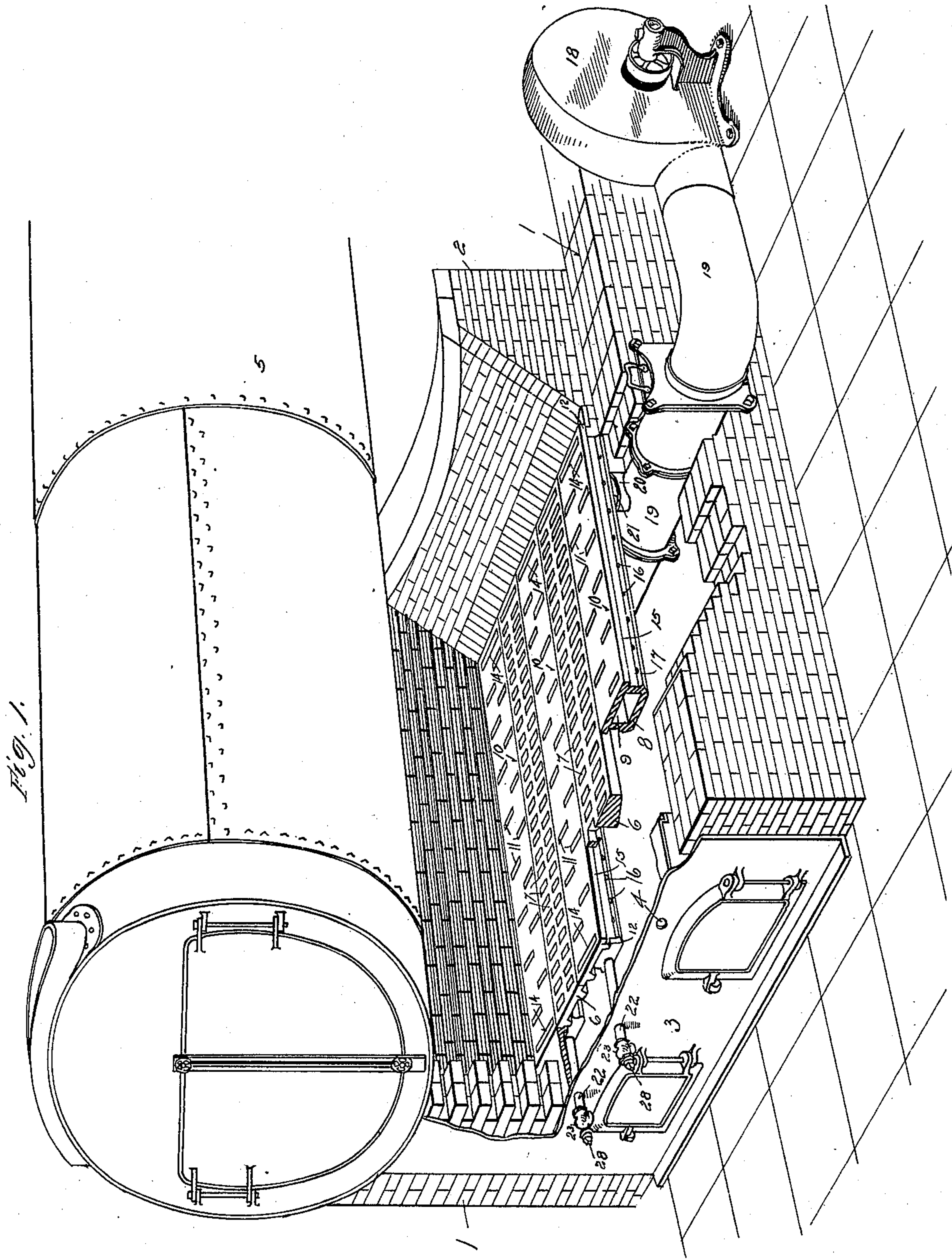
Patented Oct. 29, 1901.

J. F. CASEY.  
GRATE.

(Application filed Nov. 12, 1900.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES:

J. C. Navoley  
J. H. Schaffer.

INVENTOR.

James F. Casey  
BY R. A. Graham  
ATTORNEY.

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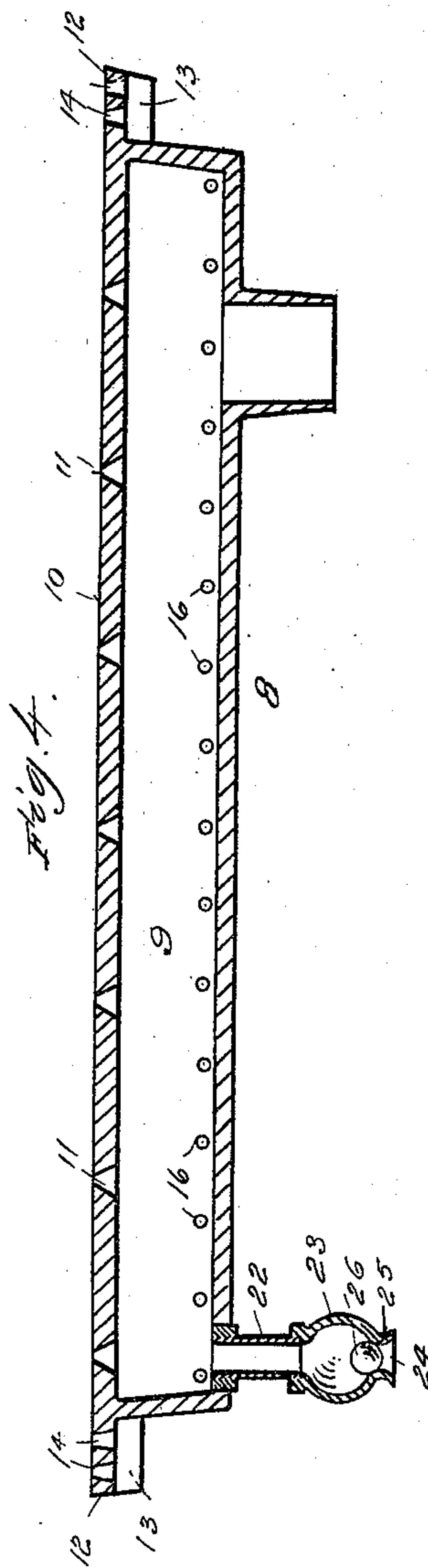
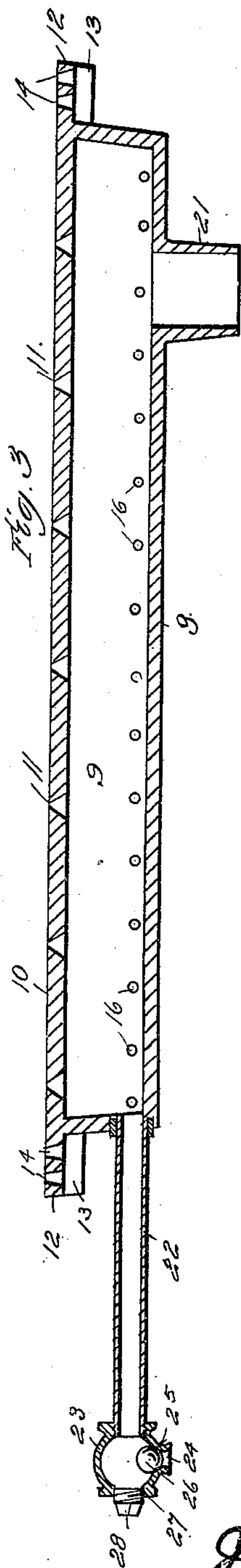
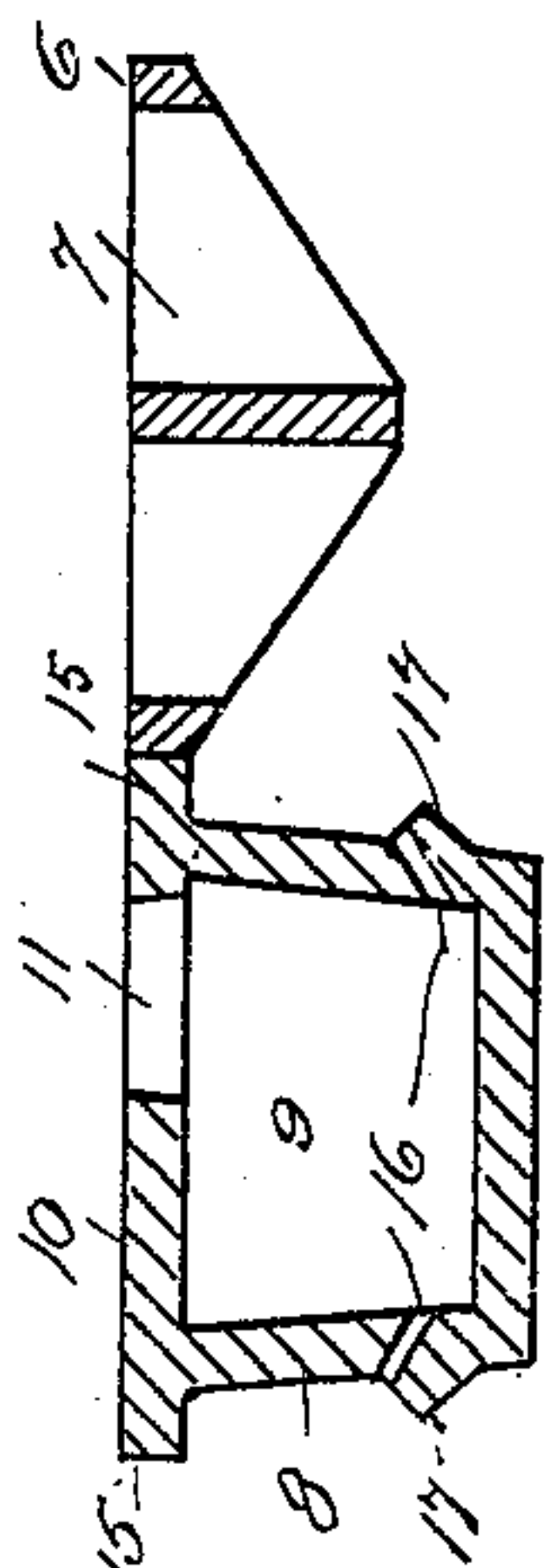
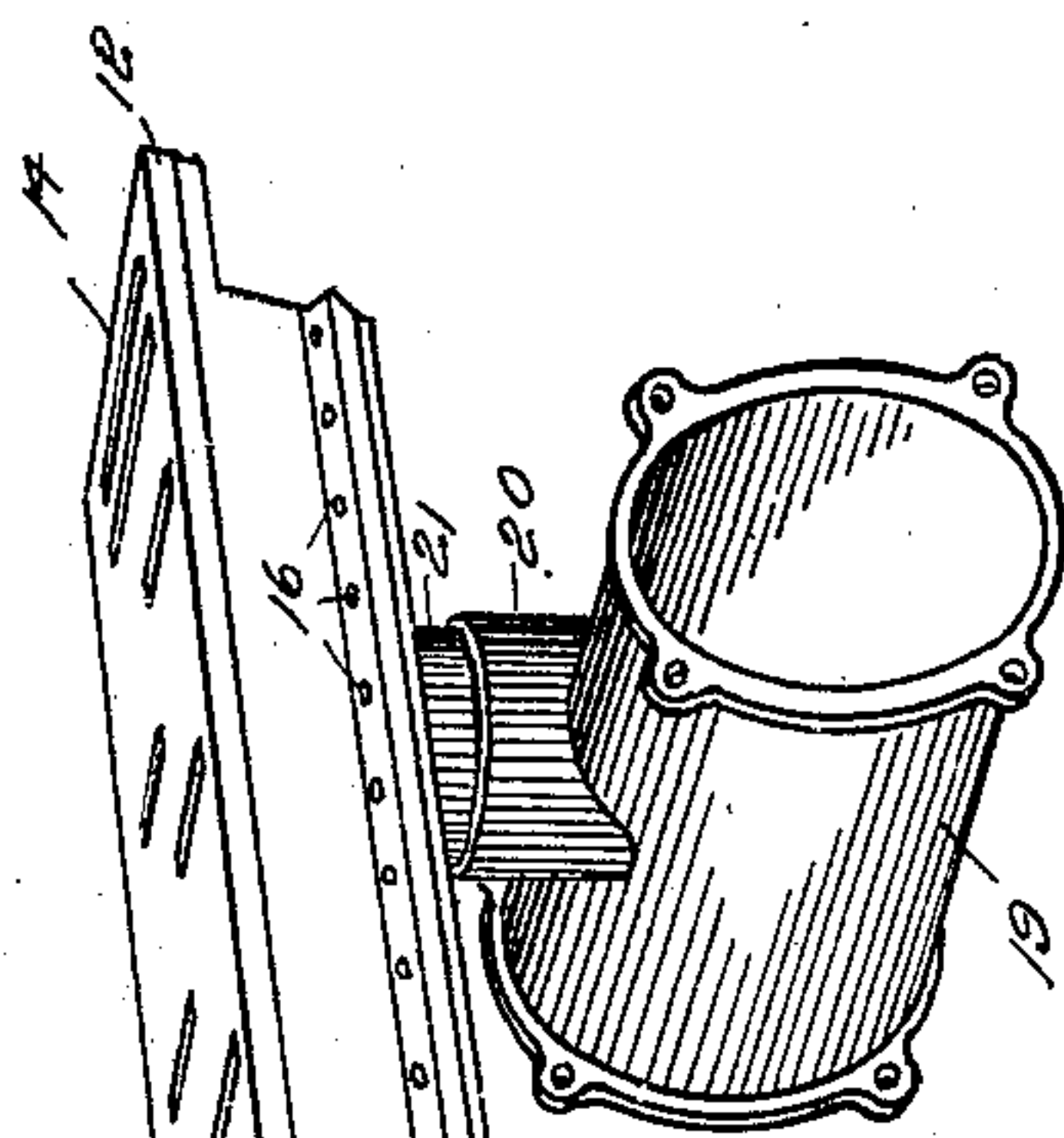
J. F. CASEY.

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(No Model.)

2 Sheets—Sheet 2.



WITNESSES:  
J. C. Dawley.

H. H. Schaefer.

INVENTOR

James F. Casey.

By H. H. Schaefer

ATTORNEY.



# UNITED STATES PATENT OFFICE.

JAMES F. CASEY, OF CHATTANOOGA, TENNESSEE.

## GRATE.

SPECIFICATION forming part of Letters Patent No. 685,444, dated October 29, 1901.

Application filed November 12, 1900. Serial No. 36,197. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES F. CASEY, a citizen of the United States, residing at Chattanooga, in the county of Hamilton and State of Tennessee, have invented certain new and useful Improvements in Grates, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to grates for furnaces—such, for instance, as boiler-furnaces—and has for its object to provide a structure such that satisfactory combustion may be obtained with inferior fuel.

To this end the invention consists in certain novel features, which I will now proceed to describe and will then particularly point out in the claims.

In the accompanying drawings, Figure 1 is a perspective view, partly in section, of a structure embodying my invention in one form. Fig. 2 is a perspective view of one of the grate-bars and its associated parts detached. Fig. 3 is a longitudinal sectional view of the same. Fig. 4 is a similar view of a modified form of bar, and Fig. 5 is a transverse sectional view of two of the bars.

In the said drawings, 1 indicates the inclosing wall of the furnace, and 2 the bridge-walls, which walls may be of any approved construction.

3 indicates the iron front plate of the furnace, which is preferably provided with apertures 4 for the purpose hereinafter set forth. A boiler is indicated at 5.

The grate, which extends from wall to wall of the furnace, is composed of two kinds of bars alternately arranged. One set or kind of bars, which may be termed "ordinary" or "draft" bars, are indicated at 6 and may be of any approved construction, provided they have apertures extending through them from top to bottom. I prefer the form of bar shown, having a flat top, a body of increased thickness at the middle, and apertures 7 extending vertically through the body of the bar at each side of the central portion thereof. The other set or kind of bars are indicated at 8, and comprise a hollow body having an air-space 9 in its interior. The top of the bar is flat, as indicated at 10, and there are formed through said top apertures 11, extending and communicating with the air-space 9. These

apertures are preferably made wider at their bottom than at their top, so as to prevent clogging in case fuel or ashes enter the same. They are preferably of less length than the width of the bar and are preferably arranged or located alternately on opposite sides of the central line of the bar, as shown. At each end the bar is provided with a flange or extension 12, recessed on its under side, as indicated at 13, and said flanges or extensions are provided with vertical apertures 14. These flanges serve to secure the bar to the walls of the furnace, and the recesses 13 and apertures 14 permit the passage of air through these portions of the grate. The bars 8 are further provided with lateral flanges 15 at each side of the top, their upper surfaces being flush with said top, and said flanges being adapted to abut and fit against the sides of the bars 6.

In the lower portion of the bars 8, along each side thereof, there are formed a plurality of apertures 16, extending from the air-space 9 in an upward and outward direction, so as to direct the air-currents toward the adjacent apertures 7 of the bars 6 from below said bars. As an aid to the formation of the apertures 16 and to better direct the blast I prefer to provide along each side of the body a rib 17, having its upper surface inclined to the body of the bar and at right angles to the apertures 16, which emerge and terminate at said upper surface.

Air is supplied to the interior of the hollow pipe by a suitable blower 18, having a pipe 19, preferably constructed in separable sections, as shown, and provided with upwardly-extending branch pipes 20, which receive downwardly-extending nipples 21 on the under side of the hollow bars.

Each of the hollow bars is provided at its front end with a test-pipe 22, by means of which the condition of the air-pressure within the grate-bar may be readily ascertained. In the preferred form of construction the pipe 22 is horizontal, extending outward from the front end of the bar through the furnace-wall and through the front plate 3, which is provided with apertures 4 for this purpose. The inner end is secured in the bar in any suitable manner and is preferably arranged with the lower edge of its opening flush with



the top surface of the bottom wall of the bar, as shown. At its outer or exposed end the pipe 22 is provided with a valve-casing 23, in the lower part of which is formed an air-outlet 24, above which is a valve-seat 25, adapted to receive a ball-valve 26, which seats itself therein by gravity. This valve is also normally held to its seat by the air-pressure. To test the grate-bar, it is only necessary to lift the valve by the insertion of a suitable object through the opening 24, whereupon the presence or absence of an escaping air-blast will at once show whether or not the main air-blast is being properly forced into the interior of the bar. In this form of construction I provide the valve-casing 23 with a terminal opening 27 in line with the pipe 22 and closed by a removable plug or cap 28. This plug may be removed to permit any dust, ashes, or the like which may have accumulated in the bar to be blown out through the pipe 22, and if the pipe or bar becomes clogged it may be readily cleaned by the insertion of a suitable rod or tool through the pipe. This blowing out and cleaning are facilitated by the fact that the bottom of the pipe-opening is on a level with the bottom of the grate-bar air-space.

In some cases where the grate is to be applied to a furnace already installed and it is not deemed desirable to provide apertures through the front wall and plate thereof I may employ the form of construction shown in Fig. 4, in which the test-pipe 22 extends downward from the front end of the bar, the valve-casing 23 being secured to its lower end and the valve 26 being accessible through the opening 24 by opening the ash-pit doors.

It will be observed that in the construction shown in Fig. 3 the valve is of such size and so located as to not present any obstruction to the insertion of the cleaning-rod.

With a grate constructed as above described it will be seen that a copious supply of air is provided for the fuel not only directly from the upper surfaces of the hollow bars, but also indirectly by means of the air-jets directed upward through the ordinary bars from the lower portions of the hollow bars. Air is also supplied to the fuel, if desired, by means of the natural draft of the furnace through the ordinary bars. The surface of the grate is smooth and flat, thus facilitating cleaning.

I do not limit myself to the precise details of construction shown and described, as these may obviously be varied without departing from the principle of my invention.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A grate composed of alternating hollow and ordinary bars, the latter vertically apertured and the former being connected with a source of supply of air under pressure and being provided with air-outlet apertures in their upper portion and with other air-outlet aper-

tures in their lower portion, below the ordinary bars, substantially as described.

2. A grate composed of alternating hollow and ordinary bars, the latter vertically apertured and the former being connected with a source of supply of air under pressure and being provided with air-outlet apertures in their upper portion and with other air-outlet apertures in their lower portion, below the ordinary bars and directed upward toward the openings in said ordinary bars, substantially as described.

3. A grate having a flat or smooth upper surface and composed of alternate hollow and ordinary bars having flush upper surfaces, the ordinary bars being vertically apertured and the hollow bars being connected with a source of supply of air under pressure and being provided with air-outlet apertures in their upper portion and with other air-outlet apertures in their lower portion, below the ordinary bars, substantially as described.

4. A grate composed of alternating hollow and ordinary bars, the latter vertically apertured and the former connected with a source of supply of air under pressure and being provided with air-outlet apertures in their upper portion and with lateral inclined ribs on their lower portion and air-outlet apertures terminating in said ribs, below the ordinary bars, substantially as described.

5. In a grate of the character described, a hollow grate-bar connected with a source of supply of air under pressure, and a testing-pipe extending from the grate-bar to an accessible point, said testing-pipe being there provided with a testing-valve, substantially as described.

6. The combination, with a hollow grate-bar connected with a source of supply of air under pressure, of a testing-pipe connected with said bar and provided with a valve held in its seat by gravity and pressure, substantially as described.

7. The combination, with a hollow grate-bar connected with a source of supply of air under pressure, of a testing-pipe provided with a valve-casing having an outlet-aperture in its bottom and a valve-seat above the same, and a ball-valve normally held in said seat by gravity and pressure, substantially as described.

8. The combination, with a hollow grate-bar connected with a source of supply of air under pressure, of a testing-pipe extending from the blast end of said bar through the furnace-wall, and provided at its exposed end with a valve-casing having an outlet-aperture and valve-seat, and a ball-valve seated therein by gravity and pressure, and a terminal aperture in line with the pipe and provided with a removable closure, substantially as described.

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

JAMES F. CASEY.

Witnesses:

W. BROWN,  
H. T. OLMSTED.