

No. 675,153.

Patented May 28, 1901.

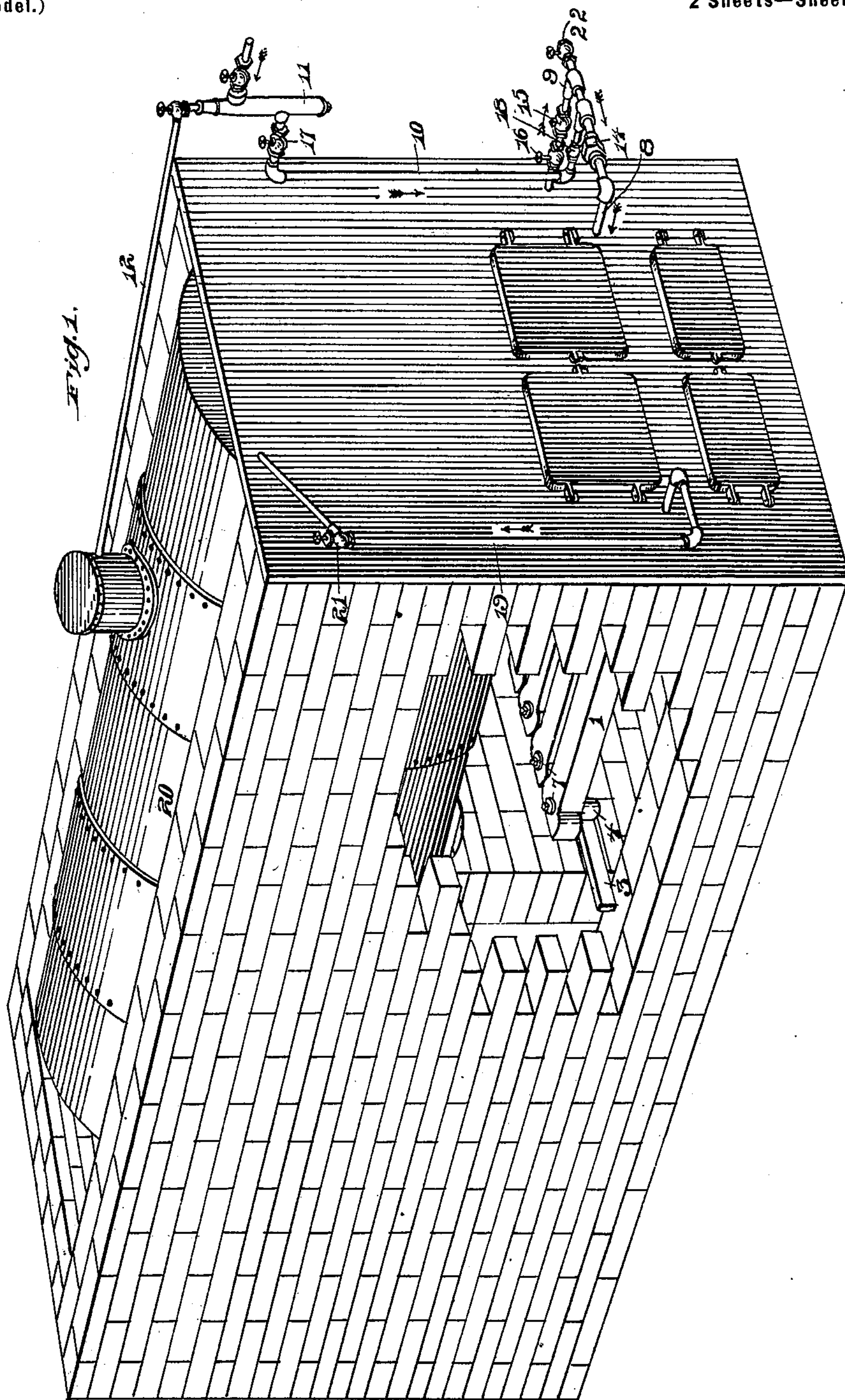
A. Y. FRY.

WATER GRATE FOR STEAM BOILERS.

(Application filed Mar. 14, 1901.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses:

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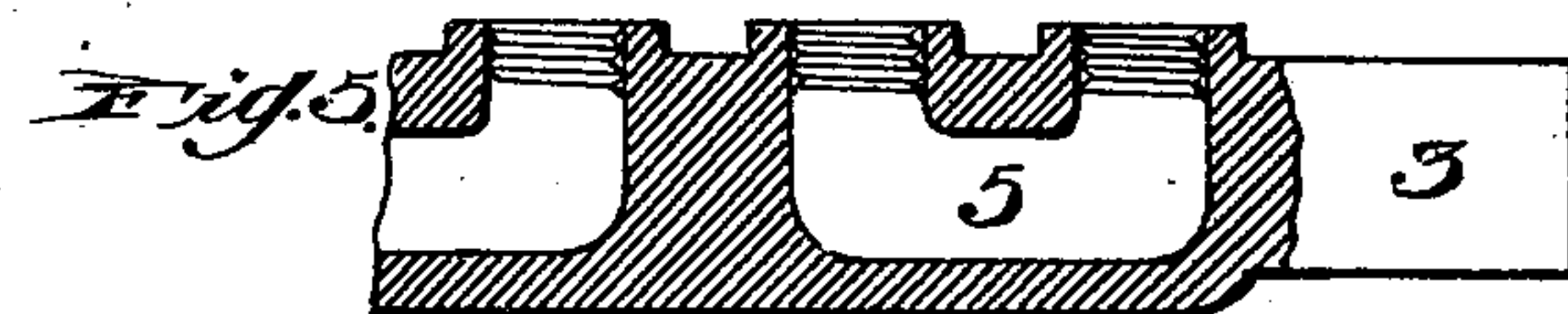
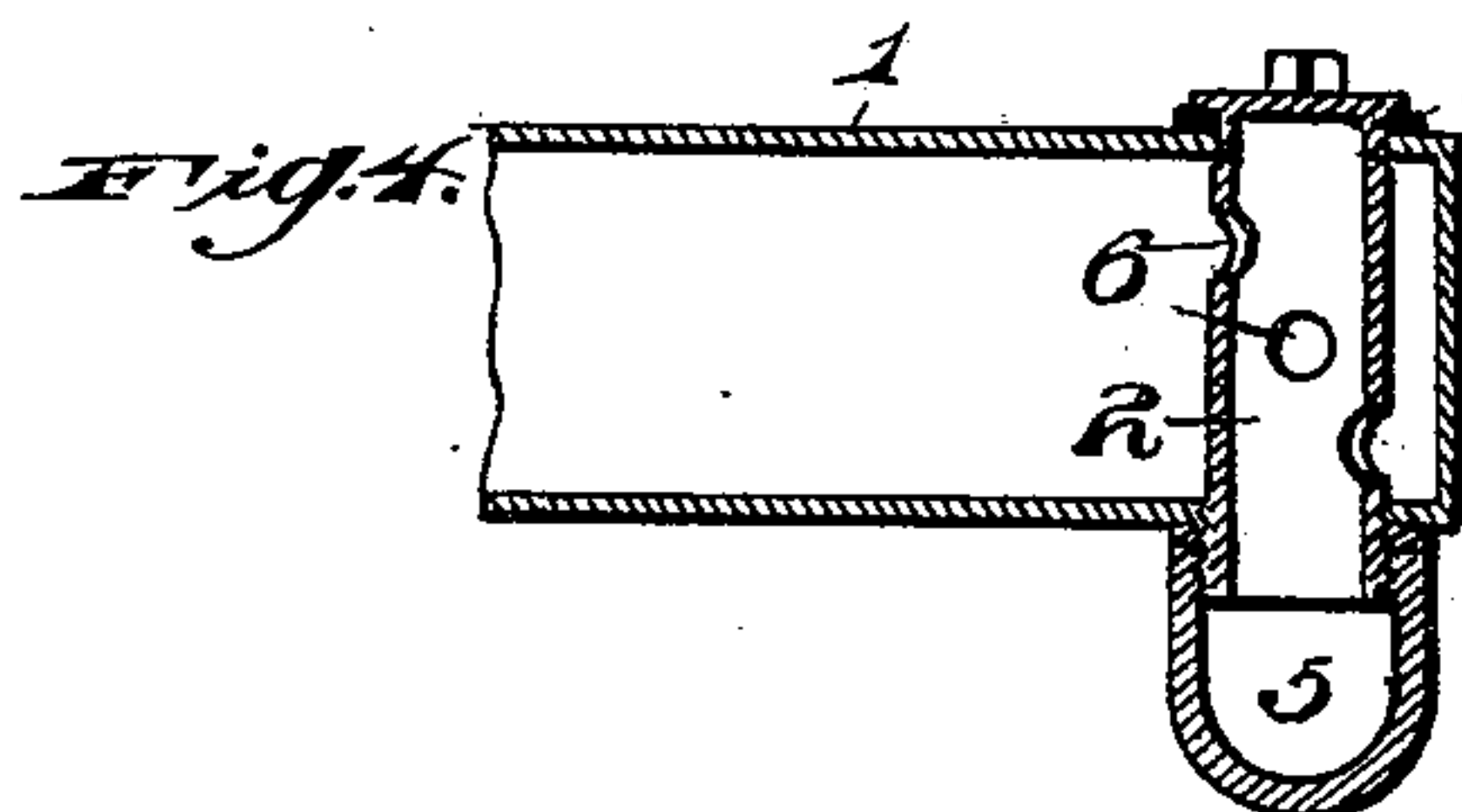
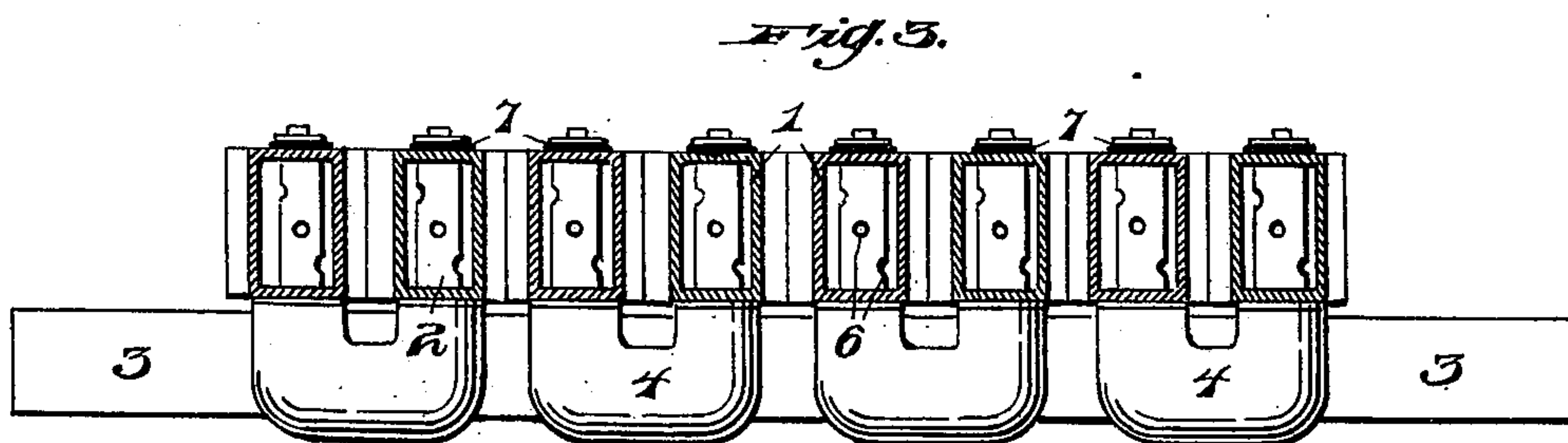
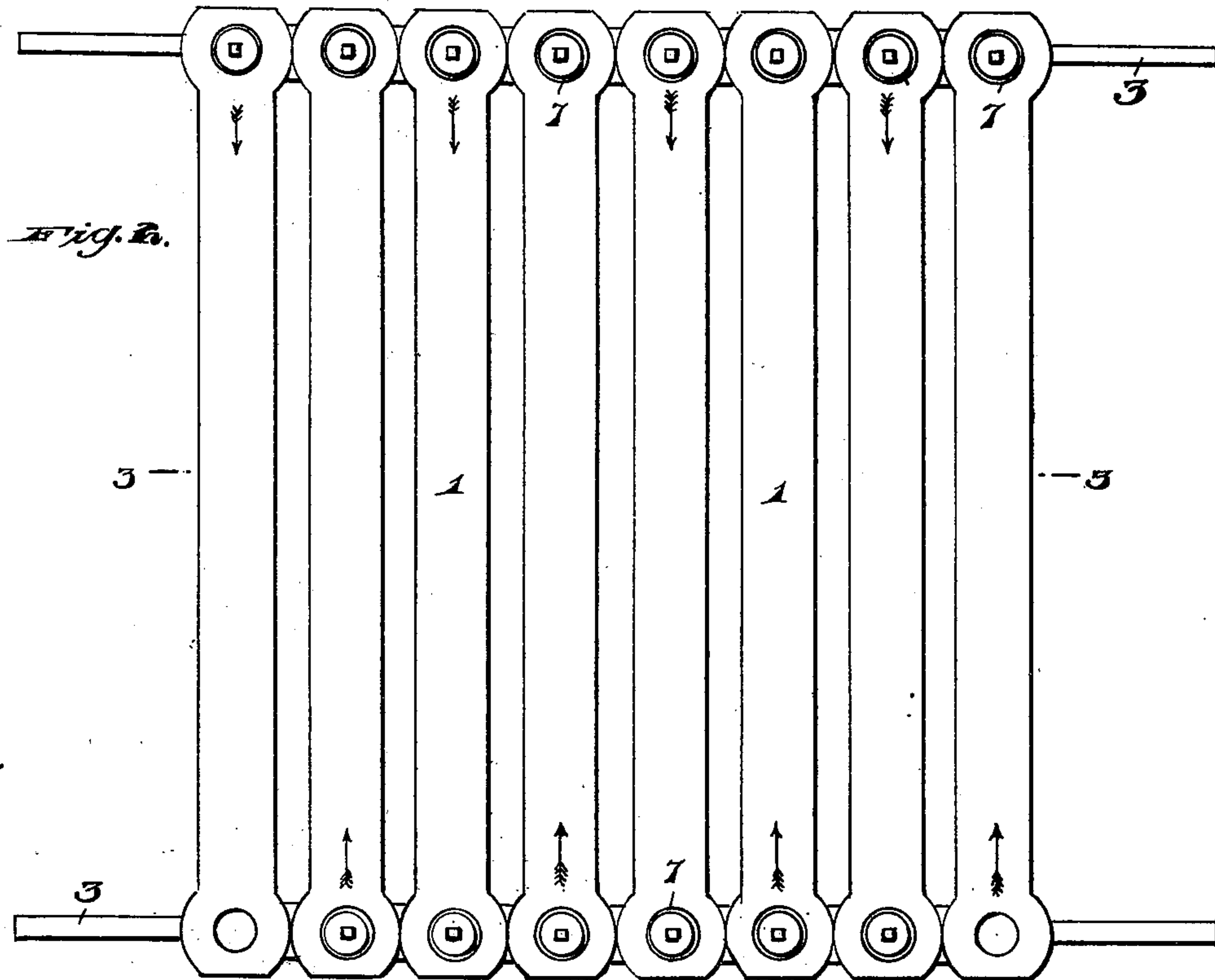
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WATER GRATE FOR STEAM BOILERS.

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(No Model.)

2 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

ALBERT Y. FRY, OF CHARLEROI, PENNSYLVANIA.

WATER-GRATE FOR STEAM-BOILERS.

SPECIFICATION forming part of Letters Patent No. 675,153, dated May 28, 1901.

Application filed March 14, 1901. Serial No. 51,089. (No model.)

To all whom it may concern:

Be it known that I, ALBERT Y. FRY, a citizen of the United States of America, residing at Charleroi, in the county of Washington and State of Pennsylvania, have invented certain new and useful Improvements in Water-Grates for Steam-Boilers, of which the following is a specification, reference being had therein to the accompanying drawings.

10 This invention relates to certain new and useful improvements in hollow grate-bars for furnaces, and has for its object to connect the grate-bars to a source of water-supply and cause the water in its passage to the boiler 15 to circulate through the grate-bars before being discharged into the boiler, thus heating the water previous to its discharge into the boiler and also protecting the grate-bars by preventing them from being burned out.

20 Briefly described, the invention consists of a series of parallel hollow grate-bars suitably supported, with their ends connected and in communication in a manner to form a continuous flue from the end of the one outside 25 grate-bar to the corresponding end of the opposite grate-bar, the end of the one outside grate-bar being in communication with the water-supply and the corresponding end of the opposite outside grate-bar being in com- 30 munication with the boiler. Connection is also made with the steam-dome or other suitable source of steam-supply, whereby steam may be admitted to blow out any dirt or sediment that may accumulate in the grate- 35 bars or connections, and all of these features, together with others entering into my invention, will be hereinafter more specifically described and then particularly pointed out in the claims.

40 In describing the invention in detail reference is had to the accompanying drawings, forming a part of this specification, and wherein like numerals of reference indicate similar parts throughout the several views of the 45 drawings, in which—

50 Figure 1 is a perspective view of a boiler, partly broken away at the side of the boiler-setting to show my improved grate-bars arranged in position in the boiler-furnace. Fig. 2 is a top plan view of the grate-bars, showing by arrows the course of the water through said bars. Fig. 3 is a vertical cross-sectional

view taken on the line 3 3 of Fig. 3. Fig. 4 is a longitudinal sectional view of a part of one of the bars. Fig. 5 is a transverse vertical sectional view through a part of the bars 55 to show the communication between one bar and the adjacent bar at the ends. Fig. 6 is a top plan view of the same.

Referring to the drawings by reference-numerals, 1 indicates the grate-bars, as many of which are employed as may be required, according to the size of the furnace in which they are to be used. These grate-bars are hollow throughout their length, with the exception, of course, that the ends thereof are 60 closed, and they are provided on the sides at each end with bushings which abut against each other, so as to space the bars apart, as shown in the drawings. Near each end these 65 bars are provided with openings which extend vertically through the bars and receive hollow connecting-bolts 2, by means of which the grate-bars are secured in position upon the supporting-bars 3. The supporting-bars 70 3 extend some distance beyond the grate-bars, so as to engage with the furnace-wall and form a support, and they are provided with enlargements or bushings 4, which have U-shaped passage-ways 5. The bolts 2 are 75 threaded into the necks of these bushings, and these bolts are provided with openings 6, which may be arranged spirally therein, as shown, or these openings may be arranged in vertical rows or circumferentially of the bolts, 80 as will be readily apparent. The heads of the bolts seat upon washers 7, arranged between said heads and the grate-bars, so as to form a perfectly tight joint and prevent leakage. It will be observed that the U-shaped open- 85 ings at each end of the bars communicate, the inlet-port with one grate-bar and the outlet-port with the corresponding end of the adjacent bar.

The one outside bar is connected at the forward end of the furnace by pipe 8 to the water-supply pipe 9, this supply-pipe connecting with the pump (not shown) or other suitable source of supply. Connected to the pipe 8 by pipe 10 is an injector 11, which is fed 95 with steam from the dome through pipe 12. Placed in the pipe 8, between the grate-bars and the connection of pipe 10, is a check-valve 14, which permits the water to flow to the 100

grate-bars, but prevents backflow of the same. A check-valve 15 is also placed in the line 9, this line also having a suitable valve 16, (such as the ordinary globe-valve.) A valve 17 (such as a globe-valve) is placed in the line 10 between the injector and the pipe 8, and a check-valve 18 may be placed in this line 10 close to the line 8. The corresponding end of the opposite outside bar is connected by a pipe or line 19 to the boiler 20, which line carries a suitable valve 21, (such as a globe-valve.) A drain or blow-off cock 22 is connected to the line 8, as shown in Fig. 1.

I preferably arrange the openings 6 in a spiral manner in the bolts 2, as this may be done without weakening the bolts, as would be the case if the openings were placed in line and in close relation to each other.

In operation, the valve 16 being open, the water flows through line 9, through line 8, into the one outside grate-bar at the forward end of the furnace, through this grate-bar, as indicated by the arrow in Fig. 2, and at the rear end of the grate-bar is discharged through hollow bolt 2 and U-shaped passage-way 5 into the rear end of the adjacent or next grate-bar, back toward the front of the furnace through this grate-bar, as indicated by arrow in Fig. 2, and discharged through the U-shaped passage-way into the succeeding grate-bar, and so on throughout the series of bars until it is discharged into the line 19 and from thence to the boiler. The grate-bars being thus filled with water, this water is heated previous to its discharge into the boiler, while the bars are prevented from becoming overheated.

The grate-bars may be readily drained of dirt or sediment by closing the valve 16 and opening valve 17, so as to admit steam from the dome through pipe 10. These connections may be varied, however, from that shown herein, and they have been illustrated mainly to show the grate-bars in operative position, and in the construction of the bars in accordance with my invention it will be observed that various changes may be made in the details thereof without departing from the general spirit of the invention.

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

1. The combination with supporting-bars having a series of U-shaped passage-ways, of hollow grate-bars supported on said bars, and hollow bolts connecting said hollow grate-bars to the supporting-bars, said hollow bolts registering with the U-shaped passage-ways in the supporting-bars and establishing communication between said passage-ways and the grate-bars, substantially as described.

2. In furnace grate-bars, a series of hollow grate-bars closed at their ends and provided with openings near each end, supporting-bars having U-shaped passage-ways registering with the openings in the grate-bars, and hollow bolts connecting the grate-bars to the supporting-bars and establishing communication between said grate-bars and supporting-bars, substantially as described.

3. In furnace-grates, a pair of supporting-bars having U-shaped passage-ways, a series of hollow grate-bars supported on said supporting-bars, hollow bolts connecting the grate-bars to the supporting-bars, said hollow bolts registering with the U-shaped passage-ways and provided with openings in their walls which register with the chambers in the grate-bars, substantially as described.

4. In furnace-grates, a series of hollow grate-bars closed at their ends, and supporting-bars having passage-ways communicating with the hollow grate-bars, said passage-ways being so arranged that the water when received at one end of one outside grate-bar must pass through all the succeeding grate-bars and be discharged at the corresponding end of the opposite outside grate-bars.

5. In furnace-grates, a series of hollow grate-bars closed at their ends, supporting-bars having passage-ways, and hollow bolts connecting the grate-bars with the passage-ways of the supporting-bars, said passage-ways being so arranged that the water received at one end of a bar is discharged therefrom at its opposite end into the corresponding end of the adjacent grate-bar, substantially as described.

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

ALBERT Y. FRY.

Witnesses:

JOHN NOLAND,
E. E. POTTER.