

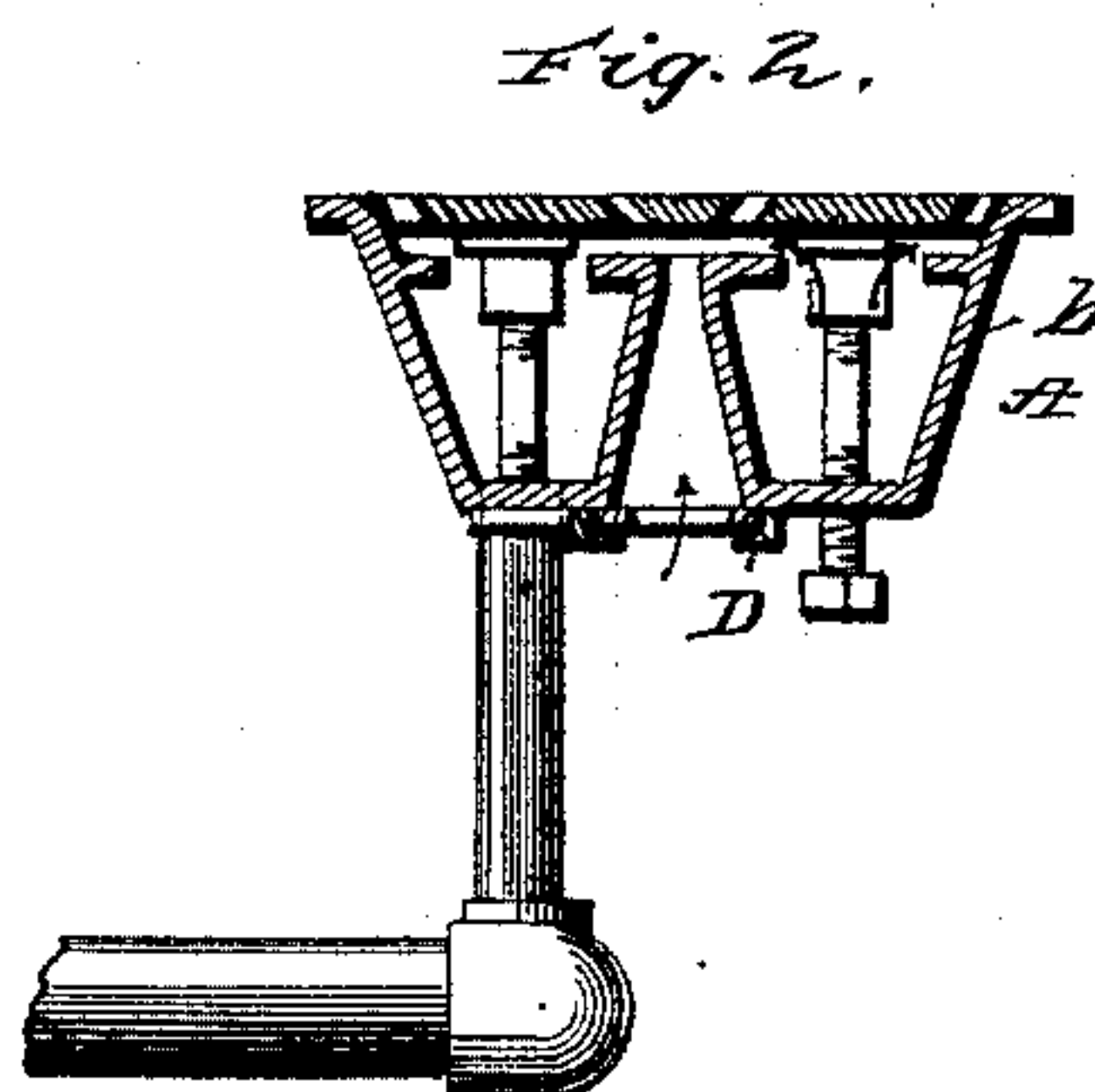
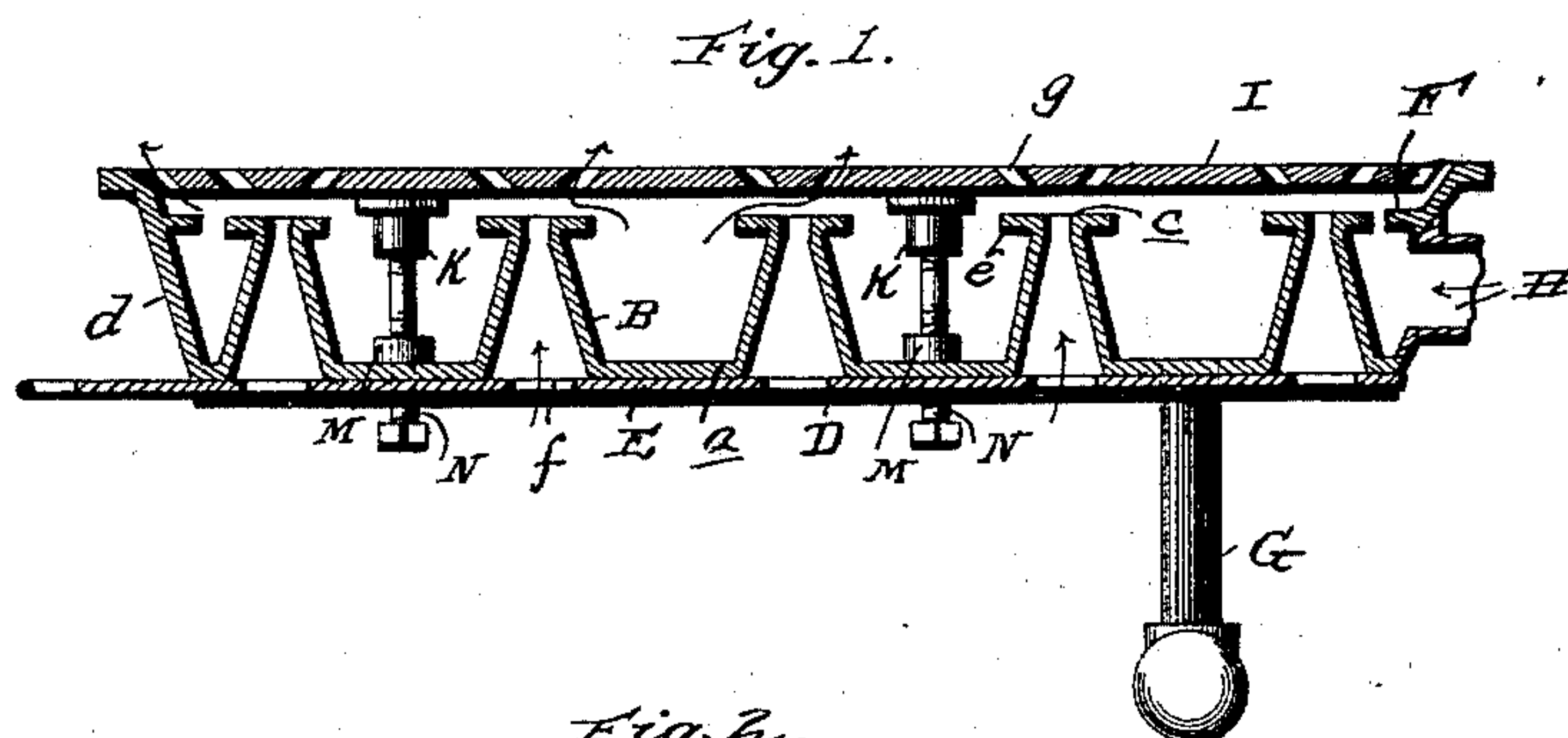
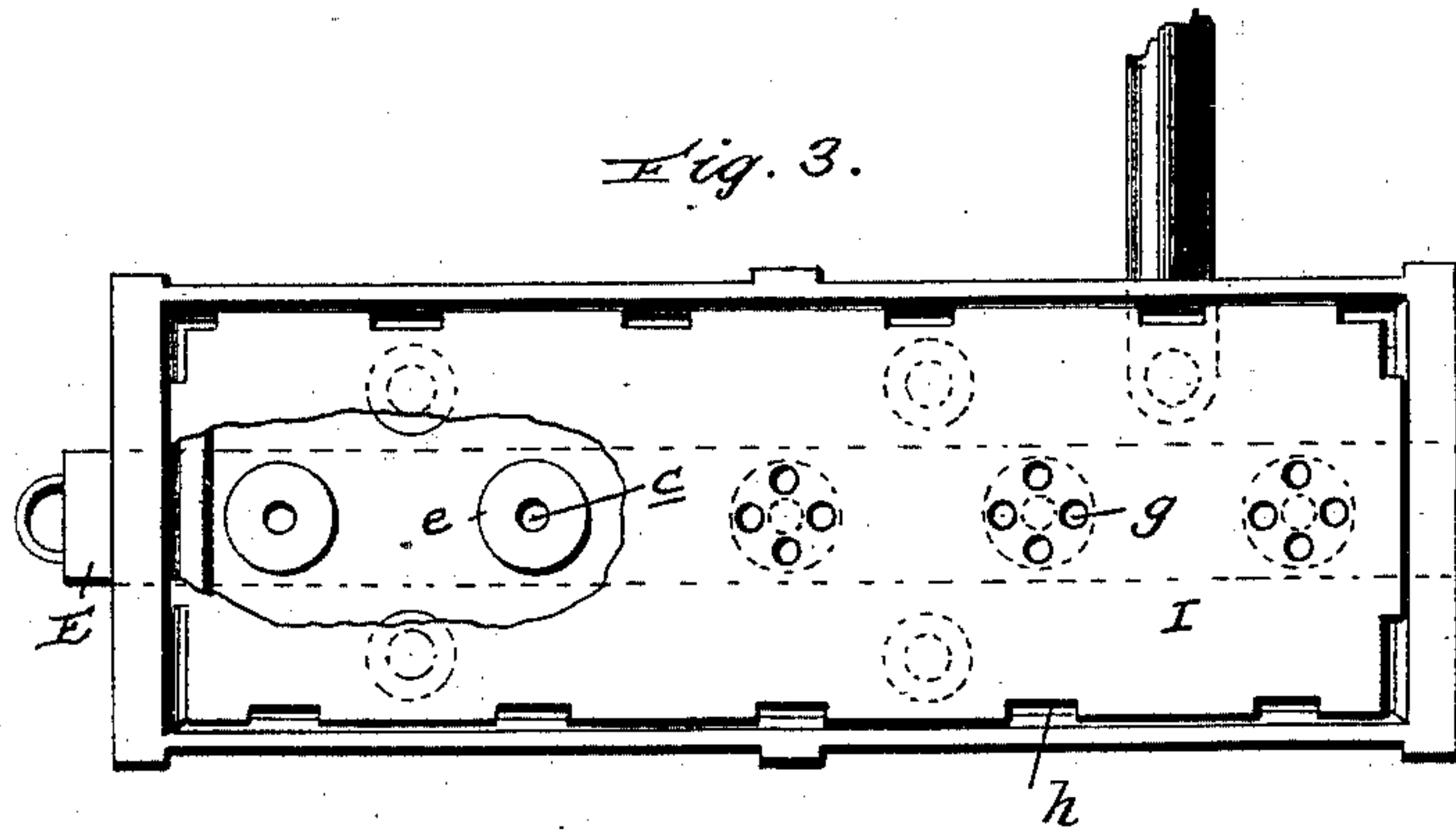
(No Model.)

2 Sheets—Sheet 1.

W. W. SUTCLIFFE.
HOLLOW GRATE BAR.

No. 483,797.

Patented Oct. 4, 1892.



Witnesses:

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(No Model.)

2 Sheets—Sheet 2.

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Fig. 4.

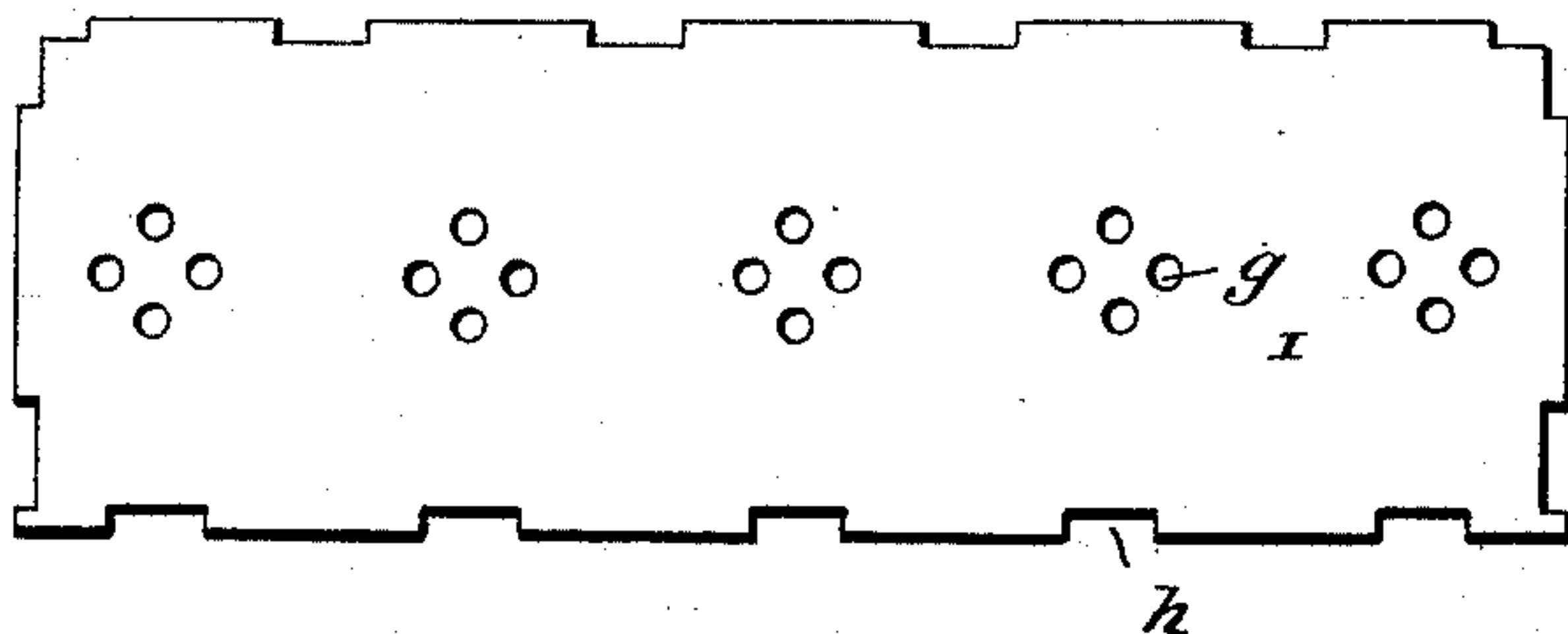


Fig. 5.

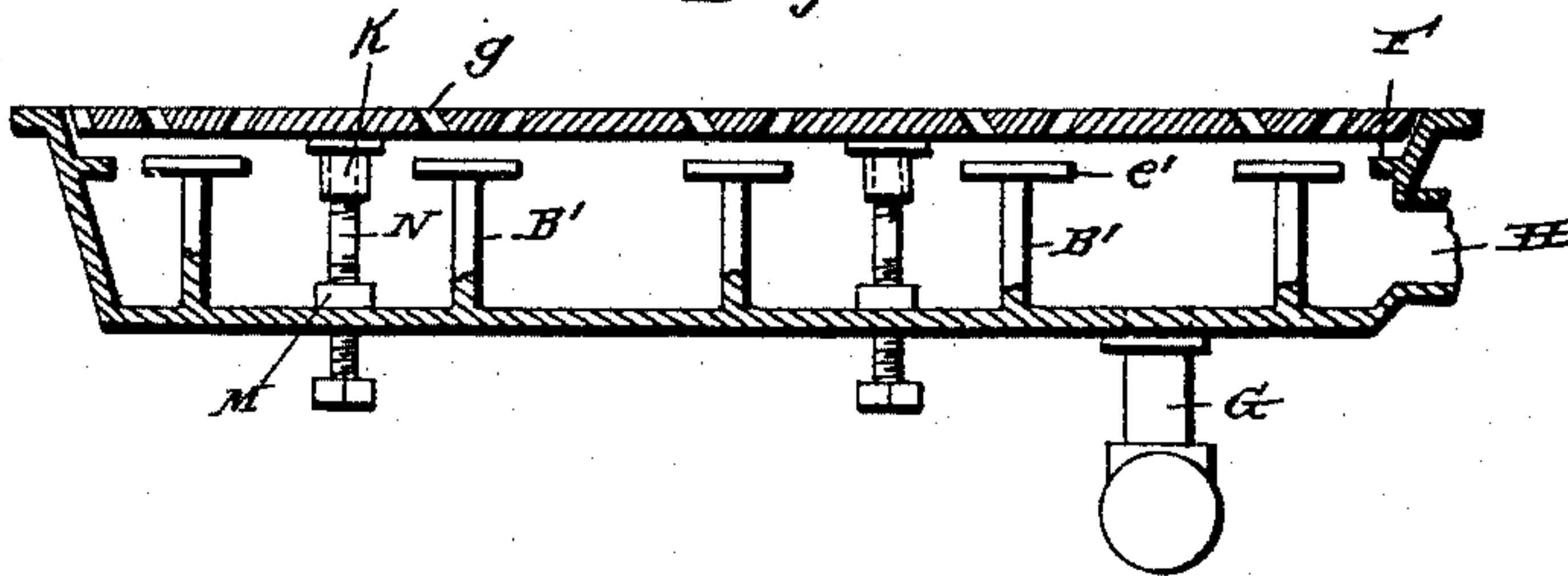
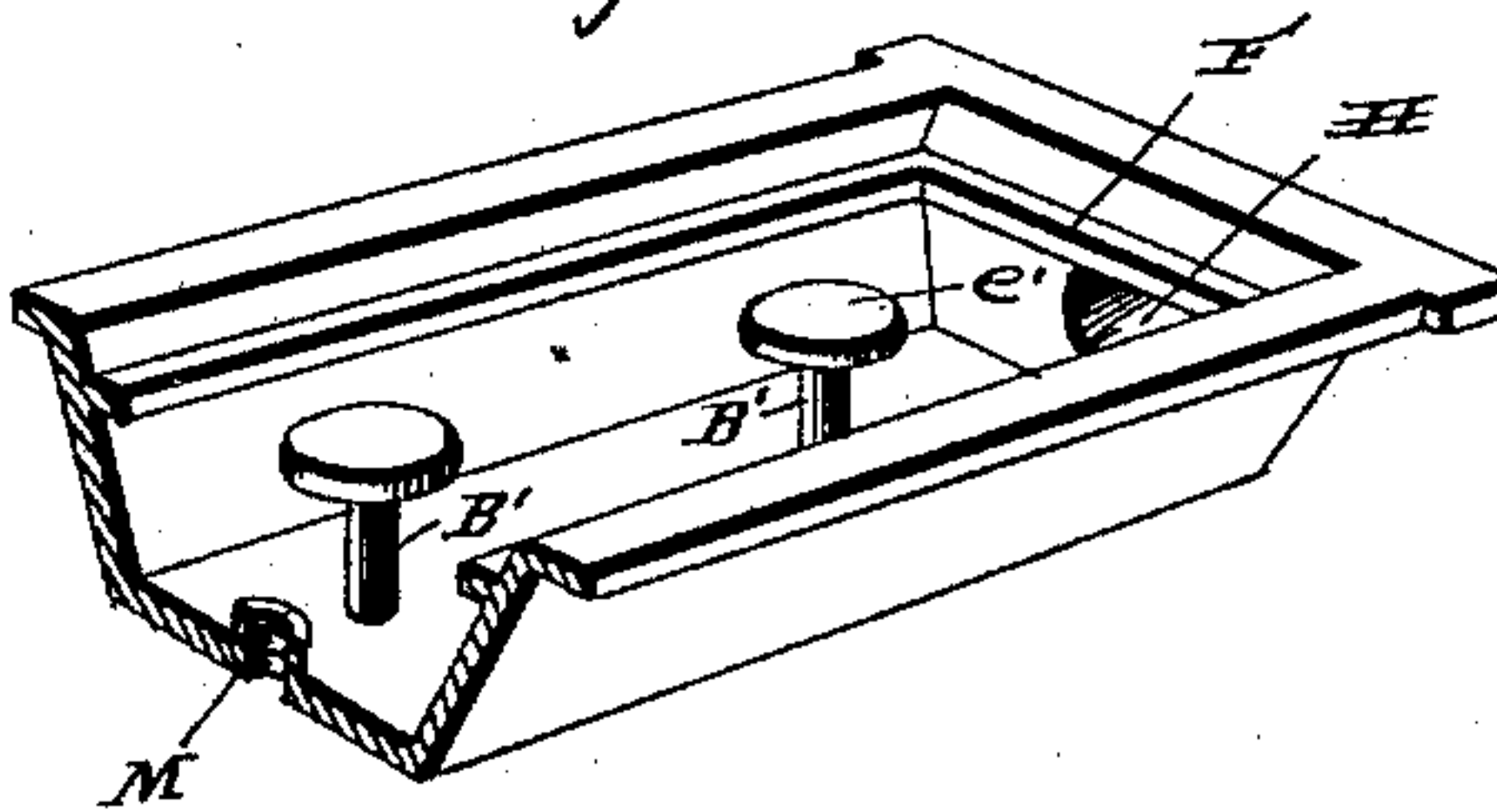


Fig. 6.



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UNITED STATES PATENT OFFICE.

WILLIAM WILSON SUTCLIFFE, OF NEW ORLEANS, LOUISIANA.

HOLLOW GRATE-BAR.

SPECIFICATION forming part of Letters Patent No. 483,797, dated October 4, 1892.

Application filed April 18, 1892. Serial No. 429,680. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM WILSON SUTCLIFFE, a citizen of the United States, residing at New Orleans, in the parish of Orleans and State of Louisiana, have invented certain new and useful Improvements in Hollow Grate-Bars; 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.

This invention has relation to an improvement in hollow grate-bars for furnaces and devices for feeding air through said bars and into the fire-chamber to facilitate and promote combustion, and while the improvements are more particularly adapted for furnaces using slack coal, sawdust, tanbark, bagasse, and other waste fuels, yet it is obvious that the bars can be advantageously used in furnaces using coal, wood, or other hard fuels.

The prime object of my invention is to provide a grate-bar through which air may be circulated either by a natural draft or air-forcer, or both combined.

A further object of the invention is to so construct a bar as to attain a widely-diffused draft into the fuel and to provide devices for regulating the force and volume of such draft.

A further object of the invention is to provide the bars with a flat adjustable top capable of being readily removed when impaired or injured and quickly replaced by another top without affecting any of the other parts of the grate or furnace in which said grates or bars are placed.

A further object of my invention is to provide a slide in the base of the bars, whereby the air tubes or tuyeres may be opened and closed or the openings regulated, so that the natural draft may be either shut off, regulated, or used in connection with the forced draft.

Other objects and advantages will appear from the following description and claims when taken in connection with the annexed drawings, in which—

Figure 1 is a longitudinal sectional view of my improved grate-bar, illustrating a part of the pipes which lead to an air-forcer and also the opening for introducing air through the

bridge-wall or other part of the furnace into the grate. Fig. 2 is a vertical cross-sectional view of the grate-bar, showing the pipe leading into its bottom, in elevation and partly broken away. Fig. 3 is a plan view of one of the bars with the top plate partly broken away to illustrate the vertical air tubes or tuyeres. Fig. 4 is a plan view of the top or cover removed. Fig. 5 is a longitudinal sectional view of a modification of the bar in which the tuyeres or vertical air-tubes are omitted and central supports are employed for the adjustable top or cover, this latter construction being adapted for use with a forced blast; and Fig. 6 is a perspective sectional view of the bar with the top or cover removed.

Referring by letter to the drawings, A indicates the grate-bar. This bar is of a suitable length and width and is usually composed of cast-iron, although it may of course be formed from any suitable material and have a flat bottom *a*, and its side walls *b* and end walls *d* are respectively converging, and although this construction is preferable, yet I would have it understood that I am not limiting myself to such shape.

The bottom of the grate-bar has arranged in a vertical manner and preferably down its longitudinal center a number of tuyeres or air-tubes B. These tuyeres, which, for the sake of cheapness in manufacture, are cast entire with the bar, have their lower receiving ends much larger than their upper discharge ends *c*, and these upper ends are formed with a marginal horizontal flange *e*, for a purpose which will presently appear. I would also have it understood that while the shape of the tuyeres or air-tubes which I have shown and described are desirable and preferable for good practical results, yet I am aware that their shape might be changed without departing from the spirit of my invention, and I, furthermore, do not wish to be understood as limiting myself to any particular arrangement or location of these tuyeres or tubes.

The bar is provided on its under side with longitudinal parallel guides D, arranged one on each side of the tuyere-openings, and are designed to receive a slide E, which slide is also provided with openings *f*, which may

register with the openings of the tubes or tuyeres, and is designed to open and close said tuyeres or by manipulation to regulate the inlet-openings to said tuyeres. By this means it will be seen that the natural draft may be regulated, and in some cases where it is desirable to use the forced draft only the natural draft may be entirely cut off by simply moving the slide E in the proper direction.

The bar is furthermore provided on its inner sloping or converging walls and at a suitable distance from the tops thereof with a ledge or flange F to serve, with the removable and adjustable top or cover, to close and regulate the marginal or elongated passages, as will be presently explained.

G indicates a pipe which leads into the bottom of the bar and is designed to be connected with any suitable air-forcer, whereby either a hot or cold blast may be introduced into the bar and from there widely diffused into the fuel.

H indicates an opening in one of the end walls of the bar. This opening is also designed for the induction of a blast which may be taken from a bridge-wall or other part of a furnace, so that when it is not desirable to use a cold blast a warm or hot blast may be conveniently used.

I indicates a flat top or cover. This top is provided with holes g, arranged in groups, and at points above the flanges e of the tuyeres or air-tubes B. In the present illustration I have shown these groups as each comprising four holes, although more or less may be used. The cover is furthermore provided at suitable points around its circumference or marginal edge with elongated apertures h, and I do not wish to confine myself to any number of these apertures nor to their particular location, as they may alternate with each other on the longitudinal edges of the plate or top, and they may in some cases be also placed at the corners; but these slots or apertures should be no greater in width than the ledge or flange F in the bars, so that when the cover or top has been drawn closely to its seat it may cover said elongated apertures, and by reason of the holes g being placed in a plane above the flanges e of the tuyeres or air-tubes. These latter holes will also be closed when the cover has been drawn down to its fullest extent, and the respective slots and holes may have their discharge regulated according to the vertical adjustment of said top or cover. The top or cover is also provided on its underside with a suitable number of screw-tapped bosses K, and the bottoms of the bars are provided at corresponding points beneath these bosses with screw-tapped apertures, which may be also surrounded by bosses M, through which are passed threaded rods or bolts N for the adjustable connection of the top or cover with the bars.

In the modification of my invention, as shown in Figs. 5 and 6 of the drawings, I have

omitted the vertical tuyeres or air-tubes and employ supports B', which are provided at their upper ends with heads e', corresponding in outline with the flanges e of the tuyeres B and adapted to serve a similar function. In this modification it is designed that either a hot or cold forced blast should be used and the natural draft dispensed with.

Having described my invention, what I claim is—

1. A hollow grate-bar having an apertured top and tuyeres arranged in the bar, substantially as specified.

2. A hollow grate-bar having an apertured adjustable top and tuyeres or air-tubes within the bar and adapted to receive air within said bar and discharge the same through the top, substantially as specified.

3. A hollow grate-bar having an adjustable and removable apertured top and also having vertically-arranged tuyeres or air-tubes, with their receiving ends enlarged and their discharge ends contracted, substantially as specified.

4. A hollow grate-bar having an adjustable and removable apertured top and also having vertically-arranged tuyeres or air-tubes provided at one end with a flange adapted to close the apertures in the top and regulate the quantity of air discharged through said apertures, substantially as specified.

5. A hollow grate-bar having converging side and end walls and also having a horizontal ledge or flange within said walls near the upper edge thereof, in combination with an adjustable and removable top having notches in its peripheral edge and adapted to be seated upon said ledge or flange and adjustably sustained above the same, substantially as specified.

6. A hollow grate-bar having its entire upper surface or top adjustable and removable, substantially as specified.

7. A hollow grate-bar having its marginal or peripheral edge provided with elongated apertures or notches and also having a seat for said notched or apertured edge, in combination with devices for adjustably sustaining said top, substantially as specified.

8. A hollow grate-bar having tuyeres or air-tubes, in combination with an adjustable and removable top provided with jet-apertures and marginal notches, said bar also having a flange for seating the top and a perforated slide for regulating the openings in the tuyeres or air-tubes, substantially as specified.

9. The hollow grate-bar having screw-tapped apertures in its bottom and also having tuyeres or air-tubes therein and provided with the horizontal flange at their upper ends, said bar also having the horizontal ledge or flange in a plane with the flanges of the tuyeres, in combination with the removable and adjustable top or cover having the elongated passages in its marginal edge and apertures arranged in groups at points above the flanges of the tuyeres, and also provided

on its underside with depending screw-tapped bosses and threaded bolts or rods taking through the bosses for adjustably securing the top to the bar, substantially as specified.

- 5 10. A hollow grate-bar having vertically-disposed stands or supports therein and provided with flat heads at their upper ends, in combination with a cover having apertures above the heads of the stands and suitable

means for adjustably sustaining the cover and so drawing the same upon said heads, substantially as specified.

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

WILLIAM WILSON SUTCLIFFE.

Witnesses:

CHAS. C. HALPINE,
K. F. MATTHEWS.