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J. G. ELLIS ET AL
FIRE GRATE FOR LOCOMOTIVES
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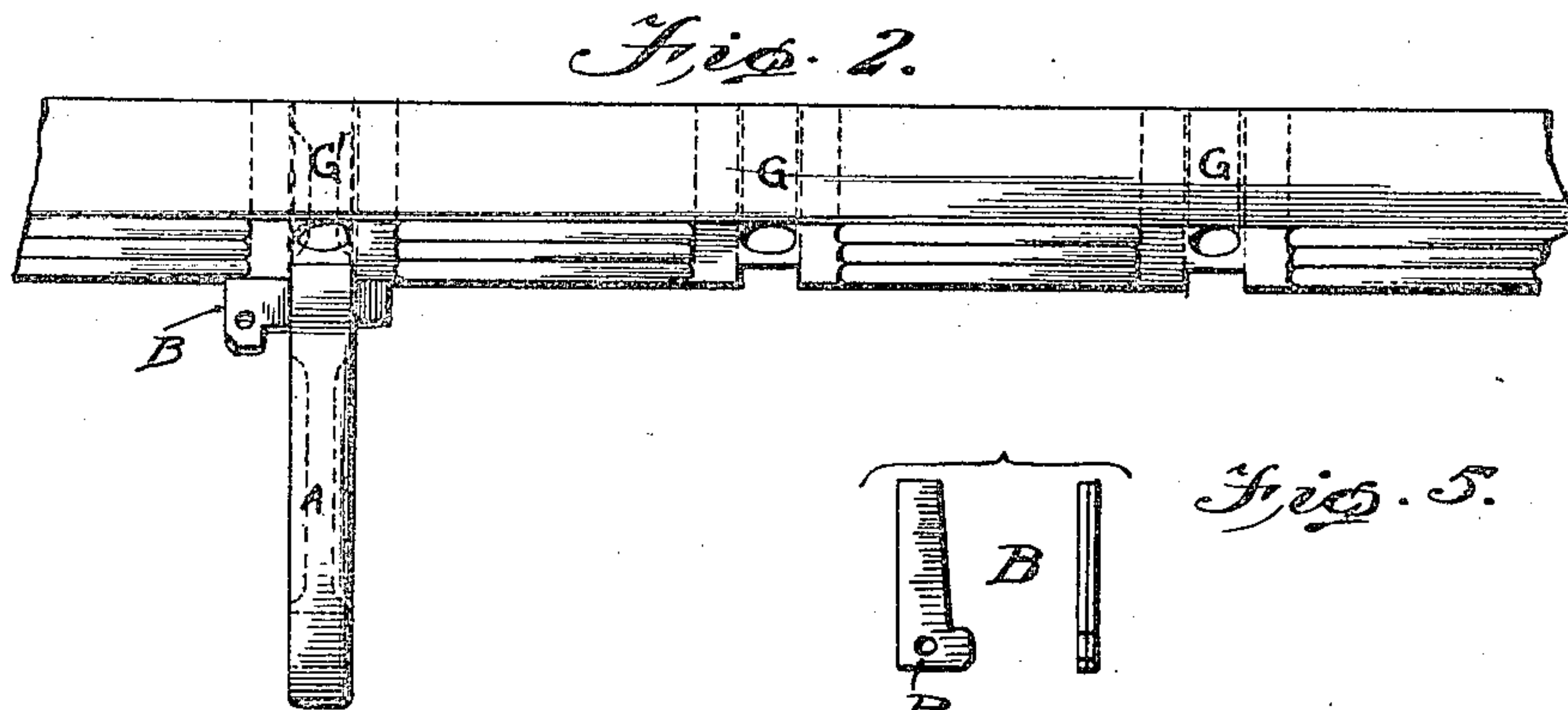
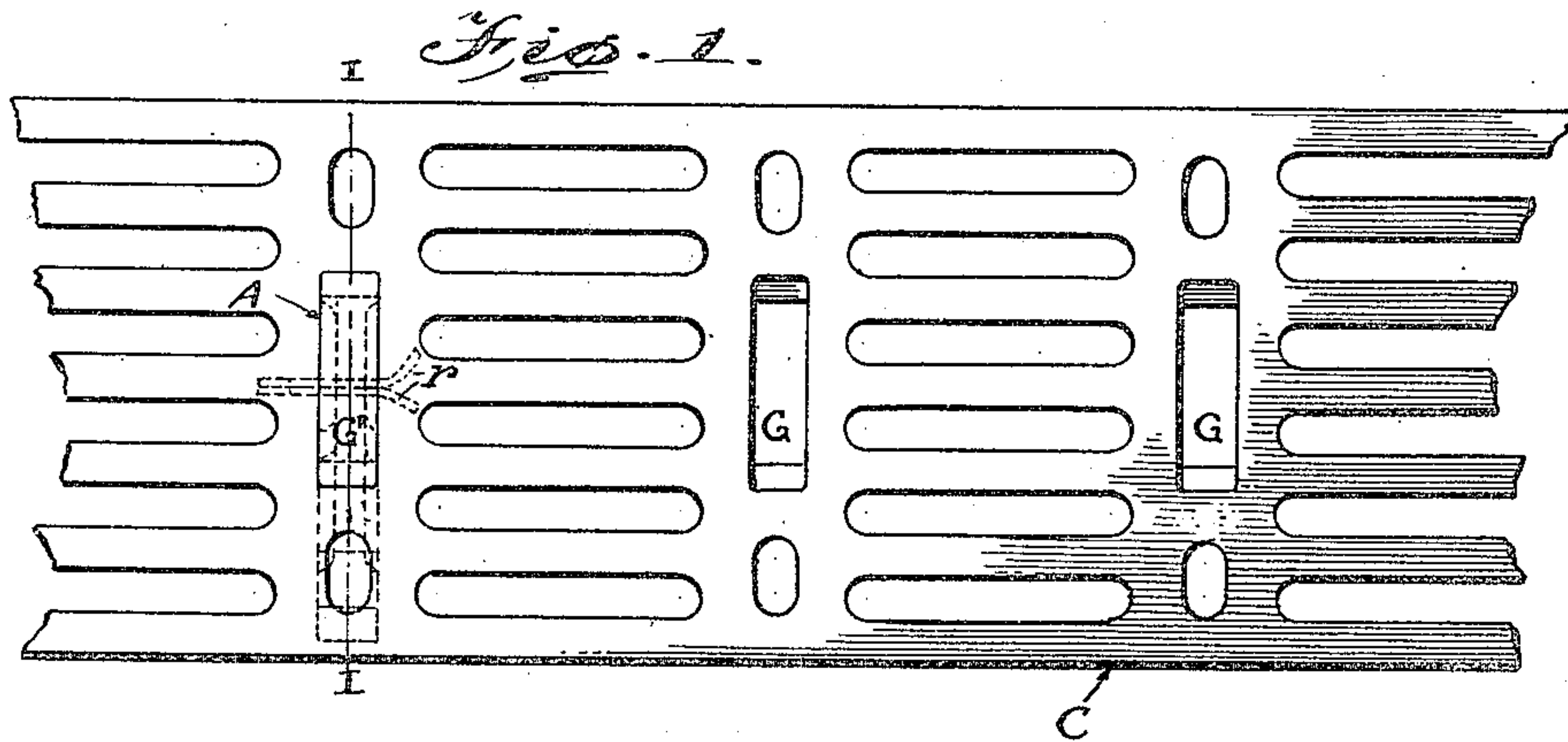


Fig. 3.

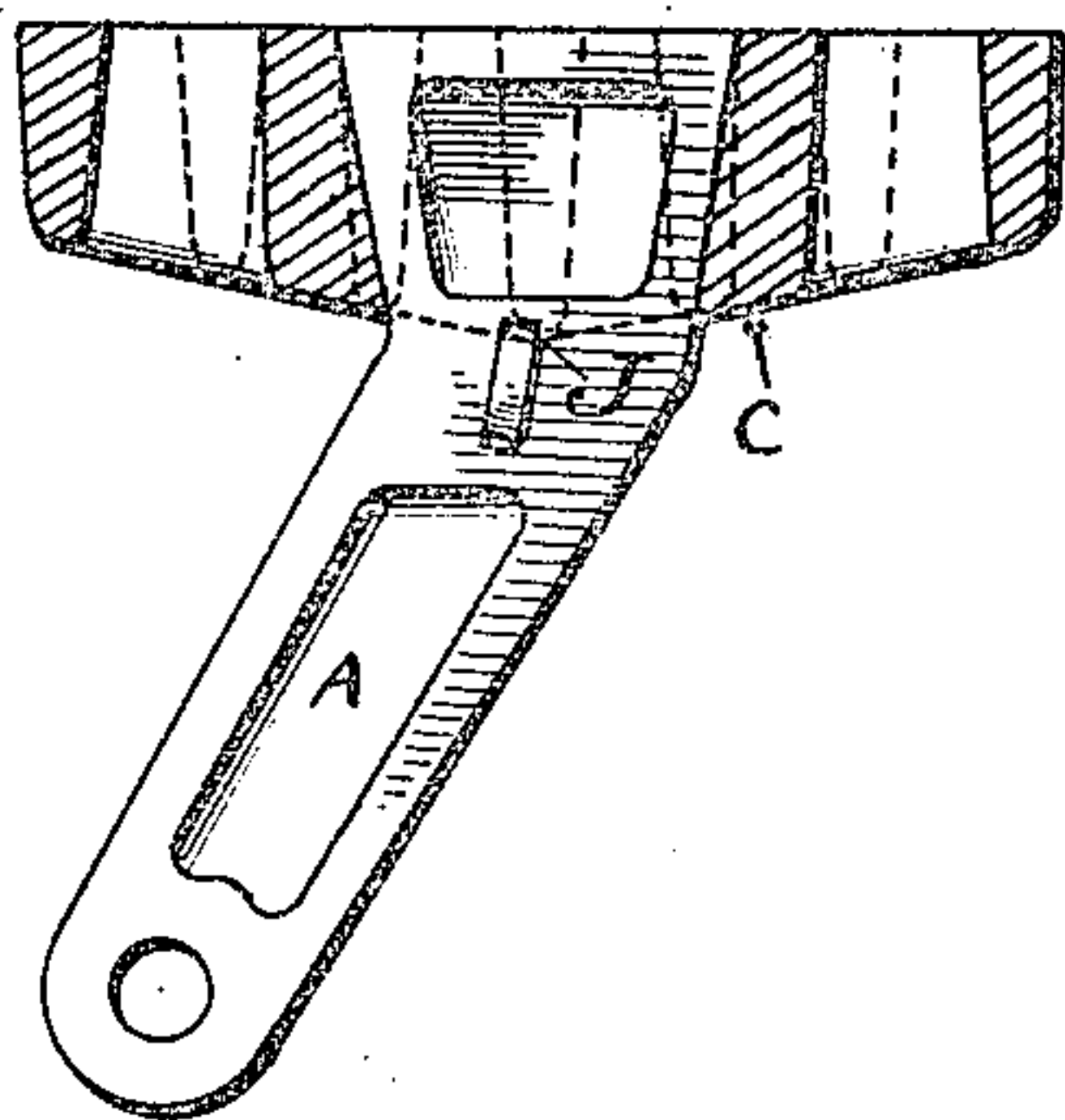
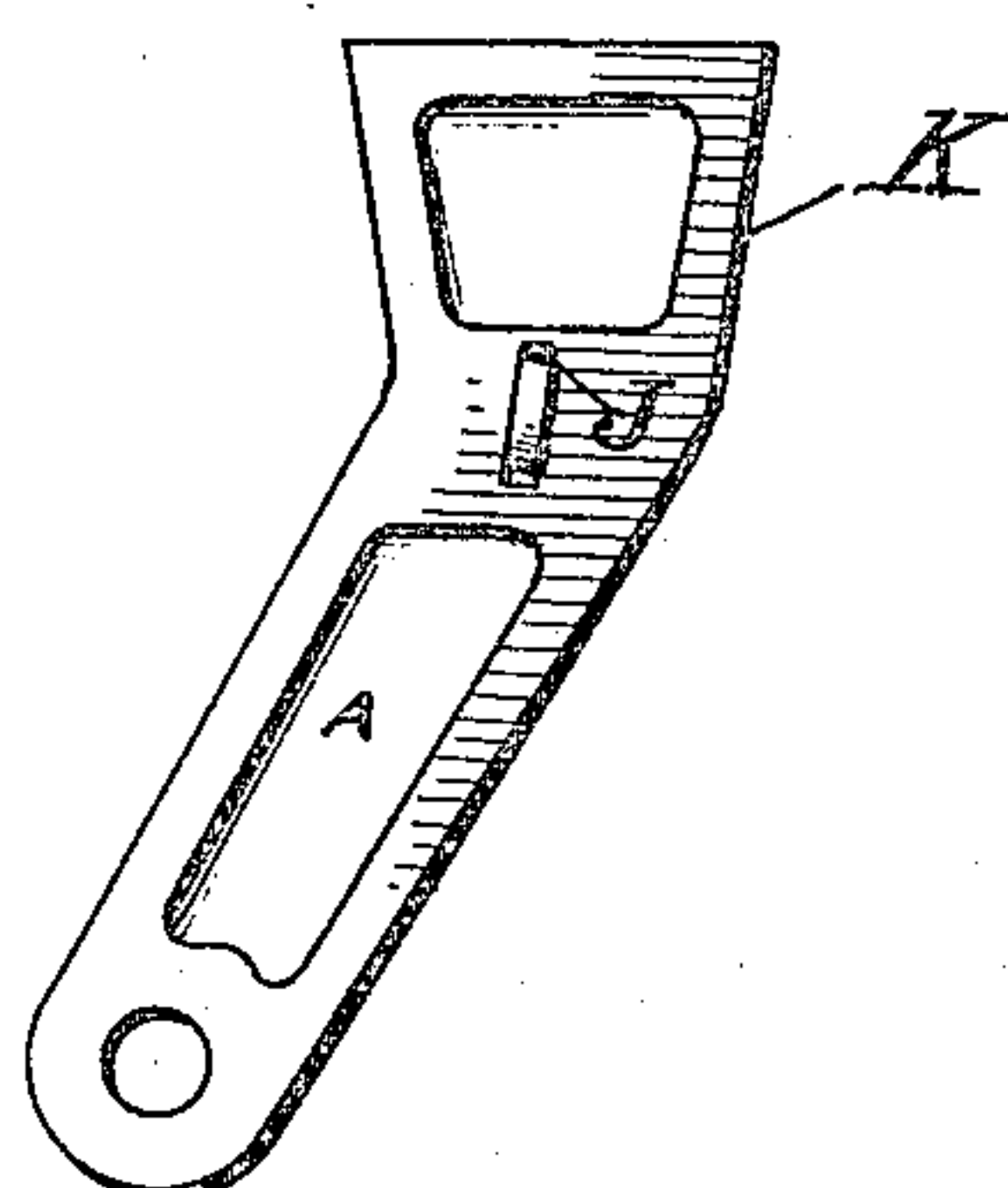


Fig. 4.



WITNESSES

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FIRE GRATE FOR LOCOMOTIVES.

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To all whom it may concern:

Be it known that we, JAMES GEORGE ELLIS, a citizen of the Dominion of Canada, and resident of No. 92 Edison Avenue, in the town of St. Lambert and county of Chambly and Province of Quebec, Canada, and GEORGE WALTER MINGIE, a citizen of the Dominion of Canada, and resident of No. 412 Bourgeois Street, in the city of Montreal and county of Hochelaga and Province of Quebec, Canada, have invented certain new and useful Improvements in Fire Grates for Locomotives, and do hereby declare that the following is a full, clear, and exact description of the same.

Our invention relates to an improvement in fire grates by which the shaker lugs instead of being cast as an integral part of the grate bar are made separately and afterwards fastened rigidly to the grate bar by means of a tapered or dove-tailed hole cast in the grate bar into which the shaker lug fits snugly and tightly and is held in place by gravity and by means of a fastener through the lug. The fundamental idea involved is in so designing and spacing the holes, or slots, or interstices in a grate bar, that one grate bar may be used in any one of a number of series (of grate bars) without alteration by dropping a lug into the appropriate hole and connecting the lug with the shaking bar of that series.

The objects of our improvements are,

First. To allow of the lugs being cast separately or to be made by other process as by drop forging or malleable casting, and that they may be made of similar, stronger or lighter material and to allow of them being cast or made of a different design than would be possible if they were cast as part of the grate bar and were inseparable from it, and in order that in case of breakage of a lug another may be substituted without loss of the grate bar.

Second. To allow of the lugs being so designed as to be interchangeable and reversible and so used on a right or left hand grate bar, thus allowing a number of different kinds or varieties of grates to be cast from one pattern, thus saving a number of patterns, and in case of breakage allowing the ordinary grate bar to be used. This particularly applies where a number of groups of grate bars are used in parallel in a loco-

motive, the shaking or connecting bars of each group being differently spaced in relation to the grate bars of one group from that of the other groups. The holes, slots or interstices of one grate bar are so designed and spaced that the same grate bar may be used in each group without modification by dropping a lug of corresponding design into the appropriate slot to connect with the shaker bar of that particular group and thus a grate bar called in the shops a right hand grate bar on account of being in the group on the right hand side of the locomotive may be reversed and used as a left hand grate bar for the group on the left side of the locomotive.

Third. To allow of one or more lugs being left off the grate bar when not required without interfering with the efficiency of the grate bar, the hole left in the bar making but another interstice by which the air is admitted to the fire and thus increasing the efficiency of the grate.

Fourth. To afford greater convenience in shipment, less space being required, and also less liability to breakage in transit when the lugs are separate as well as greater facility in casting, thus saving in time of workmen and in material which a separate design allows, as well as allowing a stock of lugs to be kept on hand to replace those which are broken.

We attain these objects by the means illustrated in the accompanying drawings in which,

Fig. 1 is a view looking down on the grate bar C from above showing the holes G—G' cast in the grid or frame and lug fitted in G'.

Fig. 2 shows a side view of grate bar C with means for fastening lug A.

Fig. 3 is a cross section view of bar C and lug A taken on Fig. 1 at I—I.

Fig. 4 is a side view of lug.

Fig. 5 is a side and edge view of pin designed for fastening lug A in bar C.

Similar letters refer to similar parts throughout the several views.

In place of a rigid lug cast as an integral part of the grate bar, we cast the grate bar with holes which may be of various symmetrical shapes such as oblong, square, round, elliptic, hour-glass or diamond or other shape a preferred type being larger at

the top than at the bottom, and with two or more sides tapered with a bevel of from one to fifteen degrees towards the bottom of the bar that the lug may be dovetailed into one of these holes and held there firmly by gravity. The taper or bevel of the sides is just sufficient to hold rigid the lug when lateral pressure is applied to it in shaking.

In the drawing submitted the hole cast in the grate bar is oblong and the end walls taper or converge towards the bottom of the bar. One or more holes are made in the grate bar either at the middle or near the ends or either or both as the case may require. Where the opposite ends of a grate bar are capable of being reversed or are interchangeable in the supporting hanger or carrier bars, but one hole or slot may be required, the grate-bar on the left hand side of the fire box being reversed for the right hand side of the fire box, and the lug within the grate bar being reversed. This double reversal eliminates the necessity of a second hole or slot and allows the lug to connect with the shaking bar on the right hand side of the fire box. In the drawing these holes G—G' are cast in the bar C near the ends of the frame, one or both of which may be used for lugs and the lugs may be reversed or one lug may be omitted without interfering with the efficiency of the grate bar inasmuch as the hole left merely makes another interstice.

Fig. 4 is a side elevation of the lug which is cast with a taper corresponding with the taper in the holes, into which it dovetails. The opposite sides of the lug and the opposite sides of the holes have a similar taper in order that the lugs may be reversed. The upper portion of the lug exactly corresponds in size and shape with the hole in the bar and dovetails neatly into it. In the lug A a small transverse hole J is made of shape for the fastener B to fit into.

This lug A may be of various shapes. The one illustrated is for a locomotive of modern type and may be made of similar metal to that of the bar or of other or stronger or lighter metal and may be cast iron or cast steel malleable cast or drop forged or made by other process and is designed for lightness and strength. The taper or bevel K on the lug Fig. 4 is the same as the taper or bevel of the holes G—G' Figs. 1 and 3: The design of this lug thus allows of its being reversed in the holes.

Fig. 3 shows a cross section of lug and bar C taken along I—I Fig. 1 showing hole J and pin B. This hole is cast in the lug oblong in shape, so that the top of the hole J shall be within and a short distance from the bottom of the bar C in order that any slack may be taken up by the split pin B.

Fig. 4 shows a side view of the lug A

with the split pin B driven through the hole J.

Fig. 5 shows split pin B for fastening lug A made of two pieces of steel or other metal with taper on the under side as shown. This is made of two pieces of thin metal which are joined together by means of a rivet or spot welded at p. The wings of the split pin B are given a bend away from each other as shown in Fig. 1 at r. Other fastenings may be used as for instance bolt or screw.

We do claim as our invention and desire to secure by Letters Patent.

1. A grate bar adapted to be shaken, provided with a plurality of spaced-apart identically formed holes extending therethrough from the top to the bottom of the bar and tapering downward, said holes constituting draft openings and shaker arm receiving openings in combination with a shaker arm comprising a head portion fitting in one of said holes and a depending portion attached to said head portion and extending below the grate bar, said head portion being adapted to fit within any one of said holes.

2. A grate bar adapted to be shaken provided with a plurality of spaced-apart identically formed slots extending therethrough from the top to the bottom of the bar and tapering downward, said holes constituting draft openings and shaker arm receiving openings in combination with a shaker arm comprising a head fitting in one of said slots and a depending portion obliquely arranged with respect to said head and extending below the grate bar, and being provided with a transverse key receiving aperture adjacent the lower surface of the bar, and a key in said aperture preventing the displacement of said head, said arm being adapted to fit within any one of said slots with its depending portion inclined obliquely to the plane of the bar.

3. A grate bar adapted to be shaken provided with a plurality of spaced-apart identically formed holes extending therethrough from the top to the bottom of the bar, said holes constituting draft openings and shaker arm receiving openings, in combination with a shaker arm comprising a head portion adapted to fit within any one of said holes.

4. A grate bar adapted to be shaken provided with a plurality of spaced draft holes therein and extending therethrough, in connection with a shaker arm comprising a head portion fitting into one of said holes and a depending portion attached to said head portion and extending below the grate bar, said head portion being adapted to fit within any one of said holes.

5. A grate bar adapted to be shaken provided with a plurality of spaced draft holes therein and extending therethrough, in connection with a shaker arm comprising a head

portion fitting into one of said holes and a depending portion obliquely attached to said head portion and extending below the grate bar, said head portion being adapted to fit
5 within any one of said holes.

6. A grate bar adapted to be shaken provided with a plurality of spaced draft slots extending therethrough from the top to the bottom of the bar and tapering downward,
10 in combination with a shaker arm comprising a head fitting in one of said slots and a depending portion obliquely arranged with respect to said head and extending below the grate bar, said head being adapted to fit
15 within any one of said slots with its depending portion inclined obliquely with respect to the plane of the bar.

7. A grate bar adapted to be shaken provided with a plurality of spaced symmetrically formed draft holes extending there-
20 through, in connection with a shaker arm comprising a head portion and extending below the grate bar fitting into one of said holes and a depending portion attached to

said head portion, said head portion being
25 adapted to fit within any one of said holes.

8. The combination with a grate bar having an inverted frusto-pyramidal opening adjacent one end, and a shaker arm having its upper and lower ends angularly disposed,
30 the upper end of said bar being of inverted frusto-pyramidal form corresponding to the opening in the grate bar and the lower end being of such size as to pass freely through the opening to permit seating of the upper
35 end therein and extending below the grate bar, said opening being perpendicular to the top face of the grate bar and the ends of the arm lying in a plane at right angles to the longitudinal axis of the grate bar whereby
40 the arm may be reversed to have its lower end incline either forwardly or backwardly with respect to the grate bar.

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Witnesses:

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