

(No Model.)

5 Sheets—Sheet 1.

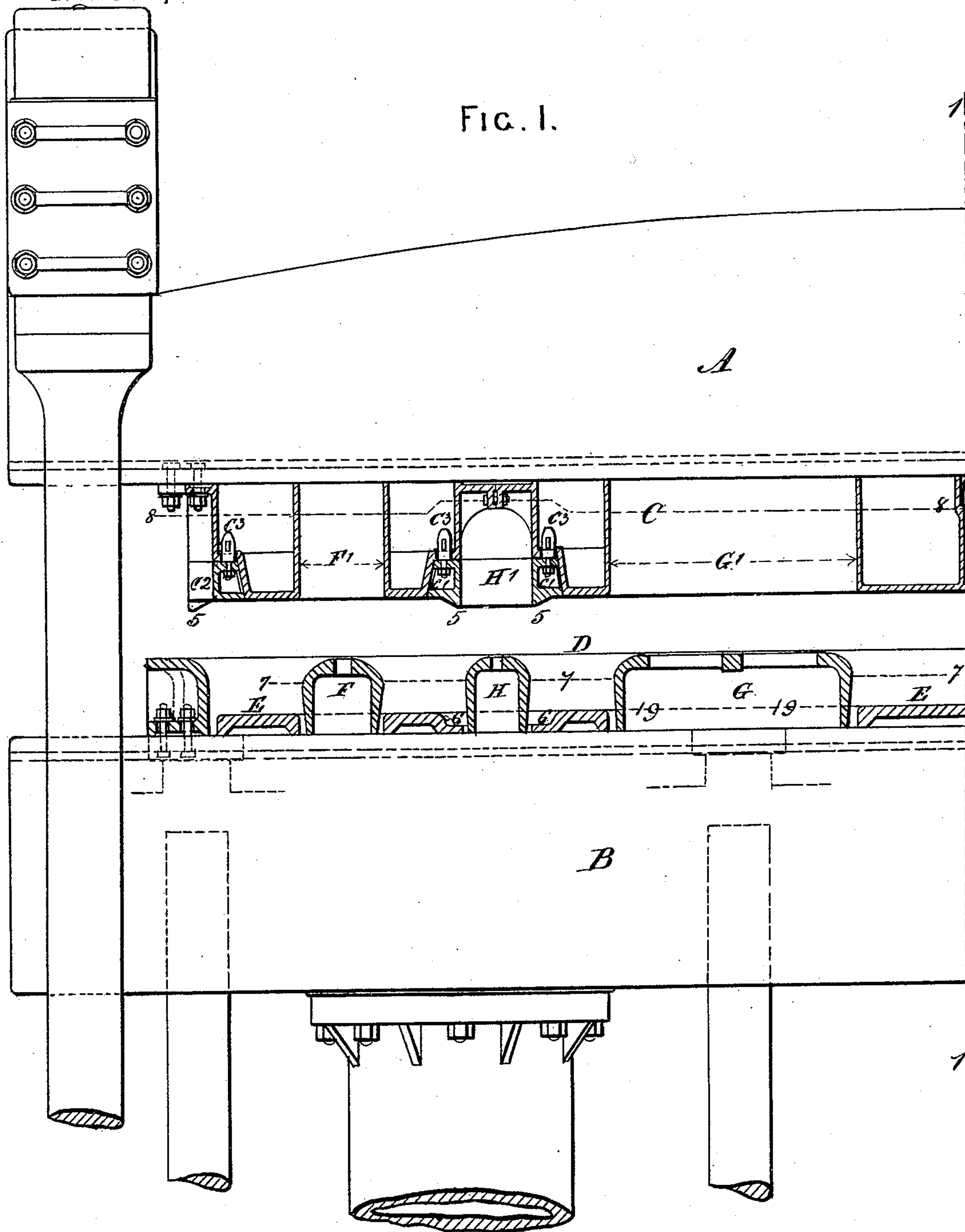
S. FOX.

APPARATUS FOR THE MANUFACTURE OF FRAME PLATES FOR  
ROLLING STOCK.

No. 397,178.

Patented Feb. 5, 1889.

FIG. 1.



Witnesses  
Thos. E. Craven.

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(No Model.)

5 Sheets—Sheet 2.

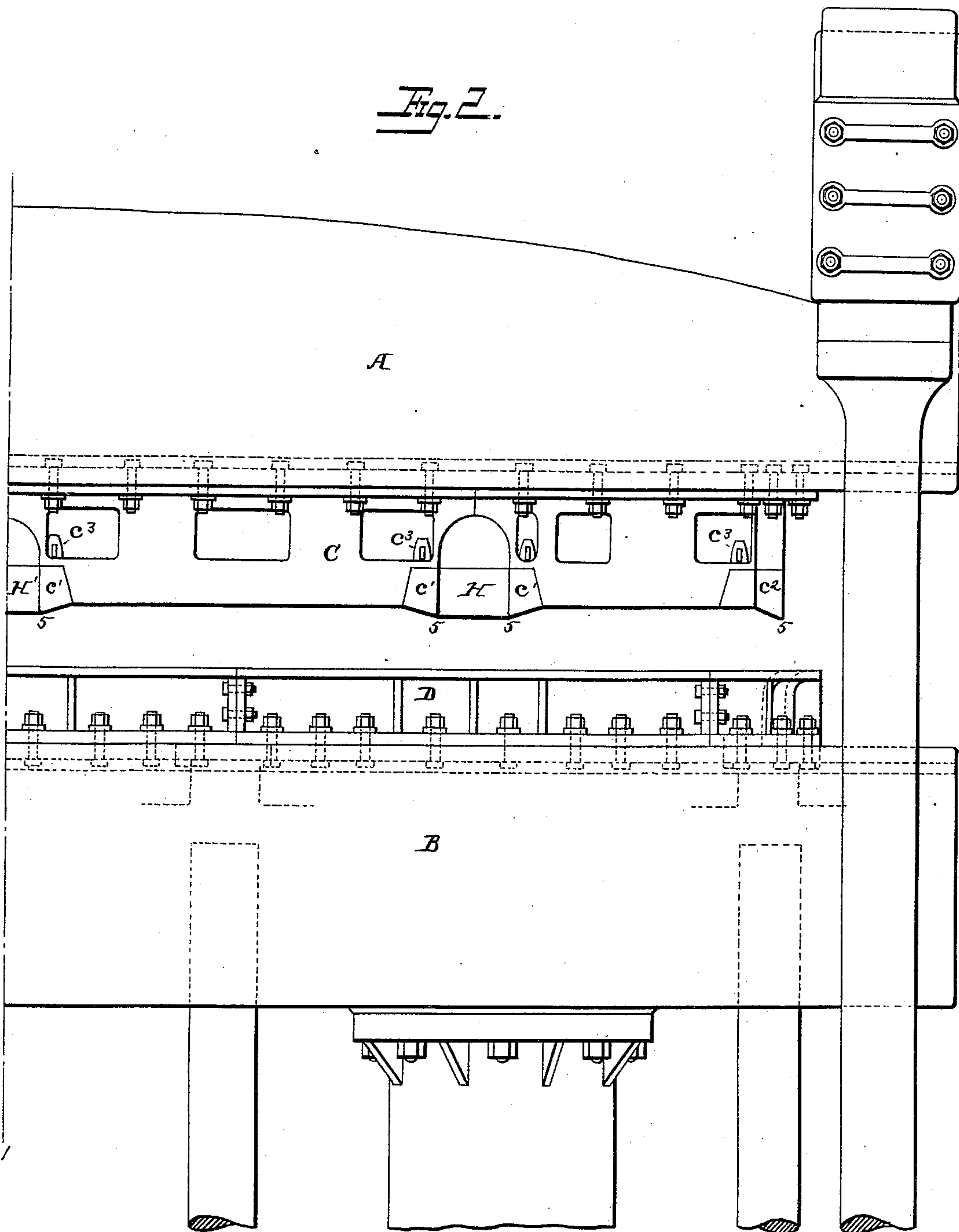
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Patented Feb. 5, 1889.

Fig. 2.



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APPARATUS FOR THE MANUFACTURE OF FRAME PLATES FOR  
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FIG. 3. Patented Feb. 5, 1889.

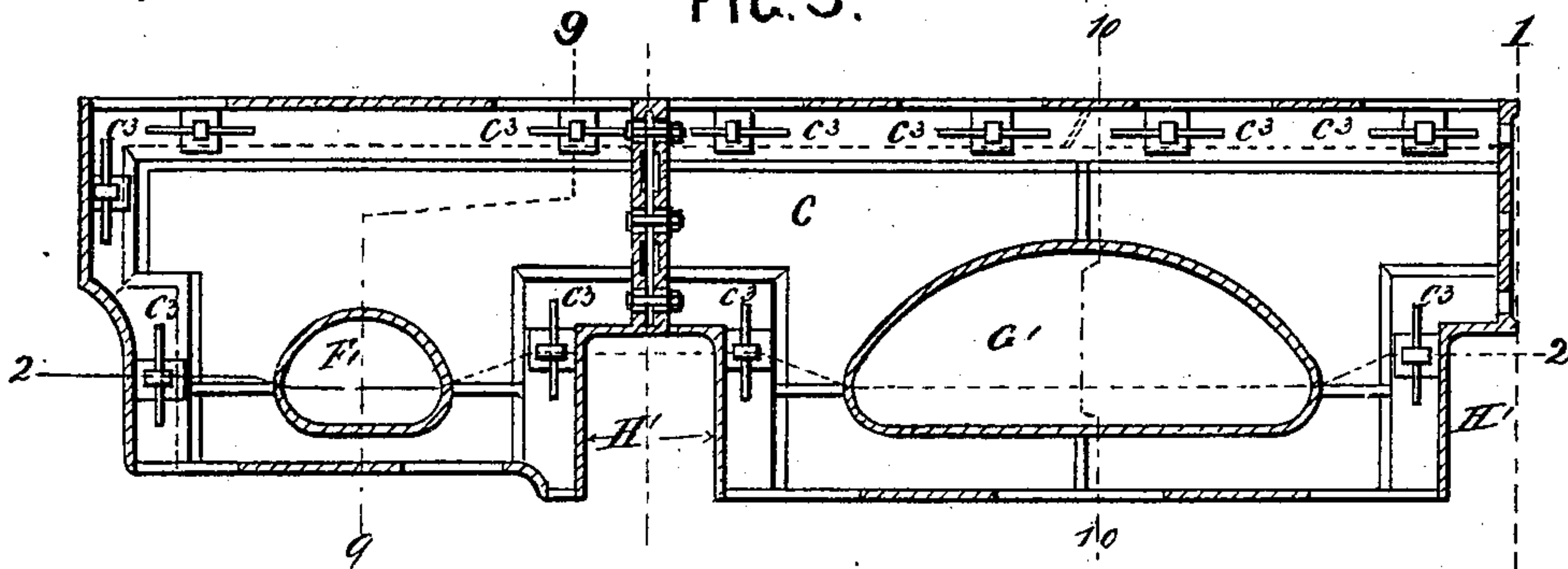


FIG. 4.

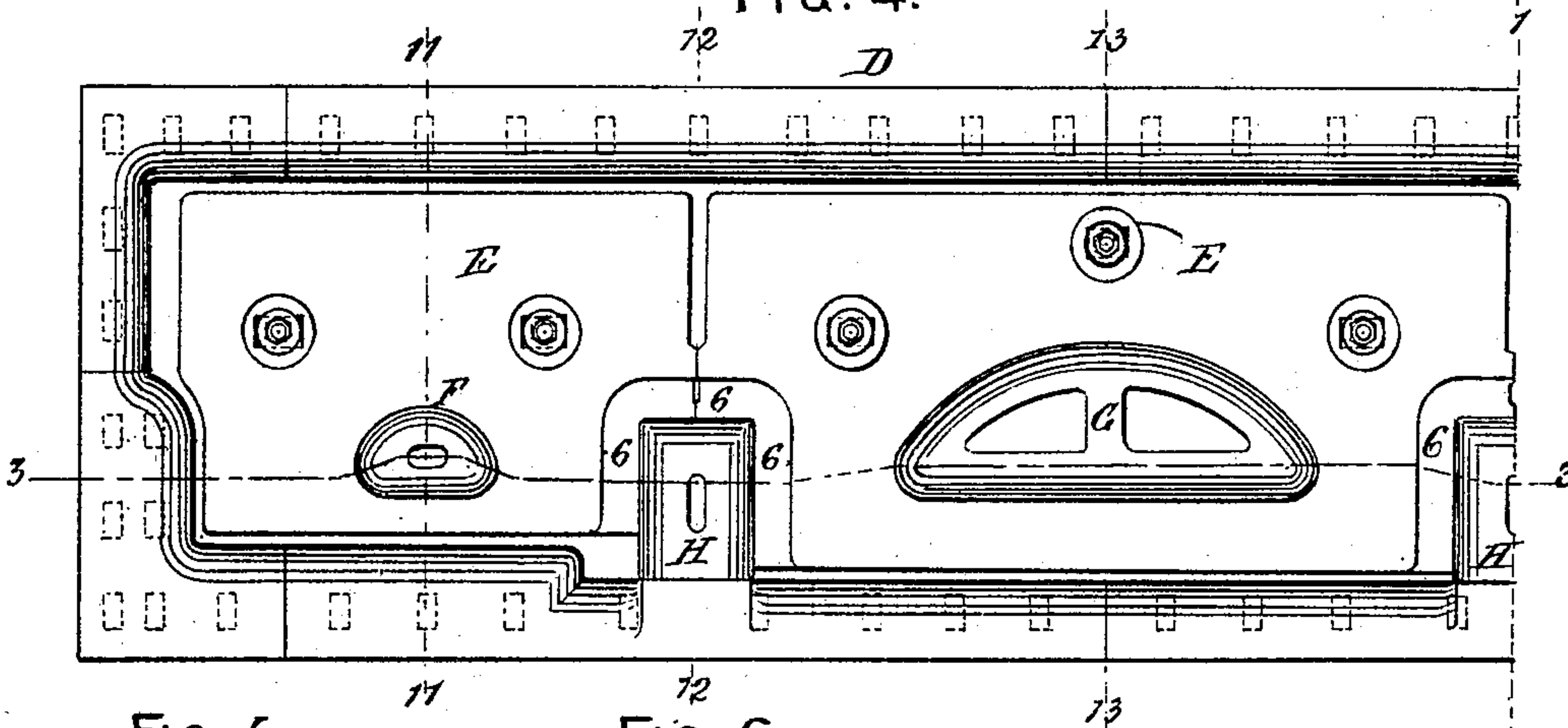


FIG. 5.

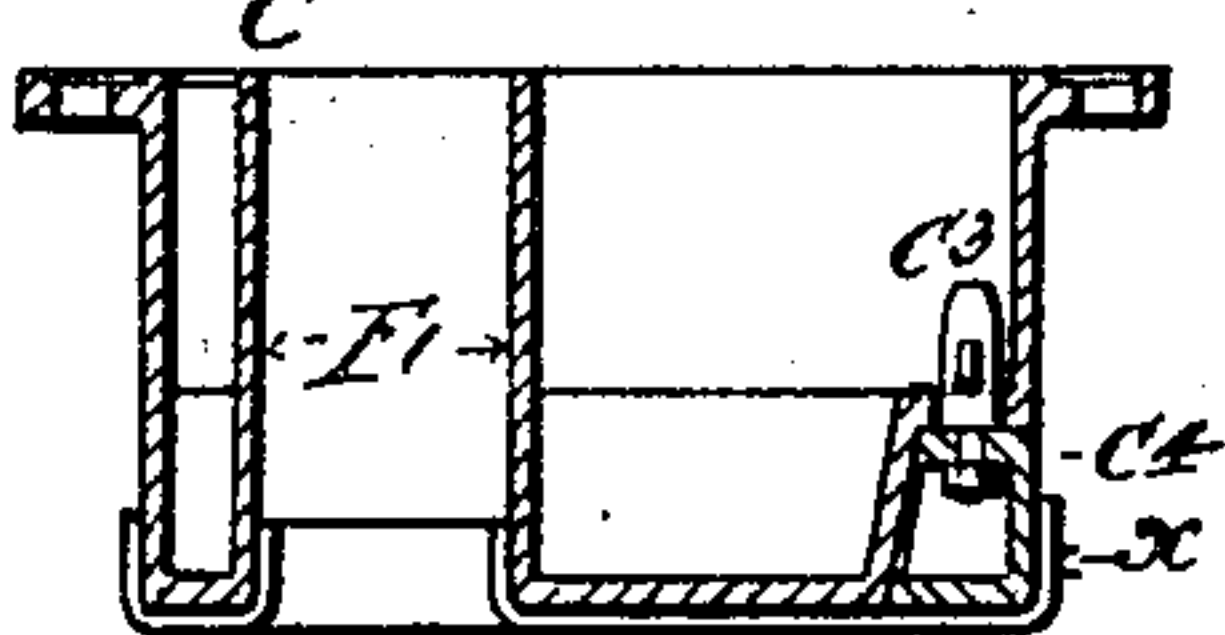


FIG. 6.

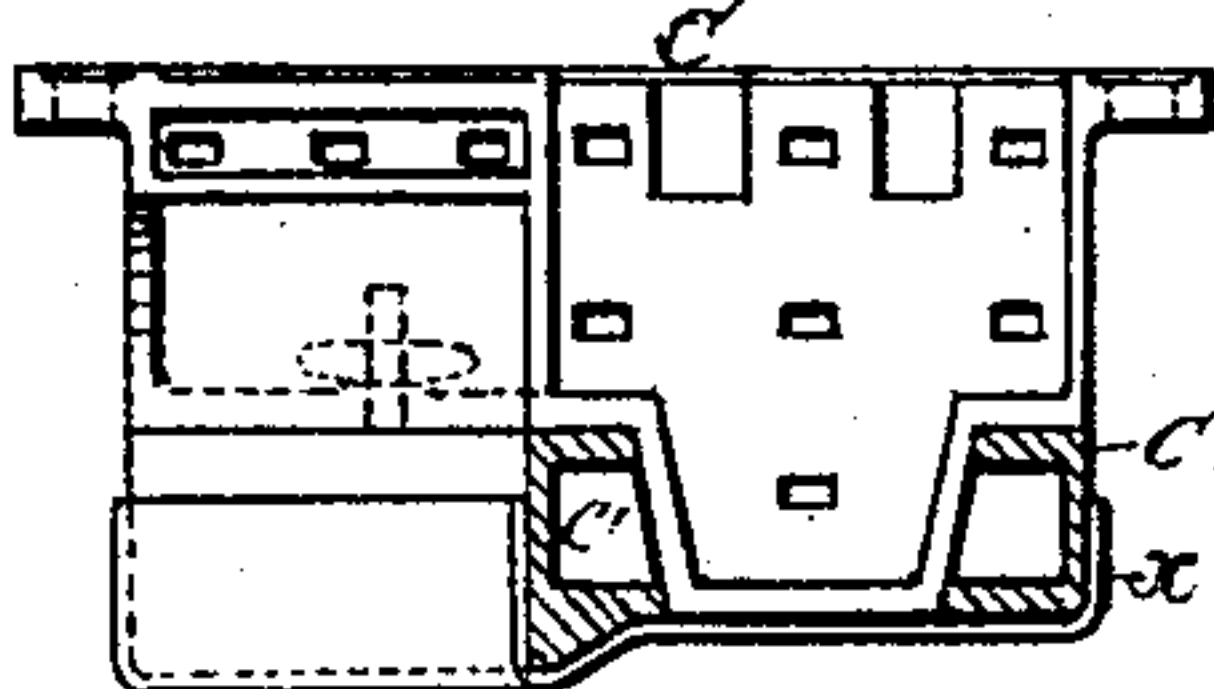


FIG. 7.

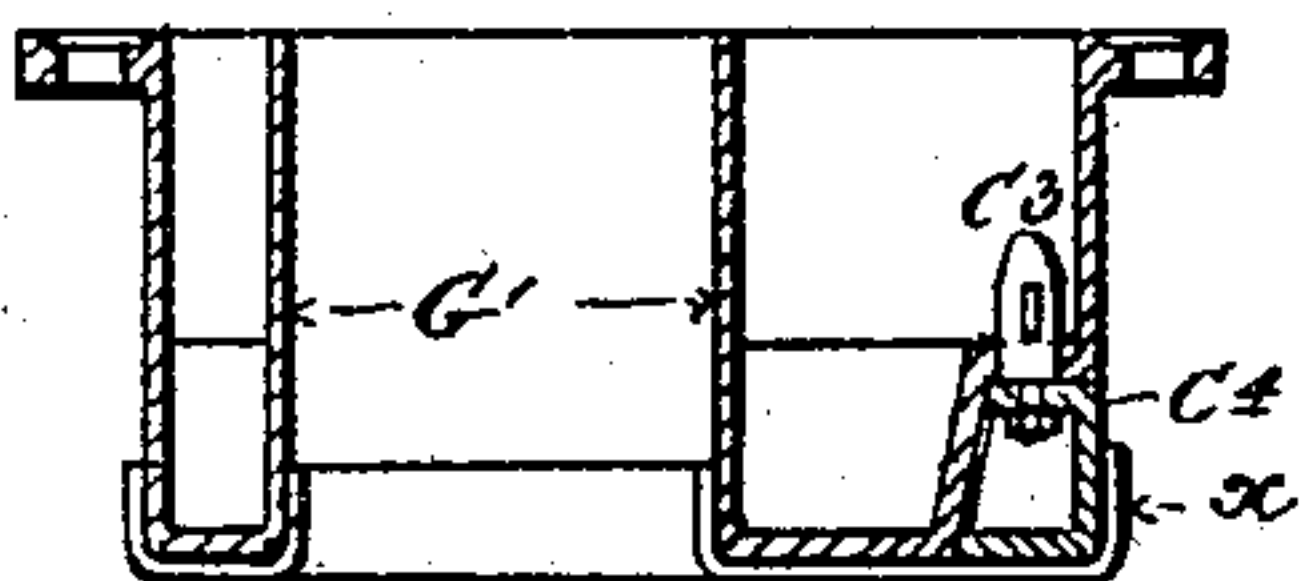


FIG. 9.

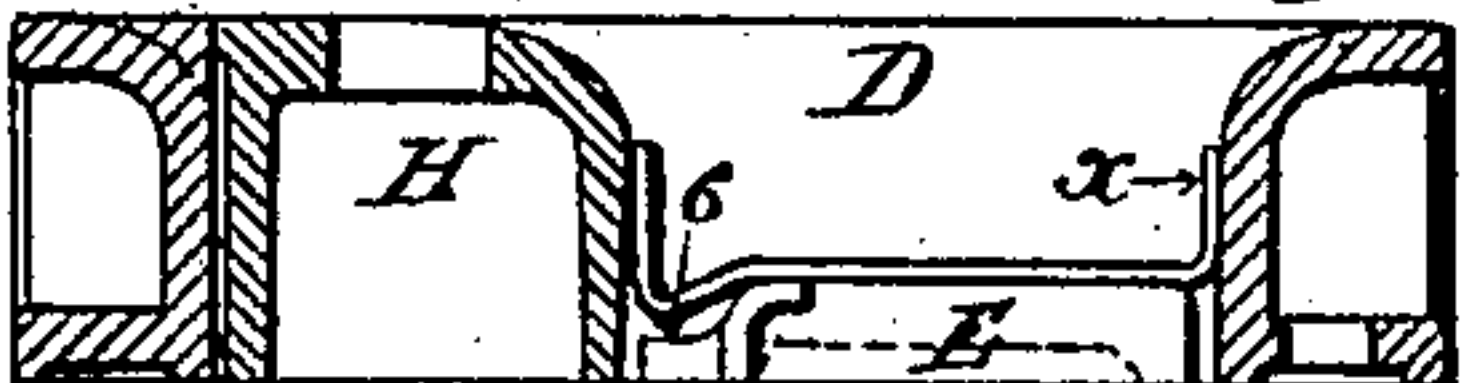


FIG. 8.

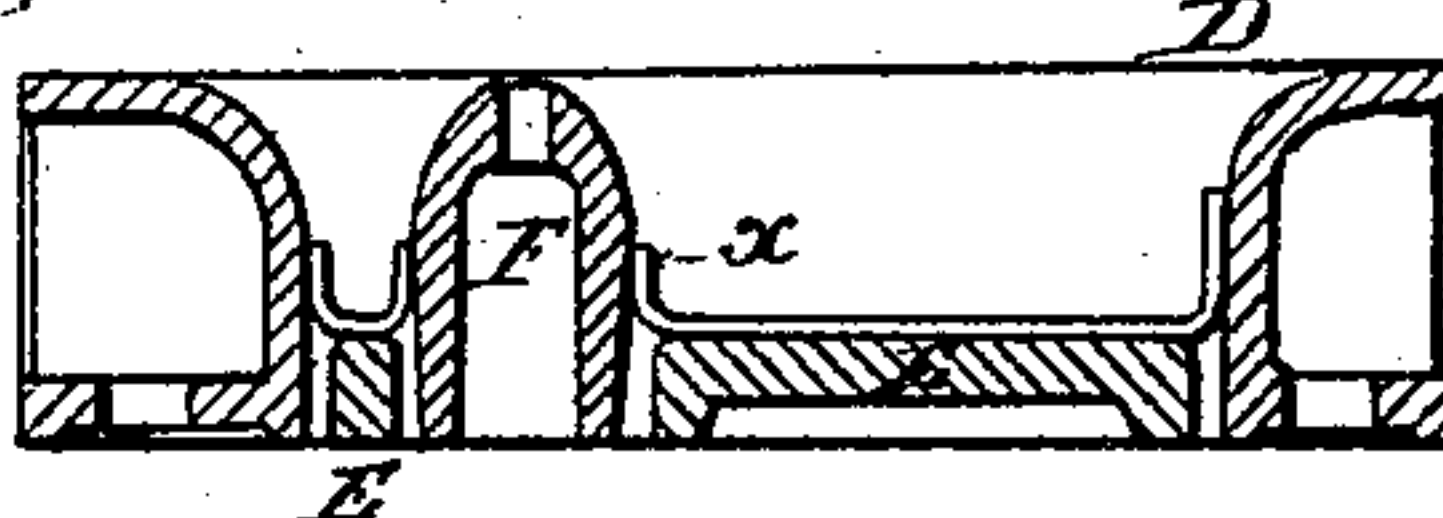
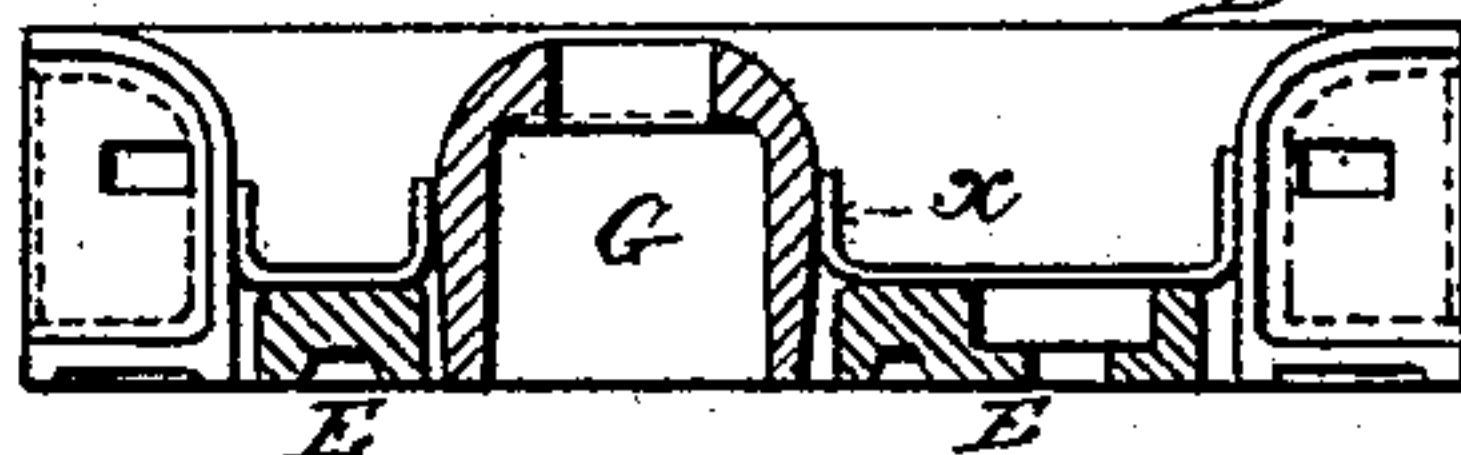


FIG. 10.



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(No Model.)

5 Sheets—Sheet 4.

S. FOX.

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FIG 11

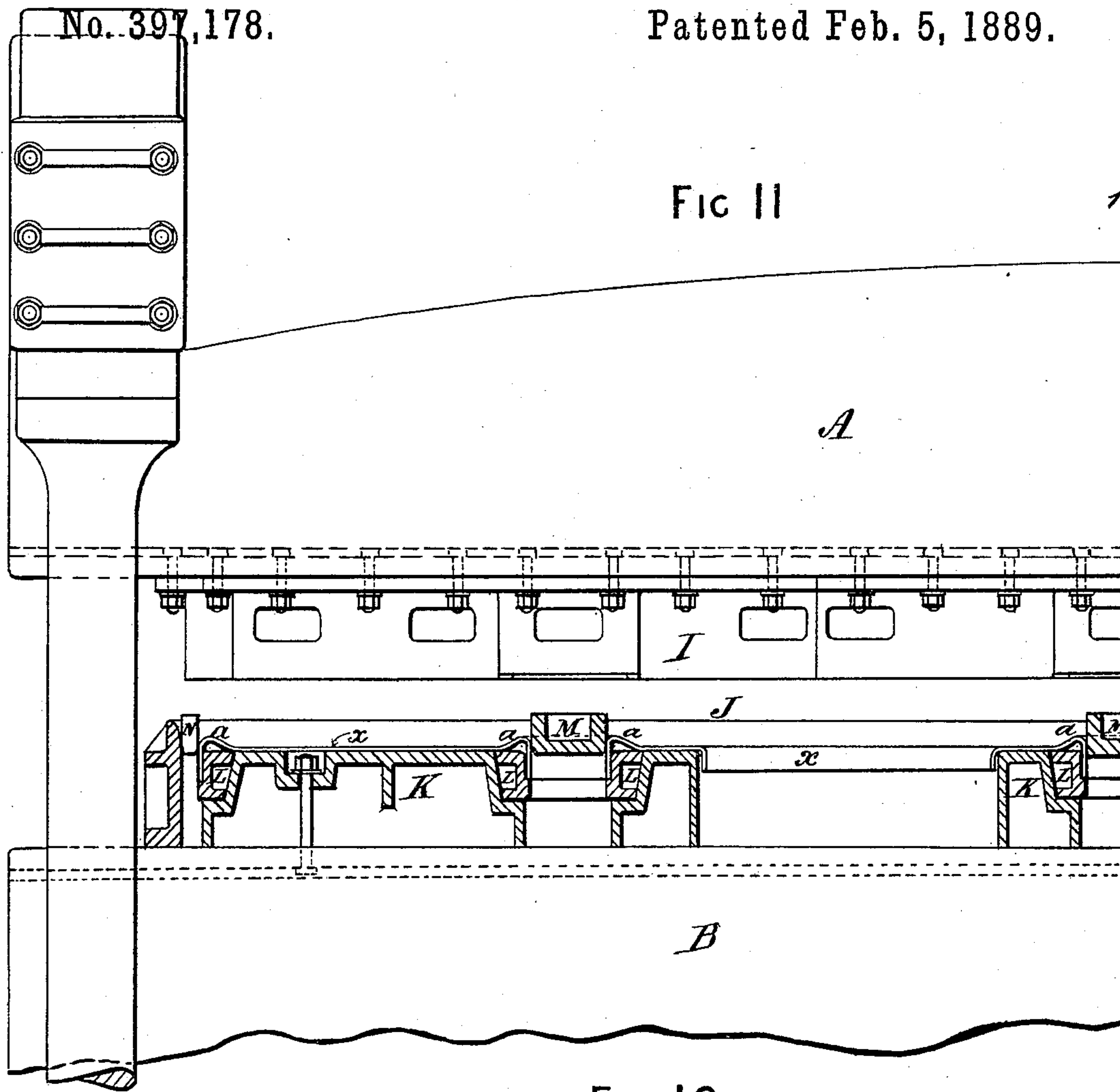
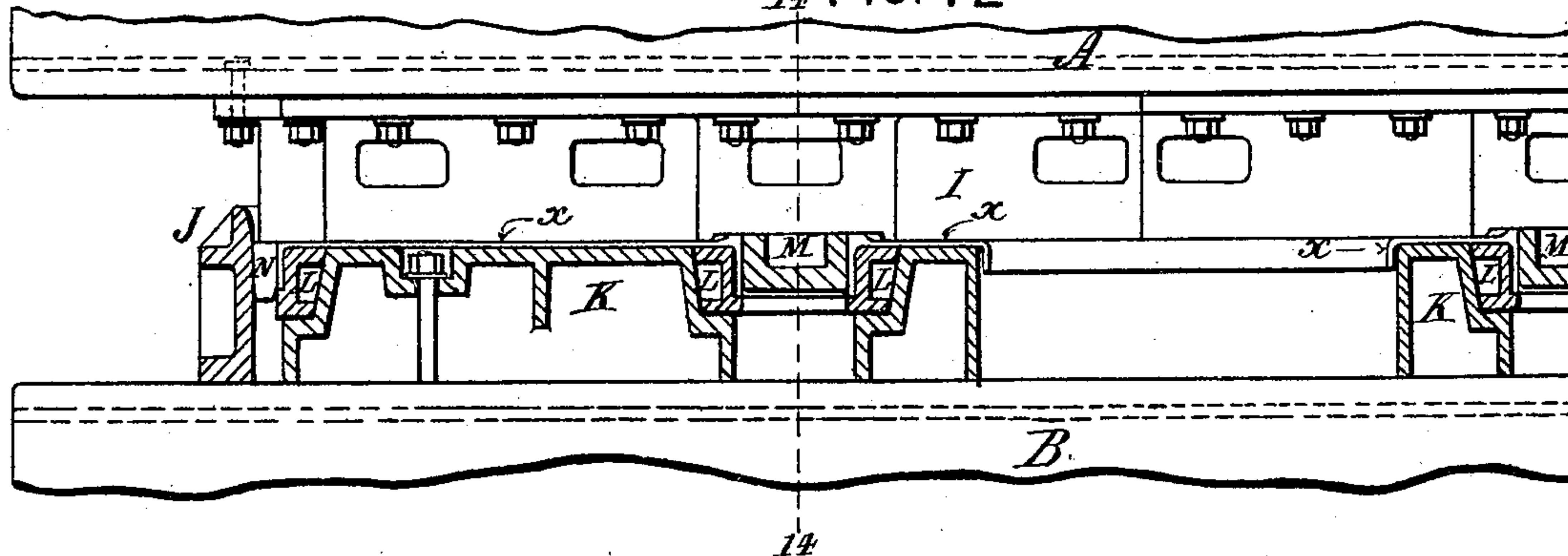


FIG. 12



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(No Model.)

5 Sheets—Sheet 5.

S. FOX.

APPARATUS FOR THE MANUFACTURE OF FRAME PLATES FOR  
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No. 397,178.

Patented Feb. 5, 1889  
Fig. 13.

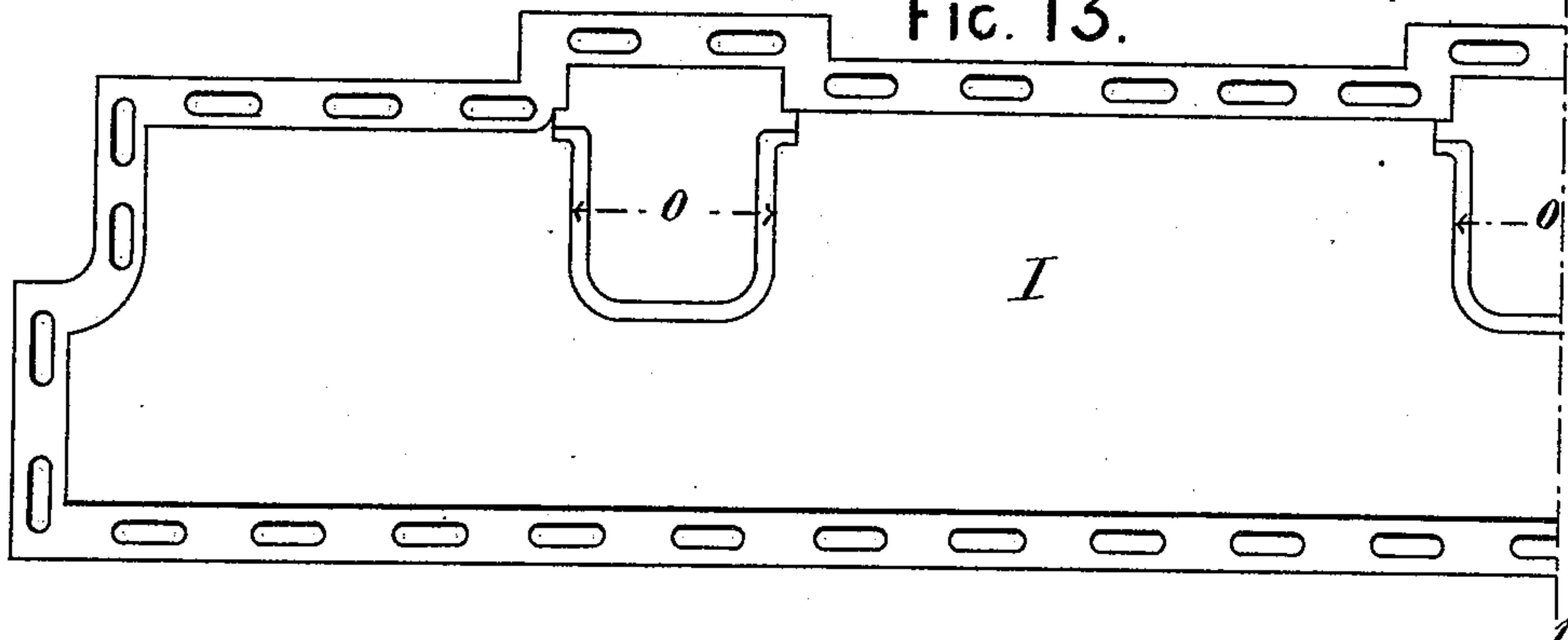


FIG. 16.

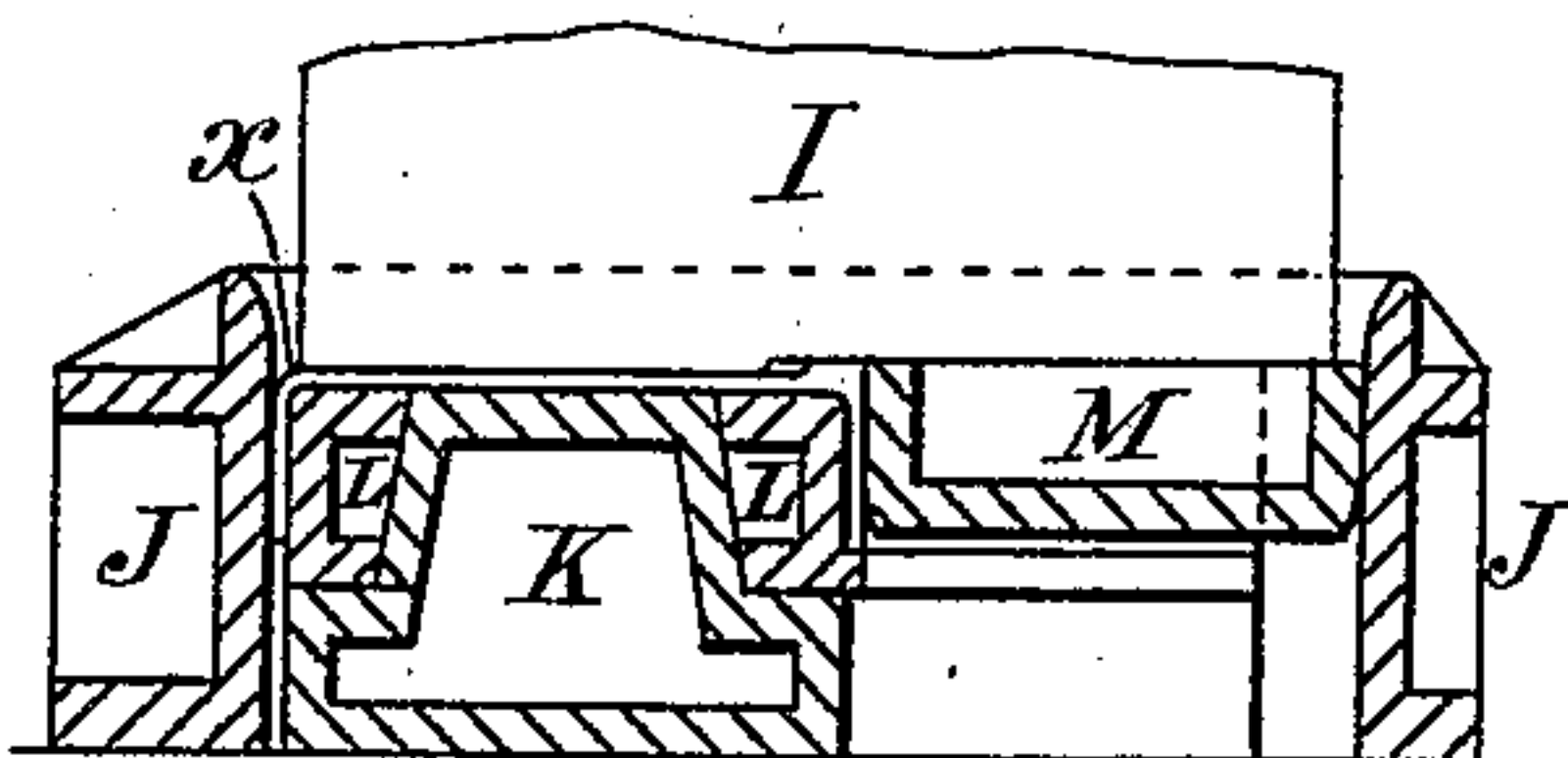


FIG. 15.

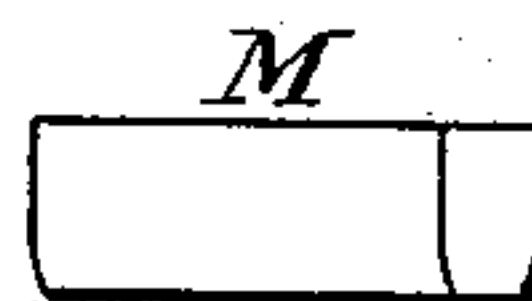
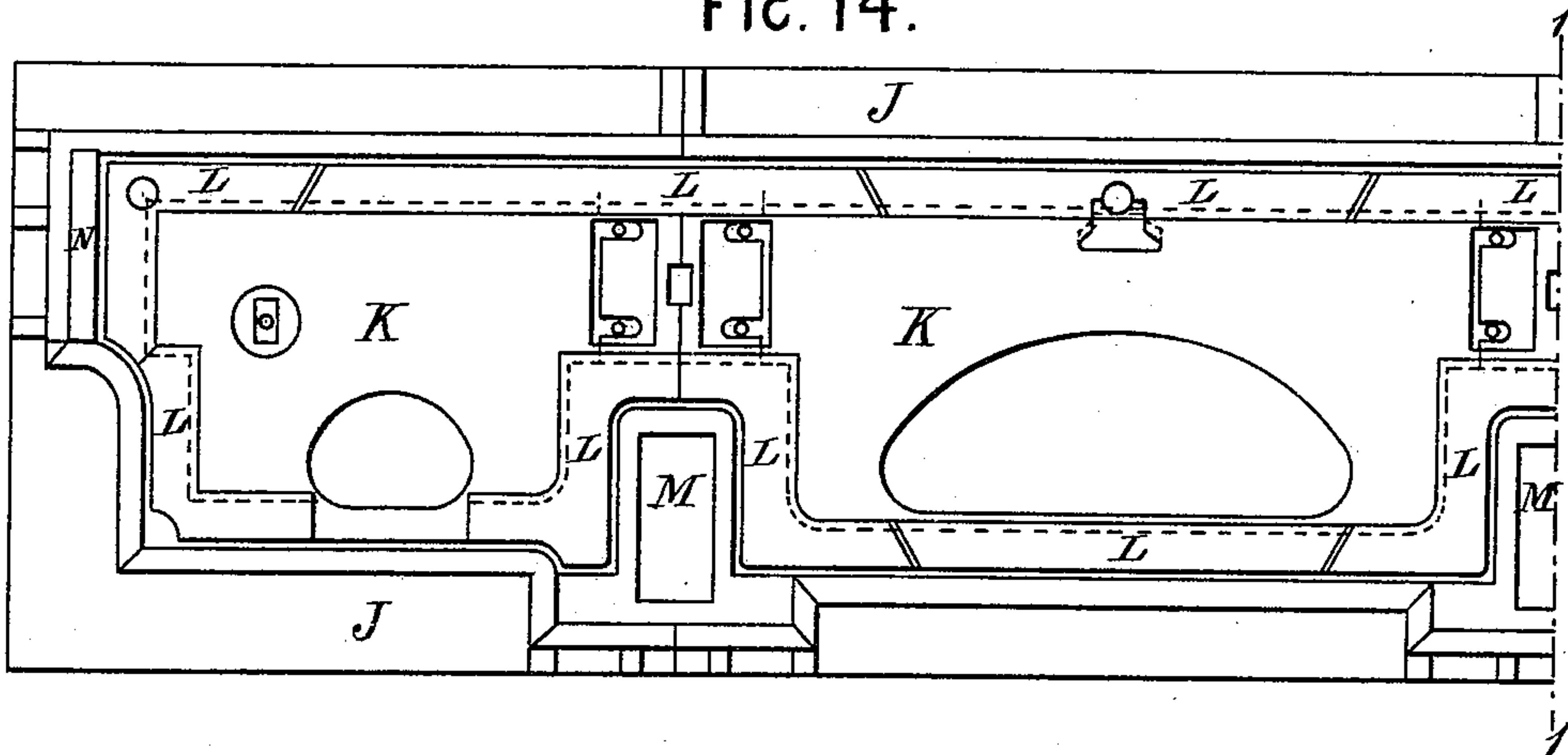


FIG. 14.



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Wm Sadler,

Inventor.  
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# UNITED STATES PATENT OFFICE.

SAMSON FOX, OF HARROGATE, COUNTY OF YORK, ENGLAND.

APPARATUS FOR THE MANUFACTURE OF FRAME-PLATES FOR ROLLING-STOCK.

SPECIFICATION forming part of Letters Patent No. 397,178, dated February 5, 1889.

Application filed January 18, 1888. Serial No. 261,166. (No model.)

*To all whom it may concern:*

Be it known that I, SAMSON FOX, a subject of the Queen of Great Britain and Ireland, residing at Harrogate, in the county of York, Kingdom of Great Britain and Ireland, have invented new and useful Improvements in Machinery or Apparatus for the Manufacture of Frame-Plates for Rolling-Stock; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same.

In the specification of former Letters Patent granted to me under date the 11th day of May, 1886, No. 341,802, is described a manufacture of flanged frame-plates for locomotives and other rolling-stock, each made with flange or flanges in one piece of metal in the manner set forth in said specification, and in the specification of other Letters Patent bearing date the 3d day of August, 1886, No. 346,539, machinery or apparatus is described for the manufacture of said frame-plates.

According to a further invention described in the specification of an application for Letters Patent of even date herewith, Serial No. 261,165, I construct frame-plates such as aforesaid in one piece of metal, not only with flange or flanges at one side, but also with a fillet or fillets around the openings for the axle-boxes, and with square internal corners therein and square corners at the ends of the frame-plates, by producing bulgings or embossments at and around such parts, and afterward by pressure forming out of the metal of such bulgings or embossments the required fillets and square corners.

Now my present invention has reference to machinery or apparatus for performing these operations, as I will proceed to describe with reference to the annexed five sheets of drawings.

Figure 1, Sheet 1, shows to line 1, in elevation, part of a hydraulic machine, with male die C in section on the line 2 2 of Fig. 3, and female die D in section on the line 3 3 of Fig. 4, corresponding to half the length of the frame-plate to be produced. Fig. 2, Sheet 2, shows, in elevation from the line 1, the other half of the machine. Fig. 3, Sheet 3, is a sectional plan of male die C C' C<sup>2</sup> on line 8 of Fig. 1. Fig. 4, Sheet 3, is a plan of female die and flooring E, with punches F, G, and H

in their places in the machine. Fig. 5, Sheet 3, is a sectional elevation of male die C C' C<sup>2</sup> on line 9 of Fig. 3. Fig. 6, Sheet 3, is a sectional elevation of male die C C' C<sup>2</sup> through one of the parts in which the axle-box openings are flanged and bulgings around same are formed. Fig. 7, Sheet 3, is a sectional elevation of male die C C' C<sup>2</sup> on line 10 of Fig. 3. Fig. 8, Sheet 3, is a sectional elevation of female die D, flooring E, and punch F on line 11 of Fig. 4. Fig. 9, Sheet 3, is a sectional elevation of female die D, flooring E, and punch H on line 12 of Fig. 4, showing the recesses 6 in the flooring for admitting the bulged part of the plate surrounding said opening. Fig. 10, Sheet 3, is a sectional elevation of female die D, flooring E, and punch G on line 13 of Fig. 4. Fig. 11, Sheet 4, shows in sectional elevation part of a hydraulic machine with the dies for forming the fillets or projections around the axle-box openings and square corners at the ends out of the bulged portions of the previously-bulged plate. Fig. 12, Sheet 4, is a sectional elevation of part of the machine with the flanged filleted plate compressed between the dies. Fig. 13, Sheet 5, is a face view of the male die 1. Fig. 14, Sheet 5, is a plan of half of the female die J with the inner floor and loose parts and the mandrels M and N in position. Fig. 15, Sheet 5, is a side elevation of the mandrel M; and Fig. 16, Sheet 5, is a cross-sectional elevation showing female die J on line 14 of Fig. 12, also loose parts L L around the axle-box openings and loose parts in section running the whole length of the straight side of the die and around the ends of a flanged filleted frame-plate being shown between dies I and J.

For the purpose of making in one piece of metal a frame-plate with flange or flanges at one side to give the required strength and rigidity, and with a fillet or fillets at the contrary side around the openings for the axle-boxes, according to my present invention, male and female dies of special construction are employed. They are such as to make the said fillets with square internal corners, as also to produce at the ends of the frame-plates square external corners.

A is the head of the machine, and B is the rising table or platform actuated by hydraulic or other suitable mechanism. To the head



A is fixed a compound male die, C C' C<sup>2</sup>, which is of a form corresponding to the general configuration of the intended frame-plate with its flange or flanges, C' C<sup>2</sup> being parts  
5 attached to the principal part C for forming, in conjunction with the female die, the before-mentioned bulgings, which parts C' C<sup>2</sup> are afterward, by suitable means, released from the main part C of the male die.

10 D is a wide-mouthed female die or matrix, the walls of which are curved or rounded inside at the upper part, and upon which the roughly-shaped plate to be treated is placed while hot. This die has an internal configuration corresponding to the outline form re-  
15 quired to be imparted to the frame-plate.

It will be understood, therefore, that the forms of the male and female dies are subject to variation to suit the shape of frame-plate  
20 required.

The female die or matrix D is fixed to the rising table or platform B.

E is the floor of this female die. 6 6 are recesses opposite the projections 5 of the male  
25 die. By these projections and the recesses 6 the bulgings above referred to are formed upon the frame-plate. The floor E is securely fixed to the table B. F and G are punches, which, together with the corresponding open-  
30 ings, F' and G', in the male die, form the flanges around the "lightening" holes in the frame-plate.

H is one of a series of punches which, in conjunction with openings H' in the male die,  
35 effect the flanging and bulging around the openings in the frame-plate for the axle-boxes. All these punches are placed loosely in openings in the floor E of the female die D, and are rounded at their tops to enable  
40 them to turn the said flanges. Below their rounded parts, at and from line 7, they gradually diminish in width as they proceed downward, so as to be free within the newly-formed flanging, and on the recession of the table B  
45 from the male die can be easily removed previously to the flanged plate being taken out of the female die.

It will be understood that the machine comprises not only the parts shown in Fig. 1, but  
50 also those shown in Fig. 2.

Figs. 5, 6, and 7 show the part C<sup>4</sup>, which runs the whole length of the male die, and is fitted thereto with a beveled joint and fixed with bolts and cotters, as in the case of the  
55 parts C' and C<sup>2</sup>, and is released at the same time and in the same manner as those parts—namely, on the flanging operation being completed and removal of the above-mentioned cotters to permit of contraction of  
60 the frame-plate due to cooling. Figs. 5, 6, and 7 also show the flanged frame-plate X upon the male die C, and Figs. 8, 9, and 10 show it as it would be within the female die D before removal therefrom for the next op-  
65 eration or trimming of the edges of the flanges previous to the formation of the

required fillets or projections around the axle-box openings and square corners at the ends.

The male and female dies and mandrels used for this purpose are shown in Figs. 11  
70 to 16, both inclusive. I is the male die attached to the head A of the machine. J is the female die, with its component interior parts or floor K attached to the table B of the machine, and loose parts L fitted to the  
75 said floor with beveled joints, (as in the case of the first-named male die C C' C<sup>2</sup>.) These parts L, being at the upper side of the part K, do not require bolts and cotters, but will rest  
80 thereon.

The frame-plate X, in the form in which it leaves the dies C, C', C<sup>2</sup>, and D, is reheated, and then is placed flange downward in the female die J, as shown in Fig. 11. Mandrels  
85 M (shown in side view in Fig. 15) are placed within the buckled parts of the axle-box openings, and mandrels N are placed between the buckled parts at the ends of the plate and the inner end of the female die J to back up  
90 the metal of such parts during the formation of the projecting fillets and square corners. The whole are then caused to advance against the male die I, the face view of which is shown in Fig. 13. O O are recesses  
95 therein for forming the projecting fillets. The surfaces of these recesses press upon the mandrels M and cause them to descend into the axle-box recesses, pressing at the same time upon the buckled parts of the  
100 frame-plate, and causing the metal thereof to enter or flow into parts of the said recesses and to form the required fillets with square internal corners. The plain surfaces of the male die at the same time press against the  
105 mandrels N, which together form the end bucklings into square-cornered flanges. The completion of this operation is illustrated in Fig. 12, the frame-plate X being shown still  
110 between the dies.

The loose parts L L are arranged as shown  
110 to allow of contraction of the frame-plate during cooling, and as it is being forced from the female die J by the action of sundry small rams of the machine or by other means. These  
115 parts L L, as clearly shown in Fig. 14, when they are in the position there shown, are not in contact at their ends, as shown by the openings, being held outward by the wedge mechanism shown, for instance, in detail in  
120 Fig. 16. Now, the plate having been compressed, as shown in the said drawings, Fig. 16 and in Fig. 12, the bolts and cotters being released which maintain the parts L and the exterior pressing parts in their relation with  
125 the press, as shown in Figs. 5 and 7, by gradually withdrawing the lower plate, B, it follows that these angular pieces will follow down with the metal and permit of the shrinkage of the metal. It is important that this  
130 withdrawal of the press B shall be gradual, allowing for the shrinkage of the metal, for if it were suddenly and rapidly done there would



be a tendency for the metal to warp and shrink out of shape.

I do not in this application claim the process therein described, having made a separate application therefor on the 29th day of November, 1888, Serial No. 291,470.

Having described and ascertained the nature of my said invention and in what manner the same is to be carried into practical effect, I hereby declare that what I claim is as follows:

1. A machine for the manufacture of frame-plates for rolling-stock, comprising a head, a movable platform or table, and actuating mechanism for the said movable platform or table, comprising hydraulic cylinders and rams or their equivalent, a male die attached to the said head, and a female die attached to the said movable platform or table, a floor within the said female die having recesses therein and openings for the reception of flanging-punches, and punches adapted to flange various required openings and to form embossments on a plate under treatment, all substantially as described and shown, for the purposes specified.

2. In a machine for the manufacture or formation of frame-plates for rolling-stock, the combination of a head, a movable platform or table, actuating mechanism, and male die comprising a part, C, parts C' and C<sup>2</sup>, with projections 5, said parts being secured to the principal part C by bolts and cotters C<sup>3</sup>, so that they may be quickly released therefrom, substantially as described.

3. In a machine for the manufacture or formation of frame-plates for rolling-stock, the combination of a head, a movable platform or table, actuating mechanism, a male die with openings, a female die, D, floor E, with openings and recesses 6, adapted to be used in conjunction with punches F G H to enter corresponding openings in the male die, so that when a frame-plate is compressed between the male and female dies it will be flanged at one side and be formed with bulgings or embossments at the other side, substantially as described, for the purpose specified.

4. In a machine for the manufacture or formation of frame-plates for rolling-stock, the combination of a head, A, a movable platform or table, B, actuating mechanism, a male die comprising principal part C, parts C' and C<sup>2</sup>, with projections 5, cotters C<sup>3</sup>, and openings at F', G', and H', a female die, D, a table or floor, E, recessed at 6, and punches F G H, all substantially as described, for the purpose specified.

5. In a machine for the manufacture or formation of frame-plates for rolling-stock, the combination of a head, a movable platform or table, actuating mechanism, male die I, female die J, and floor K, adapted to receive parts L and mandrels M and N, so as to convert the bulged or embossed parts of a frame-plate previously flanged and bulged or embossed into fillets and square corners, substantially as described, for the purpose specified.

6. The combination, in a machine for flanging metal, of a male die and a female die, the said male die having an adjustable outer surface or surfaces, consisting of an independent surface or surfaces normally fitting the metal and pressing the same against the female die, but capable of withdrawal therefrom, thus allowing for the shrinkage of the surrounding metal in the process of cooling, substantially as described.

7. In a machine for flanging metal, the combination of a male and female die for flanging metal, and the punch F, forming part of the female die, and having a greater diameter on the plane 77, first passing through the metal, than it has on the plane 1919, where the metal ultimately rests, substantially as described.

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