

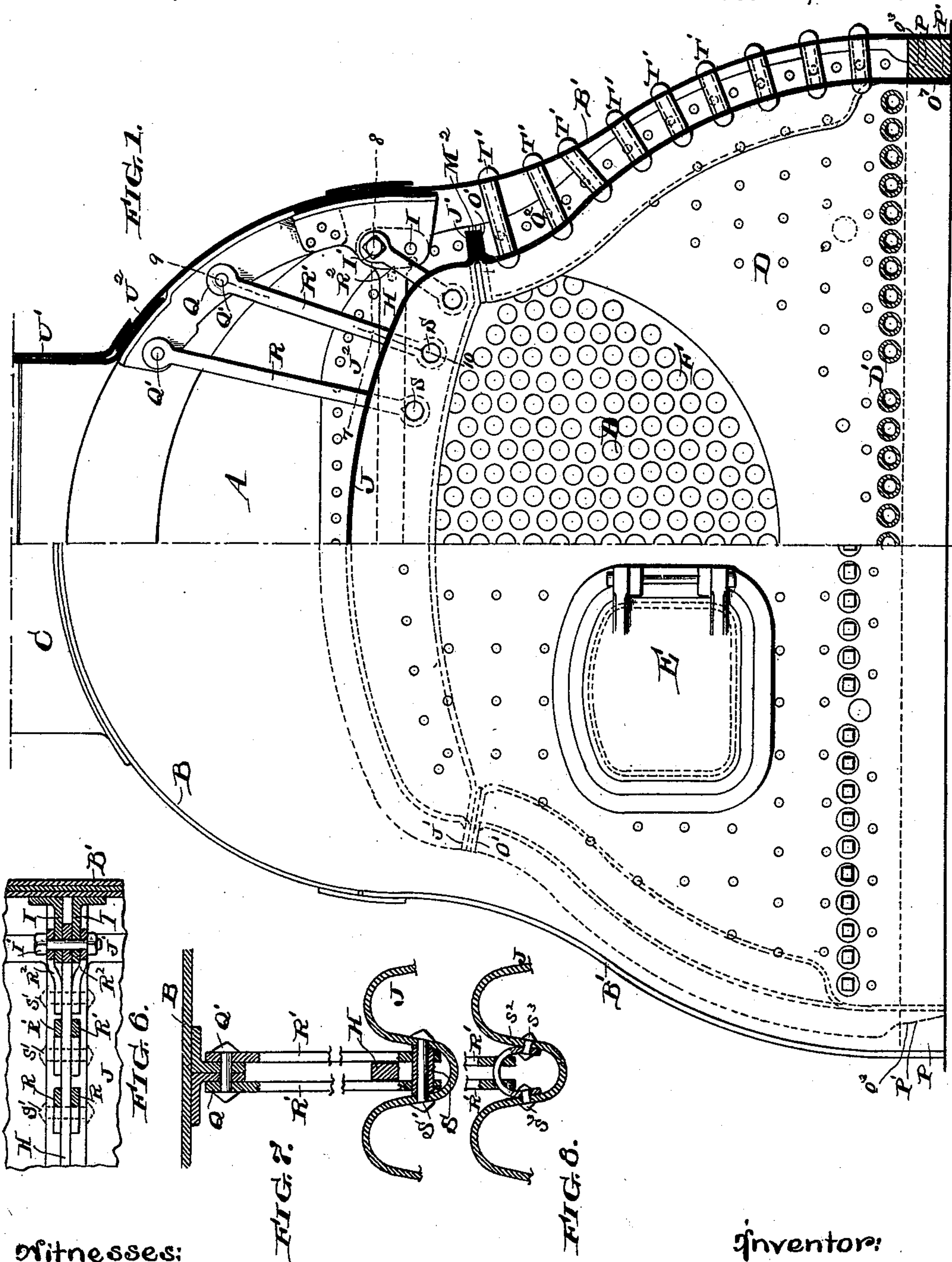
(No Model.)

6 Sheets—Sheet 1.

G. S. STRONG.
BOILER.

No. 466,085.

Patented Dec. 29, 1891.



Witnesses:

Henry Drury
Jesse Heller

Inventor:

George S. Strong
by his atty.
Francis T. Chambers

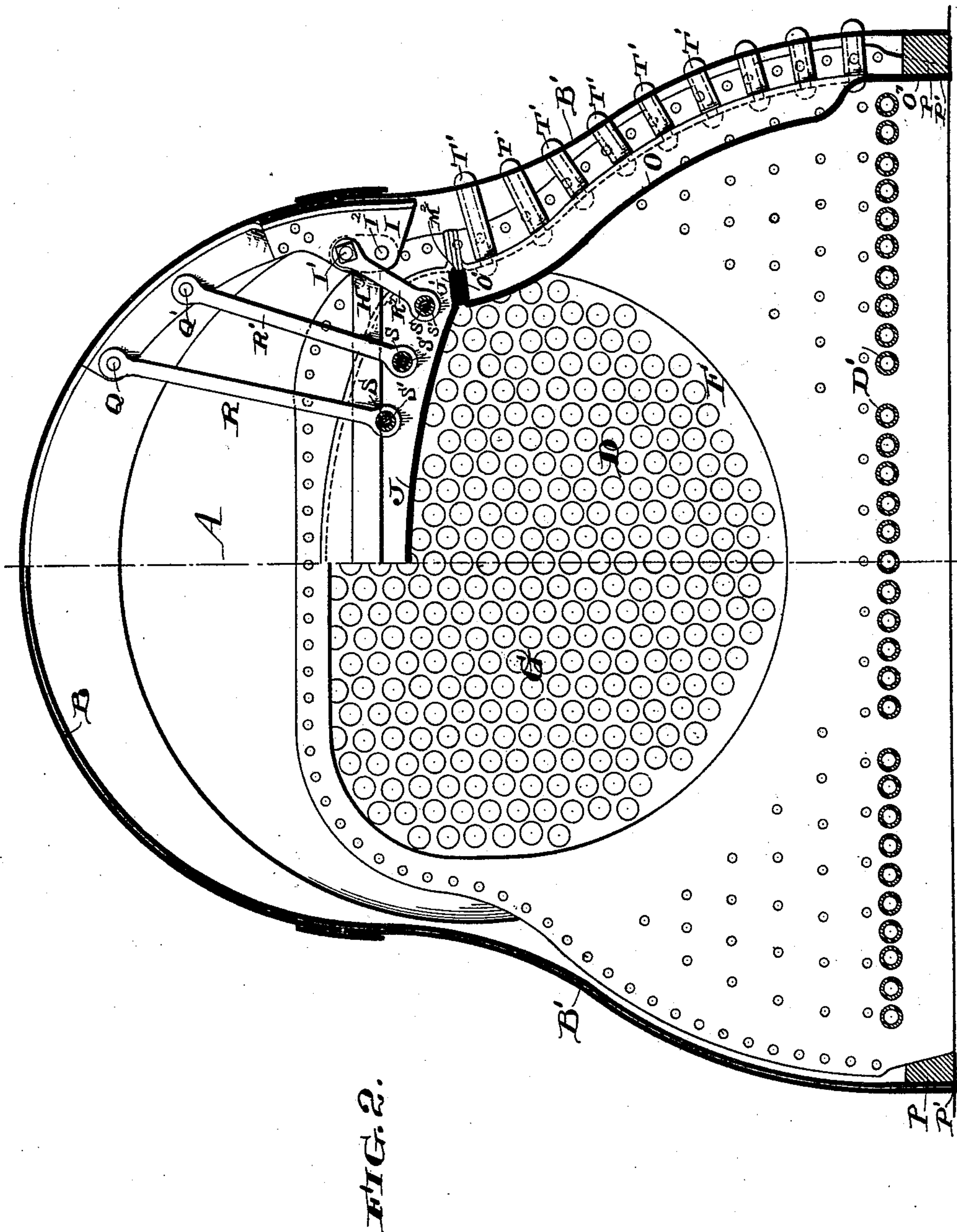
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6 Sheets—Sheet 2.

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Witnesses:

Henry D. Dwyer
Jesse Heller

Inventor:

George S. Strong
by
James T. Chamberlain

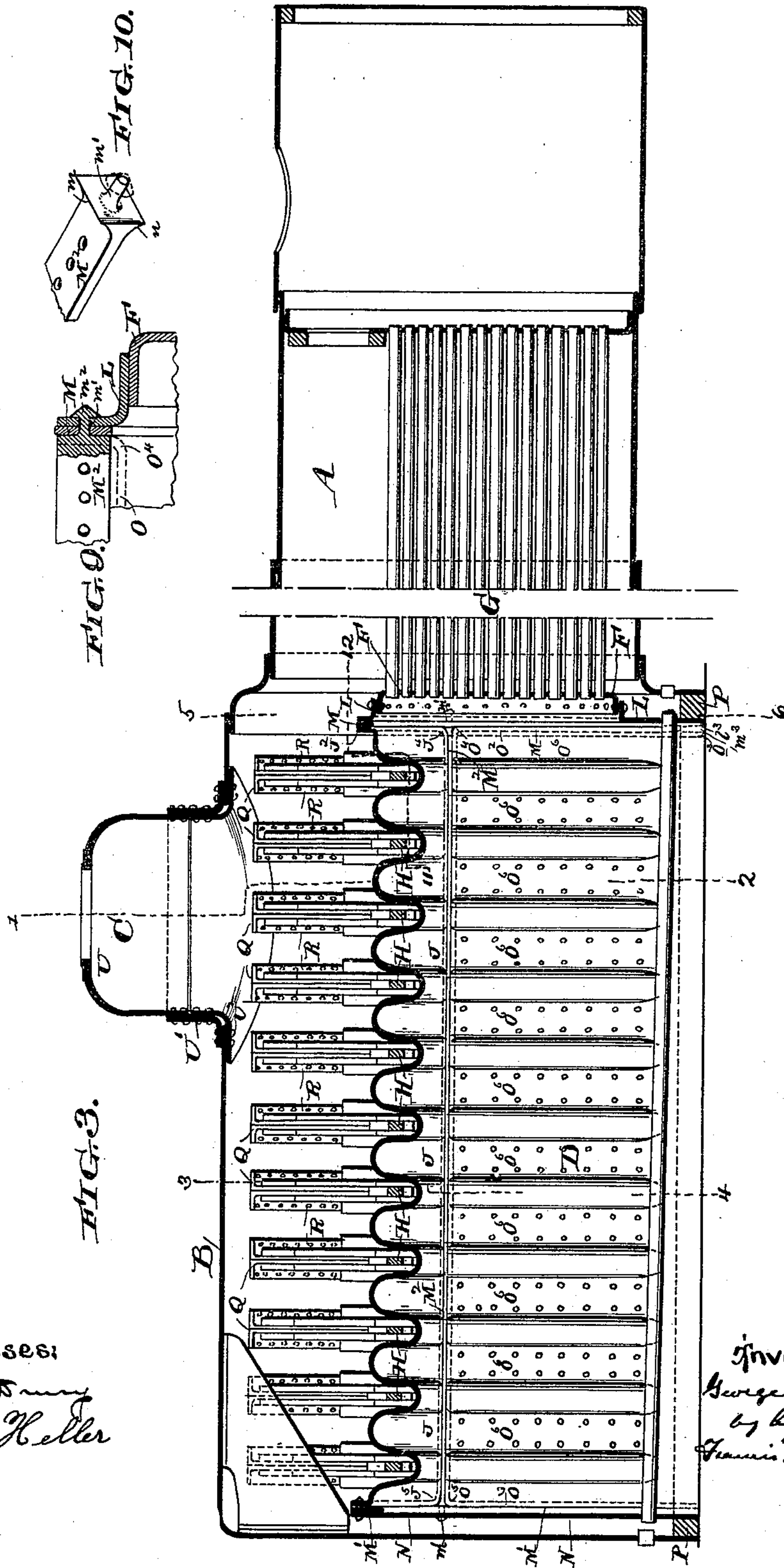
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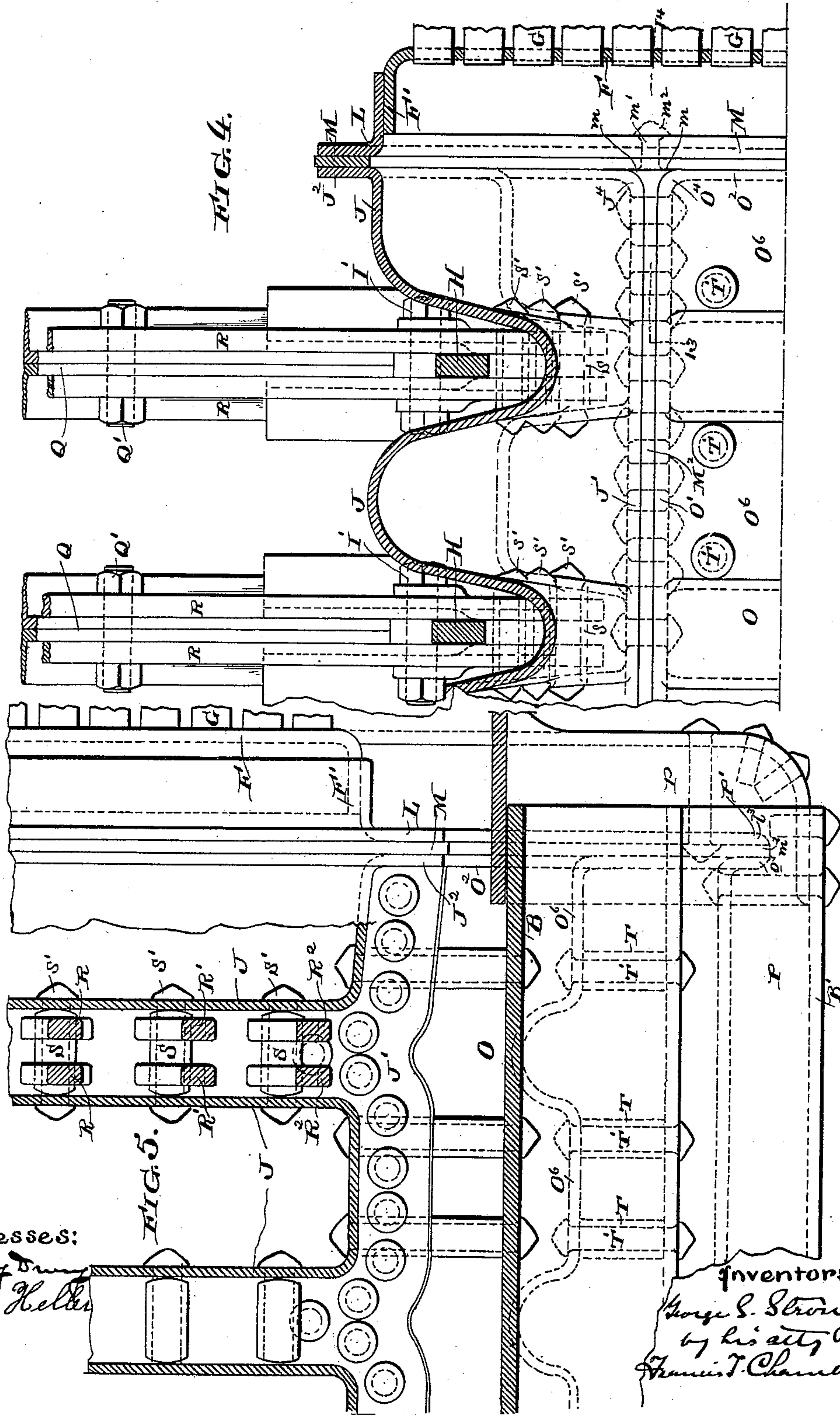
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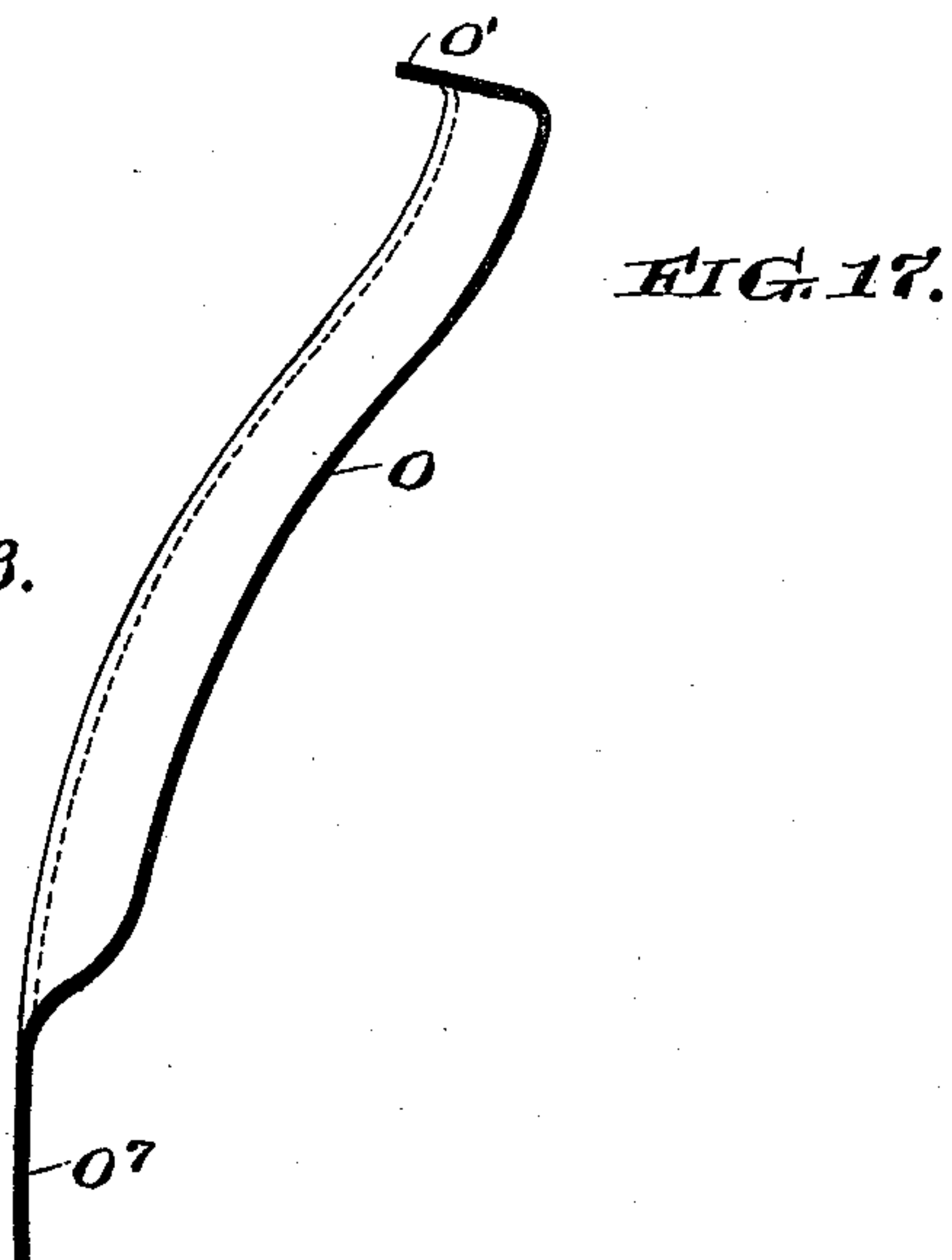
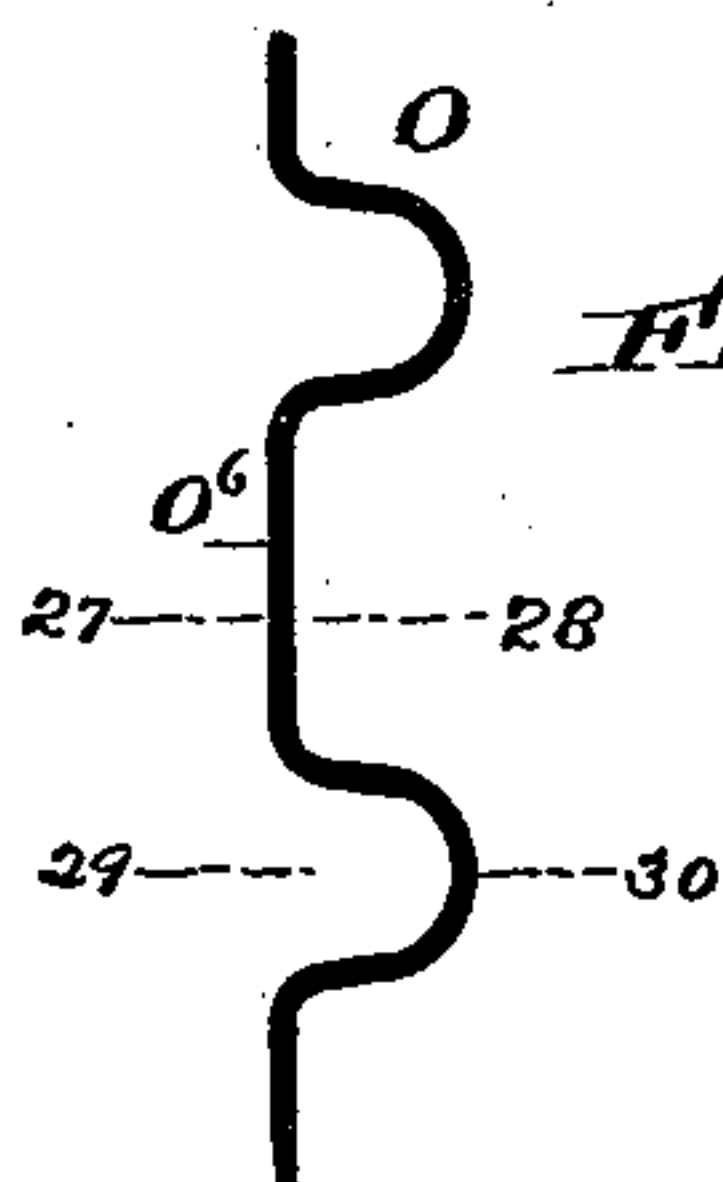
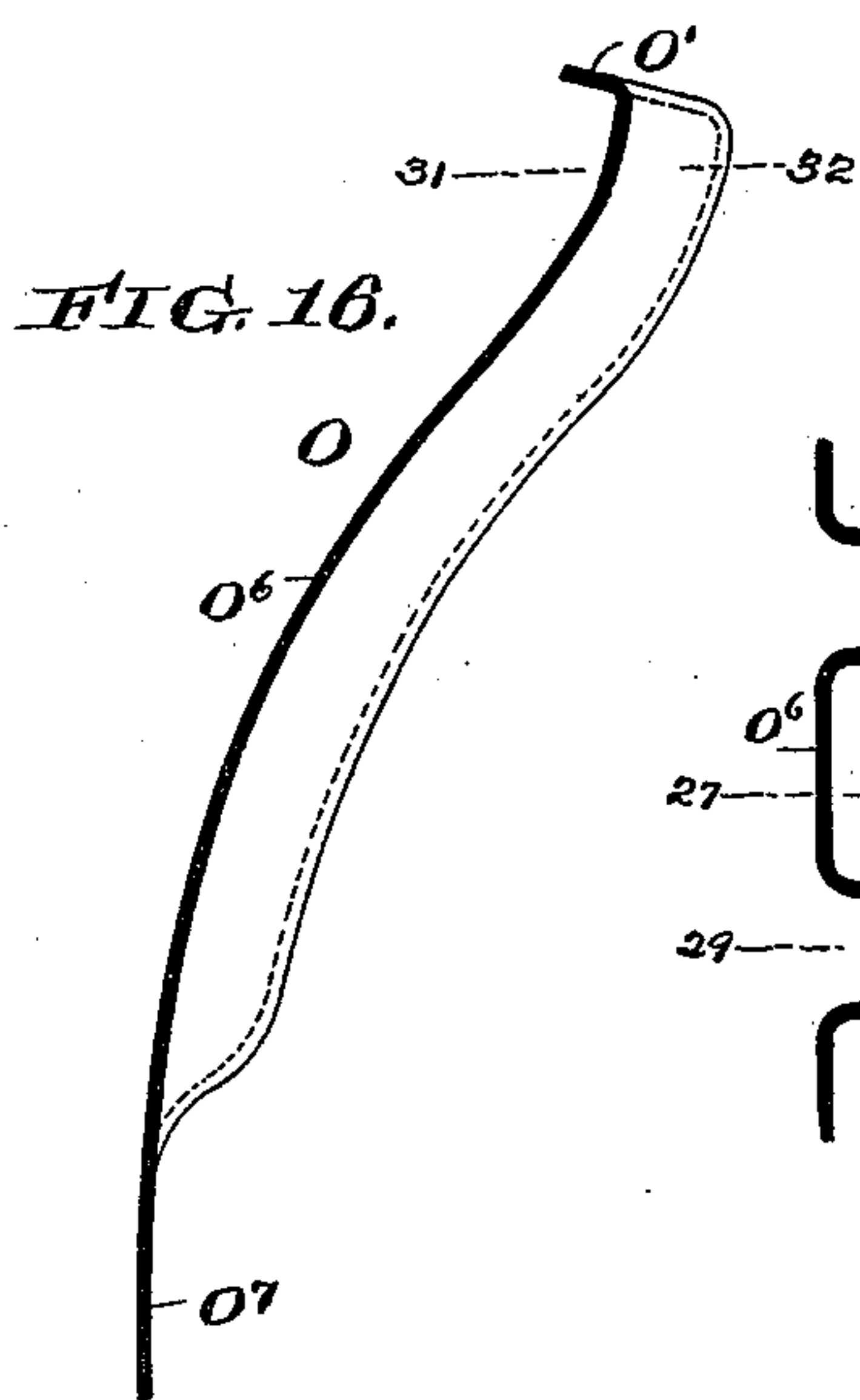
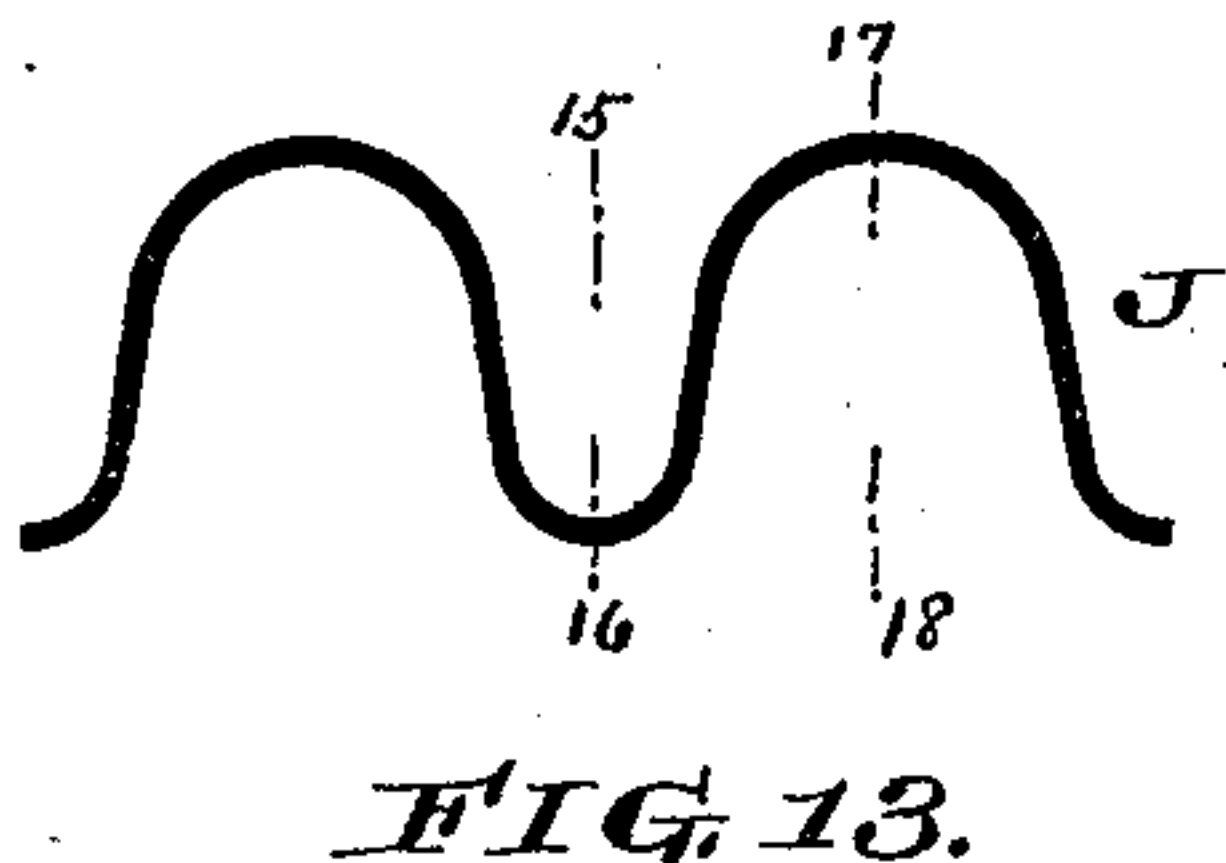
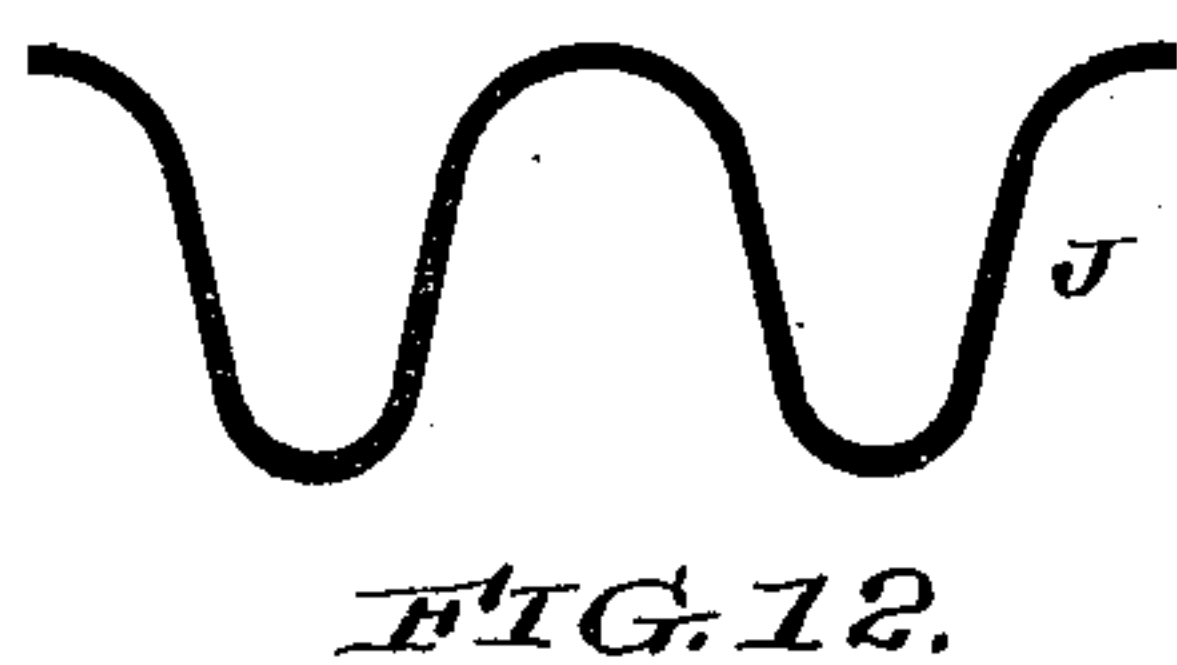
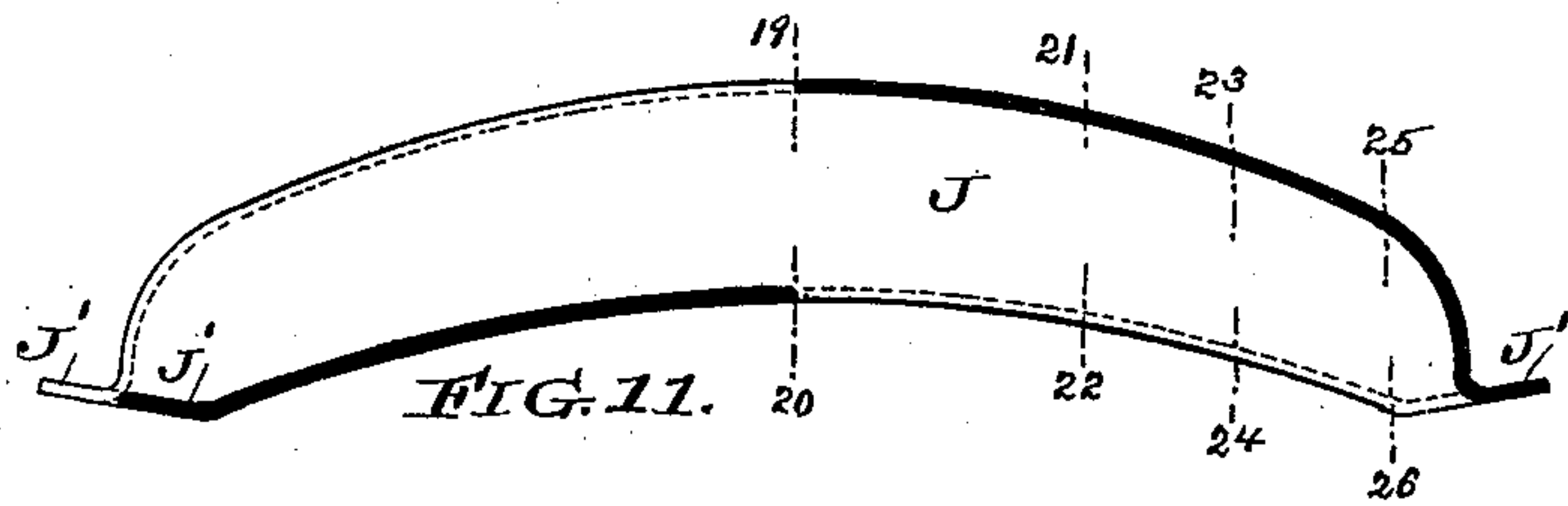
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Patented Dec. 29, 1891.



Witnesses:

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Jesse Heller

Inventor:

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by his atty
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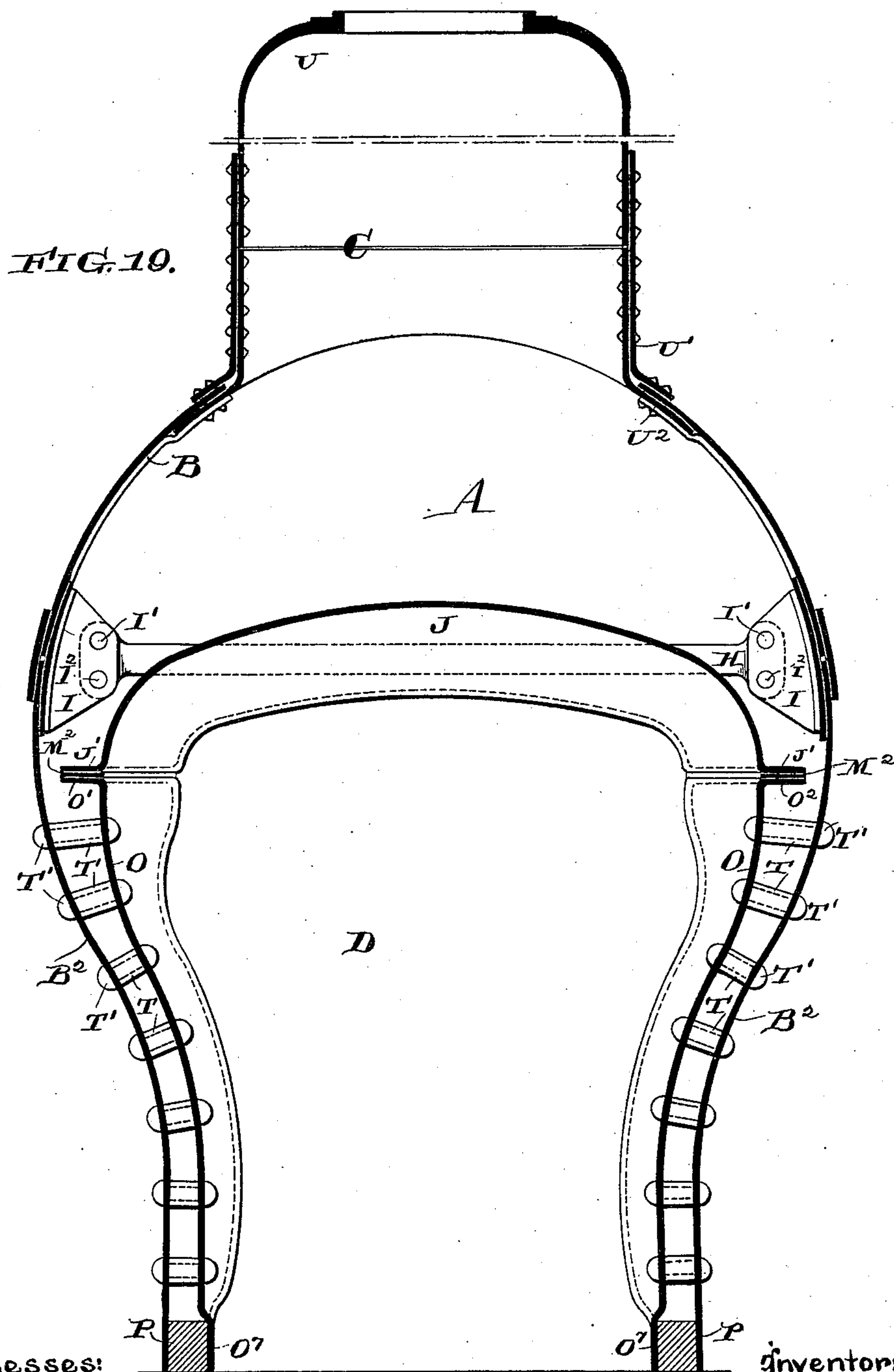
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No. 466,085.

Patented Dec. 29, 1891.



Witnesses:

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Jesse Heller

Inventor:

George S. Strong
by his atty
James T. Chambers

UNITED STATES PATENT OFFICE.

GEORGE S. STRONG, OF NEW YORK, N. Y., ASSIGNOR TO JAMES N. GAMBLE,
OF CINCINNATI, OHIO.

BOILER.

SPECIFICATION forming part of Letters Patent No. 466,085, dated December 29, 1891.

Application filed May 22, 1891. Serial No. 393,722. (No model.)

To all whom it may concern:

Be it known that I, GEORGE S. STRONG, of the city and county of New York, State of New York, have invented a certain new and useful Improved Boiler, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to the construction of boilers, and especially the type of boilers known as "locomotive-boilers," my object being to provide a boiler of great strength and durability, and which, among other advantageous features, can be shaped to embrace a fire-box having a very large grate area.

The nature of my improvements will be best understood as described in connection with the drawings in which they are illustrated, and in which—

Figure 1 is an end view of a locomotive-boiler having my improvements, partly shown in cross-section on the line 1 2 of Fig. 3; Fig. 2, a cross-sectional end view, the part to the right being taken on the section-line 3 4 of Fig. 3 and the part to the left on the section-line 5 6 of Fig. 3. Fig. 3 is a longitudinal sectional elevation of the boiler, in which, however, certain details of construction are omitted on account of the small scale of the drawings, such details being shown in other figures. Fig. 4 is a view, on an enlarged scale, taken on the same sectional line as Fig. 3, but showing only a part of the boiler shown in Fig. 3, but that part in more detail. Fig. 5 is a plan view, on an enlarged scale, taken on a section-line 11 12 of Fig. 3. Fig. 6 is a sectional view taken on the line 7 8 of Fig. 1; Fig. 7, a sectional view on the line 9 10 of Fig. 1, Fig. 8 illustrating a modification of the construction shown in Fig. 7. Fig. 9 is a section on the line 13 14 of Fig. 4; Fig. 10, a perspective view of the end of the calking-piece of the end M². Fig. 11 is a cross-sectional view of the crown-sheet of the fire-box, taken the part to the left on the line 15 16 and the part to the right on the line 17 18 of Fig. 13. Fig. 12 is a cross-sectional view showing a part of the crown-sheet on the line 19 20 of Fig. 11; Fig. 13, a similar view taken on the line 21 22 of Fig. 11; Fig. 14, a similar view taken on the line 23 24 of Fig. 11;

Fig. 15, a similar view taken on the line 25 26 of Fig. 11. Fig. 16 is a cross-section through the side sheet of the fire-box, taken on the line 27 28 of Fig. 18; Fig. 17, a similar section taken on the line 29 30 of Fig. 18; Fig. 18, a view showing a part of the side sheet, taken on the section-line 31 32 of Fig. 16; and Fig. 19, a cross-sectional view showing a modified form of fire-box.

A is the boiler; B, the top plate of what in locomotive-boilers is called the "wagon-top;" B' B', the side plates extending down from the wagon-top on each side of the fire-box.

C is the steam-dome, which, as shown, extends upward from the wagon-top, but which might of course be formed on the barrel of the boiler.

D is the fire-box; D', the grate; E, one of the fire-box doors; F, the tube-sheet extending from the end of the fire-box and through which pass the tubes G of the boiler.

H H, &c., is a series of braces bolted on each side of the wagon-top to angle-irons I, said angle-irons being riveted to the side of the wagon-top over the seams between the plates B and B', which are greatly strengthened thereby, and being fastened to the bars H by the bolts I' and I².

J is the crown-sheet of the fire-box. It is made, preferably, of an arched cross-section and with deep transverse corrugations merged into outwardly-extending flanges J' at the sides, and upwardly-extending flanges J² and J³ are formed at the ends of the crown-sheet, these flanges being in effect continuations of the flanges J', as indicated at J⁴ and J⁵. The flange J² is united with the end plate L of the fire-box by means of an Adamson seam, of which M indicates the calking-piece interposed between the two plates secured together. The tube-sheet F is secured to the plate L by a lap-joint, as shown. The front flange J³ of the crown-sheet forms an Adamson seam with the end plate N, N' indicating the calking-piece between the flange and plate.

O O are the side plates of the fire-box. These plates are corrugated to correspond with the corrugations of the crown-sheet, the corrugations merging at the top into an outwardly-projecting flange O', in form and dimensions made to correspond with the flange

J' of the crown-sheet, so that the two sheets can be united by an Adamson seam, the calking-piece of which is shown at M². The side plates have also flanges O' extending out from their back ends, by which they are united to the plate L, forming an Adamson seam with said plate, the calking-piece M continuing between the flange O² and the plate L. Corresponding flanges O³, formed on the front ends of the side plates, form an Adamson seam with the plate N. These end flanges O² and O³ are in effect continuations of the flange O', uniting with it, as shown at O⁴ and O⁵. One (preferably the inner) set of corrugations or folds in the side plates is made flat, as shown at O⁶, for a purpose to be hereinafter described, and the corrugations of the side plate merge at its bottom, so that the bottom edge of the plate O⁷ be straight and flat. This bottom edge lies along and is riveted to the mud-ring P. The plates L' and N are also riveted to the mud-ring P, and the mud-ring is recessed in its corners, as shown at P', Figs. 5 and 2, this notch receiving the Adamson seam formed between the side plates of the fire-box and the two end plates thereof in the manner illustrated in the two figures above referred to, the portions of the flanges and calking-piece which extend into the notch P' being indicated by the letters o³, l³, and m³. This plan of uniting the mud-ring and plates is one which insures great strength and stability of construction. The flanging of the corrugated crown and side sheets of the fire-box forming the seams in the manner described enables the parts to be united with great firmness and strength and enables me to use Adamson seams, which are not likely to be burned out in all places where such burning would take place with lap-seams.

When the fire-box is flared out, as shown in Figs. 1 and 2, in order to make room for a large grate area, it is desirable that the top of the fire-box should be supported against the strains which tend to collapse it, and this support I provide in the manner I will now describe. Angle-irons Q, placed back to back, are riveted to the top or wagon-top of the boiler, so that their outwardly-extending flanges will be in line with inward folds of the corrugated top sheet of the fire-box, and upon bolts Q', passed through the angle-irons Q and also through the bolt I' of the angle-iron I, which lies in the same plane with the angle-iron Q, I secure links R R' R³, the lower ends of which are secured on pins or stay-bolts S S S, which pass through the sides of the inward fold and are riveted on the inside of the crown-sheet, as indicated at S'. Preferably a pair of links are used in each case, one passing on each side of the tie-rod H, as shown in Fig. 4. The use of tie-rods extending from the top of the boiler to the top of the crown-sheet is, I am aware, not new with me; but the plan of securing these tie-rods which I have described and shown is novel

in several respects and possesses, I believe, material advantages.

I have already mentioned the flattening of the portions O' of the side sheets, and will now state that this is done to provide proper bearing and holding surfaces for a series of stays T, having end extensions which pass through holes in the side sheets of the boiler and fire-box and are riveted thereon, as indicated at T'. By thus uniting the side sheets of the boiler and fire-box the strength of the corrugated side sheets is materially increased and a firm support provided for the corrugated crown-sheet which rests upon the side sheets.

It will be noticed that by the construction of my fire-box Adamson seams are brought against the other seams, bolts, or flanges, and that one flange J², for instance, which constitutes a part of one Adamson seam, forms a continuation of the flange J, for instance, which forms a part of an Adamson seam intersecting the first one. Where such intersections occur I provide the calking-plate of the Adamson seam with a rivet-extension m', which is continued through the abutting plate and riveted thereon, as indicated at m², Figs. 4 and 9, and where flanges turn, as at J⁴ and O⁴ in the figures referred to, I make the calking-piece with annular projections m m, which fit into the turn of the flange and against the abutting flange or plate. The strength, compactness, and closeness of the seam thus formed will be readily appreciated.

Referring now to the steam-dome C of the boiler, I form the upper part of the dome of a dome-shaped piece U, which is drawn into shape by dies, much as a cartridge is drawn. To the edge of the piece U is secured a flange-ring U', extending over the top sheet of the boiler, and another flange-ring U² extends beneath the top of the boiler and alongside of the upwardly-extending annular part of the ring U'. The use of the flanged ring U², which may be called the "strengthening-piece" in the arrangement shown, materially strengthens the joint, making the union of the dome indeed a point of exceptional strength instead of, as is now commonly the case, a weak point in the boiler.

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

1. In a boiler, the combination, with a corrugated fire-box crown-sheet J, having flanges J' at its sides, of the corrugated side plates O, having flanges O' at their tops, corresponding with flanges J' in shape and adapted to form a joint therewith, as and for the purpose specified.

2. In a boiler, the combination, with a corrugated fire-box crown-sheet J, having flanges J' at its sides, of the corrugated side plates O, having flanges O' at their tops, corresponding with flanges J' in shape and adapted to form a joint therewith, the side sheets B' of the

boiler-socket, stays T T', securing the plates B' and O together, and the mud-ring P, secured to the bottom of plates B' and O, substantially as and for the purpose specified.

5 3. The mud-ring P, having notches P' at its corners, in combination with the plate or sheet L and the side sheet D, having a flange O³, arranged to form a seam with sheet L, said plates being secured to the sides of the ring
10 P and their seam engaged at bottom in notch P', substantially as and for the purpose specified.

4. In a boiler, the combination, with a corrugated fire-box crown-sheet J, having flanges
15 J' at its sides, of the corrugated side plates O, having flanges O' at their tops, corresponding with flanges J' in shape and adapted to form a joint therewith, said side sheets having
20 flattened portions O⁶ between adjacent corrugations, the side sheets B' of the boiler, and stays, as T T', securing portions O⁶ of sheets O to the side sheets B', all substantially as and for the purpose specified.

5. In a boiler, the combination of the wagon-
25 on-top B with a fire-box having a corrugated crown-sheet J, links, as R R', attached to the wagon-top at their upper ends, and stays S, secured to the crown-sheet, as described, and to which the lower ends of the links are at-
30 tached, all substantially as and for the purpose specified.

6. In a boiler, the combination of the wagon-top B with a fire-box having a corrugated crown-sheet J, tie-rods H, extending from side
35 to side of the boiler, links, as R R', attached to the wagon-top at their upper ends and extending on each side of rods H, and stays S, secured to the crown-sheet, as described, and to which the lower ends of the links are at-
40 tached, all substantially as and for the purpose specified.

7. In a boiler, the combination of the wagon-top B with a fire-box having a corrugated crown-sheet J, tie-rods H, extending from side
45 to side of the boiler and through corrugations of sheet J, links, as R R', attached to the

wagon-top at their upper ends and extending on each side of rods H, and stays S, secured to the crown-sheet, as described, and to which the lower ends of the links are attached, all
50 substantially as and for the purpose specified.

8. In a boiler, the combination of the wagon-top B with a fire-box having a corrugated crown-sheet J, angle-irons Q, riveted to the inside of the wagon-top on each side thereof,
55 links R R', pivotally attached to the angle-irons, and stays S, secured across corrugations of the crown-sheet and to which the links are secured, all substantially as and for the purpose specified.

9. In a boiler, the combination of an Adamson seam uniting two plates, a flange against which the seam abuts, and a rivet-extension
60 m' of the calking-piece extending through and riveted against the flange.

10. In a boiler, the combination of three plates, two of which are flanged at sides and edges to form Adamson seams with each other and with the third plate of a calking-piece
65 situated between the flanges, having wedge-shaped extensions m m, adapted to fill the spaces where the abutting flanges turn to fit against the third sheet, and a rivet-extension
70 m', extending through the seam of said third plate.

11. In a boiler, the combination of the corrugated crown and side sheets J O O, united by Adamson seams, as described, with the end plate L, secured to said crown and side
75 sheets by similar seams.

12. In a boiler, the combination of the boiler-shell B with a flanged ring U', riveted around an opening in the wagon-top and on the outside thereof, a flanged ring U², riveted inside
80 the wagon-top and to the upwardly-extending portion of ring U', and the dome-shaped top-piece U, riveted to ring U', as described.

GEORGE S. STRONG.

Witnesses:

JAMES P. J. MORRIS,
JOSHUA MATLACK, Jr.