

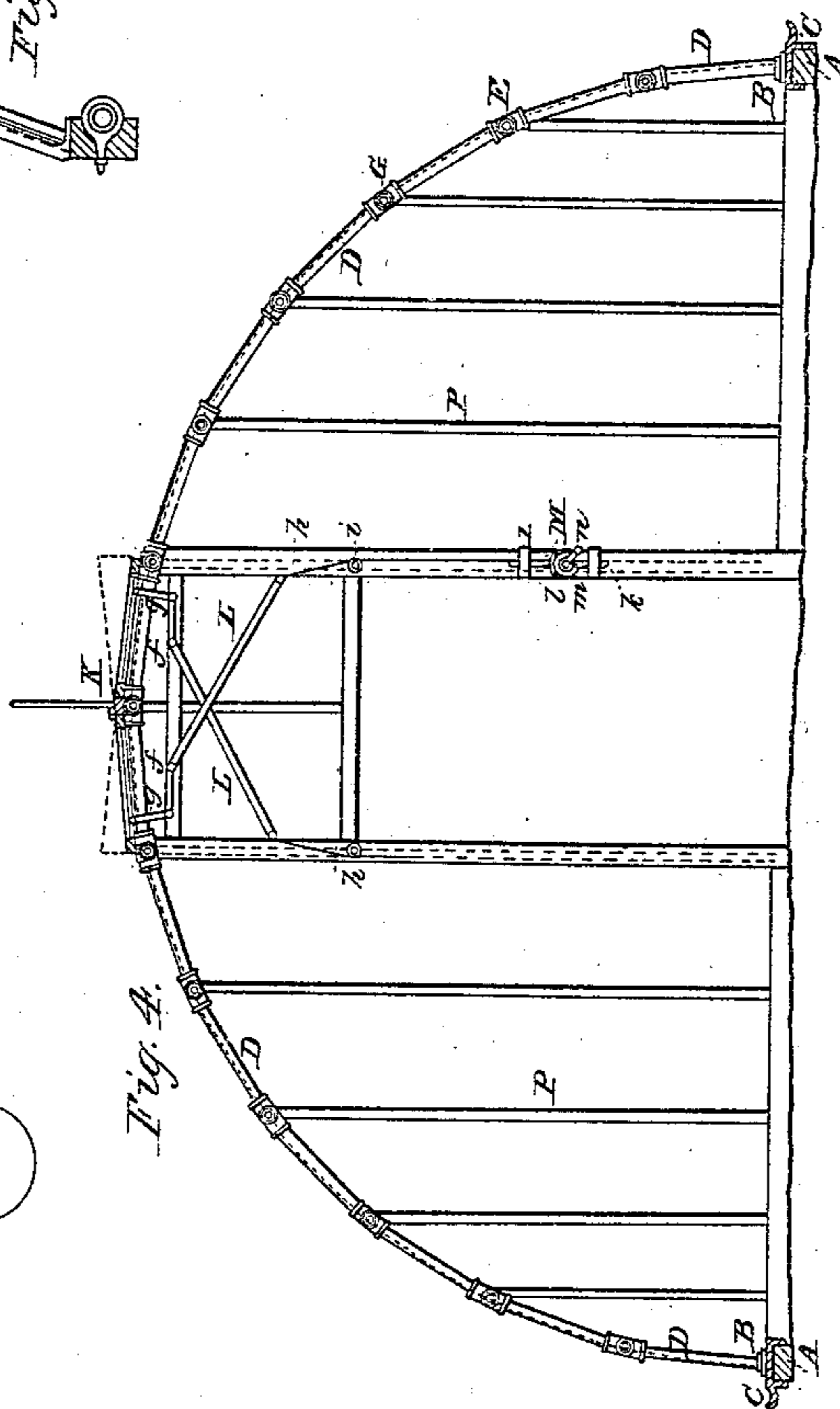
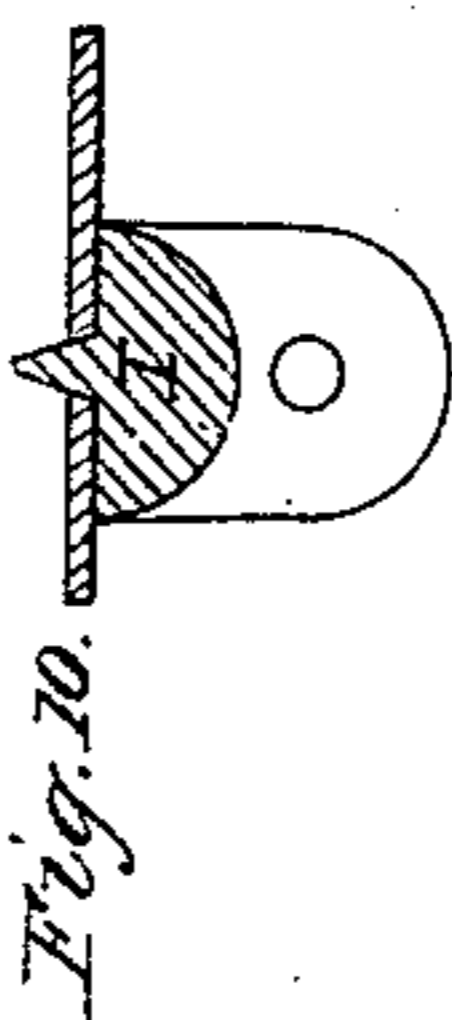
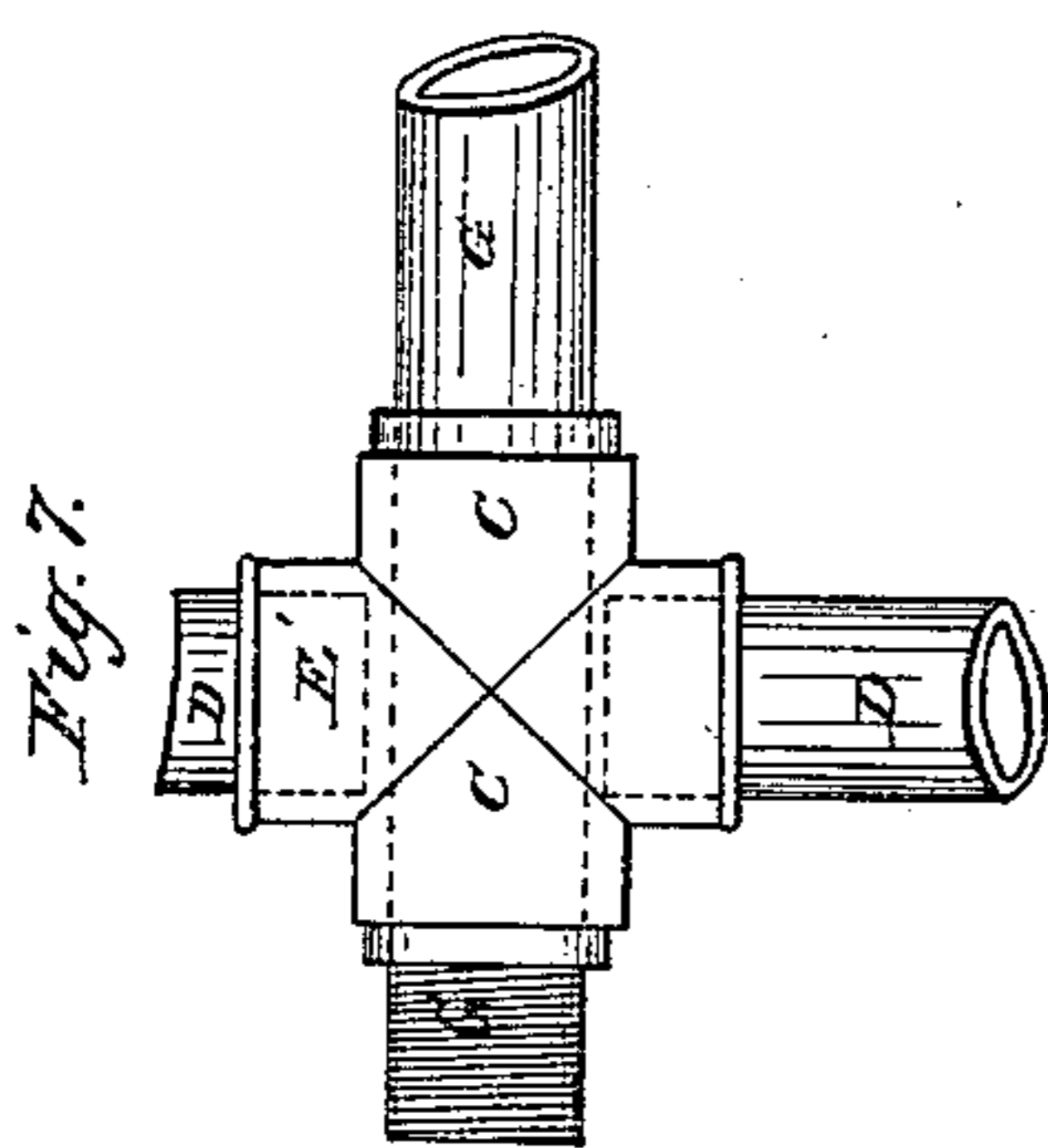
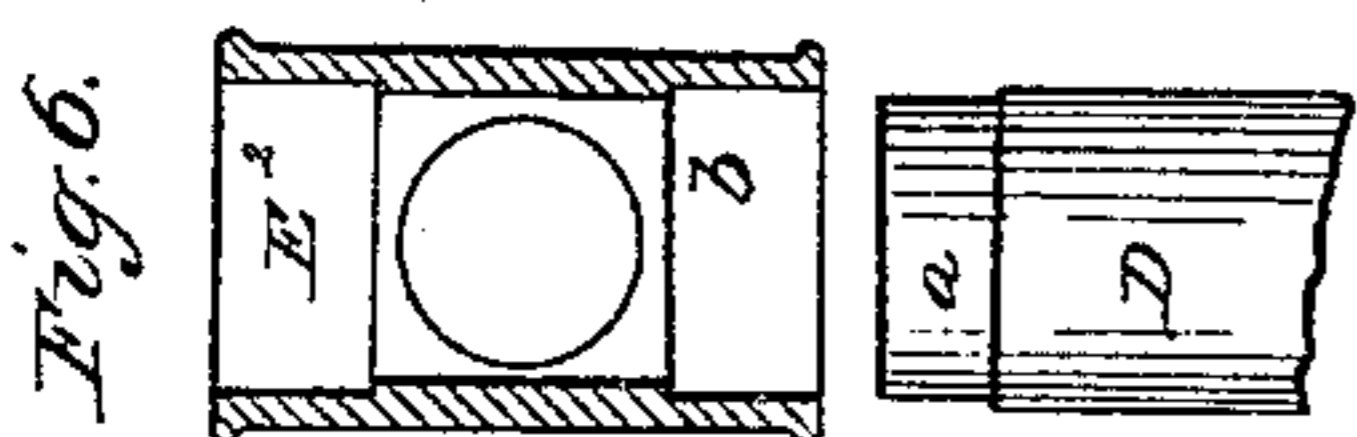
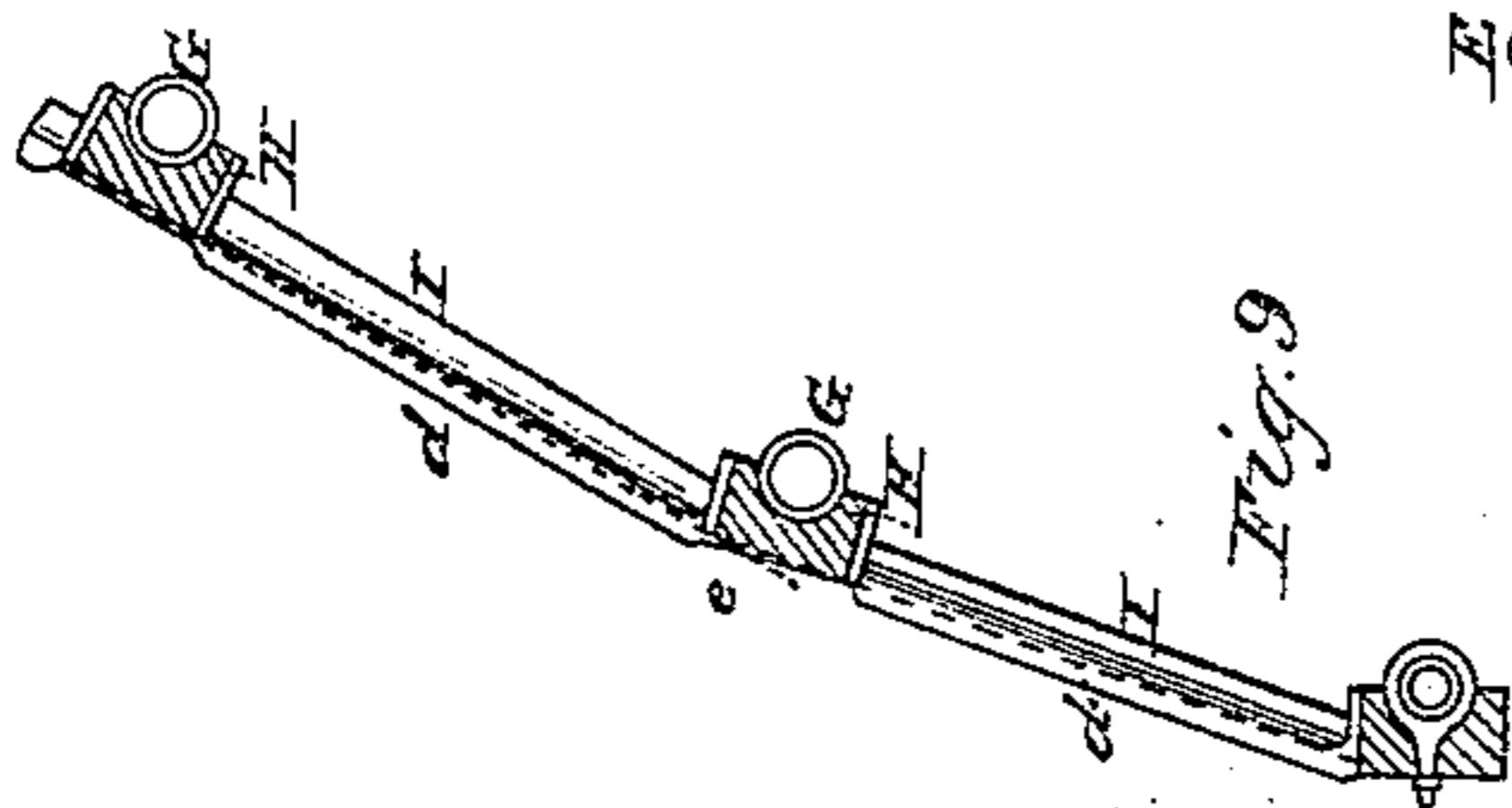
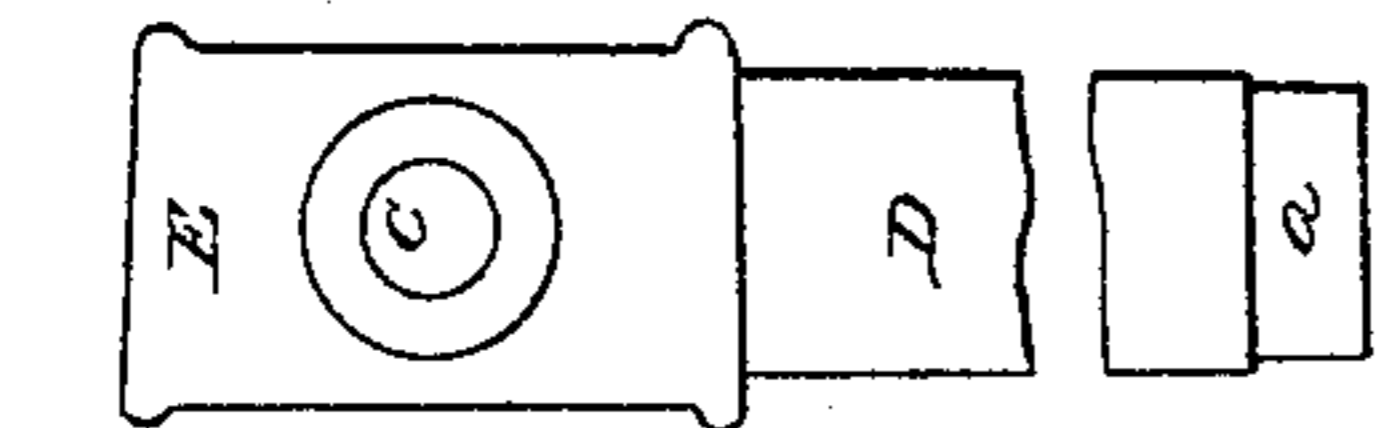
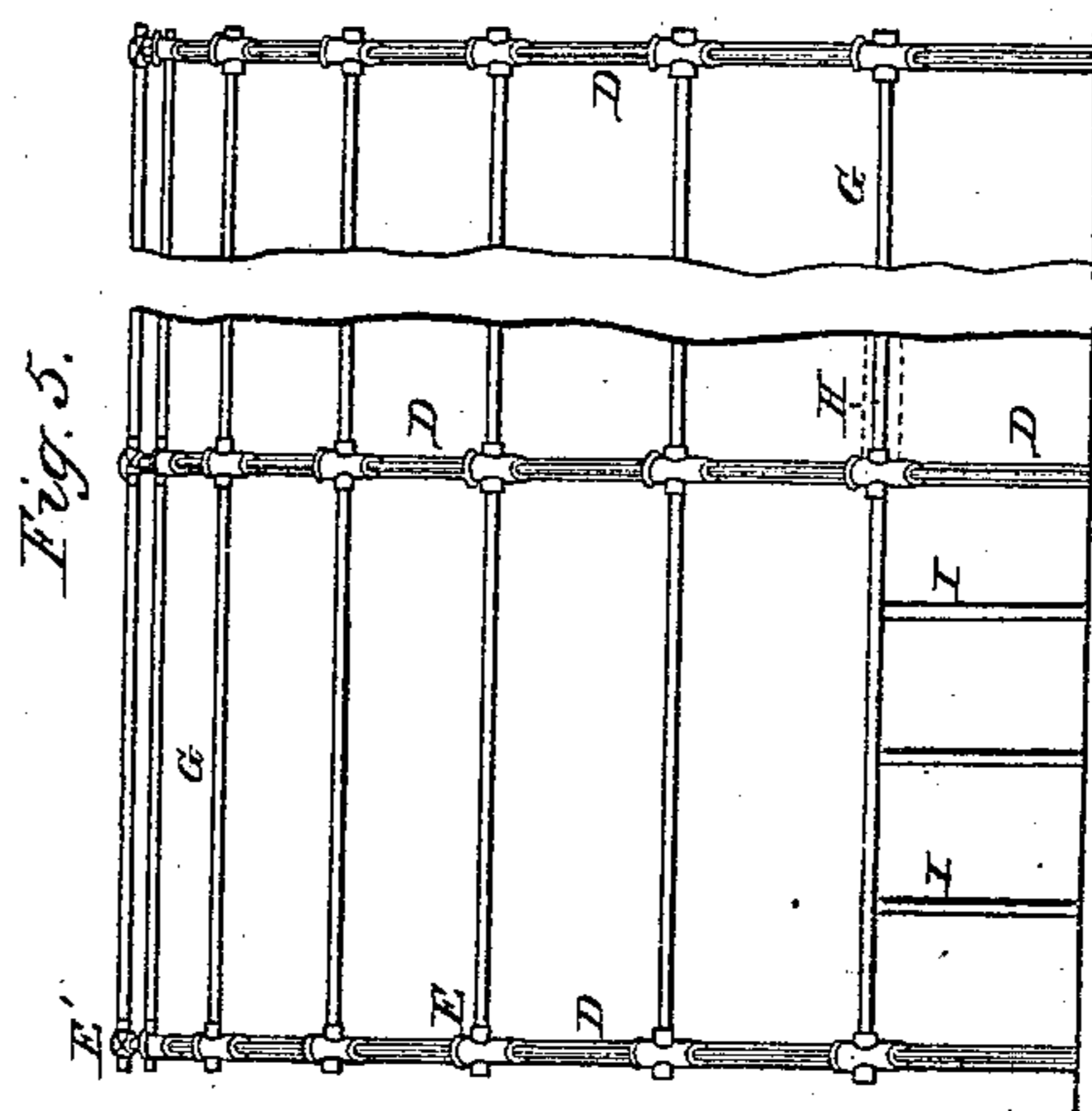
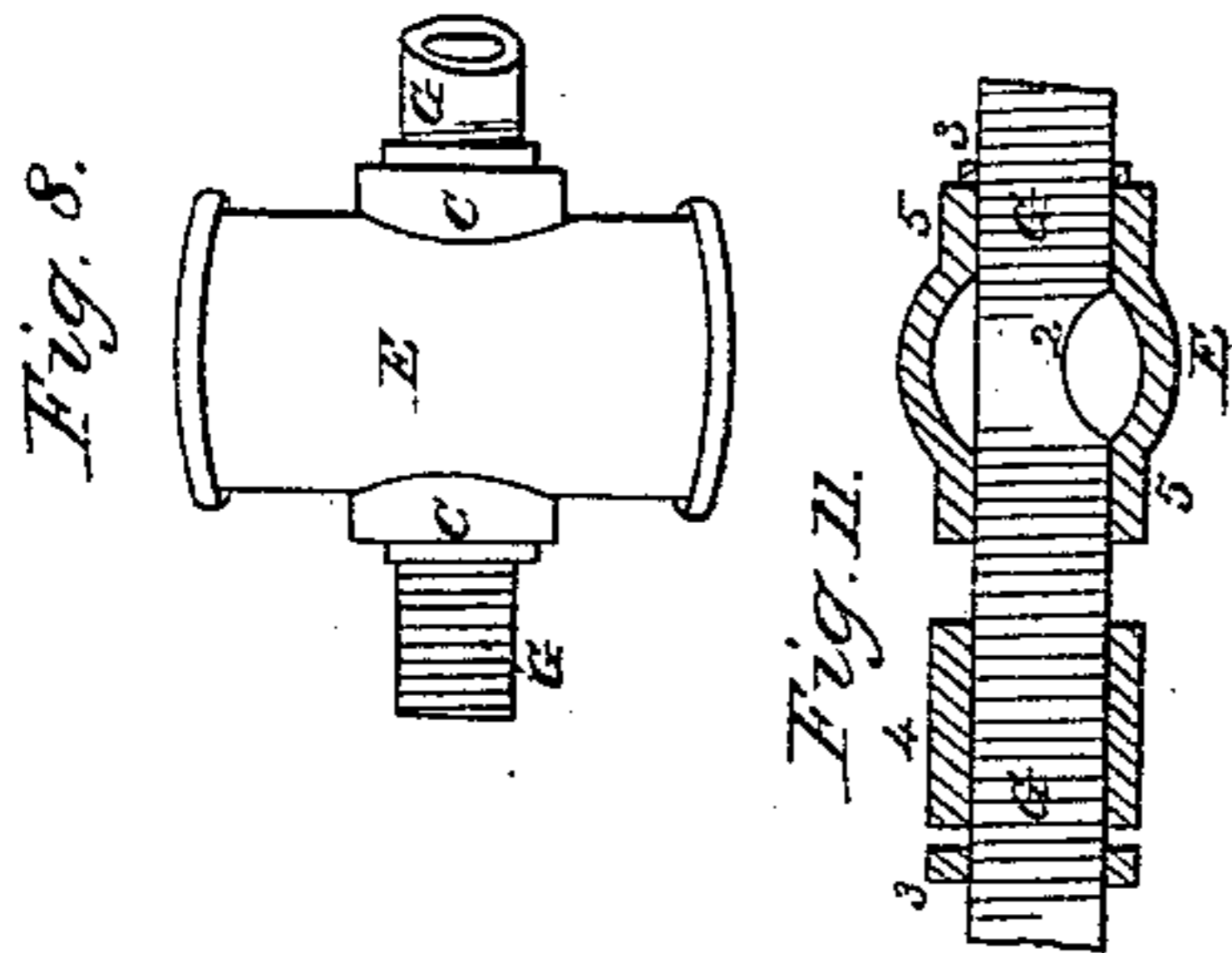
*Simpson & Howitt*

*Sheet 1-2 Sheets.*

*Steam Heater*

*N<sup>o</sup> 76,534.*

*Patented Apr. 7, 1868.*



*Witnesses.*  
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*Inventors.*  
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Simpson & Howitt.

Steam Heater.

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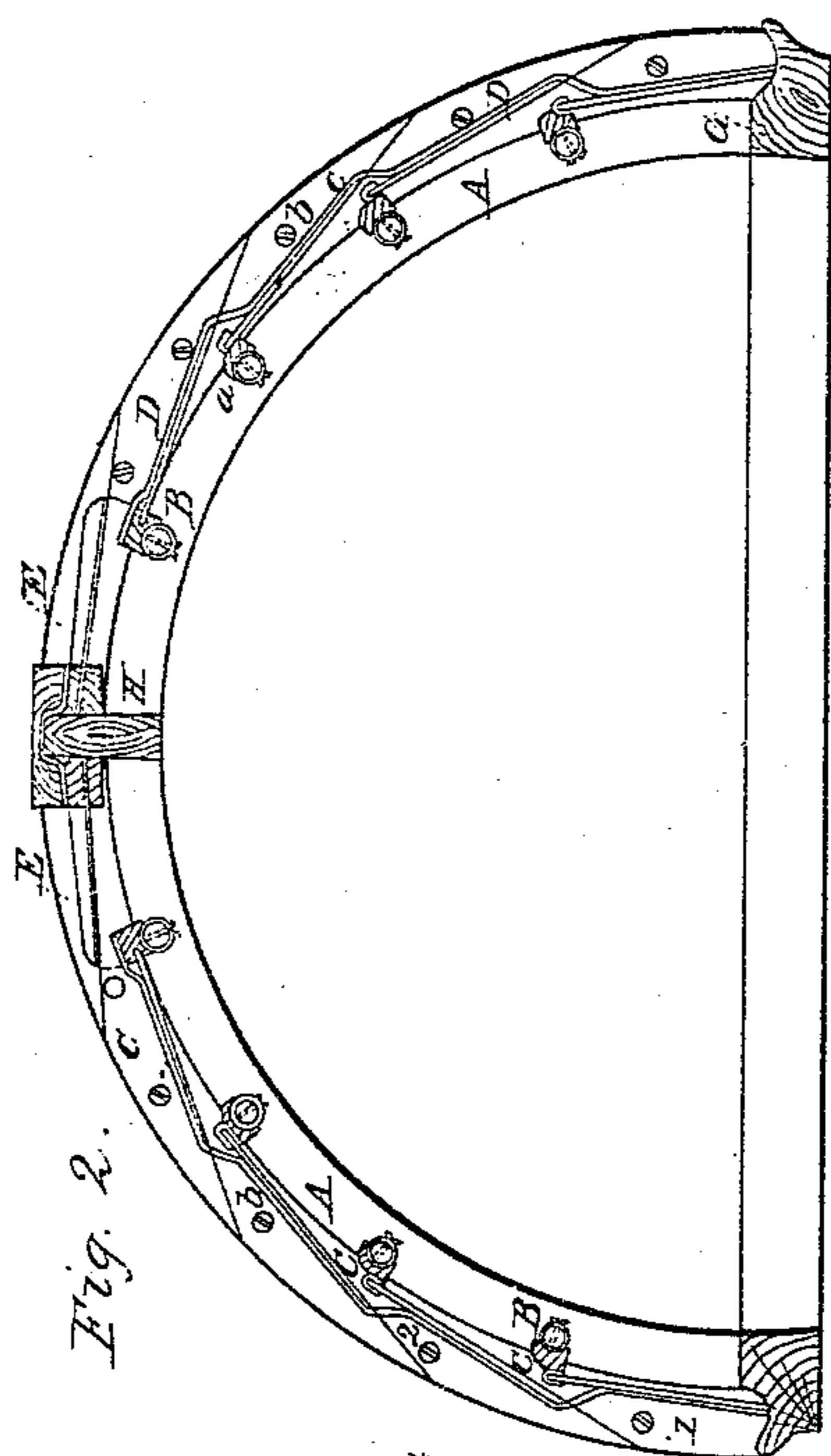


Fig. 2.

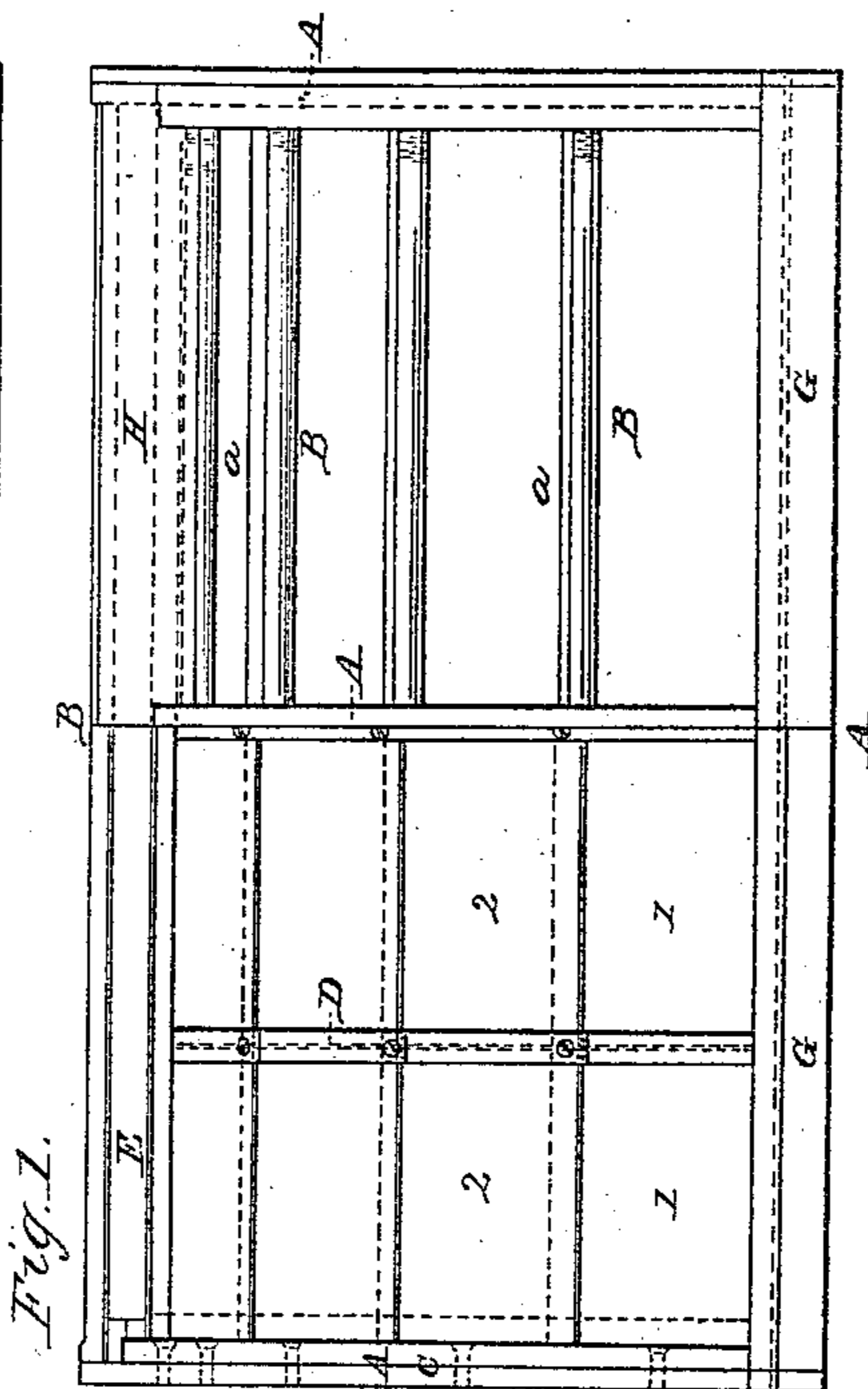
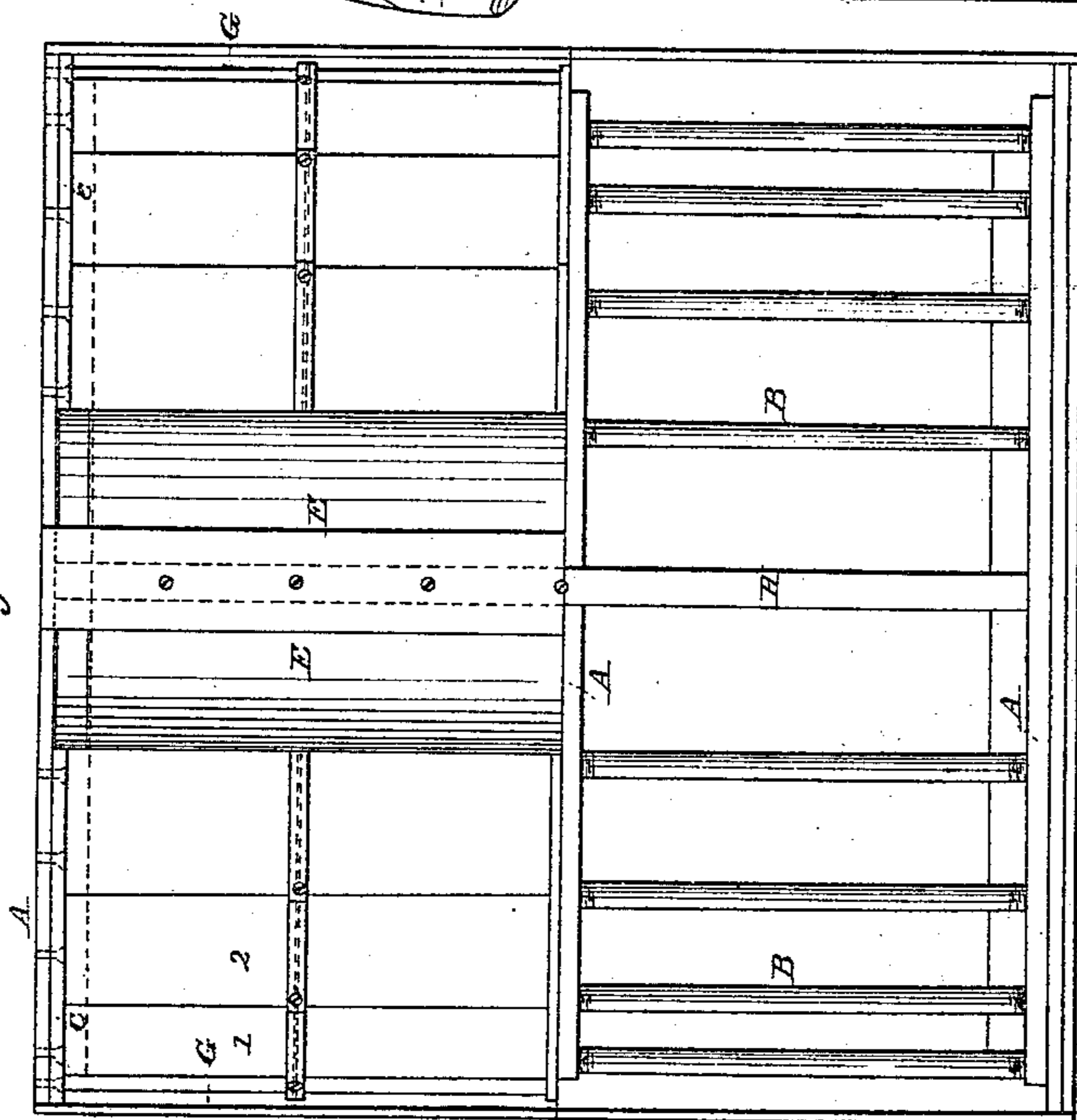


Fig. 1.

Fig. 3.



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# United States Patent Office.

WILLIAM SIMPSON, OF ROSHERVILLE, AND WILLIAM HOWITT, OF NOTTING HILL, ENGLAND.

*Letters Patent No. 76,534, dated April 7, 1868.*

## IMPROVEMENT IN STEAM-HEATERS.

*The Schedule referred to in these Letters Patent and making part of the same.*

### TO ALL WHOM IT MAY CONCERN:

Be it known that we, WILLIAM SIMPSON, of Rosherville, in the county of Kent, England, and WILLIAM HOWITT, of Notting Hill, in the county of Middlesex, England, have invented new and useful "Improvements in the Construction of the Roofs of Horticultural and other Buildings and Structures;" and we do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying sheets of drawings, and to the letters of reference marked thereon.

At sheet 1,

Figure 1 represents a side elevation, partly in section, of our improved roof.

Figure 2, a transverse and vertical section through the line A B at fig. 1.

Figure 3, a top plan view of the roof, partly covered with glass.

At sheet 2,

Figure 4 is an end elevation, and

Figure 5 a side elevation of a roof constructed according to our said invention on the self-supporting principle, but differing from that represented at sheet 1 in the following respects, that is to say, instead of forming the principals of solid metal, we form them of tubes fitting into sockets transversely of the roof, and passing through the said sockets in a longitudinal direction.

Figures 6, 7, 8, 9, 10, respectively, exhibit detached parts, hereinafter particularly described and referred to.

The nature of our said invention consists in forming the principals of the roof of a semicircular shape, or any portion of a circle, the said principals extending across the width of the roof, and being supported by suitable supports or walls. These principals we arrange at equal distances asunder, and connect them together by tubes of metal, the ends whereof have screws or threads formed about them. These screwed ends are intended to screw into corresponding-shaped screwed holes formed in the sides of the principals, so that upon turning round the said tube, the principals will be drawn towards each other. These tubes extend lengthwise of the building or roof, and are placed about three feet apart around and between the semicircular principals before mentioned, and in this manner we proceed to connect all the principals of the roof together, the said tubes serving the double purpose of tie-rods and to carry the sheets of glass or other covering of the roof.

For the sake of economy we make the pipes or tubes straight, and the sockets we form curved. For example, from the springing of the roof we build up at convenient distances asunder, according to the size of roof, straight, short pipes, the bottom end of the first length of pipe fitting in a hole in a step-piece fixed to the upright sides of the house. The upper end of this pipe fits into a hole formed in a socket-piece made in the form of a cross, and these socket-pieces we form of the same curvature as the sweep of the roof; and supposing a semicircle to be described from the sides of the house, and the socket-pieces connected together by the short pipes before mentioned, the semicircle should cut through the centre of the diameter of the said several socket-pieces. Tubes of metal pass horizontally through the several socket-pieces for connecting the several principals together, and also for the circulation of hot water over the roof. And we would here remark that the hot water only circulates through the two outer principals, or those situated at each extremity of the roof, the water entering and passing through one of these principals, and, after circulating through the several horizontal tubes, passing through the other extreme principal, and returning into the boiler, thus keeping up the circulation of the water. For the intermediate principals solid straight bars or rods, of metal or other suitable material, may be employed.

Roofs thus constructed may either be glazed, or covered with slates, or otherwise, according to the purpose for which the building or structure is required.

To enable others skilled in the art to make and use our invention, we will proceed to describe its construction as follows:

At sheet 1, A A are semicircular principals, of wood or metal, placed about ten feet asunder. These prin-

cipals we connect together by tubes, rods, or bars of metal, B, screwed by their ends into the principals. The drawing shows only three principals, for the sake of convenience, but in long roofs there would of course be several of such principals. Those at each extremity of the roof are made broader outside than the intermediate principals, for the purpose of connecting thereto pieces of wood, C, screwed thereto as at fig. 2, the said pieces C being employed to hold the end sheets of glass by their edges in proper position upon the pieces B. To these pieces we fix pieces of wood *a*, by screws at *b*, and to these pieces of wood we fix pieces of sheet metal at *c*. The panes of glass are then arranged, disposed, and fixed as follows: Beginning at the bottom of the principals, we place pane of glass No. 1, and turn the piece of metal, *c*, over the top edge of the pane. No. 2 we rest on the metal, *c*, and turn the next piece of metal *c* over the top edge of this second pane, and in this manner we proceed to fix all one row of panes of glass, and by the side of these panes we arrange and fix another row of panes, with their edges touching the edges of the other row, and finally, we cover the edges of the panes with a strip of metal, D, to make a weather-tight joint, and in this manner we proceed to cover the principals of the roof. E are hinged flaps for ventilation; G, wall-plates, serving also as gutters to carry off water. These plates rest on pillars or walls, which may have glazed openings or windows, and doors, as also the ends of the roof; and in constructing roofs intended for horticultural purposes, the tubes B may be used as channels for hot water. H is the ridge-board of the roof.

We now proceed to describe the construction of roofs represented at sheet 2, as follows:

At fig. 4, A A are dwarf walls for supporting the roof; B are steps bolted to the wall-plates C at equal distances asunder, as at fig. 4, according to the size of the roof; D are short lengths of straight pipes, and E E' are curved sockets, into which the ends of the pipes D are fitted water-tight by turning down the ends of the pipes D, as at *a*, fig. 6. The sockets E E' are also bored or turned true, to receive the ends of the pipes, which should fit tight therein, and be driven close up to the shoulders *b* in the sockets.

It will be seen, upon referring to figs. 6 and 7, that the sockets are made with cross-openings, *c c*, to receive other smaller pipes or tubes G G for tying the principals of the roof together, and for connecting thereto longitudinal pieces of timber, H, shown by dotted lines at fig. 5, and in cross-section at fig. 9, and to these pieces of timber bars of metal, I, are bolted, top and bottom, the said bars being employed to receive panes of glass when the roof is intended to be glazed, as for horticultural and other buildings, through which the light is required to pass. The panes of glass are affixed by putty to the bars I, as at fig. 10, which is a half-size cross-section of one of such said bars, and the panes of glass in each horizontal row of panes lap one over the other, as denoted by red color at *d*, fig. 9, pieces of sheet metal, *e*, being affixed to the pieces H, at the parts where the bars I are situated, so that by bending up the pieces *e*, the bottom edges of the projecting panes of glass will be supported and prevented from slipping downwards. We would also remark that the sockets E', situated at the centre and top of the roof, and which extend the entire length of the building, have their cross-openings, *c c*, made larger than the openings in the sockets E, for the purpose of connecting a larger horizontal pipe at the top of the roof for carrying the ridge-board and frieze, and for hinging the top ventilators thereto, as at K K of fig. 4. The opening and closing of these ventilators we propose to effect by means of bent levers, L, each working on a fulcrum or axis at *f*. The bent ends of the lever L are connected to the framework of the glazed ventilators at *g*, fig. 4, and the straight part of each of the levers L is connected to a chain, *h*, passing over a pulley, *i*, fixed to the door-posts of the house. The lower end of the chain *h* is made fast to the end of a screw, *k*. The upper end of the said screw is formed square, and works in a square guide-hole in the part 1 of the casting M, and the screw *k* passes through the screwed boss of the mitre-wheel, *l*, to which rotary motion is imparted by a corresponding mitre-wheel, *m*, on the axis of which a handle, *n*, is fixed. By turning round the wheel *n* in one direction, the screw *k* will be advanced downwards, thereby pushing open its corresponding ventilator. A reverse movement will close the ventilator.

We now proceed to describe the means by which the circulation of hot water is effected through some of the tubes, pipes, and sockets of which the framework of the roof is formed, observing that the hot water enters and passes through the pipes and sockets situated at one extremity of the roof, and passes out through the pipes and sockets at the other extremity of the roof, the induction and eduction-pipes extending downwards below the springing of the roof as far as is necessary to complete the circulation of the water from the boiler of the hot-water apparatus. And in order that the water may pass from the pipes into and along the horizontal-tubes, we cut a hole in the part of the pipe which passes through the sockets which are at each end of the roof, and we connect the pipe to the sockets in the manner exhibited at Figure 11, where O marks a short length of tubing screwed at each end, and with a hole cut out. At 2 3 4 are screw-nuts and collars, which, when screwed tight against the bosses 5 of the socket E, securely fix the piece O in the socket, and connect the next length of tubing thereto. The tubing that passes horizontally through the sockets of the several intermediate principals does not allow the water to pass up the said principals, and the said tubes are simply connected in lengths to the sockets by screwed collars and nuts, as before mentioned. Tubes, P, may be connected to the several sockets at the ends of the roof, the lower ends resting in steps fixed to the wall-plate, and to these tubes pieces of wood may be fixed as before stated, and so made as to receive the glazing. It is also proposed to affix an ornamental facia at each end of the roof, by screws taking into the ends of the tubes in the several sockets. The lowermost row of panes may be mounted in frames between each principal, and be fixed on hinges, so as to serve for ventilation.

The frames being all connected together, may be either opened or closed at one operation.

Roofs constructed on the above principle may be covered with sheet metal, wood, slates, or other materials, either wholly or in combination with glass.

The above description and drawings refer to horticultural buildings more particularly.

Having now fully described our invention, and the manner of construction, we hereby declare that what we claim as our invention, and desire to secure by Letters Patent, is as follows:

We claim constructing arched or curved frames for the roofs of horticultural and other buildings, wholly or in part of metallic tubes D, united by curved sockets E E', and so connected and arranged as to permit and facilitate a circulation of hot water through the same, all substantially in the manner and for the purpose herein set forth.

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Witnesses:

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