

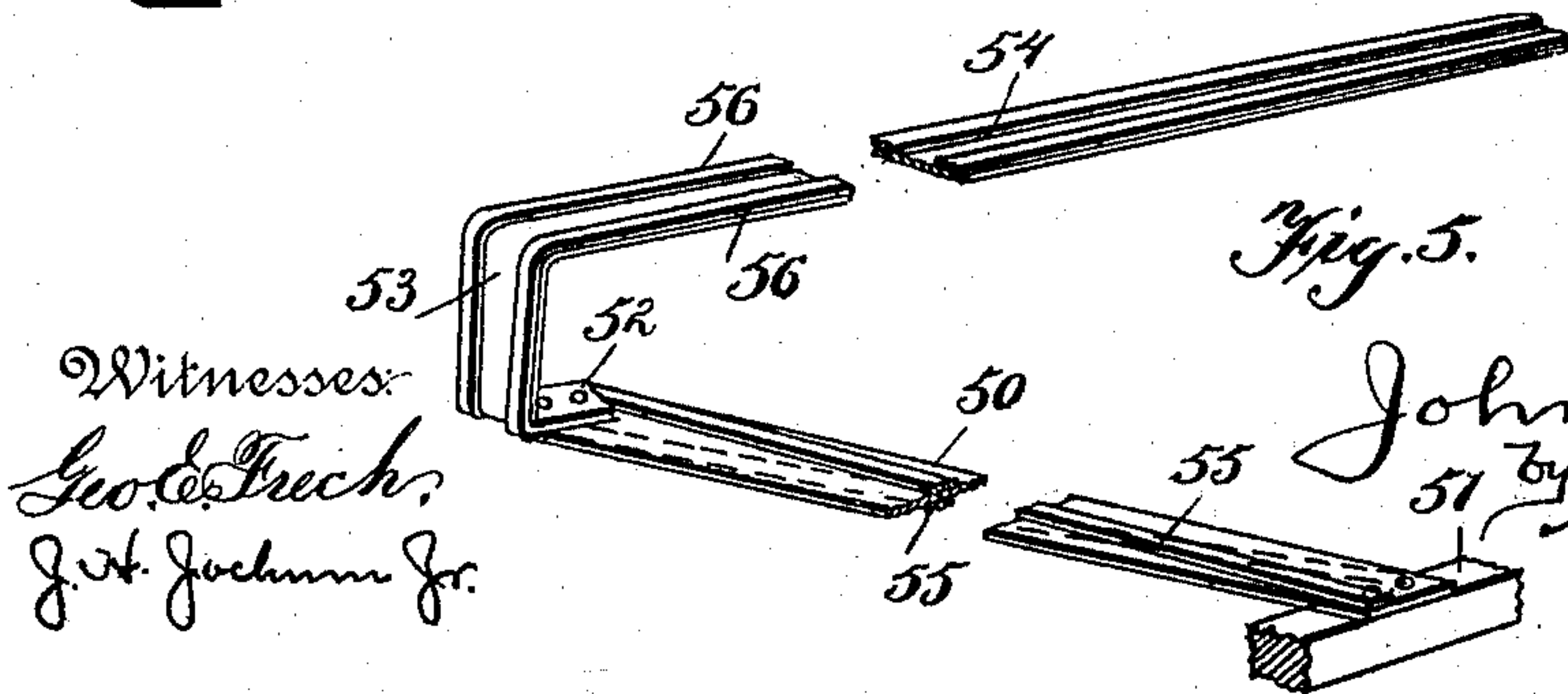
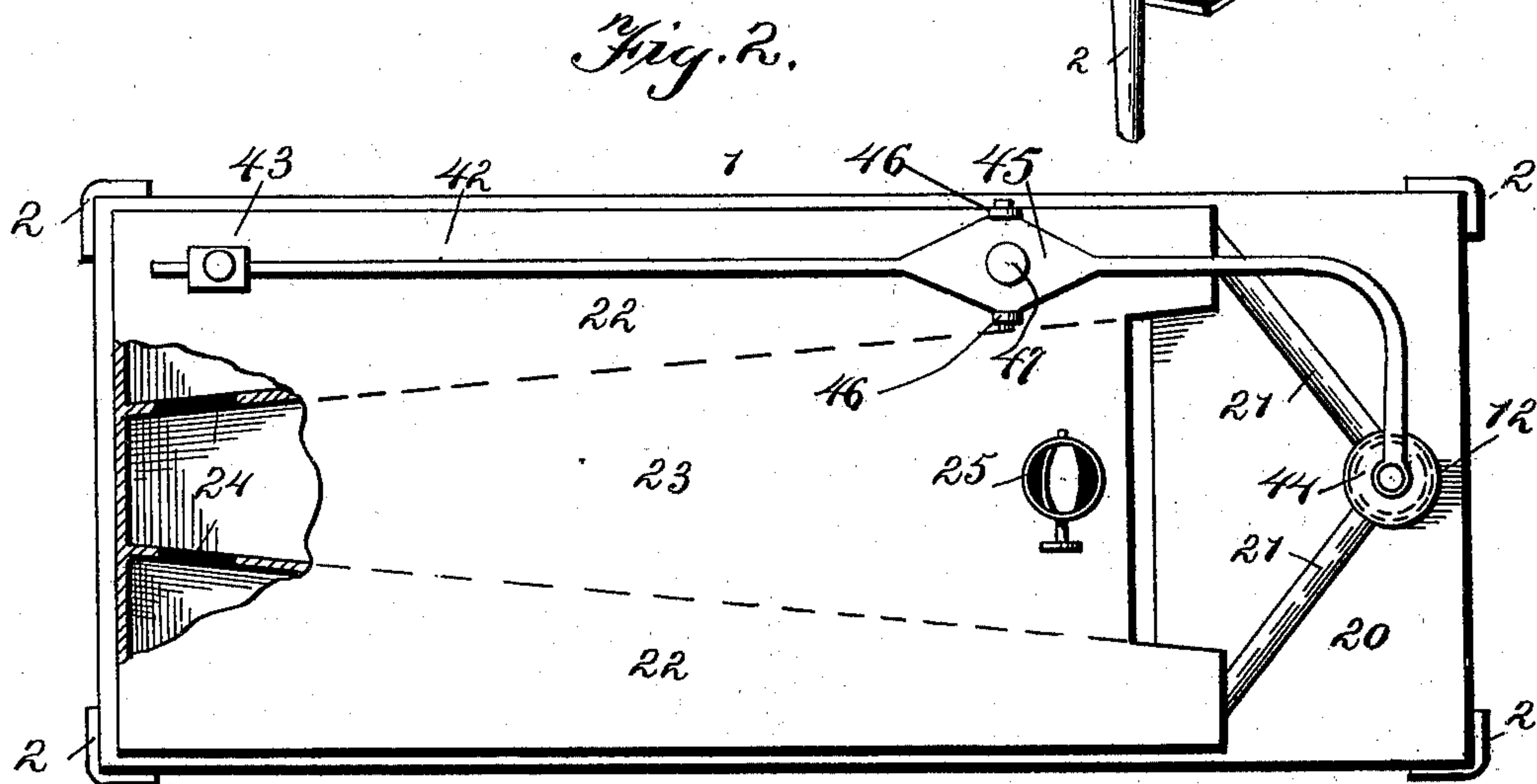
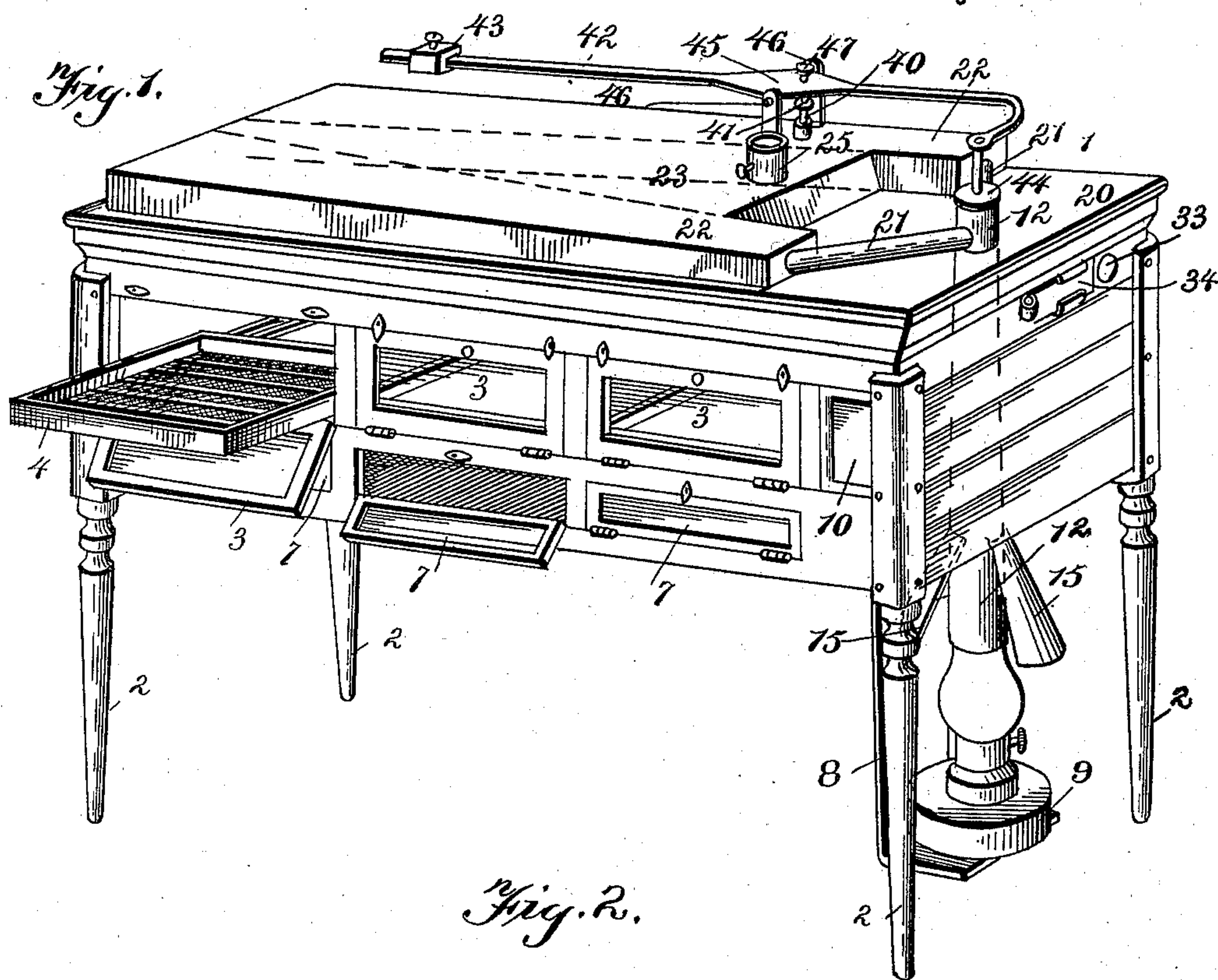
(No Model.)

2 Sheets—Sheet 1.

J. R. ROBERTS.  
INCUBATOR.

No. 603,859.

Patented May 10, 1898.



Witnesses:  
Geo. C. Trech,  
J. W. Johnson Jr.

Inventor:  
John R. Roberts,  
by Collamer & Co.,  
Attorneys.



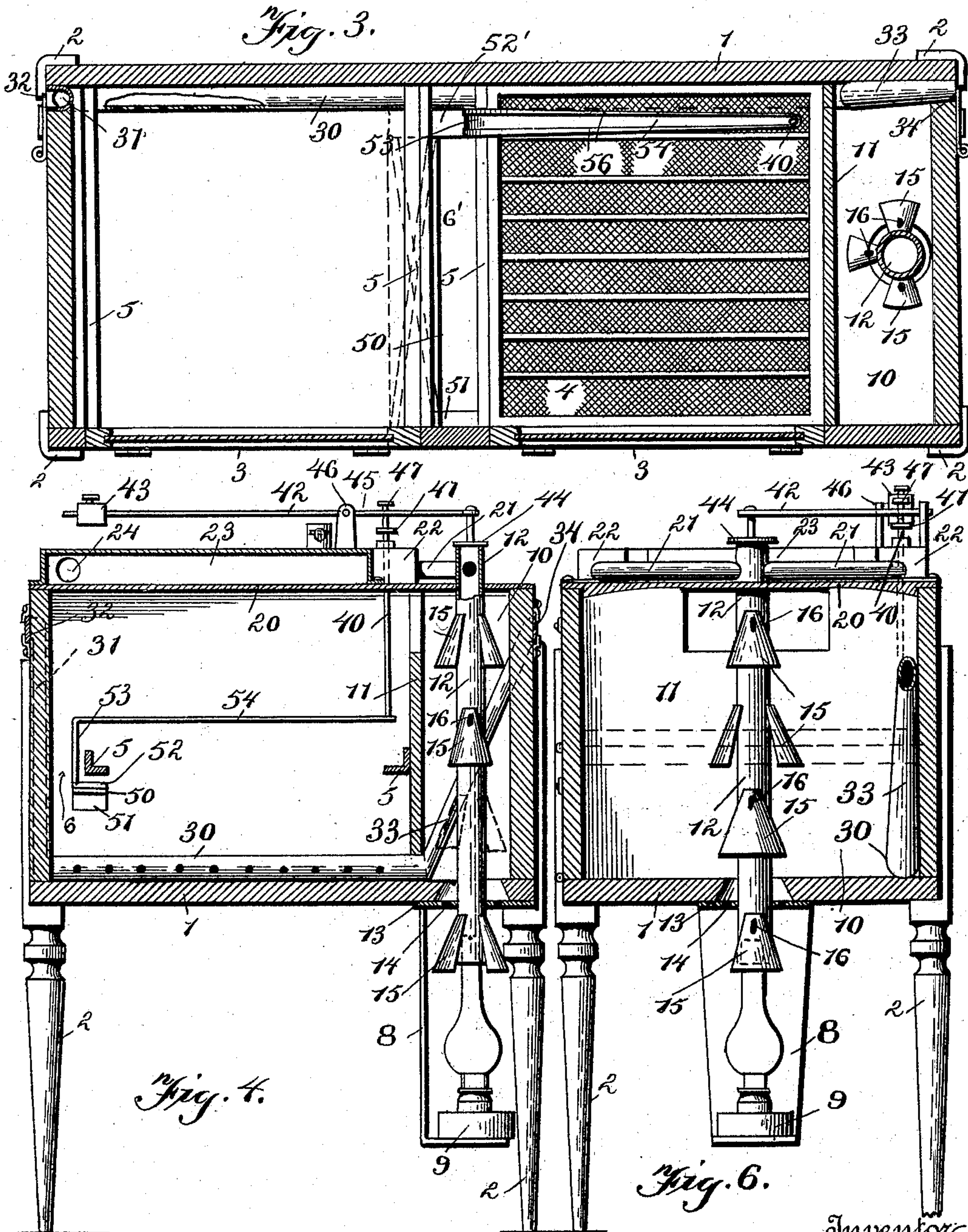
(No Model.)

2 Sheets—Sheet 2.

J. R. ROBERTS.  
INCUBATOR.

No. 603,859.

Patented May 10, 1898.



Witnesses:  
Geo. C. Frick,  
J. W. Johnson Jr.

Inventor:  
John R. Roberts,  
by Collamer & Co.,  
Attorneys.



# UNITED STATES PATENT OFFICE.

JOHN R. ROBERTS, OF HOMER CITY, PENNSYLVANIA.

## INCUBATOR.

SPECIFICATION forming part of Letters Patent No. 603,859, dated May 10, 1898.

Application filed January 30, 1897. Serial No. 621,312. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN R. ROBERTS, a citizen of the United States, and a resident of Homer City, Indiana county, State of Pennsylvania, have invented certain new and useful Improvements in Incubators; and my preferred manner of carrying out the invention is set forth in the following full, clear, and exact description, terminating with claims particularly specifying the novelty.

This invention relates to the care of live stock, and more especially to that class of devices known as "incubators;" and the object of the same is to effect certain improvements in machines of this character.

To this end the invention consists in a novel construction and location of the thermostat, as well as in certain specific improvements in the details of the whole, all as hereinafter more fully described and as illustrated in the accompanying drawings, wherein—

Figure 1 is a general perspective view of a three-hundred-egg machine or one having three trays for the eggs, each tray containing usually one hundred eggs. Fig. 2 is a plan view showing in dotted lines the flues or passages for the hot air from the lamp to the exit. Fig. 3 is a horizontal section taken through a two-tray machine just above the trays, one of which is omitted. Fig. 4 is a central vertical longitudinal section taken through a one-tray machine, the tray being omitted. Fig. 5 is a perspective view of the thermostat used in the machine shown in Fig. 4. Fig. 6 is a transverse vertical section through the heating chamber and tube, showing the lamp in elevation.

Referring to the drawings, 1 is a rectangular body, of wood or other suitable material, supported on legs 2 and having in its front the usual hinged doors 3 with glass panels, through which the attendant can see the eggs upon the trays. The latter (numbered 4) slide in and out the door-openings on cleats 5, raised above the bottom, so as to leave a space beneath the trays for the chicks when hatched, and there is left in the single-tray machine, Fig. 4, a space or opening 6 between one cleat and the end of the body, whereas in the multi-tray-machines this space is between the cleats of two trays, as will be clear. The chicks when hatched walk over the eggs remaining

until they find their way to this space, through which they drop for a few inches onto the bottom of the body 1, where they do not interfere with the hatching of the other eggs, and whence they may be removed from time to time to a suitable brooder. I also provide in the front of the body glass-paneled doors 7, hinged and buttoned and so located that the hatched chicks in this lower compartment may be seen from the front, as they naturally seek the lightest point.

8 is a hanging bracket supporting the usual lamp 9 or any other suitable source of heat, the lamp in my improved incubator standing considerably lower than in those machines now upon the market.

The numeral 10 designates the heating-chamber formed by a transverse partition 11. Across within the body and vertically through this chamber is fixed the heating-tube 12, which is held in place by any suitable means. The lower end of this tube passes downward through a hole in the bottom of the chamber 10 and is preferably surrounded by a plate 13, having air-inlet holes 14, although this plate might be omitted, if desired.

15 15 are deflectors attached at their upper ends to the exterior of the heating-tube, having perforations 16 just beneath such points of attachment and their curved bodies inclining outward gently away from the tube, the function of these deflectors being to gather the heat and air currents radiated by the tube to its exterior more thoroughly as they pass upward from the bottom, where they enter the heating-chamber at or near the lamp and convey them over the partition into the egg-chamber. There may be several of these deflectors, as shown in the drawings, and the lowest ones may stand below the bottom of the body 1, but their lower extremities should not hide the flame in the lamp or the attendant would not be able to see without stooping if his lamp had gone out. The tube and deflectors are preferably of light metal and the lamp-chimney is preferably small and extends for some considerable distance upward into the tube 12. This and the use of the deflectors will give a strong draft, which, however is nicely and automatically regulated by my improved form of thermostat described below.



The numeral 20 designates a sheet of galvanized iron or its equivalent, forming the top of the body 1 and of the heating-chamber 10, and upon this sheet are disposed the heating-flues, as best seen in Fig. 2.

21 are small pipes diverging from the heating-tube 12 along upon the sheet 20. 22 22 are two side flues laid upon this sheet and having their smaller ends connected with the pipes 21.

23 is a single central return-flue standing between the side flues 22, with its smaller end of about the same size as the larger ends of the side flues and communicating therewith, as at 24, and 25 is a restricted exit located at the larger or inner end of this central flue. By "restricted" I mean that the exit is smaller than the passage through the flues, or possibly even smaller than the passages through the inlet-pipes 21, the object being that by restricting the outlet of the heat the latter will be caused to set back to a degree within the heating-flues. Any form of valve may be used upon this exit, or none if it be of proper size. This arrangement of flues causes the heat from the tube 12 to flow more swiftly along the smaller side flues 22 while it is most intense, slower as it reaches their outer ends and passes into the return-flue, and still more slowly as it grows cooler and passes inward in the return-flue, being restricted to just the proper degree to give an equal heat to all parts of the egg-chamber above the eggs. The metallic sheet 20 receives this heat, distributes it throughout its material, and deflects it downward upon the eggs in a manner closely approximating nature, as will be clear. The egg-trays 4 are of the usual or any approved construction, forming no part of the present invention. I might say, however, that each is preferably a frame having transverse slats and its bottom is of wire-gauze in order to permit the superimposed heating devices to throw their heat to the chick-compartments below the trays, whose temperature will be about 80° Fahrenheit, while the temperature of the upper portion of the egg-chamber is much higher and that of the eggs 103°, or just sufficient to produce proper and natural incubation.

Much difficulty has hitherto been experienced with the air-outlet or ventilator, which permits the warm air within the egg-chamber to pass out as it expands, the main difficulty appearing to be that as usually constructed this ventilator frequently admitted gusts of cold air (especially if the incubator was out of doors) which chilled the eggs and destroyed the life thereof. Other objections also exist which I will not enumerate here. My improved form of ventilator consists in a perforate tube 30, located along the bottom of the egg-chamber at the rear or farthest from the doors in position to receive through its perforations the cooler air within the chamber and which normally descends therein. At the end of the body remote from the lamp

an ordinary tube 31 rises from the perforate tube 30 and opens near the top, while at the opposite end a (preferably metal) tube 33 rises obliquely through the rear part of the heating-chamber 10 and opens through the end of the body. These tubes 31 and 33 being open at both ends to the outside air permit a slight circulation through the interior of the perforate tube 30, thus producing an upward draft which draws or sucks off the cooler air within the egg-chamber, while the perforations 14 admit just sufficient outside air to maintain the draft. The open ends of the tubes 30 and 33 may have any suitable valves, as the slides 32 and 34 shown; but perhaps the greatest point of difficulty in producing an incubator which shall be strictly automatic in its action is the provision of a proper thermostat with which to regulate the amount of heat passing into the heating-flues. The devices now in general use for this purpose consist of metallic bars which expand and contract under variations in the temperature, one end being fast and the other end connected with an upright rod 40, passing through the top of the body and carrying a button at its upper end, as at 41.

42 is a lever weighted, as at 43, at one end, with its opposite end carrying a bell or damper-plate 44 over the upper end of the heating-tube 12. The pivot for this lever is formed by a flat plate 45, having side trunnions journaled in uprights 46 on the body, and through the plate passes a set-screw 47, which rests upon the button 41. Thus when the rod 40 is pushed upward by the thermal bar it raises the set-screw 47 and plate 45 and lifts the damper 44 away from the upper end of the heating-tube 12 and allows more heat to escape, hence causing less heat to be passed along the flues and communicated to the egg-chamber, or the button 41 may stand at the other side of the pivot or the set-screw have a head at its lower end above which the button projects, and this will give the opposite movement to the lever. The thermal bar has been heretofore generally arranged along the rear of the egg-chamber, so as to be out of the way and also because there was space for it there, the trays being made sufficiently shallow to leave an opening behind them; but this location was open to the objection that this bar was acted on by the heat in that part of the chamber only. The thermal bar could not be located above the trays, for there the heat is too great, nor below them, for the reverse reason. These objections I propose to overcome.

The numeral 50 (see Fig. 5) designates a flat body-strip of brass, aluminium, or suitable metal, secured at its forward end upon a block 51, attached within the front of the incubator-body and extending thence to the rear in a plane just beneath the egg-tray. Secured upon and at right angles to the rear end of this strip is a similar cross-strip 52, which extends laterally to one side, then



bends upward in an elbow 53, standing within the opening 6, (see Fig. 4,) and thence extends outward in a finger 54, that stands along above the eggs in the tray. Secured upon the top and bottom of the body-strip 50 are narrow strips 55, of steel or some suitable metal having a different coefficient of expansion from the material of said strip 50, these narrow strips 55 standing in X shape, as shown, so that the action of the heat thereon will twist the combined thermal bar thus formed. In addition similar narrow strips 56 may be secured to the outer face of the cross-strip 52, elbow 53, and finger 54 along its edges, as shown, or a single central longitudinal strip of steel may suffice. If preferred, either the crossed strips 55 or the longitudinal strips 56 may be omitted, and the other set will suffice; but I usually employ both, producing a thermal bar, about as seen in Fig. 5, and to the free end of the finger is attached the rod 40 in any suitable manner.

The twisting of the lower arm of the thermal bar under varying degrees of temperature causes the cross-strip 52, with its elbow, to dip downward or to rise, and this movement throws the tip of the finger 54 downward or upward, as will be clear.

For the multitray-machine the construction of the thermal bar will be about the same, save that here (see Fig. 3) the body-strip 50 will stand beneath one tray, the cross-strip 52' will project in the opposite direction from that shown in Fig. 5, the elbow 53 will rise through the opening 6', which is here between the trays instead of at the end, and the finger 54 will project along above the other tray, as seen. In other respects the thermal bar for a multitray-machine is the same, and its action will of course be identical. The advantages arising from the use and location of the thermostat, as just set forth, are that one part is just beneath and one just above the egg-trays, so that the combined length of the thermal bar receives the mean temperature within the egg-chamber as between its upper and lower parts. One part of the bar extends from front to rear and the other longitudinally within the chamber, so that the mean temperature as between its front and rear portions is also gained, and no part of the bar impedes free access to the interior by the attendant's arm or the trays, and the elbow or upright portion of the bar extends through the opening 6, which is necessary for the passage of the hatched chicks, so that it does not require the trays to be made of smaller size in order to accommodate the thermostat; yet the latter acts properly, as though controlled solely by the mean temperature within the entire chamber.

As for the operation of this machine the use of incubators is now so well known that it will not be necessary to give it at length here. I might add that I do not confine myself to the precise details of construction herein set forth, as considerable change there-

in may be made without departing from the essential principles of my invention.

What is claimed as new is—

1. In an incubator, the combination with the egg-chamber, cleats therein above its bottom, the egg-tray mounted directly thereon and smaller in one direction than the transverse distance across the chamber so as to leave a clear chick-space at one side of the tray from the space below to that above it, and the heating mechanism entirely out of contact with the tray; of glass-paneled doors in the front of the body opposite and above the tray, and similar doors below it, the space within the body beneath the tray being adapted to serve as a brooder-chamber, as and for the purpose set forth.

2. In an incubator, the combination with the heating-chamber having holes through top and bottom, and a source of heat; of an upright tube extending loosely through the lower hole and closely fitting the upper hole in the chamber and conveying heat internally from said source, and transversely-curved deflectors secured to the exterior of said tube at their upper ends and diverging outward therefrom toward their lower ends, their bodies having perforations near their upper extremities, as and for the purpose set forth.

3. In an incubator, the combination with a heating-chamber having holes through top and bottom, a plate covering one hole and itself having a central hole and surrounding perforations within the periphery of the hole in the chamber, and a source of heat; of an upright tube passing through the hole in the plate and through the remaining hole in the chamber, and deflectors secured at their upper ends to said tube with their lower ends diverging outward therefrom and perforations in their bodies, as and for the purpose set forth.

4. In an incubator, the combination with the heating-tube projecting to the exterior of the body; of pipes leading therefrom, a pair of outwardly-extending side flues connected with said pipes, an interposed return-flue connected with the outer ends of the side flues, all the flues standing against the body, an exit in the inner end of the return-flue, and a valve for adjustably restricting the size of said exit, as and for the purpose set forth.

5. In an incubator, the combination with the body having an egg-chamber and a heating-chamber, and means for leading the heat from the latter to the top of the former; of a perforate ventilator-tube extending along the bottom of the egg-chamber, an upright valved tube leading from one end thereof and opening near the top of the body, and another tube leading from the other end of the perforate tube through the heating-chamber upward and opening to the exterior of the body, as and for the purpose set forth.

6. In a thermostat, a body-strip of one metal attached at one end to a fixed support, narrow strips of another metal having a dif-



ferent coefficient of expansion secured upon opposite faces of said body in X shape, and a cross-strip attached to the free end of the body; combined with a heating-tube, a damper therefor, and connections between said cross-strip and damper, as and for the purpose set forth.

7. In a thermostat, a body-strip attached at one end to a support, a cross-strip of one metal secured to the other end of the body and bent upward in an elbow and thence outward in a horizontal finger, and narrow strips of another metal having a different coefficient of expansion secured upon one face of the body-strip, elbow, and finger along their edges; combined with a heating device, a damper therefor, and connections between the finger and damper, as and for the purpose set forth.

8. In a thermostat, a body-strip of one metal attached to a support, a cross-strip of the same metal secured to one end of the body and bent upward in an elbow and thence outward in a finger at right angles to the length of the body, and narrow strips of another metal having a different coefficient of expansion secured on opposite faces of the body in X shape and longitudinally along the outer face of the cross-strip, elbow, and finger; combined with a heat-regulating damper, and connections between said finger and damper, as and for the purpose set forth.

9. In an incubator, the combination with

the egg-chamber, means for imparting heat to its top, and an egg-tray supported within the chamber between its top and bottom and having an opening at one side; of a thermal bar having one part below the tray and another part above it, and an interposed elbow passing through said opening, both said parts standing out of a vertical line through the opening so as to leave a clear chick-passage therethrough, and heat-regulating devices operated by said bar, as and for the purpose set forth.

10. In an incubator, the combination with the egg-chamber, means for imparting heat thereto, and an egg-tray within the chamber and having an opening at one side; of a thermal bar L-shaped in plan view, one arm extending from front to rear of the chamber beneath the tray, the other arm extending at right angles to the first and above the tray, and an interposed upright elbow extending through said opening and connecting the two arms, and heat-regulating devices operated by said bar, as and for the purpose set forth.

In testimony whereof I have hereunto subscribed my signature on this the 26th day of January, A. D. 1897.

JOHN R. ROBERTS.

Witnesses:

JOSEPH W. CRISWELL,  
J. G. ROBERTS.