

(No Model.)

2 Sheets—Sheet 1.

S. Q. DUNCAN.
INCUBATOR.

No. 520,181.

Patented May 22, 1894.

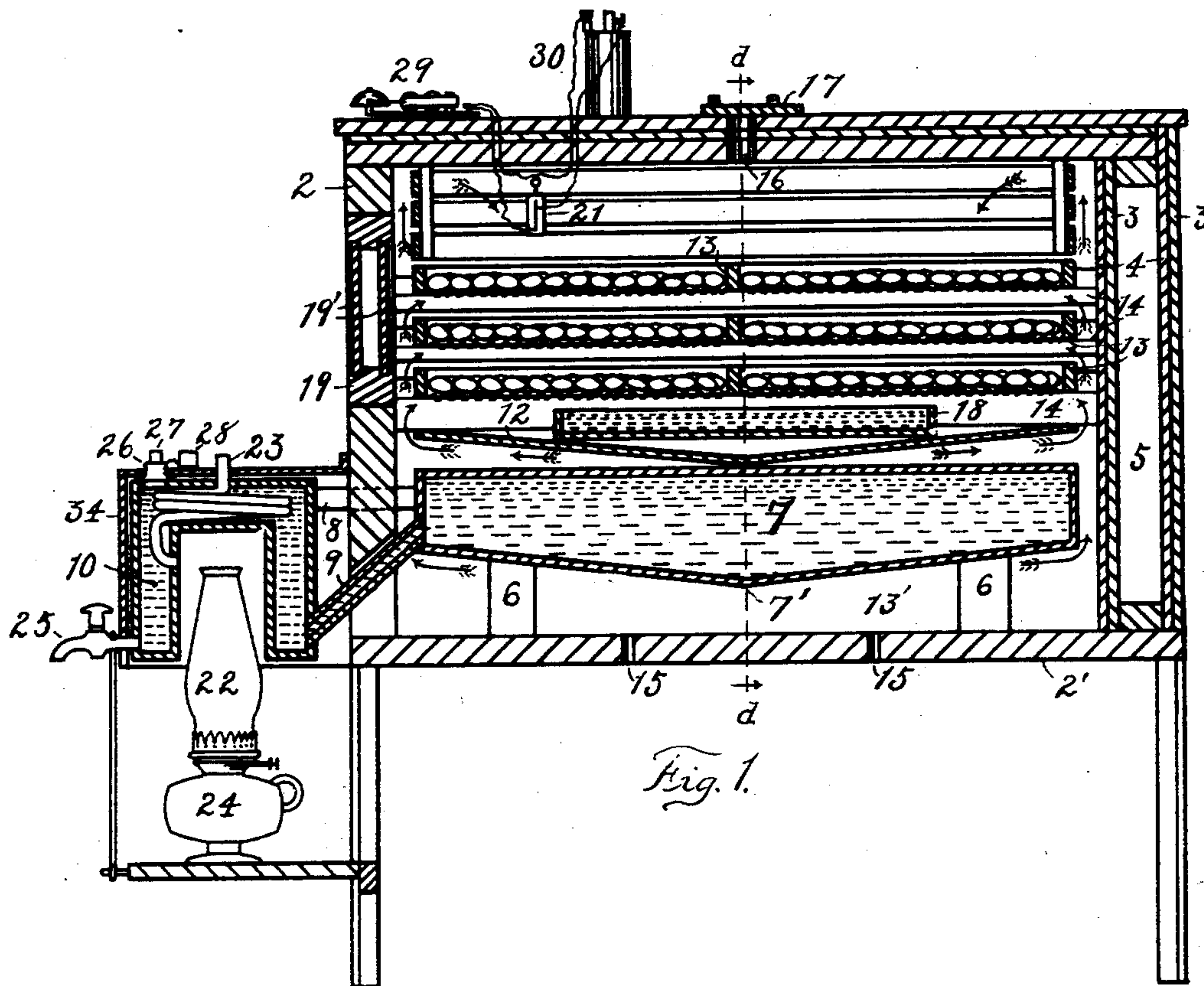


Fig. 1.

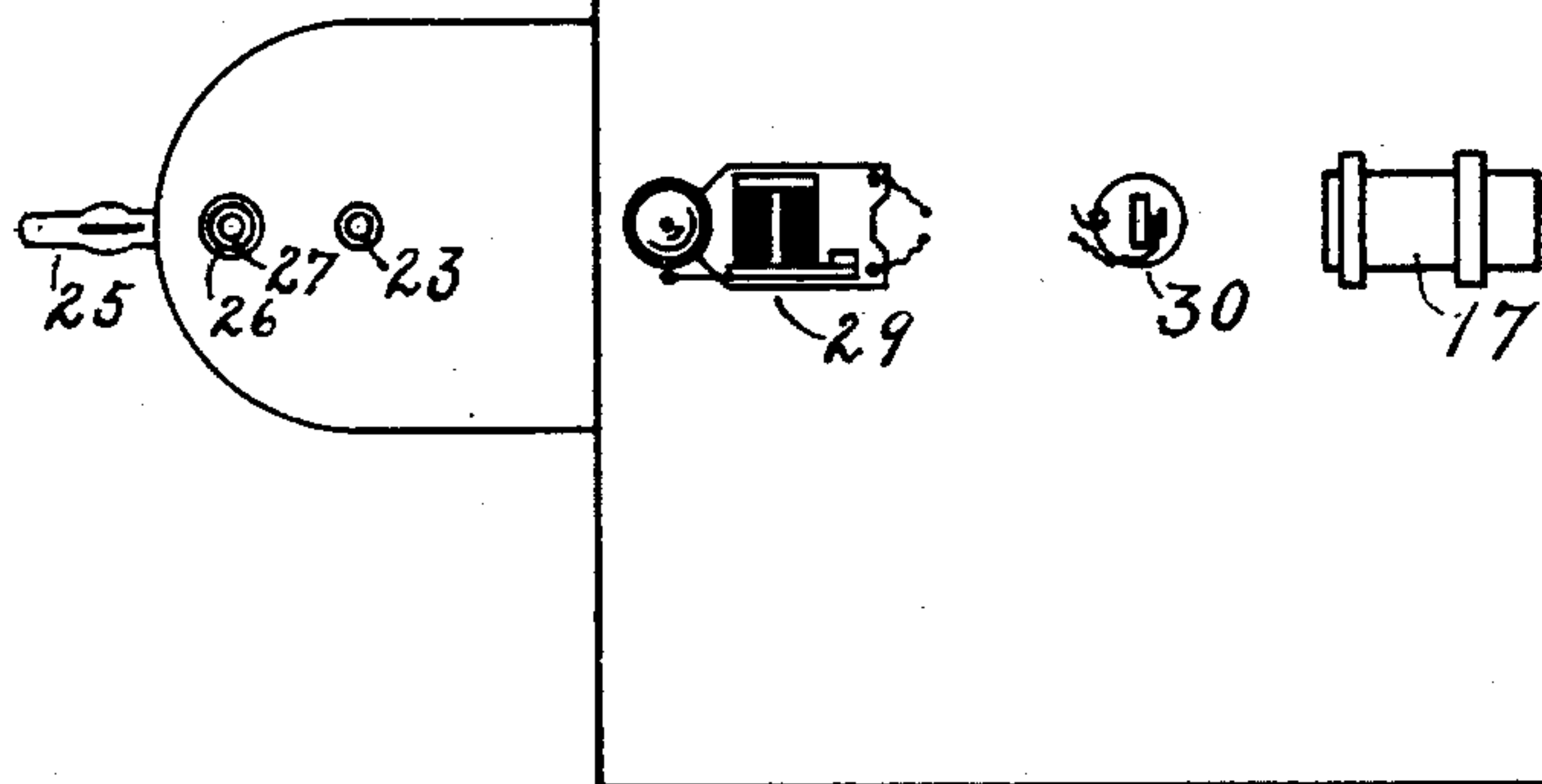


Fig. 2.

Witnesses:

J. H. Cornell
H. W. Marks

Inventor:

Samuel S. Duncan,
By Eugene L. Arnold,
att'y

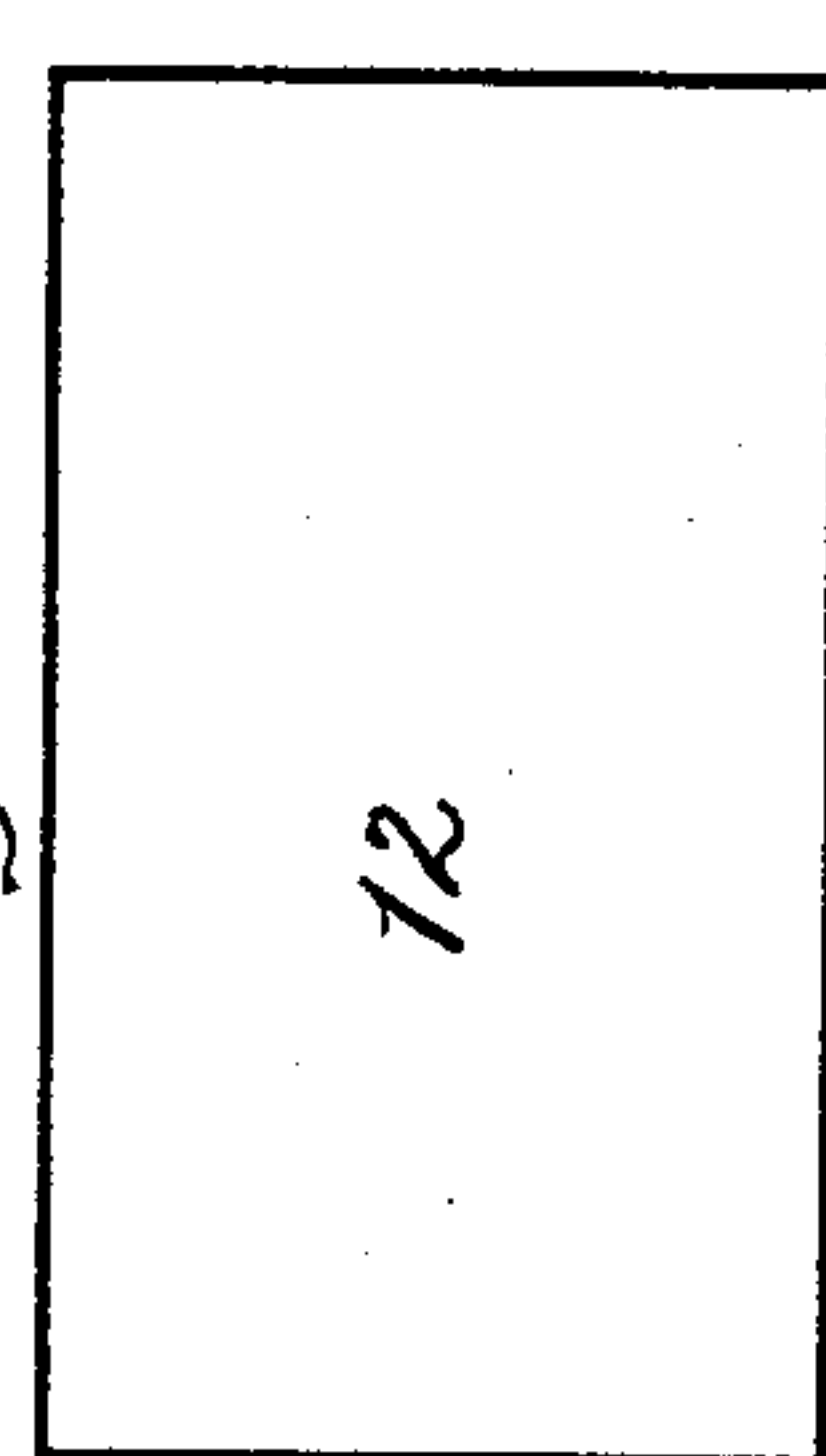
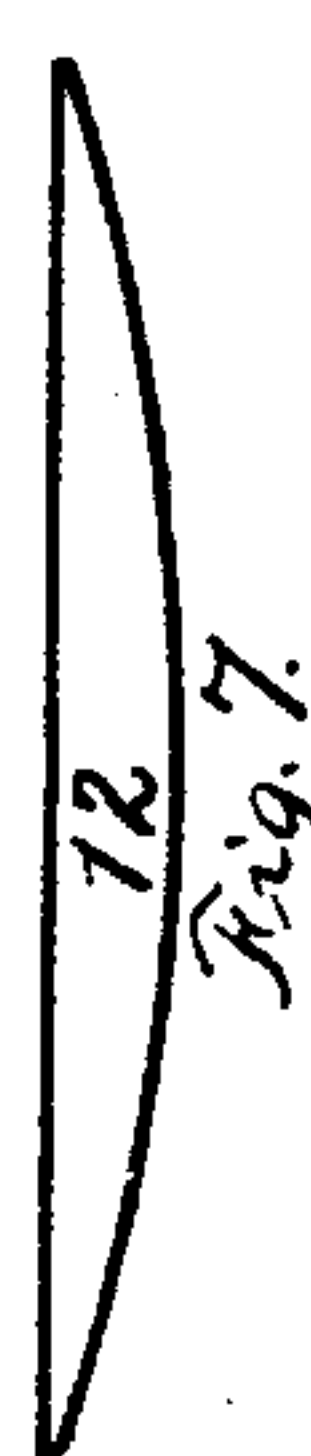
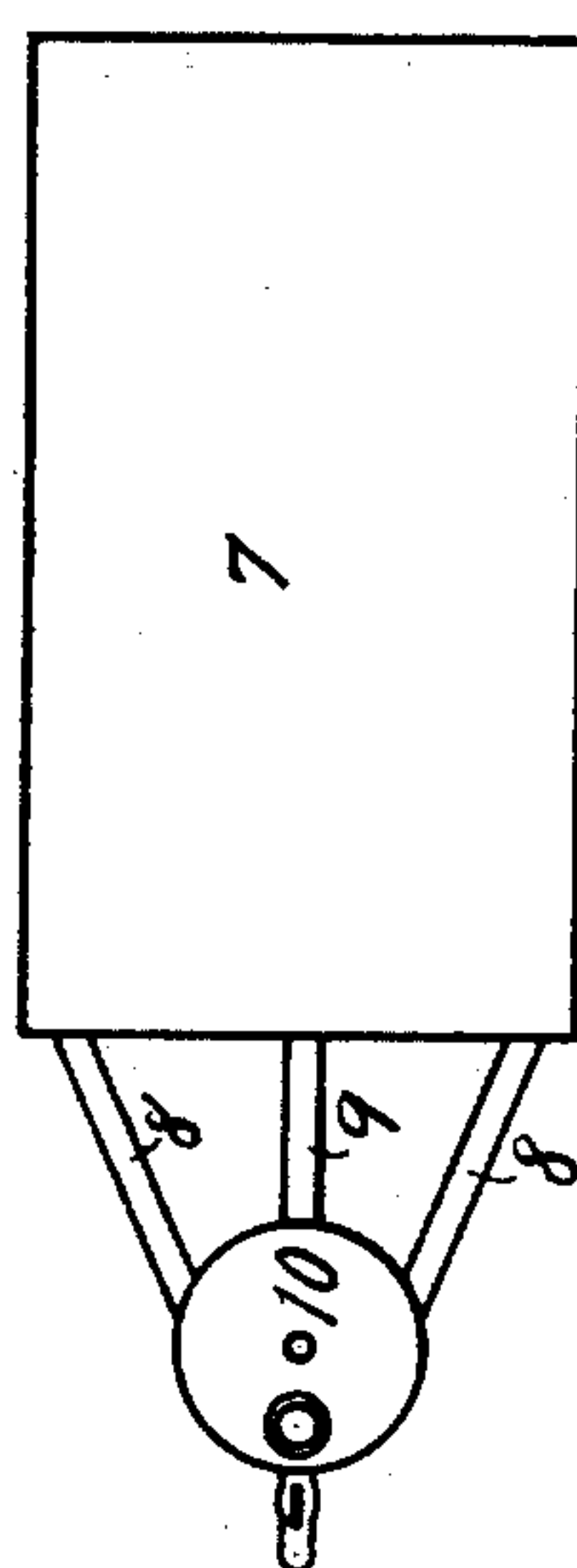
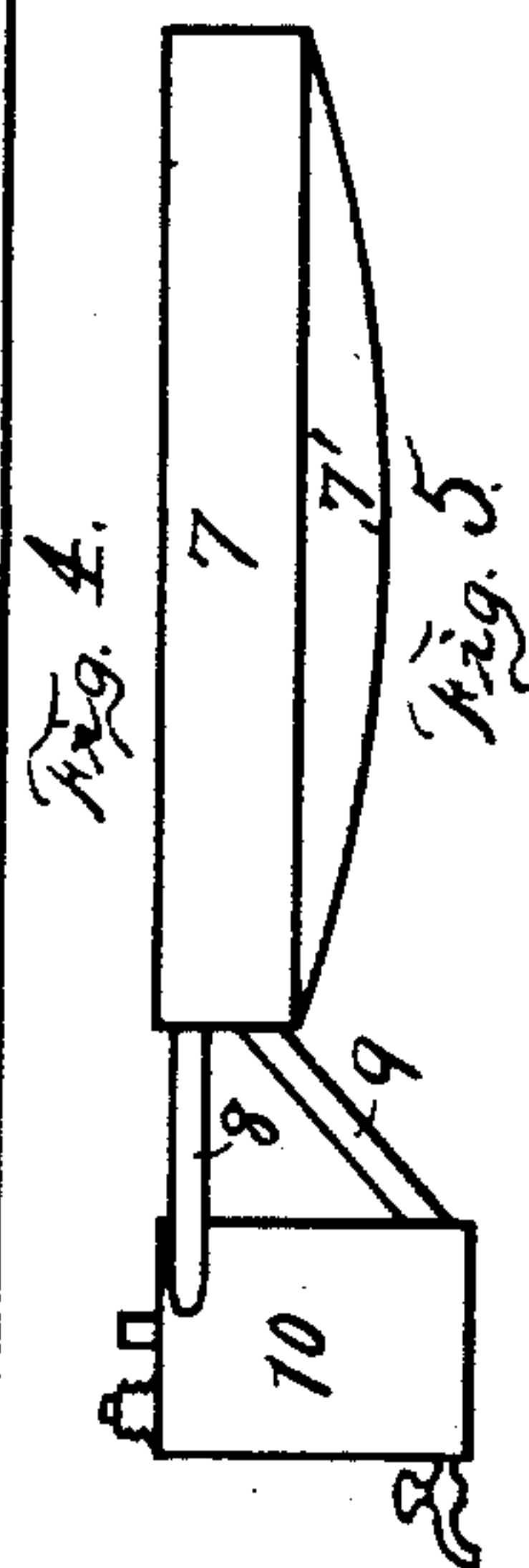
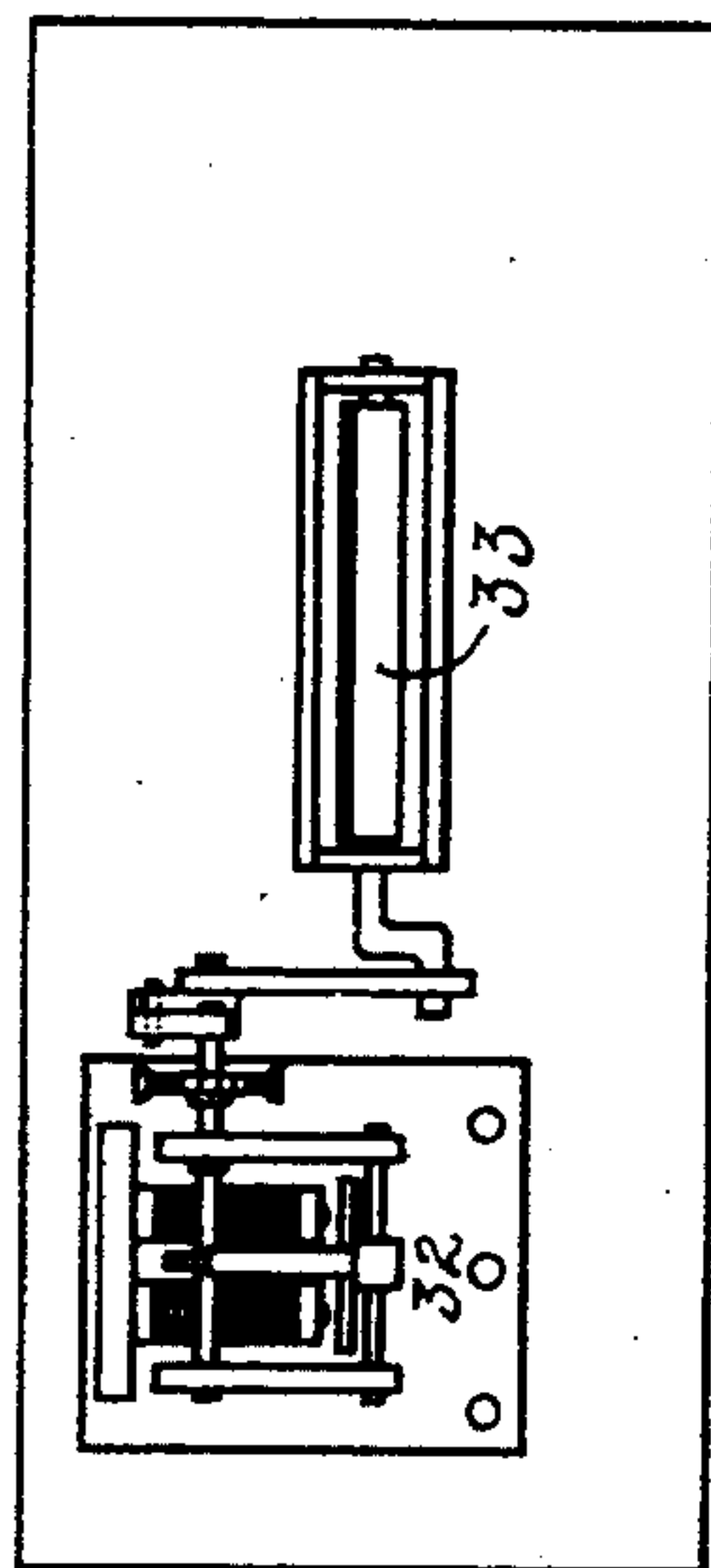
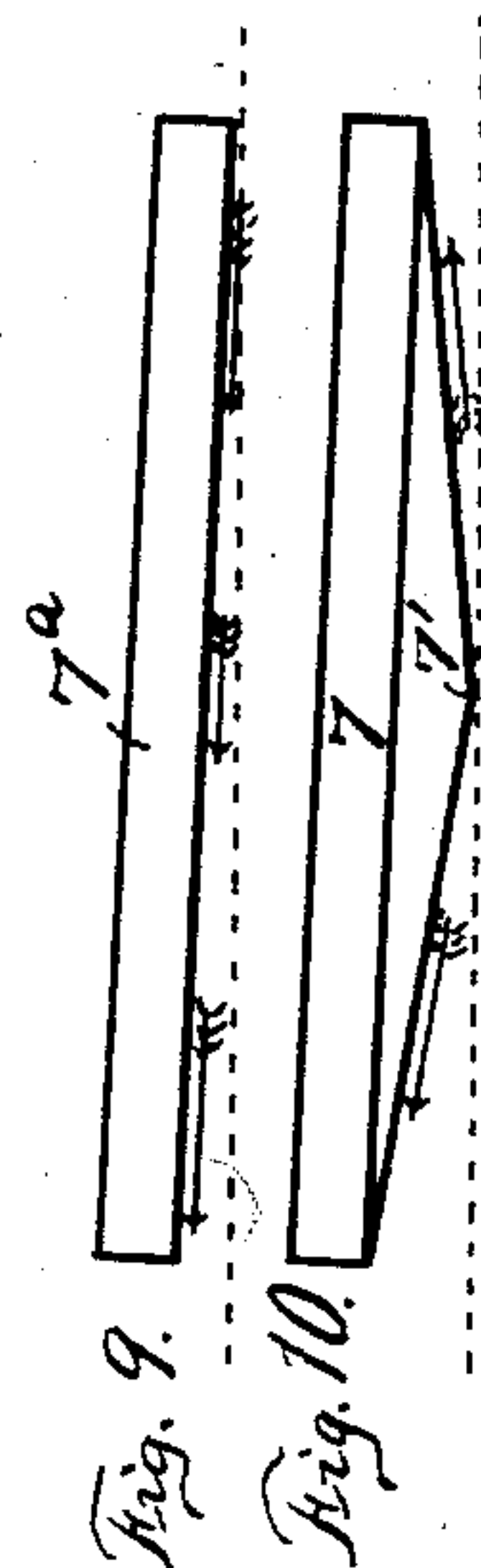
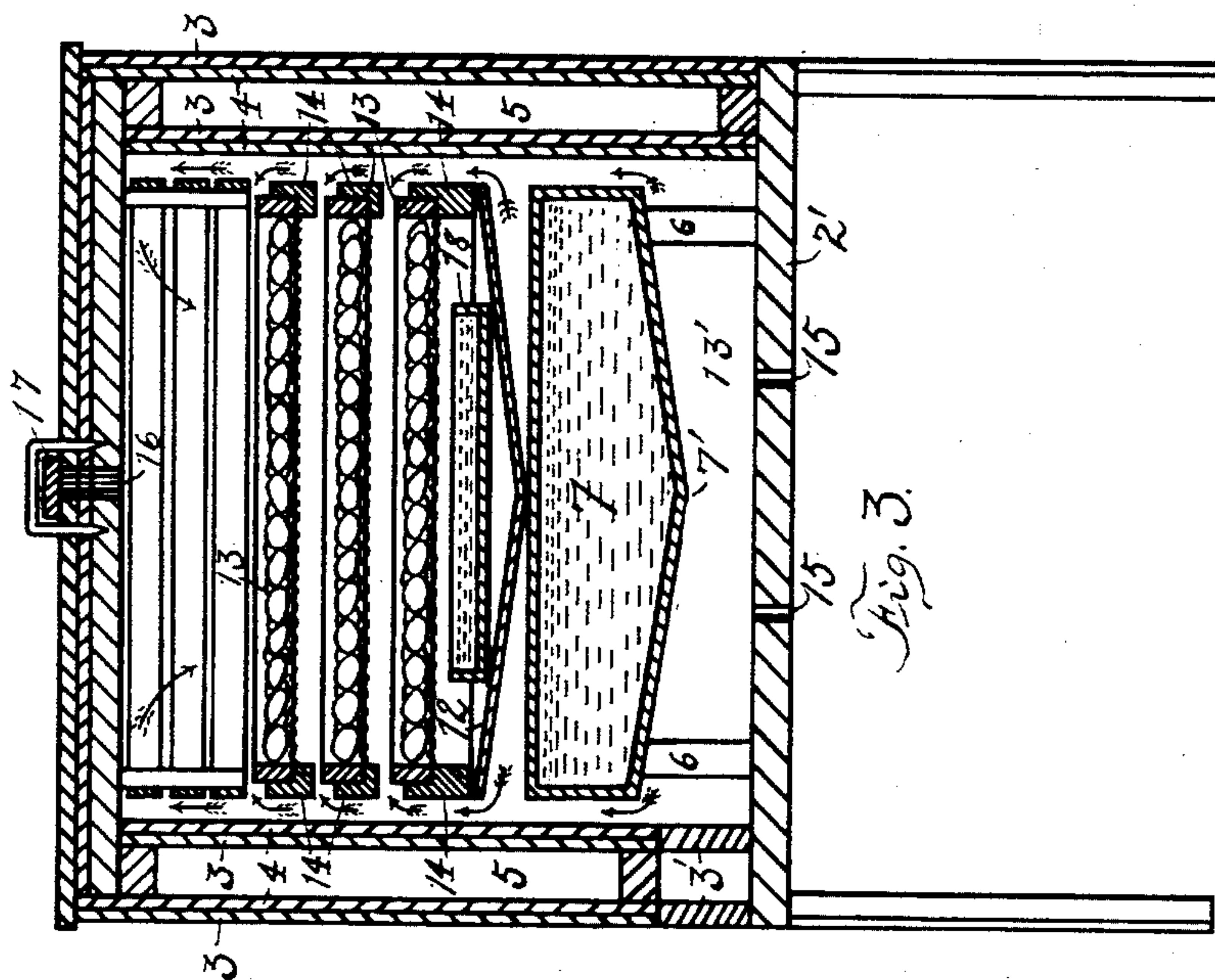
(No Model.)

2 Sheets—Sheet 2.

S. Q. DUNCAN.
INCUBATOR.

No. 520,181.

Patented May 22, 1894.



Witnesses:

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Inventor:

Samuel L. Duncan,
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UNITED STATES PATENT OFFICE.

SAMUEL Q. DUNCAN, OF GREENFIELD, OHIO, ASSIGNOR TO THE COLUMBIAN MANUFACTURING COMPANY, OF SAME PLACE.

INCUBATOR.

SPECIFICATION forming part of Letters Patent No. 520,181, dated May 22, 1894.

Application filed February 9, 1893. Serial No. 461,590. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL Q. DUNCAN, a citizen of the United States, residing at Greenfield, in the county of Highland and State of Ohio, have invented certain new and useful Improvements in Incubators, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to incubators, and its object is, first, to produce an incubator in which the heat will be evenly and perfectly distributed throughout the egg-chamber; and, second, to embody certain new and useful features in incubators; all of which will be hereinafter fully set forth, and specifically pointed out in the claims.

In the accompanying drawings, Figure 1 is a central vertical section of an incubator embodying my invention. Fig. 2 is a top or plan view of the same. Fig. 3 is a central cross-section taken on the line *d d* of Fig. 1. Fig. 4 is a top or plan view of an incubator showing a modified form. Fig. 5 is a side elevation showing a modified form of hot water tank, and Fig. 6 is a top or plan view of the same. Fig. 7 is a side elevation showing a modified form of heat distributor, and Fig. 8 is a top or plan view of the same. Figs. 9 and 10 are side elevations of hot water tanks illustrating the manner in which the heat is distributed.

Like numerals of reference indicate like parts in all the views.

The casing or cabinet of the incubator may be made in any form and of any material desired, but in the accompanying drawings I have shown the preferred construction.

The numeral 2 represents the front side of the incubator, which is preferably made of wood, while the remaining sides are made of galvanized iron or sheet metal, represented by 3, and lined with one or more thicknesses of heavy paper 4. The walls are preferably made double, as shown, thus securing the dead-air chamber 5 through which the outside air can not readily penetrate. This dead-air chamber is continuous upon three sides of the incubator, thus securing an even temperature upon each side of the egg-chamber.

A tank 7, which is supplied with water, oil,

or other fluid, is placed near the bottom of the egg-chamber, and connected by means of pipes 8 and 9 with the boiler or heater 10. The bottom or under side of this tank has an angular, curved, or irregular form, in order to distribute the heat equally to each side of the egg-chamber. The central portion of the bottom, marked 7', is lower than any other part of the tank, and the other portions of the bottom slant, curve, or incline upward from the center to the edges, respectively, as shown in the drawings. These portions of the bottom may be straight or plane, as shown in Figs. 1 and 3, and form an inverted pyramid, or curved or irregular, as shown in Fig. 5. The utility of this construction of tank bottom lies in the fact that the air, when heated, naturally rises, and the center 7', being the lowest, forms a dividing point or line from which the heated air flows in every direction.

In Fig. 9 a flat-bottomed tank 7^a, which is of the usual construction, is shown in a slightly tilted position, the horizontal being represented by the dotted line, and with this construction the heated air, in rising, all flows in one direction, namely, toward the highest edge, as indicated by the arrows, and as a result the temperature at one side of the egg-chamber may become several degrees warmer than the other side. Consequently some of the eggs may be injured by too much heat, and others by too little.

In Fig. 10 a tank of my improved form of construction is shown tilted to the same position shown in Fig. 9. It will be observed that the central portion 7' of the bottom is still lower than any other portion, and even when the tank, or the incubator in which it is placed, is tilted to one side, the heated air, in rising, flows from the central portion toward each edge, as indicated by the arrows.

The tank 7 is supported upon blocks 6, and its bottom or under side is a short distance above the bottom 2' of the incubator, as shown in the drawings, thus forming a warm brooder-chamber 13' beneath the tank. Soon after the eggs are hatched the young chicks jump out over the sides of the trays 13 and descend through the open space between the trays and casing, and between the tank and

casing alighting without injury upon bottom 2' of the incubator. Here they remain, supplied with fresh air through openings or air-ports 15, and heated by tank 7, for several hours, or several days, if desired. They may then be removed through the double door 3' in the side of the incubator. It is obvious that much better results will be obtained by allowing the chicks to escape from the egg-trays, so that they may not be surrounded with broken shells, and furthermore that they may not trample over or otherwise disturb the eggs which are just being hatched. By means of door 3' the young chicks may be removed from the brooder-chamber 13' without throwing an injurious draft of cold air upon the unhatched eggs in trays 13.

Just above the tank 7, and resting thereon, is a heat-distributor or deflector 12. This heat-distributor or deflector is formed exactly in the shape of the bottom or under side of the tank 7, as illustrated in Figs. 1, 3, and 7, and is for the same purpose, except that it distributes the heated air above the tank, while the bottom distributes the heated air below it. The heat-distributor or deflector 12 also constitutes a shield to protect the eggs from direct radiation from the hot water tank. The heat naturally is given off from the tank in waves or flashes of varying intensity, often injurious to the eggs, and this heat-distributor or deflector 12, being interposed between the tank and egg-trays, causes the principal part of the heated air to flow to the sides and then rise to the top of the egg-chamber, whence it is gradually diffused throughout the chamber. The egg-trays 13, which are supported on suitable guides 14, do not touch the sides of the chamber, thus leaving a channel along the sides of the chamber for the ascension of the heated air. The hot water tank is also made small enough to leave a space between its edges and the casing of the chamber. The egg-trays are placed above the tank and arranged one above the other, thus securing the greatest egg-capacity in a given space.

Openings or air-ports 15 are provided in the bottom of the incubator directly beneath the hot water tank, for the admission of fresh air. The air in passing around the tank is thoroughly heated before it reaches the egg-trays. An opening or vent 16, normally closed by slide 17, is provided in the top of the incubator for lowering or regulating the temperature. The circuits described by the air are indicated by the arrows.

A moisture-pan 18 is interposed between the heat-distributor and egg-trays, and its purpose is well understood.

A door 19, which has a panel of double glass 19', is provided in the front of the incubator, whereby the egg-trays may be shifted or removed.

The bottom of the incubator, marked 2', is preferably made removable by means of wood-

screws, in order that the tank may be readily taken from the egg-chamber. The screws are not shown in the drawings.

The boiler or heater 10 has its bottom formed up into a hollow core for the reception of lamp-chimney 22. A coiled pipe 23, which is placed inside the boiler or heater, has one end communicating with said hollow core, while the other end projects through the top of the boiler. This pipe creates a draft for lamp 24, and carries off the smoke and gas; it also imparts a large per cent. of the passing heat to the water which surrounds it. A faucet 25 is provided for drawing off the water. Screw-cap 26 has a vent-tube 27 for the escape of steam or expanded water. This vent-tube has a securing cap 28 which is attached to the screw-cap by a cord or chain. The boiler or heater 10 is incased with a galvanized iron covering 34, thus forming a hot air chamber around the boiler and securing an even temperature. The heated water rises to the top of the boiler or heater 10 and thence flows through pipes 8 into tank 7, while the colder water returns to the boiler through pipe 9, thus securing a constant circulation and consequently an even temperature, as will be readily understood.

An electric bell 29 and battery 30, which may be of any ordinary construction, are placed on top of the incubator, and the circuit is closed through a column of mercury in thermometer 21 when the temperature reaches a certain predetermined degree. It will be observed that one wire runs from the bell to the battery, while another wire runs from the bell to the thermometer, and being inserted into the glass tube near its end, is always in contact with the mercury. The remaining wire runs from the battery to the thermometer and is inserted into the glass tube at a point adjacent to any desired degree, and when the mercury, by expansion, reaches the last-named wire the circuit from the battery will be completed through said mercury, as will be readily understood. The thermometer 21 is placed in the egg-chamber, and hence the bell is set in operation and gives due and ample warning when the temperature becomes too high and the eggs are in danger of being overheated. The temperature may be lowered by turning down the lamp and moving the slide 17.

A modified arrangement is shown in Fig. 4, in which an electric motor 32 opens a damper 33 when the circuit from the battery is closed, thus automatically lowering the temperature in the egg-chamber. But as this arrangement is not of my invention it will not be necessary to describe it more particularly here.

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

1. The combination, with the casing or cabinet of the incubator, and the egg tray or

trays placed therein, of a hot water tank having the central portion of its bottom or under side lower than other portions of said bottom or under side, whereby the heated air, in rising, flows equally to opposite sides of the egg-chamber, and a boiler or heater connected with said tank, substantially as set forth.

2. The combination, with the incubating-chamber containing the egg tray or trays, of a hot water tank having the central portion of its bottom or under side lower than other portions of said bottom or under side, whereby the heated air which is radiated from the bottom or underside of said tank flows equally to opposite sides of the egg-chamber, a boiler or heater, and pipes extending between said boiler or heater and said tank, substantially as set forth.

3. The combination with the casing or cabinet of the incubator, and the egg tray or trays placed therein, of a hot water tank, a boiler or heater connected with said tank, and a heat distributor interposed between the hot water tank and the egg trays, said heat distributor having its central portion extended lower than its other portions, whereby the heated air is directed equally to opposite sides of the egg chamber, substantially as described.

4. The combination with the casing or cabinet of the incubator, and the egg tray or trays placed therein, of a hot water tank having the central portion of its bottom or under side lower than other portions of said bottom or under side, a heat distributor interposed between the hot water tank and the egg trays, said heat distributor having its central portion depressed or lower than its other portions, whereby the heated air is directed equally to opposite sides of the egg chamber,

and a boiler or heater connected with said tank, substantially as described.

5. The combination, with the casing or cabinet of the incubator, and the egg tray or trays placed therein, of a hot water tank placed beneath said trays and small enough to leave a passage-way between said tank and casing, and the bottom of said casing having an opening or air-port beneath said tank, whereby the incoming air is heated before it reaches the egg-trays, substantially as set forth.

6. The combination, with the casing or cabinet of the incubator, of a hot water tank contained therein, the egg tray or trays above said tank, said trays and tank being small enough, respectively, to leave a passage-way between them and the casing, and a brooder-chamber beneath said tank, whereby the chicks may jump down from said trays to said brooder-chamber, substantially as set forth.

7. The combination, with the casing or cabinet of the incubator, the egg tray or trays contained therein, and the hot water tank beneath said trays, said trays and tank being, respectively, small enough to leave a passage-way between them and the casing, of a brooder-chamber beneath said tank, and a door in said casing or cabinet adjacent to said brooder-chamber, whereby the chicks may be removed from the brooder-chamber without throwing a cold draft of air upon the unhatched eggs, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

SAMUEL Q. DUNCAN.

Witnesses:

J. N. McCONNELL,
H. W. MARKS.