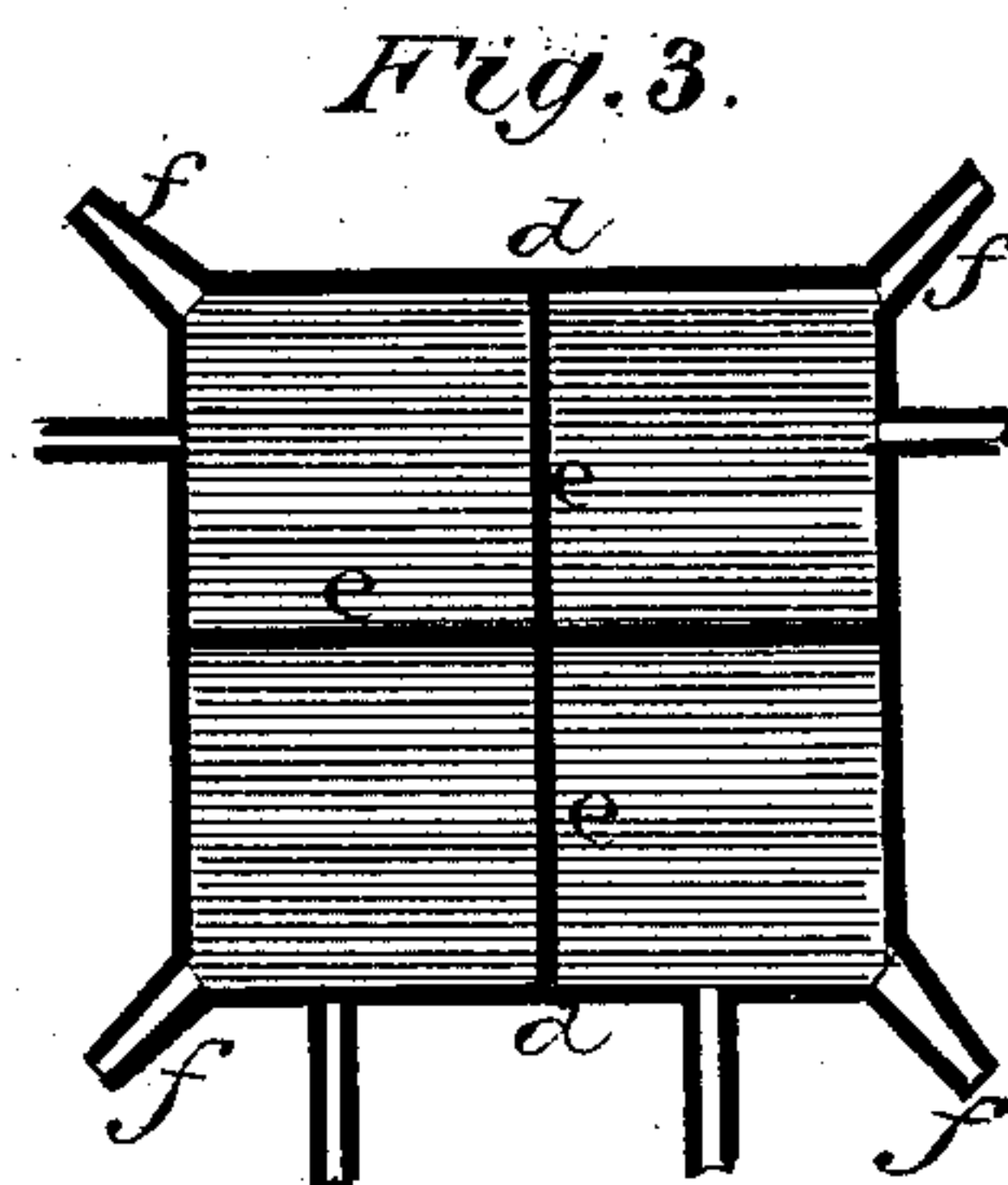
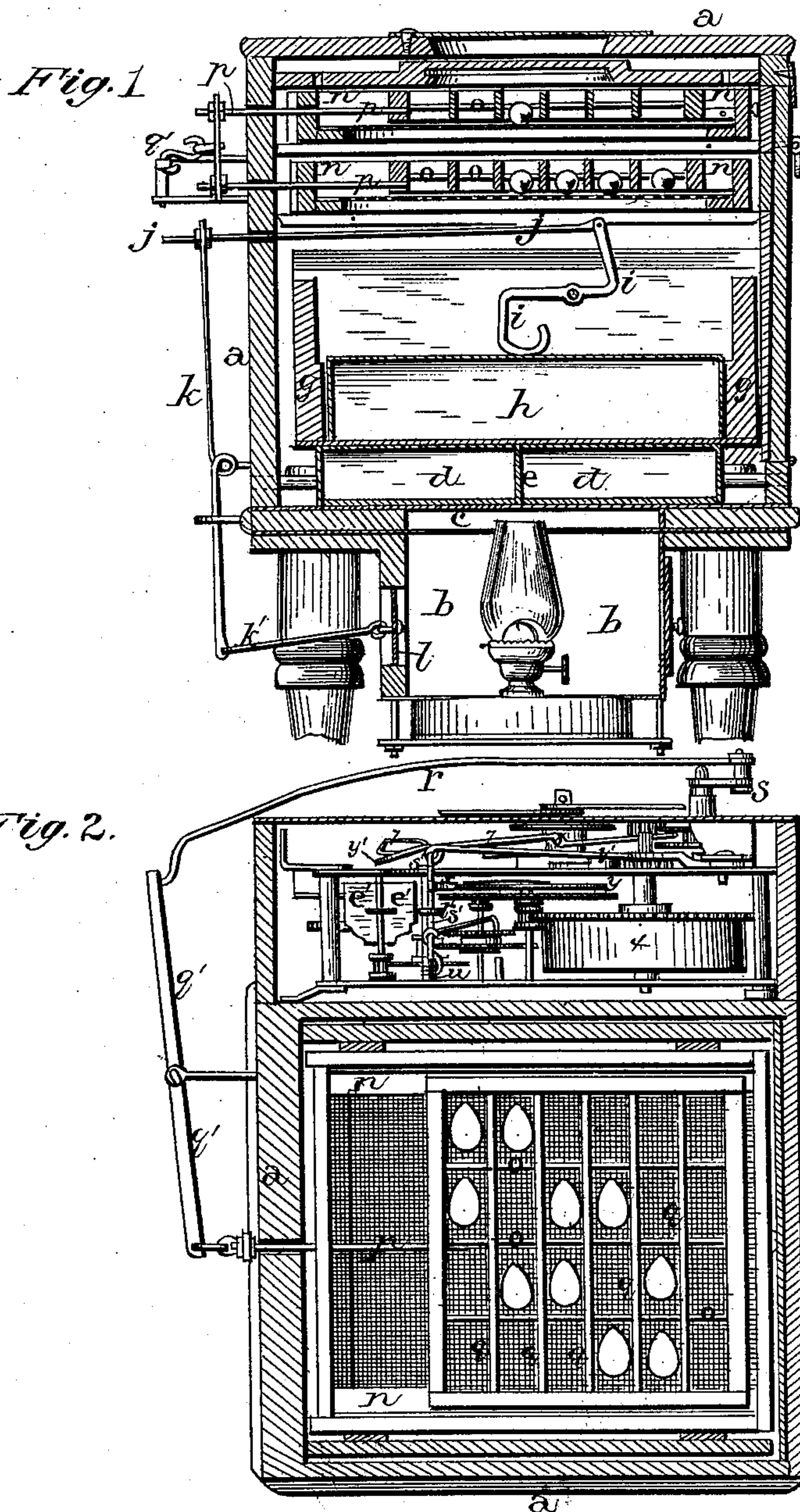


J. L. CAMPBELL.
Incubator.

No. 221,214.

Patented Nov. 4, 1879.



Witnesses
Ed. G. Dieterich
J. W. Garner

Inventor.
Jas. L. Campbell,
per
J. A. Lehmann,
Atty.

J. L. CAMPBELL.
Incubator.

No. 221,214.

Patented Nov. 4, 1879.

Fig. 4

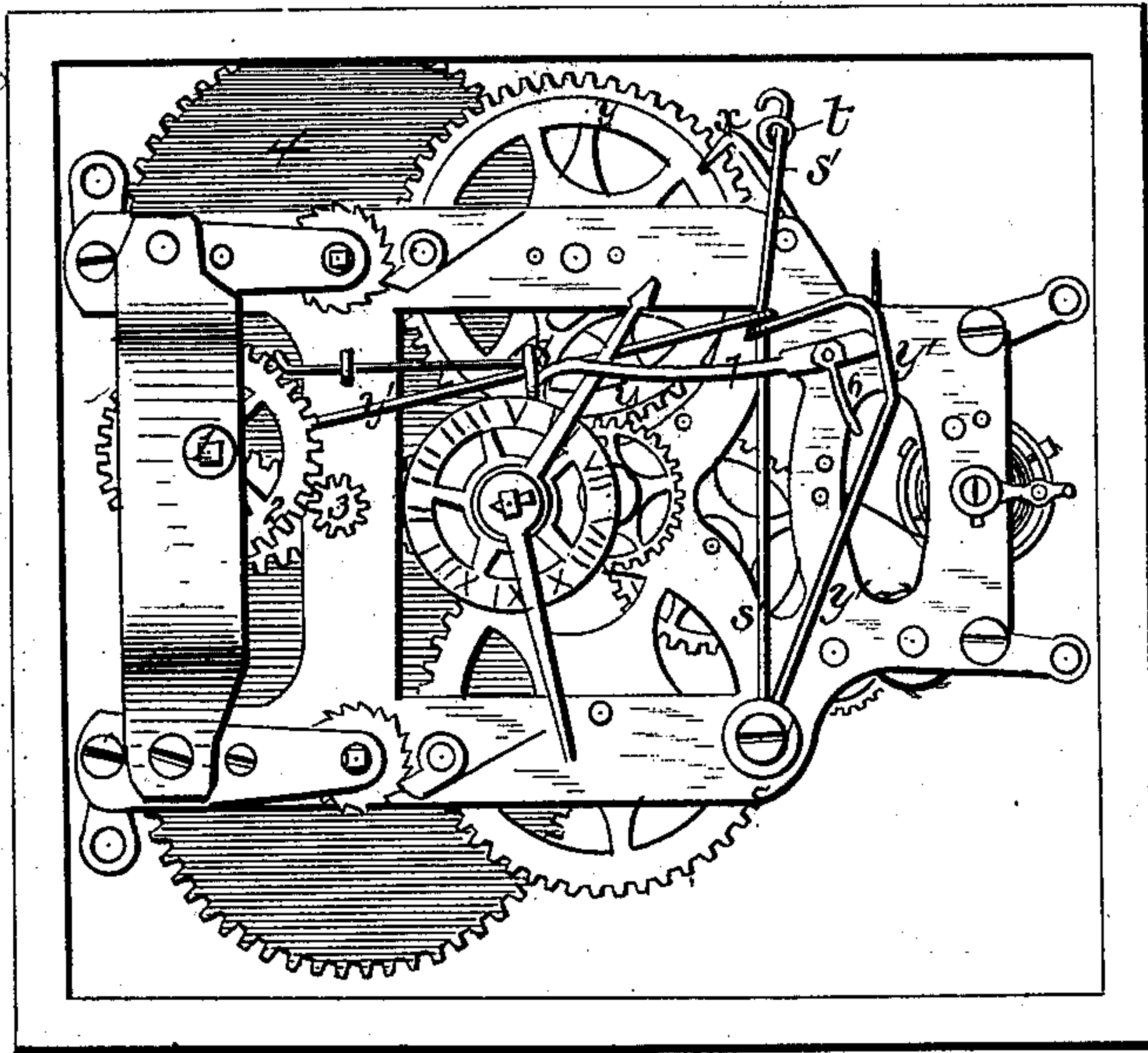


Fig. 5.

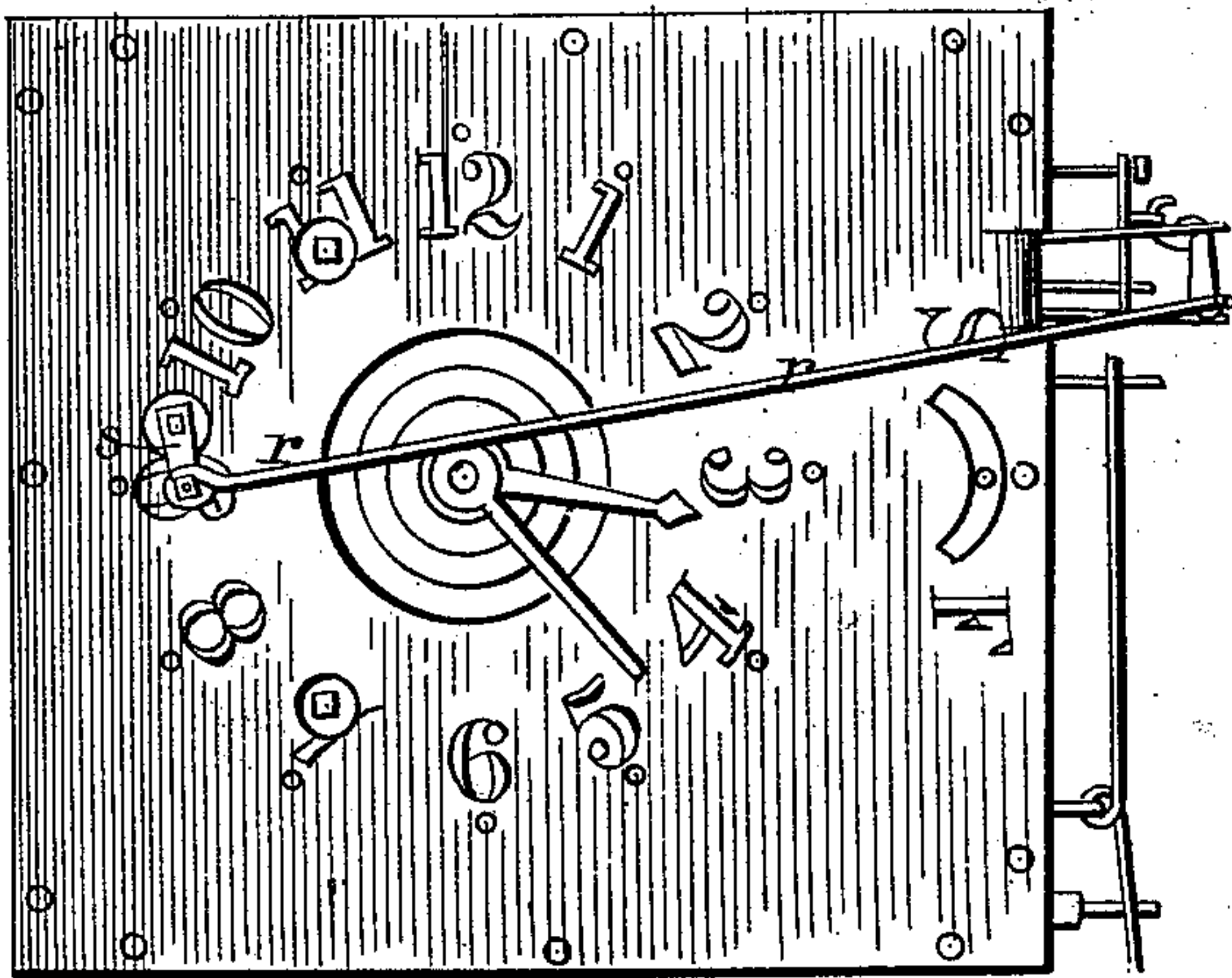


Fig. 6.

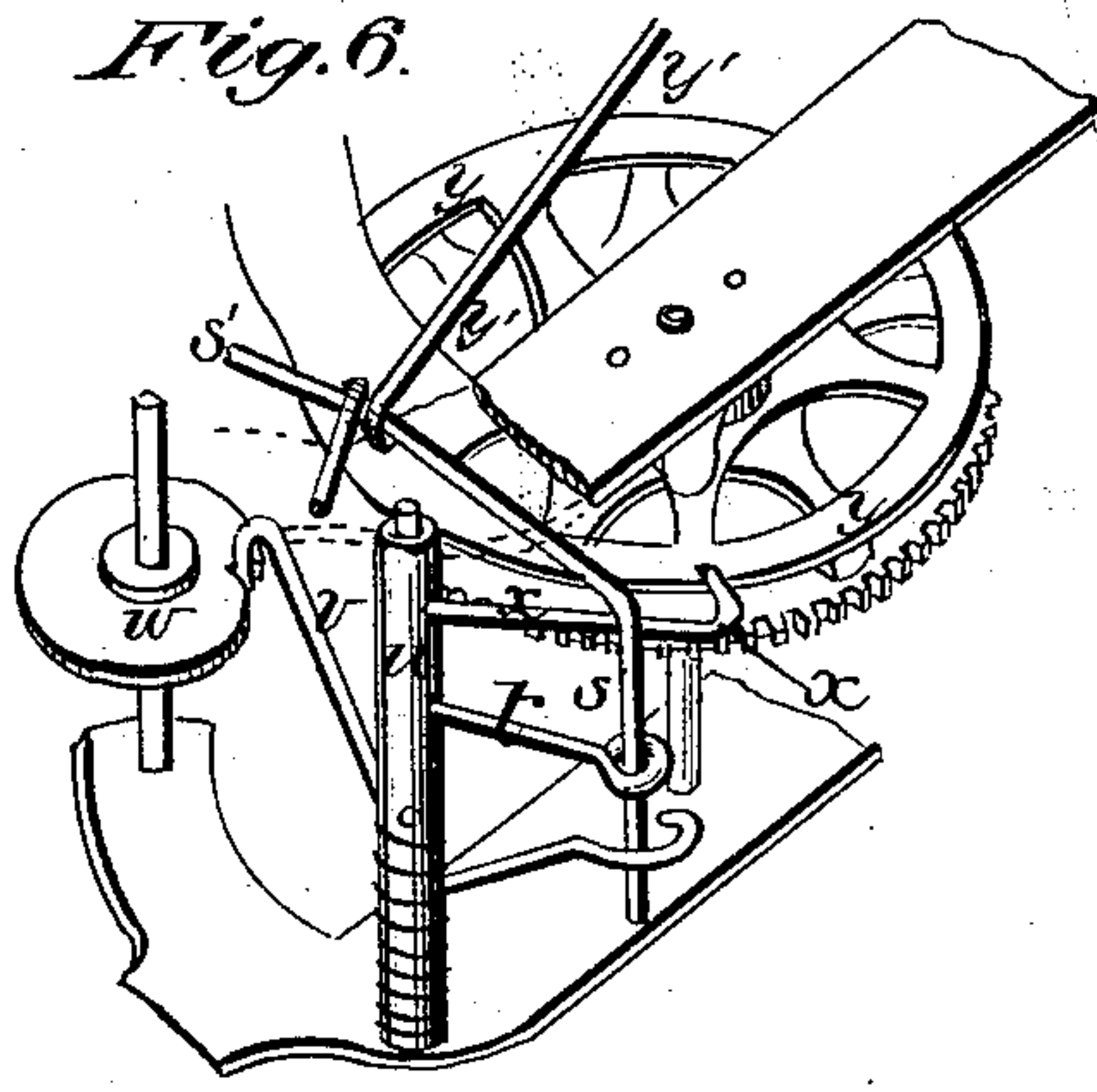


Fig. 7.

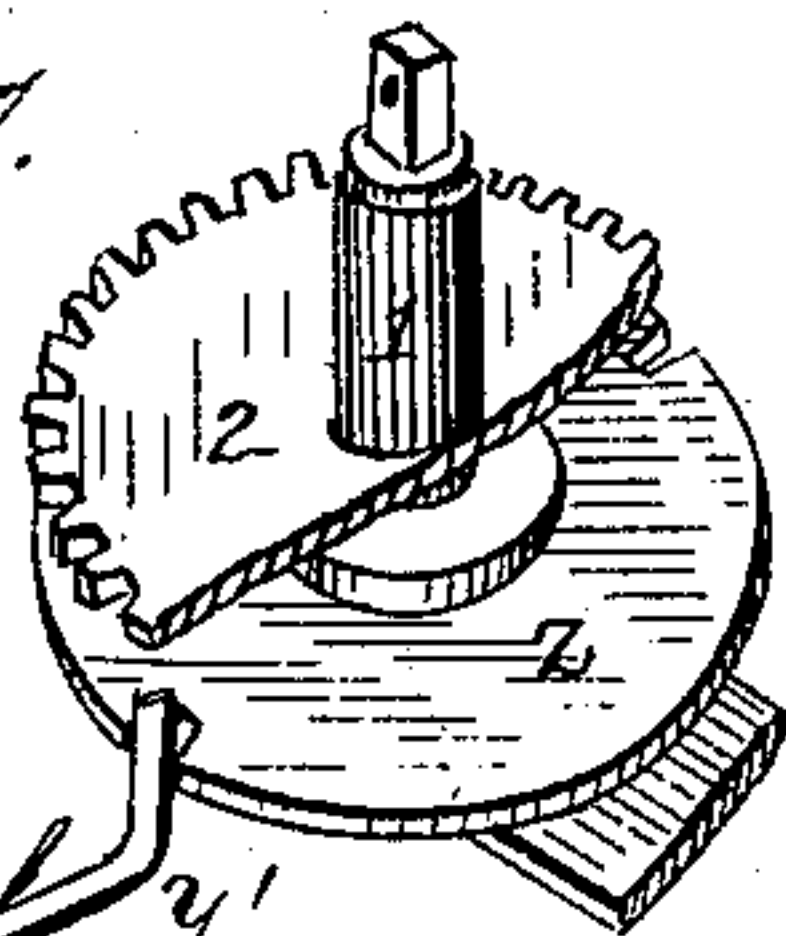
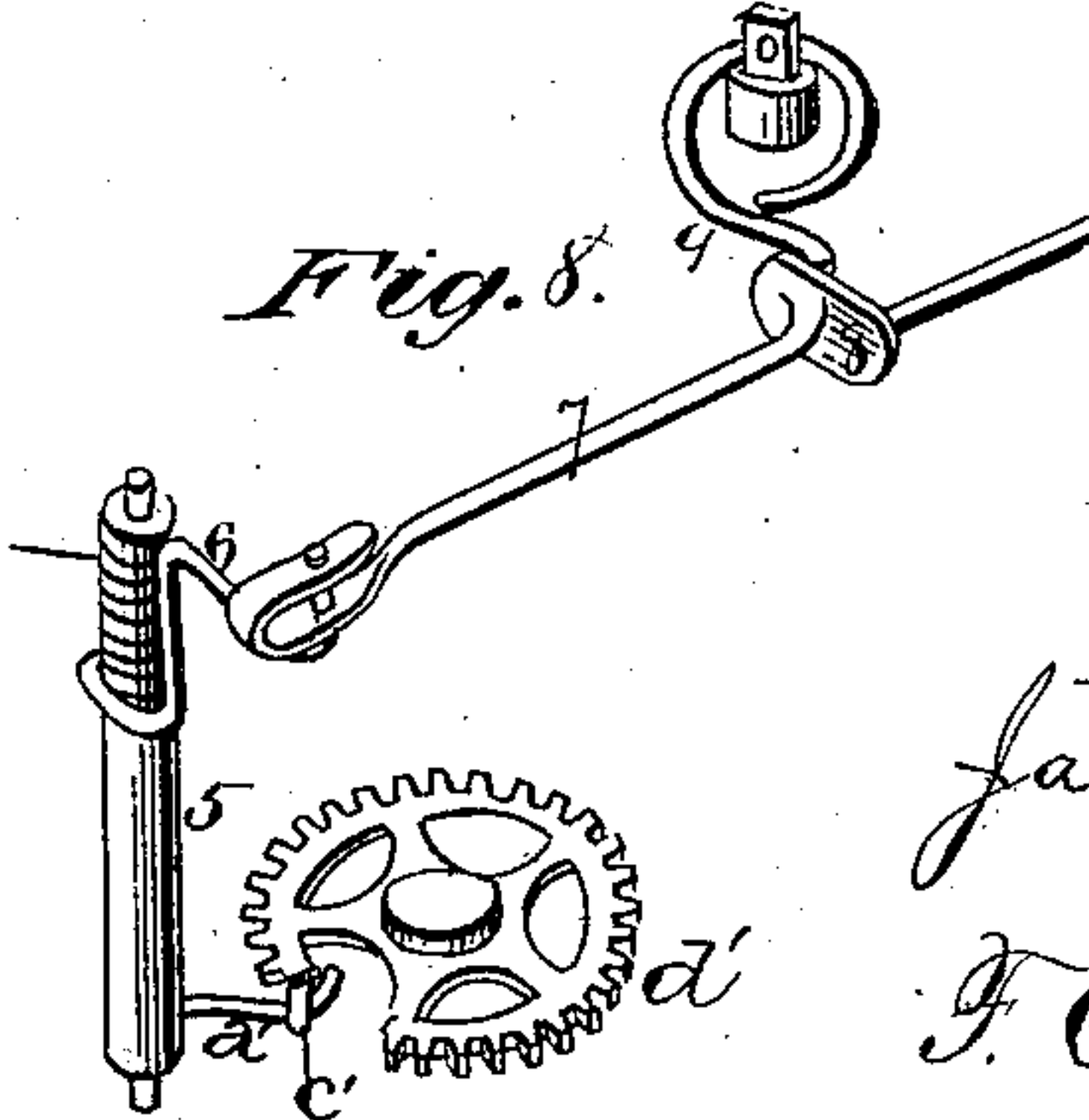


Fig. 8.



Witnesses

Ad. G. Dietrich
J. W. Garner

Inventor.
Jas. L. Campbell,
per
F. A. Lehmann,
Att'y.

UNITED STATES PATENT OFFICE.

JAMES L. CAMPBELL, OF WEST ELIZABETH, PENNSYLVANIA.

IMPROVEMENT IN INCUBATORS.

Specification forming part of Letters Patent No. **221,214**, dated November 4, 1879; application filed August 12, 1879.

To all whom it may concern:

Be it known that I, JAS. LOGAN CAMPBELL, of West Elizabeth, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Incubators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to an improvement in incubators; and it consists in, first, a box that is divided into compartments, and provided at the corners with outlets for the warm air, so as to direct the air up into the corners; second, a box in which a partial vacuum has been formed, as a means of regulating the heat for hatching; third, the arrangement of strips on wires, for the purpose of turning the eggs in the trays; fourth, a clock mechanism for moving the eggs every twelve hours, all of which will be more fully described hereinafter.

Figure 1 is a vertical section of my invention. Fig. 2 is a horizontal section of the same. Fig. 3 is a horizontal section of the box in which the air is heated. Fig. 4 is a front view of the mechanism for moving the trays. Fig. 5 is an elevation of one side of the frame. Figs. 6, 7, 8 are details of the mechanism.

a represents a suitable frame or case, which may be of any desired size or construction. Secured to the under side of this frame is a sheet-iron chamber, *b*, with an open bottom, just under which the lamp is placed. This lamp is so supported that its body remains below the chamber, and hence never becomes sufficiently hot to be in danger of an explosion.

The top of the chamber is formed by a sheet-iron plate, the full size of the box, with a round hole in the center for the entrance of the top of the lamp-chimney, and one inch above this is placed a second plate, against which the heat from the lamp strikes, and the heat from this plate *c* is communicated to the flat sheet-iron box *d*, placed on top of it. This box *d* is divided by the partitions *e* into four parts, as shown, and from each of the subdivisions thus

formed in the box by means of partitions there extends a short pipe, *f*.

Each subdivision is supplied with air from the outside of the frame by means of a suitable pipe, and as soon as this air becomes heated it at once passes out at the corner through the pipe *f*. These pipes *f* are located at the corners, so that the hot air will be made to pass out at those parts, and thus equally heat every part of the box at once. When these tubes are not used the corners of the box are always colder than any other part, and hence the hot air does not rise equally around all the eggs, and, as a consequence, the eggs in the corners of the trays do not hatch.

Placed inside of the frame *a*, on the top of the subdivided box *d*, is a wooden frame, *g*, which has a sheet-metal bottom, and in this frame *g*, and resting on the sheet-metal bottom, is a box, *h*, which is made of any suitable material. This box has a small hole made in it, and then it is heated up to a certain temperature, so as to expel a portion of the air, and then the hole is closed up. A partial vacuum having been formed in the box, the top of the box, which is very thin, becomes very sensitive to heat and cold, and rises and falls at the very slightest change in temperature.

Placed upon a pivot, at a suitable distance above the top of this box *h*, is the curved lever *i*, the lower end of which bears upon the top of the box, while to the upper end is fastened the connecting-rod *j*, which extends out through the frame, as shown in Fig. 1, and has its end fastened to the pivoted rod *k*, which is connected to an arm, *k'*, which projects out from the valve *l*.

When the temperature falls or rises in the frame *a* the box-cover at once rises or falls, and in so doing moves the lever *i* so as to open or close the valve to a corresponding degree, and thus admit air to or shut it off from the lamp.

So sensitive is the box *h* that the change of a single degree in the temperature at once affects the valve.

As here shown, this valve-controlling mechanism is made in its simplest form; but should it be desired to make it still more sensitive there will be another lever on another pivot

used, and the ends of these levers will be united by crossed rods.

The trays *n*, in which the eggs are placed, are arranged in tiers in the upper part of the frame, and have fine-wire bottoms, so as to allow a free circulation of the warm air around the eggs. This frame consists of a number of horizontal wires, *o*, upon which the adjustable strips *q* are placed. These strips are made adjustable, so as to adjust them to the size of the eggs being hatched. Where the eggs are large and small the strips are adjusted to the size of the large eggs, and the frames will move part way before turning the small eggs. When the eggs are all small the strips will be placed to suit them and the movement of the frames shortened by shortening the crank *s*.

The trays *n* remain stationary; but the frames for turning the eggs move back and forth in them, being fastened by means of rods *p* to a pivoted lever, *q'*, on the outside of the frame *a*. The front end of this pivoted lever is connected, by a rod, *r*, with the crank *s*, which is made to make a half-revolution every twelve hours.

The mechanism for operating the crank consists of the movement of an eight-day striking-clock, to which I have added a few additional parts. Outside of the parts which I have added to this clock-movement I make no claim whatever. The hour and minute hands of the clock, the dial, and the alarm-register remain the same as in the common clock.

Pivoted to the frame-work in which the clock mechanism is secured is a long wire, which is so bent as to form one arm, *s'*, which extends straight up across the face of the works, and has its end bent at right angles, so as to pass through an arm, *t*, which projects out from the shaft *u*, which shaft has a spring wrapped around it, so as to cause it to return to place after having been moved. Fastened to this shaft is an arm, *v*, which catches in the cam *w* and stops it after the cam has revolved a certain number of times. From this shaft also projects an arm, *x*, having a hooked end to catch in a recess in the edge of the wheel *y*. This wheel *y* is the same as the usual striking-wheel, with the exception that instead of having a series of groups of notches it has only one notch.

In all this part of the clock mechanism I have made no change, except in doing away with the series of groups of notches and connecting the arm *s'* to the shaft.

The other arm, *y'*, of the wire is bent at right angles, as shown, and has its end to catch in one of two notches made in the edge of the disk *z*, which is secured to the same shaft, 1, as the crank *s*, and which shaft is made to revolve half-way around every twelve hours. This shaft is provided with a spur-wheel, 2, which is operated by a pinion, 3, on a shaft that is turned by the cylinder 4, containing the operating-spring. The arm *y'* is

fastened to the arm *s'* where they cross each other, so as to cause them to move together.

To the shaft 5, around which is wrapped a spring, is secured the bent arm 6, and to this arm 6 is fastened the rod 7. This rod 7 is provided with a shoulder, 8, under which a pin, 9, on the alarm-dial catches, as the dial revolves around with the hour-hand every twelve hours.

As this dial sweeps around, the pin 9 catches under the shoulder and pushes the rod 7 endwise far enough to turn the shaft 5 partially around, and at the same time the arm 6 catches under the arm *y'* and moves both it and the arm *s'* far enough to lift the end of the arm *y'* out of its recess in the disk *z*, and the arm *v* out of the cam *w*. At the same time that the arms *y'* and *v* are loosened the shaft 5 is turned just far enough to cause its arm *a'* to catch behind the pin *c'* on the wheel *d'*, that operates the fan *e'*, and prevent the wheel from turning until the alarm-dial has passed on beyond the shoulder 8, when the driving-spring at once sets the whole mechanism to moving, as in a striking-clock, and continues to revolve until the disk *z* has turned one-half around, when the end of the arm *y'* at once catches in one of the two recesses in the edge of the disk, and at the same time the arm *v* catches in the cam *w*, and at once stops the mechanism. This mechanism runs just long enough for the disk to revolve one-half around, and no longer, and this it does every twelve hours.

As the disk sweeps around the crank *s* also turns and operates the lever *q'*, as already described, so as to turn the eggs.

Instead of moving the eggs one-half over, if so preferred the trays may be made to tilt slightly up and down, so the eggs will roll one-half over and roll back.

The hour at which the eggs shall be turned every day is set the same as an alarm, by turning the alarm-dial under the hour-hand.

This machine with one winding will automatically turn the eggs every twelve hours until the chickens are all hatched.

Having thus described my invention, I claim—

1. In an incubator, the box *d*, divided by the partitions *e* into compartments, and placed above the lamp and below the box *h*, substantially as shown.

2. In an incubator, the box *d*, divided into compartments by the partitions *e*, and provided with the pipes *f*, for equally distributing the warm air into the corners, substantially as described.

3. In combination with the heating apparatus of an incubator, the box *h*, having a partial vacuum formed in it, as a means of regulating the temperature in the frame, substantially as set forth.

4. The combination of the box *h*, having a partial vacuum formed in it, with the lever *i*, and rods *j k k'*, and valve *l*, and a means for

heating the air in the frame, substantially as specified.

5. In an incubator, the combination of a clock mechanism with the rods $s' y'$, arms $x t v$, cam w , rod 7, having the shoulder 8, alarm-dial, wheel z , crank s , and rods $r q'$, whereby the eggs are moved in the trays at regular intervals, substantially as set forth.

6. In an incubator, the combination of the stationary trays n , the wires o , and the strips

q , made adjustable on the wires, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 23d day of July, 1879.

JAMES L. CAMPBELL.

Witnesses:

F. A. LEHMANN,
A. W. GRAY.