

No. 705,558.

Patented July 29, 1902.

J. BUTCHER.
ELECTRIC CLOCK.

(Application filed Oct. 16, 1901.)

(No Model.)

5 Sheets—Sheet 1.

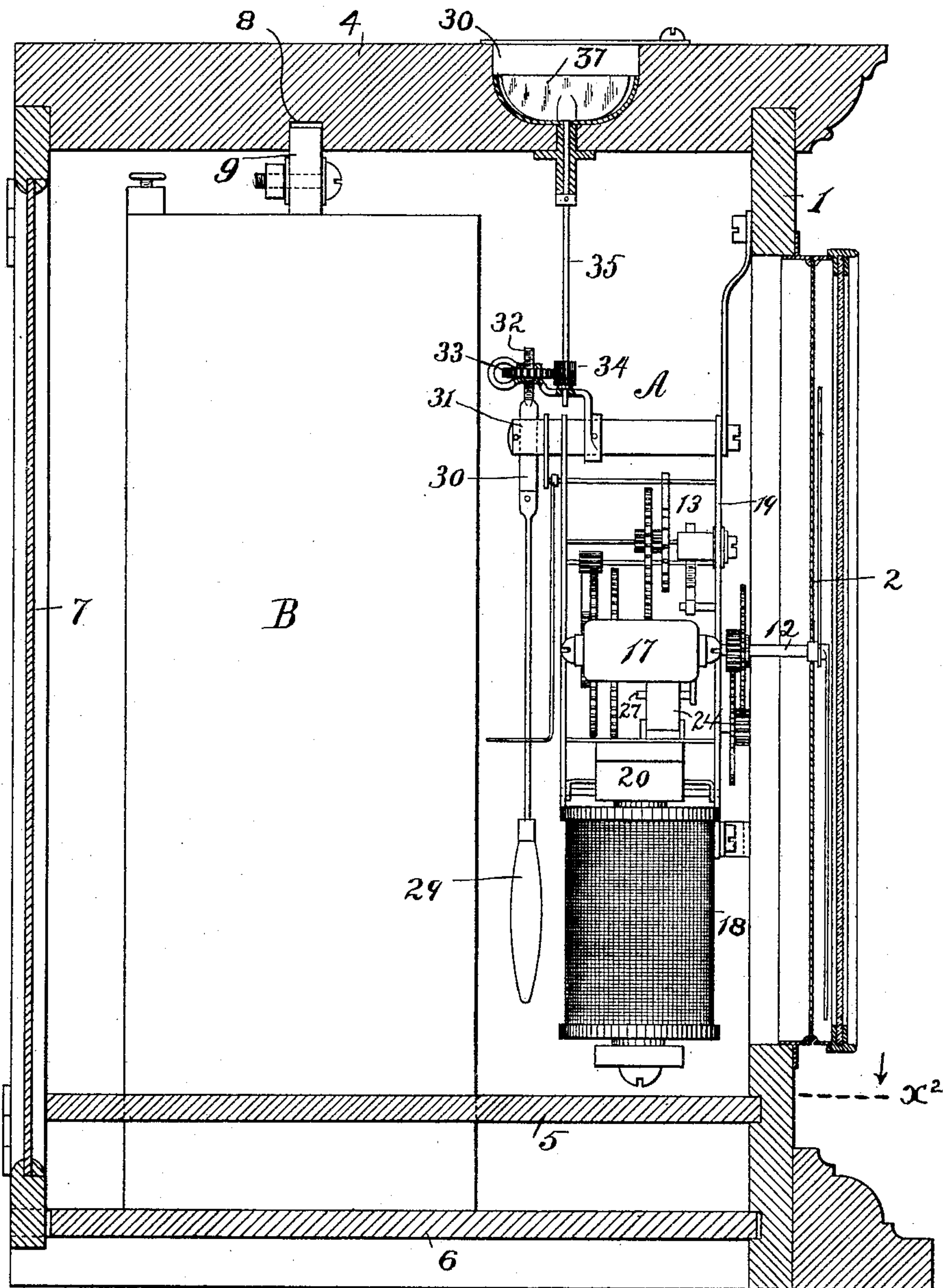


Fig. 1.

WITNESSES:

Gro Eisenbaum

H. Alan Connell

INVENTOR:

Joseph Butcher

BY

Henry Connell

ATTORNEY

No. 705,558.

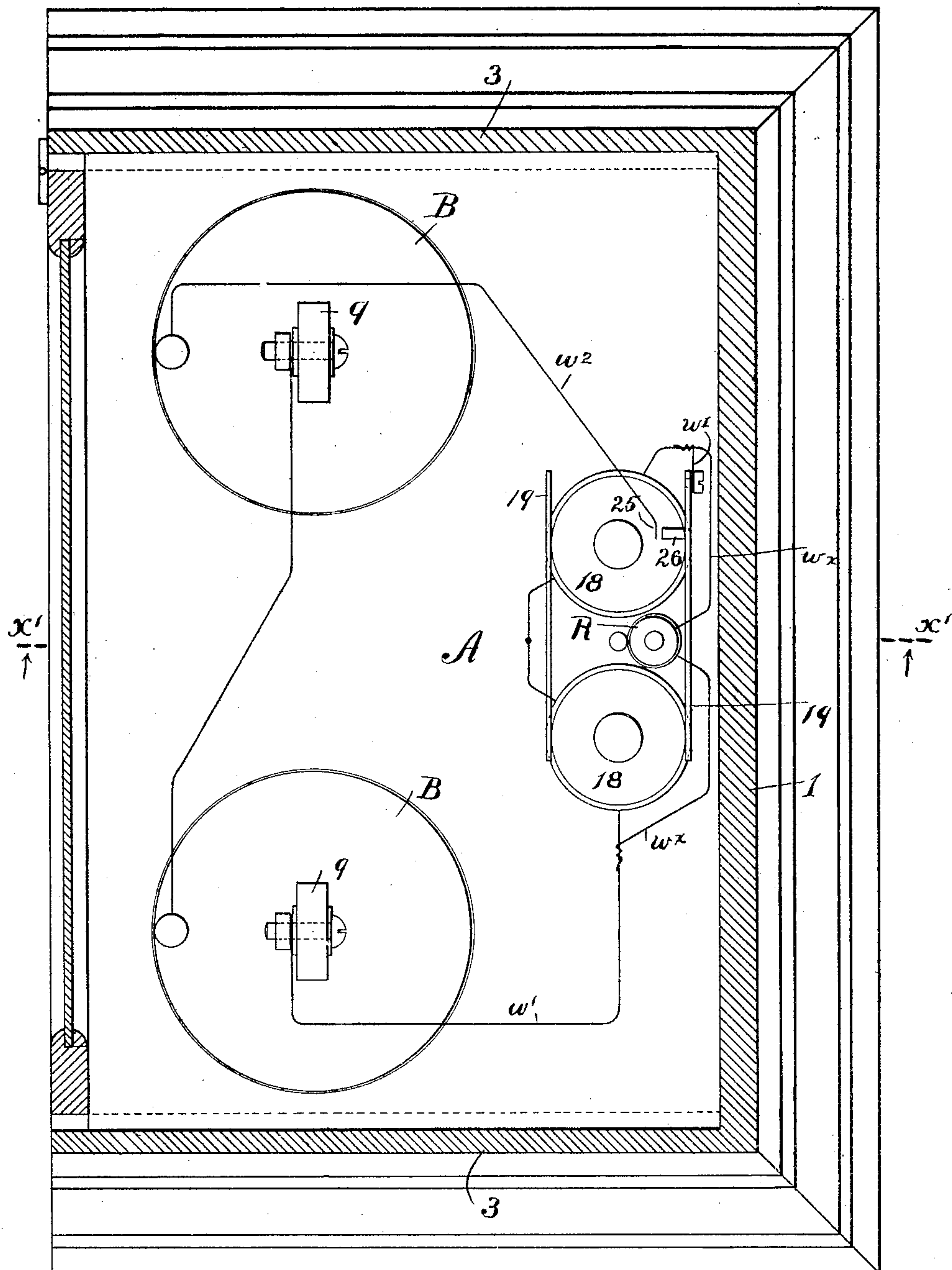
Patented July 29, 1902.

J. BUTCHER.
ELECTRIC CLOCK.

(Application filed Oct. 18, 1901.)

(No Model.)

5 Sheets—Sheet 2.



WITNESSES:

Grover E. Eubank

H. Alan Connett

Fig. 2.

INVENTOR:

Joseph Butcher

BY

Henry Connett

ATTORNEY

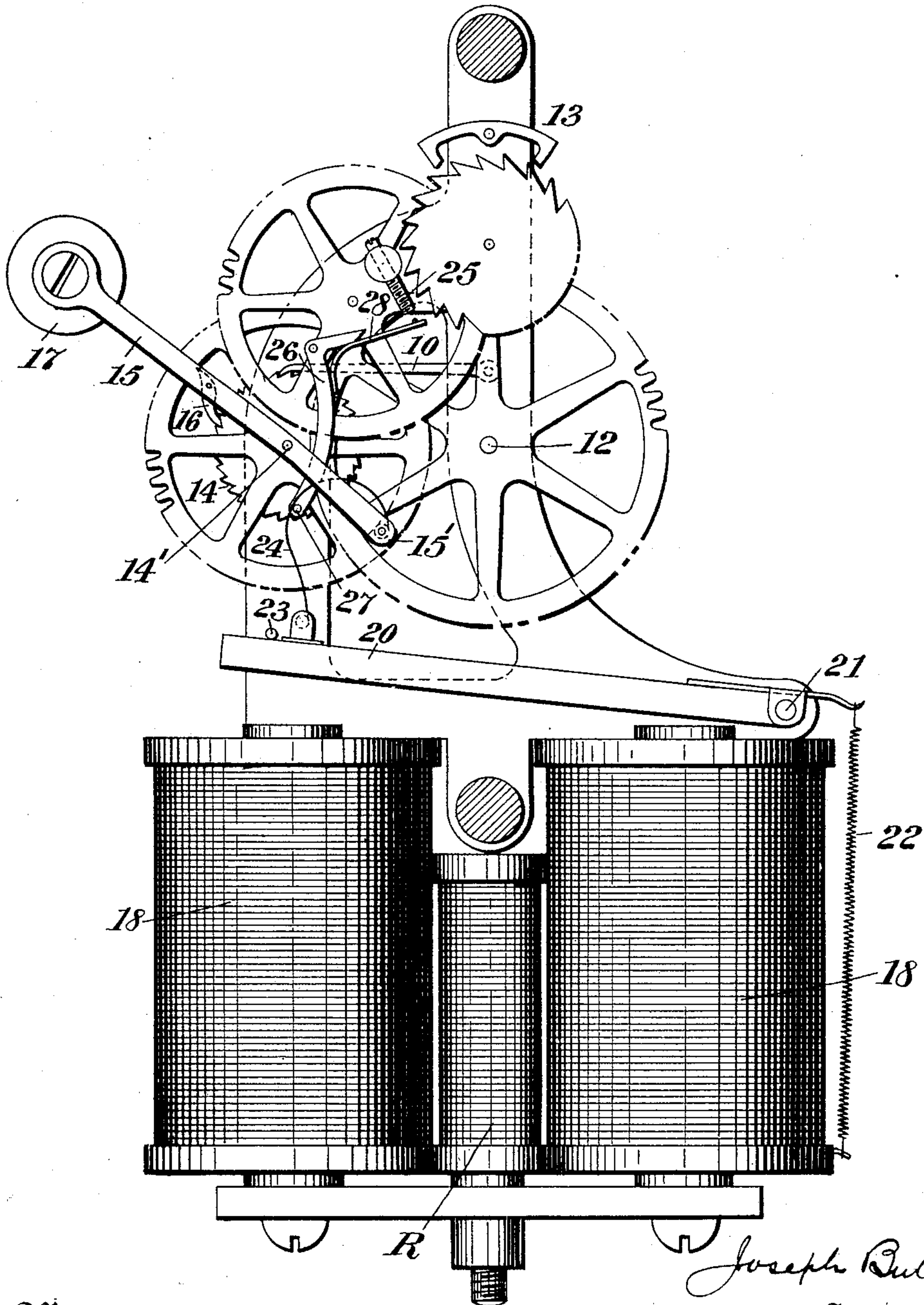
J. BUTCHER.
ELECTRIC CLOCK.

(Application filed Oct. 16, 1901.)

(No Model.)

5 Sheets—Sheet 3.

Fig. 3



Witnesses
Bert C. Jones.
Charles W. Hildreth

Joseph Butcher
Inventor
By his Attorney Henry Bennett

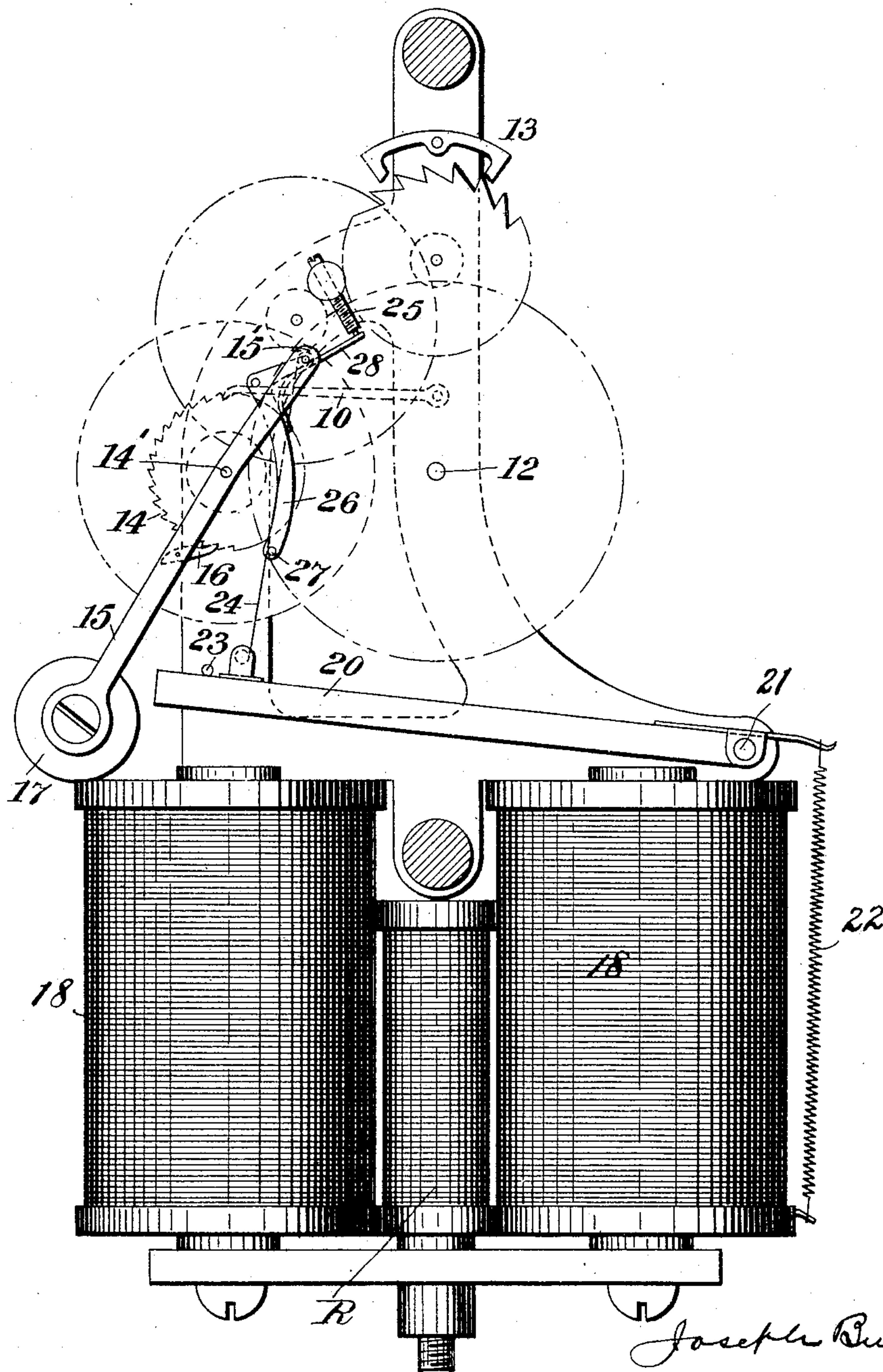
J. BUTCHER.
ELECTRIC CLOCK.

(Application filed Oct. 18, 1901.)

(No Model.)

5 Sheets—Sheet 4.

Fig. 4



Witnesses
But. C. Jones.
Charles H. Hildreth

Joseph Butcher
Inventor
By his Attorney *Henry Connel*

No. 705,558.

Patented July 29, 1902.

J. BUTCHER.
ELECTRIC CLOCK.

(Application filed Oct. 18, 1901.)

(No Model.)

5 Sheets—Sheet 5.

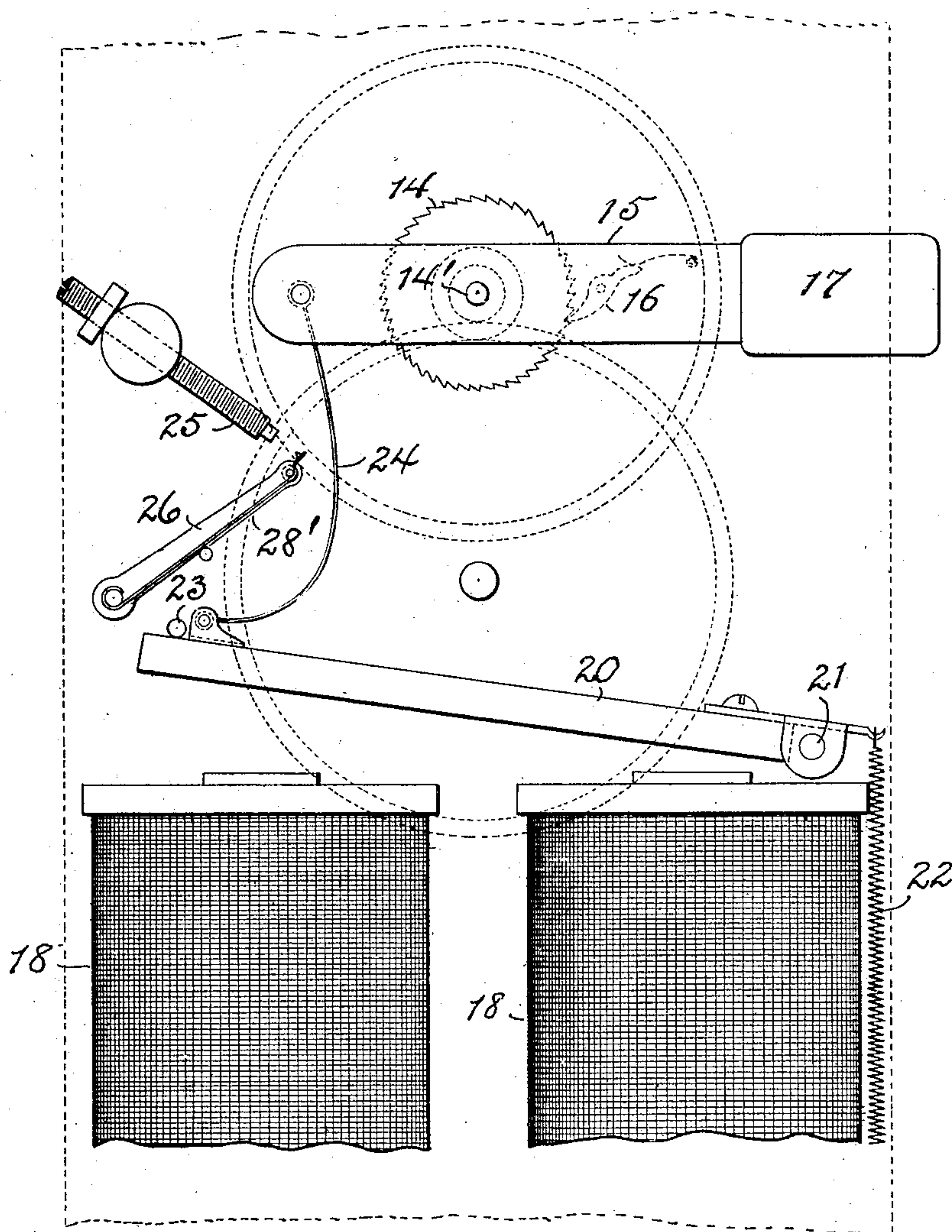


Fig. 5.

WITNESSES:

Geo. W. Eisenbraun

H. Alan Connett

INVENTOR:

Joseph Butcher

BY

Henry Connett

ATTORNEY

UNITED STATES PATENT OFFICE.

JOSEPH BUTCHER, OF NEW YORK, N. Y., ASSIGNOR TO SIMEON N. PUTNAM,
OF JERSEY CITY, NEW JERSEY.

ELECTRIC CLOCK.

SPECIFICATION forming part of Letters Patent No. 705,558, dated July 29, 1902.

Application filed October 16, 1901. Serial No. 78,785. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH BUTCHER, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Electric Clocks, of which the following is a specification.

This invention relates to the class of electric clocks wherein the motive power is obtained from a battery within the clock-case and a weighted pawl-arm is thrown up at intervals by an electromagnet momentarily excited by the current from said battery.

The object of the present invention is to provide an efficient means for operating the circuit-closer through the medium of the weighted pawl-arm and the operation of the pawl-arm by the armature-lever of the magnet.

Other features of the invention will be fully described hereinafter and the novel features carefully defined in the claims.

In the accompanying drawings, which serve to illustrate an embodiment of the invention, Figure 1 is a vertical section through the clock-case in substantially the plane indicated by the line x' in Fig. 2; and Fig. 2 is a horizontal section or sectional plan, the case being in section at line x'' in Fig. 1. Fig. 3 is an elevation of the clock-movement on a larger scale than the principal figures. This view shows the weight elevated. Fig. 4 is a similar view to Fig. 3, but showing the weight down and the circuit closed. Fig. 5 is a view illustrating a slightly-different arrangement of the contact-making mechanism from that seen in Figs. 3 and 4.

Referring primarily to Figs. 1 and 2, 1 is the front of the case; 2, the dial therein; 3 3, the sides of the case; 4, the top thereof; 5, the fixed bottom thereof; 6, the removable sliding bottom thereof, and 7 the hinged or removable back. Within the case is mounted the clock-movement, (indicated as a whole by A.) Also mounted in the case are two cells B B of a dry battery for actuating or driving the clock. For convenience in placing and removing the cells B the upper fixed bottom 5 of the case has in it two apertures through which the cylindrical cells may be passed, and in inserting them the clock-case

is inverted, the sliding bottom 6 drawn out, and the inverted cells dropped in. The sliding bottom is then replaced and the case righted. To steady the cells, there is a recess 8 in the top 4 of the clock in the proper position to receive the upper end of the carbon 9 of the cell, as clearly shown in Fig. 1. When placed and fixed in this manner at both top and bottom, the clock may be handled without disturbing the cells.

Referring now to Figs. 3 and 4, the improvements in the movement A will be described. 12 is the hand-arbor. 13 is the escapement. 14 is the driving ratchet-wheel, adapted, as usual, to drive the hand-arbor through a suitable train of gears. 15 is a pawl-lever, which turns about the arbor 14' of the ratchet-wheel and carries a pawl 16, engaging the teeth of said ratchet-wheel. On the one arm of the lever 15 is a weight 17, which in descending rotates said wheel. All of these parts are known in some form in this class of clocks. An electromagnet 18 is mounted in the frame 19 of the clock-movement and its coils are in the circuit with the battery in the case. The circuit will be traced hereinafter. 20 is the armature of the magnet. It is hinged at 21 and is held away from the poles of the magnet by a light spring 22, and its movement under the influence of the spring is limited by a pin or stop 23 in the frame. The rear arm 15' of the pawl-lever is coupled to the free end of the armature 20 by a flexible ribbon 24, which is drawn taut or straight by the full descent of the weight 17, as seen in Fig. 4. In drawing the ribbon straight or taut by the descent of the weight the ribbon engages a part of the contact device, and thus completes the circuit through the electromagnet, and the latter attracts its armature, which by its sudden movement toward the poles of the magnet acts through the taut ribbon to throw the pawl-lever and the weight 17 thereon up to their elevated position ready to descend again. The contact device, as shown in Figs. 3 and 4, where the near side of the movement-frame is broken away or omitted to disclose the construction, comprises an adjustable but normally stationary contact 25, mounted on and insulated from the movement-frame, and a rocker 26

in electrical contact with the metal of said frame. This rocker has a laterally-extending pin 27 in position to be engaged by the straightening ribbon 24 as the weight descends for rocking the rocker and a spring contact-arm 28, which is brought finally into electrical touch with the contact 25 when the weight 17 shall have reached the lowest point in its descent, as seen in Fig. 4. As stated, when the contacts touch the circuit is closed through the electromagnet 18, its armature 20 instantly moves to the poles of the magnet, and the weight 17 is thrown up, the pawl 16 riding over the teeth of the ratchet-wheel. The momentum of the weight carries it beyond the point that would be due to the taking up of the ribbon by the movement of the armature, and the ribbon instantly slackens, thus allowing the contacts to separate and break the circuit.

Fig. 5 illustrates a slightly-different arrangement of the contact devices; but they are substantially as described above. In this view the pawl-lever and the weight, the electromagnet and its armature, the rocker, the operating-ribbon, and the fixed contact are, in substance, the same as before described. In this case, however, the spring contact-arm 28' lies alongside of the arm of the rocker 26, as will be seen. This view, Fig. 5, shows the ribbon 24 slack, as in Fig. 3, and out of contact with the pin 27. Obviously the construction of these details may be varied to suit the circumstances without departing materially from the invention.

Fig. 1 illustrates a means for regulating the clock by varying the length of the pendulum. In this figure 29 is the pendulum. 30 is the thin flat pendulum-spring, engaging slidably the crotch 31. At its upper end the spring 30 has a screw 32, which screws through a wheel-nut 33, collared in the movement-frame. This nut supports the pendulum. Gearing with the wheel-nut is a long pinion 34, fixed on an upright shaft 35, journaled below in the movement-frame and projecting up through the top 4 of the clock-case, where it has an upper bearing. This shaft 35 projects up into a recess 36 in the top of the case, and in said recess and fixed on said shaft is a thumb-piece 37 for turning the shaft. Through the shaft 35 and pinion 34 the wheel-nut 33 is rotated and the pendulum thus made shorter or longer at will.

The circuits may be traced from inspection of Fig. 2. The current flows from one pole of the battery by a conductor w to and through the coils of the electromagnet, thence to the metal of the movement-frame 19 at w' , thence through the frame to the rocker 26 and spring contact-arm 28, thence through said arm to the fixed and insulated contact 25, and thence by a conductor w^2 back to the other pole of the battery. In order to avoid or reduce sparking by the interruption of the current on the breaking of the circuit at the contacts, a resistance-coil R (seen in Figs. 2 and 4) is

connected up in a shunt w^x from the main circuit. This coil does not entirely obviate sparking, but it reduces it very much and prevents burning or oxidizing at the contact-point, which is very important in a clock of this character, where the circuit is closed and broken frequently throughout a long period.

It will be noted that the construction shown utilizes the metal of the movement-frame 19 as a part of the circuit; but this is not material or essential to the invention. It is convenient to do this merely because one of the contacts is mounted movably in the frame.

The part 24, which has been called a "ribbon," will be by preference a narrow flat silk ribbon of a flexible character, but somewhat stiff and springy also, like a very light ribbon-spring. This form of flexible connector will keep its place and form during the operation of the clock mechanism better than an absolutely limp connector, such as a soft cord or chain. However, the present invention is not specifically limited in this respect.

In Figs. 3 and 4, 10 designates an ordinary pawl to prevent back rotation of the ratchet-wheel 14.

I have shown a case for the clock and a pendulum-regulator; but these features are as well adapted for other styles of clock-movements and are not claimed in this application; nor is the present invention limited to use with the style or kind of case and pendulum-regulator shown. The movement claimed may be inclosed in any case.

Having thus described my invention, I claim—

1. In an electric clock of the character described, the combination with the movable armature and the weighted pawl-lever, of a flexible connector which couples them together, and a contact device actuated to close the operating-circuit by the straightening of the connector when the said weighted arm descends.

2. In an electric clock of the character described, the combination with the movable armature and the weighted pawl-lever, of a flexible connector which couples them together, and means for completing the operating-circuit through said magnet when the weighted lever shall have descended and straightened the connector, whereby the attraction of the armature throws up said weighted lever.

3. In an electric clock, of the character described, the combination of the movable armature, the weighted pawl-lever, and the flexible connector which couples the armature with that arm of said lever opposite to the weight, of the fixed contact in the operating-circuit, the movable contact in the said circuit, said movable contact having a pin which is in the path of the straightened connector, and the said circuit including a generator and electromagnet.

4. In an electric clock, the combination with the hand-arbor, the driving-arbor, the connecting-train, the ratchet-wheel on the driv-

ing-arbor, the pawl-lever and its weight, the
pawl on said lever and engaging the teeth of
the ratchet-wheel, the electromagnet, its mov-
able armature, the operating-circuit includ-
5 ing a generator and the coils of said magnet,
and the fixed and movable contacts forming
terminals at a break in said circuit, of the
ribbon 24, coupling together the said arma-
ture and the arm of the pawl-lever opposite
10 to its weight, said movable contact having a

part projecting into the path of said ribbon
as it straightens under the influence of the
descending weight of the pawl-lever.

In witness whereof I have hereunto signed
my name, this 15th day of October, 1901, in 15
the presence of two subscribing witnesses.

JOSEPH BUTCHER.

Witnesses:

HENRY CONNETT,

J. EDMUND STANLEY.