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Fig: 1.

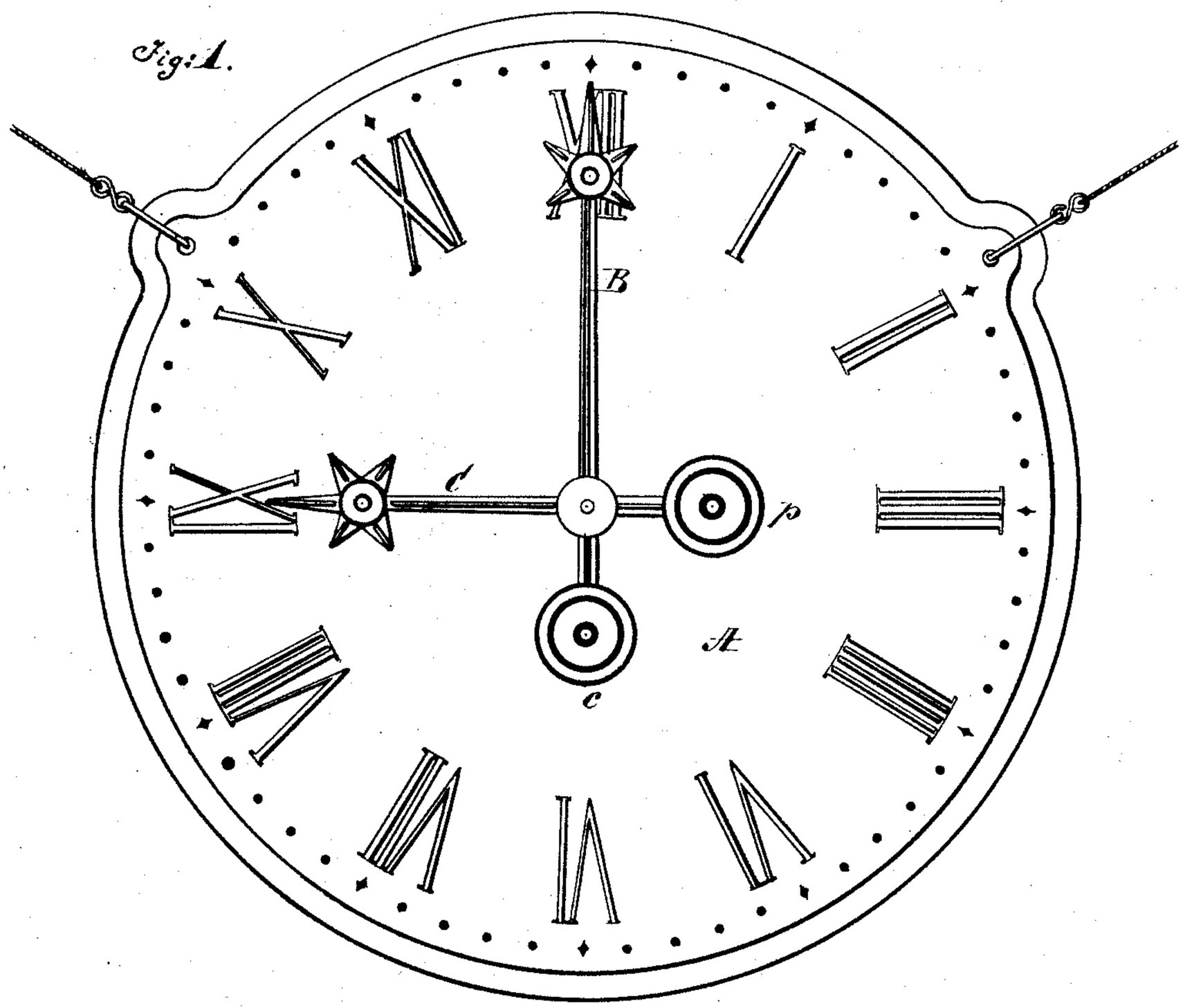
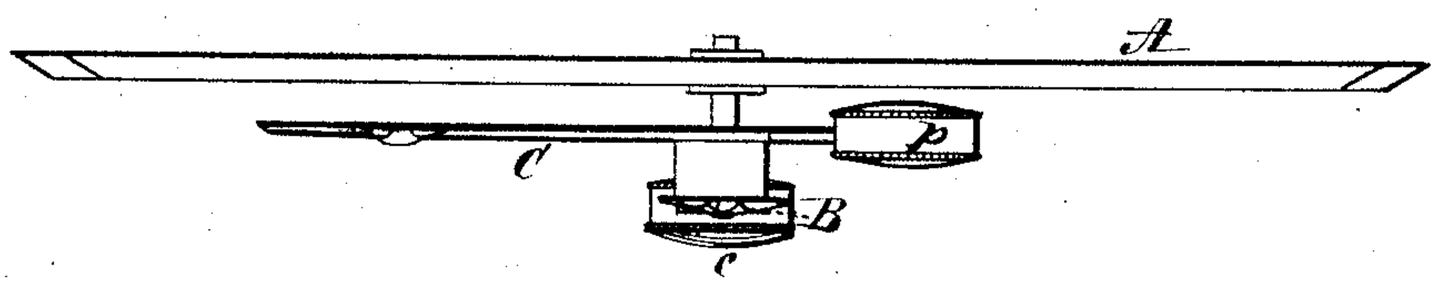


Fig: 2



Witnesses:

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Emile Duhan

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Fig. 5.

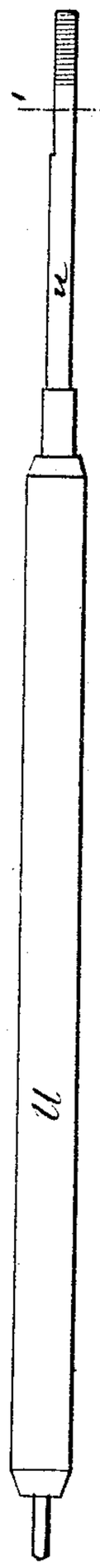


Fig. 6.

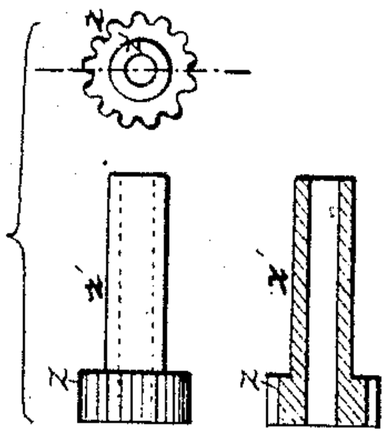


Fig. 7.

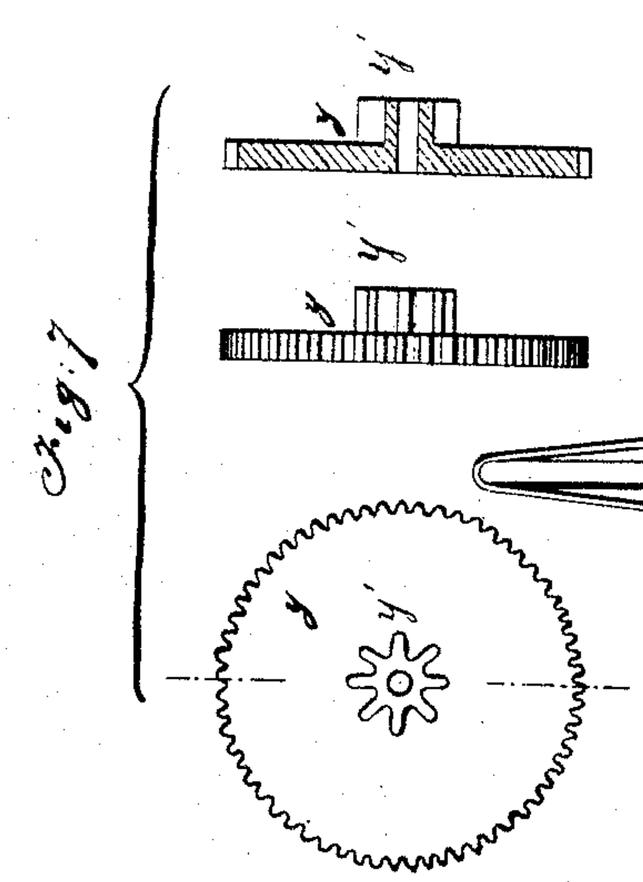


Fig. 8.

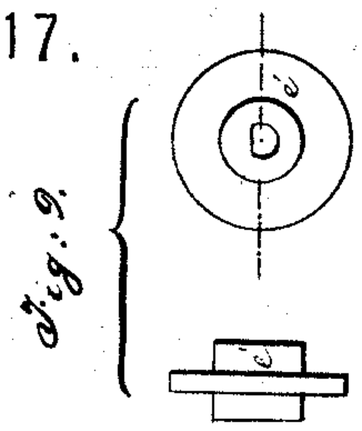


Fig. 9.

Fig. 10.

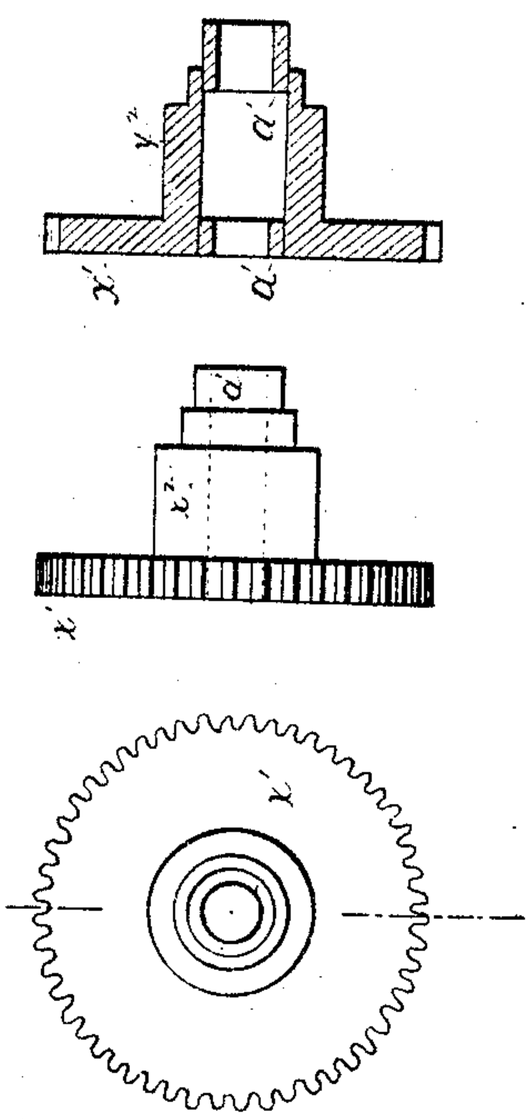
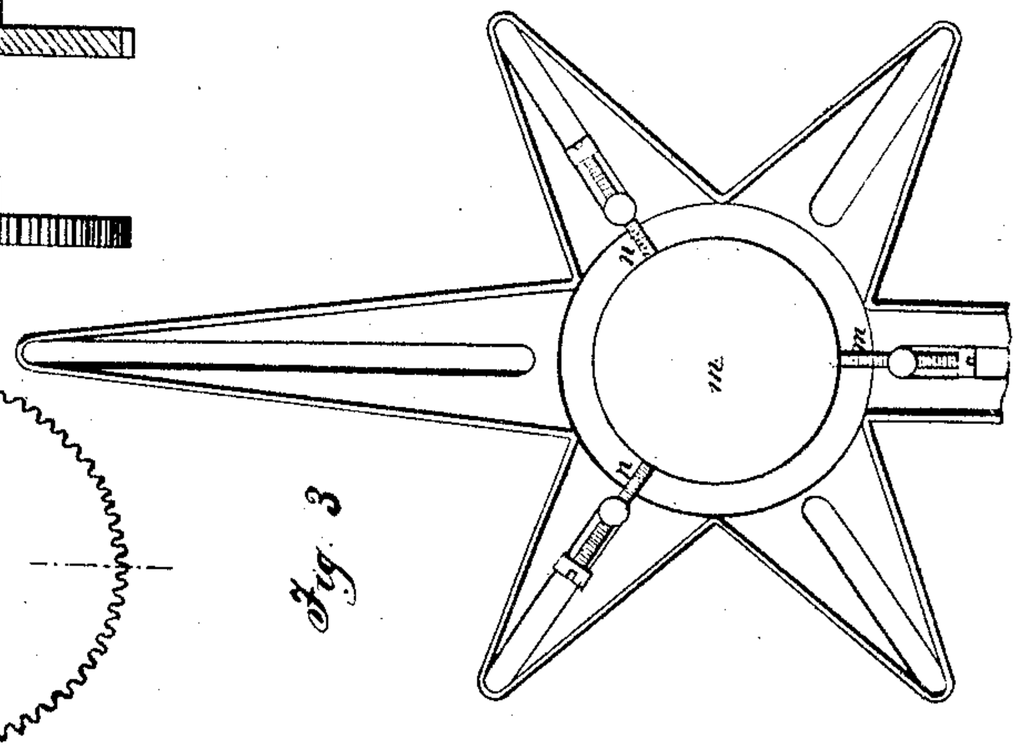


Fig. 3



Witnesses:

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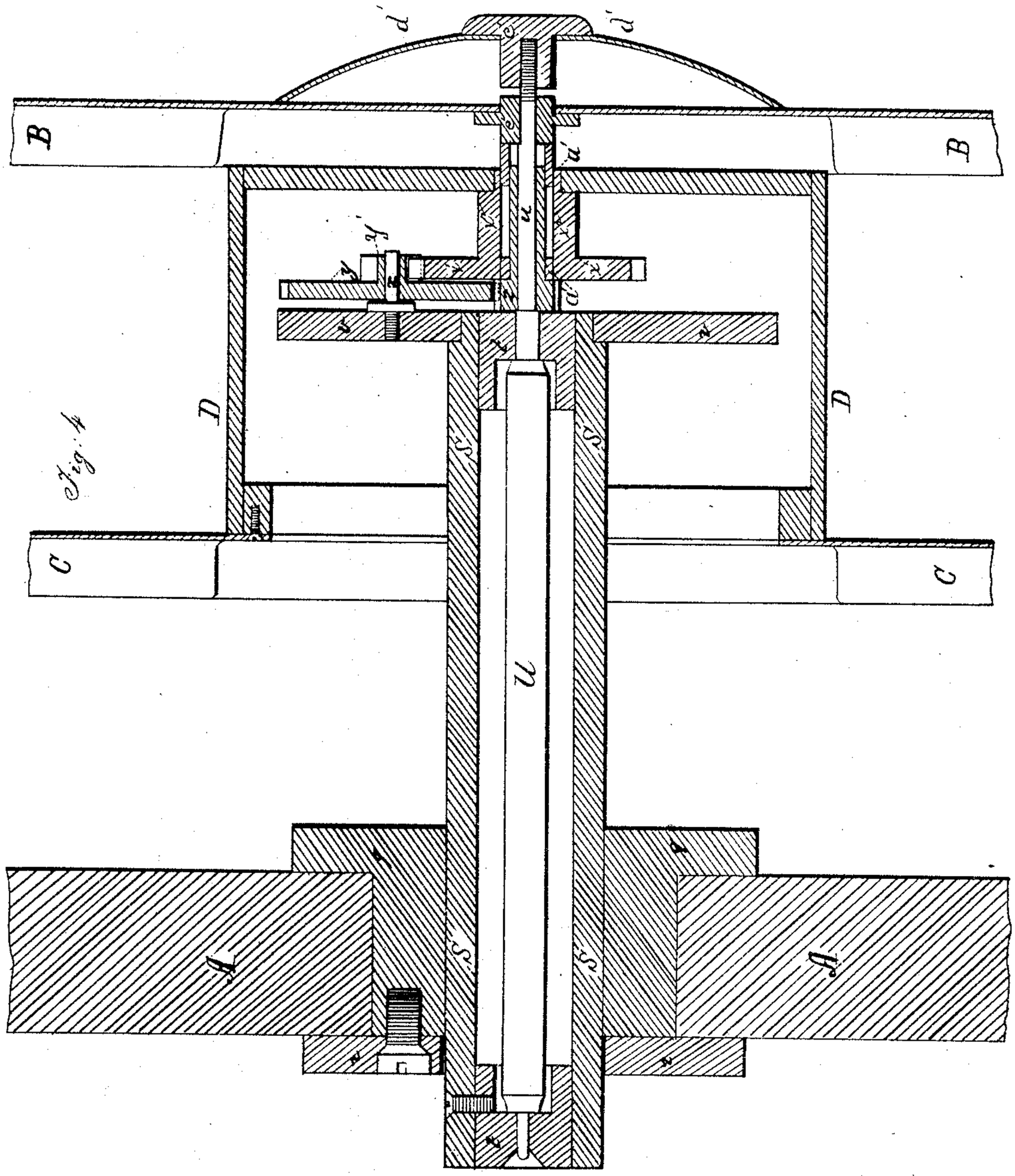

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Clocks.

No. 154,717. Patented Sept. 1, 1874.

Fig. 13.

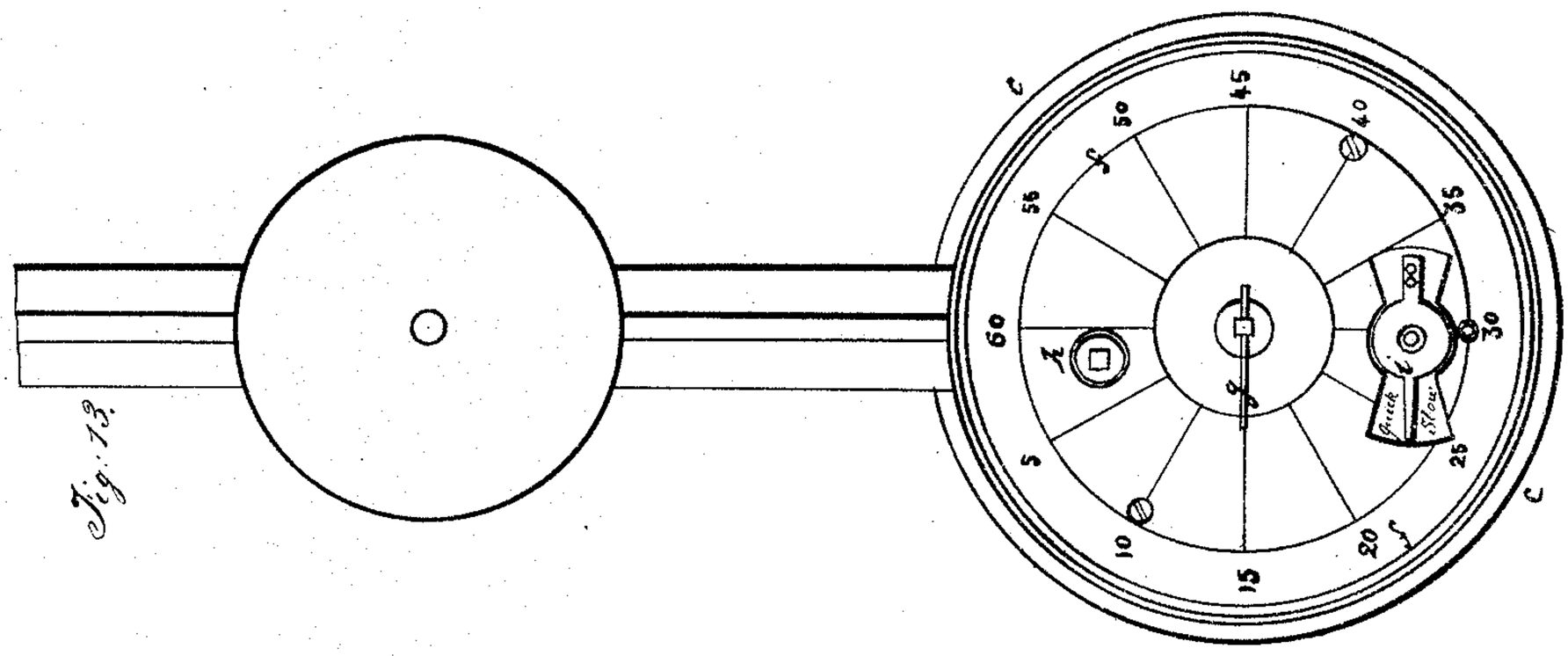


Fig. 12

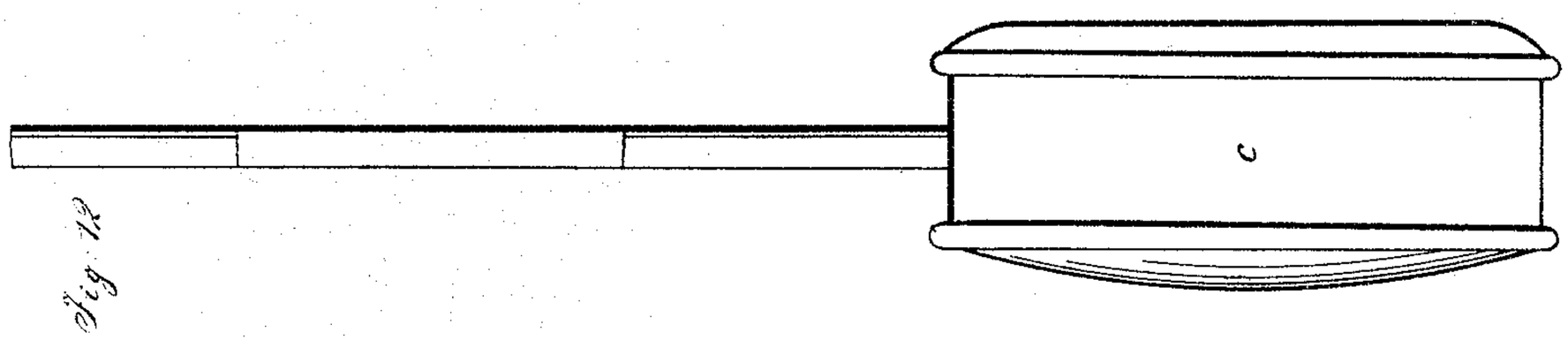
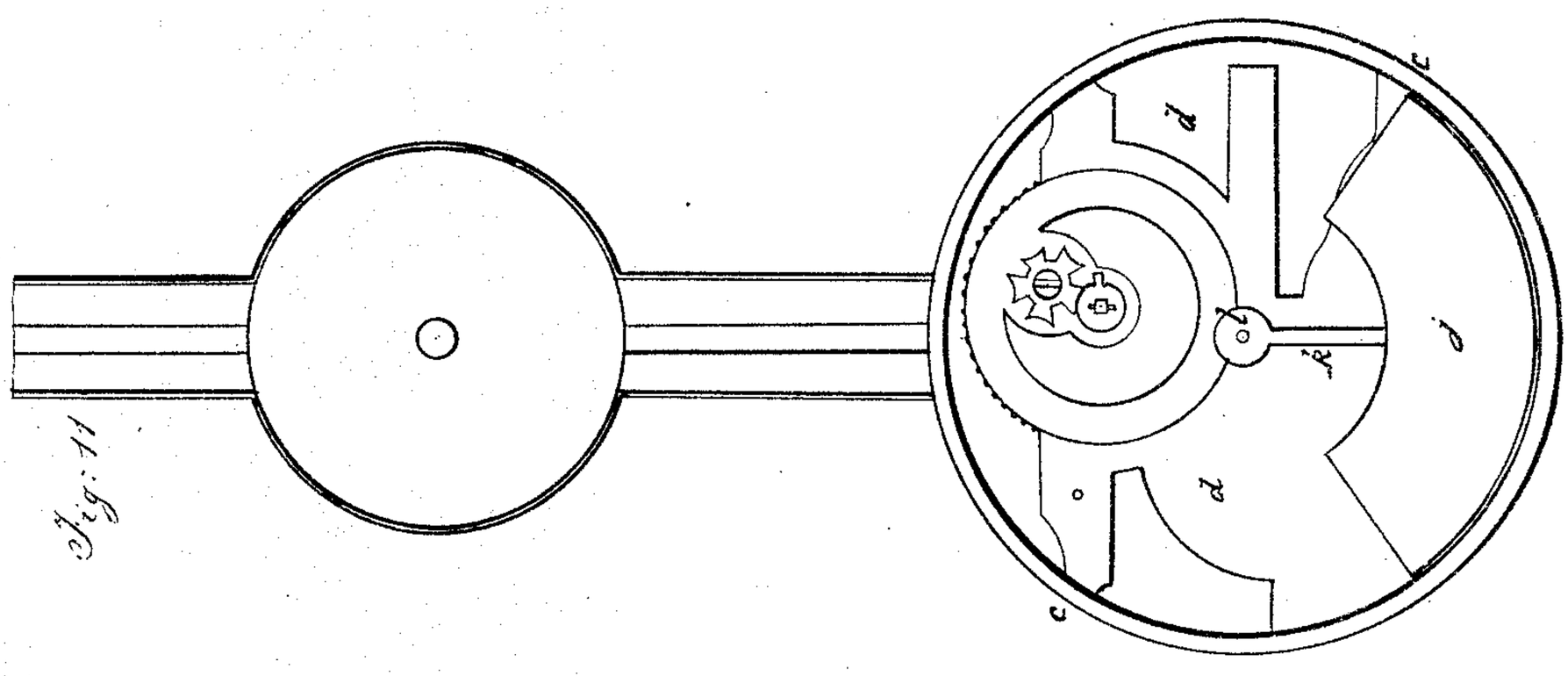


Fig. 11



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UNITED STATES PATENT OFFICE.

HENRI ROBERT, OF PARIS, FRANCE.

IMPROVEMENT IN CLOCKS.

Specification forming part of Letters Patent No. **154,717,** dated September 1, 1874; application filed July 18, 1874.

To all whom it may concern:

Be it known that I, HENRI ROBERT, of Paris, France, have invented a new and useful Improvement in Clocks; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings forming part of this specification, in which—

Figure 1 is a front view of clock; Fig. 2, edge view of same; Fig. 3, detail view of counter-weight in extremity of pointer; Fig. 4, sectional view of the connection of the hands with the dial, and the intermediate gearing between said hands; Fig. 5, detail view of arbor; Fig. 6, transverse section of flattened extremity of arbor; Fig. 7, detail views of loose wheel and pinion *y y′*; Fig. 8, detail views of tight sleeve and pinion *z z′*; Fig. 9, detail view of plate *e′*; Fig. 10, detail views of wheel and cylinder x^1 x^2; Fig. 11, rear view of case C; Fig. 12, edge view of same; Fig. 13 front view of same.

This invention relates to that class of clocks which have no apparent actuating mechanism, and consists in the peculiar arrangement of a pair of hands delicately balanced and pivoted to a transparent or translucent disk, having a graduated dial-face. In a circular case, attached to an extension of the minute-hand on the opposite side of the pointer, is an ordinary watch-movement, so disposed within the same that the portions of said movement on opposite sides of the longitudinal axis of the hand exactly balance each other. To a central arbor of said movement is attached an arm which carries upon its extremity, just inside the periphery of the case, a platinum weight made in the shape of a segment of a flat ring. As the movement operates, the weight is made to revolve once every hour, which motion, by altering the position of the center of gravity in the nicely-balanced hand, imparts to the same a secondary motion in an opposite direction. Said hand has, at its other extremity, an adjustable counter-weight, and is connected, by means of a train of speed-diminishing wheels, with another hand, which, with a speed one-twelfth the minute-hand, indicates the hour.

In the drawings, Fig. 1, A represents the glass disk having the graduated dial-face, and B C are the hands pivoted to the same, and having the cases *c p* upon their extensions, of which *c* contains the actuating mechanism. Said mechanism consists of an ordinary watch-movement, *d*, Figs. 11, 12, 13, with the parts so arranged on the opposite sides of the longitudinal axis of the hand that they exactly balance each other. To a central arbor, *l*, of said movement is attached an arm, *k*, which carries the weight *j*, said weight being made in the shape of a segment of a flat ring, and preferably of platinum, inasmuch the greatest amount of weight, in a given space, can be secured by the use of said metal. Fig. 13 shows the front face of the mechanism, upon which is the winding-shaft *h*, regulator *i*, graduated dial *f*, and pointer *g*, by means of which the clock is wound up, regulated, and set, at the proper time. Upon the opposite end of the hand, Fig. 3, is the adjustable counter-weight *m*, placed upon the under side of the expanded portion of the pointer, and moved nearer to or farther from the axis, as may be required, to balance the hand by means of the set-screws *n*.

The hands B and C are pivoted to the glass disk, and connected with each other by the following mechanism, Fig. 4: A represents a glass disk, in the center of which is fitted the socket *q*, fastened by the plate *r*. In said socket is securely fastened a tube, S, having in each end the bushes *t t*, in which turns the arbor U, which carries the minute-hand B. Said tube S has upon its end the disk *v*, upon which is fixed the stud *x*, which supports the loosely-moving wheel and pinion *y y′*. Upon the arbor *u* is the tightly-fitting sleeve and pinion *z′ z*, Figs. 4 and 8, which move with said arbor, and communicate motion to the wheel *y* and also to the wheel x^1, through the pinion *y′*, Figs. 4, 7, 8, and 10. Said wheel x^1 is connected by means of the cylinder x^2 with a cap, D, which carries the hour-hand C, and the said wheel and cylinder provided with the bushes *a′ a′* to reduce the friction upon the sleeve *z′*. Against the bush *a′* of the cylinder x^2 rests the plate *e′*, which is attached to hand B, and has an eye made to fit the flattened

side of the arbor *u*, so that they both turn together. Fastened to the arbor with a screw, *c'*, is an outside cap, *d'*, which moves with said arbor and hand B, and prevents the latter from coming off.

The operation of this clock is as follows: The movement is first wound up by a watch-key upon the shaft *h* in the usual way, and the hands set to the proper place upon the dial, by moving the weight *j* to a corresponding position. This may be accomplished by a key upon the central shaft, to which the pointer *g* is attached, Fig. 13, the face of the movement being graduated to correspond with the face of the dial, but in a reverse direction. The clock being now wound up, the action of the movement has a tendency to cause the weight to revolve once every hour, in an opposite direction from which the hands are intended to move. Now, the hands being delicately balanced, it is evident that they will assume that position which admits of the nearest position of the weight to the earth. As the mechanism, however, elevates the weight, the center of gravity is shifted, the equilibrium of the hand destroyed, and a corresponding change made in the position of the hand, as the reaction of the first movement, and the weight allowed to maintain its proneness to the earth. This action being a constant one, the action of the mechanism, in endeavoring to force around the weight, manifests itself in a reaction upon the hand, which causes it constantly and uniformly to shift its position, and by so doing indicates the time in minutes upon the dial. As the hand B moves around the dial once every hour, it carries in its revolution the arbor U, and with it the tightly-fitting sleeve *z'*, which, through the nicely-adjusted gearing *z y y' x'*, causes the cap D to revolve with the hand C in the same direction, but at a diminished speed of one-twelfth of hand B, thus indicating the hours upon the dial.

In this clock the hands are made as light as consistent with the practical utility of the clock as a time-keeper, are delicately balanced to insure evenness of working, and the friction of all of the bearings reduced as much as possible to cause the hands readily to respond to the action of the mechanism.

The dial A is made of any transparent or translucent material, but is preferably made of plate-glass, to render apparent the fact that no mechanism actuates the hands from the rear.

I know that clocks have been constructed heretofore which operate from the action of a watch movement upon a weight contained within the hand. I therefore disclaim my right to such broadness of invention, and confine myself to the specific devices as herein shown.

Having thus described my invention, what I claim as new is—

1. In a clock, the combination of the weight *m* and screws *n*, for forming an adjustable counter-weight for the hand, substantially as and for the purpose specified.

2. The combination of the arbor U, bushes *t t*, tube S, and disk *v*, substantially as and for the purpose specified.

3. The combination of the plate *e'* with the flattened extension of the arbor *u* and the tight sleeve *z'*, substantially as and for the purpose specified.

4. The combination of the hand B, plate *e'*, arbor *u*, sleeve and pinion *z' z*, wheel and pinion *y y'*, wheel x^1, cap D, and hand C, substantially as and for the purpose specified.

5. The combination of the hand B, screw *c'*, cap *d'*, and arbor *u*, substantially as and for purpose specified.

HENRI ROBERT.

Witnesses:
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EMILE DUHAN.