

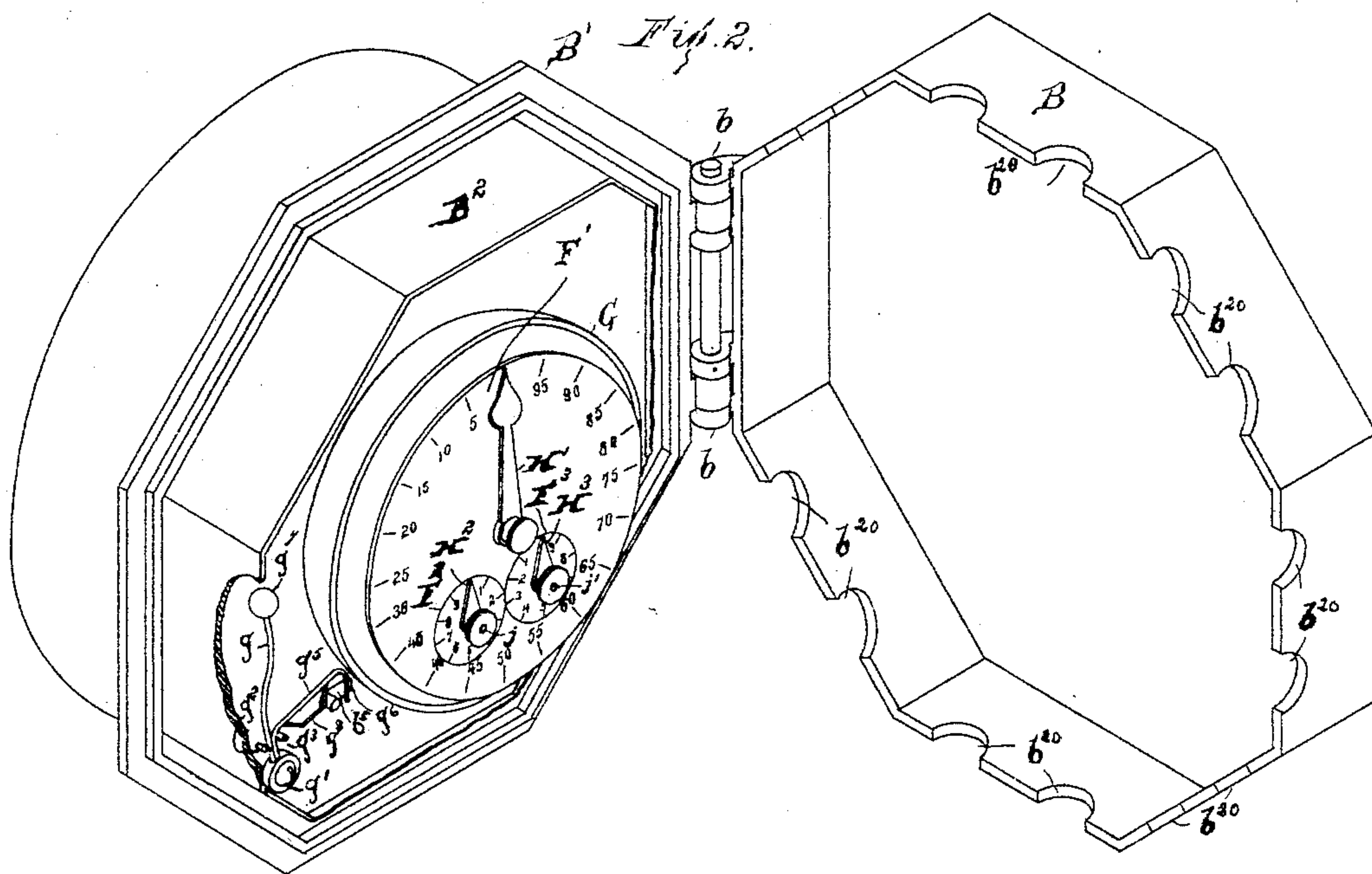
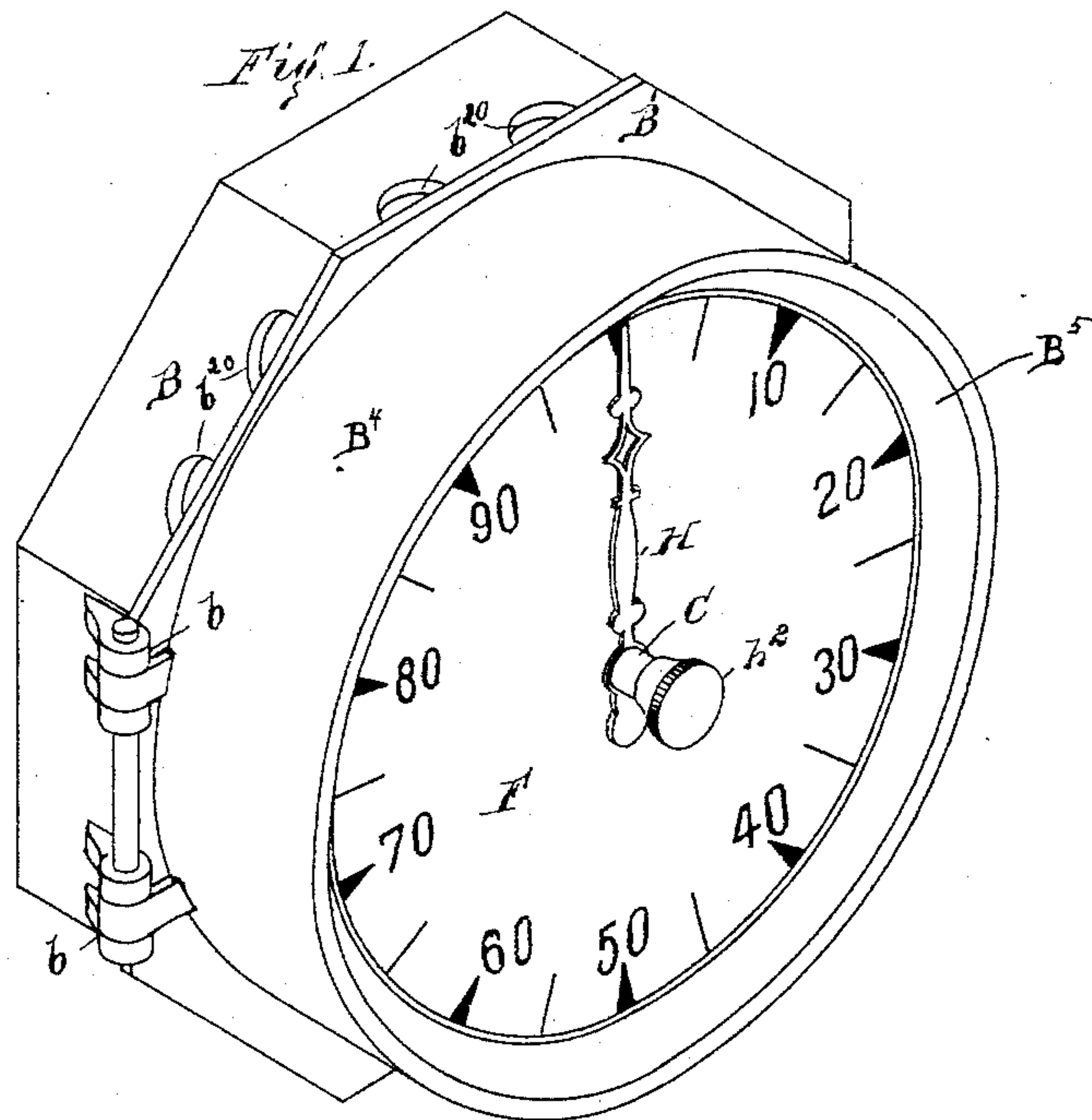
(No Model.)

4 Sheets—Sheet 1.

E. A. SCALES.
ELECTRIC FARE REGISTER.

No. 389,857.

Patented Sept. 18, 1888.



Witnesses.

Kirkley Hyde,
Antine M. Day.

INVENTOR-

Edward A. Scales,
By Albert M. Moore,
His Attorney.

(No Model.)

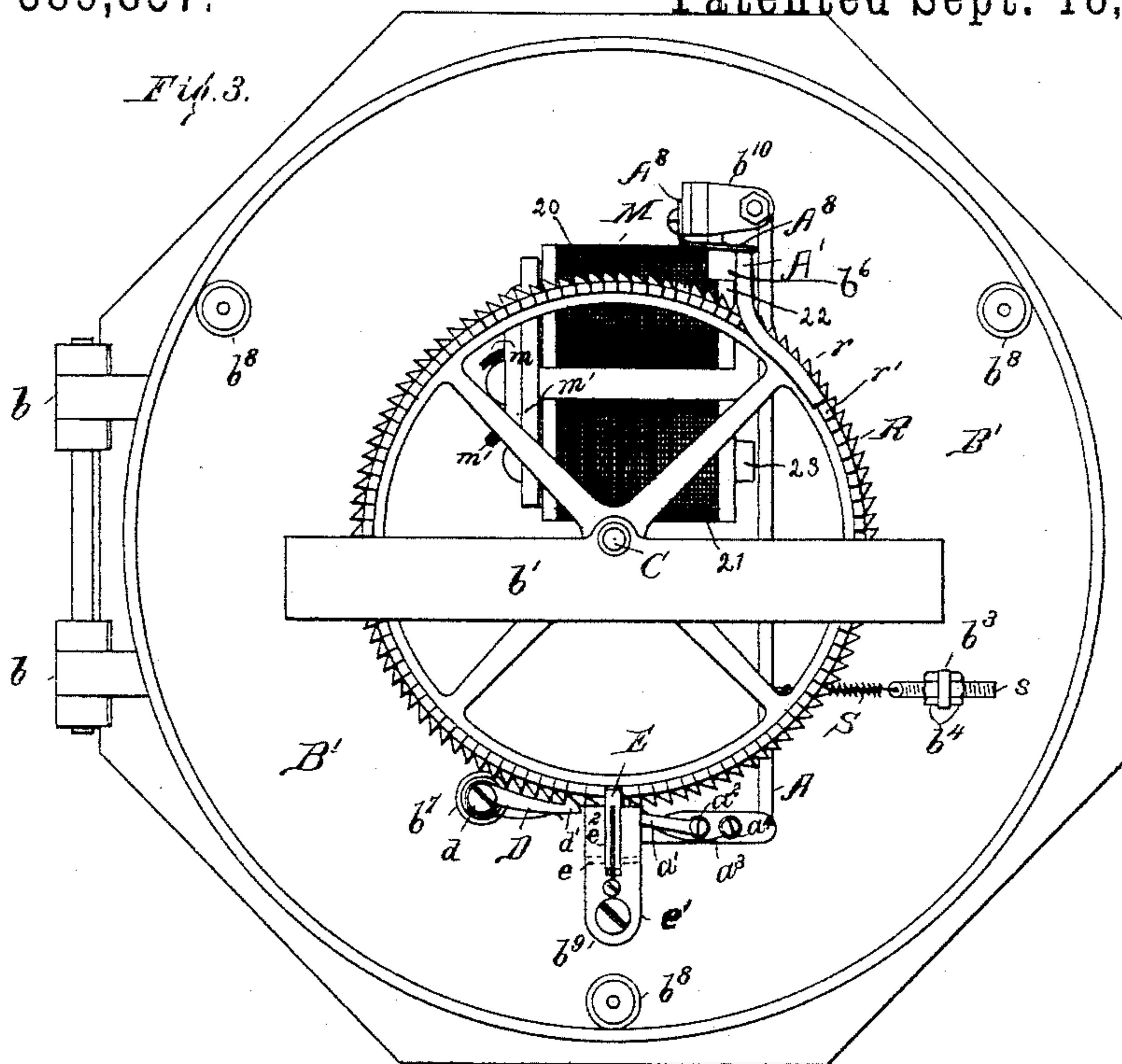
4 Sheets—Sheet 2.

E. A. SCALES.

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Witnesses.

Hirshley Hyde.

Amos M. Day.

INVENTOR.

Edward A. Scales,
By Albert M. Moore,
His Attorney

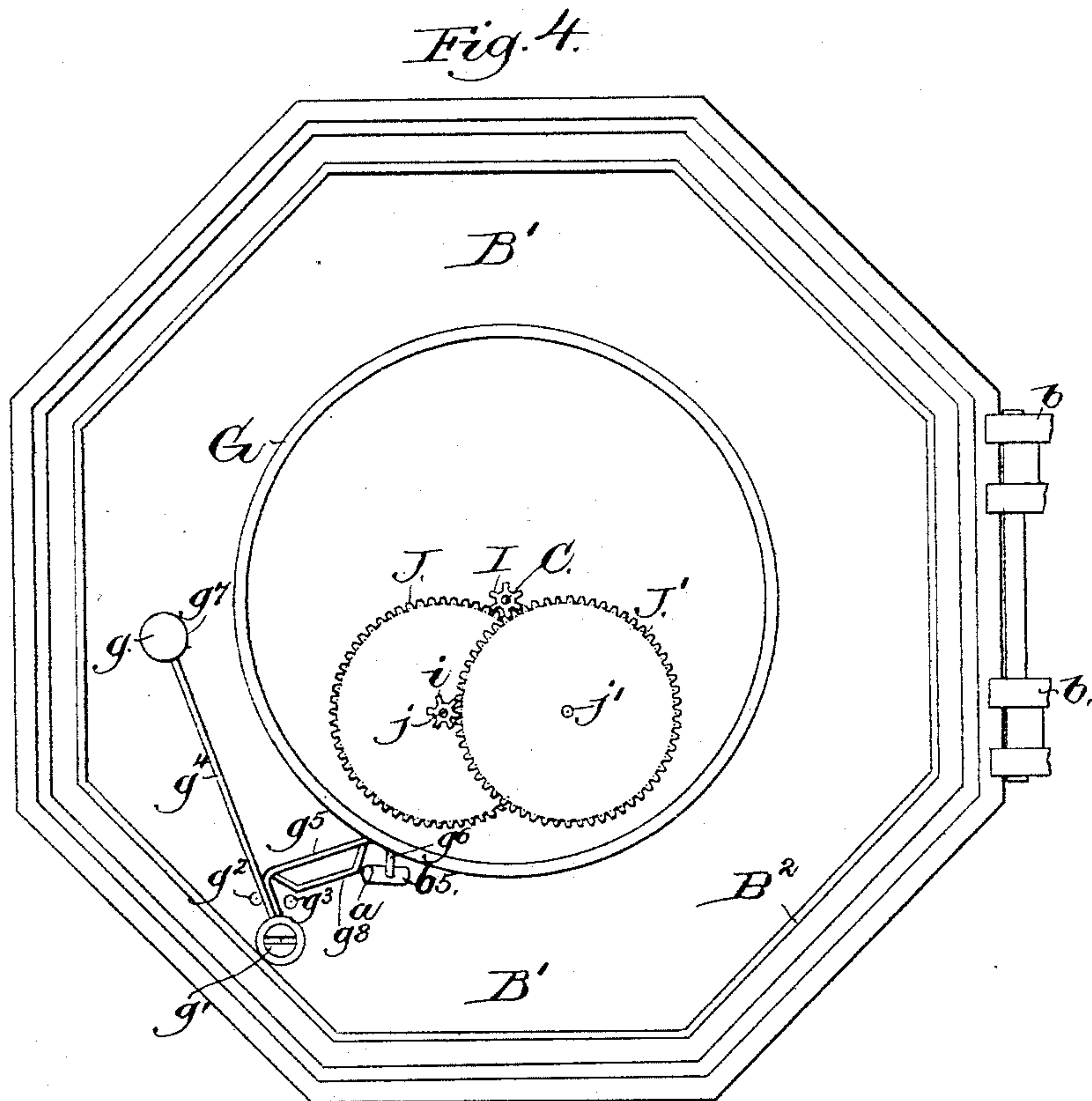
(No Model.)

4 Sheets—Sheet 3.

E. A. SCALES.
ELECTRIC FARE REGISTER.

No. 389,857.

Patented Sept. 18, 1888.



witnesses.

Fred. S. Chumley
Howard F. Eaton

Inventor

Edward A. Scales
by Leroy Gregory attys.

(No Model.)

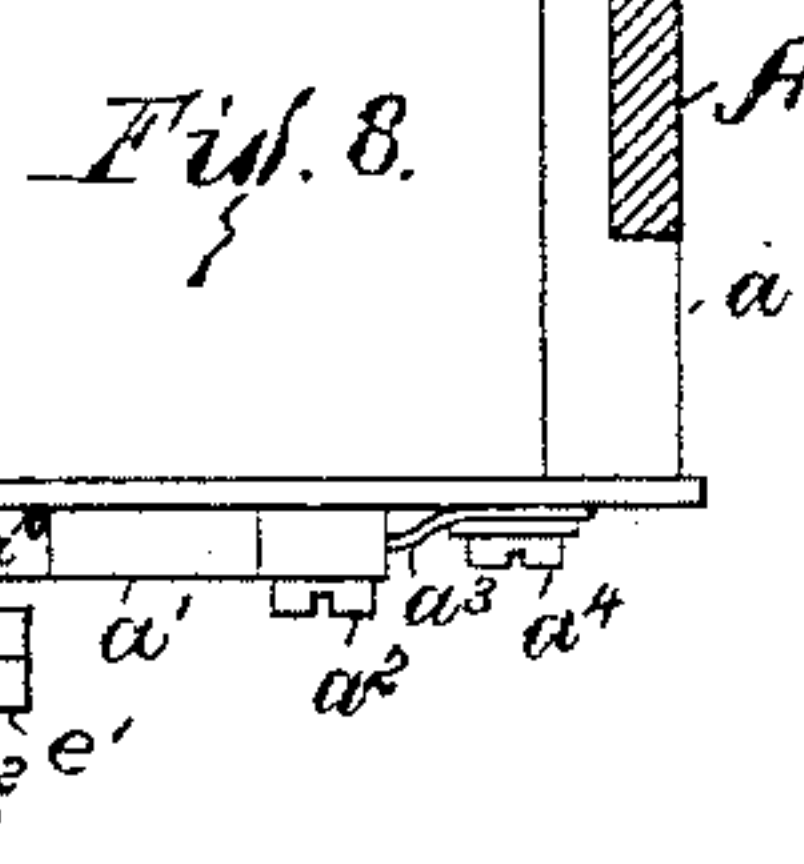
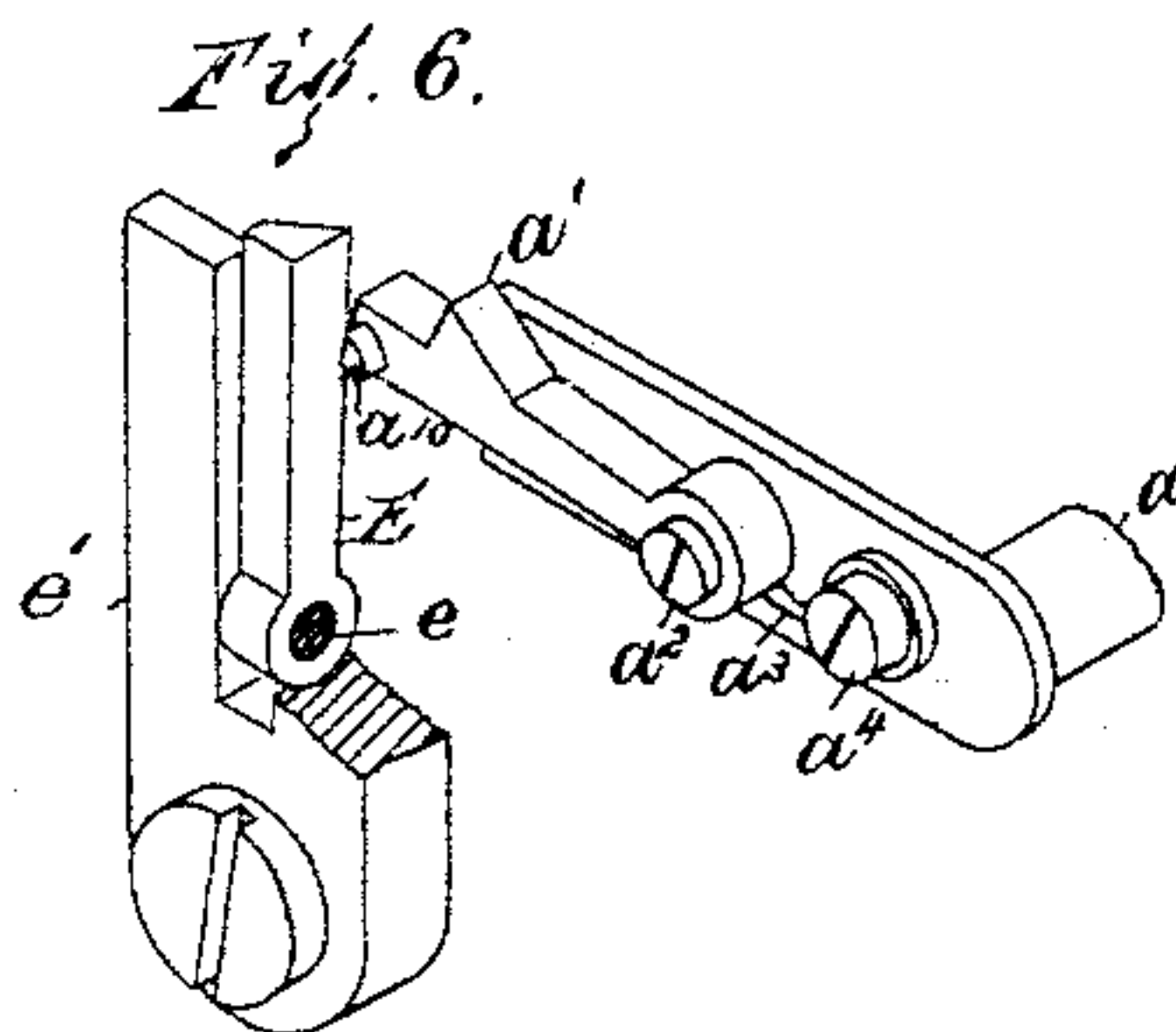
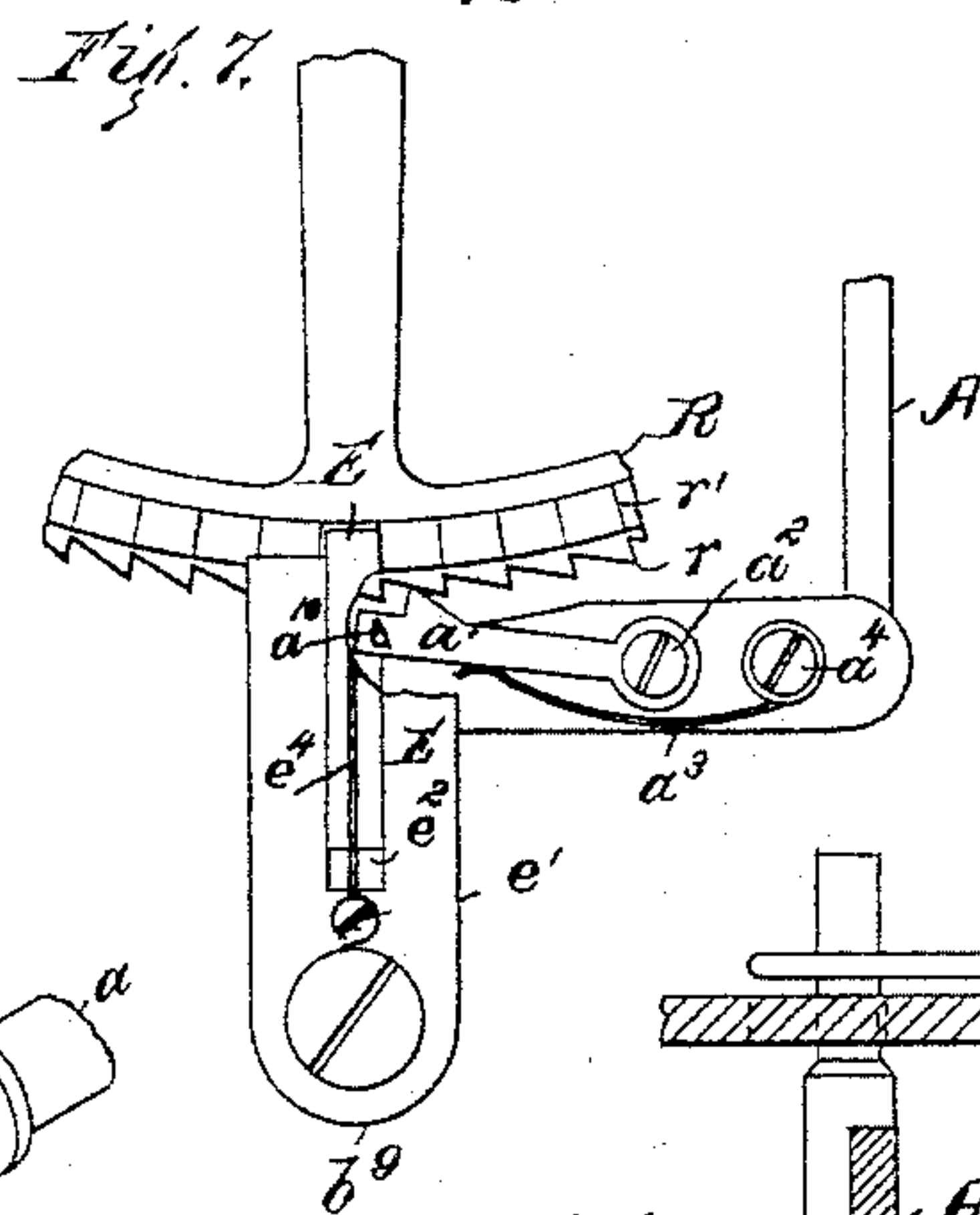
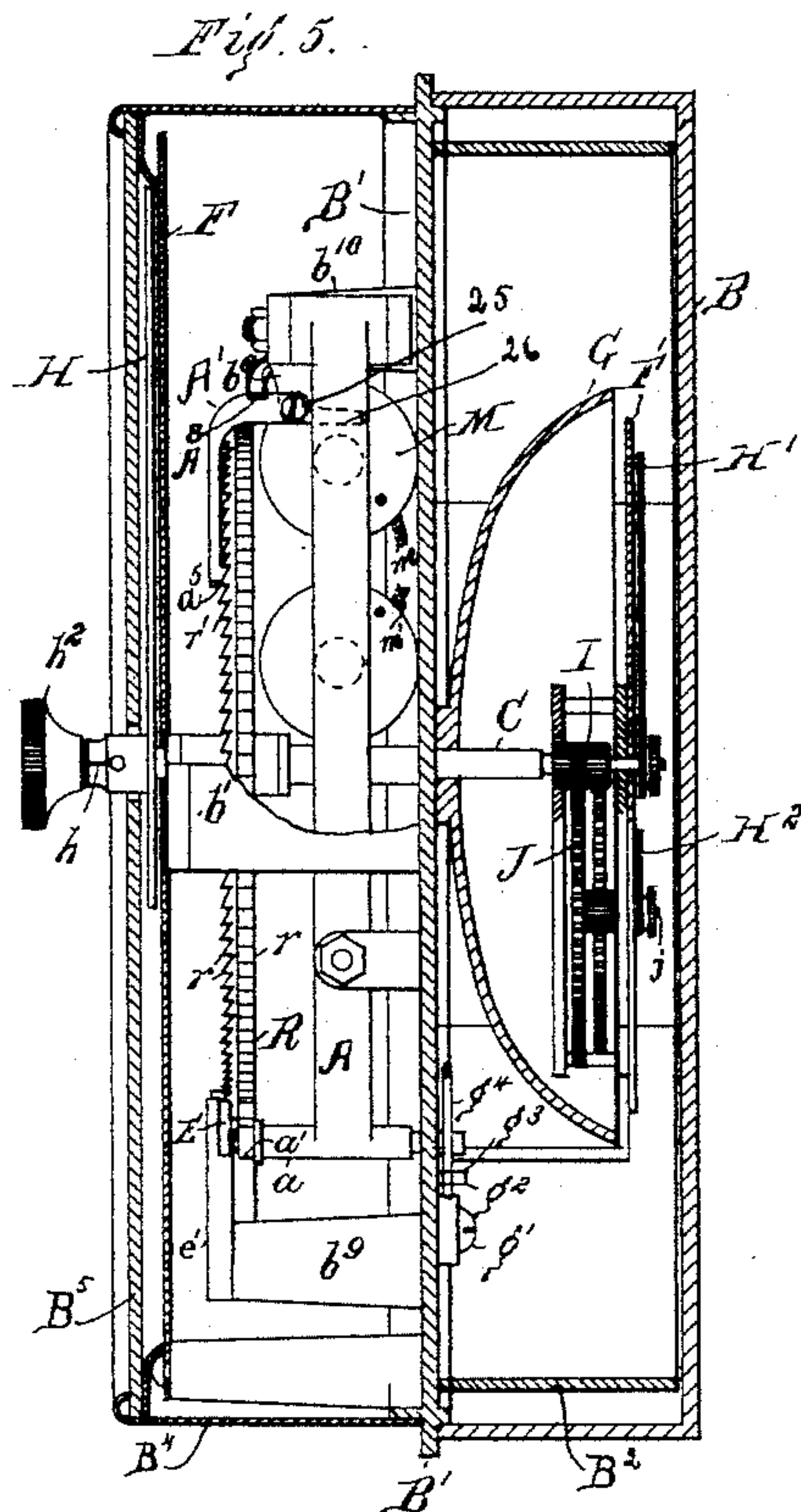
4 Sheets—Sheet 4.

E. A. SCALES.

ELECTRIC FARE REGISTER.

No. 389,857.

Patented Sept. 18, 1888.



Witnesses—
Hinkley Heyde.
Antonia M. Day.

INVENTOR-
Edward A. Scales,
By Albert M. Moore,
His Attorney.

UNITED STATES PATENT OFFICE.

EDWARD A. SCALES, OF LOWELL, MASSACHUSETTS, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE AMERICAN ELECTRIC REGISTER COMPANY, OF PORTLAND, MAINE.

ELECTRIC FARE-REGISTER.

SPECIFICATION forming part of Letters Patent No. 389,857, dated September 18, 1888.

Application filed October 6, 1887. Serial No. 251,579. (No model.)

To all whom it may concern:

Be it known that I, EDWARD A. SCALES, a citizen of the United States, residing at Lowell, in the county of Middlesex and Commonwealth of Massachusetts, have invented a certain new and useful Improvement in Electric Fare-Registers, of which the following is a specification.

This invention relates to electric registers especially adapted, among other things, to be used for registering fares on horse-cars and in other places, and is an improvement upon the register shown and described in my United States Patent No. 331,826, dated December 8, 1885, it having for its object to simplify the construction of the same, and to provide means, as will be described, to prevent the register from indicating more than a single fare at a single closing of the circuit.

The register shown in the patent referred to contains as part of its operating mechanism a main and an auxiliary electro-magnet, the auxiliary magnet being in a branch or shunt circuit. The connections between the main and branch circuits in practice become imperfect and out of order, thus rendering the apparatus unreliable and frequently inoperative.

It is the object of this invention to construct the registering apparatus, as will be described, whereby it is rendered positive in its action, is simple and less expensive in construction, and not liable to become inoperative even after long-continued use.

In accordance with this my present invention I employ but a single electro-magnet having two coils, the cores of which are extended beyond the ends of the said coils, a single ratchet-wheel having two sets of ratchet-teeth, an armature provided with a pawl to engage one set of ratchet-teeth to rotate the said wheel, a locking-pawl to engage the other set of ratchet-teeth to prevent the ratchet-wheel from being rotated more than one tooth at a time, and a magnetically-operated lever to engage one set of ratchet-teeth to lock the said ratchet-wheel and prevent it being rotated mechanically, by the jarring of the car or otherwise, while the electric circuit is open, substantially as will be described.

The particular features in which my inven-

tion consists will be pointed out in the claims at the end of this specification.

In the accompanying drawings, on three sheets, Figure 1 is an isometric view of my improved register closed and in position to be operated, showing the front dial and index-finger; Fig. 2, an isometric view of the same open, showing a rear view of the central plate which supports the operating parts; Fig. 3, a front view of the register with the front dial and indicating-finger removed; Fig. 4, a rear view of said register with the back of the case and the rear dials and index-fingers removed, showing the means of moving said index-fingers, the alarm-bell, and bell-hammer; Fig. 5, a central vertical section of the case, dials, and gong and a right-side elevation of the operating parts; Fig. 6, an isometric view showing the impelling-pawl and the spring-operated or front retaining-pawl and the holder of said last-named pawl, the holder being partially in section; Fig. 7, a front elevation of the parts shown in Fig. 6, and also of part of the ratchet, a part of the holder of the retaining-pawl and part of said pawl being broken away; Fig. 8, a plan of the impelling-pawl, the holder of the front retaining-pawl, the bell-hammer arm, the stud which carries the impelling-pawl, and a horizontal section of the supporting-pawl, the armature, and said retaining-pawl.

The case containing the operating parts of the register consists, as shown, of a central supporting-plate, B', having hinged to it, as at b, a back cover, B, which, when closed, conceals the parts of the apparatus supported at the back of the plate B', the said plate being provided at its front side with a cap consisting, preferably, of a sheet-metal ring, B¹, having the usual glass face, B², the plate B' and cover B being made, preferably, of cast-iron. Upon the front of the supporting-plate B' is cast or otherwise secured a double bracket or flat arch, b', in which and in the said supporting-plate is journaled the shaft C. On the shaft C, in front of the supporting-plate, is secured a ratchet-wheel, R, having two sets of teeth, r, r', one set, r, being formed in the periphery of the said ratchet-wheel and used in the rotation thereof, and the other set of teeth, r', being

preferably formed on the side of the said ratchet-wheel to enable it to be locked, as will be hereinafter described.

Between the ratchet-wheel R and the supporting-plate B' an electro-magnet, M, consisting of two coils, 20 21, is secured to the supporting-plate, the said coils having their cores 22 23 extended beyond their ends, for a purpose to be hereinafter described, the said magnet being connected by wires *m m'* to a battery. (Not shown.)

A suitable circuit-closer, of any well-known construction, and therefore not shown, but adapted to be operated by hand, is to be used in one of the wires *m m'*. When the circuit is closed, the electro-magnet M attracts its armature A, pivoted on a horizontal post, *b¹⁰*, on the plate B'. When the circuit is broken, the armature is drawn away from the magnet by the retraction-spring S, the same being shown as a spiral spring, one end of which is secured to said armature, and the other end of which is secured to an adjusting screw, which turns in a post, *b³*, and is held at any desired distance from the armature by check-nuts *b⁴* in the usual manner.

To the free end of the armature A is secured a cross-piece, *a*, (herein shown in Fig. 5 as extended at right angles to the supporting-plate B',) the front end of said cross-piece being bent parallel with said supporting-plate below the ratchet-wheel R and nearly in contact therewith. An impelling-pawl, *a'*, is pivoted on the bent portion of the cross-piece *a*, as at *a²*, and is forced into engagement with the teeth *r* of the ratchet-wheel R by a spring, *a³*, (see Figs. 6 and 8,) one end of which is held by the screw *a⁴*, and the free end of which presses upon the under side of the pawl *a'*. The attraction of the armature A by the magnet M therefore turns the ratchet-wheel R one tooth. The rear end of the cross-piece *a* is extended backward, as shown, through a slot, *b⁵*, in the supporting-plate B'.

To the back of the supporting-plate B' the arm *g⁴* of the bell-hammer *g* is pivoted, as at *g'*, the motion of said bell-hammer being limited, as shown, by stop-pins *g² g³*, driven into the said supporting-plate on either side of said arm. The hammer-arm *g⁴* has extended from it, substantially at about a right angle, a bent arm, *g⁵*, secured to or forming part of the said hammer-arm, one end of the arm *g⁵* being bent downward slightly toward the hammer-arm *g⁴*, as shown at *g⁶* in Fig. 4. The arm *g⁵* has secured to or forming part of it, as shown, a projection, *g⁸*, which normally rests upon the rear end of the cross-piece *a* and holds the ball *g⁷* of the bell-hammer out of contact with the bell or gong G.

When the armature A is attracted by the magnet M, the cross-piece *a* is drawn suddenly to the left, (to the right in Fig. 4, which shows the rear of the gong and bell-hammer against the bent portion *g⁶* of the arm *g⁵*,) the said cross-piece drawing the arm *g⁵* downward and throwing the ball *g⁷* against the gong; but when the

armature is released and is withdrawn in the opposite direction the rear end of the cross-piece *a* passes under the projection *g⁸* and forces the bell-hammer away from the gong. The gong G is supported centrally on the back of the plate B'.

In order that the ratchet-wheel R may not be turned mechanically or by the jarring of the car in which the register is placed, a magnetically-operated ratchet-lever, A', is pivoted, as at 25, upon a post or bracket, *b⁶*, (see Fig. 5,) above and slightly in front of the core 23 of the electro-magnet M, so that the short arm, as 26, of the said lever will be attracted by the said core whenever the circuit is closed.

The front end or long arm of the ratchet-lever A' is bent downward, as shown in Figs. 3 and 5, in front of the ratchet-wheel R, and is provided with a hook or pawl, *a⁵*, which normally engages the teeth *r'* of said ratchet-wheel while the current is open, but which is disengaged from the said teeth when the current is closed. The armature A and the arm 26 of the ratchet-lever A' are simultaneously attracted by the cores of the magnet M.

In order that the ratchet-wheel may be rotated, the pawl *a'* is normally out of engagement with the teeth *r*, it being about half-way between two successive teeth, as shown in Fig. 7, so that the pawl *a⁵* by the movement of the ratchet-lever may be disengaged from the teeth *r'* before the pawl *a'*, by the movement of the armature A, is brought into engagement with one of the teeth *r*.

The ratchet-wheel R is prevented from being turned backward by the friction of the pawl *a'* thereon when the armature A is drawn back to its normal position by the spring S by a retaining-pawl, D, pivoted at one end, at *d*, upon the post or bracket *b⁷*, and provided at its free end with a hook, *d'*, which engages the teeth of the ratchet *r* and allows the ratchet to turn freely in one direction only.

The pawl *a⁵* of the ratchet-lever A' remains out of engagement with the teeth *r'* after the circuit is closed until the circuit is again broken, when the said lever is immediately thrown into engagement with the teeth *r'* by the spring A⁸, supported upon one of the posts *b¹⁰* and pressing against the ratchet-lever A' in front of its pivot, the said spring, as shown, acting on the upper side of the said ratchet-lever.

It is desirable to stop the ratchet-wheel as soon as it has turned a single tooth. This is accomplished by another pawl, E, pivoted at its lower end, at *e*, in a holder, *s'*, supported upon a post, *b⁹*, projecting from the front of the supporting-plate, said pawl E being guided in a vertical slot, *e²*, in the holder *e'*, and extending over the teeth *r'*, and, when in engagement with said teeth, preventing the forward motion of the ratchet. The under side of the pawl E near its free end is provided with a backward projection, *e³*, beveled from right to left, as shown in Fig. 8, and this projection is struck by a forward projection, *a¹⁰*, on the pawl

a' , (shown in Figs. 6 to 8,) when the impelling-pawl a' moves forward as the armature A is attracted, so that the pawl E is pressed forward out of engagement with the teeth r' just before the impelling-pawl a' engages a tooth, r , of the ratchet-wheel; but the pawl E again engages with the teeth r' as soon as the projection a^{10} passes the projection e^3 , the said pawl E being again brought into engagement with the teeth r' by a spring, e^4 , secured to the holder e' , and pressing, as shown, upon its front side near its upper end. When the armature A returns to its normal position, the pawl E is not disengaged from the teeth r' , because the free end of the pawl a' is thrown or turned on its pivot by the projection a^{10} (which is beveled off on its upper side, as shown in Figs. 6 and 7) striking against the projection e^3 . In front of the ratchet-wheel, at right angles to the shaft C, is secured a dial, F, as shown in Fig. 1, the same being graduated into as many spaces as there are teeth r in the ratchet-wheel R, the said dial being supported upon three or more posts, b^3 , (see Figs. 3 and 5,) which project horizontally from the front of the supporting-plate.

An index-finger, H, is held on the front end of the shaft C, and, moving with said shaft, passes from one graduation to the next at each closing of the circuit in the usual manner, the front end of the shaft C being tapering and the hub of the index-finger being split at h , radially, entirely through from side to side and slightly tapered, and provided with an external screw-thread upon which a thumb-nut, h^2 , is turned, the said thumb-nut pinching the outer split end of the hub firmly upon the tapering front end of the shaft C. The shaft C has secured to its rear end an index-finger, H', which passes over graduations on a dial, F', (see Figs. 2 and 5,) equal in number to the teeth r . Just in front of the index-finger H' is a pinion, I, which engages with a gear, J, having ten times as many teeth as said pinion I, and to the shaft j of the gear J is secured an index-finger, H², which passes over and indicates the graduations on a small dial, r^2 , a complete revolution of the index-finger H² indicating ten times as much as a complete revolution of the index-finger H'. The shaft j is provided with a pinion, i , which engages a gear, J', on the shaft j' , and to the end of the shaft j' is secured another index-finger, H³, which rotates over a dial, F³, each graduation of which indicates ten times what is indicated by a single graduation on the dial F², the gear J' having ten times as many teeth as the pinion i .

The front edge of the box B is provided with notches or openings b^{20} , in the usual manner, to allow the sound of the gong to escape from the case, and in order that the parts supported on the back of the supporting-plate B' may not be tampered with a rim of sheet metal, B², as shown in Figs. 2, 4, and 5, is secured to the back of the supporting-plate, and which when the case is closed, extends to the inside

of the back of the case or box B to prevent any instrument being introduced through the notches or openings b^{20} to move the index-fingers.

The operative mechanism of the register in front of the supporting-plate is surrounded by the ring B⁴, of sheet metal, which extends from said supporting-plate to a point a little in front of the front dial, its front edge being turned in in the usual manner to retain a glass over the front dial.

I claim as my invention—

1. In an electric registering apparatus, an indicating-surface provided with graduations, a shaft, an index or pointer mounted thereon and adapted to be moved over said indicating-surface, and a ratchet-wheel having two sets of teeth, as r r' , combined with an electro-magnet, its armature provided with a pawl to engage one set of ratchet-teeth, as r , to rotate the said ratchet-wheel, and with a magnetically-operated ratchet-lever, as A', having one arm adapted to be acted upon by the said magnet and its other arm in engagement with the other set of ratchet-teeth, as r' , substantially as described.
2. In an electric registering apparatus, an indicating-surface provided with graduations, a shaft, an index or pointer mounted thereon and adapted to be moved over said indicating-surface, and a ratchet-wheel having two sets of teeth, as r r' , combined with an electro-magnet, its armature provided with a pawl to engage one set of ratchet-teeth, as r , to rotate the said ratchet-wheel, and with a magnetically-operated ratchet-lever, as A', having one arm adapted to be acted upon by the said magnet, and its other arm in engagement with the other set of ratchet-teeth, as r' , and with a locking-pawl, as E, to engage the teeth r and prevent the ratchet-wheel rotating more than a single tooth at each closing of the electric circuit in which the magnet is placed, substantially as described.

3. The combination of the supporting-plate, the electro-magnet, the armature provided with a cross-piece, the gong secured to said supporting-plate, and the bell-hammer pivoted on said supporting-plate and provided with an arm adapted to be struck by said cross-piece when said armature is attracted to ring said bell, said arm being provided with a projection on its under side, adapted to rest upon said cross-piece when said armature is in its normal position to hold said bell-hammer out of contact with said gong, as and for the purpose specified.

4. The combination, in an electric fare-register, of the bell or gong, the pivoted bell-hammer provided with an arm having a projection and a hook, stops to limit the motion of said hammer, with an electro-magnet, its armature, and a pin or cross-piece secured thereto and adapted by the movement of the said armature to alternately press against said projection and move said hammer in one direction, and to engage said hook and to move

said hammer in the other direction, as and for the purpose specified.

5 In an electric registering apparatus, an indicating-surface provided with graduations, a shaft, an index or pointer mounted thereon and adapted to be moved over said indicating-surface, and a ratchet-wheel having two sets of teeth, as r r' , combined with an electro-magnet consisting of two coils having their cores
10 extended beyond the ends of the said coils, the armature A , the pawl a' , to engage one set of ratchet-teeth, as r , and with the ratchet-lever

A' , having one arm acted upon by one of the said magnet-cores, and its other arm provided with a pawl, as a' , to engage the second set
15 of ratchet-teeth, as r' , substantially as described.

In witness whereof I have signed this specification, in the presence of two attesting witnesses, this 2d day of April, A. D. 1887.

EDWARD A. SCALES.

Witnesses:

ALBERT M. MOORE,
GERTRUDE M. DAY.