(No Model.) 3 Sheets—Sheet 1.

E. Y. JUDD.

REPEATING MECHANISM FOR CLOCKS.

No. 360,888. Patented Apr. 12, 1887.

Fig. 1

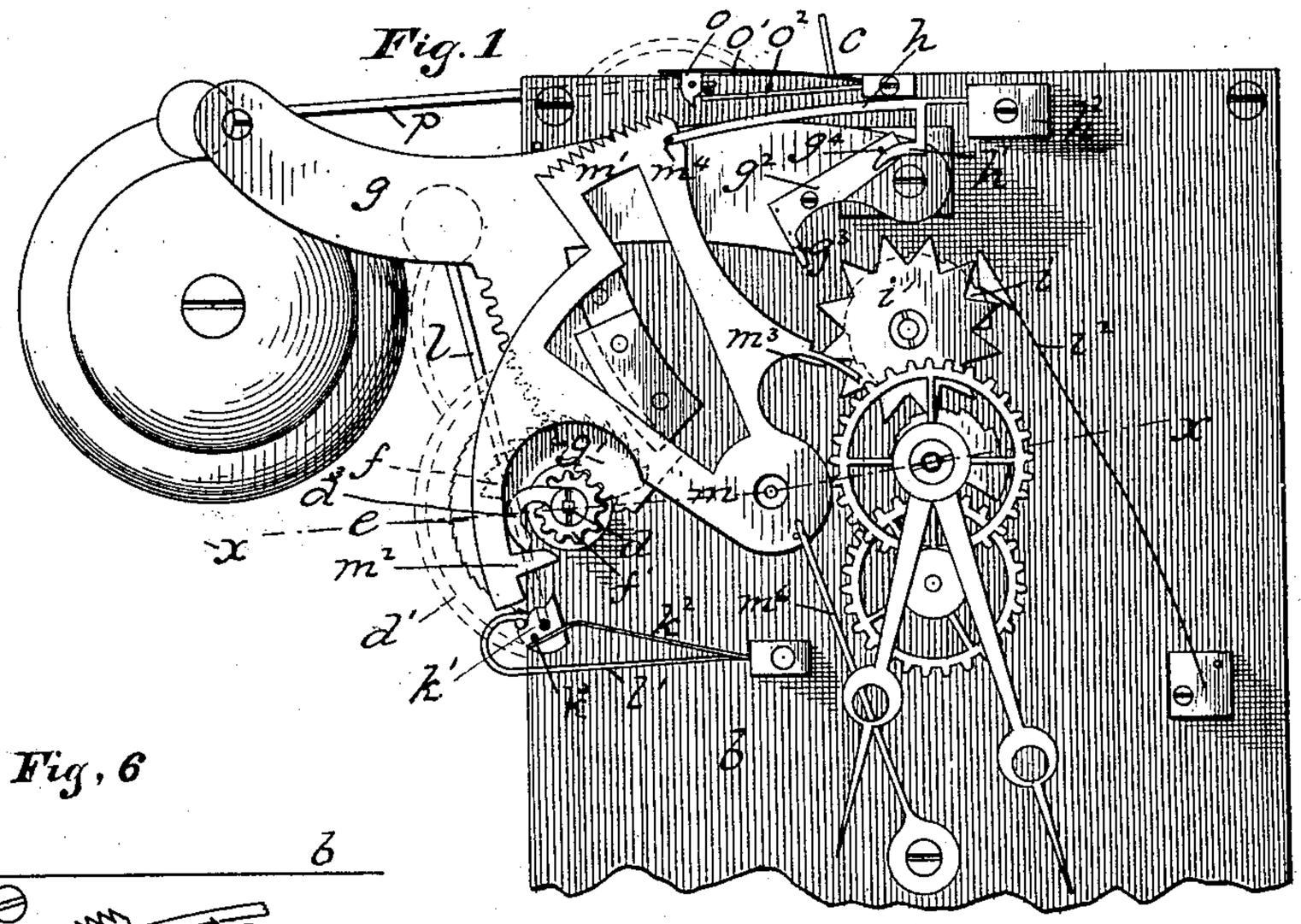


Fig. 6

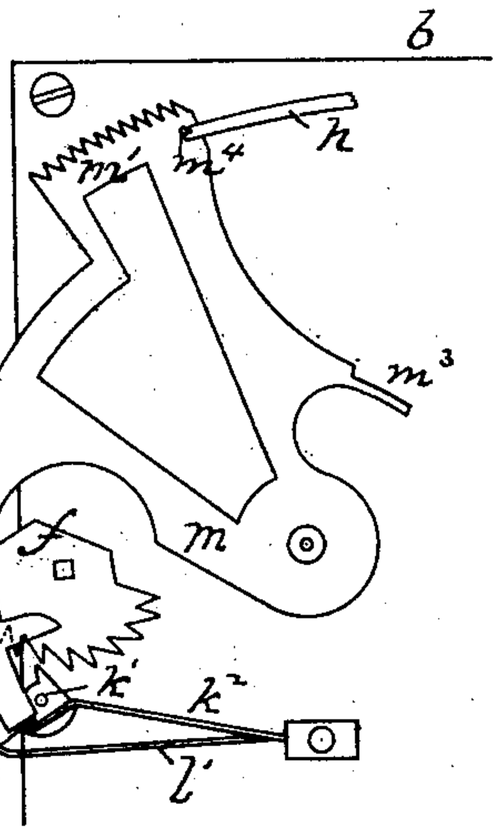
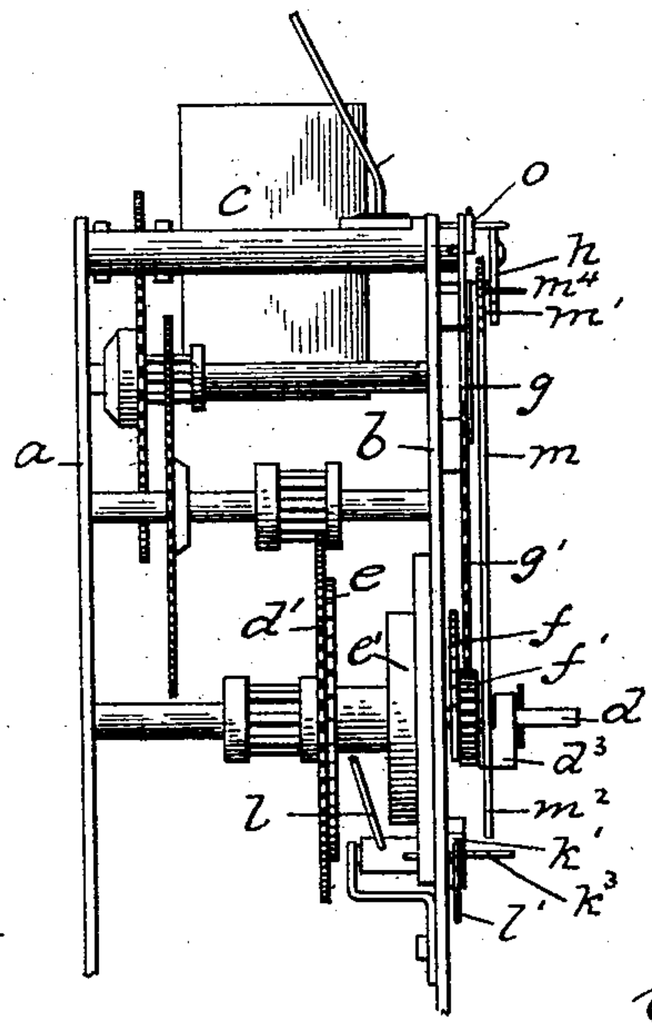


Fig. 2



Witnesses,
C. E. Burkland.
J. D. Carter.

Inventor;
Edwin Y. Judd
by Simonds & Burdett,
Attys.

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E. Y. JUDD.

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Fig. 3

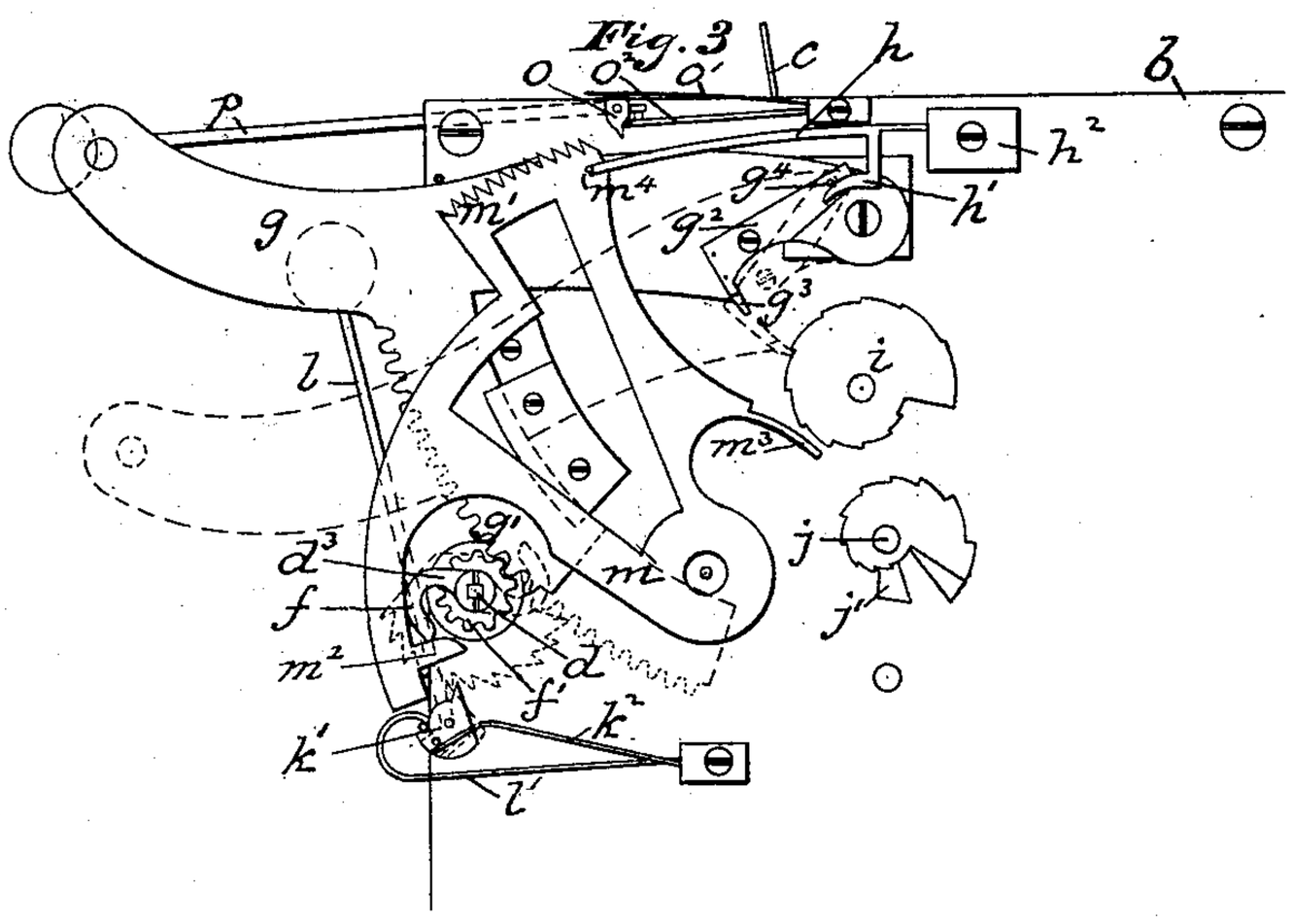


Fig. 4

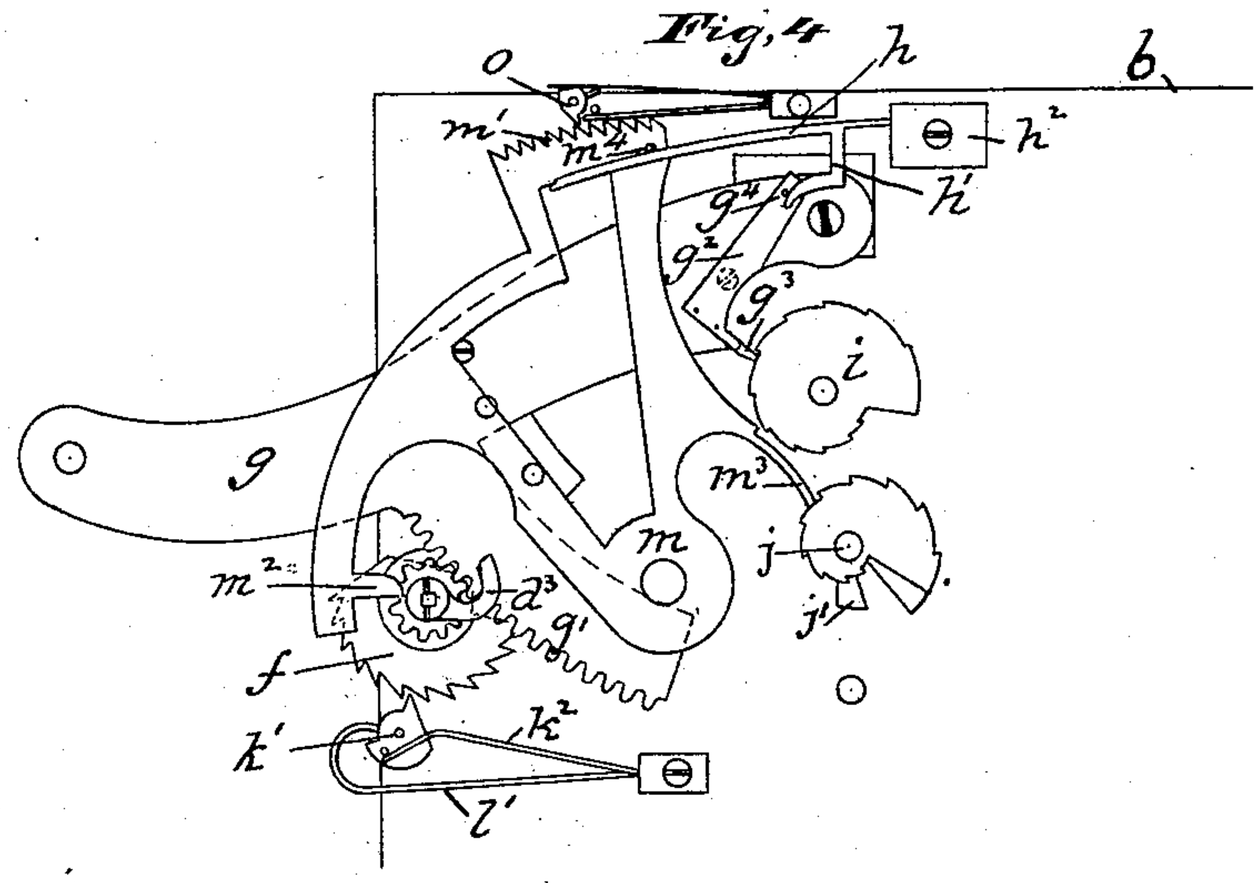
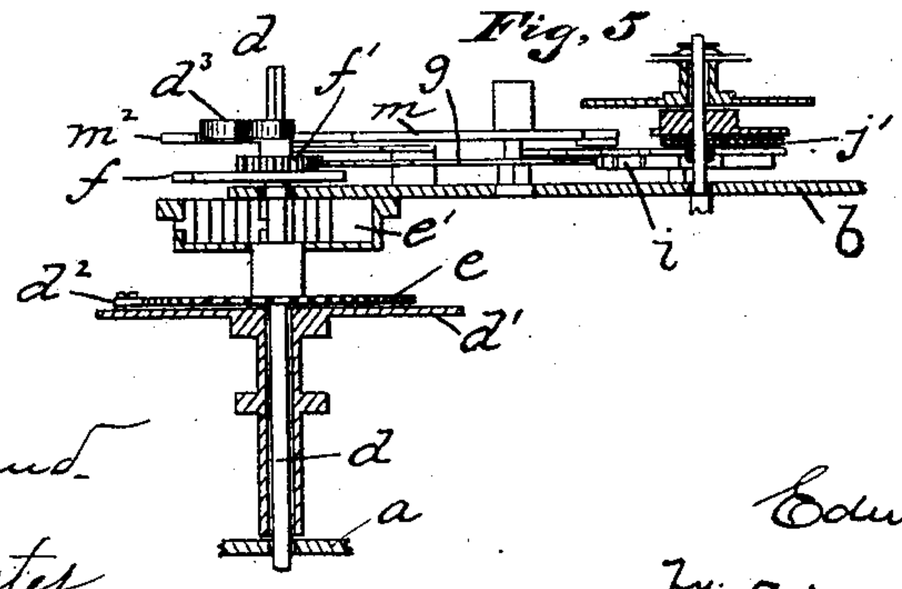


Fig. 5



Witnesses,
C. E. Buckland
J. D. Carter

Inventor,
Edwin Y. Judd,
by Simonds & Burdett,
Attys.

(No Model.) 3 Sheets—Sheet 3.

E. Y. JUDD.

REPEATING MECHANISM FOR CLOCKS.

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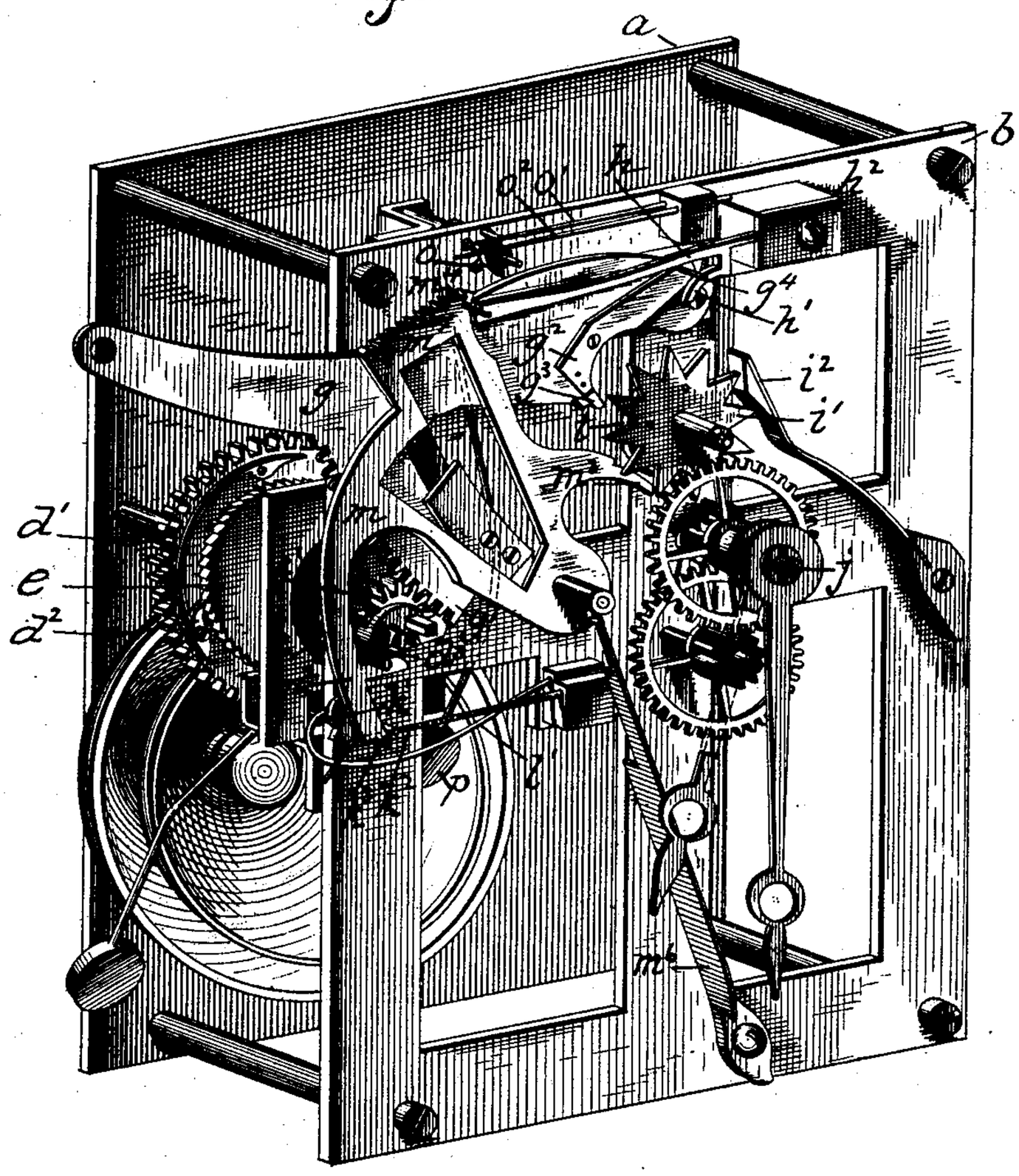
Fig. 1.



WITNESSES

Chas. H. Durand.

John Enders Jr.

INVENTOR

Edwin Y. Judd

by Simonds & Burdett,

Attorneys

UNITED STATES PATENT OFFICE.

EDWIN Y. JUDD, OF HARTFORD, CONNECTICUT.

REPEATING MECHANISM FOR CLOCKS.

SPECIFICATION forming part of Letters Patent No. 360,888, dated April 12, 1887.

Application filed August 13, 1885. Serial No. 174,252. (No model.)

To all whom it may concern:

Be it known that I, EDWIN Y. JUDD, of Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Repeating Mechanism for Clocks, of which the following is a description, reference being had to the accompanying drawings, where—

Figure 1 is a plan view of the face-plate of a clock bearing my improved mechanism, with parts cut away. Fig. 2 is a side view of the same looking from the left. Fig. 3 is a detail diagram view of the mechanism, illustrating one step in the operation. Fig. 4 is a detail diagram view of the same, illustrating a further step in the operation. Fig. 5 is a detail view in cross-section on plane denoted by line *x x* of Fig. 1. Fig. 6 is a detail diagram view of the lever bearing the minute-ratchet and showing its position between the spring-stop and hour-pawl. Fig. 7 is a perspective view of the works of a clock bearing my improvements.

My invention relates to the class of striking devices that are attached to the plates or form a part of the mechanism of clocks and watches, and are used to indicate the hours and minutes; and it consists in the combination of several snails, racks, and other parts making up the repeating mechanism, as more particularly hereinafter described.

The several parts of my improvement, as herein described, are not adapted for striking the hours as they recur; but they act simply as a repeater.

In the accompanying drawings, the letter *a* denotes the back plate of the works of a clock; *b*, the front plate; *c*, the fly; *d*, the main spindle of the fly-train; *d'*, the main gear-wheel of the striking mechanism, that is fast on a sleeve which turns freely on this spindle; *e*, a ratchet-wheel that is fast to the spindle *d* and lies next the wheel *d'*, on which is borne a spring-pawl, d^2, that engages the teeth of the ratchet-wheel *e*.

The spring-barrel *e'* is attached to the face-plate, and contains a spring one end of which is fast to the frame or barrel on the face-plate, and the other is fast to the spindle *d* in such manner that the recoil of the spring drives the striking mechanism and the fly-train.

The spindle *d* bears the hour-rack *f*, which is a segmental disk that is fast to and rotates with the shaft, and has on its outer edge a series of twelve ratchet-teeth. Next outside this hour-rack is a cog-wheel, *f'*, that is in mesh with the teeth on the curved arm *g'* of the rack-tail *g*, that is pivotally connected at one end to the plate and moves in the plane of the latter, with its outer end extending beyond the plate a limited distance.

The feeler g^2 is a short lever pivoted to the tail *g* near its inner end, with the finger g^3 extending from the lower edge of the tail-piece, and a pin, g^4, projecting from the other end of the feeler in position to engage an arm, *h'*, on the lower side of the spring-stop *h*, that is secured to the standard h^2 on the face-plate.

The hour-snail *i* is pivoted on a short standard that projects from the face-plate, and it turns in the plane of movement of the feeler g^2. Fast to the snail is a toothed wheel, *i'*, which has twelve teeth, and the spring-pawl i^2 holds the snail against rotation with a yielding pressure, so that it has a step-by-step movement in its rotation. This snail is rotated by means of the arm *j'*, which projects from the arbor *j*, that bears the hour-hand. It is moved forward a single step at intervals of an hour, and this presents to the feeler-arm g^2, after each movement, a different part of the periphery of the snail—that is, either a spiral or a series of steps at increasing distances from the center along the periphery.

By pulling down upon the outer end of the rack-tail the spindle *d* is rotated by means of the intermeshing teeth upon the arm *g'* and the cog-wheel *f'*, and this movement will continue until the finger g^3 on the feeler g^2 strikes the periphery of the hour-snail. By this rotation of the spindle *d* the hour-rack *f* is moved with it, and a certain number of its twelve ratchet-teeth move over the pawl *k'*, that is hung on the pivot of the hour-hammer, *l*. This pawl *k'* has a limited play between the spring k^2, that yields to allow the teeth on the hour-ratchet to pass the pawl, and the hammer-spring *l'*, that gives the impulse to the hammer in striking as the pawl is tripped by the return of the teeth on the hour-ratchet under the recoil of the spring.

The minute-rack *m'*, consisting of eleven ratchet-teeth, is borne on the upper edge of the lever *m*, that is pivoted on a standard near the center of the face-plate, overlies the rack-

tail g, and moves in a plane parallel to it, with the arm m^2, that extends down to and partly around the spindle d, at a short distance from it and moves in the path of the arm d^3, fast to the spindle d. From the upper side of the lever m extends the feeler m^3, in the plane of the minute-snail that is borne on the arbor of the minute-wheel on the central arbor of the clock. The pin m^4 on the outer end of the lever m, near the first tooth on the minute-rack, is the one against which the spring-stop h lies until it is tripped by the feeler g^2, when its outer end strikes the hour-snail in the downward movement of the tail-rack. By the movement of the lever m the ratchet-teeth on the minute-rack trip and engage the pawl o of the minute-hammer p, which pawl has the pawl-spring o' and the striking-spring o^2, arranged and operating similar to the spring-pawl and springs of the hour-striking mechanism. By this latter arrangement of parts the nearest five minutes is struck—for instance, if the repeater is set in operation with the hands, as illustrated in the drawings, there will be six strokes for the hour and five for the twenty-five minutes past the hour.

In order to avoid the very careful adjustment of the several snails and the parts by which they are moved, the arm j' is so attached to the main arbor that it has a limited rotation and bears with it a segment of a disk, which forms an extension of the minute-snail at its highest point. This insures the operation of the snail at this part of its periphery by a simple and effective device.

When the several parts of my device are put together, as shown in Fig. 1 of the drawings, the repeater is operated by pulling down upon the outer end of the rack-tail g, which carries the hour-rack past the pawl of the hour-hammer a certain number of teeth, depending on the part of the periphery of the hour-snail which is struck by the feeler g^2. As soon as the feeler is stopped in its progress it trips the spring-stop and releases the lever m, which, under the impulse of the spring m^6, swings on its pivot and carries a certain number of teeth past the pawl of the minute-striking mechanism, the number of teeth carried by in this instance being determined by the point on the periphery of the minute-snail which is struck by the feeler on the lever m. On releasing the rack-tail the recoil of the mainspring causes the hour-ratchet to trip the pawl, so that the hours are struck, and the arm d^3 on the spindle d then engages the arm m^2 on the lever m and pulls it around, driving the ratchet-teeth past the pawl o, and thus tripping it and causing it to strike the minutes.

In the drawings, from Figs. 1 to 5, the lower end of the arm m'' on the lever m is cut away, in order to show parts beneath it; but in Fig. 6 this arm is shown as extended the proper length, which brings its end into contact with the pin k''', which projects from the upper face of the pawl k' of the hour-striking mechanism when the pin m^4 on the upper end of the lever is in contact with the end of the spring-stop h. The object of this arrangement of the parts is to push the pawl k' out of the path of the teeth on the hour-ratchet f, so that until the minute-lever has been released the ratchet f will fail in its rotation to trip the pawl k', and therefore will not strike the hours. This insures the setting of the lever m in correct position to strike the minutes, and prevents either the correct number of hours or any hour from being struck until the minute-lever has been so set for operation.

I claim as my invention—

1. In combination with a watch or clock mechanism, the snails supported on the standard on the face-plate and on the minute-arbor, respectively, the hour-snail movable with a step-by-step action, the rack-tail having the arm with the cogged rack and bearing the tilting feeler with projecting finger, the spring-stop, the lever bearing the minute-ratchet, the several pawls of the hour and minute striking mechanisms, and the mainspring-arbor bearing the arm that engages the arm m^2 on the lever m, all substantially as described.

2. In combination, in a watch or clock, the hour and minute striking mechanisms, the main spindle d, bearing the gear-wheel d', the spring-pawl d^2 and ratchet-wheel e, an hour-rack, f, and cog-wheel f', and an arm, d^3, the rack-tail g, pivoted to the face-plate, with the arm g', having cogs in mesh with the wheel f', and the tilting feeler g^2, with the finger g^3 and pin g^4, the spring-stop h, the lever m, pivoted to the plate and bearing the minute-rack m', the arm m^2, the feeler m^3, and the pin m^4, the hour-snail i, with the toothed wheel i', the spring i^2, the minute-snail, and the arm whereby the wheel i' is rotated, all substantially as described.

3. In combination, in a watch or clock, the minute-snail fast to the minute-arbor, the arm borne on the said arbor and adapted to engage a toothed wheel fast to the hour-snail, pivoted to a stump or standard on the face-plate of the movement, the spring which holds the hour-snail with a yielding grasp, the tail-rack pivoted to the face-plate and bearing the tilting feeler, with the stop-tripping mechanism and the arm whereby the hour-ratchet is moved, the lever, also pivoted to the plate and bearing the minute-ratchet, the feeler, and the arm engaging the arm on the hour-ratchet spindle, and the several pawls, springs, and hammers of the respective hour and minute striking mechanisms, all substantially as described.

4. In combination, in the movement of a time-piece, the rack-tail pivoted to the plate of the movement and bearing the tilting feeler and in engagement with the spindle bearing the hour-rack, the lever m, bearing the feeler m^3, the minute-ratchet and the arm m^2, engaging the arm d^3, fast to the spindle of the fly-train, the spring-retained hour-snail pivoted to the plate, and the minute-snail fast to the minute-arbor, that bears also an arm, whereby

the step-by-step movement is imparted to the hour-snail, all substantially as described.

5. In a repeating mechanism of substantially the within-described construction, in combination, the lever bearing the minute-ratchet, the spring-stop holding this lever from movement in one direction, and the pawl of the hour-striking mechanism held out of the path of the hour-ratchet by contact with a part of the lever on the side opposite the spring-stop, all substantially as described.

EDWIN Y. JUDD.

Witnesses:
CHAS. L. BURDETT.
J. D. CARTER.