No. 632,046. Patented Aug. 29, 1899.

E. B. ELLICOTT & L. E. OEHRING.

TELEGRAPH REGISTER.

(Application filed Sept. 15, 1898.)

(No Model.) 3 Sheets—Sheet 1.

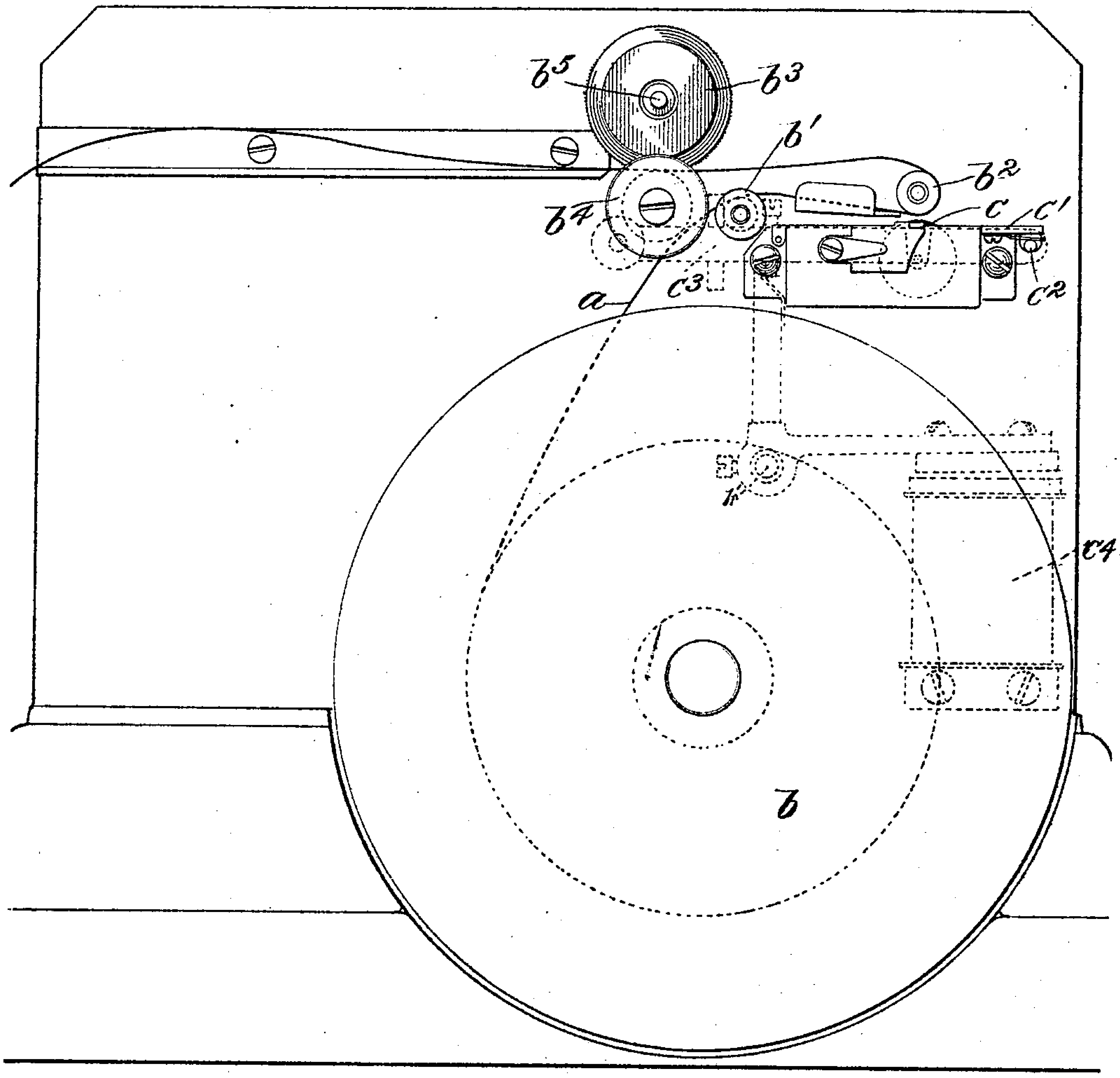

Fig. 1.

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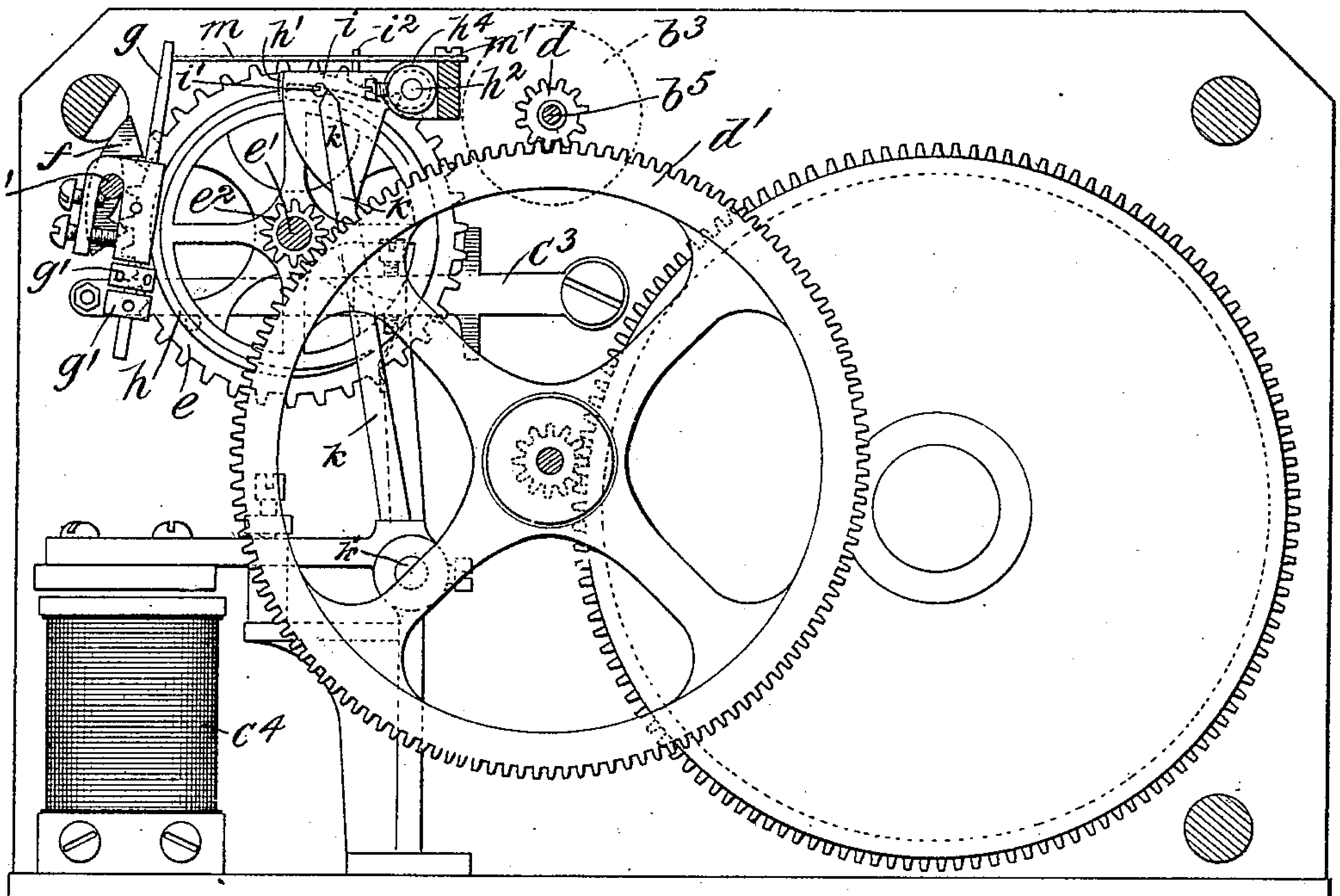

Fig. 2.

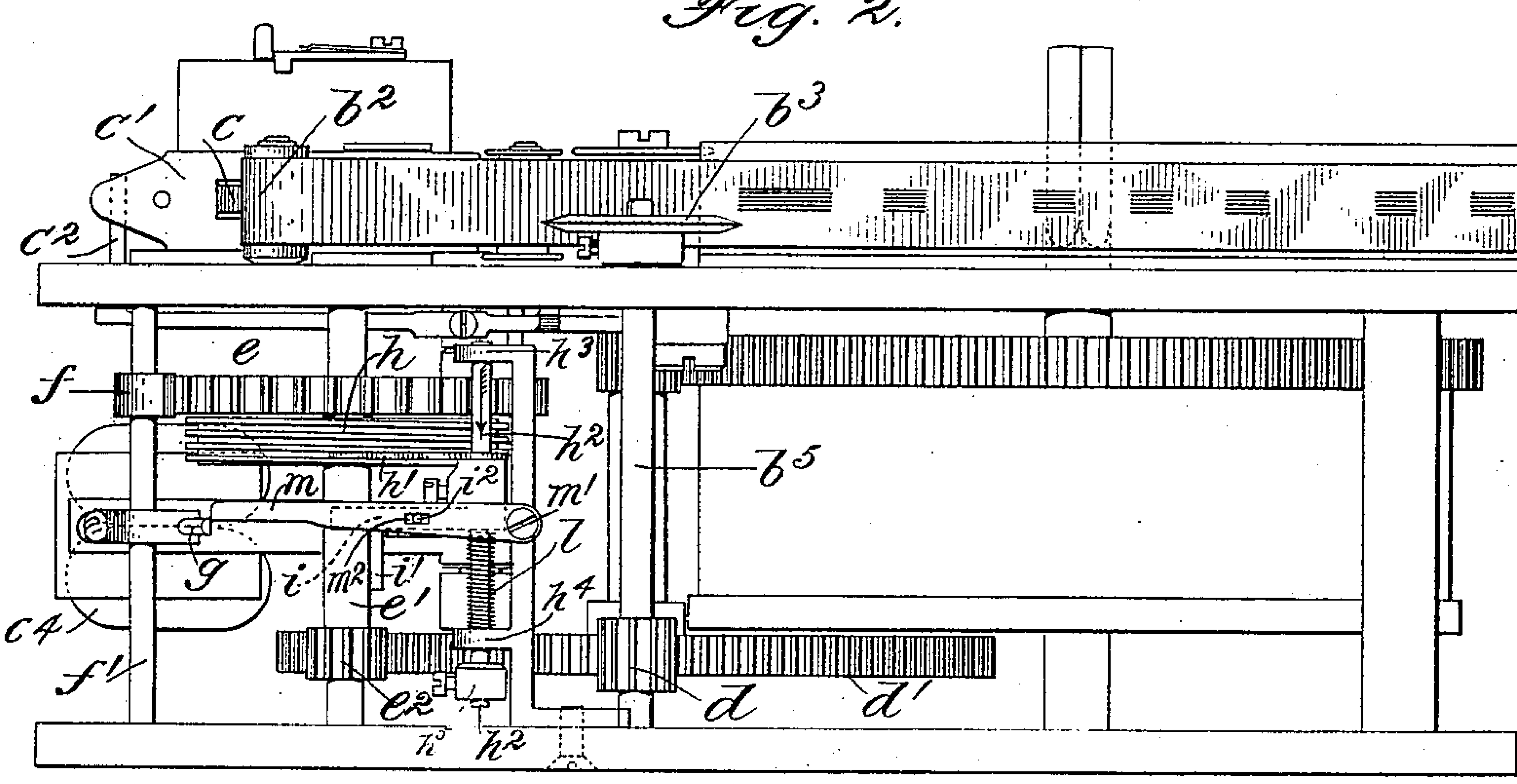

Fig. 3.

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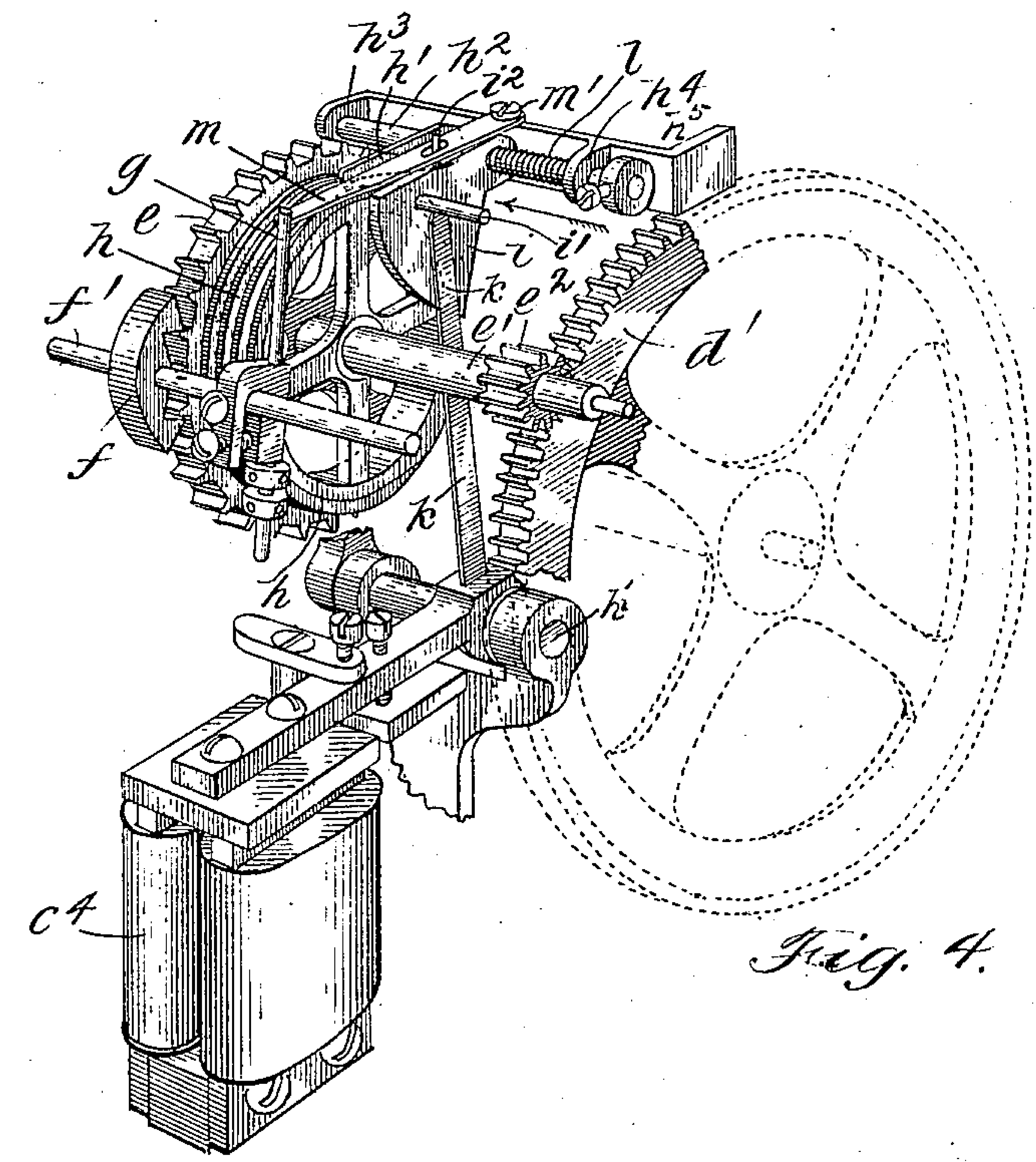

Fig. 4.

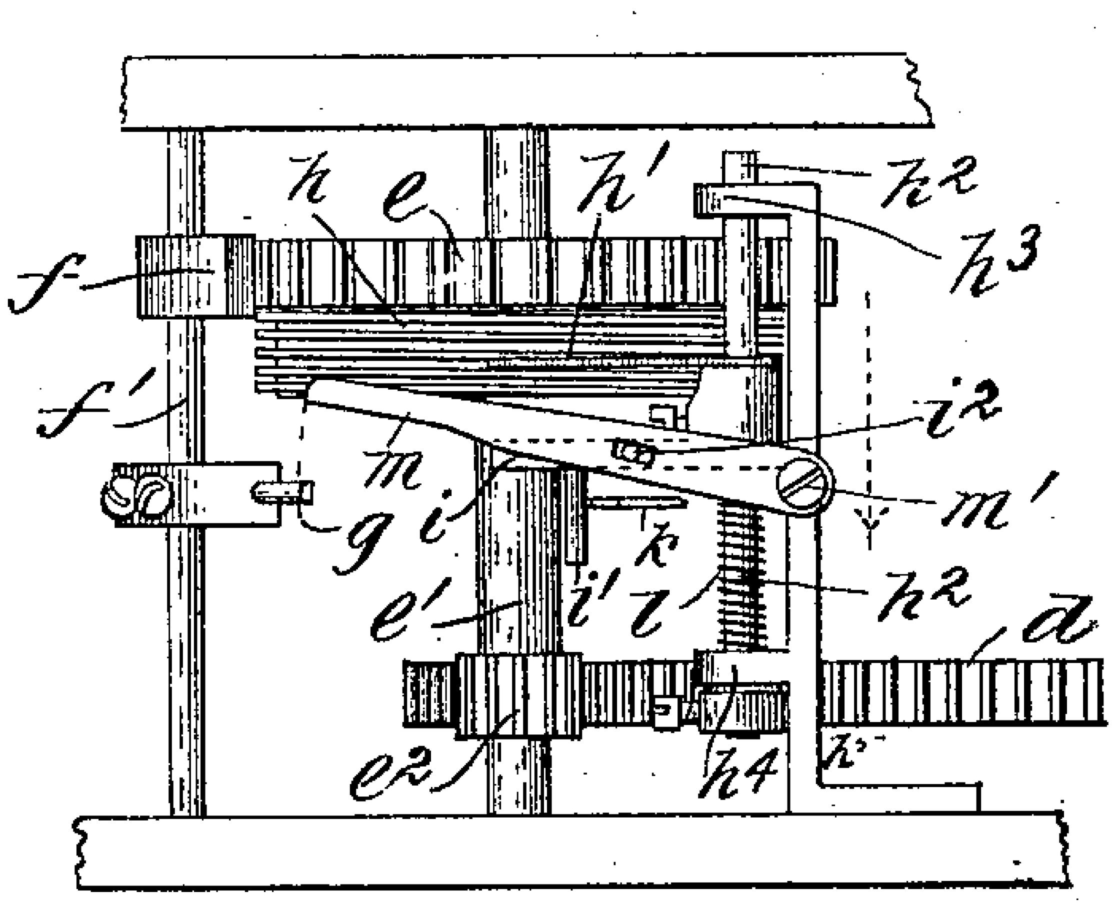

Fig. 5.

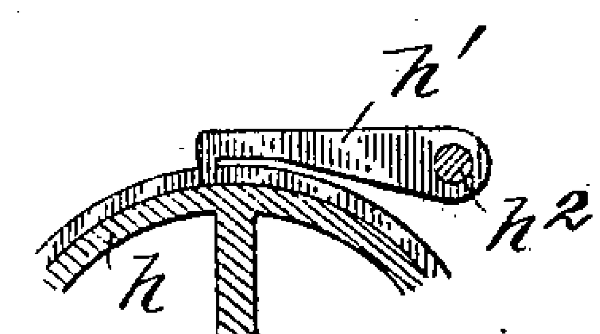

Fig. 6.

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UNITED STATES PATENT OFFICE.

EDWARD B. ELLICOTT AND LOUIS E. OEHRING, OF CHICAGO, ILLINOIS, ASSIGNORS TO THE WESTERN ELECTRIC COMPANY, OF SAME PLACE.

TELEGRAPH-REGISTER.

SPECIFICATION forming part of Letters Patent No. 632,046, dated August 29, 1899.

Application filed September 15, 1898. Serial No. 690,987. (No model.)

To all whom it may concern:

Be it known that we, EDWARD B. ELLICOTT and LOUIS E. OEHRING, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Telegraph-Registers, (Cases Nos. 7 and 4,) of which the following is a full, clear, concise, and exact description.

Our invention relates to telegraph-registers, and has for its object to provide an improved construction of the escapement-controlling mechanism which regulates the feeding of the tape.

Considerable difficulty has been met with in the operation of telegraph-registers as heretofore constructed by reason of their failure to respond readily to small currents. The pull exerted by the magnet upon its armature must be sufficient not only to actuate the printing mechanism, but to release the escapement and permit the tape-feeding train to rotate, and the tension of the spring which drives the tape-feeding train often is so great that the parts bind or stick together and the device fails to operate. This binding or sticking usually is the fault of the mechanism which controls the escapement. A well-known form of escapement, with its controlling device, consists of an escape-wheel associated with the tape-feeding train or forming a member thereof, a pallet engaging the teeth of the escape-wheel, a vibrating arm associated with the pallet, said arm being properly weighted and adapted to be rocked to and fro by said pallet, a worm-wheel associated with the escape-wheel and rotating therewith, and a dog or detent resting in the spiral groove of said worm-wheel and adapted to engage with a pin provided in said groove to stop the wheel from further rotation. Means are provided which come into play when the printing mechanism is actuated by which the detent is disengaged from the pin and lifted out of the groove in the worm-wheel to allow the gear-train to rotate and feed forward the tape. When the printing mechanism is again at rest, the detent drops back into the groove in the worm-wheel and follows the groove until it engages the pin, when further movement of the worm-wheel and train is arrested.

In the construction above described the difficulty has been with the detent and pin which control the escapement. The tension of the driving-spring causes the two to bind and stick, so that the power available is unable to disengage them.

In designing the telegraph-register which forms the subject-matter of this application it has been our purpose so to arrange the escapement and releasing mechanism therefor that only a very slight expenditure of power is necessary in order to release the escapement. In accordance with our invention, therefore, the escapement is controlled not by a pin on the worm-wheel and a detent engaging therewith, but by a stop adapted to be interposed in the path of the arm which is vibrated by the escapement-pallet. Normally this stop remains in the path of the vibrating arm and prevents the movement thereof; but when the registering mechanism is put in action means are provided, preferably a spring-actuated stop-guide, for removing said stop from the path of said vibrating arm and so maintaining said stop until the registering mechanism is again at rest. Thereupon the stop will automatically be moved back again to engage the vibrating arm and check further movement. This construction may more easily be understood upon an inspection of the accompanying drawings, wherein—

Figure 1 is a view in elevation of a telegraph-register, showing the tape-feeding rollers and the printing mechanism. Fig. 2 is a sectional elevation of the interior of the register, showing the operating mechanism. Fig. 3 is a plan view of the register. Fig. 4 is a perspective view of the escapement and associated parts. Fig. 5 is a plan view thereof, showing the stop and its guide in an alternative position from that shown in Fig. 3—that is, in a position removed from the path of the vibrating arm; and Fig. 6 is a detail sectional elevation of a portion of the worm-wheel and the stop-guide.

Like letters of reference indicate like parts throughout the several figures of the drawings.

Referring more particularly to Fig. 1, the tape a is reeled upon a spool b and the end thereof is passed around the rollers b' b^2 and between the rollers b^3 b^4, the former of which is positively driven by a gear-train in a manner hereinafter explained. The printing device is immediately under the roller b^2 and consists of a stylus-wheel c, rotatably mounted upon the hinged lid c' of an ink-chamber. The lid c' is adapted to be raised by a pin c^2, carried upon one end of a vibrating arm c^3, which is pivoted at its other end to the framework of the register.

The electromagnet c^4 for receiving the electrical impulses or telegraphic signals impressed upon the circuit wherein it is included is provided with an armature mounted upon one of the arms of a pivoted bell-crank lever, as illustrated in Figs. 1, 2, and 4, which lever is thus caused to vibrate in response to the aforesaid signals. The other arm of the bell-crank lever has a beveled end, which engages a set-screw mounted upon the vibrating arm c^3, whereby the latter is moved upward when the magnet attracts its armature and is allowed to fall again when the magnet is deënergized. When the arm is raised, the pin c^2 upon the end thereof lifts the lid c', carrying the stylus-wheel, thereby causing the latter to engage with the tape a and imprint an ink-mark thereon.

The feeding-roller b^3 is mounted upon an arbor b^5, carrying a pinion d, which pinion meshes with one of the gear-wheels d' of the gear-train. A pinion e^2 also meshes with the gear-wheel d', said pinion being carried upon an arbor e', which supports the escape-wheel e. An escapement-pallet f engages with the escape-wheel e and is mounted to vibrate upon an arbor f'. A vibrating arm g also is carried by this arbor and, among other functions, serves to control the speed at which the pallet vibrates, adjustable weights g' g' being provided upon the arm for this purpose. The arbor e', which carries the escapement-wheel, also carries a worm-wheel h, having a spiral groove in its periphery. A stop-guide h' is rigidly mounted upon the shaft or arbor h^2, which is rotatably supported near its ends in bearings h^3 h^4. The arbor is also longitudinally movable within the bearings h^3 h^4. It will be understood, therefore, that when the worm-wheel is rotated the stop-guide h', whose end rests in the groove of the worm-wheel, will be caused to move laterally across the periphery thereof, and thereby will move the arbor h^2 longitudinally in its bearings in the direction indicated by the arrow in Fig. 3.

A weighted arm i is mounted rigidly upon the arbor h^2, and its tendency is to rotate the arbor in a direction to maintain the guide h' resting in the spiral groove of the worm-wheel. The arm i carries two pins. One of them, i', projects horizontally therefrom parallel to the arbor h^2, and the other pin, i^2, projects vertically. The functions of these two pins will presently be described. The pin i' is adapted to be engaged by the beveled or wedge-shaped point of an arm k, which is associated with the armature-lever c^4 in such a manner that the two constitute a bell-crank lever pivoted at k'. When, therefore, the armature of the magnet is drawn down, the arm k is rocked about its pivot k', and the beveled end engages with pin i' and raises it vertically together with the arm i. This movement rocks the arbor h^2 in its bearings h^3 h^4 and lifts the end of the guide h' out of the groove in the worm-wheel.

A compression-spring l encircles the arbor h^2 between the bearing h^4 and the arm i, so that the tendency of the spring is to move the arbor longitudinally in its bearings in the direction indicated by the arrow in Fig. 4. This movement, however, normally is checked by the engagement of the guide h' with the worm-wheel's groove; but when the guide is lifted out of the groove, as described in the preceding paragraph, the spring is no longer opposed, but acts to shift the arbor h^2 longitudinally in its bearings, as described, the extent of such movement being determined by an adjustable collar h^5 upon the end of the shaft, which collar engages with the bearing h^4.

A stop m is pivoted at m' to a portion of the supporting-framework, as indicated in Figs. 2, 3, 4, and 5, and has a slot m^2 therein, said slot being engaged by the pin i^2, which extends vertically from the arm i. It will be understood, therefore, that upon any longitudinal movement of the arbor h^2 the stop m will be rotated about its pivot m'. One position of this stop is indicated in Fig. 3, another in Fig. 5.

When the parts are in their normal position, as illustrated in Figs. 2, 3, and 4, the free end of the stop m is interposed in the path of the arm g, so that the latter cannot vibrate. The escapement-pallet, therefore, simply engages fixedly with the teeth of the escape-wheel and prevents its rotation. If, however, the armature-lever be drawn down, the pin i' is engaged by the arm k, the arbor h^2 is turned in its bearings to raise the guide h' from the spiral groove in the worm-wheel, and the spring l acts to shift the arbor h^2 longitudinally in its bearings. This movement of the shaft causes the stop m to be rotated about its pivot and to take up the position illustrated in Fig. 5, leaving the arm g free to vibrate. The gear-train thus will be permitted to turn, its speed being regulated by the wheel-and-pallet escapement. As long as the armature-lever continues in action—that is, as long as the beveled end of the arm k continues to move to and fro under the pin i—so long will the stop-guide h' be maintained free of the spiral groove and the gear-train be free to rotate and to feed forward the tape; but when the armature-lever becomes inactive in either an attracted or an unattracted position—that is, when the wedge-shaped point of the arm k remains on either one side or the other of the pin i'—then the pin and the arm i will be allowed to fall, rocking the arbor h^2 and dropping the guide h' into the spiral groove of the worm-wheel h. Now as the worm-wheel rotates the stop-guide h' will be engaged by the walls of the groove and the guide and arbor will be forced in a direction indicated by the dotted arrow in Fig. 5, overcoming the opposing force of spring l. This movement causes a corresponding rotation of the stop m about its pivot m' and continues until the end of said stop is brought into the path of the vibrating arm g, when further movement of the train and escapement will be checked.

It will be appreciated that the power required to operate the telegraph-register need be but very small, for the engagement between the vibrating arm and the stop m is light, and even these parts are released not by the direct movement of the armature-lever, but by the spring l, so that the only work which the magnet has to do besides printing the marks upon the tape is to raise the arm i against only the weight of such arm and against the extremely slight frictional resistance caused by the engagement of the guide h' with the sides of the spiral groove in the worm-wheel h.

Having thus described our invention, we claim as new, and desire to secure by Letters Patent, together with such modifications as may be made by mere skill, the following:

1. In a telegraph-register, the combination with electromagnetic printing mechanism, of a tape-feeding gear-train, a vibrating escapement therefor, stop mechanism adapted to engage with a vibrating part associated with said escapement to prevent the operation thereof, a worm-wheel and means for driving the same, said worm-wheel being associated with the stop mechanism and normally engaged therewith, said worm-wheel, when engaged with the stop mechanism, serving to interpose the latter in the path of the vibrating part aforesaid, and means for disengaging the stop mechanism and worm-wheel from one another during the active operation of said printing mechanism, substantially as described.

2. In a telegraph-register, the combination with printing mechanism, and an electromagnet for operating the same, of a tape-feeding gear-train, a vibrating escapement therefor, a stop normally engaging with a vibrating part associated with said escapement, to prevent the operation thereof, means for disengaging said stop from the vibrating part while the printing mechanism continues in active operation and means for moving the stop back to engage with said vibrating part when the said magnet remains in an energized or a deënergized condition, substantially as described.

3. In a telegraph-register, the combination with electromagnetic printing mechanism, of a tape-feeding gear-train, a wheel-and-pallet escapement therefor, a stop adapted normally to engage with a vibrating part associated with the escapement-pallet and thus to prevent the operation of the same, a spring adapted to disengage said stop from said vibrating part to release the escapement, and means, operated by said electromagnetic printing mechanism, for controlling the operation of said spring, substantially as described.

4. In a telegraph-register, the combination with electromagnetic printing mechanism, of a tape-feeding gear-train, an escapement therefor, a stop adapted to engage with a movable part of said train or escapement to prevent the operation thereof, a spring adapted to disengage said stop and thereby to release the gear-train, and means, operated by said electromagnetic printing mechanism, for controlling the operation of said spring, substantially as described.

5. In a telegraph-register, the combination with electromagnetic printing mechanism, of a tape-feeding gear-train, an escapement for said train, a stop adapted normally to engage with a movable part of said train or escapement to prevent the operation thereof, a worm-wheel driven by said gear-train, a stop-guide adapted to travel in the spiral groove of said worm-wheel, and connected with said stop to control the position thereof, said worm-wheel being adapted, in rotating, to move said stop-guide in a direction to cause the engagement of said stop with said movable part, a lever associated with said electromagnetic printing mechanism and adapted, during the active operation of said printing mechanism, to disengage said guide from said worm-wheel, and a spring associated with said stop, and tending to move the stop and to disengage the same from said moving part, said spring being permitted to cause such movement of the stop only when the stop-guide is disengaged from the worm-wheel, substantially as described.

In witness whereof we hereunto subscribe our names in the presence of two witnesses.

EDWARD B. ELLICOTT.
LOUIS E. OEHRING.

Witnesses to signature of Ellicott:
GEORGE P. BARTON,
MARGARET M. HEAVENER.

Witnesses to signature of Oehring:
D. W. C. TANNER,
GEORGE L. CRAGG.