

No. 848,393.

PATENTED MAR. 26, 1907.

J. G. ROBERTS.
AUTOMATIC EXCHANGE SELECTOR.

APPLICATION FILED JUNE 18, 1906.

4 SHEETS—SHEET 1

Fig. 1.

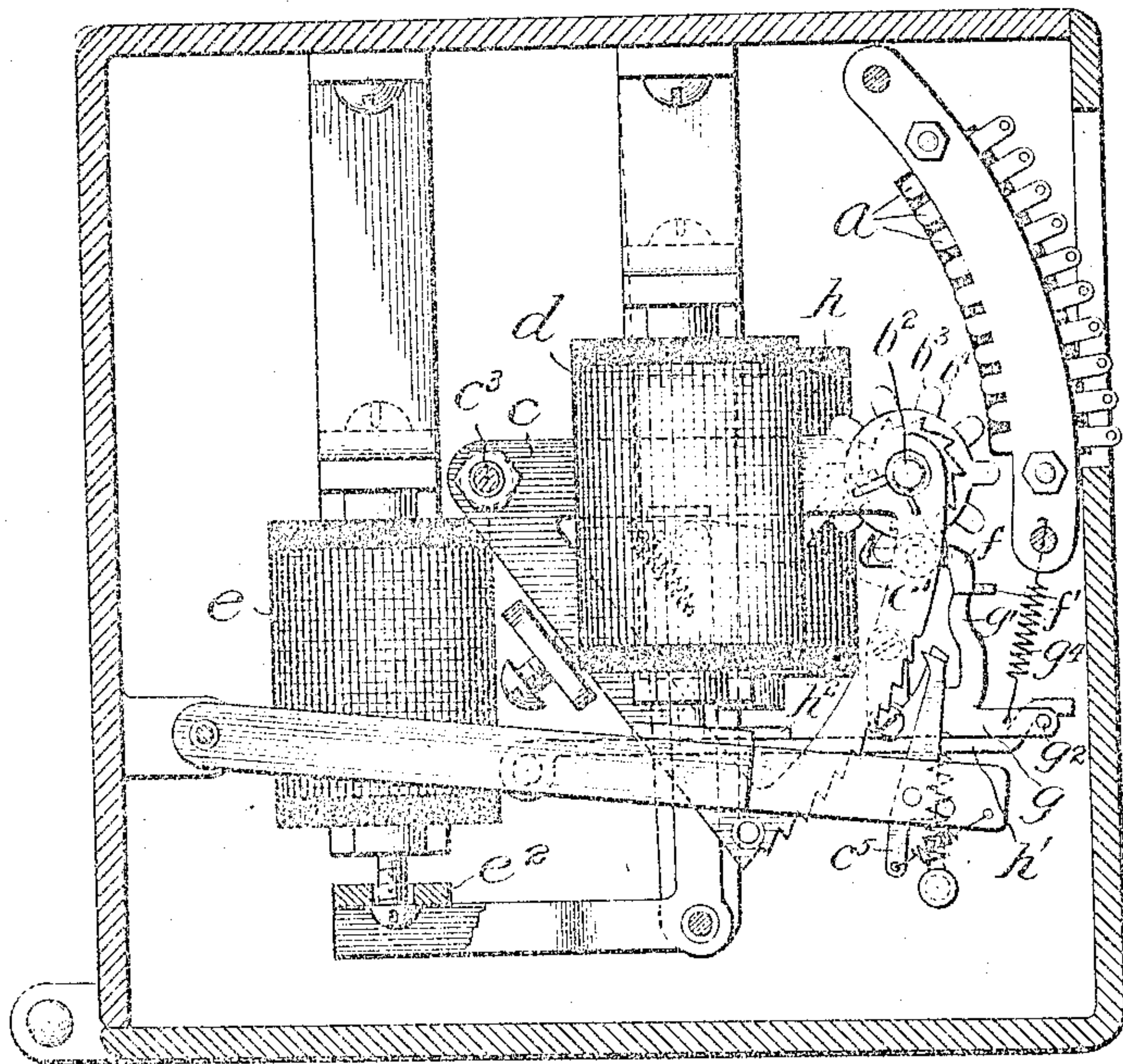
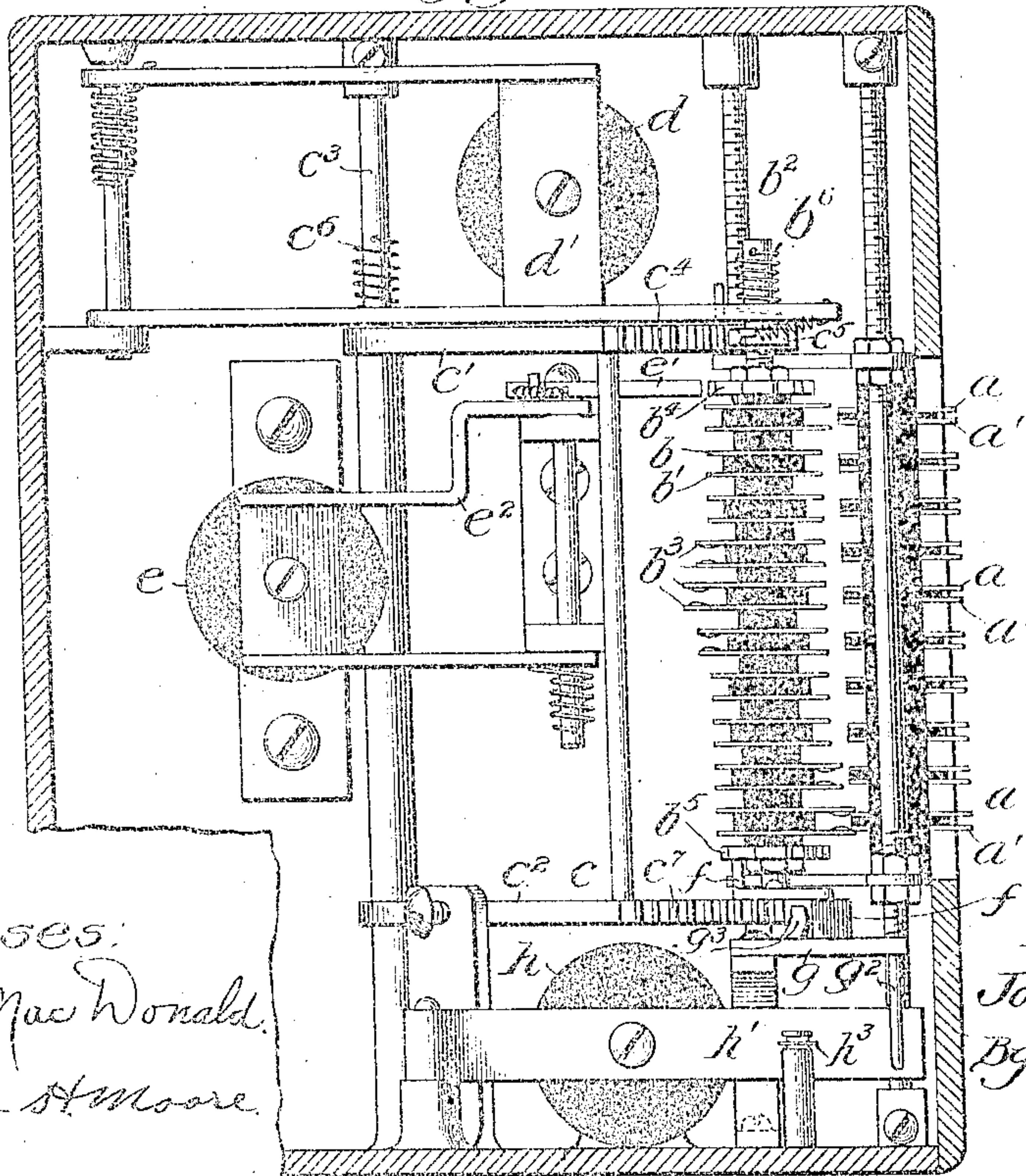


Fig. 2.



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4 SHEETS—SHEET 2.

Fig. 3.

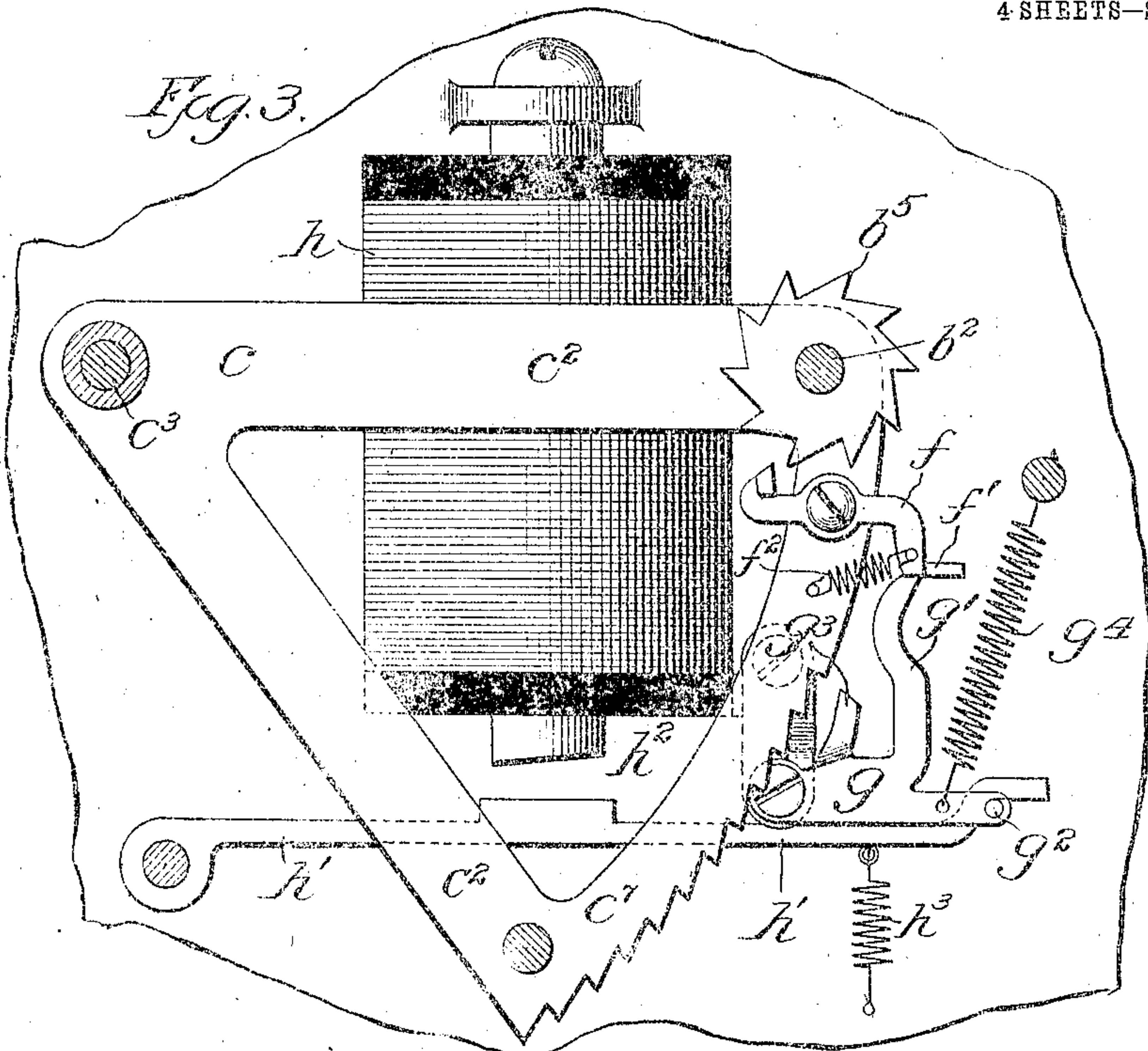
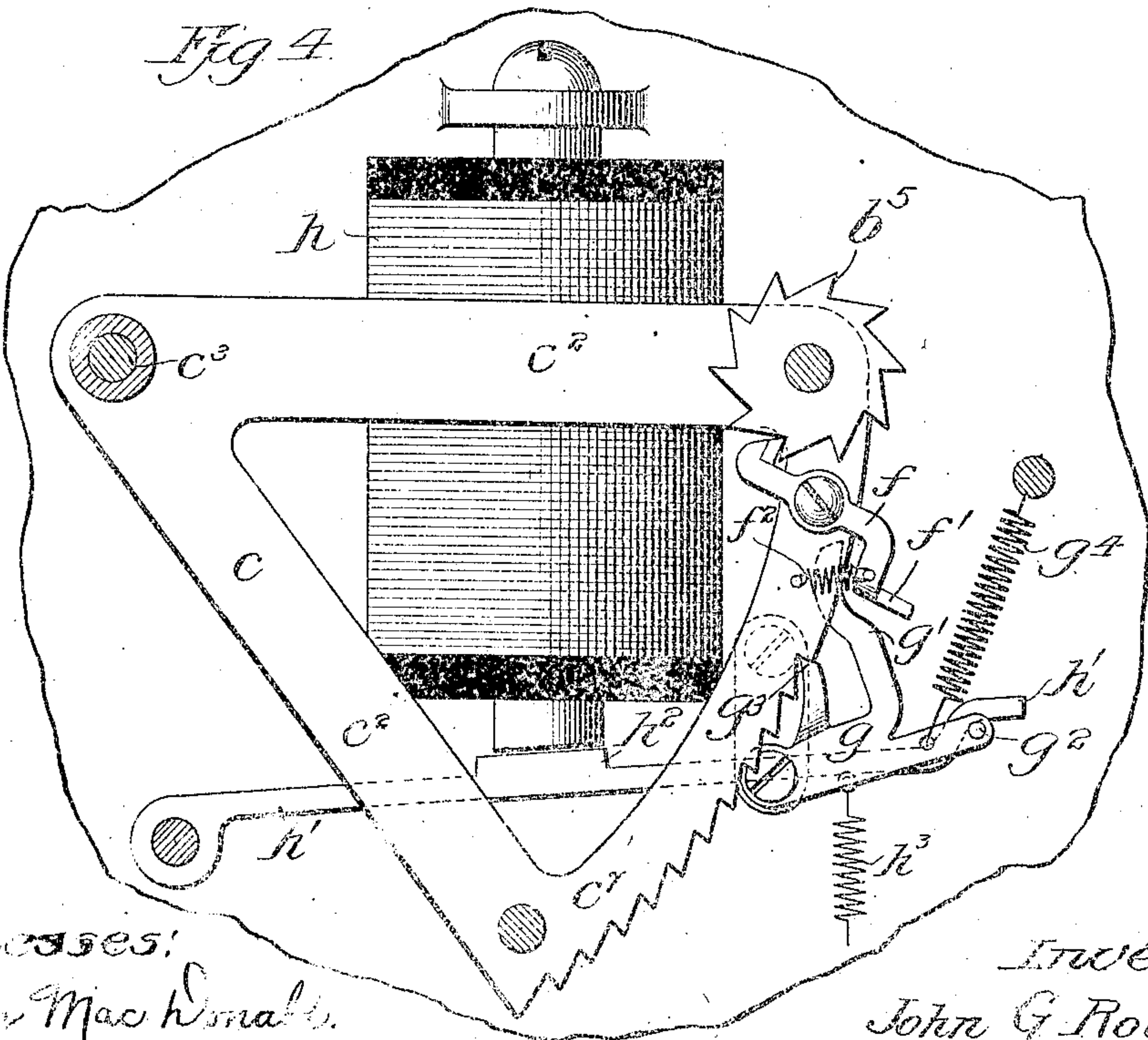


Fig. 4.



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4 SHEETS—SHEET 3.

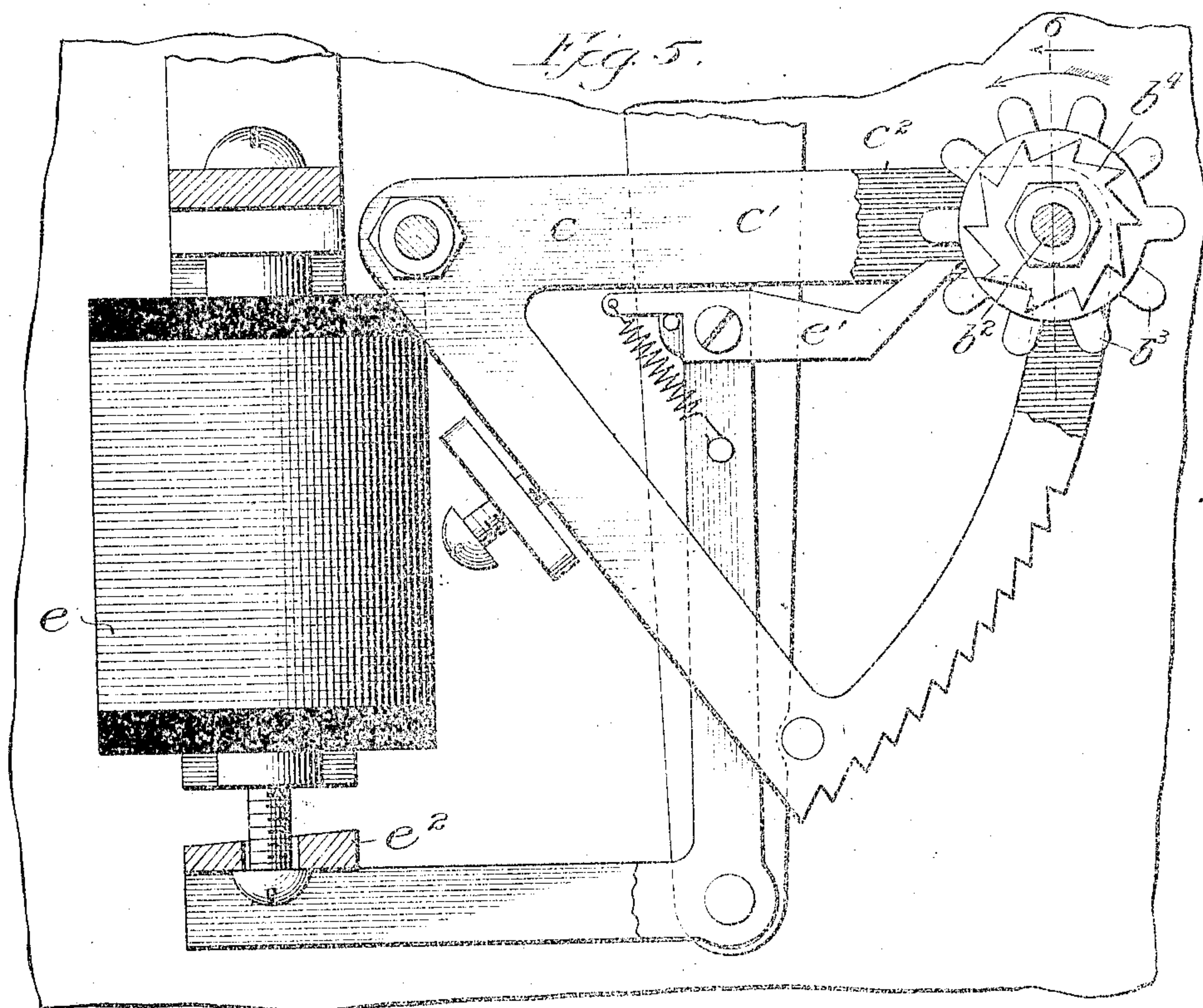
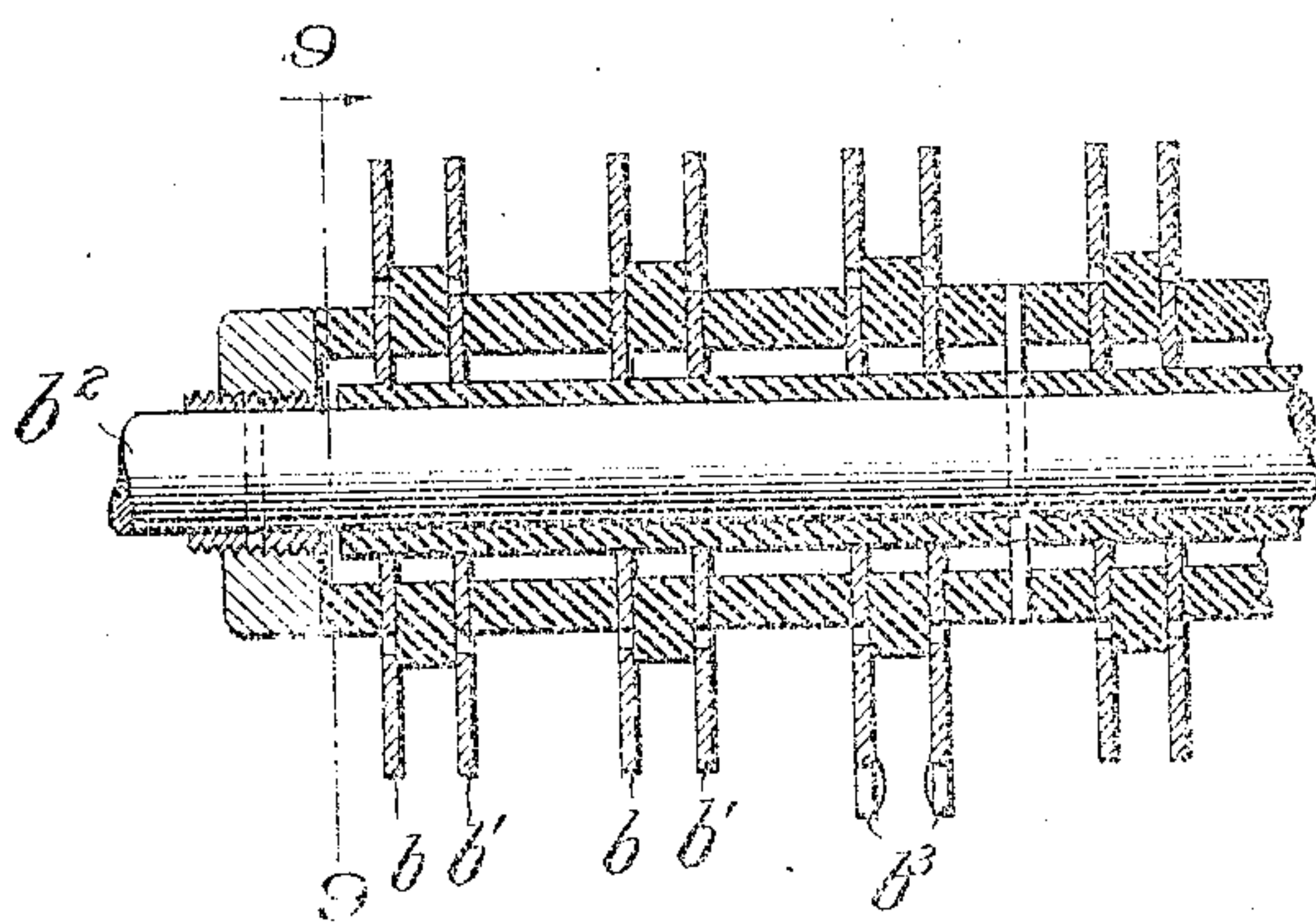


Fig. 6



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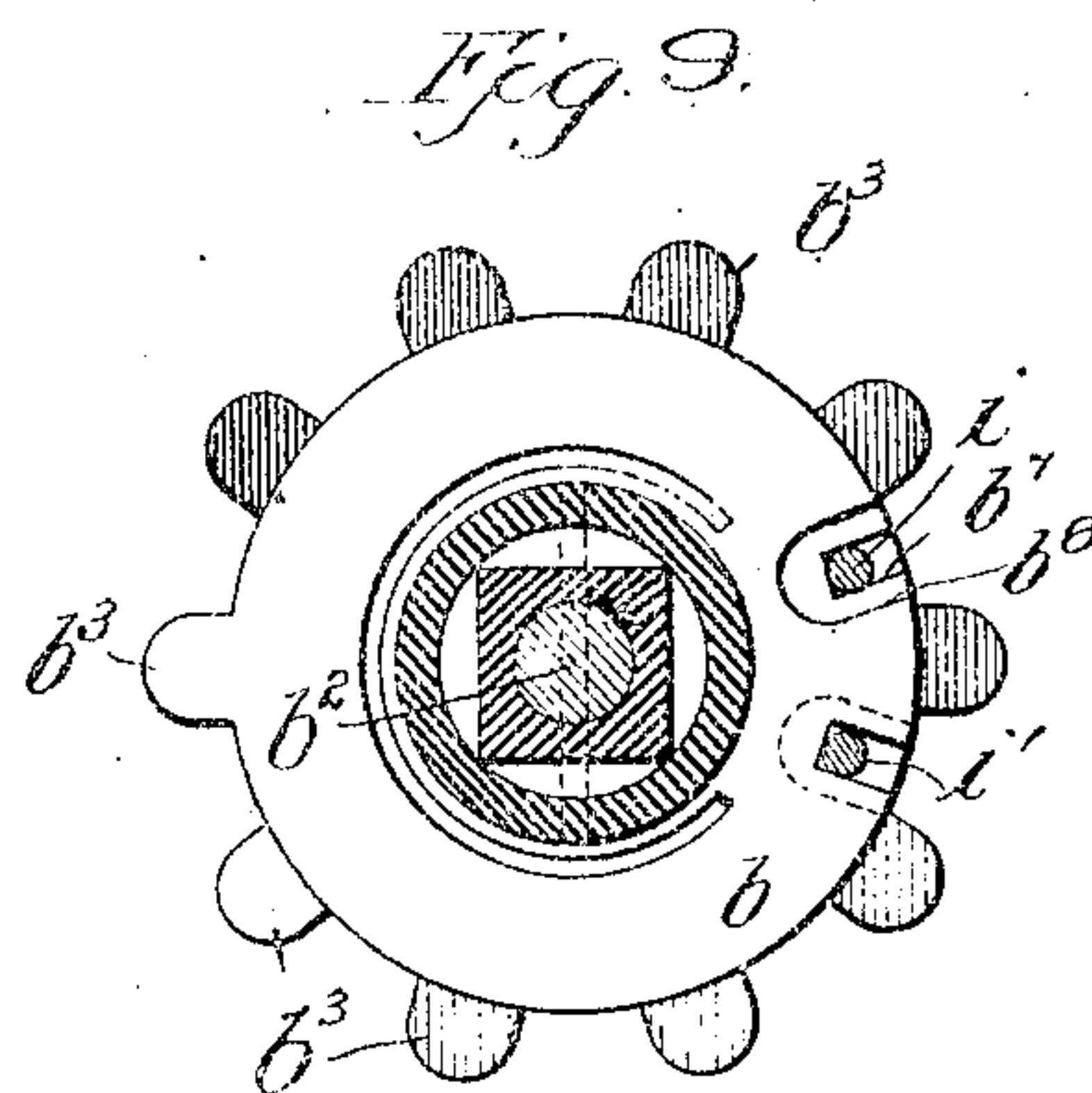
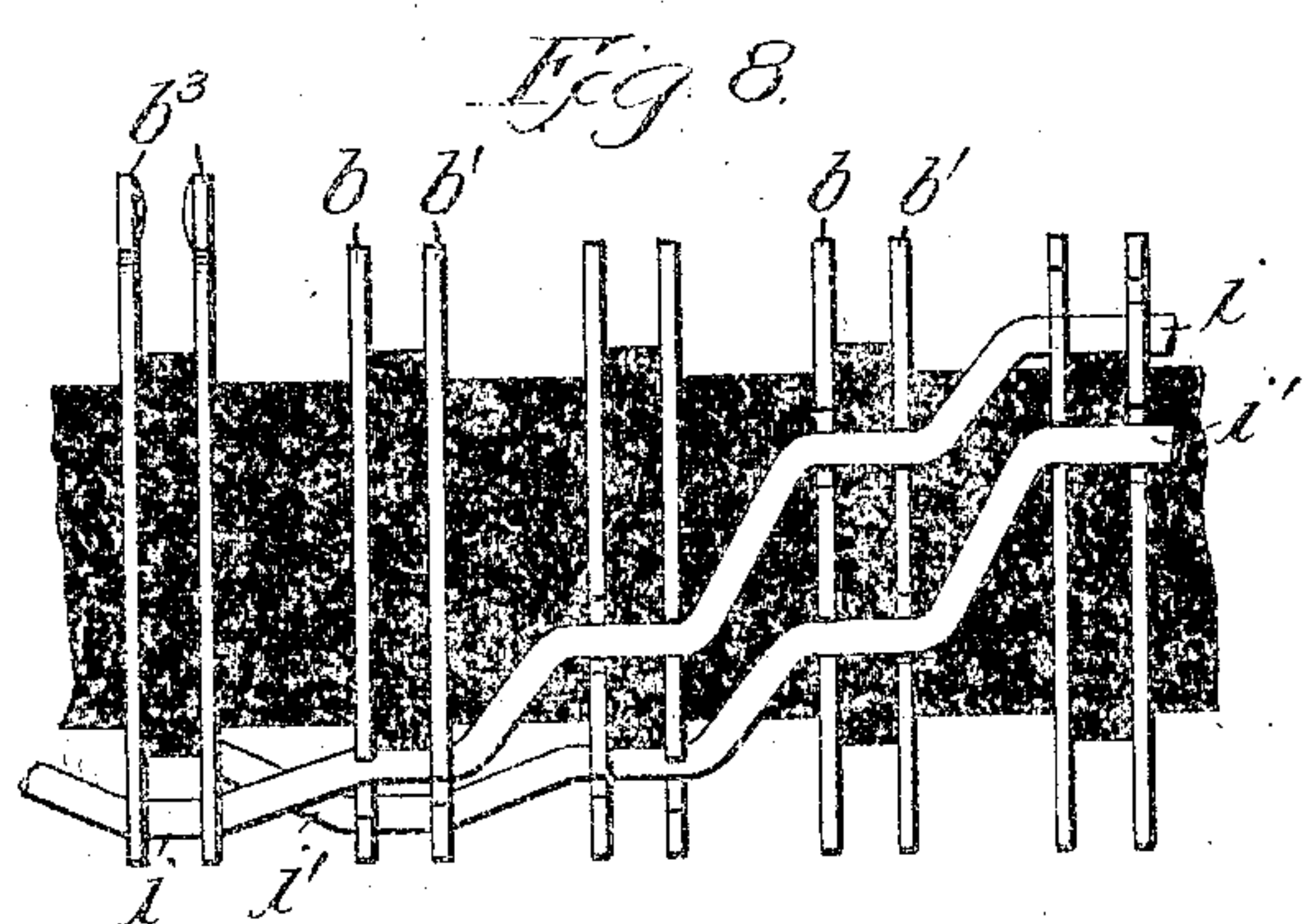
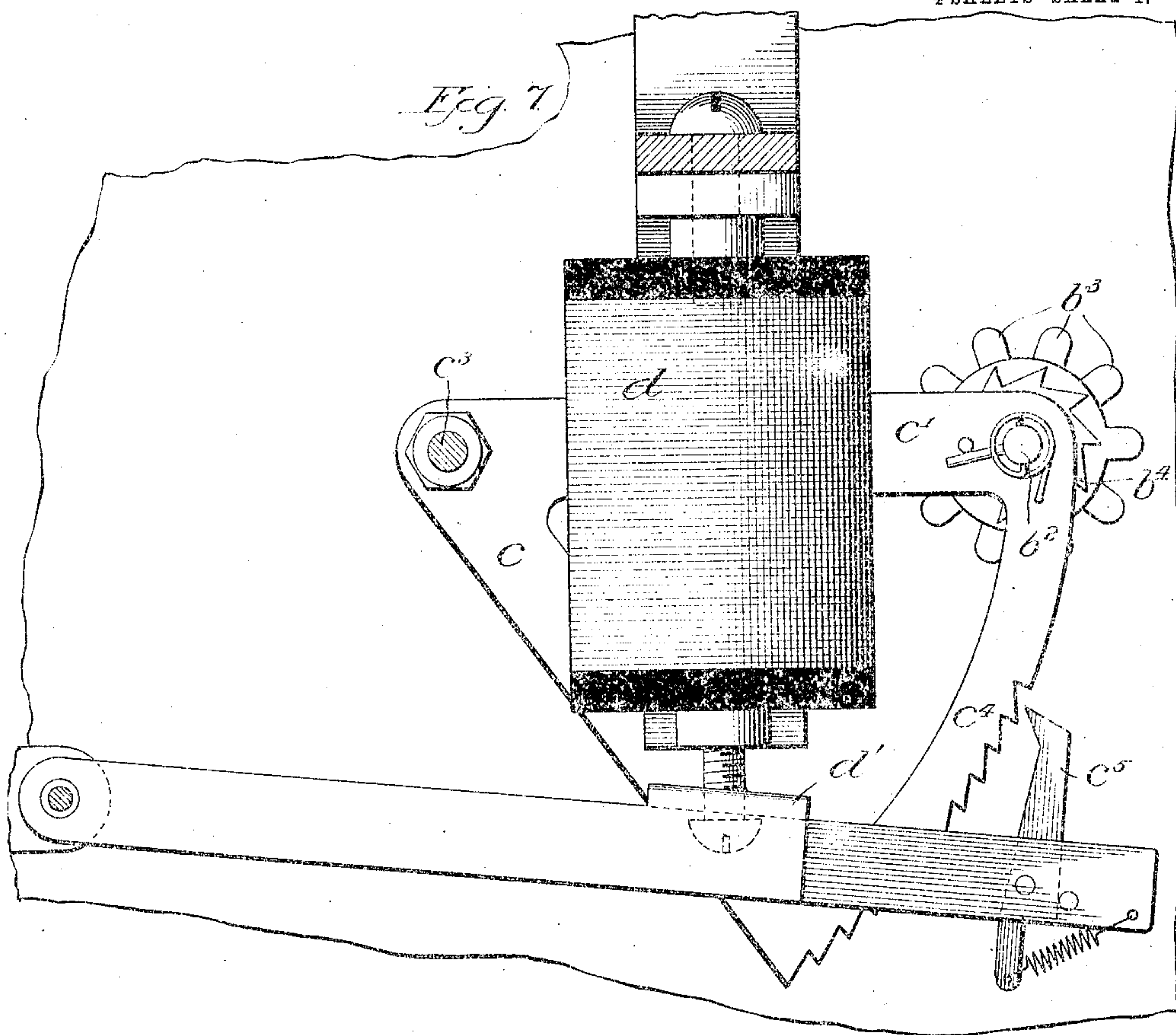
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4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

JOHN G. ROBERTS, OF CHICAGO, ILLINOIS, ASSIGNOR TO WESTERN ELECTRIC COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

AUTOMATIC-EXCHANGE SELECTOR.

No. 848,398.

Specification of Letters Patent.

Patented March 26, 1907.

Application filed June 18, 1906. Serial No. 322,145.

To all whom it may concern:

Be it known that I, JOHN G. ROBERTS, a citizen 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 Automatic-Exchange Selectors, of which the following is a full, clear, concise, and exact description.

My invention relates to a selector for an automatic telephone-exchange; and its object is to provide simple, reliable, and efficient mechanism for effecting the interconnection of the different lines terminating at the central exchange.

My invention contemplates a selector in which the pairs of multiple line-terminals are arranged in a series of rows in an arc-shaped field. I provide an oscillating frame carrying switch-terminals of the subscriber's line with which the selector is associated, means being provided for rotating said terminals to bring a pair thereof into operative relation with the row of line-terminals in which the terminals of the desired line are located. Means are also provided for advancing said frame to move said switch-terminals over the said row of line-terminals until the proper line-terminals are reached.

I will describe my invention by reference to the accompanying drawings, wherein—

Figure 1 is a plan view of a selector embodying my invention. Fig. 2 is a side elevation with the casing in section. Figs. 3 and 4 are detail plan views showing the retaining mechanism of the switch-terminals and the frame therefor. Fig. 5 is a detail plan view of the means for rotating the switch-terminals. Fig. 6 is a detail sectional view on line 6 of Fig. 5 of the rotatable member carrying the switch-terminals. Fig. 7 is an enlarged detail plan view showing the mechanism for oscillating the frame carrying the switch-terminals. Fig. 8 is an enlarged fragmentary view of the rotatable switch member, showing the method of connecting the terminals or disks in multiple; and Fig. 9 is an enlarged cross-section on line 9 9 of Fig. 6.

Like parts are designated by similar letters of reference throughout the several views.

In carrying out my invention the multiple

line-terminals a a' are arranged in an arc-shaped field, the drawings showing ten vertical rows with ten pairs of line-terminals in each row, each terminal being insulated from its mate and from the other terminals in the field.

It will be understood that there is a selector for each subscriber's line, said line having for its terminals disks b b' , respectively. The disks b are all electrically connected in multiple, as well as the disks b' , which are insulated from the disks b . These disks are mounted upon a shaft b^2 in such manner that they are insulated therefrom. Each disk is provided with a lip b^3 , which when in operative position makes contact with any line-terminal in the vertical row which it may be opposite. In the drawings ten pairs of disks b b' are shown, corresponding to the vertical rows of line-terminals. The ten pairs of disks are so arranged on the shaft b^2 that the lips of each pair are displaced approximately thirty-six degrees with reference to those of the adjacent pairs, said pairs of lips thus extending in a spiral formation about the shaft b^2 . By rotating said shaft one revolution the individual pairs of contact-lips are successively brought into position for engagement with the corresponding row of line-terminals.

The vertical shaft b^2 has bearings in the arms c' c^2 of an oscillating frame c , pivoted upon a shaft c^3 . The rotary movement of the frame c is controlled by a rack c^4 , carried by the arm c' of the frame, and a pawl c^5 arranged to be operated by the armature d' of an electromagnet d . Upon the ends of the shaft b^2 are ratchets b^4 b^5 , respectively, the former cooperating with a stepping-pawl e' , adapted to be operated by the armature e^2 of an electromagnet e to intermittently rotate the shaft, the ratchet b^5 cooperating with a rocking retaining-pawl f to hold the shaft in its rotated position. A coiled spring b^6 returns the shaft to its normal position upon the disengagement of pawl f .

The pawl f , as shown in Fig. 3, is normally held out of engagement with the ratchet by a lug g' engaging a foot f' upon the pawl. The lug g' is carried by a lever g , provided with a pin g^2 , adapted to be engaged by an arm h' , carried by the armature h^2 of an electromag-

net *h* to hold said lever in position to effect the engagement of the lug *g'* with the foot *f'* of pawl *f*. The lever *g* also carries a retaining-pawl *g'*, adapted when the lever *g* is rocked by its spring *g'* to engage a rack *c'*, carried by the arm *c'* of the oscillating frame *c*. When the armature *h'* is attracted and moves the arm *h'*, as shown in Fig. 4, the lever *g* is released and is moved by its spring *g'* to withdraw lug *g'* from foot *f'* of pawl *f* and to move retaining-pawl *g'* into engagement with the rack *c'* of frame *c*. The pawl *f* is now moved by its spring *f'* into engagement with the ratchet *b'*, and the shaft may now be advanced to select the desired pair of switch-terminals *b b'*. In the idle position of the disks the contact-lips *b'* are out of engagement with the terminals *a a'*, but the first pair of lips is in position to engage the first vertical row of terminals when the frame *c* is rocked.

If any other line-terminals than those in the first vertical row are to be selected, it is first necessary to actuate the shaft *b'* to bring the lips *b'* of the disks *b b'* corresponding to the row in which the desired terminals are located in position to engage with the terminals of that particular row. After the retaining-pawl *f* has been brought into engagement with ratchet *b'*, as previously described, the pawl *e'* is operated by magnet *e*, as shown most clearly in Fig. 5, and the ratchet *b'* or shaft *b'* rotated until the desired pair of lips *b'* lie in position to engage the row of terminals in which the terminals of the desired line are located. After the proper contacts *b b'* have been selected the frame *c* is rocked by pawl *e'*, its engagement with the rack *c'* being controlled by magnet *d*. As long as the magnet *h* is energized the retaining-pawl *g'* holds the frame in its advanced position. When, however, the magnet is deenergized, the arm *h'* is retracted by its spring *h'* and engages the pin *g'*, moving the lever *g* to withdraw the pawl *g'* from the rack *c'* and cause the lug *g'* to engage the foot *f'* of retaining-pawl *f*, moving said pawl out of engagement with ratchet *b'*. The shaft *b'* is now returned to normal position by spring *b'*, and the frame *c* is returned to its normal position by a spring *c'*.

The structure and mounting of the disks *b b'* are shown clearly in Figs. 6, 8, and 9. As shown therein, said disks are insulated from the shaft *b'*. In each disk is a slot *b'* and an enlarged slot *b''*. In each pair of disks *b b'* the slots *b'* are opposite the slots *b''*. Uninsulated conductors *i i'* are placed in said slots, the conductor *i'* fitting closely the slots *b'* in the disks *b* and connecting said disks in multiple. Said conductors do not engage the sides of the enlarged slots *b''*, said slots being enlarged for the purpose of preventing

the conductors *i* and *i'* from contacting with the disks *b'* and *b*, respectively.

I claim—

1. In an automatic telephone-exchange, the combination with multiple line terminals arranged in rows across an arc-shaped field, of a switch having a series of terminals corresponding to said rows, means for bringing any one of said terminals into operative relation to its corresponding row, and means for rocking said switch to bring said selected terminal into connection with the desired line-terminal in its corresponding row.

2. In an automatic telephone-exchange, the combination with multiple line-terminals arranged in rows in an arc-shaped field, of a switch having a series of terminals corresponding to said rows, means for rotating said switch to bring any terminal into operative relation to its corresponding row, and means for oscillating said switch to bring said selected terminal into connection with the desired line-terminal in its corresponding row.

3. In an automatic telephone-exchange selector, the combination with multiple line-terminals arranged in rows in an arc-shaped field, of a selector-switch comprising a rotatable shaft, a series of contact-points arranged longitudinally on said shaft, one for each row of terminals, electromagnetic mechanism for rotating said shaft into position in which any desired contact-point is in operative relation to its corresponding row of terminals, a pivoted frame for said switch, and electromagnetic mechanism for advancing said frame to move said switch over the terminals until the selected contact reaches the desired terminal in its row.

4. In a selector for an automatic telephone-exchange the combination with a rotatably-mounted switch member, of a stepping-pawl and a retaining-pawl controlling the rotation of said member, a pivoted frame carrying said switch member, a stepping and a retaining pawl controlling the advance of said frame, a lever controlling the engagement of said retaining-pawls with said switch member and frame, electromagnetic mechanism controlling said lever, and electromagnetic mechanism controlling said stepping-pawls.

5. In a selector for an automatic telephone-exchange, the combination with a rotatably-mounted switch member, of a stepping-pawl and a retaining-pawl controlling the rotation of said member, a pivoted frame carrying said switch member, a stepping and a retaining pawl controlling the advance of said frame, a lever carrying the retaining-pawl of the frame, a lug carried by said lever adapted to engage the retaining-pawl of said switch and hold the same away from said member, an electromagnetically-controlled arm adapt-

ed to move said lever to maintain both retaining-pawls away from said frame and switch member, a spring adapted when said arm is removed to move said lever to render
 5 operative said retaining-pawls, and electromagnetic mechanism controlling said stepping-pawls.

In witness whereof I hereunto subscribe my name this 16th day of June, A. D. 1906.

JOHN G. ROBERTS.

Witnesses:

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 E. F. BEAUBIEN.