No. 634,912. Patented Oct. 17, 1899.

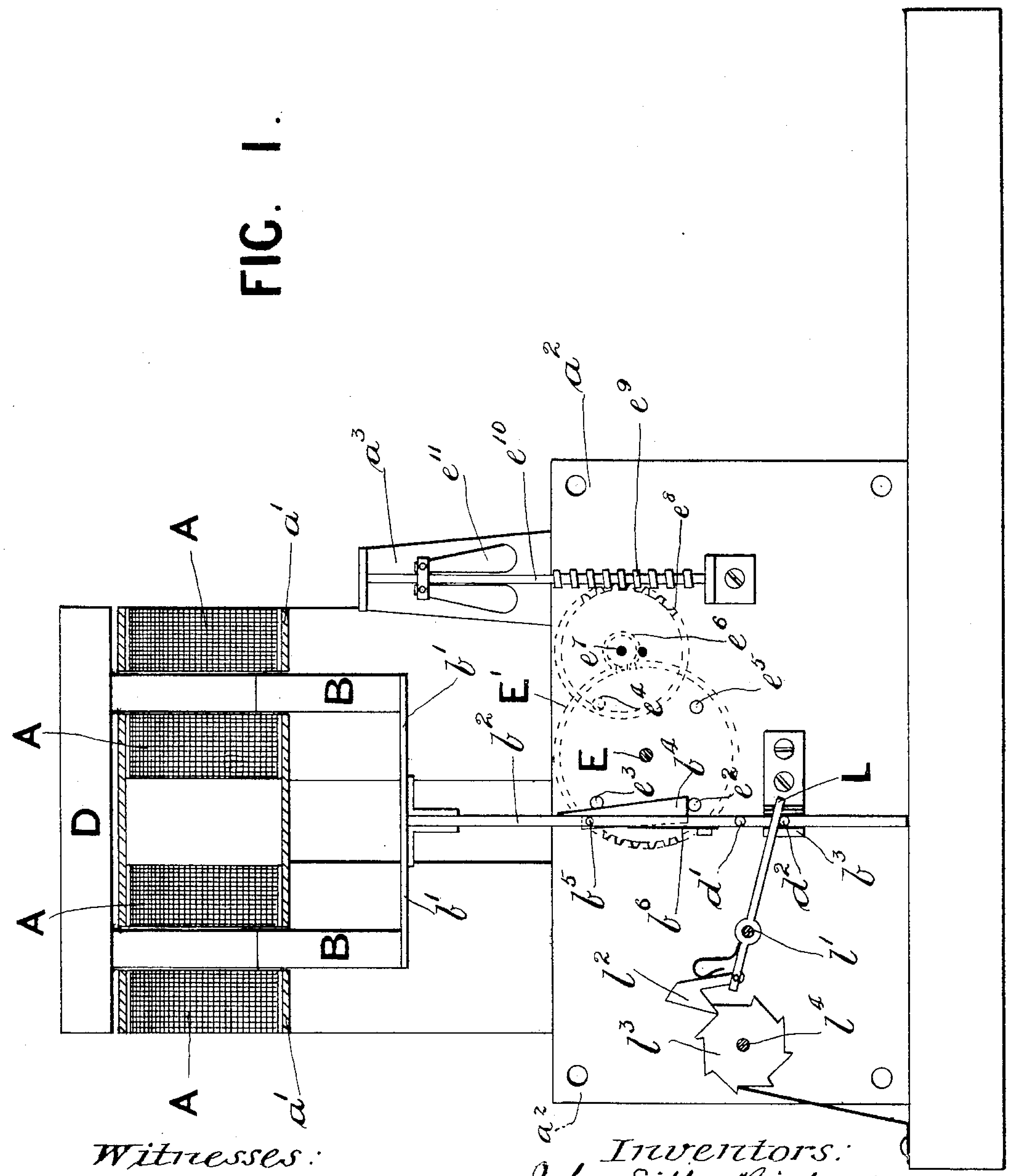
J. S. RICHARDSON, S. JEVONS & W. A. GENT.

MECHANISM FOR ELECTRICALLY ILLUMINATED DEVICES.

(Application filed Sept. 24, 1898.)

(No Model.) 4 Sheets—Sheet 1.

FIG. 1.



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(No Model.) 4 Sheets—Sheet 2.

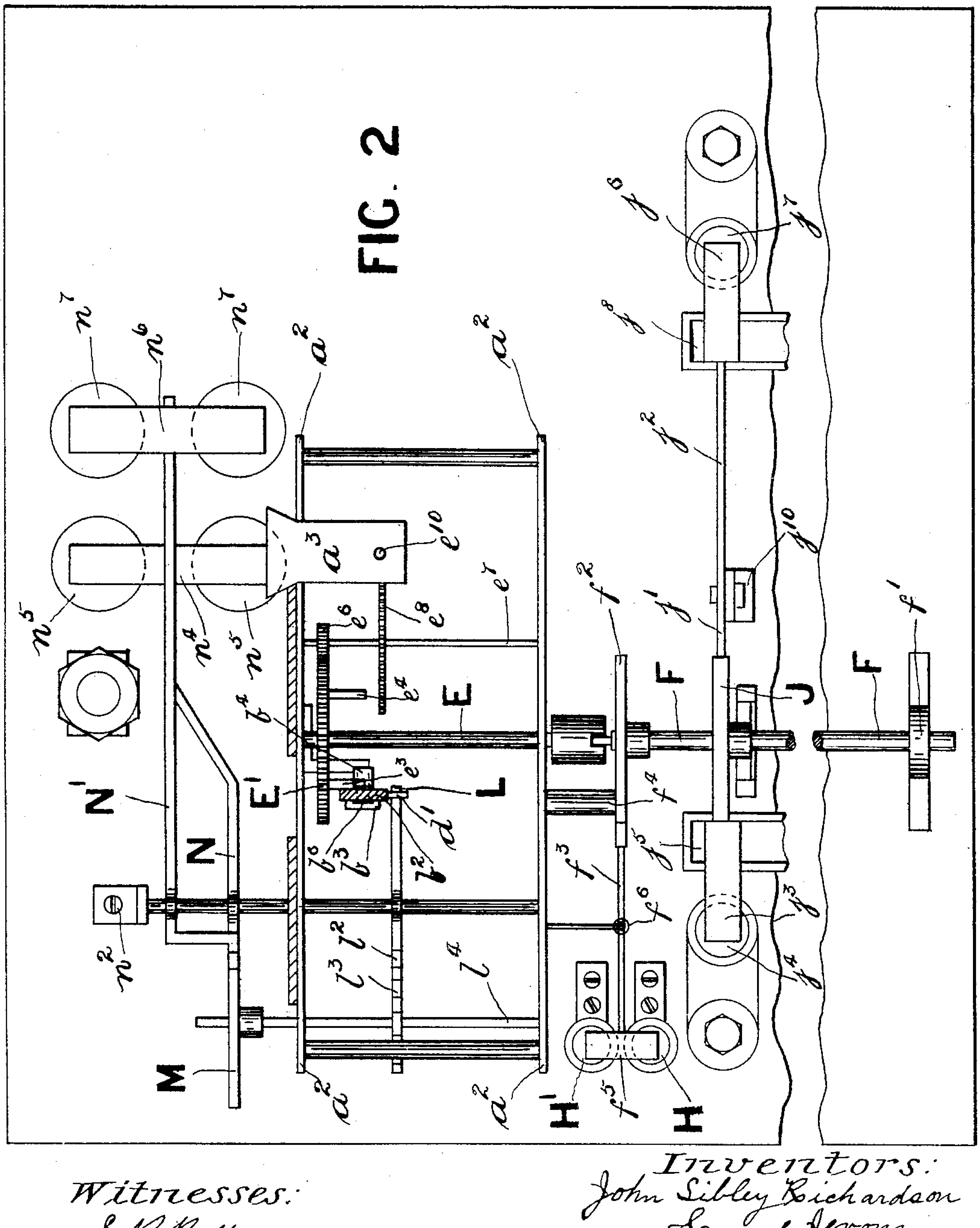

FIG. 2

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(No Model.) 4 Sheets—Sheet 3.

FIG. 3.

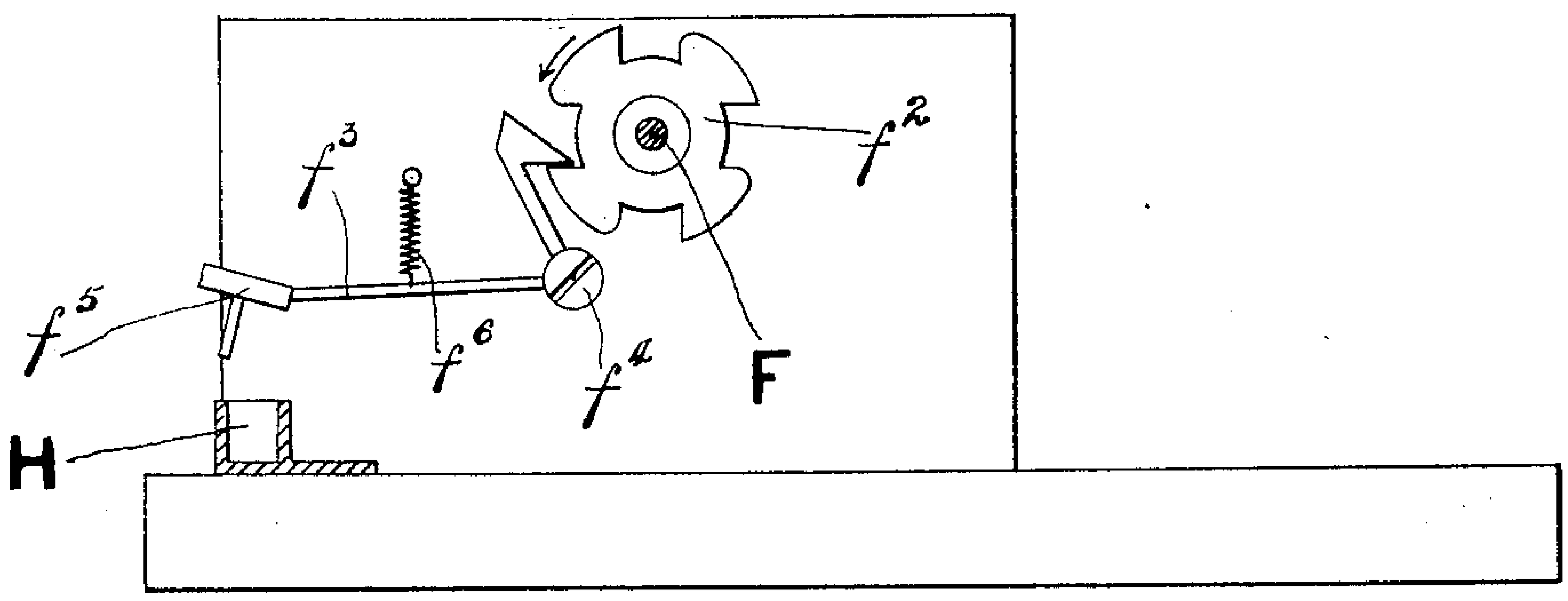


FIG. 5.

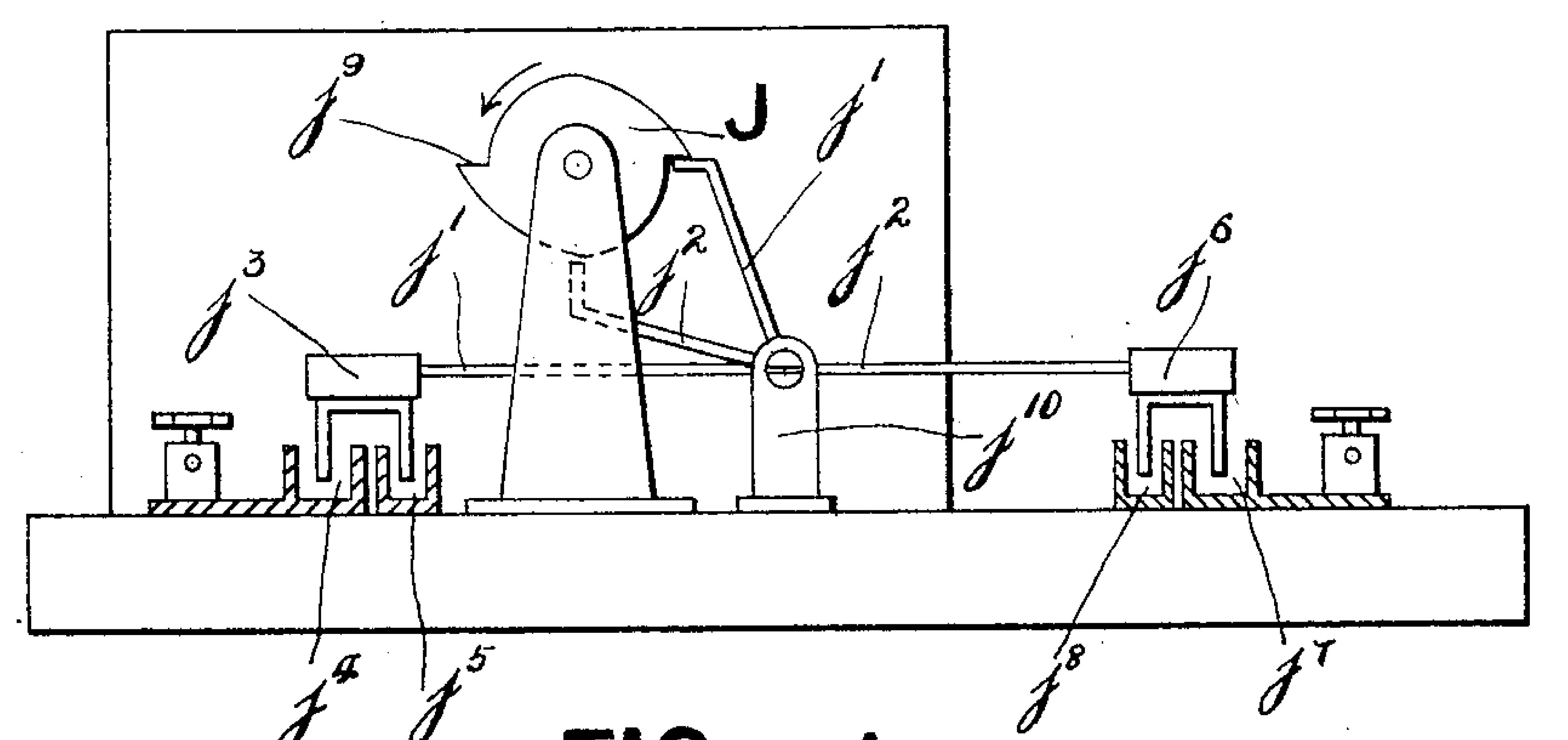
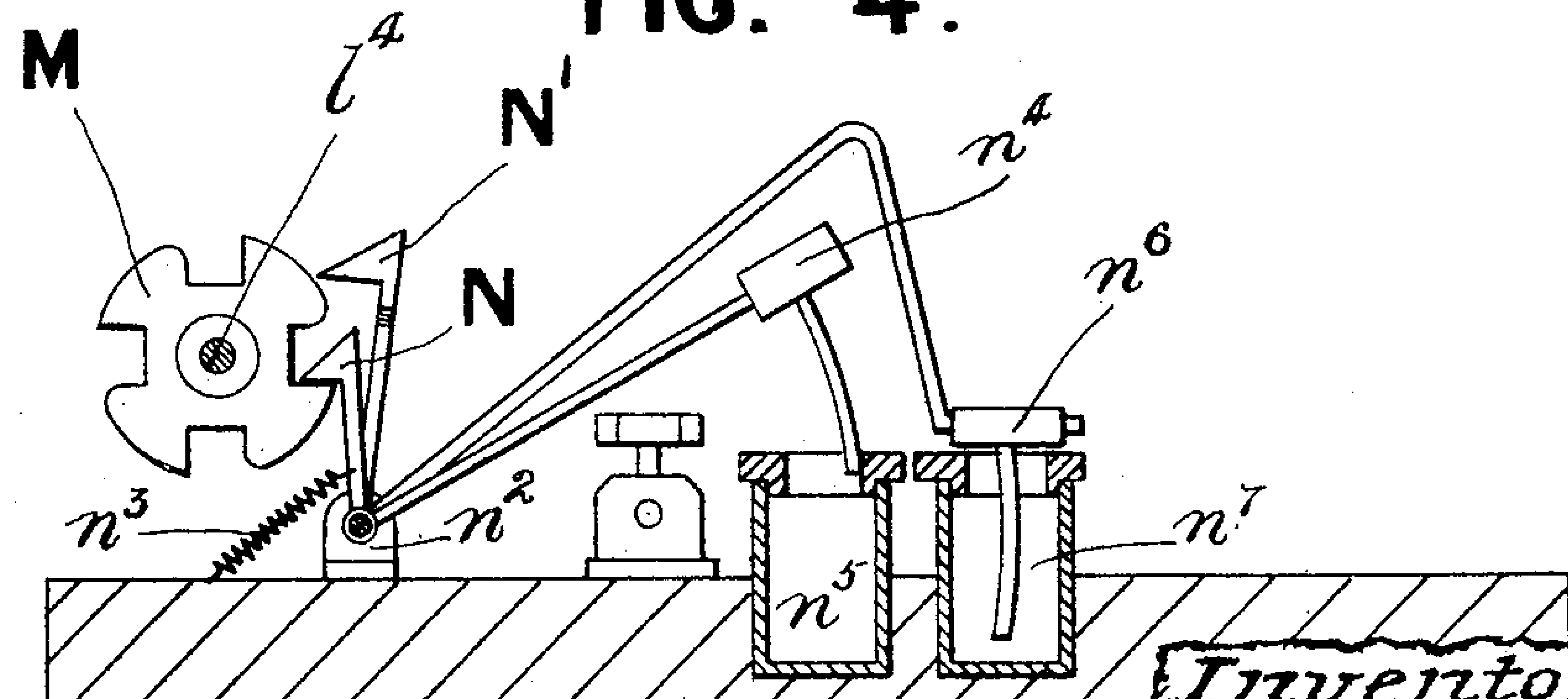


FIG. 4.



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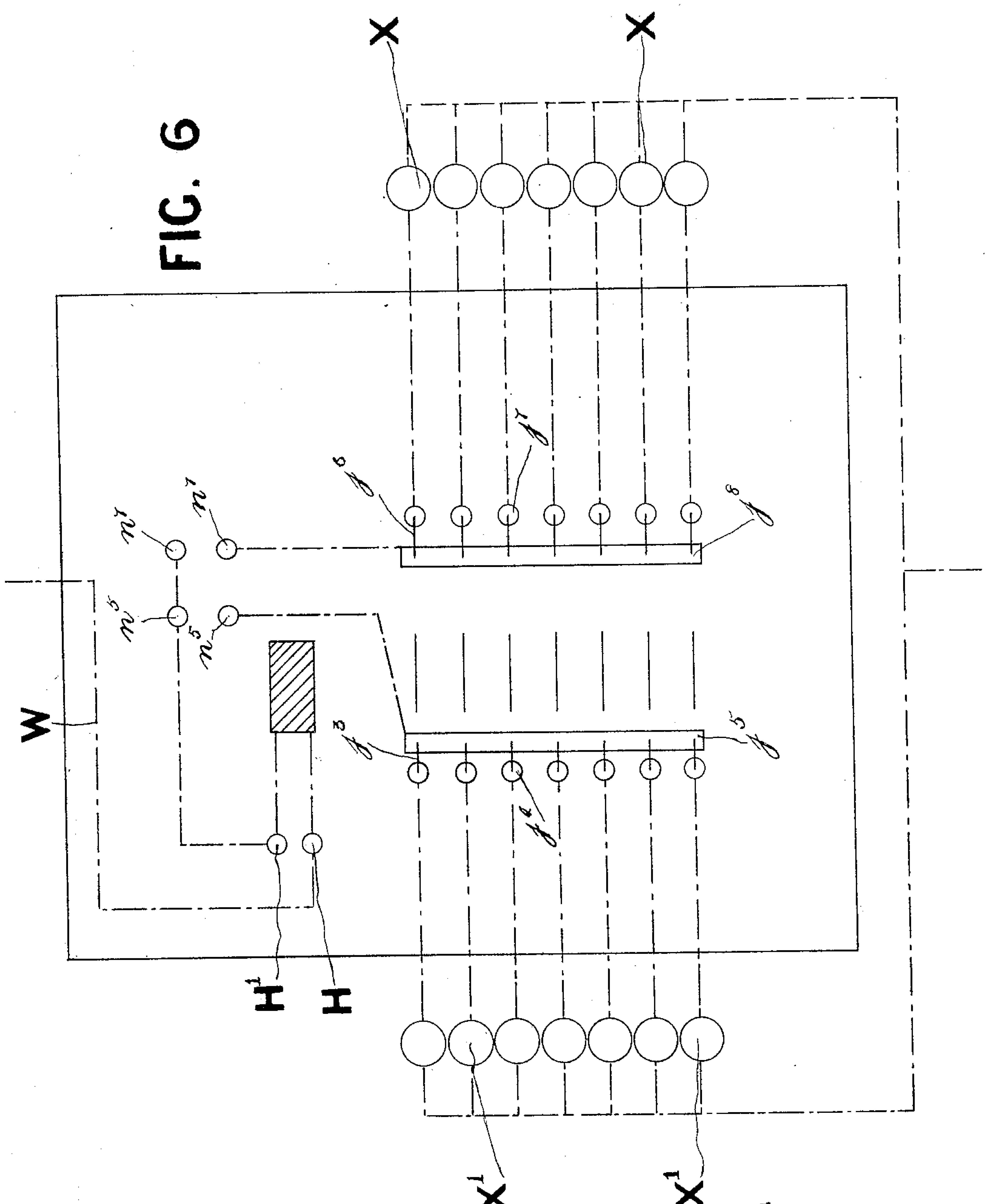
(No Model.) 4 Sheets—Sheet 4.

FIG. 6



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UNITED STATES PATENT OFFICE.

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MECHANISM FOR ELECTRICALLY-ILLUMINATED DEVICES.

SPECIFICATION forming part of Letters Patent No. 634,912, dated October 17, 1899.

Application filed September 24, 1898. Serial No. 691,800. (No model.)

To all whom it may concern:

Be it known that we, JOHN SIBLEY RICHARDSON, SAMUEL JEVONS, and WILLIAM ALFRED GENT, subjects of the Queen of Great Britain, residing at Birmingham, county of Norwich, England, have invented certain new and useful Improvements in Electrically-Illuminated Devices, of which the following is a specification.

Our invention has for its object improvements in connection with the mechanism of electrically-illuminated devices for automatically making and breaking electric circuits used in such electrically-illuminated devices by which we are enabled to dispense with the use of motors and lessen the cost of manufacture and maintenance and also to illuminate such devices in a steady and regular manner, and this we accomplish by the use of a weight and a solenoid, which actuate or operate the mechanism for making the contacts of such electrically-illuminated devices as advertising signs, pictures, and the like—that is to say, the weight by its descent operates the mechanism which produces the necessary electrical contacts and at a given point causes the main current to be directed through the solenoid, thereby pulling or lifting the weight to its normal position ready for the next action.

In order that our invention may be more clearly understood and easily carried into practical effect, we have appended hereunto four sheets of drawings, upon which we have illustrated an example of our mechanism for operating electrically-illuminated devices.

Figure 1 is a front elevation of our apparatus with the front plate removed. Fig. 2 is a broken plan view of Fig. 1 with the magnet removed. Fig. 3 is a view showing the mechanism of the solenoid cup-break. Fig. 4 is a view showing the mechanism of the main breaks. Fig. 5 is a view showing the cam action for making the different contacts for the electrically-illuminated devices. Fig. 6 is a diagram view showing the various connections.

In carrying our invention into practice we mount the solenoid, with its bobbins A, on the support a', which is fixed to the frame a^2 of the machine. Fitted into these bobbins are the cores B B, made in two parts, the top halves being brass and the lower halves being soft iron, which pass up the center of these bobbins and are fixed at their lower ends to the cross-bar or crown-piece b', and this crown-piece is supported or carried by the perpendicular bar b^2, which is free to work in the bearing b^3, fixed to the frame of the machine. Mounted on the top of the cores B B is the weight D for lowering the bar b^2 after it has reached the limit of its upward stroke. Fixed on the shaft E, which is mounted in the frame a^2, is the gear-wheel E', provided on its face with the studs or projections e^2, e^3, e^4, and e^5, fixed at equal distances apart, which engage with the movable catch b^4, pivoted at b^5 to the bar b^2, and this catch is kept in its normal position by the flat spring b^6. The bar b^2 as shown at Fig. 1 is at its lowest position; but when it is raised by the action of the solenoid on the cores B B the catch b^4, which is resting upon the stud e^2, is pressed backward as it comes in contact with the stud e^3 until the bar b^2 has reached the limit of its upward stroke and the catch has cleared the stud e^3. This catch then shoots forward into its normal position by the action of the spring b^6, so that it rests upon the stud e^3. The combined weight of the weight D, the cores B B, and the bars b' and b^2 now cause the bar b^2 to descend and the catch b^4 to bear upon the stud e^3, thereby revolving the wheel E' one-quarter of a revolution, and in order to regulate the speed of this wheel E' we gear it with the pinion-wheel e^6, fixed on the shaft e^7, mounted in the frame of the machine. Also mounted on the shaft e^7 is the wheel e^8, gearing with the worm e^9, formed on the end of the spindle e^{10}, mounted in the frame a^3, and on the other end of this spindle we mount the "flier" e^{11}. Thus by adjusting the wings of this flier we can further regulate the downward motion of the bar b^2. Coupled to the shaft E or formed in one with this shaft is the shaft F, which revolves a quarter of a revolution each time the bar b^2 descends. One end of this shaft is mounted in the standard f', and on the other end we fix the cam f^2, which engages with the catch formed on one end of this cranked lever f^3, pivoted at f^4 to the frame a^2, and on the other end of this lever we fix the fork f^5, which spans and dips into the mercury-cups H and H', to which the ends of the solenoid are connected. When the bar b^2 has reached the limit of its downward stroke, the cam f^2 is timed to be in the position as shown at Fig. 3, thus suddenly releasing the catch on the end of the lever f^3, which drops into one of the notches in the cam by the action of the spiral spring f^6, thereby raising the fork f^5 out of the mercury-cups, which causes the solenoid to pull the cores and weight up again ready for another quarter-revolution, as hereinbefore explained. Also fixed on the shaft F are a series of the cams J, one for each electrical circuit, according to the number used in displaying the advertisement, operating the cranked lever j' and j^2, pivoted to the bracket j^{10}, for completing the respective electrical circuits in the following manner: As the cam J revolves a quarter of a revolution it allows the fork j^3, fixed on the end of the lever j', by reason of its own weight to suddenly drop into and bridge the mercury-cup j^4 and trough j^5, thus completing a circuit, and at the same time the fork j^6 on the end of the lever j^2 is resting in the mercury-cup j^7 and trough j^8, as clearly shown at Fig. 5, and during the same quarter-revolution the lever j^2, with its fork j^6, will be gradually raised out of the mercury-cup j^7 and trough j^8 until it reaches the point j^9 on the cam J, when it will suddenly drop and the fork j^6 enter the mercury-cup j^7 and trough j^8. Then as the cam continues to revolve the fork j^3 on the end of the lever j', which still remains in the mercury-cup j^4 and trough j^5, will be gradually raised out of the mercury-cups until it reaches the point j^9 on the cam, and so on, first one lever and then the other being gradually raised. The series of cams mounted on the shaft F are so formed that each lever on one side drops in rotation during one quarter of a revolution and all rise gradually at the same time during the next quarter-revolution. The cam shown represents the first to drop, each succeeding cam being so formed as to allow the levers on the one side to fall in any required order and those on the other side to rise simultaneously during the same quarter-revolution, this process being reversed during the next quarter-revolution.

In order to switch off the current entirely when the levers with their forks are all dipping in the mercury-cup on the one side, the current which passes along the main cable W (see diagram Fig. 6) goes straight to the mercury-cups H and H', which are also joined up to the solenoid, and from thence to one side of each of the two main cup-breaks n^5 and n^7, so that whatever current is in the main circuit passes through the solenoid-fork f^5, which is in the mercury-cups H H', and not through the solenoid; but when the quarter of a revolution is completed the lever f^3 is released by the cam f^2, as previously explained, and the fork lifted out of the cups H H'. Consequently whatever current was passing through this fork must now pass through the solenoid, which thus lifts the cores B B and the weight D, and consequently the bar b^2, upward, and as this bar, which is provided with the two projections d' d^2, rises the lower projection d^2 catches under and lifts one end of the lever L, which is pivoted at l' to the frame a^2, thus causing the catch l^2 on the other end to descend and pull the eight-toothed ratchet-wheel l^3, which is fixed on the shaft l^4, also mounted in the frame, around one tooth—that is, one-eighth revolution. Also mounted on this shaft l^4 is the main break-cam M, which revolves one-eighth of a revolution each time the ratchet-wheel is moved one tooth. Thus with every one-eighth revolution of the cam M it will be seen that the cranked levers N and N', which are pivoted to the bracket n^2 and held against this cam by the spiral springs n^3, will rise and fall alternately, thereby making and breaking their respective main circuits. In the examples as shown at Fig. 4 the end of the lever N to which is fixed the fork n^4 has just sprung up out of the mercury-cups n^5, thus breaking the circuit in these cups; but the end of the lever N' which is provided with the fork n^6 has been pushed by the action of the cam M on the opposite end into the mercury-cups n^7, thus making the circuit in these cups. At the next one-eighth revolution of the cam M the lever N will make the circuit and the lever N' will break it, and so on, alternately and automatically. The forks in all cases which dip into the various mercury-cups are insulated from their levers, and as these forks bridge their respective cups, which are filled with mercury, they complete the electrical circuit.

Fig. 6 shows connections for fourteen circuits, seven for spelling a word in white lamps, and when that circuit is switched off the other seven circuits are lighted up with colored lamps. The current starts from the cable W to the solenoid-cup H. As this is now bridged by the mercury-switch f^5, it goes through this to the mercury-cup H' and thence to the two mercury-cups n^5 and n^7, which are joined up. Suppose the lever N' be down, with the fork n^6 in the mercury-cups n^7. The current goes along this to trough j^8, then along to the various lamp-circuits X, and returning to the negative circuit, which does not come to this gear. The next time the current passes through the lamp-circuits X', (shown in diagram on left-hand side,) and so on alternately. If only one color of lamp is wanted—that is, seven circuits only—both sides are connected with the one set of lamps. It will be evident that the solenoid may be fixed under the mechanism or in any other convenient position instead of above, as shown, so long as it is connected in such a way as to enable it to raise the weight and its attachments.

We claim—

1. In combination with the electric illumi-

nating devices, means for automatically making and breaking the circuits leading thereto, a falling weight, a solenoid for lifting the weight connected in the circuit leading to the illuminated devices, a switch controlled by the movement of the weight and solenoid-core for diverting the current through the solenoid, substantially as described.

2. In combination, the lamps and their circuit connections, the double switch controlling the circuits to the two sets of lamps, a solenoid and weight, a switch for diverting the current through the solenoid when the core and weight have reached their lowest position and means for operating the double switch, said means being operated by the rising movement of the solenoid and weight, substantially as described.

3. In combination, the weight and solenoid-cores, the lamps, the circuit connections leading thereto, the contacts j^5 and j^6 controlling the lamp-circuits, means operated by the falling of the weight and solenoid for controlling the said contacts, the switch for controlling the passage of the current through the solenoid, said switch being operated at the final downward movement of the solenoid and weight and the switches controlling the circuits to the two sets of lamps, said switches being controlled by the rising movement of the solenoid and weight, substantially as described.

In witness whereof we have hereunto set our hands in presence of two witnesses.

JOHN SIBLEY RICHARDSON.
SAMUEL JEVONS.
WILLIAM ALFRED GENT.

Witnesses:
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E. S. FRIEND.