3 Sheets--Sheet 1.

L. T. LINDSEY.

Printing Telegraphs.

No. 143,702. Patented Oct. 14, 1873.

Fig 1

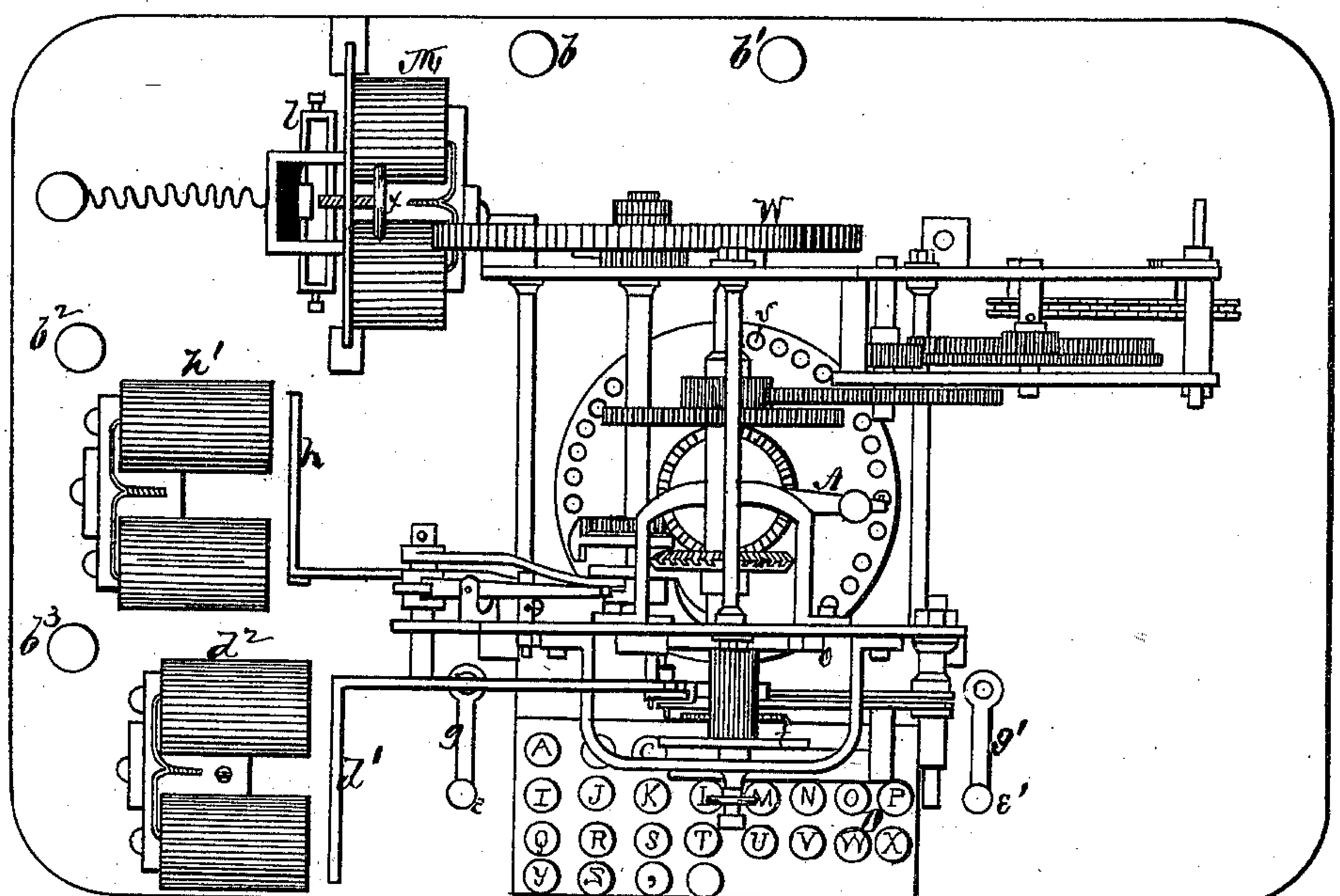

Fig 2

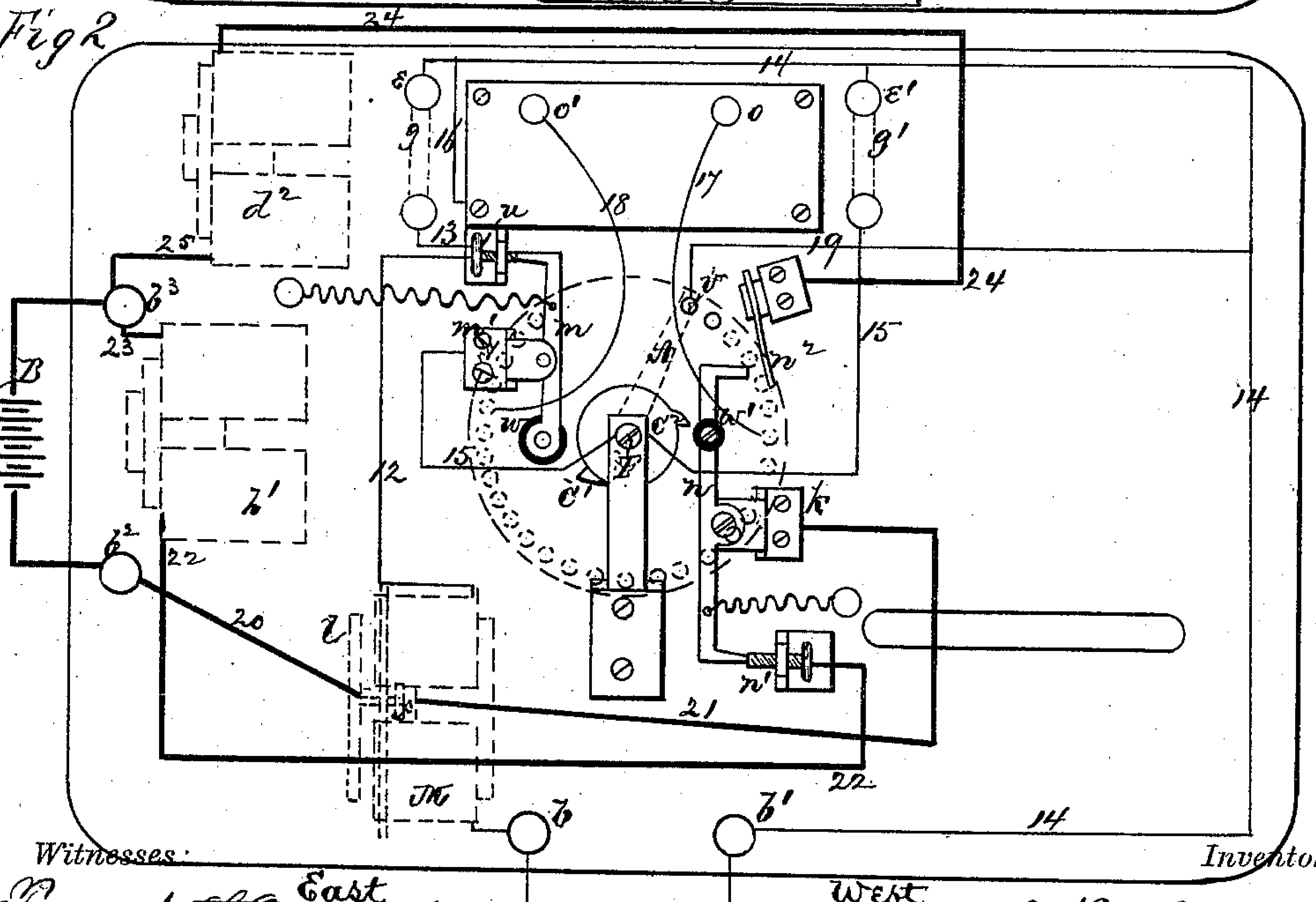

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Fig 3

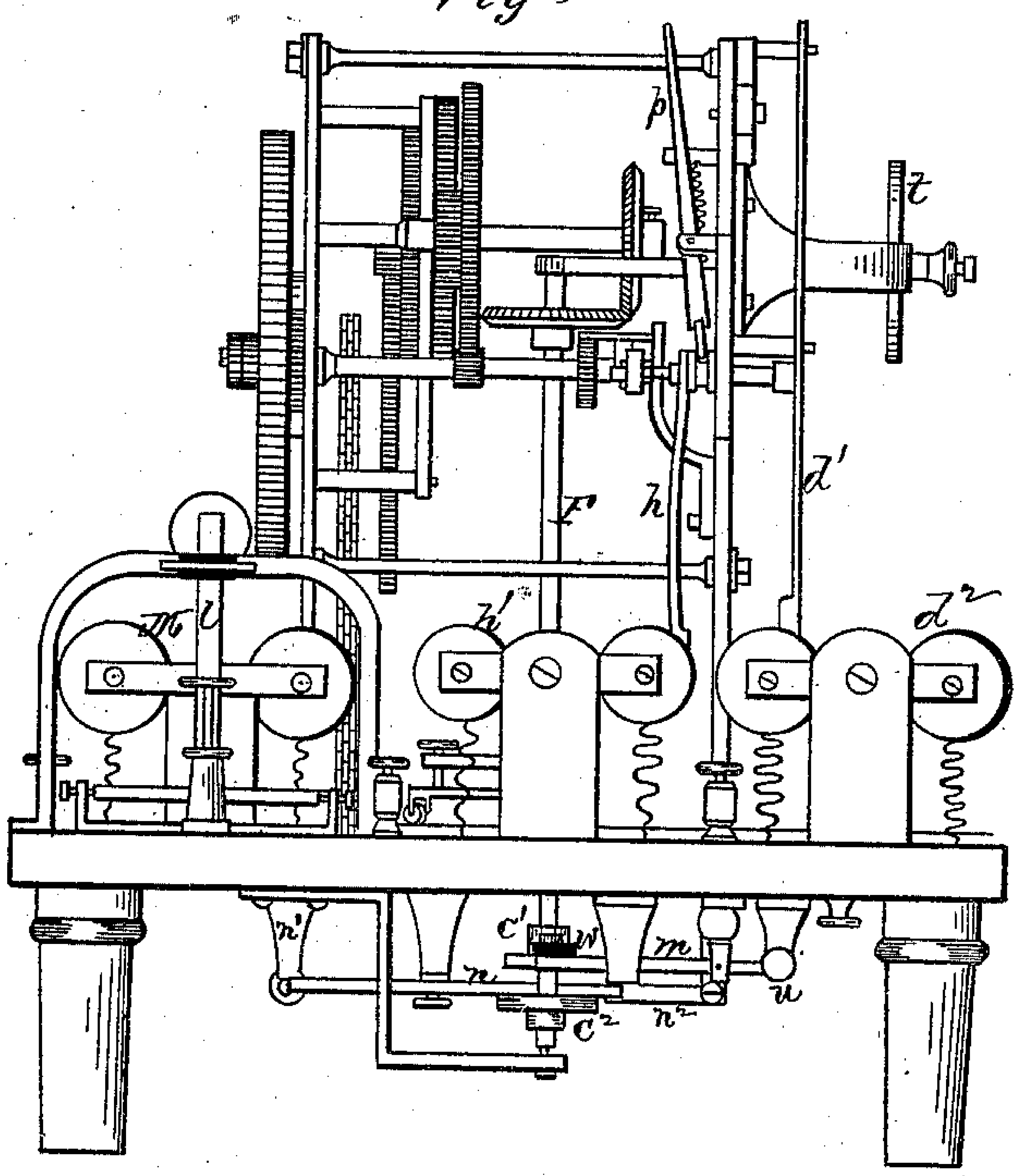

Fig 6

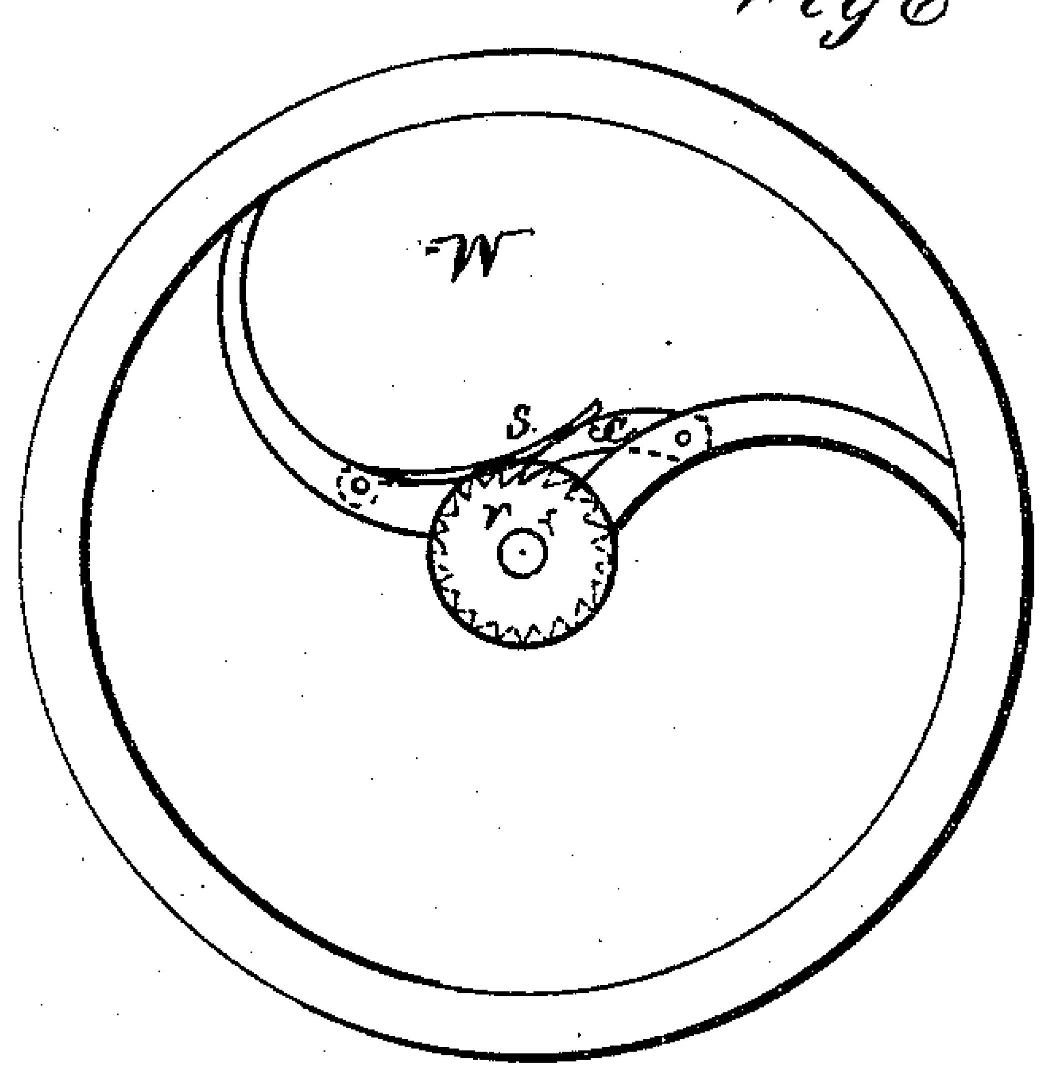

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Fig 4

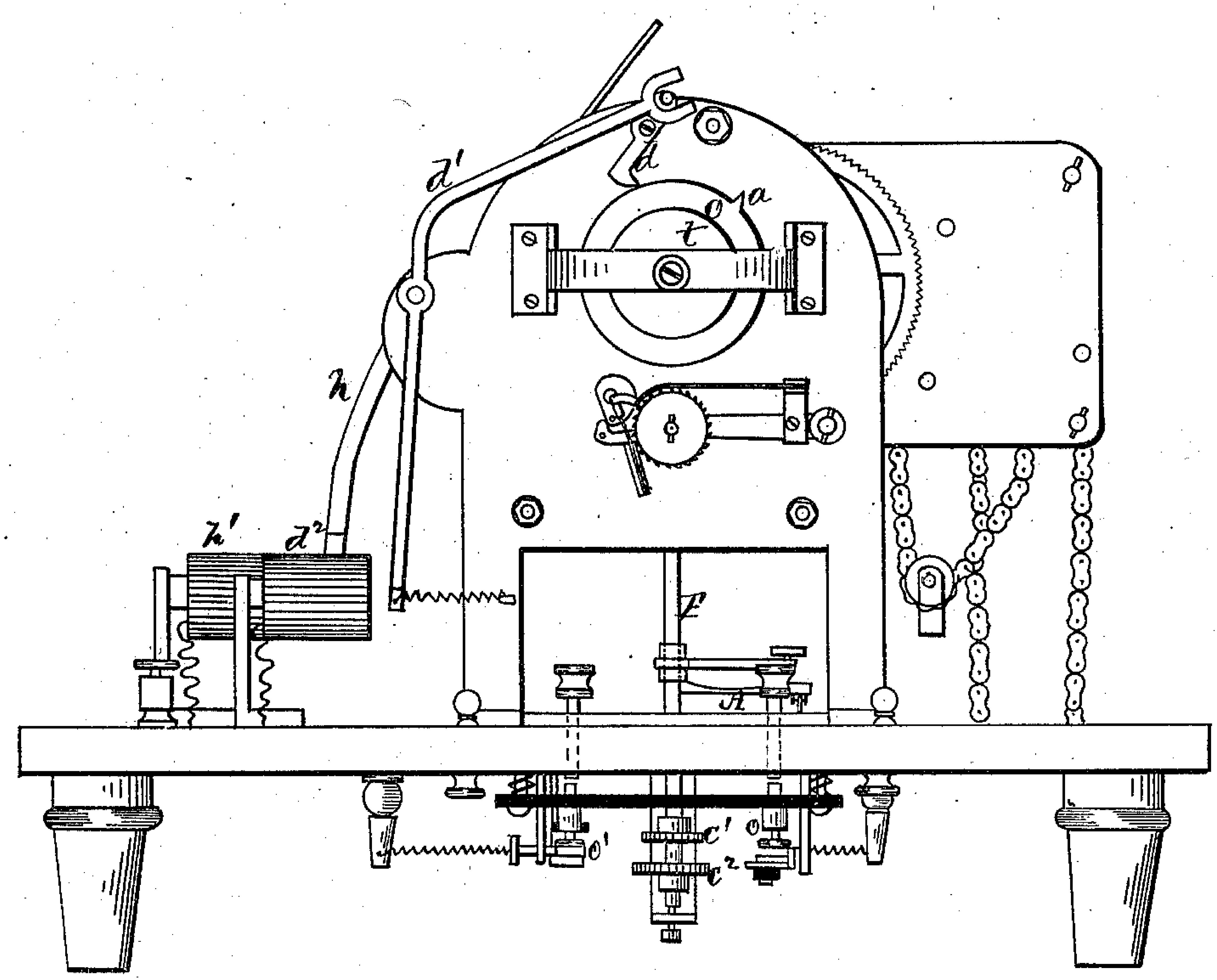
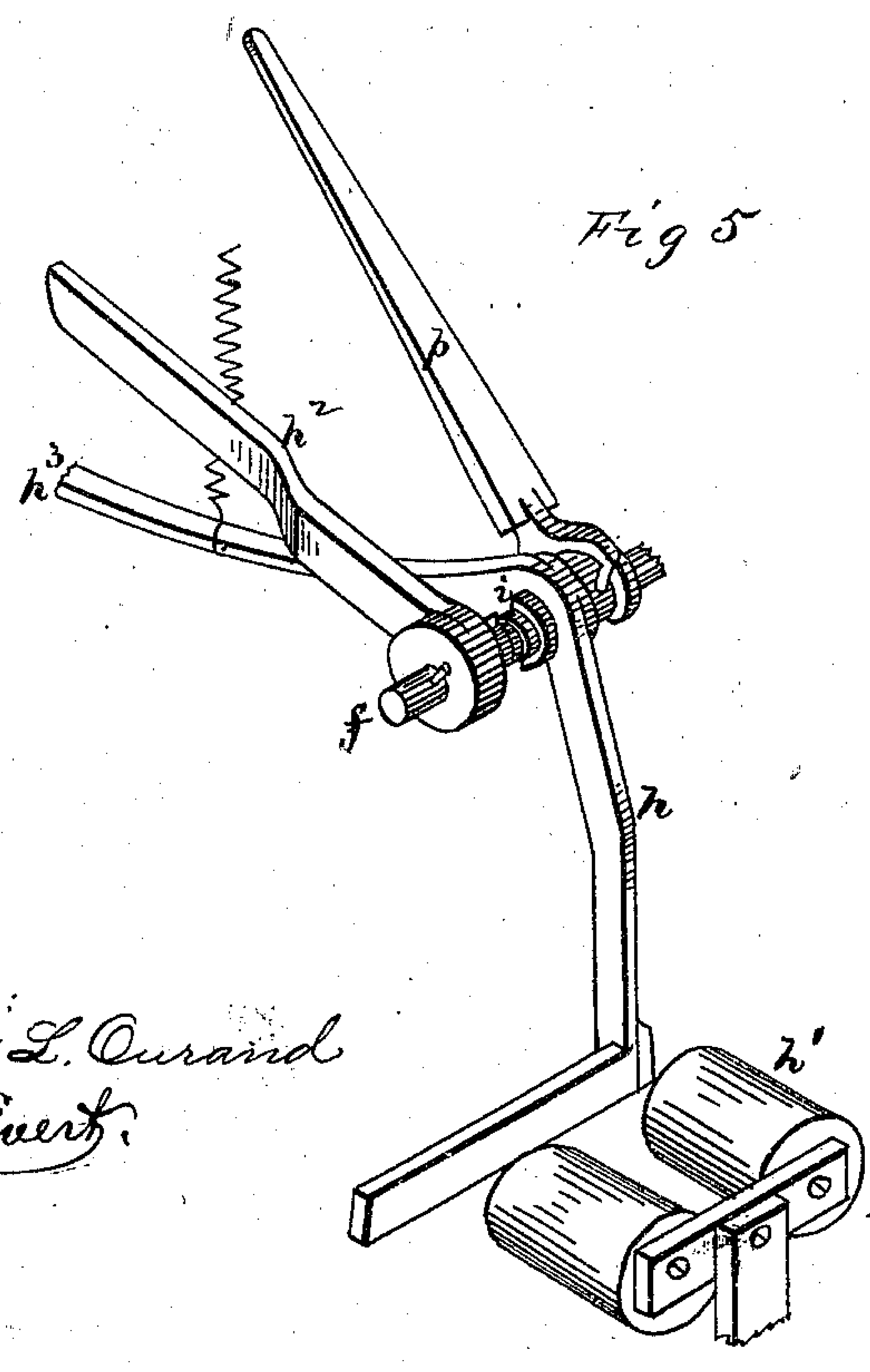


Fig 5



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UNITED STATES PATENT OFFICE.

LANDY T. LINDSEY, OF JACKSON, TENNESSEE.

IMPROVEMENT IN PRINTING-TELEGRAPHS.

Specification forming part of Letters Patent No. **143,702**, dated October 14, 1873; application filed May 3, 1873.

To all whom it may concern:

Be it known that I, LANDY TUNSTALL LINDSEY, of Jackson, in the county of Madison and in the State of Tennessee, have invented certain new and useful Improvements in Printing-Telegraphs; and do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings and to the letters of reference marked thereon, making a part of this specification.

In the accompanying drawings, Figure 1 is a plan view of my machine. Fig. 2 is an underneath view, showing the various parts on the under side of the base-board, and immediately beneath the parts represented in the plan view, Fig. 1, which parts are shown in dotted outline. This view also presents the electrical connections, showing the arrangement of the circuits and the mechanical parts, with which they are electrically connected by means of proper conducting-wires. Fig. 3 is an end view, and Fig. 4 a front elevation. Fig. 5 is a detached enlarged view of the mechanism, actuated by magnetism, which throws the printing apparatus into operation. Fig. 6 is an enlarged view of a loosely-fitted balance-wheel, held steady upon its shaft, when in motion, by the friction of a ratchet-wheel, pawl, and spring, or any other suitable frictional appliance.

Similar reference letters denote the same parts where they occur in the different views, and will be explained as the specification proceeds.

My invention consists in a printing-telegraph instrument so constructed that when two of them are in operation, one as the transmitter and the other as the receiver of messages, they will be so controlled by a combination of electrical and mechanical effects that they will begin anew each revolution of the type-wheel in exact correspondence by being compelled to start together from a unison-point at the commencement of each successive revolution. One instrument, should it arrive at its unison-point in advance of the other, will be halted until the other has also reached its unison-point, when their combined action will disengage the stops by which they are arrested, and they will thus be liberated simultaneously. The instrument is to be moved by clock-work propelled by a weight or spring, of which the former is preferred, as furnishing a more uniform power, which is also susceptible of being increased or diminished, as may be required. I prefer an endless chain for sustaining the weight, as it is susceptible of being wound up without affecting the power which is keeping the clock-work in motion.

The instruments should be weighted, so as to travel ordinarily at somewhat near the same speed, the stop at the unison-point serving to check momentarily any slight gain of one instrument over another in the course of a single revolution by retarding it until the instrument following has reached the same point, when they will be simultaneously liberated, and begin together the succeeding revolution, this result ensuing in every revolution when the type-wheels do not arrive at their unison-points in exact correspondence. When the type-wheels arrive at the unison-point in their respective instruments synchronously, the stop in each instrument is lifted simultaneous with their arrival, and no interruption follows.

The operation of the stop and unison-point above alluded to will be explained by reference to Fig. 4.

The unison-point *a* is upon the circumference of a wheel, *o*, fixed upon the same shaft, and revolving with the type-wheel *t*, or upon a shaft making an equal number of revolutions therewith. The stop *d* is supported above and connected with the armature-lever d^1 of the magnet d^2. This magnet d^2 is included in a local circuit, which is opened or closed by the operation of a relay-magnet. The circuit which includes the relay-magnets of the two instruments is broken just before, and will only close when, these unison-points have reached their respective stops, at which time the relay-magnets attract their respective armature-levers, which in turn close the local circuits, which include magnets d^2, and these latter magnets, attracting their respective armature-levers d^1, cause them to lift the stops *d*, and thus release the unison-points *a* simultaneously.

As the instruments are calculated to run at a rate of speed about or exceeding one hundred revolutions of the type-wheel per minute, and as they will mutually correct each other and start together as often as they complete a revolution, it will be seen that the liability to get out of correspondence is practically obviated, as, for instance, if the type-wheels were making one hundred revolutions per minute, the instruments would mutually regulate and correct themselves one hundred times in that minute.

The printing mechanism is thrown into operation by the movement of the armature-lever h, actuated by a magnet, h^1, which is also controlled by the action of the relay-magnet above referred to, closing its local circuit, as will be more fully hereinafter explained.

The positions occupied by the armature-lever h and magnet h^1 are shown in Figs. 1, 3, and 4; but, for the purpose of illustration, a more comprehensive view may be had by reference to the detached section, Fig. 5, which represents it on an enlarged scale. By reference thereto, it will be seen the armature-lever h has two prongs, h^2 h^3, the prong h^3 branching off in a right-angled direction, while the prong h^2 stands at somewhere near an angle of forty-five degrees above it. When the magnet h^1 attracts the armature-lever h, the motion thus imparted to the prong h^2 is intended to cause it to throw the printing mechanism into gear by forcing a click from off its rest, and causing it to lock into a ratchet which is revolving uniformly with the clock-work, thus gearing in that end of a shaft which lifts the paper to the type-wheel to be printed upon; or it may control an escapement operated by a separate power. The office of the prong h^3 is to prevent the click detached by prong h^2 engaging again with the ratchet upon the completion of its revolution, which otherwise it would be liable to do; but, as its use in this connection is not new, no reference need be had further thereto. The prong h^3 is a right-angled continuation of the armature-lever h; but the prong h^2 is made separate and detached therefrom. They are both movably fitted on the pin f, which supports them. Each of these prongs has a small hub turned thereon on the sides facing each other, and one-half of each hub is cut away, so that only one-half of a hub remains to either prong, and these are on opposite sides of the pin f; that on the prong h^3 is shown at i, while that on the prong h^2 is not visible in the drawing, but is just opposite to that shown at i.

The object of this arrangement is to throw the prong h^2 in and out of gear with the lever h, as, when it is desired to print, it is necessary for it to be in gear, that it may respond to the action of the magnet h^1; but, when it is not desired to print, as when the instrument is used in transmitting, its effect should be nullified.

By sliding the prong h^3 up to the prong h^2 it causes the semi-hubs on the prongs to overlap, so that the respective halves united form a complete whole, and gear the two prongs so completely together as to form a complete hub. The reverse movement disunites the previously-formed hub, leaving the parts disunited, the prong h^2 now lying loose and passive on its support. This shifting is done by means of a lever, p, which can be moved laterally in either direction to accomplish either desideratum.

In order to avoid in great measure the jar which the clock-work would sustain by being suddenly halted by the unison-stop when in rapid motion, I fit the balance-wheel W loosely on its shaft, and depend upon the application of some frictional contrivance thereto sufficiently strong to prevent the wheel slipping during the movement of the clock-work, but which, when the clock-work is checked, will allow the momentum which the wheel has acquired to expend itself by overcoming the friction and sliding ahead. In the present instance I employ a ratchet-wheel, r, pawl c, and spring s, which may be seen by reference to Fig. 6. I do not, however, confine myself to the appliance of these parts, as a spiral spring upon the shaft upon which the balance-wheel is fitted may be used to keep a friction-pad in contact with a suitable surface on the wheel; or any other equivalent means may be employed. I contemplate the use of a loosely-fitted balance-wheel, held to and revolving uniformly with the shaft upon which it is placed by a frictional appliance, which, when the shaft is suddenly stopped, will allow the balance-wheel to slip ahead until it has expended its acquired momentum, so that the clock-work will be relieved from the jar which it would otherwise sustain.

I will now proceed to describe the course and effect of the circuits, which may be traced by reference to Fig. 2, the connections for the main or line circuit being indicated by the light, and those for the local circuit by the heavy, lines. I will first trace those belonging to the main or line circuit. Entering the instrument from the eastward by the wire so marked, the current proceeds from the binding-post b directly to and through the relay-magnet M; thence, via wire 12, to screw-point u; and if the switch-bar g be closed on its button e. the course of the current will be onward via wire 13, this switch-bar and wire 14 leading from the button e to the binding-post b^1, where it leaves the instrument in a westward direction by the wire so marked.

It will be seen, therefore, that when the switch-bar g is in contact with its button e, the current, upon entering and passing through the relay-magnet, goes directly through and out of the instrument, ignoring any and all connections which offer it a passage through the mechanism thereof.

We will now suppose the bar g removed from its button e, and trace the course of the current. Entering, as before, from the east, its course is the same as above described, as far as the screw-point u. At this point, owing to the bar g being off its button e, the current will traverse the metal bar m, and through its contact-point m', via wire 15, to the switch-bar g', and through this bar and its button e', upon which it is resting, continue via wire 14, which is also in metallic contact with the button e', to the binding-post b^1, and out, as above expressed. This indicates its course when the switch-bar g is off its button e and switch bar g' is in contact with its button e'.

We will now suppose both switch-bars g g' removed from contact with their buttons e e', and trace the direction the current will be compelled to take under these circumstances. Entering from the east, the current proceeds, as described in the last illustration, until it reaches the wire 15, and follows this wire to where it connects with a vertical shaft, F, of the machine. Only the head of the screw upon which this shaft is pivoted is shown in Fig. 2, but its full outline and position is clearly shown in Figs. 3 and 4. This shaft carries thereon a right-angled revolving arm, A, the exact position of which is shown in Fig. 4, and in dotted outline in Fig. 2. This arm, in the course of its revolution, sweeps across the surface of a circle of metal points, arranged in a rubber, glass, or other insulating disk, in number corresponding to the characters represented on the type-wheel. Each of these points has a separate conducting-wire leading therefrom and connecting with its particular anvil in the transmitting device. The character-designating knobs A B C D, &c., are in number the same as the anvils and circle of metal points, and occupy a position each immediately over and covering its particular anvil. These knobs are all metallically connected by means of the metal plate D, which holds them. (See Fig. 1.) The metal plate D is also connected by the wire 16 with the wire 14. We have above traced the current to where the wire 15 connects with the vertical shaft F. Thence it proceeds to the arm A on this shaft; and when this arm, in the course of its revolution, passes over one of the metallic points in the circle it traverses, and the corresponding alphabetical knob in the plate D is depressed to a contact with its anvil, the current flows, passing from the shaft F via the arm A and the point with which it is momentarily in contact; thence, following the connecting-wire leading therefrom, to an anvil; thence, through this anvil and the alphabetical knob in contact therewith, to the plate D and wire 16, to wire 14, where it finds exit, as before, through the binding-post b^1. In Fig. 2 I have represented two of these anvils O O′, connected with their corresponding metallic points by the wires 17 and 18, respectively. When the alphabetical knob immediately over the anvil O is brought into contact therewith, and the arm A is passing across the surface of the metallic point which is connected by the wire 17 with this anvil, the current will continue from the point to which we have already traced it on wire 15, via the arm A, metal point, wire 17 leading therefrom, anvil O, plate D, wire 16, to wire 14, and thence outward from the instrument. A similar result will follow when the revolving arm A reaches the point which is connected with the anvil O′ by the wire 18, provided its corresponding knob is depressed, or when the arm is passing across any point in the circle, the corresponding alphabetical knob of which is depressed to contact with its anvil, closing the circuit of the relay-magnet during the time it is sweeping across such point.

It will be observed that I have represented in my transmitting device twenty-six alphabetical knobs and an additional knob to represent a period, and also one which is blank for spacing purposes, making twenty-eight in all. There are also twenty-eight corresponding anvils; but in the circle of metallic points I have arranged twenty-nine of these points; twenty-eight of said points connect each with an anvil. The extra or twenty-ninth point v has a connecting-wire, 19, leading therefrom, and uniting with wire 14. The arm A is so set on its shaft F that it reaches the point v just as the unison-point a reaches the stop d. The object of this is to cause the arm A and point v once in each revolution to close the circuit of the relay-magnet M through the wires 19 and 14, when both switch-bars g g' are off their respective buttons e e', which otherwise, when these switch-bars are in this position, could not be done. It will also be observed that the circle in which the metallic points are placed is not completely filled by them, a gap equal to the space occupied by these points occurring in the present illustration wherein there is nothing, and the reason therefor will now appear. The main or line circuit, which includes the relay-magnets of the several instruments which may be employed, is automatically broken once during each revolution of the type-wheel and arm A, which move at equal speed. This is done by means of a cam-wheel, c^1, having a single projection on its circumference, revolving upon the same shaft with the arm A. This projection once in each revolution comes in contact with a rubber or other insulating roller, w, of the bar m, forcing this bar away from its contact with the screw-point u, to which it is held by a spring, and destroying the passage of the current by that route. The breadth of the gap created in the circle of metal points is equal to the distance the revolving arm A travels during the time the bar m is forced off from contact with the screw-point u, as the arm A is of no use so long as the circuit is broken at this point. The object of having the circuit thus automatically broken once in each revolution for a uniform time is, that in the event one instrument is somewhat behind another the circuit cannot be restored until the revolving arm A of each has reached the metallic point v, when their combined action will close the circuit through the wires 19 and 14 in their respective instruments, thereby causing the stops to lift and release their unison-points simultaneously, which were above shown to come together in an instrument just as the arm A reached the point v. The breadth of this gap is gaged by the length of time the projection on the cam-wheel c^1 keeps the circuit broken, and this time may be varied, as desired, by proportioning the size of this projection. The circuit may also be thus broken oftener during a revolution, if desired, by increasing the number of projections on the cam-wheel c^1, and also corresponding gaps in the circle of metal points; also, duplicating the point v and wire 19 for each projection thus added to the surface of the wheel c^1. It is also to be understood that the type-wheel has to be constructed accordingly, no letters being allowed on those portions of its surface which are passing the printing mechanism during the time of these successive breaks of the circuit. This practically disposes of the connections requisite for the main or line circuit, which includes the relay-magnets.

I will now describe the course and operation of the local circuits, which may be briefly done as follows: Herein I employ two magnets, one of which (magnet h^1) controls the lever h, which throws the printing mechanism into gear, and the other (magnet d^2) controls lever d^1, which lifts the stop d, and simultaneously releases the several instruments employed in a circuit. As the practical operation of each of these has been hereinbefore described they need no reference here.

Inasmuch as no printing can be done just at the moment when the instruments are liberated at their unison-points, I utilize one local battery to furnish a current for either magnet, h^1 or d^2, the direction of the circuit being determined by a circuit-changing bar, n, the operation of which will be explained further on. The circuit of this local battery is closed through either magnet by the action of a relay-magnet, in the ordinary way.

Starting from one pole of the battery B, the current proceeds to the binding-post b^2; thence, via wire 20, to the armature-lever l; thence, via adjusting-screw x and wire 21, to the support k of the circuit-changing bar n; thence, via this bar, to the screw-point n^1 and wire 22, to and through the magnet h^1, wire 23, binding-post b^3, to the other pole of the battery B. This completes the circuit through the magnet h^1, which actuates the printing mechanism. The circuit-changing bar n is here shown in its normal position, being held to contact with the screw-point n^1 by means of a spiral spring.

I will now trace the course of the current when the circuit is completed through the magnet d^2, which controls the unison movement: Starting from the same pole of the battery, via the binding-post b^2, the route of the current is the same as above described, until the circuit-changing bar n is reached. Here the current is made to follow the bar n to a readily-yielding spring, n^2, with which it is in contact; thence, via wire 24, to and through the magnet d^2, wire 25, and binding-post b^3, to the other pole of the battery. In order to force the circuit-changing bar n to a contact with the spring n^2 once in each revolution, just at the time when it is necessary to close the circuit of the magnet d^2, which controls the unison-stop, I have recourse to the use of another cam-wheel, c^2, having a single projection on its surface, and so set on the shaft F that, at the proper time in each revolution, it will come in contact with a rubber or other insulating roller, w', on said bar, and thereby force this bar to swing around sufficiently to make contact with the spring n^2, breaking its contact simultaneously with the screw-point n^1 by having that end forced therefrom. This automatically changes the circuit momentarily once in each revolution, so as to include the magnet d^2, which controls the unison-stop, leaving it at all other times to include only the magnet h^1, which actuates the printing mechanism. The projections upon the cam-wheel c^2 must equal in number those on the cam-wheel c^1, as these wheels act conjunctively.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination of the cam-wheel c^1 and the circuit-breaking bar m with insulating-roller w, for automatically breaking the circuit of the relay-magnet M, as herein set forth.

2. The combination of the cam-wheel c^2, circuit-changing bar n, with insulating-roller w', and the spring n^2, for closing a circuit through the magnet d^2 at the time when the unison-point is in contact with its stop, as herein set forth.

3. The combination of the lever h, prongs h^2 and h^3, with semi-hubs thereon, and the shifting-lever p, as and for the purposes herein set forth.

4. In combination with the printing mechanism, the use of the magnet h^1 and its local circuit, controlled by a relay-magnet, for actuating the printing apparatus, as herein set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 2d day of May, 1873.

L. T. LINDSEY.

Witnesses:
C. L. EVERT,
A. N. MARR.