3 Sheets—Sheet 1.

L. T. LINDSEY.

TELEGRAPH APPARATUS.

No. 112,360. Patented Mar. 7, 1871.

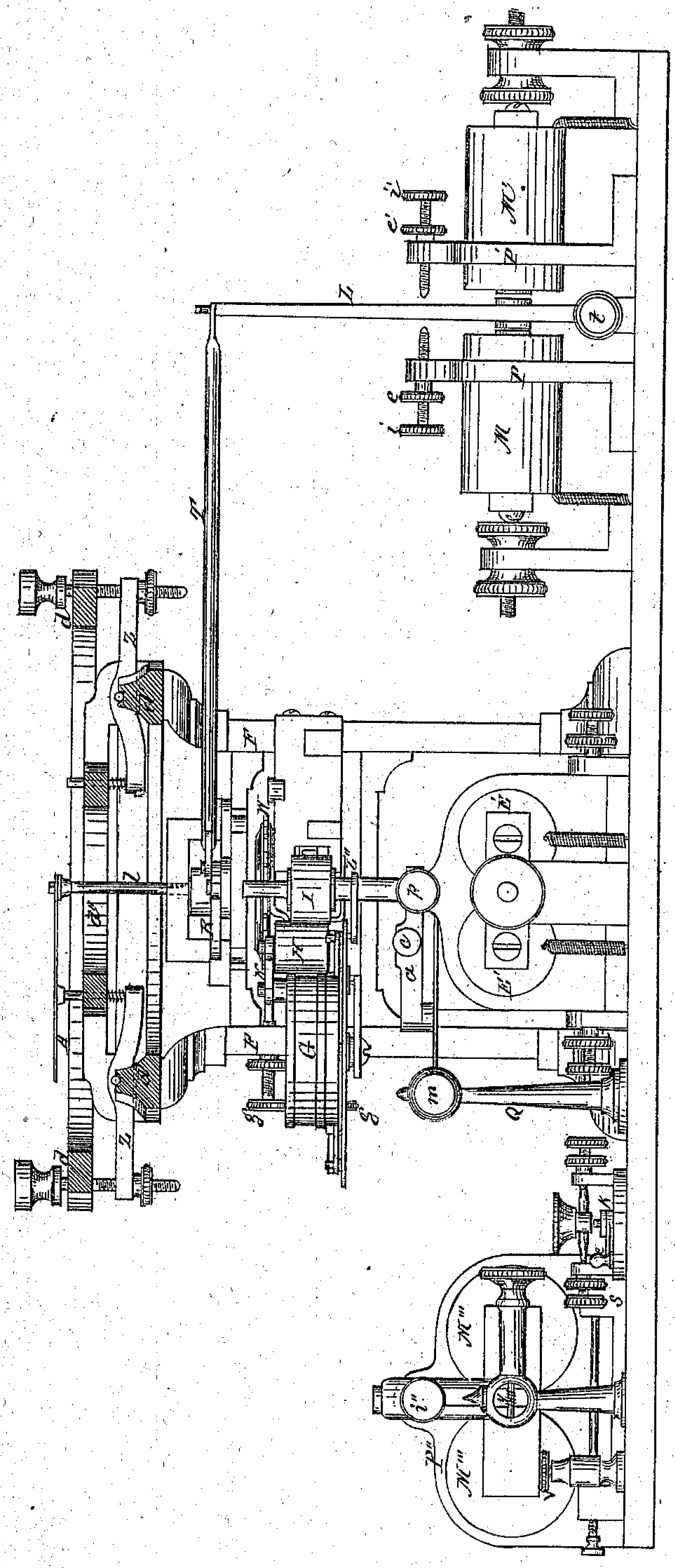


FIGURE 1.

INVENTOR.
L. T. Lindsey
per Atty
Wm. H. Coburn

WITNESSES.
[illegible]
[illegible]

L. T. LINDSEY.

TELEGRAPH APPARATUS.

No. 112,360. Patented Mar. 7, 1871.

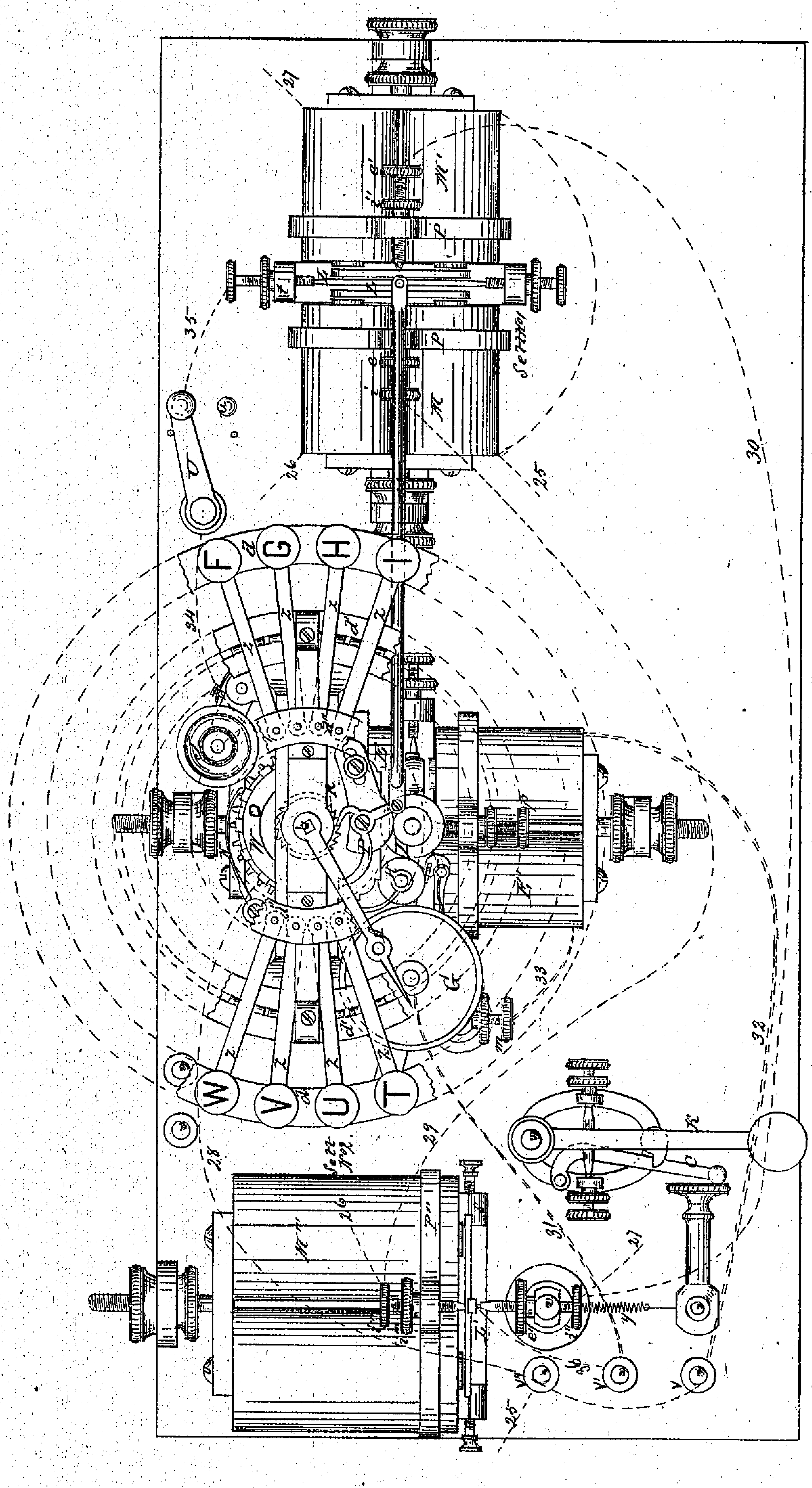


FIG 2.

INVENTOR:
L. T. Lindsey per Atty Wm. F. Cohen

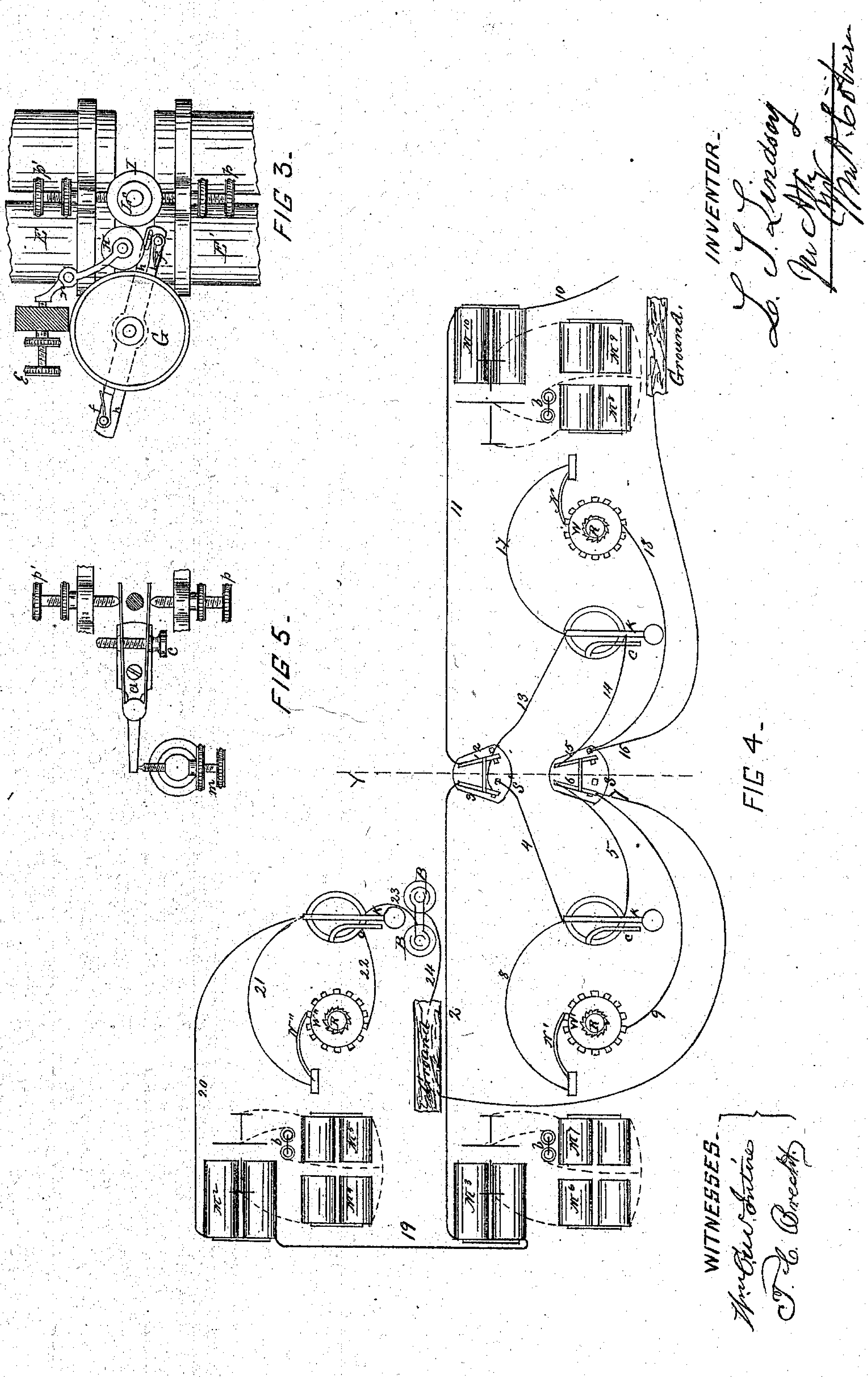
WITNESSES:

3 Sheets—Sheet 3.

L. T. LINDSEY.

TELEGRAPH APPARATUS.

No. 112,360. Patented Mar. 7, 1871.



United States Patent Office.

LANDY TUNSTALL LINDSEY, OF JACKSON, TENNESSEE.

Letters Patent No. 112,360, dated March 7, 1871.

IMPROVEMENT IN TELEGRAPH APPARATUS.

The Schedule referred to in these Letters Patent and making part of the same.

To whom it may concern:

Be it known that I, LANDY TUNSTALL LINDSEY, of Jackson, in the county of Madison and State of Tennessee, have made certain new and useful Improvements in, and in the use of, my Electro-Magnetic Motor of the improved form patented August 16, 1870, and numbered 106,493, whereby it can be used for dial, printing, sound, or repeating-telegraph purposes; and I do declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings and to the letters and figures of reference thereon.

Similar reference letters or figures represent the same parts in vertical or horizontal outline.

In the drawings—

Figure 1 is a vertical projection of the instrument.

Figure 2 is a horizontal view and plan, divested of such parts as are not necessary to show the operation of magnets E E′ in controlling printing-lever L″.

Figure 3 represents a detached sectional view of the feed motion for the paper, illustrating the alternate action of magnets E E′ and operation of lever L″ in controlling it.

Figure 4 shows three of the instruments, and the arrangement of their circuits, so that they may be made to work isochronally, and also illustrates the manner of using two of them as "repeaters."

The magnets M M′ M‴, levers L L′, connecting-rod T, pawls P, ratchet-wheel R, toothed wheel W, shaft *l*, spring N, frame F, spring *y*, adjusting-screws *i″ i‴* are the component parts of my electro-magnetic motor as patented August 16, 1870, and I here remark that a *vice versa* arrangement in the operation of the toothed wheel W and spring N, by attaching the spring to shaft *l*, or the arm A thereon, so that it will revolve with them and strike alternate teeth and spaces in a stationary ring, will insure the same automatic movement of the motor.

The parts of the instrument which are additional are as follows:

L″ is a printing-lever, having an armature thereon facing the poles of and common to either magnet E E′; the breadth of its stroke can be adjusted by the use of the adjusting-screws *p p′*.

I is an impression-roller, fitted loosely on the top of lever L″, and opposite to a type-wheel, O, on the shaft *l*. This roller is made of India rubber, and has a yielding surface.

E′ is a magnet for withdrawing lever L″ after the blow has been given to the types.

E is a magnet, which attracts lever L″ when necessary to bring impression-roller I into contact with type-wheel O to imprint a letter.

a is a forked lever, lying in a right angle horizontal position to and controlled by lever L″, which stands vertically between the prongs thereof.

G H, figs. 1 and 3, are the rollers through and by which the paper is moved forward.

J is an inking-roller for supplying the type-wheel with ink. It swings in a frame, and is held to the surface of the types by a semicircular spring. It revolves with the type-wheel by frictional contact, and materially assists to steady the motion of the instrument.

U is a small switch-bar for breaking the circuit of magnet E when it is not desired to print.

K is an ordinary transmitting-key, employed in connection with the instrument to give signals or otherwise open and close the circuit, which includes the governor-magnets therein.

C is the circuit-closer of the key K, and, when opened at any one point in the circuit, allows the motion of all the instruments included therein to begin, and when closed stops them.

Z represents the alphabetical levers, arranged in circular form, only a segment of the circle appearing on either side of the drawings, fig. 2.

d d′ d″ are three rings which support these levers. They are connected together by suitable arms, the middle ring *d′* serving as a fulcrum for the levers to rest in.

The inner ring *d″* contains twenty-eight stop-pins, and the outer ring *d* a like number of alphabetical knobs. These knobs are screwed into the outer ends of the levers, and the stop-pins rest upon the inner converging ends thereof. By depressing any one of the alphabetical knobs in the outer ring the inner extremity of the lever will be correspondingly elevated and raise therewith, the stop-pin resting thereon sufficiently high for it to cross the path of and intercept the revolving arm A, which is fixed on the shaft *l* above, stopping its motion to allow a letter to be printed. The lever and pin resume their original position, when released, by the aid of a spiral spring which encircles the latter.

h is a horizontal metal bar, swinging on the same axis with roller G.

This bar is furnished with two arms, *f f′*, acting as friction clutches on the surface of roller G, and moved by an arm, extending from lever L″, working in a slot in the bar *h*.

V V′ V″ are binding-posts for the reception of the battery-wires of the propelling and printing power.

The use and utility of the electrical conducting-wires will be hereinbelow explained when referred to.

My invention consists in employing my electro-magnetic motor, of the improved form patented and numbered as above, to give rotation to an arm, A,

fixed on the shaft *l*, which supports the toothed wheel W and ratchet-wheel R thereon, and of combining with it a circle of alphabetical levers arranged around this shaft for the purpose of arresting this arm at any point it is desired that it should indicate a letter, the arm and levers constituting a transmitting device at the sending-station and indicating apparatus at the receiving-station.

The intention of this combination is to render the motor effective as a dial-telegraph. Advantage is taken of the fact, as represented in my first patent, No. 92,066, that any number of sets can be introduced into the circuits, but only two are necessary to actuate and govern the motion. In consonance with the meaning of this portion of the specifications of the patent above referred to, I include the magnet of the governor-set of each instrument in the circuit of the line-wire, so that the pulsations of electricity communicated by the propelling-set of a single instrument to the magnet of its governor-set will be likewise communicated to the magnet of the governor-set of each of the other instruments included in the same circuit at different points on the line, thereby insuring a simultaneous movement of the lever of each of the governor-sets, and, as the vibration of each of these levers in turn causes a similar movement of the propelling-lever of their respective instruments, it will be readily perceived that the movement of two or more of the instruments can thus be made isochronal. An illustration of this is furnished in fig. 4, where, by tracing the connections to the left of the dotted line *y*, it will be seen that the circuit which includes the magnet of the governor-set of each instrument therein starts from one pole of the battery B and proceeds, through wire 23, key K, wire 20, magnet M^2, wire 19, magnet M^3, wire 2, switch-bar 3, wire 4, key K, wire 5, switch-bar 6, wire 7, to ground, through which it finds its return to opposite pole of battery B, thus making the circuit complete, and including therein magnet M^3 of the governor-set of one instrument and magnet M^2 of the governor-set of the other instrument.

When the circuit is opened or closed these magnets will be similarly and simultaneously affected, and communicate a corresponding effect to those of the other or propelling set of their respective instruments.

As the operation of the spring N and toothed wheel W is to open and close the circuit, which includes the magnet of the governor-set of each instrument therein, it is necessary to provide a circuit-closer, to keep the circuit permanently closed at all points, except where the instrument is used for transmitting, where it is required to be opened, that the action of the spring N and toothed wheel W may alternately open and close it.

Instead of adopting the ordinary circuit-closer, composed of a single bar and button, for this purpose I employ an ordinary transmitting-key, K, having a circuit-closer, C, thereon, so that, by lifting the connecting-rod T from off the top of lever L, fig. 1, the key may be manipulated, and the lever L, moving correspondingly therewith, may, in such instance, be made to occupy the place of a sounder for signaling offices, or otherwise.

At the receiving-station, as above observed, the circuit of the line-wire must be kept closed at all other than the transmitting point. It therefore follows that the operation of the spring N and toothed wheel W amount to nothing elsewhere than at this point, the circuit-closers at all other points keeping them cut out.

Advantage is taken of this fact to utilize the toothed wheel and spring at a receiving point, where there is also another line leading in some different direction, to open and close the circuit thereof, and thus repeat the pulsations of electricity thereon. Fig. 4 illustrates the manner of doing this.

By reference thereto it will be seen that I employ two switches, S S′, each consisting of two bars, connected together by a transverse bar, which must be of some insulating substance.

One of these switches, S′, when not used in connection with repeaters, leaves the circuit of each line distinct, and, in all respects, as though it was not employed; but when changed, in order that the instrument may be operated as repeaters, it exchanges the course of the line-wires, so that each leads to the spring N of the opposite instrument, respectively.

If the wire which leads from the toothed wheel of each instrument led to a distant point instead of to the ground, as shown in the drawing, then it would be necessary to have four bars to the switch S′, in order to exchange their course, each to the opposite toothed wheel also.

Changing their course in the present illustration, however, would amount to nothing, as both lead directly to the ground.

The only use of the other switch S is to open the circuit on either one side and close it simultaneously on the other during the operation of repeaters.

When not in use the bars of this switch rest midway on all the buttons and keep the circuit on each side closed.

My invention further consists in employing the vibrating levers L L′ of my motor, and the adjusting-screws *i i′ i″ i‴*, against which they strike, to form part of the circuit of magnet E, which controls printing-lever L″, and which, operating in conjunction with the movement of the toothed wheel W and spring N, will, whenever the motion of the instrument is stopped and these levers are in contact with the points *i i‴* or *i′ i″*, respectively close the circuit in any other than the sending station, through the coils of magnet E, causing it to attract printing-lever L″ thereto, and the roller I thereon, to press an interposed strip of paper to the type-wheel.

This paper is supported in suitable guides, which do not admit its touching the types except when pressed thereto by roller I.

The lever L″, just as its movement toward the type-wheel is completed, will move the lever *a*, by striking one of the prongs thereof, to a contact with adjusting-screw *m*, the effect of which will be to cut off the current from its passage through the coils of magnet E, and establish its flow through the coils of magnet E′, thereby withdrawing lever L″ as soon as it has struck the blow and given the impression of the type to the paper.

The circuits formed by either of the above arrangements for controlling lever L″ are distinct from and do not conflict with those of the motor.

The success of the arrangement depends upon the lever L′ of the governor-set always severing its contact with either adjusting-screw *i″* or *i‴* just before lever L of the propelling-set reaches either adjusting-screw *i′* or *i*, respectively, thus keeping the circuit of magnet E continually broken.

When the motion of the instrument is continuous, the operation of lever L of the propelling-set breaks one part of the circuit of magnet E by advancing the toothed wheel W to or beyond a contact with spring N, just before it closes another part of this circuit, by making contact with that adjusting-screw toward which it is moving.

Advancing the toothed wheel W to or beyond a contact with spring N breaks the circuit of magnet E, by causing lever L′ of the governor-set to be withdrawn from its contact with either adjusting-screw *i″* or *i‴* before lever L of the propelling-set reaches either adjusting-screw *i′* or *i*, respectively.

But when the motion of the instrument is arrested the operation of the spring N and break-wheel W, in this regard, is stopped also, which allows the levers L L′ to come to rest against the points of adjusting-screws

i i‴ or *i′ i″*, respectively, at the receiving station, in either of which positions they will close the circuit of magnet E, which will immediately attract printing-lever L″ thereto and give the impression of the type to the paper.

As it will be seen that the success of the arrangement depends upon lever L, when the motion is continuous, driving the toothed wheel W to or beyond a contact with spring N, so that their action will cause lever L′ of the governor-set to open one part of the circuit of magnet E just before the former lever closes another part thereof, it follows that any equivalent device, controlled by the same lever and accomplishing the same purpose, would answer, the novelty and utility of the arrangement depending upon the lever L so long as its motion is continuous, breaking one part of the circuit of magnet E just before it closes another part thereof.

When levers L L′ have closed the circuit through magnet E by their contact with adjusting-screws *i i‴*, respectively, the circuit through magnet E may be thus traced:

Starting from binding-post V, which represents one pole of the battery, *via.* wire 28, through magnet E, thence *via.* wire 34, switch-bar U, wire 35, lever L, adjusting-screw *i*, wire 29, adjusting-screw *i‴*, lever L′, wire 36, to binding-post V′, representing the other pole of the battery, and completing the circuit.

When the same circuit is closed by the contact of the above levers with adjusting-screws *i′ i″*, respectively, the circuit may be thus traced:

Starting from binding-post V, *via.* wire 28, through magnet E, thence *via.* wire 34, switch-bar U, wire 35, lever L, adjusting-screw *i′*, wire 30, adjusting-screw *i″*, lever L′, wire 36, to binding-post V′, again completing the circuit.

The short dotted lines 25, 26, 27, in duplicate, represent the connections of the propelling-set of the motor, and if shown in full extension, the duplicates, in each instance, would join and form a continuous wire, leading to and connecting the parts, as represented by their similar numbers.

The wire connections necessary to include the governor-magnet M‴, spring N, and toothed wheel W therein, as forming part of another circuit, are not shown in fig. 2, to avoid confusion of circuits, but appear in full outline in fig. 4.

When the printing-lever moves forward to the poles of magnet E it becomes necessary to insure its prompt withdrawal as soon as the blow has been given to the type. This is accomplished by the lever L″, just as it completes its stroke in the direction of magnet E, striking one prong of the lever *a*, driving it to a contact with adjusting-screw *m*, thereby cutting off the battery-current from magnet E and establishing its flow through the coils of magnet E′, the latter magnet immediately attracting printing-lever L″ to its poles.

The forked portion of lever *a* begins about its center, and is so made that the prongs spring outwardly, and the breadth of space between them is expanded or contracted by means of a small thumb-screw therein. The breadth of this space must be not quite equal to that of the stroke of the printing-lever L″, which stands upright between the prongs, so that it will strike a prong of the lever *a* at each stroke it makes in either direction, and move it sufficiently to either make or break its contact with the adjusting screw *m*.

When lever L″ drives lever *a* to a contact with adjusting-screw *m*, it will be seen, by reference to the double dotted lines in the drawings, that the effect of this contact will be to cut off the current from magnet E and direct its flow through the coils of magnet E′.

The circuit so formed may be traced by starting from one pole of the battery, represented by binding-post V, *via* wire 32, through magnet E′, thence *via* wire 33, adjusting-screw *m*, forked lever *a*, wire 31, to binding-post V′, representing the other pole of the battery, and completing the circuit.

The formation of this circuit causes magnet E′ to attract lever L″ thereto; but just as it reaches the poles of this magnet it will strike a prong of lever *a*, breaking contact of this lever with adjusting-screw *m* and destroying the circuit formed as just described, leaving lever L″ to remain, by its own gravity, against the poles of magnet E′ until the magnet E again attracts it thereto, when a repetition of the effects above described will again follow.

It will be seen that I employ only three binding-posts, V V′ V″. The reason for this is that the lever L′ of the governor-set assists to close two circuits, that of the propeling-set of the motor and also of the printing-lever. It is, therefore, necessary that the same element of the respective batteries of these circuits should be in connection with this lever.

As one binding-post, in such case, receives the wires from the same pole of each battery, only two additional posts are necessary to receive the wires from the remaining pole of each battery.

A single battery could with propriety be used for both the propelling and printing powers, giving its full strength to the former when that circuit only was in operation, and dividing its strength between each when both circuits were closed, upon the principle of two or more lines working from one battery.

My invention also consists in an adjustable feed-motion for the paper. The novelty of this arrangement consists in securing a feed for the paper operated by the magnets E E′, and entirely adjustable by giving more or less stroke or motion to the printing-lever L″ by the use of the adjusting-screws *p p′*.

The parts concerned in this arrangement and their operation will be explained by reference to the detached sectional drawing, fig. 3, and the position they occupy in the instrument can be seen by reference to fig. 1. They are thus removed from the plan, fig. 2, to avoid the confusion they would cause by making obscure other portions of the instrument they would exclude from view.

An arm of the lever L″ passes through a slot at one end of the bar *h*.

The bar *h* has two movable hands, *f f′*, fixed on stationary pins, actuated by springs and acting as friction-clutches on the periphery of roller G. These hands slide freely over the circumference of this roller when the bar *h* moves toward magnet E, but tighten and grasp the roller as it returns toward magnet E′, firmly holding and moving the roller forward, and carrying therewith the paper, also, which passes between this and roller H, and is propelled by their friction.

The pressure of the rollers G H on the paper is regulated by means of the screws *g g′*, which operate upon one extremity of arms *n*.

The arms *n*, which support roller H, are flexible, and will yield sufficiently should any inequalities in the paper or surfaces of the rollers tend to impede their movement.

The roller G has a groove in its surface to prevent blurring the letters as the paper passes through.

As the feet *f f′* on the bar *h* control the movement of the roller G, and as the lever L″ controls the movement of the bar *h*, any breadth of stroke given the lever L″ will likewise communicate a corresponding movement of the roller G, and with it the paper, so that, to determine the requisite distance for the paper to advance to give place to another letter thereon, it is only necessary to adjust the stroke of the lever L″ until the required breadth of space is secured.

Having described my invention,

What I claim therein, and wish to be secured in by Letters Patent, is—

1. The arrangement of levers L L′, adjusting-screws *i i′ i″ i‴*, and the electrical conducting-wires connecting therewith as traced, in conjunction with toothed wheel W and spring N, or their equivalent, for causing an automatic movement of printing-lever L″, in the manner as described.

2. The arrangement of a lever, *a*, adjusting-screw *m*, post Q, having proper electrical conducting-wires connecting therewith, controlled and operated in the manner as described, and for purposes set forth.

3. The combination of lever L″, rubber roller I, magnets E E′, controlled and operated as described, for giving the impression of the type to the paper.

4. The combination of the bar *h*, arms *f f′* thereon, rollers G H, arms *n*, adjusting-screws *g g′*, constituting an adjustable feed movement for the paper, and controlled by the magnets E E′, lever L″, and adjusting-screws *p p′*, in the manner described.

In testimony whereof I have hereunto signed my name in the presence of two subscribing witnesses this the 20th day of September, 1870.

L. T. LINDSEY.

Witnesses:

M. M. MILLER,

H. H. CURTISS.