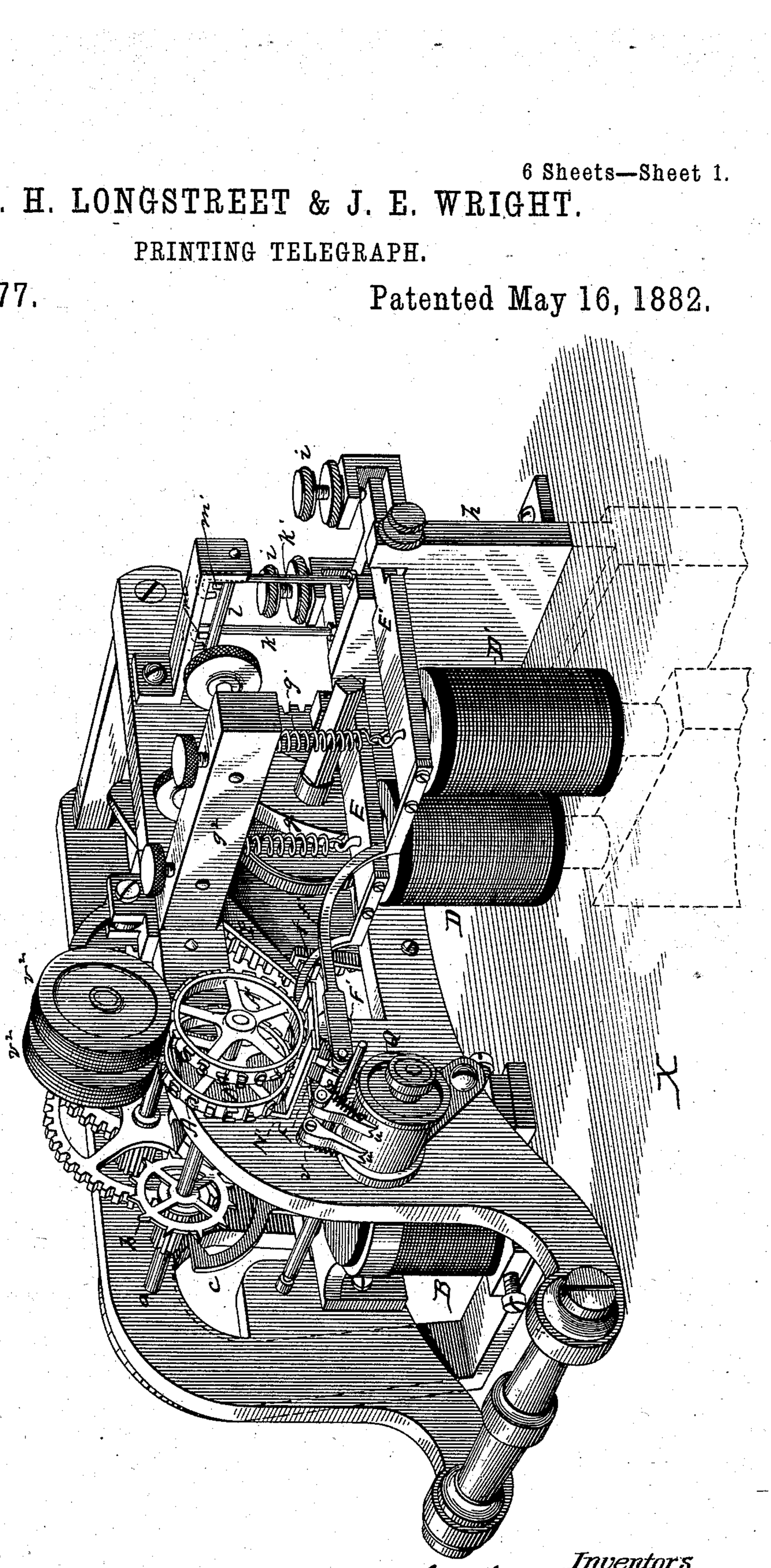
(No Model.) 6 Sheets—Sheet 1.

J. H. LONGSTREET & J. E. WRIGHT.

PRINTING TELEGRAPH.

No. 257,877. Patented May 16, 1882.

Fig. 1.



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(No Model.) 6 Sheets—Sheet 2.

J. H. LONGSTREET & J. E. WRIGHT.

PRINTING TELEGRAPH.

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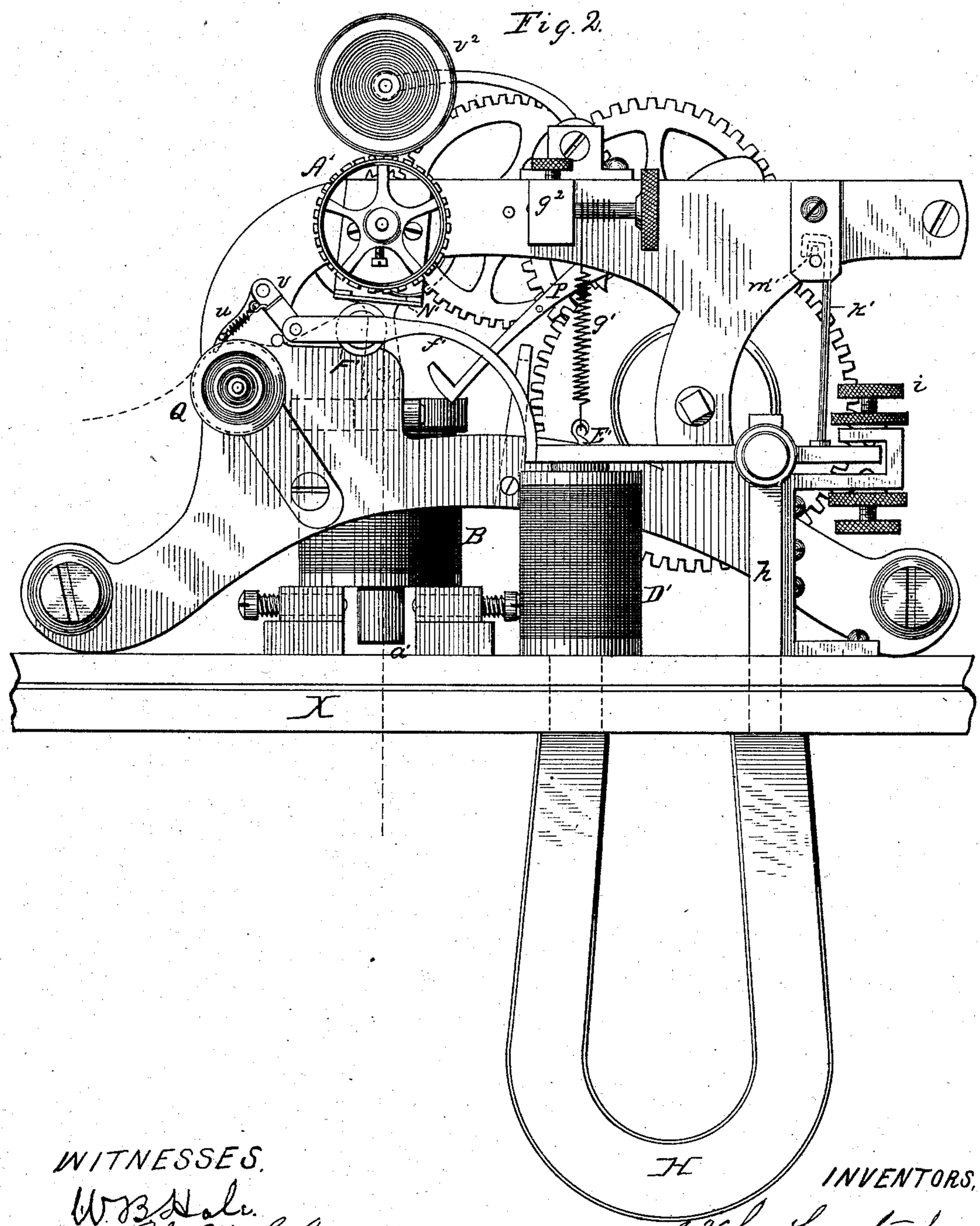
Fig. 2.



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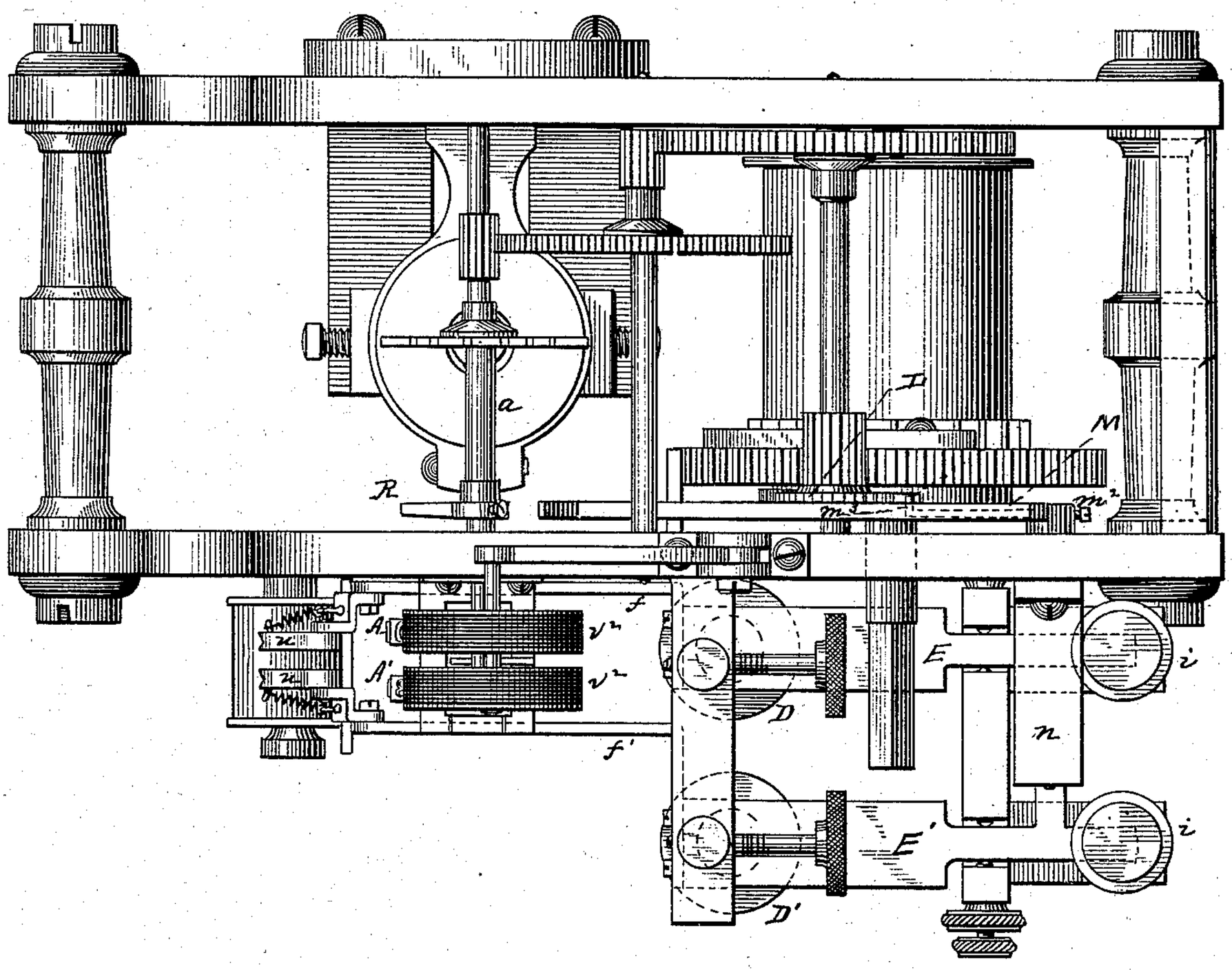
(No Model.) 6 Sheets—Sheet 3.

J. H. LONGSTREET & J. E. WRIGHT

PRINTING TELEGRAPH.

No. 257,877. Patented May 16, 1882.

Fig. 3.



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PRINTING TELEGRAPH.

No. 257,877. Patented May 16, 1882.

Fig. 4.

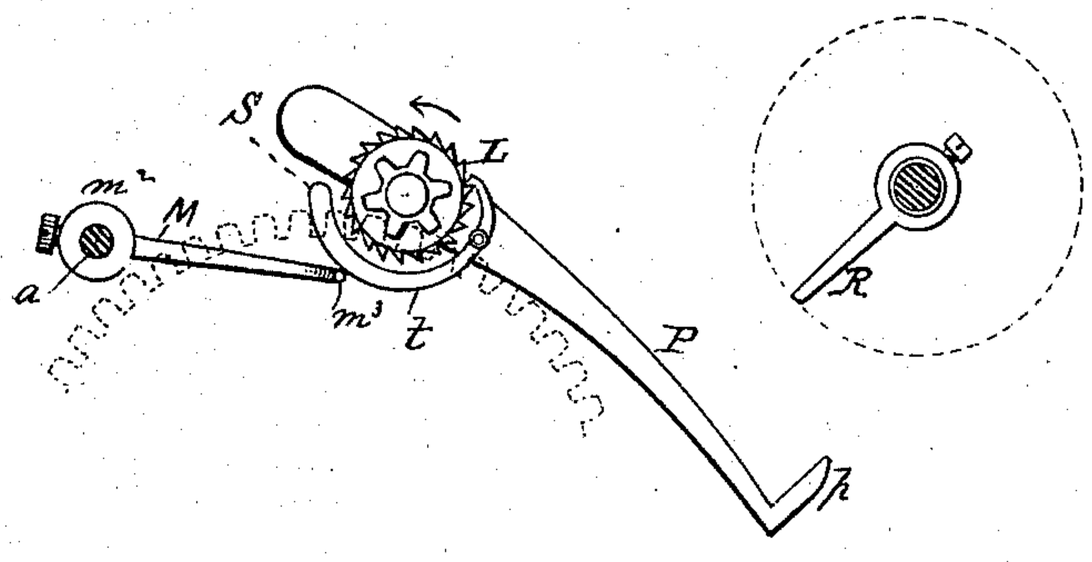
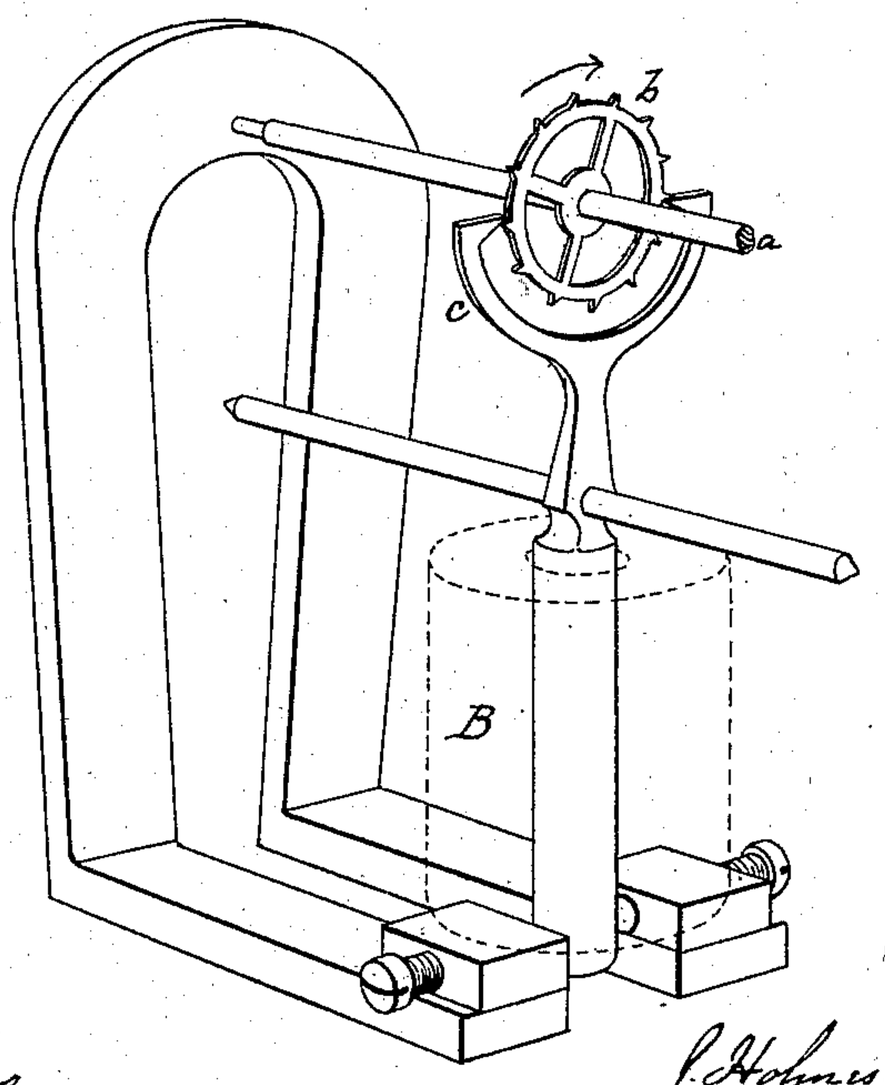


Fig. 5.



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PRINTING TELEGRAPH.

No. 257,877. Patented May 16, 1882.

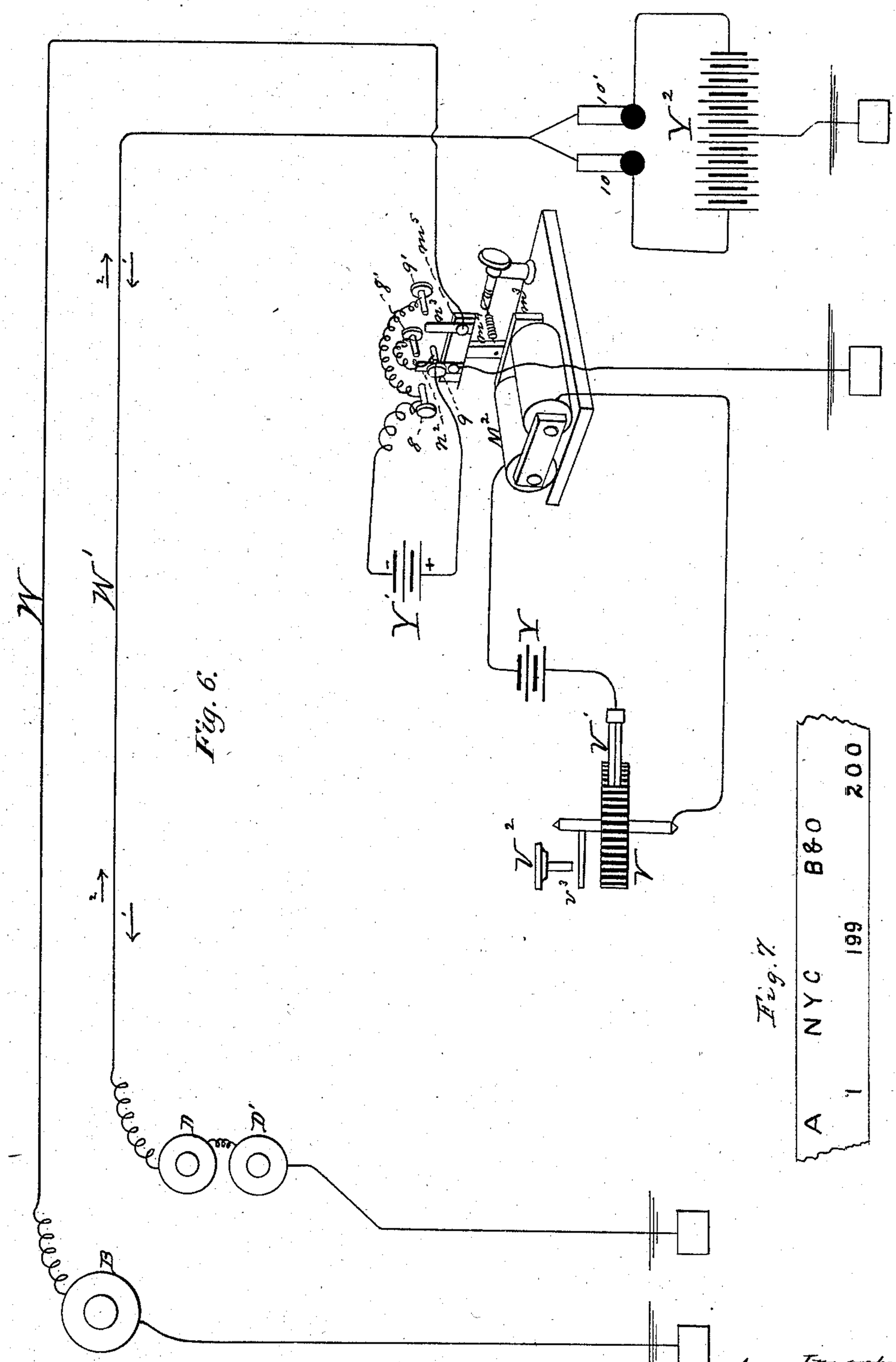

Fig. 6.

Fig. 7.

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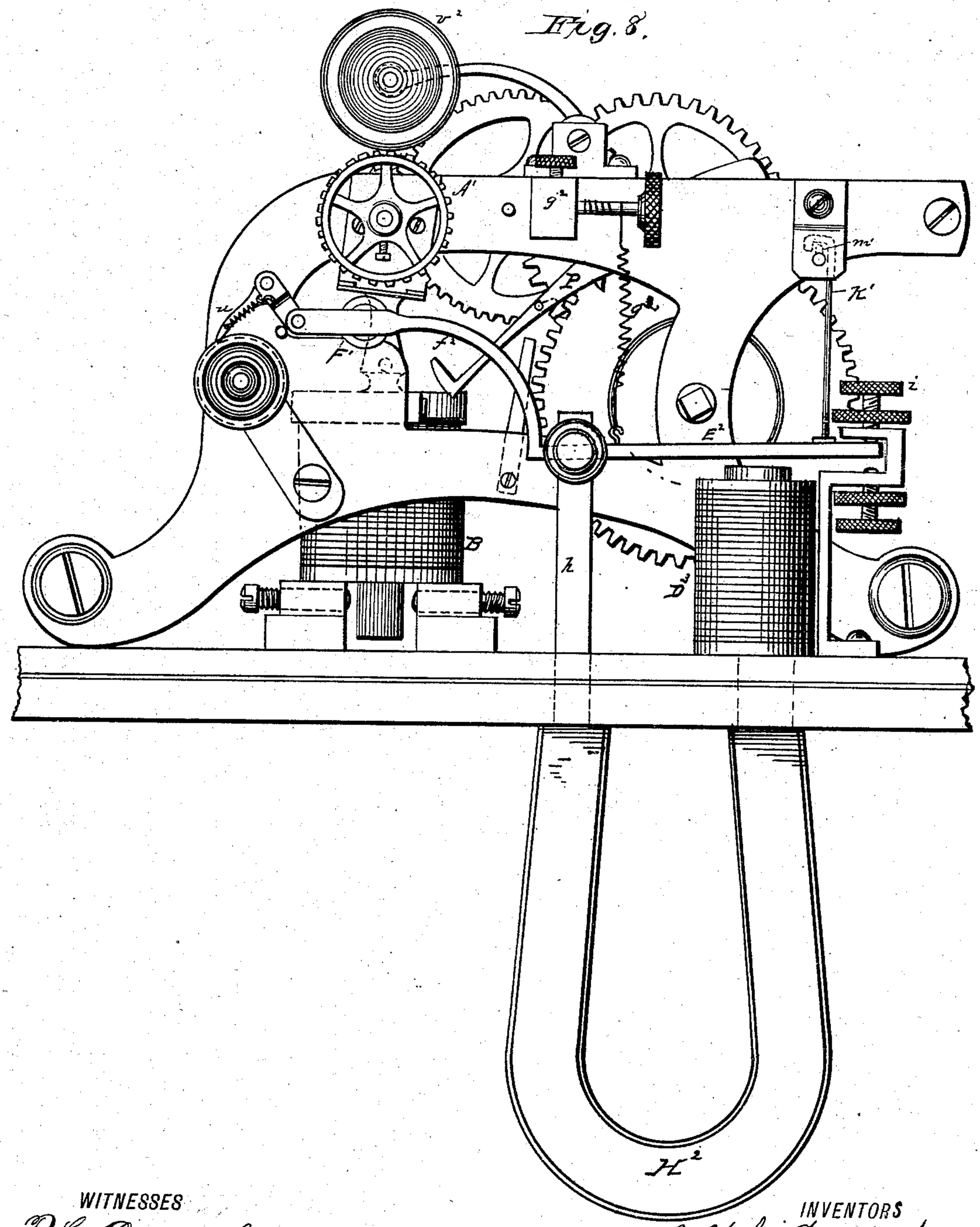
PRINTING TELEGRAPH.

No. 257,877. Patented May 16, 1882.

Fig. 8.



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UNITED STATES PATENT OFFICE.

J. HOLMES LONGSTREET, OF HOBOKEN, NEW JERSEY, AND JOHN E. WRIGHT, OF NEW YORK, N. Y., ASSIGNORS OF ONE-HALF TO JOHN G. MOORE, OF NEW YORK, N. Y.

PRINTING-TELEGRAPH.

SPECIFICATION forming part of Letters Patent No. 257,877, dated May 16, 1882.

Application filed February 6, 1882. (No model.)

To all whom it may concern:

Be it known that we, J. HOLMES LONGSTREET, a citizen of the United States, residing at Hoboken, in the county of Hudson and State of New Jersey, and JOHN E. WRIGHT, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Printing-Telegraphs, of which the following is a specification.

Our invention relates to printing telegraph-instruments in which separate electro-magnets are used for operating the type-wheel escapement and printing or impression mechanism respectively, said magnets being connected in separate line-wires; and it relates especially to that class of instruments intended for printing stock and other market quotations, and similar matter in which letters and Arabic numerals are combined in approximately equal proportions.

The object of our invention is to increase the speed of receiving messages by such instruments, and to simplify their construction and operation; and to this end it consists mainly in a novel combination of two type-wheels fixed upon the same shaft, one bearing letters simply and the other numerals, an independently-operated printing-pad or impression device for each type-wheel, and devices for feeding to said wheels a fillet of paper or other suitable material wide enough to receive impressions from both wheels without necessitating lateral shifting of any of the parts for that purpose, the impressions being formed in two rows, letters in one row and numerals in the other, as will be hereinafter particularly described.

It also consists in an electro-magnet composed of a permanent magnet having one of its poles bifurcated to form two cores, upon which are arranged separate helices of insulated wire, and two armatures pivoted to the other pole and arranged to be acted upon by said cores respectively, in combination with two printing-pads connected with said armatures respectively, and two type-wheels arranged to receive pressure from said pads respectively, the arrangement of the coils being such that their cores will be respectively neutralized or partially neutralized temporarily by electric currents of opposite polarity or direction.

Our invention also comprises certain novel details of construction, which will be hereinafter fully described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a perspective view of a printing telegraph-instrument embodying our invention. Fig. 2 is a side elevation thereof. Fig. 3 is a plan view of the same. Fig. 4 is a detail view of the unison devices. Fig. 5 is a detail perspective view of the escapement mechanism. Fig. 6 is a diagram illustrating a transmitting apparatus suitable for use in connection with our improved instrument; and Fig. 7 is a view of a fillet printed by the instrument.

The unison devices and escapement are the same as shown and described in our Letters Patent No. 245,732, granted August 16, 1881, but somewhat differently arranged.

The letters A and A′ designate two type-wheels, fixed upon a common shaft, *a*, geared to a driving-train, and provided with an escapement-wheel, *b*, the movement of which is controlled by an anchor escapement-pallet, *c*, vibrated by a polarized electro-magnet. The only difference between this escapement and that in our patent above referred to is that the helices of the polarized magnet and the escapement-pallet are here arranged below the escape-wheel, while in said patent they are arranged above, and a further description of these devices is therefore unnecessary.

The letters D and D′ designate the helices, the cores of which control the armatures E and E′, to which are connected the printing-pads F and F′ respectively, by means of arms *f* and *f′*, to the outer ends of which said pads are pivoted. The armatures are drawn upward for printing by means of springs *g* and *g′* connected thereto, and to an arm, g^2, projecting laterally from the frame of the train, said springs being connected directly to suitable adjusting-arbors mounted in said arm in the usual manner. The cores of the helices D and D′ are extensions or prongs of one bifurcated pole of a permanent magnet, H, (shown arranged below the base X upon which the in-

strument sits,) its other pole having an extension, *h*, projecting upwardly through the base, and having pivoted in its upper edge the armatures E and E′, upon steel pivots secured in said projection. The armatures extend rearwardly somewhat beyond the projection *h*, so as to come under adjustable stops *i* and *i′*, arranged in brackets attached to said projection, these stops serving to regulate the downward movement of the armatures. To the rear of the extension *h* of the magnet H each of the armatures has rigidly connected to it a vertical rod, as shown at *k* and *k′*, these rods at their upper ends being hooked over a shaft, *l*, the hooks normally embracing, without touching, pins *m* and *m′* respectively, which project upward from said shaft. This shaft *l* has its outer bearing in the bracket *n* and its inner bearing in the frame of the machine, projecting through said frame, and having fixed to its inner end an arm, M, by means of a collar, m^2, said arm M being shown in dotted lines, Fig. 3, and in full lines in the detail view, Fig. 4. Said arm is bent at its free end to form a finger, m^3.

L (shown in Figs. 3 and 4) is a ratchet-wheel attached to a slowly-moving shaft of the train which impels the type-wheel, and moves continuously in the direction indicated by the arrow. Fitted loosely to the same shaft is the locking-arm P of the unison-stop mechanism, having a finger, *p*, bent laterally at its end, and R is an arm fixed to the type-wheel shaft *a*, and which engages with the finger *p* of the arm P when the latter is raised at the proper point.

Pivoted to the arm P is a gravity-pawl, S, which tends to constantly engage with the ratchet-wheel L, thus locking the arm P to the train and causing it to be lifted toward a point where it will lock the type-wheel shaft. The pawl S is provided with a curvilinear extension, *t*, against which the finger m^3 of the arm M strikes whenever either of the printing-pads is operated, thus disengaging the pawl from the ratchet-wheel L and allowing the arm P to drop back by gravity to its starting-point. The curvilinear extension *t* at the same time slides upon finger m^3, and the pawl is thus prevented from re-engaging with the ratchet before the arm P has completed its downward movement.

It will be seen that when either of the armatures E or E′ rises to operate its printing-pad its rod *k* or *k′* will be swung rearward, and the hook at the top of the arm, whichever it may be, will strike one of the pins *m* or *m′*, thus giving the shaft *l* a partial rotation, which throws up the arm M, so that its finger will strike the curvilinear extension *t* of the pawl S.

The operation of the unison devices from the arm M to the arm R on the type-wheel shaft is the same as in our patent heretofore referred to; but the devices for giving a partial rotation to the shaft differ from the devices for the same purpose shown in said patent, as here we operate said shaft from either of two printing-armatures, while in said patent it is operated by the vibrating tubular core of the printing-magnet.

It will be understood that when the train is wound up the escapement-wheel *b* has a constant tendency to move forward in the direction indicated by the arrow and move the type-wheels in the same direction, and that by sending reverse currents over the helix B the tubular core *a′* and pallet *c* will be vibrated to allow any desired letter or figure of either of the type-wheels to be brought into proper position for printing upon the fillet. Said fillet may be brought from a reel preferably located below the table or base, passed over both the pads F and F′, and thence over the drum Q, as shown in dotted lines, Fig. 2. Each of the arms *f* and *f′* has fixed to its tip beyond the printing-pads a bracket, *v*, and to these brackets are pivoted toothed pawls *u*, the toothed ends of which are forced toward the drum Q by suitable springs, so that either of said pawls, when raised by the arms to which it is connected, will slip over the fillet on the drum, and when again depressed its teeth will take into said fillet and move it forward on the drum. Now, supposing that a certain letter is to be printed on the fillet and a certain numeral after it, the type-wheel shaft, by sending reversed currents through the helix B, is rotated sufficiently to bring the proper letter of the wheel A into position for printing, then a proper current is sent through the helix D to neutralize, or partially neutralize, the magnetism of its core, and the spring *g* will raise the armature E and its arm *f* and thus drive the pad F upward to press the fillet against the letter. In the meantime the armature E′ is held down firmly, for though the helices D and D′ are to be connected in the same line-wire they are wound in different directions about their cores, so that a current which neutralizes, or partly neutralizes, the magnetism of the core of one helix re-enforces the magnetism of the other core. The letter having been printed by the action of the armature E and the circuit broken, so that said armature is again attracted by the core below, the escapement is again operated to bring the desired figure of wheel A′ into position to print, and then a current of suitable polarity or direction is sent over the helix D′ to neutralize, or partly neutralize, its core, so that the spring *g′* will raise the armature E′ and its arm *f′*, causing the pad F to press the fillet against the figure for printing. The printing-circuit being then broken the armature E′ is then again attracted by the core below, and the instrument is again in condition to print either letters or numerals, as desired. Of course several letters or several numerals may be printed in succession—as, for instance, N Y C at one side of the fillet and 1 9 8 at the other side, as shown in Fig. 7. As each armature descends the feed-pawl feeds the paper along properly to receive the

next impression. A frame, N′, prevents the side of the fillet which is not to be printed upon from being carried against the type-wheel above it and blurred. The ink is supplied to the type-wheels by ink-wheels v^2 in the usual manner.

In the diagram Fig. 6 we have illustrated a transmitting apparatus and shown the arrangement of line-wires and batteries which may be used in operating our improved instrument. In this diagram B designates the escapement-magnet and D and D′ the helices of the printing-magnet. W is the line-wire operating the escapement, and W′ the line-wire for operating the printing mechanism. Y is a local and Y′ a main-line battery at the sending-station. The letter M^2 designates an electro-magnet included in the circuit of the local battery Y, one terminal of said circuit being connected with a break-wheel, V, the makes and breaks of which are equal in number to the characters on one of the type-wheels. The other terminal of this circuit connects with a metallic spring-finger, which bears upon the periphery of the break-wheel, which is supposed to be constantly revolving by means of suitable mechanism. From the shaft of this wheel projects an arm, v^3, and V^2 represents one of the keys of the key-board, either of which may be pressed down in the path of the arm v^3 and stop the rotation of the break-wheel. The armature m^3 of the magnet M^2 is carried by a spring-retracted pivoted lever, m^4, which also carries at its top a cross-bar, m^5, of non-conducting material, which is provided with upwardly-projecting metallic fingers n^2 and n^3, the former of which makes contact alternately with the metallic stops 8 and 8′ as the lever m^4 vibrates, while the latter makes similar contact with the metallic stops 9 and 9′. One pole of the main battery Y′ is connected with the stop 8, which is electrically connected with the stop 9′, and the other pole is connected with the stop 9. The finger n^2 is connected with the ground and the finger n^3 with the line wire W, which is connected with the escapement-helix B. The stop 8′ is connected with the stop 9. When the fingers n^2 and n^3 make contact with the stops 8 and 9 respectively a current flows from the positive pole of the battery to stop 9, and thence over the finger n^3 and the line-wire, and at the same time a current flows from the ground to finger n^2 and over stop 8 and the connecting-wire to the negative pole of the battery; but when the fingers make contact with the opposite stops, 8′ and 9′, the current flows from the positive pole to stop 9, thence to stop 8′, and over finger n^2 to the ground-wire, while at the same time a current flows from the line-wire W to finger n^3 and thence over stop 9′ and the connecting-wire to stop 8, and thence to the negative pole of the battery.

As the break-wheel is in constant rotation, except when stopped by a key, the lever m^4 is in similarly constant vibration, and thus a succession of reverse currents are sent over the line-wire W while the transmitter is in operation, resulting in the step-by-step rotation of the escape and type wheels of the printing-instrument, as heretofore described. When a key of the key-board is depressed it will be struck by the arm v^3 and the break-wheel will be stopped. As it starts from a point in unison with the type-wheels, the depressed key will designate the letter or numeral which is slipped into position to print.

The letter Y^2 designates the printing-battery, the opposite poles of which are connected with anvils under the keys 10 and 10′, both of which are connected with the line W′, which is connected with the helices D and D′, the cores of which control the printing-armatures E and E′ of the printing-instrument, the middle of the battery being connected to the ground. When a key of the key-board is depressed to stop the type-wheels one of the keys 10 or 10′ is to be depressed immediately after to cause the operation of one of the printing-armatures. Which of the keys 10 or 10′ is to be depressed depends upon the arrangement of the coils D and D′, with respect to the neutralization, or partial neutralization, of their cores, and whether a letter or numeral is to be printed. If a current in the direction of the arrows No. 1 neutralizes the core of the helix D, and a letter is to be printed, the key 10 is to be depressed to contact with its anvil, and then a current flows from the positive (—) pole of battery Y^2 in the direction of said arrows, the core of helix D is neutralized, and its armature flies up to print, and if a current in the direction of arrows No. 2 neutralizes the core of helix D′ and a numeral is to be printed, then the key 10′ is to be depressed, and a current will flow over the wire W′ in the direction of arrows No. 2 to the negative pole of the battery.

While this diagram illustrates the general principle of a transmitting apparatus adapted for use with one printing-instrument, we may use any other form which will cause currents to flow similarly over the line-wires.

We are aware that printing telegraph instruments have been provided with two type-wheels upon the same shaft, one bearing letters and the other numerals; but in every such instrument known to us either the type-wheels must be shifted laterally to a printing-pad or a single printing-pad must be shifted to the different type-wheels as a letter or numeral is to be printed, thus wasting the time in shifting, which in our instrument is utilized in printing immediately when the escapement-wheel is rotated far enough to bring the proper letter or numeral opposite its pad.

In the modified construction of the apparatus shown in Fig. 8 the attraction of the armatures by the magnets produces the impression, and the retractile springs simply act in the ordinary manner to remove the armatures from the cores, thus removing the pads from the type-wheels. The armature E^2

is pivoted to the pole of the permanent magnet nearest the type-wheel, and this armature and the pad-carrying arm f^2 form a lever of the first kind, while in the machine as illustrated in Figs. 1, 2, and 3 each of the pad-carrying arms forms a lever of the third kind. The spring g^2 holds the armature normally away from the core of coil D^2, and when a current is sent over said coil the permanent magnetism of its core is re-enforced by the inductive influence of the current and it attracts the armature, thus causing the pad to be thrown toward the type-wheel, pressing the fillet thereagainst. In this form of machine the cores of the printing-magnets may be either of unmagnetized soft iron or permanently polarized. In the former case the letter H^2, Fig. 8, may be considered to designate a bent soft-iron bar, while in the latter case it would indicate a permanent horseshoe-magnet, and in the former case the armatures would require to be permanently polarized, the helices being arranged to differently polarize their cores, so that a current in one direction would cause one core to attract and the other to tend to repel its armature, and a current in the opposite direction would produce a relatively reverse effect. In both cases the cores are formed by extension of one end of the metal bar, and the armatures are pivoted to an extension of the other end.

Only one magnet is visible in Fig. 8; but it will be understood that the other printing-magnet is similarly constructed and arranged with relation to its armature and a pad-carrying arm, which performs the impression of the fillet upon the other type-wheel, the type-wheels and all other devices, besides the magnets, armature, and pad-carrying arms, being constructed and arranged as shown in Figs. 1, 2, and 3.

The electro-magnet which controls the armatures for operating the printing-pads we intend to make the subject of a separate application for Letters Patent.

What we claim is—

1. In a telegraphic printing-instrument, the combination, with two type-wheels and devices for rotating the same to and stopping them in desired positions, of a printing-pad for each type-wheel, separate armatures arranged to operate said pads, and two connected helices having permanently magnetic cores arranged to control said armatures respectively, the arrangement of said helices being such that an electric current therethrough in one direction will neutralize, or partly neutralize, the core of one, while a current in the opposite direction will have a similar effect upon the other, substantially as described.

2. In a telegraphic printing-instrument, the combination, with two type-wheels fixed upon the same shaft and devices for rotating the said shaft to and stopping it in desired positions, of two printing-pads, one for each type-wheel, separate armatures for operating said pads, and controlled by the cores of separate helices, said cores being connected to one pole of a permanent magnet and the armatures pivoted to the other pole of said magnet, the arrangement of the said helices being such that an electric current in one direction will neutralize, or partly neutralize, the core of one, while the current in the opposite direction will have a similar effect upon the core of the other, substantially as described.

3. The combination, with the unison-stop devices of a printing-telegraph provided with two type-wheels fixed upon the same shaft, of two armatures arranged to operate separate printing-pads for said wheels respectively, and intermediate devices by which both of said armatures control said unison-stop devices independently of each other, substantially as described.

4. The combination, with the two type-wheels fixed upon the same shaft and suitable escapement devices, of the helices D D′, surrounding cores forming extensions of one pole of the permanent magnet H, the armatures E and E′, pivoted to the other pole of said permanent magnet, and provided with the arms f and f', having the attached printing-pads, and the springs g and g', substantially as described.

5. The combination, with the unison-stop devices, substantially as described, and the shaft l, carrying the tripping-arm M and provided with the pins m and m', of the armatures E and E′, controlled by separate electro-magnet cores, and the hooked arms k and k', having their hooks arranged to strike said pins, substantially as described, and for the purpose set forth.

6. The combination, with a printing telegraph-instrument provided with two type-wheels fixed upon the same shaft, the escapement, and duplex printing devices, substantially as described, of a transmitting apparatus provided with means for sending reversed currents over one wire for operating said escapement devices, and means for sending reversed currents over a separate wire for operating independently of each other the two portions of said printing devices, substantially as described.

In testimony whereof we affix our signatures in the presence of two witnesses.

J. HOLMES LONGSTREET.
J. E. WRIGHT.

Witnesses:
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DAVID VAUGHAN.