

2 Sheets—Sheet 1.

Patented Nov. 1, 1864.

Fig: 1.

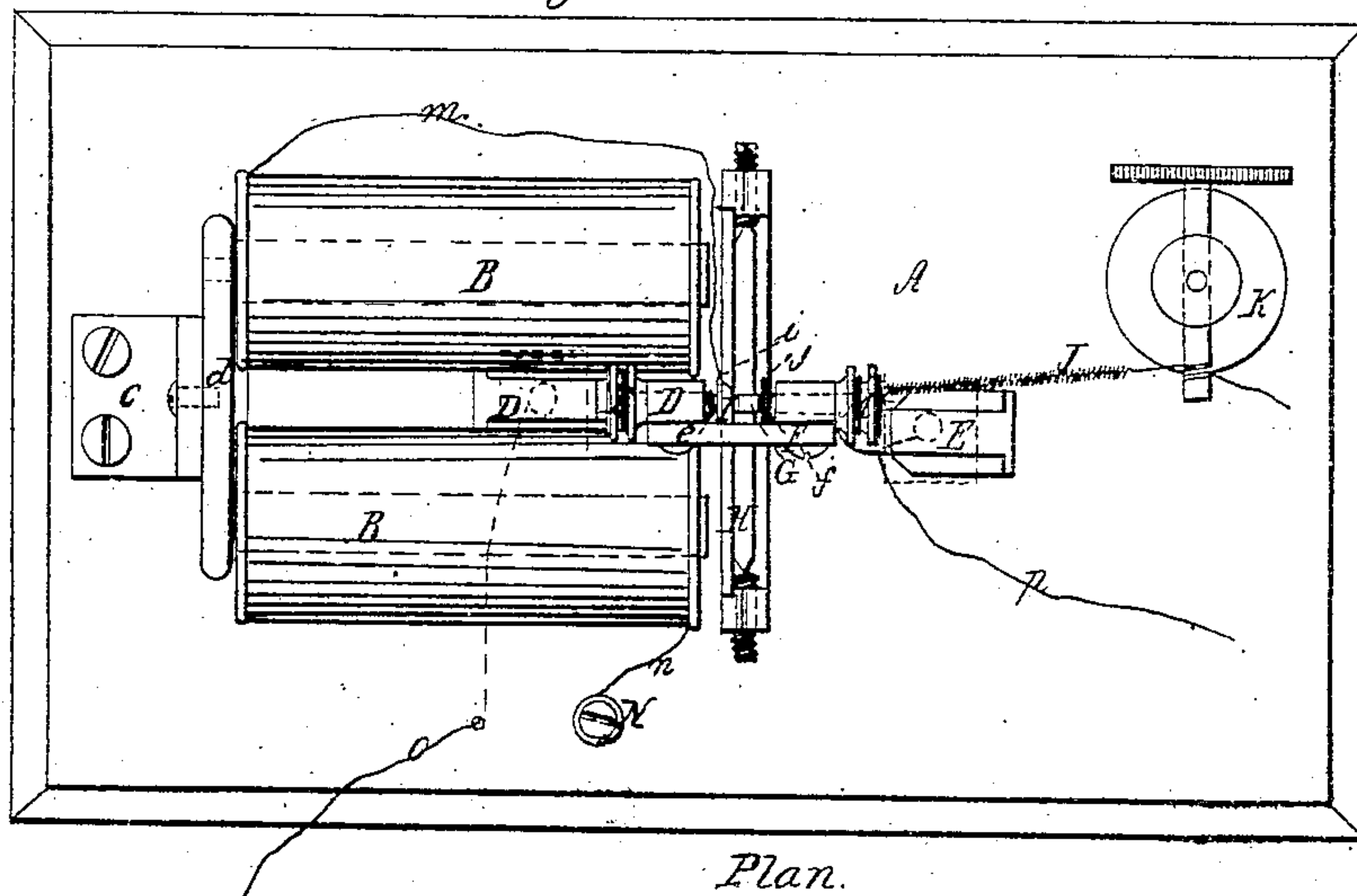


Fig. 2

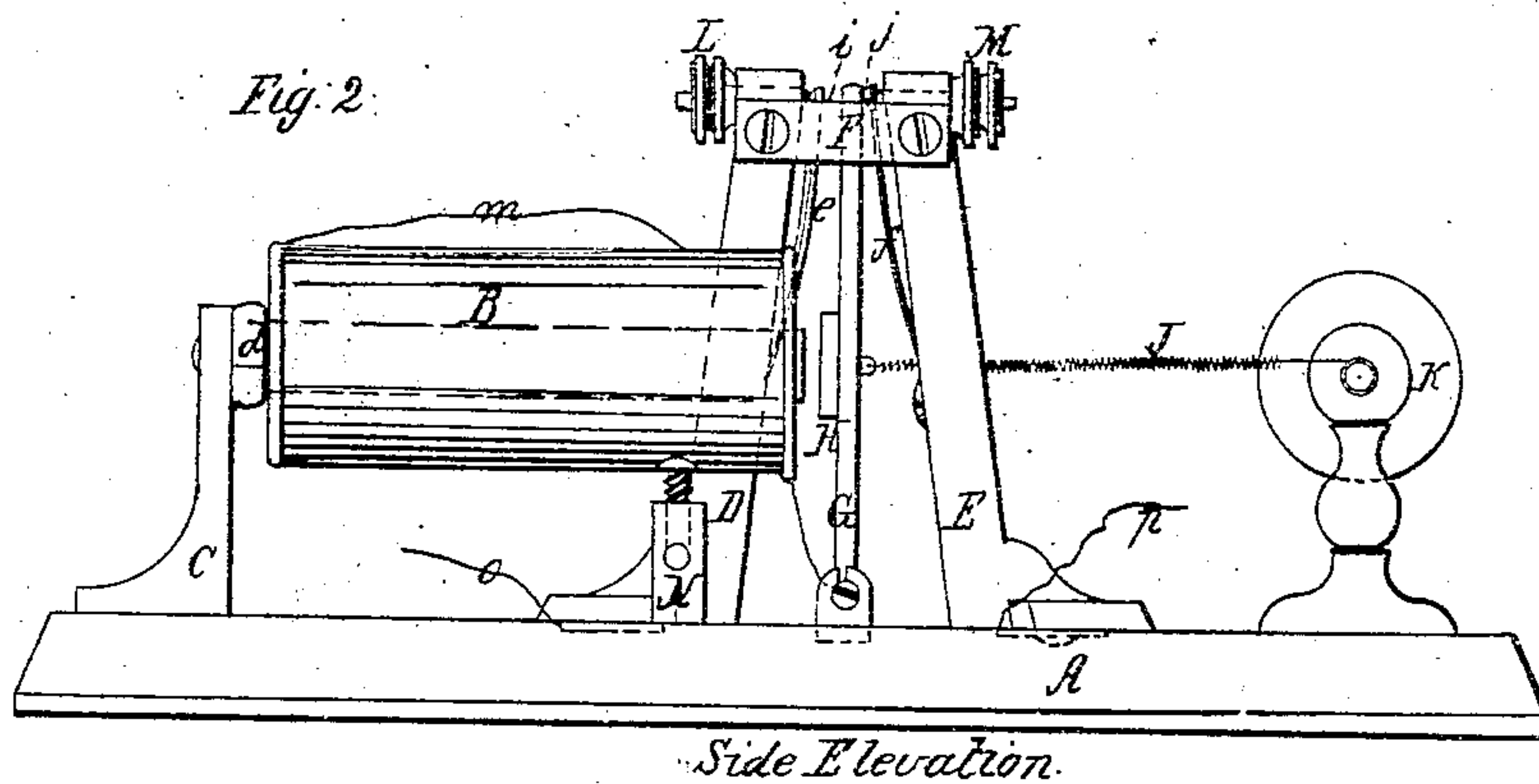
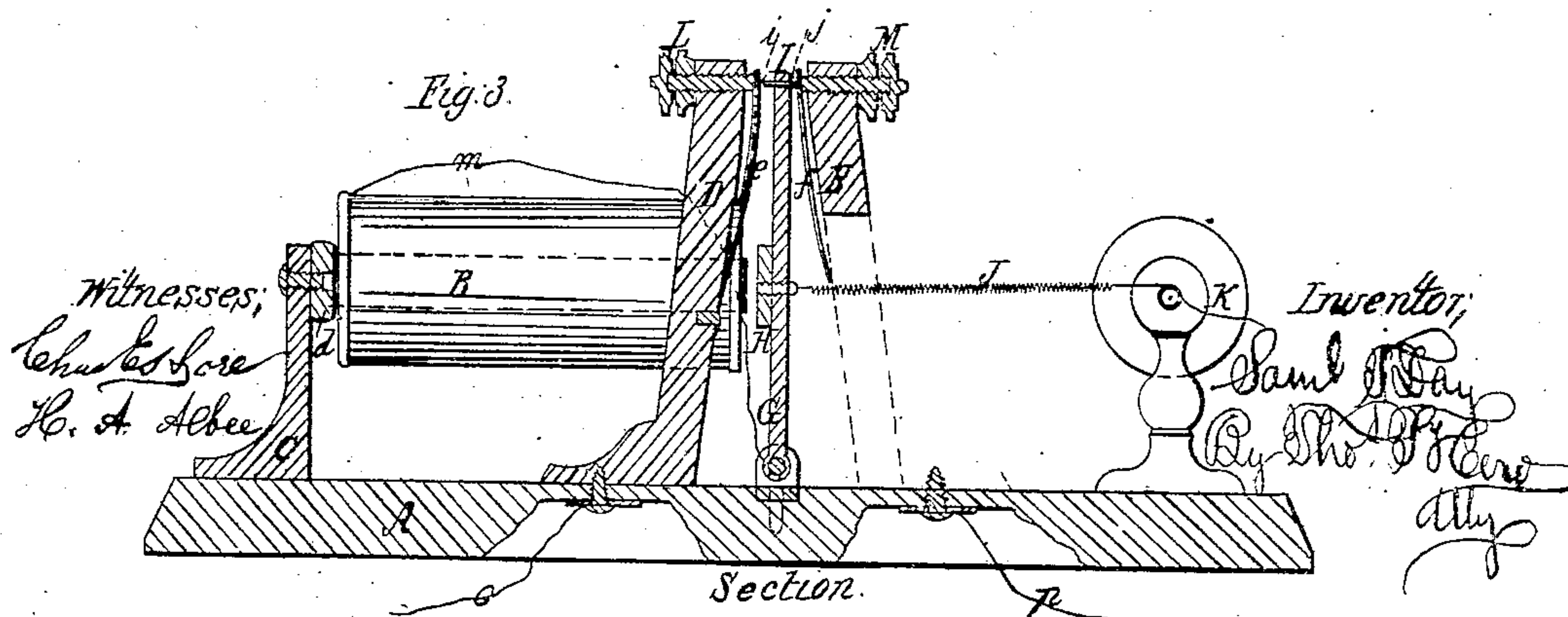


Fig. 3.



S. F. DAY.
TELEGRAPH INSTRUMENT.

No. 44,855.

Patented Nov. 1, 1864.

Fig. 4.

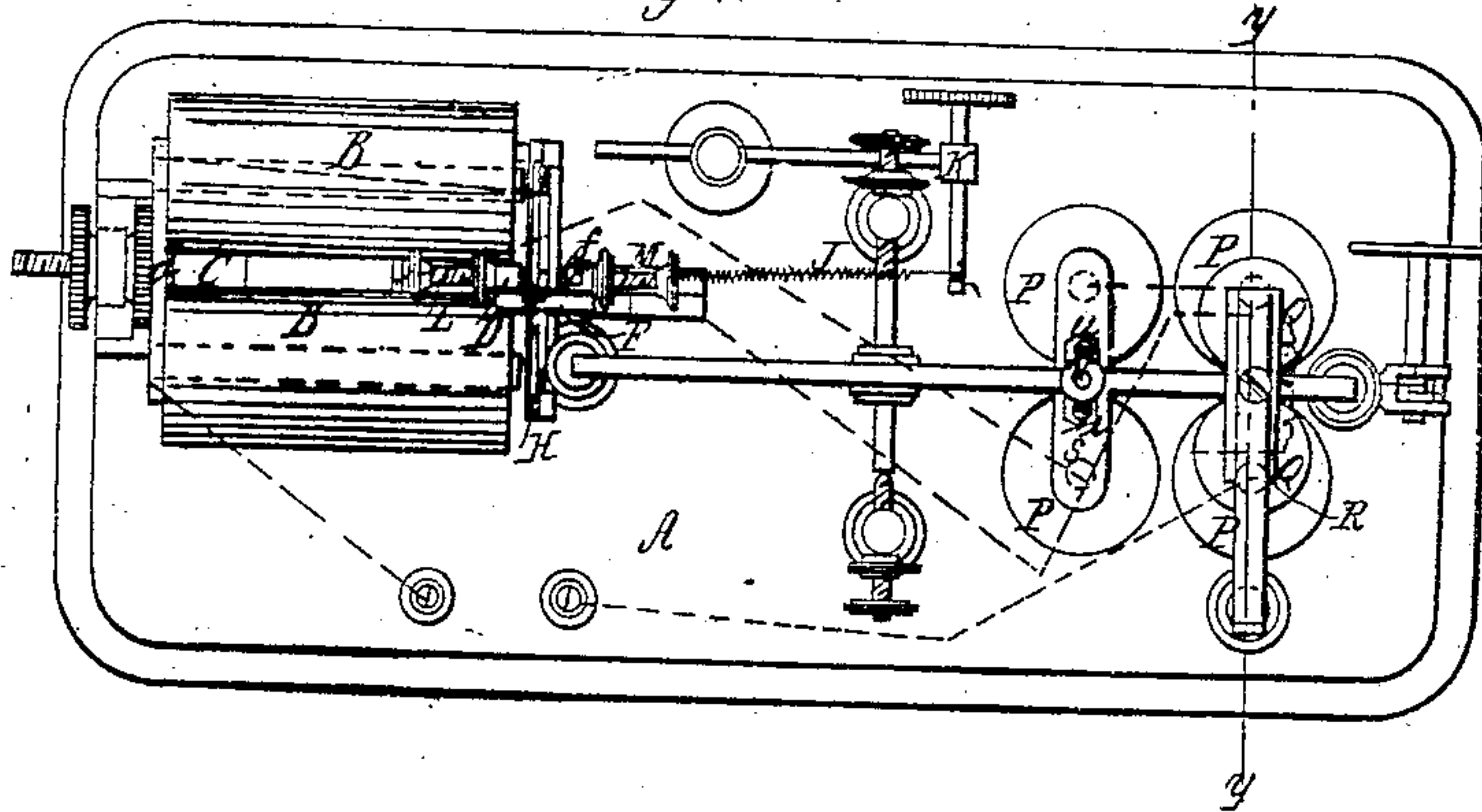


Fig. 5.

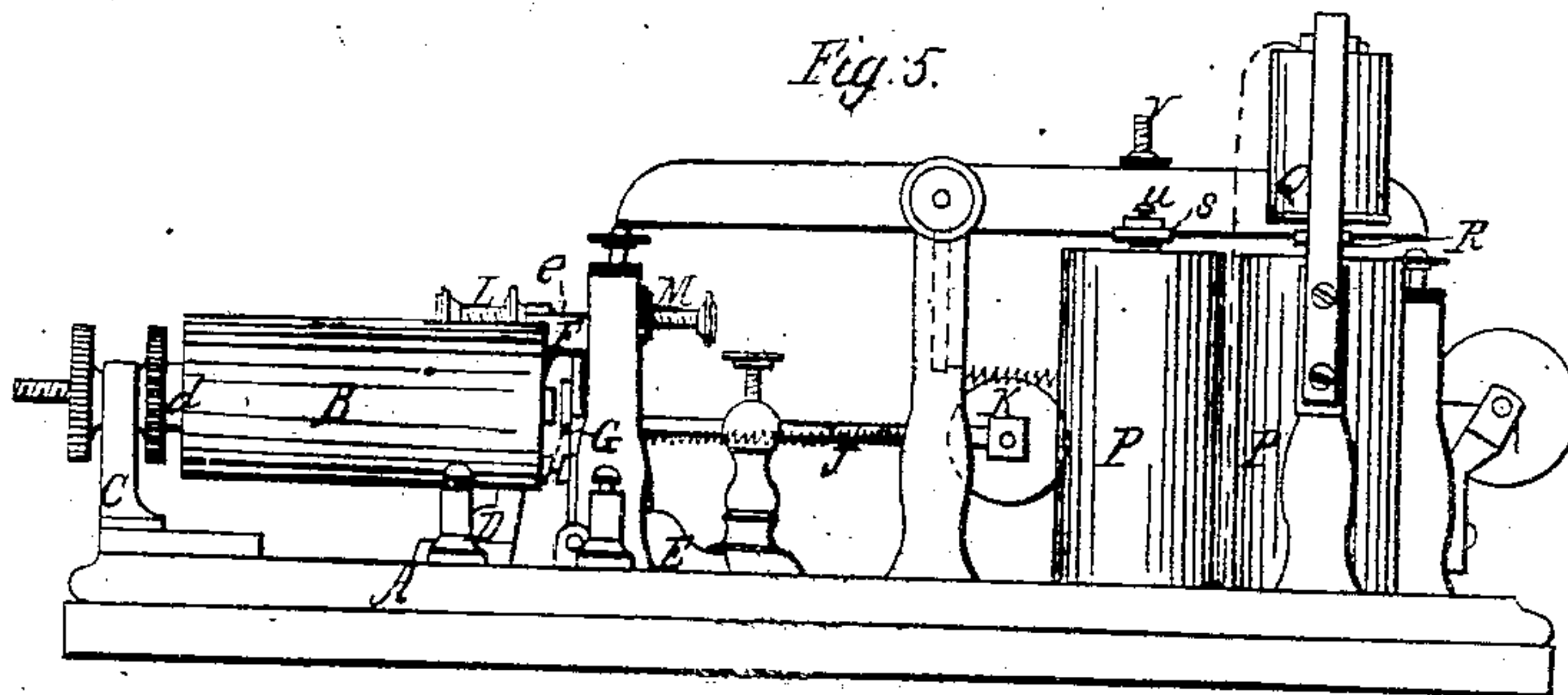
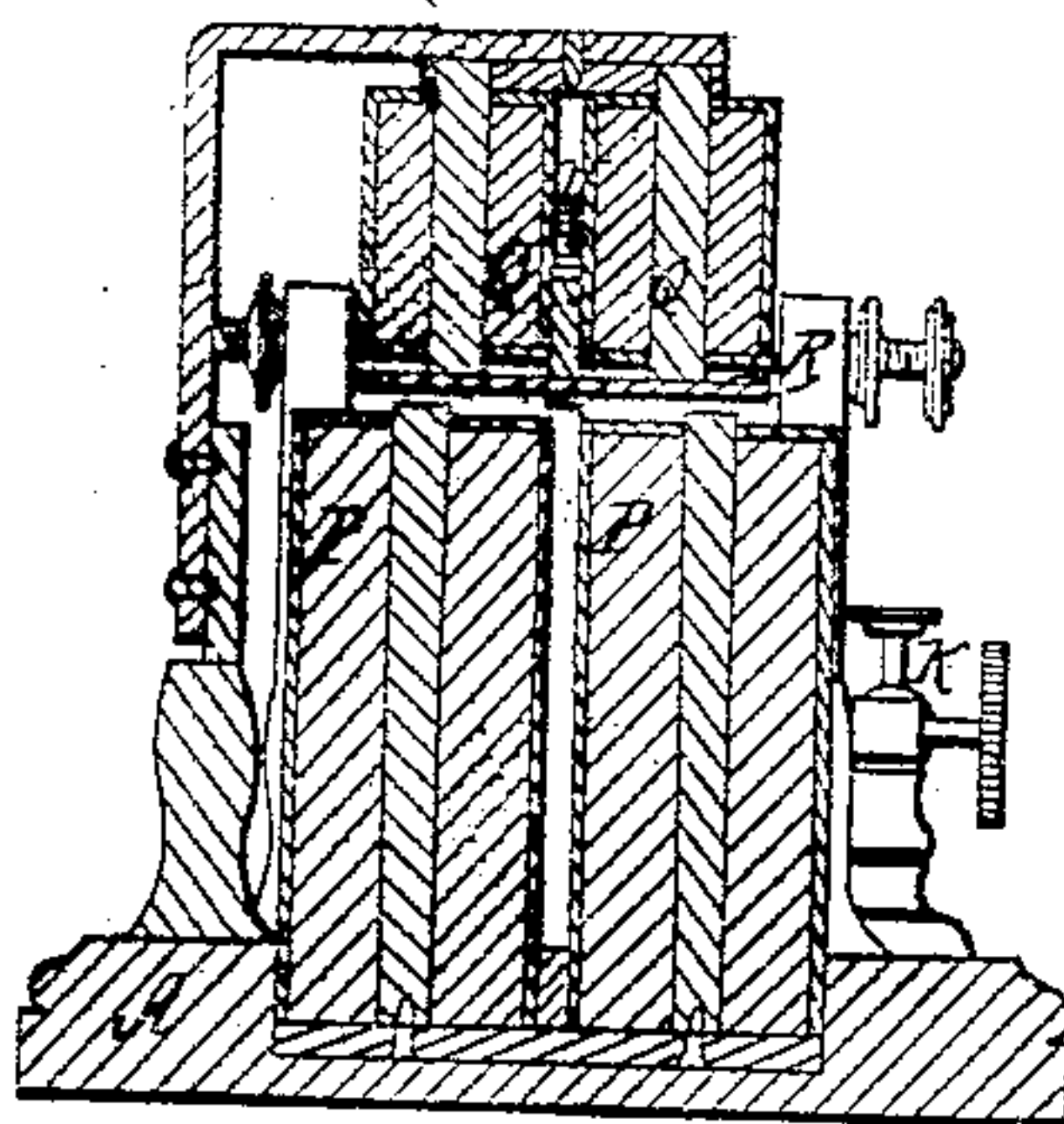


Fig. 6.



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UNITED STATES PATENT OFFICE.

SAMUEL F. DAY, OF BALLSTON SPA, NEW YORK.

IMPROVEMENT IN TELEGRAPHIC INSTRUMENTS.

Specification forming part of Letters Patent No. 44,853, dated November 1, 1864.

To all whom it may concern:

Be it known that I, SAMUEL F. DAY, of Ballston Spa, in the county of Saratoga and State of New York, have invented certain Improvements in Telegraphs; and I 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.

The object and purpose of the first part of the said invention is to more perfectly and fully insulate the sounding-instrument from the current at the instant of the opening of the circuit, or at least from the tendency of the current to prevent the lever from vibrating with that delicacy and promptness which is desirable in telegraphic instruments. In the ordinary telegraphic apparatus now in use this is but imperfectly accomplished, and the result is that a much heavier current is required to work the instrument than would otherwise be the case; and with the loss of power by the grounded current much more original force of battery is made requisite than is in the use of my invention. In a portion, at least, of the instruments now in use a short line is run around the instrument, and a device employed for opening and closing the connection with this short line, so as to send the current alternately through the instrument and through the short line around it, and thus produce the necessary pulsations by means of the difference in the length of the two lines, it being generally, or, at least, very commonly, supposed that the current will take the shortest line to complete its circuit. To a certain extent this is true, but not in its fullest sense. A portion of the current will still pass through the coil, while the greater portion passes around it. But there is another difficulty involved in said construction—viz., that where a current has a choice of lines it will operate much more sluggishly than if its line of communication is cut off in one direction when it is connected in the other.

The second part of my invention consists in providing the instrument with an additional set of magnets which work in an opposite direction, or rather which move the lever in an opposite direction, from the magnets commonly and ordinarily used, these magnets being, in addition to those ordinarily employed, and in combining therewith, and with the magnets

ordinarily used, a device for shifting the direction of the current, so that the current will alternately operate upon the magnets ordinarily used and upon these additional magnets, thereby effecting the return of the lever by means of the current sent through these additional or supplementary magnets, by which the tension of the spring formerly used for that purpose can be very much reduced, or even dispensed with altogether, by which means the necessary current is still further reduced and a very small amount of electricity is rendered capable of operating the instrument satisfactorily.

In the accompanying drawings, Figure 1 is a plan of the device or instrument by which the object aimed at in the first part of my invention is attained. Fig. 2 is a side elevation thereof. Fig. 3 is a vertical longitudinal section, showing the parts which are beyond the center in Fig. 1. Fig. 4 is a plan showing the instrument with the sounder and the additional magnets for withdrawing the lever above referred to. Fig. 5 is a side elevation thereof. Fig. 6 is a vertical section, showing the parts at the left hand of the line Y Y as drawn across Fig. 1.

A is the wooden bed on which the parts of the instrument are mounted.

B B are the coils in ordinary use in telegraphic instruments to operate the brake for opening and closing the circuit.

C is a standard by which these coils are supported. d is the cross-bar by which they are connected at the end.

D and E are supports or brackets attached to the bed A, to which supports or brackets the springs e and f are attached. These brackets D and E are connected at the top by a piece of wood or other insulating substance, F, and in this piece F are inserted two pins, i and j, against which the springs e and f rest when in their normal position.

G is a vibrating lever which carries the armature H near the center of said lever and the pin I at the top, through which pin the circuit passes, and through one or the other of the springs e and f, which said circuit is transmitted around or through the instrument, as the case may be. The lever G is thrown back to the position represented in the drawings by the tension of the ordinary spring J now in

common use, and this tension is adjusted to suit the current upon the well-known and common device which consists of a pin set in a standard, around which pin a fine line attached to the spring is wound by means of a thumb-head, as is represented at K.

The construction of the parts of this machine is such that the pin *i* does not break its connection with one of the springs *e* *f* till it has effected a connection with the other, so that there is no break or surging of the current caused by absolute disconnection with the main line. To accomplish this purpose and make this connection properly, and transmit it when desired, the pins *i* and *j* are set at such a distance apart as to allow the springs *e* and *f* to come sufficiently near to each other to both touch upon the pin *i* when it is in a central position; but when it is moved out of that central position it leaves one or the other of the springs *e* or *f* and continues its connection with the other, through which it transmits the whole current. The sweep of this lever is adjusted by means of the thumb-screws L and M. To allow a greater range to the lever, without allowing the springs to leave the pin *i* far enough to make the current inefficient, I make the springs *e* and *f* slightly twisted, as represented in the drawings, but still sufficiently delicate that the current will bring them up flat against the stop, as more especially represented in Fig. 1.

The connection from the battery over the line-wire is made to the screw-cup N, from which the wire *n* connects with the coils or U-magnet B, and carries the circuit through the coils represented in Figs. 1, 2, and 3, and this current is transmitted by means of the wire *m* to the lever G, and through it to one of the springs *e* or *f*. The current of electricity is thus communicated to either the bracket D or the bracket E, to which the wires *o* and *p* are, respectively, attached, the first of which wires is connected to the usual magnets in the sounding-instrument, and the other to the other magnets, which are placed above the lever to withdraw it, as represented in the last three figures.

P P are the ordinary magnets or coils in common use for operating the sounding-lever, with the exception that they are in this case arranged in a manner described in a patent granted to me May 20, 1862, for an improvement in instruments for telegraphs.

Q Q are two coils or magnets, placed in such a position that a current of electricity passed through them will have a tendency to draw the lever in an opposite direction to that in which it will be drawn by the magnets P P. These last-described magnets connect with and operate upon an armature, R, attached to the lever, and by means of the attraction of the current when passed through these coils Q Q the lever may be returned in an opposite position from that in which it is drawn by the magnets previously described. This armature

R also works upon the outer one of the magnets P P.

To secure a perfect adjustment of the magnets to be operated upon by the different coils I attach the armature S by an adjustable attachment, so that either end or both ends of this armature can be raised and secured in position to give the adjustment desired. This is done by means of the adjusting-screws *u* *v* passing through an auxiliary armature in combination with the screw *v*.

By means of my improvements I not only perfectly insulate the coils P P from the current at the proper time for the return of the lever, but I also make the portion of the current thus cut off from those coils available to return the lever into its proper position, thereby reducing the tension applied to the adjustable spring J or dispensing with said spring altogether, and consequently giving a much more audible stroke with the same current, or the same stroke with a much less current, than could be done with the devices now used for the same purpose.

It will be clear from what has been said that when the armature H is attracted by the magnet, so as to draw the lever G against the spring *e* and thus break the connection with the spring *f*, the whole current will be transmitted through the coils P P, which will attract that end of the lever downward, and the current through the upper coils, Q, will be completely cut out or switched off; but when the attraction ceases and the lever G falls back into its normal position, as represented in the drawings, the connection with the line through the coils Q Q is renewed, and the line through the lower coils is perfectly broken, so that no electricity can possibly pass through them unless by the extraordinary operation of jumping. This being the case not only leaves the sounding-instrument perfectly free to open, but causes it to work more promptly and with less power than would otherwise be the case, but, also, the current passing through the upper coils causes it to open without depending upon the tension of the spring to do so. The result is, therefore, that the sounding-lever is brought down with the whole force of the current unresisted by the tension of the spring. The spring represented is attached to this part of the instrument, being more designed to adjust the stroke than to simply effect the return of the lever.

To obviate the possibility of the jumping of currents as far as possible, I generally make the points of the thumb-screws L and M of wood, though they may be made of metal; but I prefer the material previously named. It is obvious that either part of this invention can be used without the other, though I prefer to use them together as producing the best effect.

One of the principal and important advantages of my invention is that it enables me to entirely dispense with the local battery and to work the sounder, even on a long line, by the line-current alone, and, by the aid of certain

improvements for which Letters Patent of the United States were granted to me the 24th day of May, 1864, to work an indenting-register in like manner.

It will be observed by an inspection of the parts that the line-connection is connected directly to the repeating-instrument at N, and that when the armature H is sufficiently attracted the current of electricity is transmitted directly, and without the intervention of a local battery, to the magnets P P, from which the current is conducted through the wire S to the screw-cup T, to which the continuation of the line-wire is attached. When the current is cut off by the breaking of the circuit the electricity remaining in the line-wire or derived from the atmosphere being insufficient to overcome the tension of the spring J, the connection through the wire *o* and the magnets P P is broken, and the current which remains then passes over the wire *p* to the magnets Q Q, and from them over the wire S, to which they are connected, to the screw-cup T, from which it passes over the continuation of the line-wire, as before. By combining with this construction and combination of parts such a registering-instrument as is described—my above-mentioned patent of May 24, 1864—I am enabled to work the registering-instrument on a very long line without a local battery and without difficulty, thus not only saving the expense of the local battery, but the difference between the salary of an operator capable of reading by sound and that of one only capable of reading from a register.

Having thus fully described my said invention, I claim—

1. The combination of the lever G, connecting-wires *o*, *p*, and *m*, or their equivalent, magnet B, one or more of the magnets P, and the sounder or registering-lever, in the manner hereinbefore described, and without the intervention of a local battery between the repeat-

ing or relay magnet B and the sounding or registering magnets P—that is to say, in such a manner as to completely break the circuit through the magnet or magnets P, by which the sounder or registering lever is operated, and the circuit around them alternately, by means of the pulsations produced in the line-current by the direct action of the operating-key, substantially as herein set forth, and without changing the direction of the current upon the line-wire or breaking the connection of the line by the action of the parts composing this combination.

2. The combination of the shifting-lever G, springs *e* and *f*, brackets D and E, or their equivalent, magnet or magnets P, and the sounder or registering lever, substantially in the manner hereinbefore described—that is to say, in such a manner as to continue the circuit in one of these directions till the connection in the other is fully made, and without changing the direction of the circuit or current through the line-wire or diverting it therefrom by its operation, substantially as and for the purpose hereinabove set forth.

3. The combination of the magnet Q, the registering lever or sounder, and the magnet or magnets P, when the said magnets are so connected to the current through which the message is received from the operating-key that the pulsations of the said current are made to change its direction so as to send it through the magnet or magnets P, and through the magnet Q alternately, thereby causing the same direction of current upon the line to attract the sounder or registering-lever in opposite directions, substantially as and for the purpose hereinbefore set forth.

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