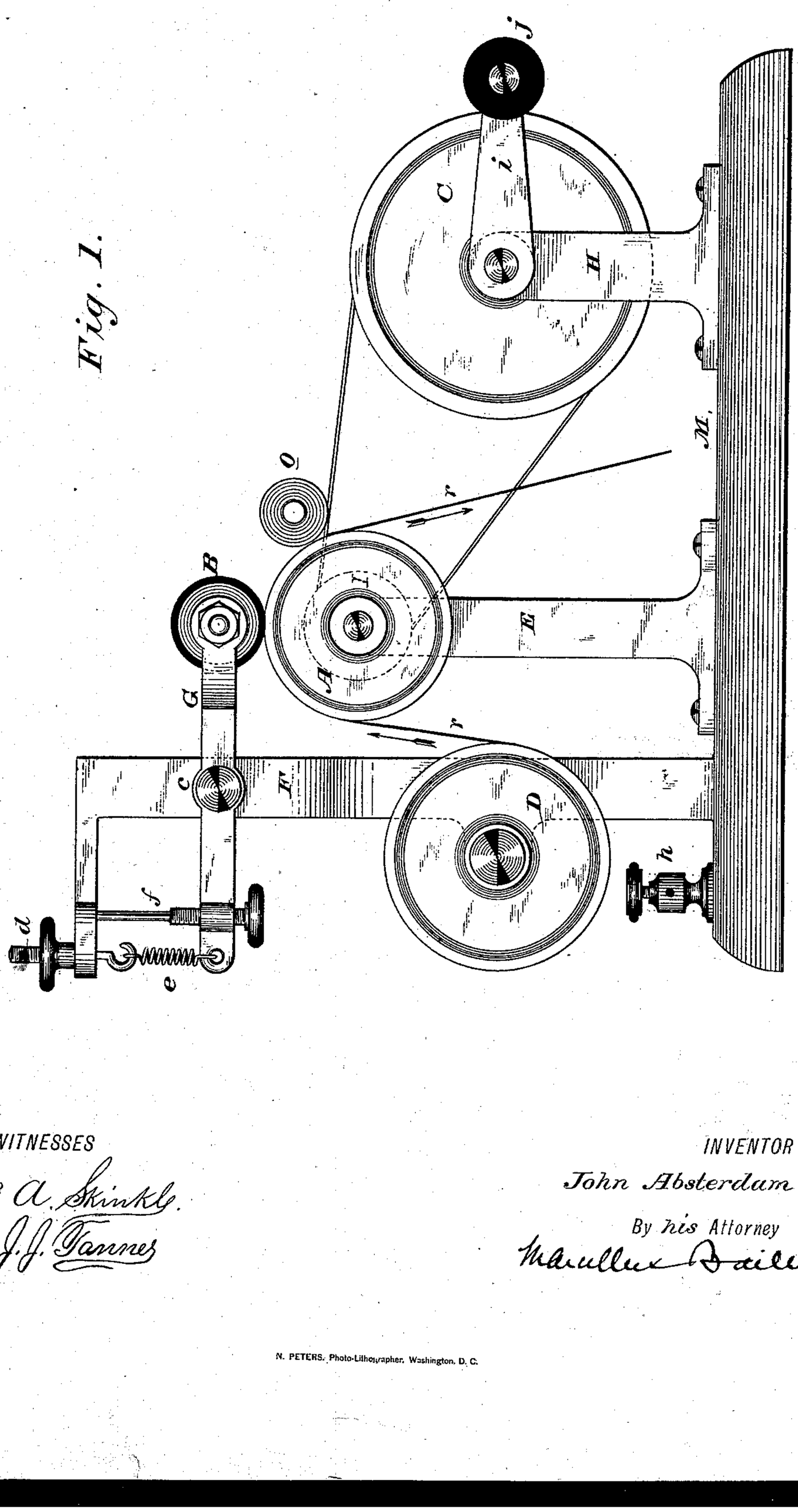
(No Model.) 4 Sheets—Sheet 1

J. ABSTERDAM.

AUTOMATIC TELEGRAPH.

No. 261,975. Patented Aug. 1, 1882.

Fig. 1.



WITNESSES

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(No Model.) 4 Sheets—Sheet 2.

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AUTOMATIC TELEGRAPH.

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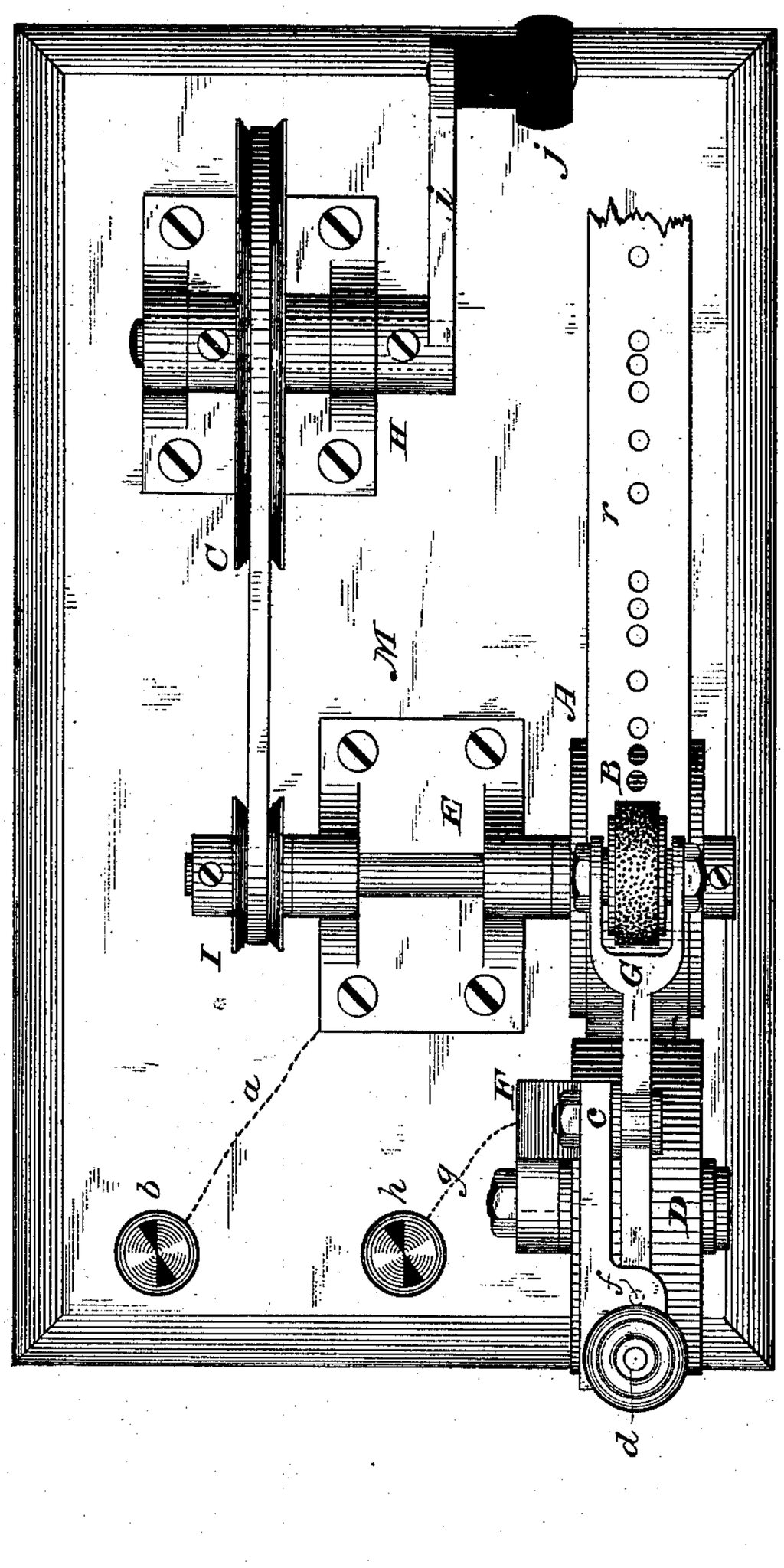
Fig. 2.



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4 Sheets—Sheet 3.

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AUTOMATIC TELEGRAPH.

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Fig. 5.

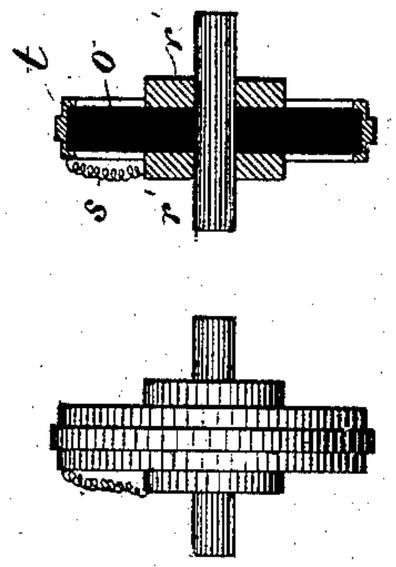


Fig. 4.

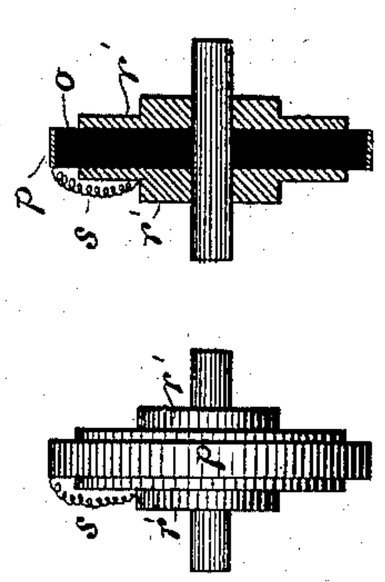


Fig. 3.

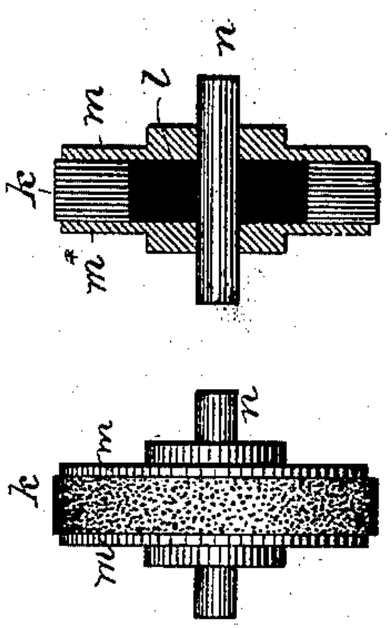


Fig. 6.

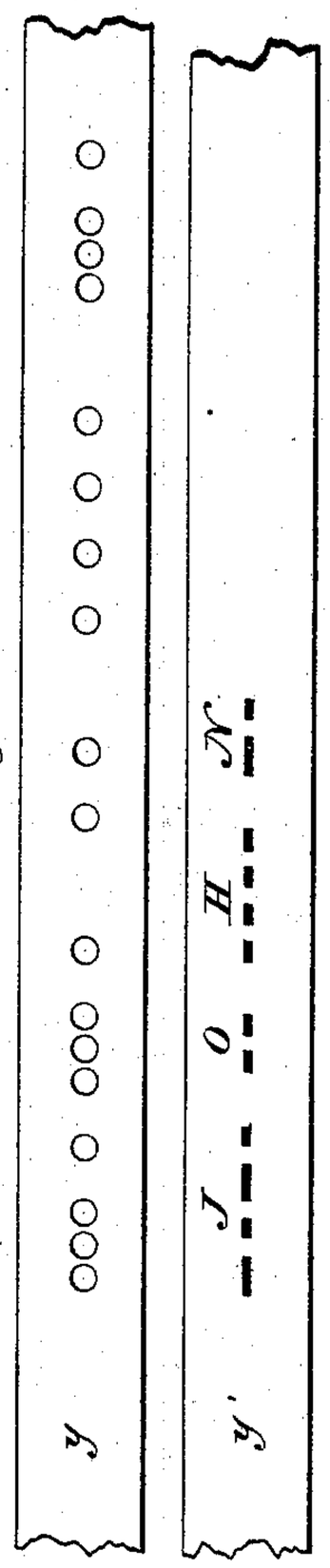


Fig. 7.

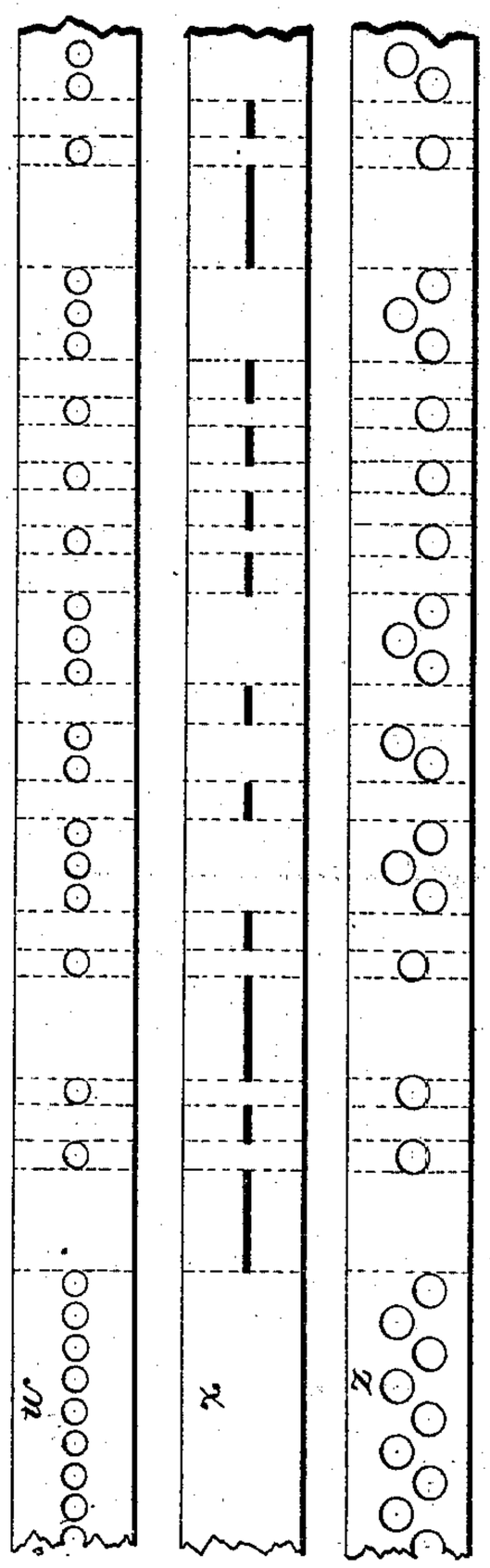


Fig. 9.

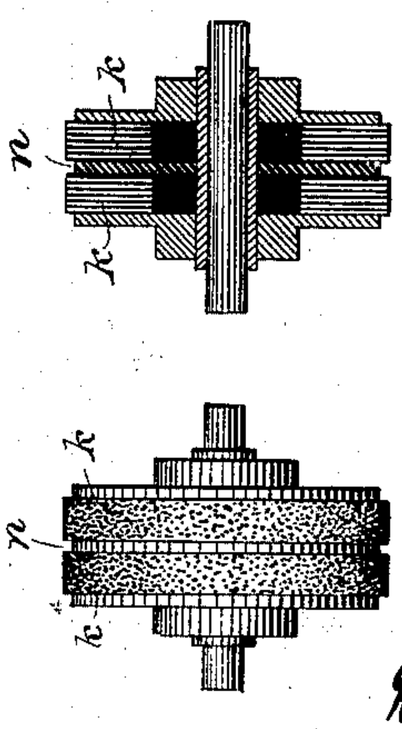
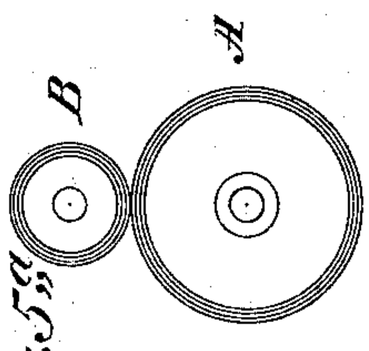


Fig. 5½.



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AUTOMATIC TELEGRAPH.

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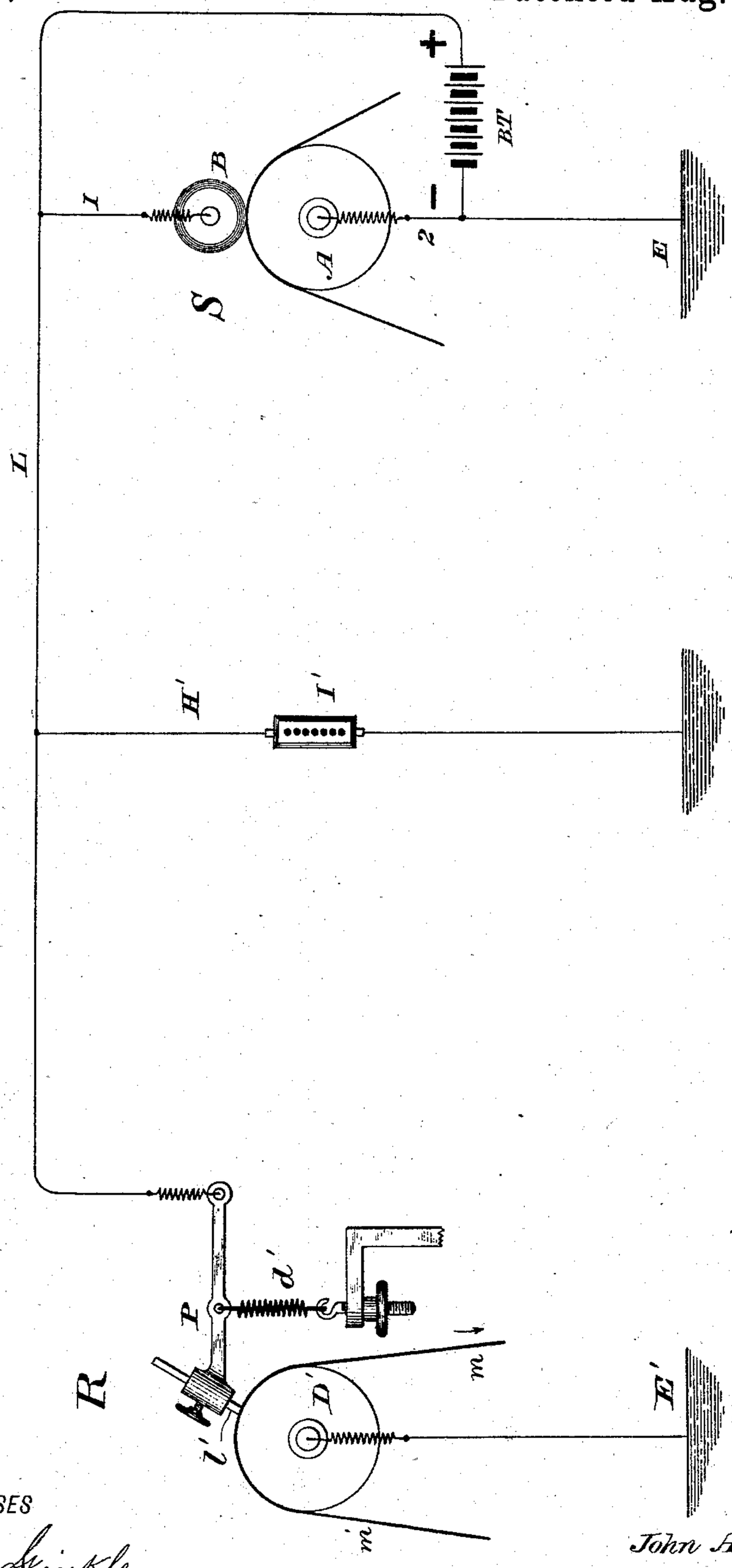

Fig. 8.

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UNITED STATES PATENT OFFICE.

JOHN ABSTERDAM, OF NEW YORK, N. Y., ASSIGNOR OF TWO-THIRDS TO LOUIS G. DREYFUS, OF SAME PLACE.

AUTOMATIC TELEGRAPH.

SPECIFICATION forming part of Letters Patent No. 261,975, dated August 1, 1882.

Application filed December 21, 1881. (No model.)

To all whom it may concern:

Be it known that I, JOHN ABSTERDAM, of the city, county, and State of New York, have invented certain new and useful Improvements in Electric Telegraphs, of which the following is a specification.

My improvements have chiefly reference to that portion of apparatus used in electric telegraphy which is employed to transmit signals or messages. As the transmitting instrumentality I make use of a flexible, cushion-like, pliable or elastic contact wheel or roller, which runs against or in connection with another wheel or drum, between which and the contact wheel or roller is intended to pass a perforated or otherwise suitably-prepared strip, which, as it moves along, will permit the contact-roller intermittently and at proper intervals to have electrical contact with the drum.

It has been usual heretofore to pass the transmitting perforated strip between a drum or large roller on the one side and a small vibratory spring presser-roller, or a stud or stylus, or the like, on the other side, which will make contact with the large roller or drum through the perforations in the paper as the latter moves along. Such contacts are perhaps sufficiently good when the perforated strip moves only at a moderate speed; but the moment the strip moves fast, as it must in rapid telegraphing, the contact is not uniform, and consequently the marks on the receiving-strip are confused and blurred for the reason that the devices heretofore used, in order to make contact with the drum, must drop or fall through each perforation of the transmitting-strip, which, to make good contact, requires time; and when the perforated strip is caused to travel very fast the stud or roller, wire stylus, spring, or other instrumentality heretofore employed to make contact through the perforations vibrates rapidly, moving up and down in a series of leaps or jumps and following oftentimes an irregular or zigzag line, resulting in only partial and imperfect contacts, which result in the reproduction of indistinct and oftentimes unintelligible marks or signals at the receiving-station. In my improved transmitter, however, the contact is made by two rollers having (one or both) elastic cushion-like metallic conducting-faces, which bear upon the strip passing between them and press or bulge through the perforations of the strip, so as to make contact with one another, and there is thus no leaping or jumping or vibratory movement of the parts; but the motion is even, continuous, and such as would be produced by running two rollers one against the other, and I thus make a good, firm, and complete contact under all circumstances, no matter at what speed the rollers travel, with the result of producing equally good marks or signals at the receiving-station.

There is the further disadvantage attending the use of the levers, springs, or wire styluses or pencils heretofore used that in constantly rubbing against the surface of the perforated strip they are apt to gather dirt or lint on their contact ends, which prevents their making good contact. No such liability exists when my improved transmitting-roller is used.

I am aware, also, that it has heretofore been proposed to employ a contact or circuit-closing wheel or roller provided with yielding points, such as outwardly-spring-pressed pins projecting through and beyond its periphery; but the same difficulty of making good contacts is experienced with such a roller as with the devices just mentioned. The pins or projections, which are necessarily placed at intervals from one another, cannot always register properly with the perforations in the strip, and thus the pins do not always make full contact throughout the length of the respective perforations. Some contacts are longer or shorter than others, instead of being uniform, and consequently the telegraphic marks which are registered thereby are not uniform. Indeed, it happens in practice, when the transmitter is moving rapidly, that some perforations of the strip passing under the circuit-closing wheel are not entered at all by the pins or projections. Consequently there is not contact where there should be, and the record on the receiving-strip is defective and worthless. In my improved contact roller or wheel, on the contrary, the acting face or periphery is elastic, flexible, cushion-like, and as smooth as skill can make it, particular care being taken to avoid any projections or points extending beyond the face of

the roller, the object being to obtain contact by the face itself, and not by pins or like instrumentalities projecting from the face.

The nature of my improvement and the manner in which the same is or may be carried into effect can, however, best be explained and understood by reference to the accompanying drawings, in which—

Figure 1 is a side elevation, and Fig. 2 is a plan, of a transmitting apparatus for rapid telegraphing, made in accordance with my invention. Figs. 3, 4, and 5 represent in plan and cross-section, respectively, some of the forms of rollers with elastic cushion-like peripheral faces that may be used under my invention. Fig. 5ª represents a modification in which both the transmitting-drum and the contact roller are provided with elastic cushion-like faces. Figs. 6 to 9, inclusive, will be hereinafter particularly referred to.

A represents a rotary metallic drum, supported in bearings in the standard E and designed to be electrically connected with one pole of a battery through that standard and the conducting-wire *a* and binding-post *b*. Placed against the drum, and so as to run by contact therewith, is the contact wheel or roller B, hereinbefore referred to, which has its bearings in a forked arm or beam, G, pivoted at *c* to a standard, F. The beam is connected to a thumb-screw, *d*, by a stiff spring, *e*, and by means of this screw the beam can be moved to cause the roller to press against the drum as forcibly as desired. Another thumb-screw, *f*, is provided, by means of which the beam can be moved in the opposite direction whenever for any purpose it is desired to remove the roller from contact with the drum. The roller is electrically connected with the other pole of the battery through the parts F G and the conducting-wire *g* and binding-post *h*.

The drum A may be rotated by any suitable power. In the present case it is rotated by hand from the driving-wheel C, supported on a standard, H, and provided with a crank-handle, *i*, and connected with the drum by a belt or chain which passes from it to a pulley, I, on the axis of the drum. The crank-handle is provided with a knob, *j*, of some suitable non-conducting material.

D is a spool or reel, on which the prepared perforated strip is wound, and O is a pressure-roller, which presses the strip against the drum. The strip is represented at *r*, and the direction of its movement is indicated by the arrows in Fig. 1.

The parts are supported on a suitable base, M, of wood or other suitable non-conducting material, and are suitably insulated from one another at proper points. The apparatus is also to be provided and connected with all necessary switches, keys, and calling-instruments, which, however, I have not deemed it necessary to represent in the drawings.

Having given a general description of the apparatus, I now proceed to describe more particularly the contact roller or wheel B.

The roller shown in side elevation in Fig. 1 is also represented in plan and section in Fig. 3. It consists of fine metallic conducting-wires *k*, which are embedded and thickly and closely set in a tin, lead, or solder annular base, *l*, and clasped laterally by the metallic side disks, *m*, whose diameter is such as to permit the wire ends to project beyond them, as indicated in Figs. 1 and 3. I thus obtain in effect a wire wheel whose periphery is elastic, yielding, and cushion-like. The wheel is provided with a suitable axle, *n*.

In Fig. 4 is represented in plan and section a contact-roller, the body of which is composed of a soft vulcanized-rubber disk, *o*, set on an axle and clasped laterally between brass disks *r'*, of somewhat smaller diameter, and encircled by a close-fitting, thin, pliable metallic ring or tire, *p*, in lieu of which a fine, flat, closely woven or linked metallic chain or ribbon may be used. Electrical connection is made between the ring or tire *p* and the hubs or shoulders of the disks *r'* by wires *s*.

In lieu of a tire such as shown at *p*, I can employ one such as shown in plan and cross-section at *t* in Fig. 5, of a shape to fit not only upon the periphery but also upon the sides of the rubber disk *o*. The clasping-disks *r'* in this modification are but little more than hubs.

The forms of contact-roller just described serve to indicate the many ways in which the roller may be made, the essential feature in every case being that the roller shall have an acting-face that is inherently elastic, pliable or flexible, and cushion-like, so that it may protrude through the perforations of the strip, in order to make contact with the drum on the other side.

The mode of operation of the transmitter, supposing it to be connected up properly to line, is as follows: The perforated strip is wound upon the reel D and the unperforated end of the strip passed between the drum A on the one side and the contact-roller B and pressure-roller O on the other side. The receiving-station is then signaled that all is ready, and on receiving the return signal to start the drum A is put in rapid rotation. By the action of the wheels A B O the strip is caused to move with corresponding rapidity in the direction of the arrows. Each time a perforated part of the strip passes into the bite of the contact-roller and the drum metallic contact between these two parts is made and the electric current passes to line, when the battery is connected with the line and earth for that purpose, as it would be were a perforated strip, such as shown at *y*, Fig. 6, used. In case such a strip be employed, contact made through its perforations will send the current to line. The cushion-like elastic contact-roller in passing over the perforations makes long contacts with those perforations grouped or placed near to one another, for the face of the roller makes contact through the perforation in advance before quitting the one in rear; but in passing over single or more widely separated perfora-

tions it makes but short contacts. The result at the receiving-station is that short contacts produce dots and long contacts dashes. Thus a transmitting-strip perforated as indicated in Fig. 6 will cause the production of characters such as shown on the strip *y'*, Fig. 6; but when the arrangement of the battery-connections is such that both its poles are connected to earth when the roller B and drum A make contact, and that no current passes to line until this contact is broken, then a perforated strip such as shown at *w* or *z*, Fig. 7, should be used. In these strips the imperforate spaces between the single or grouped perforations produce dashes or dots, according to the spacing, as indicated at *x*, Fig. 7.

My contact-roller can be used with all perforated strips ordinarily used in telegraphy, and will make solid positive contacts through the perforations, no matter at what speed the perforated strip travels. It can also be used with good effect in cases where the message, instead of being perforated, is written or painted with a non-conducting ink or paint or varnish on a conducting-strip or upon a metallic drum or plate.

Fig. 8 represents diagrammatically the arrangement of line and battery connection last above referred to. B T is the line-battery. S is the sending and R is the receiving stations, and L is the line. P is a chemical recording-instrument, of which D' is the metallic drum, connected to earth at E', and *l'* is the stylus, the point of which is pressed against the chemically-prepared paper *m'* by the spring *d'*. The drum A of my transmitter is connected to earth at E, the + pole of the battery is connected to the contact-roller B, and the — pole to the transmitting-drum and earth. With this battery-connection the operation is as follows: So long as the drum A and roller B make electrical contact the electric current will pass from the + pole of the battery through wires 1 and 2, this arrangement operating, under the circumstances, somewhat similar to a shunt. When, however, metallic contact between B and A is broken, the current passes to line, to the receiving-station, and then passes through the recording-instrument to earth.

When employing the arrangement just described I insert in the line the additional batteries that are necessary to a long line, and in order to better discharge the line or stop the current after each pulsation I insert an earth-connection, H', (which may be called an "artificial leakage,") in which is placed an adjustable rheostat, I', of high resistance, and I may also insert in the line near the receiving-instrument a small battery, which will produce a counter-current sufficiently strong to cut short the passage of any tailing current from the transmitting end.

When it is desired to telegraph by the double-current system, by alternate positive and negative currents or pulsations, (in which event the strip is perforated with two or more rows of perforations, the one for sending a recording-current, the other for sending the opposite current for freeing the line,) I make my elastic and cushion-like contact-roller double, or of two wheels placed on the same shaft and insulated from one another, as indicated at *n*, Fig. 9, each wheel of course having suitable battery-connection.

Under my invention it is not necessary that the receiving and transmitting apparatus should move at the same rate of speed. I sometimes run the transmitter from ten to fifty per centum faster than the register.

The transmitting-drum A may be made with a flexible, cushion-like, pliable, elastic, or yielding metallic face in a similar manner to the contact-roller B, as indicated diagrammatically in Fig. 5ª.

In lieu of and as the equivalent of the drum, I may use a bed-plate (provided, if desired, with an elastic or yielding metallic face) on which the paper strip can be secured by suitable fastening. The bed-plate may be straight or curved, and can be movable or not, as desired. A convenient arrrangement is to have the bed stationary and make the transmitting-roller travel over the face of the bed-plate or against the perforated strip thereon.

Having described my improvement, what I claim, and desire to secure by Letters Patent, is—

1. In an electro-telegraphic transmitter, the combination, substantially as hereinbefore set forth, of a contact-roller and a drum or its equivalent, formed one or both with an elastic, flexible, and cushion-like acting-face, as described.

2. In an electro-telegraphic transmitter, a contact roller or wheel having an elastic, flexible or pliable, and cushion-like acting-face, substantially as and for the purposes hereinbefore set forth.

3. In an electro-telegraphic transmitter, the combination, substantially as hereinbefore set forth, of the rotating transmitting-drum, and the contact roller or wheel arranged so that it will revolve by contact with said drum or with the strip passing between it and said drum, and formed with an elastic, flexible or pliable, and cushion-like acting-face, substantially as and for the purposes hereinbefore set forth.

This specification signed and witnessed this 2d day of December, 1881.

JOHN ABSTERDAM.

Witnesses:
F. H. CONNOTH,
FRED. A. LEAVITT.