

(No Model.)

3 Sheets—Sheet 1.

W. A. LEGGO.
Automatic Telegraph.

No. 238,929.

Patented March 15, 1881.

Fig. 1.

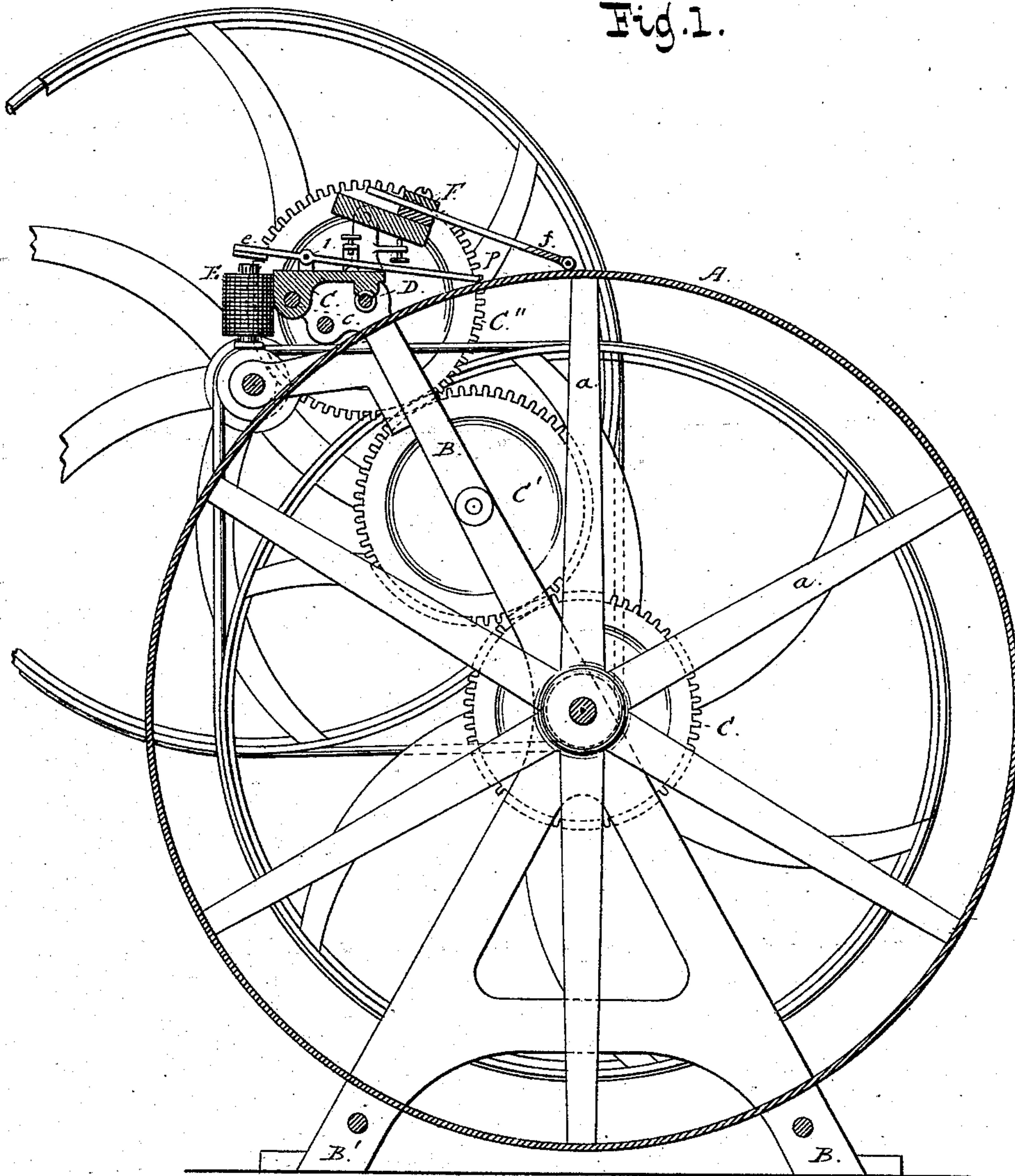


Fig. 4.

Witnesses.
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Inventor.
William A Leggo
by Dyer & Wilber
Atty.

(No Model.)

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Fig. 2.

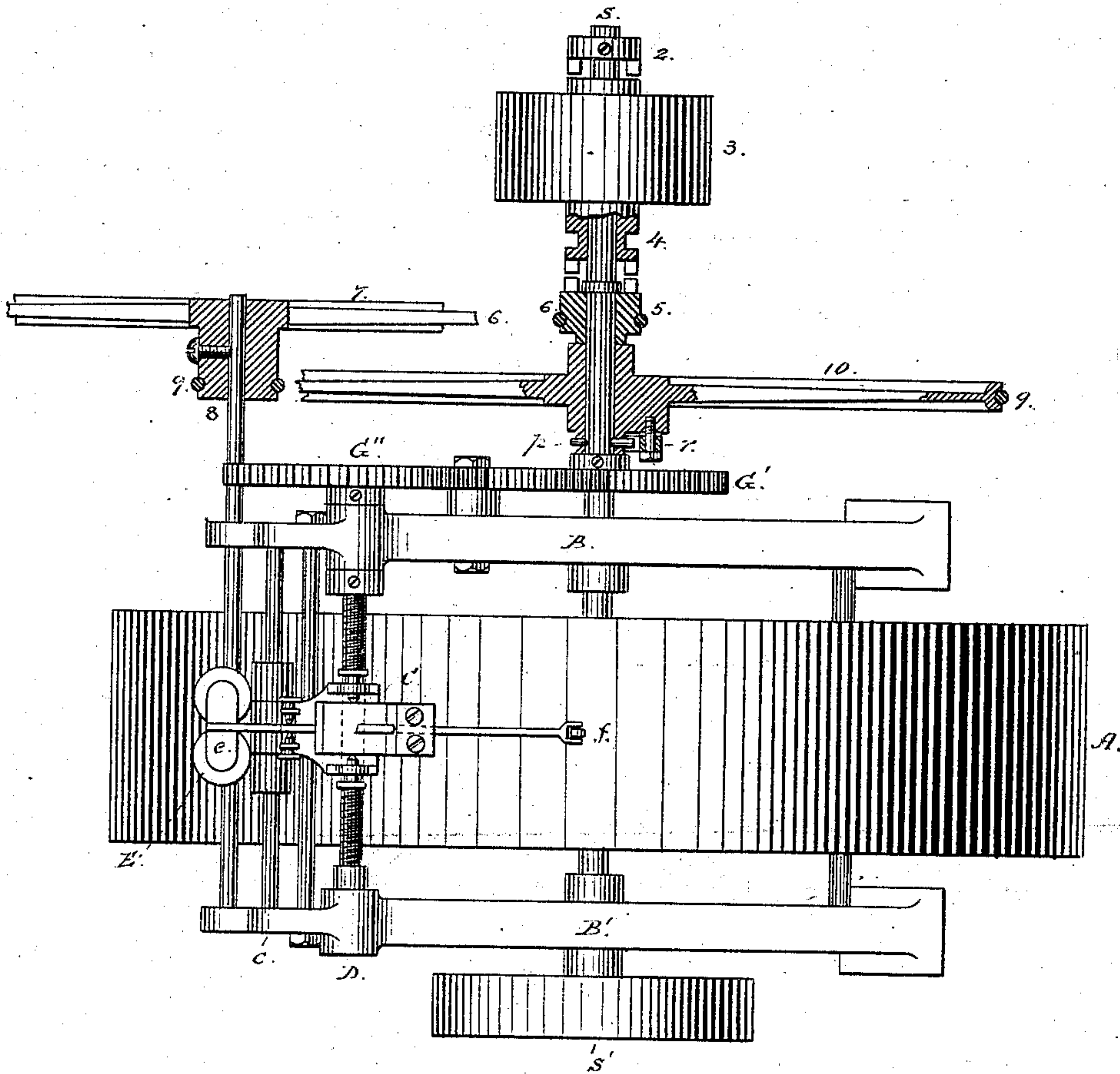
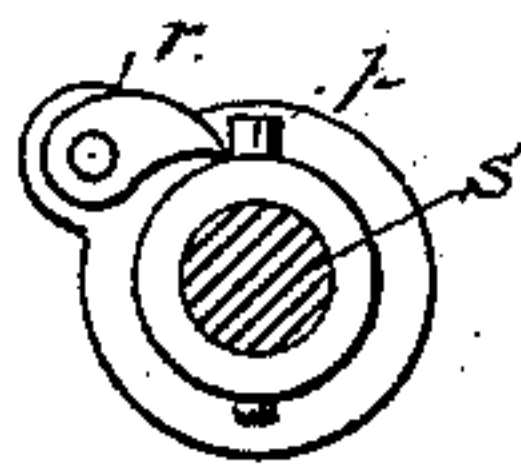


Fig. 3.



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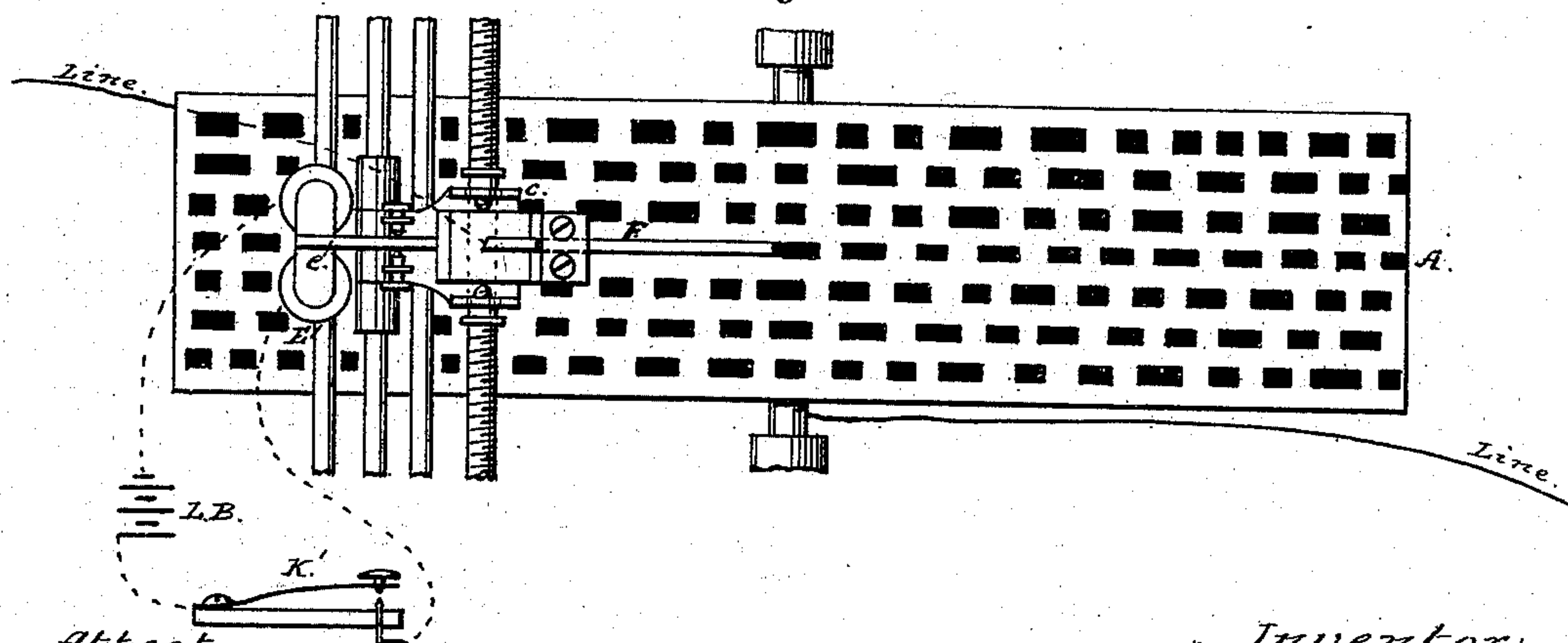
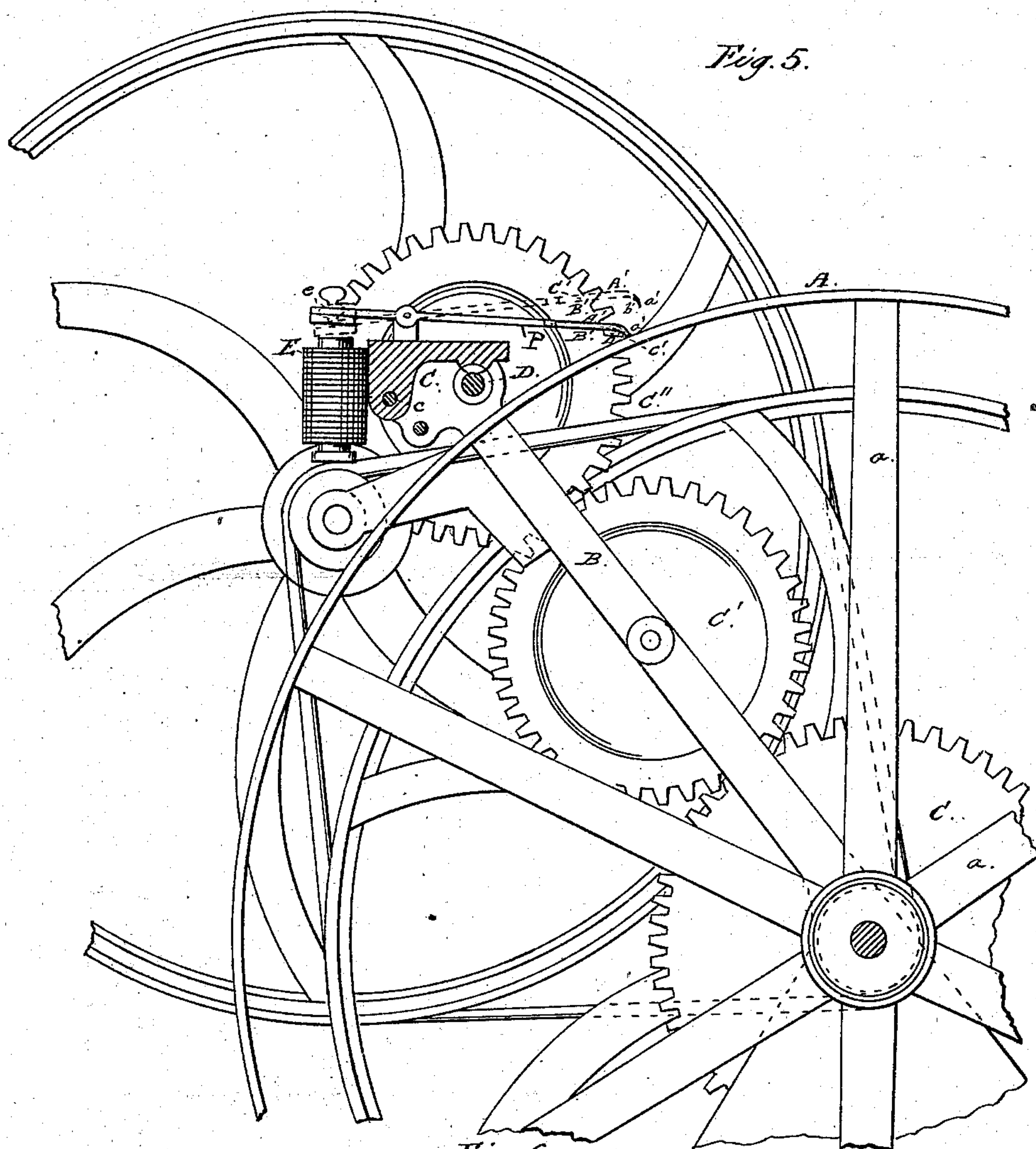
(No Model.)

3 Sheets—Sheet 3

W. A. LEGGO.
Automatic Telegraph.

No. 238,929.

Patented March 15, 1881.



Attest;
H. W. Howard
M. J. Blagell.

Inventor;
William A. Leggo
per Dyer & Wilber Attys

UNITED STATES PATENT OFFICE.

WILLIAM A. LEGGO, OF NEW YORK, N. Y., ASSIGNOR TO ELECTRO GRAPHIC MANUFACTURING COMPANY, OF SAME PLACE.

AUTOMATIC TELEGRAPH.

SPECIFICATION forming part of Letters Patent No. 238,929, dated March 15, 1881.

Application filed November 30, 1880. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM A. LEGGO, of New York, in the county of New York and State of New York, have invented a new and useful
5 Method of and Means for Automatic Electro-Telegraphy; and I do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference
10 marked thereon.

The object of this invention is to furnish a system of automatic rapid telegraphic transmission in which the preparation of the message may be accomplished by the use of the
15 ordinary key, thus avoiding the use of perforated paper and the necessity of machinery for perforating the paper, enabling one machine to be used both for the preparation for transmission and for the transmission of messages. A metallic drum capable of rotation
20 in suitable bearings is arranged to be driven by any desirable motive power. Two sets of gearing are arranged between the prime motor and the drum, the change from one to the
25 other being quickly and easily made by a shifting-lever. One set is calculated to give a comparatively slow rate of rotation to the drum for the reception upon it of the message at the ordinary speed of the "Morse operator,"
30 the other set giving the rapid rate permissible in automatic transmission. Upon a carriage are mounted, in such relation to the drum that when desired they may take thereupon, a stylus for transmission of the message placed upon
35 the drum and a pen for placing the message thereon. This pen is controlled by a magnet mounted upon the carriage, the pen normally resting at its outer end upon the drum, while upon the other end of its lever it is provided
40 with an armature, so that when the magnet is charged it is lifted from the surface of the drum, or vice versa. To the magnet leads a circuit from any suitable source of electric energy, a proper key being interposed in such
45 circuit. The pen is charged with an insulating-ink, which may be any ordinary ink, to which has been added a little gum, mucilage, or sugar.

In operation the drum is set to rotate at its
50 slower rate and the Morse key operated in the

usual manner, the stylus being thrown back from contact with the drum. While the key is open the pen rests upon the drum, placing thereon a line of insulating-ink, whose width
55 depends upon the width of the pen, which may be of any desired or effective width. Upon closure of the key the pen is lifted from contact with the drum, leaving its metallic surface clear. Thus the message is placed thereon in a series of insulating and conducting
60 spaces, the latter representing the signals or the unitary portions forming a signal. When this preparation of the drum is completed the stylus is thrown down into contact with the drum and the pen removed therefrom. The
65 stylus and drum are properly connected in the circuit leading to the point of reception, and the gearing shifted to give the drum its higher rate of rotation, whereupon impulses are transmitted over the line with great rapidity,
70 corresponding exactly to the impulses which, through the medium of the pen, caused the record upon the drum.

It should be noted that the carriage carrying the stylus and the pen and its magnet
75 is mounted upon a shaft on which it may slide, and rests also upon a screw-shaft receiving motion through intermediate gearing from the shaft of the drum, so that while the drum is rotating the carriage has a properly-adjusted motion at a right angle to the
80 line of rotation, causing the pen and stylus to describe a spiral line upon the surface of the drum. The carriage rests upon the screw-shaft by a half-nut only, or by a pin, or by a
85 knife-edge, so that it may be lifted therefrom and slid back to the starting-point upon the completion of its range of motion.

The message is received upon any suitably-prepared chemical paper, as is well understood in automatic chemical telegraphy, although the paper prepared with nitrate of silver and then lubricated, as set forth in other applications of even date herewith, is preferable.
90

It is desirable that the drum or other metallic surface used in the transmitter should be first thoroughly cleaned, and that then a coating of gum or equivalent be applied to its surface, the surface then being washed until
100

all the superfluous gum be removed—in fact, till to ordinary tests, feeling or visual, no gum apparently remains. Such treatment does not interfere with its conductivity, but serves to fill up any pores in the surface of the metal, rendering it smooth and avoiding or diminishing to a minimum friction thereon, and further preventing the adhesion thereon of any greasy matter, so promoting the preparation thereon of the message in insulating-ink.

By the arrangement thus generally sketched the Morse operator, using his key in the ordinary manner, may prepare and compose the matter to be sent for automatic transmission, two or three minutes then sufficing for the transmission of what has occupied an hour for preparation, and which would have occupied an hour in transmission over the wire by the ordinary Morse method of telegraphy. This system, then, makes one wire suffice practically for many operators, increasing to that extent the capacity of each wire and providing for large amounts of business without the expenditure of large sums of money in additional wires, &c.

The same general principles are exceedingly applicable and desirable for fac-simile telegraphy. For such transmission the message, which may be a writing, map, plan, chart, picture, or anything else capable of graphic representation, is written or imprinted upon the face of the drum, which is then caused to rotate, as before explained, a perfect fac-simile thereof being produced at the receiving station.

It is evident that, instead of the surface of the drum being used, a plate, band, ribbon, tape, or any other equivalent form may be used, which may be prepared in any desirable manner and then placed in the machine, which in that case need have only the suitable quick motion; further, that instead of a drum a flat plate may be used, or any other form of message-receptacle, to which is connected gearing for giving the two rates of motion—slow and fast—hereinbefore described, when such plate is used in the machine for both preparation and transmission.

In the drawings is illustrated a convenient form of mechanism for carrying into effect the invention, Figure 1 being a side view and Fig. 2 a top view thereof, while Fig. 3 shows a detail for locking the gearing to the shaft. Fig. 4 is a diagrammatic representation of a signal as it appears upon the drum prepared for transmission. Fig. 5 is a detailed cross-section of the pen and a portion of the connected apparatus, and Fig. 6 a plan of part of the apparatus, showing the surface of the drum and circuit connections.

B B' is a framing in which is supported the shaft S, upon which is mounted the drum A. Upon the shaft is the loose pulley 3, moved thereon by means of a shifting-lever (not shown) taking into the recess 4, in the sleeve of the pulley. On the shaft S is fixed the clutch 2, with which the pulley may be locked,

so that the shaft and drum may be rotated directly with the pulley, a high rate of speed being the result. Loose upon the shaft S is the small pulley 5, from which a belt, 6, leads to pulley 7, from whose small or pinion pulley 8 a belt, 9, leads to pulley 10, also loose upon S, but provided with pawl *r*, taking upon rotation in the proper direction against pin *p* in shaft S and causing S to rotate with it. If the loose pulley 3 be thrown to engage with 5, its motion is communicated to S and A through 5 7 8 10, its motion thereby being very much slowed down.

Within the upward extensions of the parts B B' of the framing B B', and upon a shaft, *c*, supported in B B', is mounted a carriage, C, capable of moving horizontally along *c* and of turning thereon vertically as upon a pivot. At the front end of C a half-nut is formed, which rests upon the screw-shaft D, which receives the motion from S through gears G G' G''. Upon this carriage is mounted a pen, P, pivoted thereon, and having upon the end of its lever an armature, *e*, taking over the poles of a magnet, E, supported and carried by the carriage C, and which is in an electrical circuit provided with any suitable key.

In Fig. 5 the operation of the pen is more clearly shown. As shown in dotted lines, the pen is raised from the drum, and the parts A' B' spring together at *a' b'*, preventing the egress of the fluid C', which is an ink treated so as to possess insulating qualities. When, however, the pen is allowed to rest upon the drum, as shown in full lines, the parts A' B' are separated and the ink escapes at *c'*, the result being as shown in Fig. 6, in which the black spaces represent the intervals during which the circuit would be broken, while the clear spaces indicate the closures necessary to the transmission of a message.

In Fig. 6 the dotted lines represent a local circuit, in which is included the key K', local battery L B, and magnet E. The key being closed, the magnet attracts *e*, lifting the pen from the drum. The line is connected on one side to the pen *e* and stylus F and on the other to the drum, the stylus and pen being insulated from the drum.

The pen P is of such a construction that when lifted from the drum it shall not permit the ink to escape therefrom, but that the mere laying of the end upon the drum or other surface shall cause it to open and permit the escape of the ink. Such a pen is shown in another application of even date herewith.

Upon the carriage C is also pivotally supported the stylus F, whose end preferably carries a roller, *f*. This stylus, when in use, lies upon the surface of the drum. When not in use it is raised therefrom.

The operation is as follows: The pulley 3 is thrown to engage with clutch 5, and thus rotate the drum at low speed. The stylus F is turned up from contact with the drum, the pen P, charged with ink, bearing normally upon the surface of the drum, laying thereon an insu-

lated line. The operator manipulating his key, the magnet E attracts the armature e whenever the circuit is closed, lifting the pen from the drum and leaving thereon the conducting signal-spaces, as shown at *n n n*, Fig. 4. The drum, rotating, causes the rotation of D, giving a horizontal movement to C, so that the entire surface of the drum may be covered by a spiral line. When as much as is desired has been composed upon the drum the carriage is lifted from contact with D and slid back to the place of starting, the pen is removed from contact, and the stylus is put into contact with the drum. The pulley 3 is thrown to engage with 2, and thus to rotate the drum at high speed. The stylus and drum are properly connected in the electrical circuit and the motive power applied. As the stylus passes over the places inked by the pen the circuit will be broken and no current will pass, while in passing over the spaces left clear by the raising of the pen the circuit will be closed and impulses sent, these impulses corresponding exactly to the impulses used in preparing the drum, which were the same as though the key had been connected directly in the transmitting-circuit.

In describing the operation it was stated that the pen is moved back to the place of beginning for transmission. Instead thereof the motion of the machine may be reversed and the last of the message placed in the drum transmitted first. When all the message has been received it is simply necessary to commence the reading at the last end of the receiving-strips, which in practice will be probably the more convenient.

As hereinbefore described, a positive copy of the message to be sent is shown as placed

upon the drum. When desired a negative copy may be placed thereon, in which case the unitary members of the signals would be placed upon the drum in insulating-ink, while the spaces, &c., would be left clear—the reverse of what is shown in Fig. 4.

It is evident that the magnet E and its circuit and the key therein may be dispensed with when desired, and that the end of the pen itself may be used as the key, the operator manipulating the pen itself directly, instead of controlling it indirectly through intermediate devices.

What I claim is—

1. The method of automatic transmission herein described, which consists in causing the ordinary manipulations of a key to be recorded in insulating and conducting spaces upon a suitable surface, and then using the record so made to automatically control the transmitting-circuit, substantially as set forth.

2. The combination, with one transmitting-surface, of two sets of gearing, one adapted to give the surface a much greater speed of movement than the other, and means for changing from one to the other, substantially as set forth.

3. The combination, in an apparatus for preparing messages for telegraphic transmission, of a conducting-surface, a pen adapted to normally ink the surface thereof, and devices arranged to lift the pen from the surface when it is desired to indicate thereon signals for transmission, substantially as set forth.

This specification signed and witnessed this 19th day of November, 1880.

W. A. LEGGO.

Witnesses:

J. HERMANN WAHLERS,
JAMES A. PAYNE.