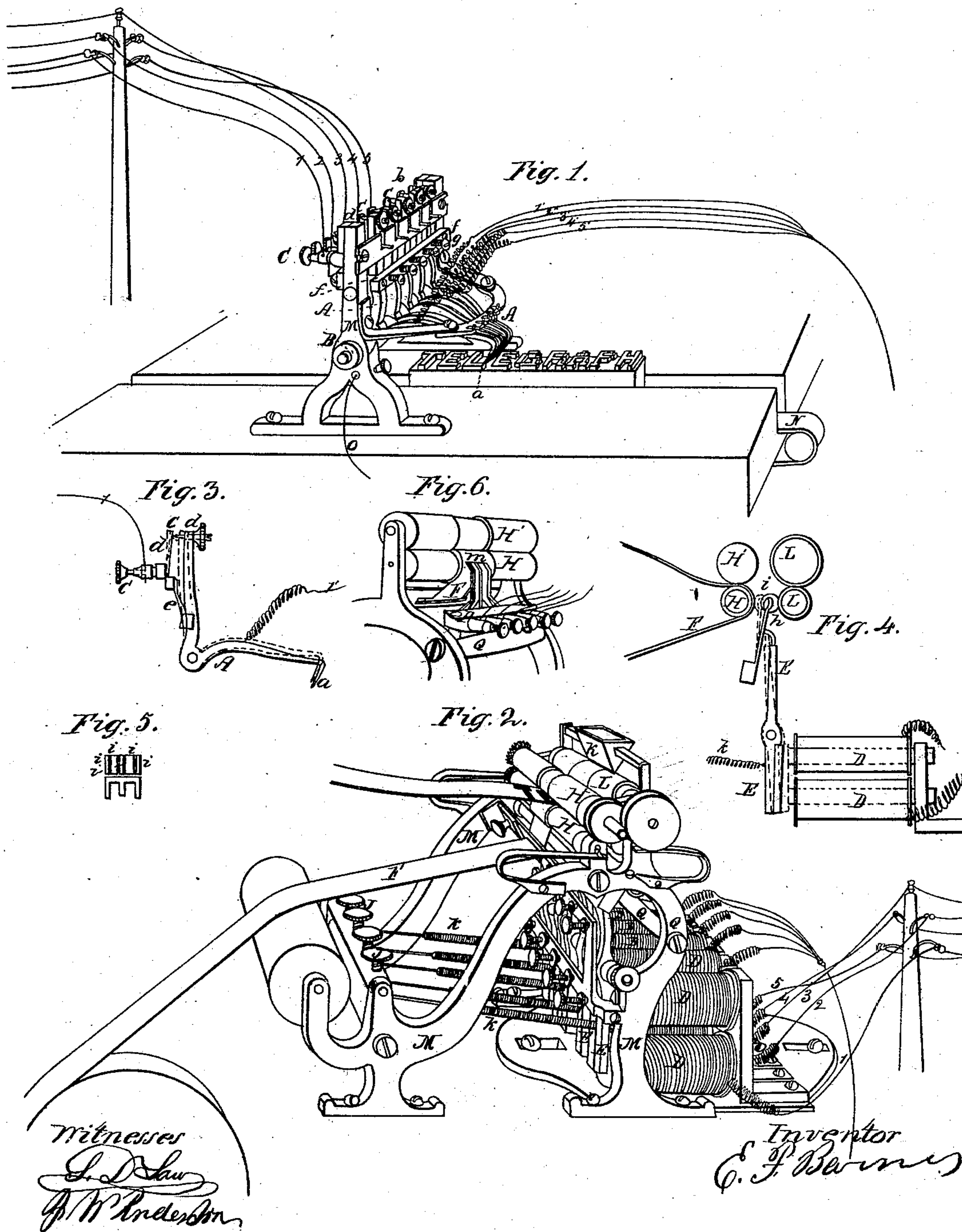


E. F. BARNES.
AUTOMATIC TELEGRAPH.

No. 33,373.

Patented Oct. 1, 1861.



UNITED STATES PATENT OFFICE.

EDMUND F. BARNES, OF NEW YORK, N. Y.

IMPROVED TELEGRAPH-INSTRUMENT.

Specification forming part of Letters Patent No. 33,373, dated October 1, 1861.

To all whom it may concern:

Be it known that I, EDMUND F. BARNES, of the city and State of New York, have invented a new and improved instrument or combination of conductors and attachments for transmitting and recording messages in any form of letter or character by means of electricity or electro-magnetism; and I do hereby declare that the following is a full, clear, and exact description thereof, and of its construction and mode or manner of operation, reference being had to the accompanying drawings, and to the letters of reference marked thereon, making a part of this specification.

The particular and distinguishing character or feature of my invention consists in the application and use, for practical action and operation in transmitting and recording letters or outlines by means of an electric current, of a number of wires or conductors proportioned in number to the elemental divisions or parts of the letters and figures, each one acting independently and distinctly from, but in combination with, each and all of the others, and in so arranging such wires or the parts connecting therewith at the transmitting station that the ends of all such wires or their attachments shall be brought into contact with the surfaces of raised letters or outlines, so that whenever any or all of such wires or their attachments comes in contact with the surface of such letter or outline the circuit of such wire or wires will be closed, and a current of electricity be sent through them, and a record or impression be made at the other ends of such wires, or at the receiving-station corresponding to the contact of such wire or wires with the letter or outline at the transmitting-station.

When such invention is to be applied and used for the purpose of telegraphing or transmitting and recording messages in the shape of printed letters and figures, I prefer to use five wires in combination, as all the capital letters and figures of the language may be formed and represented by five elementary or separate lines, or impressions, or records, and with more certainty and rapidity than with any other number.

Figure 1 shows the arrangement of the wires and their levers or the parts connected therewith, in connection with raised letters,

when applied for transmitting messages. Fig. 2 shows the connection of the several wires to the magnets and the combination of the several magnets and impressing or recording levers and surfaces at a receiving-station. Fig. 3 is a detached view of one of the levers connecting with the wires at a transmitting-station. Fig. 4 is a detached view of one of the magnets and recording-levers at a receiving-station, with a section of the inking and paper rollers. Fig. 5 is a diagram of the impressing-surfaces of the several recording-levers, showing their relative positions and extents.

The manner of extending the wires from place to place and of their insulation may be the same as are generally made use of, except that if the wires are supported on poles they should be so placed in respect to each other, as shown in Figs. 1 and 2, or in some equivalent manner, that they will not be affected or their conductivity lessened by the dripping of rain or moisture from one to the other. The capability of the wires will also be much increased by using a larger wire than is generally used, and their durability will be improved by galvanizing them.

In Figs. 1 and 2 the lines 1 2 3 4 5 represent the five wires connecting with the transmitting and recording portions of the instrument. The raised letters or surfaces used at the transmitting-station are shown in Fig. 1 by the word "telegraph."

A series of bent levers, A A, Figs. 1 and 3, equal in number to the number of the wires and insulated from each other are supported on a shaft, B, or to render the friction of their movements less they may be suspended on and between hardened points, the lower ends *a a* of which come in contact with the surfaces of the raised letters as the letters pass underneath them as hereinafter described. These lower ends may be beveled, as seen more plainly in Fig. 3, or be so shaped as to pass easily over the raised surface of the letters, and while so passing be in continued close contact with them. The other ends, *b b*, of such levers carry small points *c c*, which, as the ends *a a* are raised by passing over the surfaces of the letters, are brought in contact with the little plates or anvils *d d*, connecting with the binding-screws C C, to which are connected the wires 1 2, &c., and thereby communication

made between the battery and the line, the wires 1' 2' 3' 4' 5' extending to the battery and thence to the ground, if the instrument is at a terminal station; but if the instrument is at a way station, then such wires are connected to and pass through the instruments and again connect with the main line without connecting with any battery. By this arrangement of the points *c c* acting against the plates *d d*, the circuit is closed by a direct contact, which renders the action of the instrument much more effective, and by making the plates *d d* slightly elastic they yield a little when the points *c c* are brought in contact with them, thus preventing any jar or shock to the instrument and rendering its action easier and more effective. The springs *e e* as soon as the lower end of the levers pass from off the surface of the raised letters throw the points *c c* out of contact with the plates *d d* and open the circuit, and the passage of the electric current is arrested. The extent of the drop of the points *a a* of the levers is regulated, and the dropping too far is prevented, by the cross-bar *f* and regulating-screws *g g* or any equivalent arrangement.

Fig. 2 shows the arrangement of the magnets and levers and recording parts in the receiving portion of the instrument.

The main wires 1 2 3 4 5 connect each with an electro-magnet, D D, which are so arranged on respect to the levers E E as to act directly in one end of such levers without the intervention of any armature, the ends of such levers being themselves made the armatures. If, however, for any purpose, an intervening armature is desired one can be introduced. As the lower end of any one of the levers A A comes in contact with the raised surface of the letters, and the circuit of any one of the wires is thereby closed at the transmitting-station, the electro-magnet D, connected with such wire at the receiving-station, attracts the lower end of the lever E and causes the upper end of such lever on the arm *h*, against which the upper end of the lever rests, to be carried against the paper F on the paper-roller H and printing or making a record or impression corresponding to the contact of the points *a* of the lever A with the surface of the letter. As soon as the points of the lever A pass from off the surface of the letter and the circuit is opened, the spring K, the tension of which is regulated by the screw J, draws the lever E back and away from contact with the magnet D, and the making of the record is stopped. The upper ends of the levers E E or the arms *h* carry each a small roller, *i*, the relative size of which on the several levers is shown in Fig. 5. This arrangement or proportionate size is found most suitable for recording or making letters, as all of the horizontal parts of the letters can be made by the outside and central wires and rollers, and the remaining portions can be made by the two broader rollers or surfaces. The whole width of all these several

rollers will determine the length of the recorded letter.

K is an ink-vessel, underneath which are the ink-rollers L L, which are revolved by the same power moving the type and the paper, and by which the recording-rollers are continually freshly inked.

The electro-magnets D D have their cores of flat soft iron—say about one or one and a half sixteenth of an inch thick by about five-sixteenths wide—which will give the magnets when wound the size of about an inch by an inch and a quarter in diameter, and such magnets may be best adapted to different lengths of line and the number of stations thereon.

By giving the cores of the magnets a flat shape iron of a more perfect fibrous character and capable of being more uniformly annealed can be obtained, and as a result the magnets can be more rapidly and completely charged and discharged than when the cores are thicker.

The ends of the levers E E used as armatures may be made very light and need not be wider than the cores of the magnets. Magnets of the ordinary or of any other particular form of construction may, however, be substituted in the place of those constructed as above described.

The several levers and attachments of the transmitting and receiving portions of the instrument are supported by suitable frame-work, M M, fastened to any sufficient support. The several movable parts of each may be propelled by the same power; but the connections between the two should be such that either the one or the other can be disconnected or thrown out of gear when it is not being used.

When type or letters are to be used at the transmitting-station to transmit messages to be recorded at a distant station, I prefer to use what are generally called "block-letters," and generally they may correspond in shape with such letters as ordinarily made, though their outline may be varied. The following form of letters and figures may be adopted with good results:

ABCDEFGHIJKLMN O P Q R S
T U V W X Y Z & . 1 2 3 4 5 6 7 8 9 0 . -

As will be readily apparent, each one is easily distinguished and legible, and all are produced or made up of five elemental or several lines and impressions.

The letters used for transmitting may be made of any size preferred, but a size well adapted for use is that of about half an inch long and of a properly-proportioned width. Such type are set up or composed in the same manner as type usually are, and are placed in cases or troughs of the width of a single type, having a bottom and perpendicular sides about two-thirds the height of the type. One side should be fixed to turn down as the type are being

set up and then when turned up to fasten and hold the types firmly in position.

To insure greater stability to the type they may be made with one or more nicks in one or both sides, with corresponding ribs on the inner surfaces of the case to fit into them; or the bottom of the type may be the broadest, or any device made use of to hold them firmly. Such troughs or cases have on their under sides a number of sharp points or projections, which penetrate the endless band N, so that they will be carried along as such band is moved. Such band moves continuously in one direction, as indicated by the arrow, directly under the points of the levers A A.

The cases or type-troughs may be from three or four to more inches long, and the table on which the instrument rests may most conveniently be long enough to hold at least two or three of the troughs. After the type have passed from under the levers the troughs may be removed by hand, or they may be passed by the action of the belt onto another table, and the type then distributed. Such belt may be kept constantly in motion, and may be moved at any speed desired or found practicable. It is only necessary, therefore, to set any messages up in type and fix them in the troughs and place them upon the belt, when they will be carried under the levers A A and recorded at any distant station. As the type are moved along by the belt N, and the lower end of each lever A passes over any portion of the raised surface of the letter, it is raised and the point *c* brought in contact with the plate *d* and the circuit closed and a record made at the other end of the line corresponding to the contact of the end of the lever A with the letter passing under it, and as each lever and the wire connected therewith acts independently from the rest, whenever the circuit of any wire is closed a record is produced at the other end corresponding to the contact of the lever A with the latter. It follows, therefore, that the aggregate or combined records or impressions made or produced by all the several wires and their recording apparatus must correspond with the whole surface brought in contact at the transmitting-station with all the several levers A A. In other words, the record made will be a copy of the form or outline passed under the levers A A. The size of the letters used for transmitting messages has not, however, any necessary relation to the size of the recorded letter, which will be proportioned to the aggregate breadth or surface-measurement of the impressing-surfaces, and which may be increased or diminished as desired.

By proportioning the size of the rollers carrying the endless belt N and that of the paper-propelling rollers H H' the movement of the paper may be made equal to or faster or slower than the movement of the types; if the same, the shape of the recorded letter will be like that used at the transmitting-station; if

faster or slower, the recorded letters will be elongated or shortened in their breadth.

The belt N and the paper-rollers H H' and the different movable parts of the instrument may be put in motion by a treadle, or by any convenient power.

The form and arrangement of the levers A A and of the parts connected therewith for opening and closing the circuits of the different wires may be varied or altered without affecting or changing the principle or action of my invention or the result produced; or the circuits may be closed by the mere contact of the levers *a a* with the metallic surfaces of the letters, though in such case the circuits would be closed by a sliding contact, which is not as complete and effective as when a direct contact is made. When the circuits are closed, as shown in Fig. 1, the letters or type used may be of wood or any material of sufficient substance to elevate the points *a a* as they pass over them. When the battery is connected with the several levers A A by means of the separate wires 1' 2', &c., Fig. 1, the shaft B will be made of hard rubber or some non-conductor. If the shaft is metallic the connection with the battery may be by means of the single wire O, Fig. 1.

The arrangement and combination of the magnets D D and levers E E and ink-rollers is intended for use when the record is to be made in printed letters or when the electric current acts mechanically to put the recording apparatus in motion.

From an examination of the form and structure of the capital letters and the figures it will be seen that they can be separated or resolved into five distinct parts or elements, so to speak, as shown in Fig. 5, and that they all can be reproduced or made with perfect completeness by five distinct or several impressions, and also that they cannot be so made and made perfectly with any number less than five. Having found out and determined the elemental construction of the letters and figures, or the least number of parts which unite to make up their whole and the least number of impressions by which they can be made or formed, I apply to their transmission and recording, by means of the electric current, a number of wires corresponding with the elemental parts or divisions of such letters and figures and regulate the number of wires for transmitting and recording letters, &c., by such elemental parts of the letters, and therefore require for the transmission and recording of such letters and figures but five wires, and neither more nor less. It will, however, be apparent that any one or all of the impressions capable of being made by a single wire may be made by two or more, acting as one, and that therefore the number of wires may be thus increased without interfering with or destroying the relation between the impressing-surface and the elemental divisions of the letters and figures, and this principle of the elemental division of

the letters is the same whether they are recorded mechanically or chemically.

I do not in this application claim, generally, the use and application of a number of wires, in connection with the transmission of the electric current for delineating or tracing surfaces or outlines.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The application and use, for the purpose of transmitting and recording letters and figures, substantially as set forth, of five wires or their equivalents, corresponding to the five elemental or distinct parts of such letters and figures.

2. The combination of the transmitting-levers A A and movable letters or figures with a series of five wires, substantially as set forth.

3. The combination of a series of magnets, D D, and recording or inking surfaces *i i'*, substantially as described, with a series of five wires, for the purpose of recording letters, &c., by the action of the electric current acting mechanically.

4. The arrangement of the electro-magnets D D and the levers E E, substantially as described, the magnets acting directly upon such levers, and such levers being made the armatures of the magnets, in combination with the use of a series of wires and recording apparatus, as set forth.

E. F. BARNES.

Witnesses:

S. D. LAW,

J. W. ANDERSON.