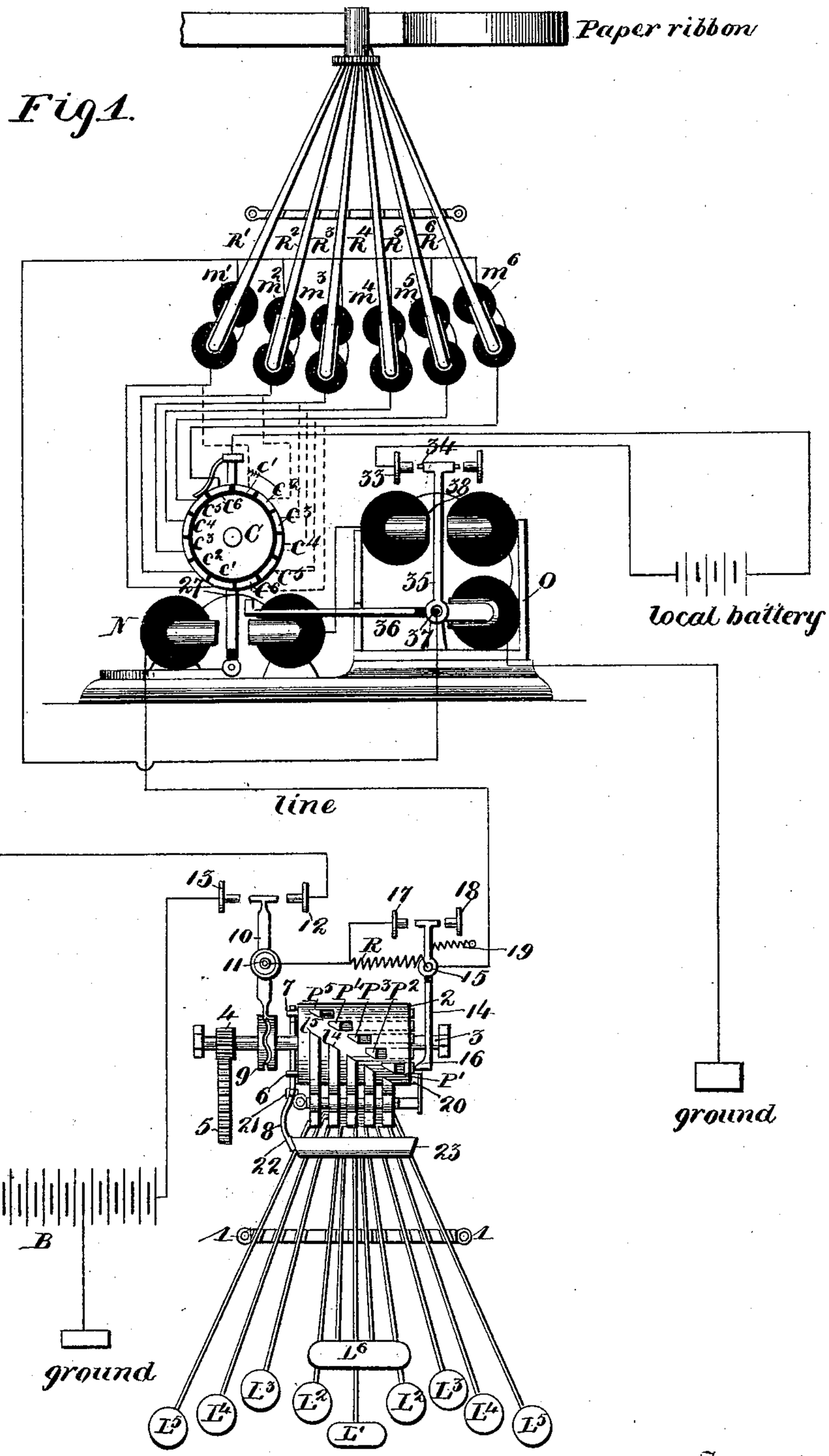
(No Model.) 3 Sheets—Sheet 1.

J. A. PARKER & L. L. SUMMERS.

TELEGRAPH APPARATUS.

No. 516,552. Patented Mar. 13, 1894.

Fig 1.



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TELEGRAPH APPARATUS.

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Fig. 3.

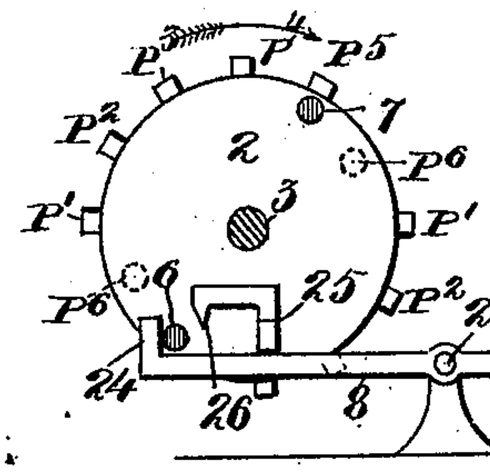


Fig. 2.

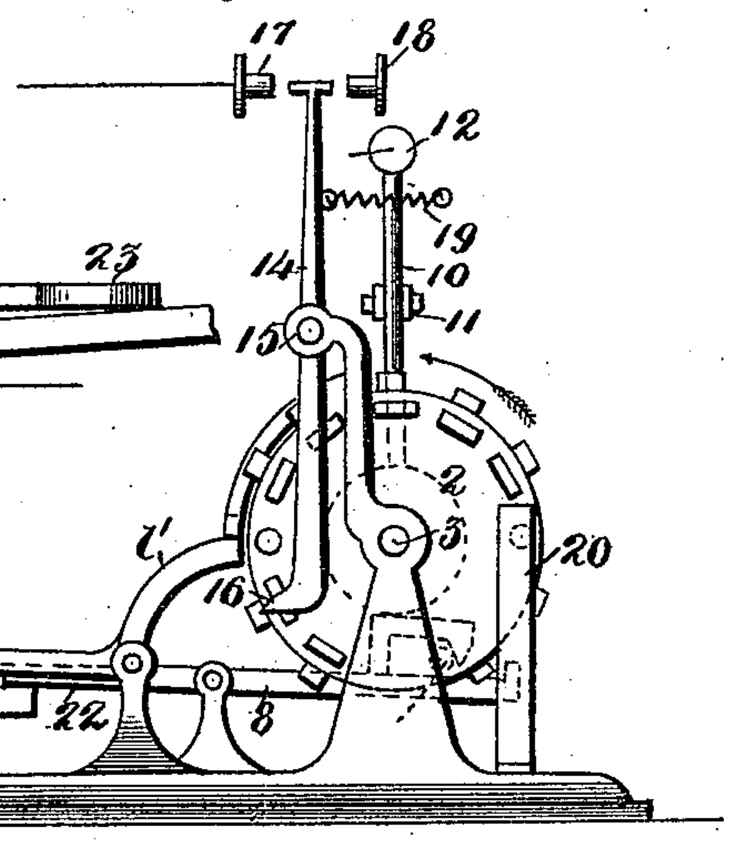


Fig. 4.

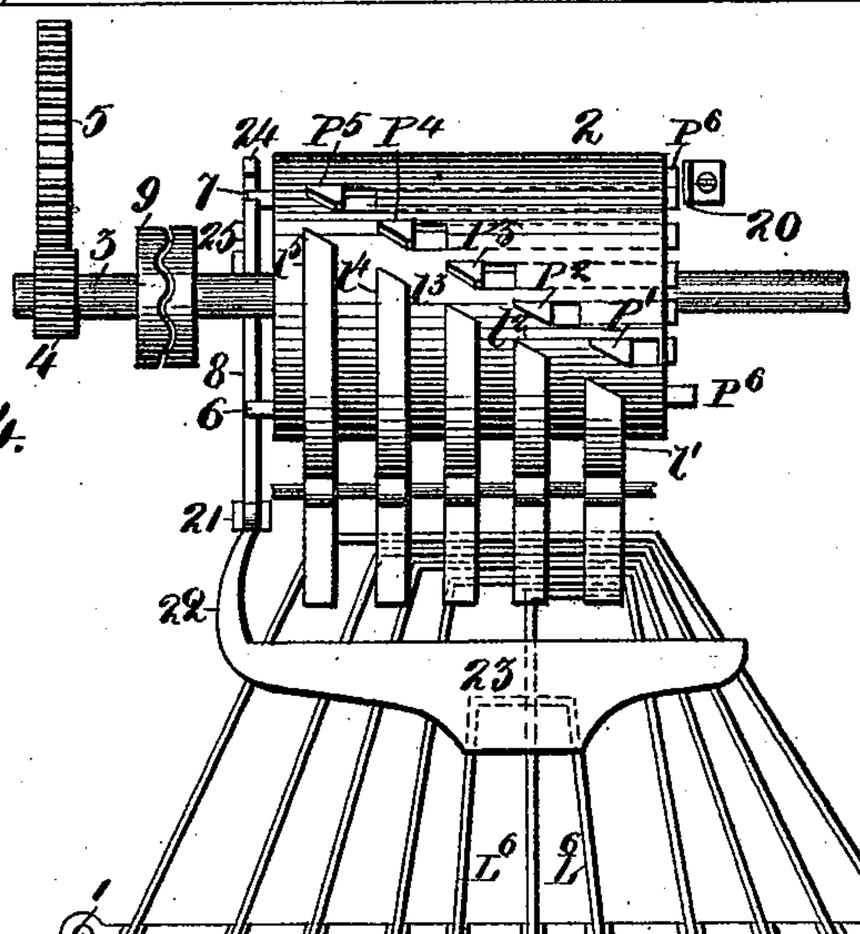
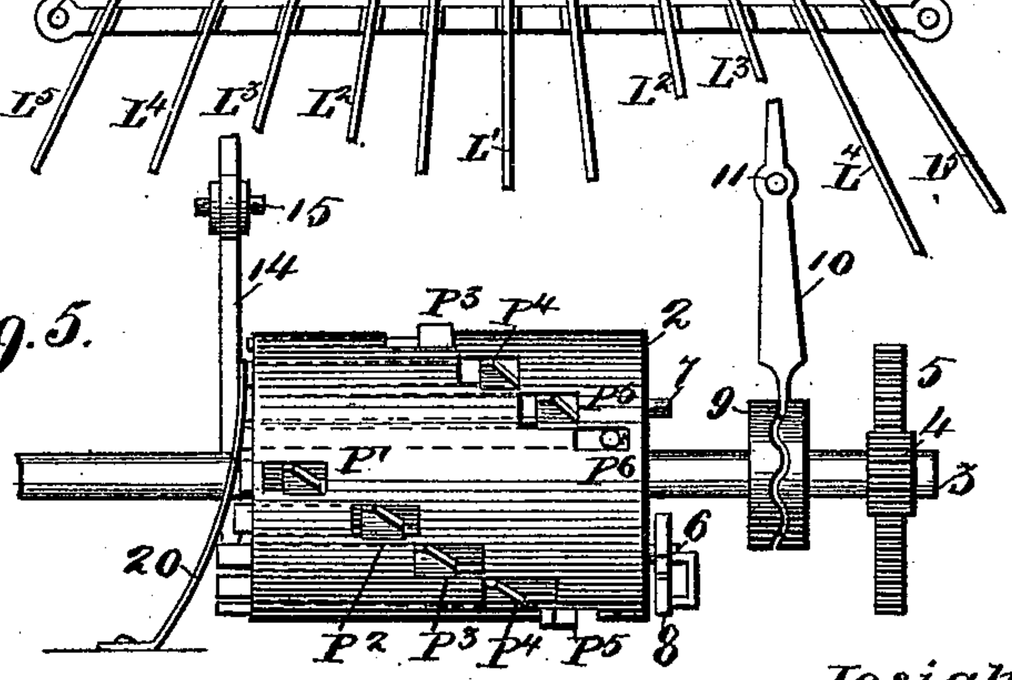


Fig. 5.



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(No Model.) 3 Sheets—Sheet 3.

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TELEGRAPH APPARATUS.

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Fig. 6.

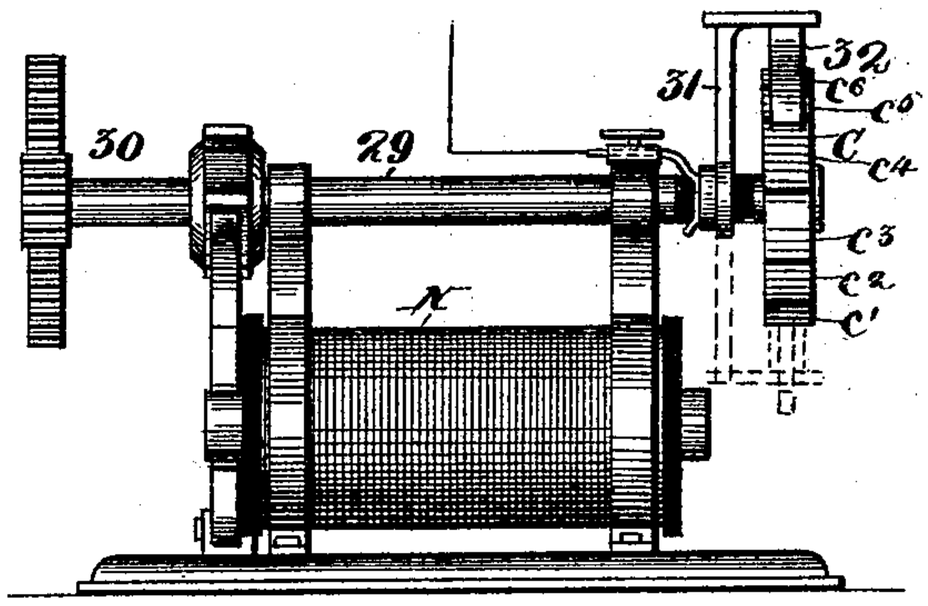


Fig. 7.

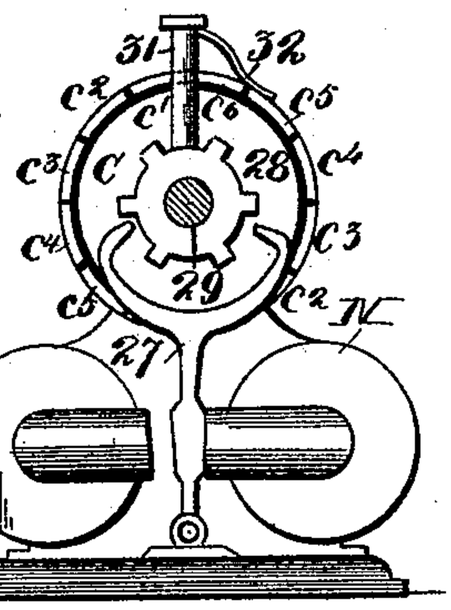


Fig. 8.

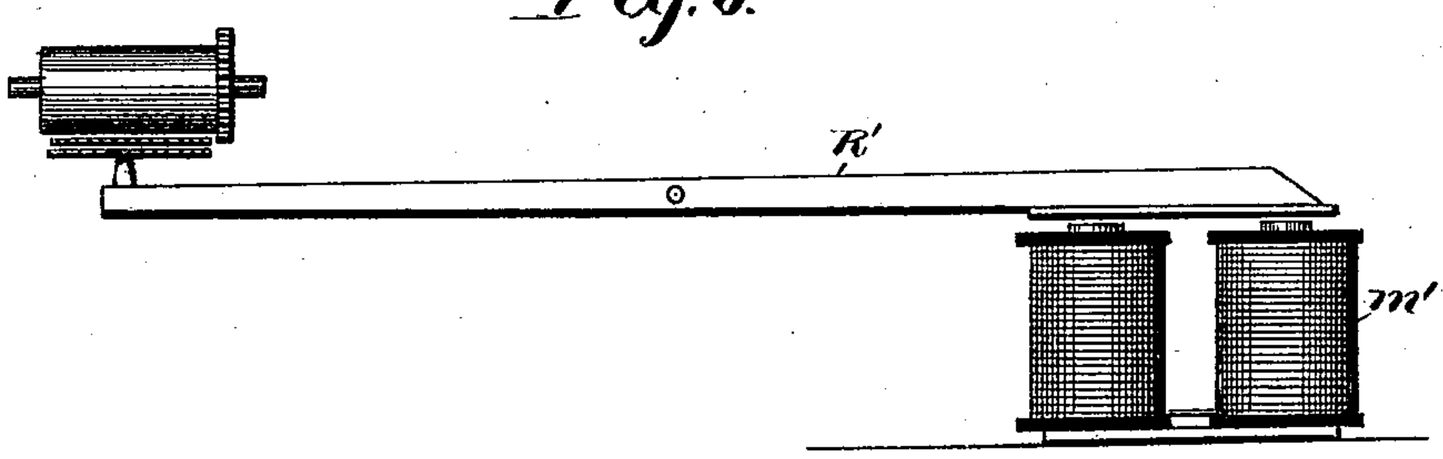
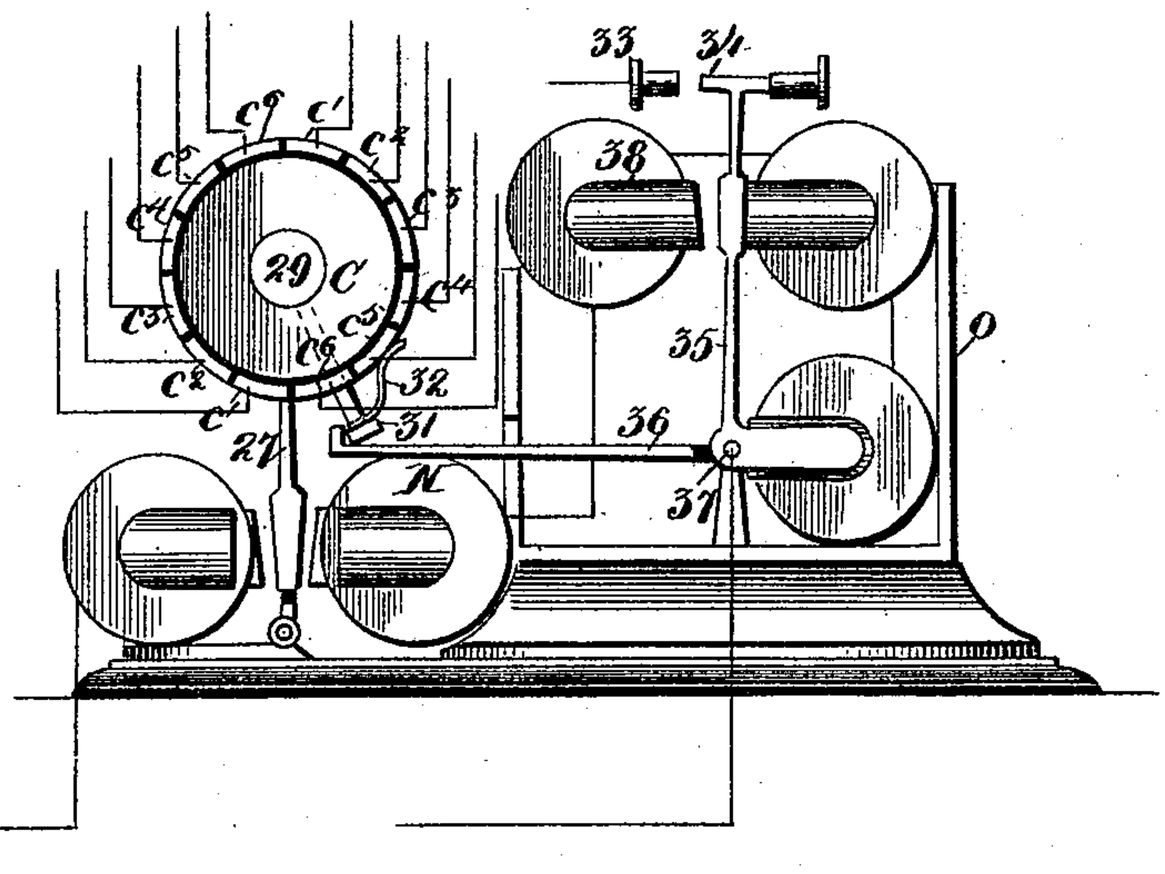


Fig. 9.



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UNITED STATES PATENT OFFICE.

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TELEGRAPH APPARATUS.

SPECIFICATION forming part of Letters Patent No. 516,552, dated March 13, 1894.

Application filed February 23, 1893. Serial No. 463,510. (No model.)

To all whom it may concern:

Be it known that we, JOSIAH A. PARKER, of St. Louis, Missouri, and LELAND L. SUMMERS, of Chicago, Illinois, have invented certain new and useful Improvements in Telegraph Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

Our invention relates to telegraphic apparatus and consists in the novel arrangement and combination of parts more particularly set forth in the specification and pointed out in the claims.

In the drawings Figure 1 is a diagrammatic view of our complete invention. Fig. 2 is a side elevation of the transmitter. Fig. 3 is a detail in side elevation showing the opposite side of the drum with the releasing lever attached to the space key. Fig. 4 is a top plan view of the receiver with parts broken away. Fig. 5 is a side elevation of the drum of the transmitter showing the spring in connection therewith co-operating with the push pins or contacts. Fig. 6 is a side elevation of one of the relays (adapted to be operated by a current of variable strength). Fig. 7 is an end view of the same showing the escapement with the selecting apparatus. Fig. 8 is a detail view in side elevation showing one of the levers of the receiver and the parts co-operating therewith; and Fig. 9 is an end view of the two relays connected to the line wire.

The present invention is an improvement in the general line of stenograph-telegraphing apparatus described in Letters Patent granted to J. A. Parker February 24, 1891, No. 447,198, and to J. A. Parker and L. L. Summers, under date of November 29, 1892, No. 487,154. The principle of opposite currents is employed, coupled with conditions under which said currents may be made to vary in strength and thus produce the necessary results at the receiving station; at the same time simplifying the mechanical arrangement of the parts which contribute to carry out our invention. Briefly stated, the system is composed of a single line wire, necessary electrical energy, a transmitting instrument comprising a series of finger levers or keys, a revolving drum having a series of movable push pins or contacts co-operating with said levers, a lever operated by said pins coupled with a resistance coil for varying the intensity of the transmitted currents, a second lever for reversing the polarities of the currents, a relay operating under the influence of a weak or strong current controlling a lever which operates an escapement to which is secured a revolving brush, a disk or selecting apparatus composed of a series of sections contacting with said brush, each section corresponding to one of the finger levers of the series, a second relay operating only under a strong current and limiting the movement of the brush which co-operates with the selecting apparatus; a series of magnets operating a series of levers constituting the receiving instrument, a local battery controlling the action of the magnets, and a traveling ribbon at the receiving station. The details of the system may be described as follows:

L', L^2, L^3, &c., represent finger levers or keys provided with buttons as in the ordinary stenograph machine, the same being pivoted along the common fulcrum 1—1. The rear ends of the said keys are arranged to raise the bell-crank levers l', l^2, l^3, &c., corresponding to the respective finger keys; the bell-crank levers are curved around the surface of a drum 2. The drum is mounted on a shaft 3 to which is keyed a pinion 4 meshing with a gear 5 of any suitable motor, and when in operation revolves in the direction shown by the arrows in Figs. 2 and 3. The ends of the bell-crank levers over the drum are provided with inclined surfaces so arranged as to come in contact with the correspondingly inclined surfaces of the movable pins P', P^2, P^3, &c., projecting from the surface of the drum, as the drum is revolved, and the bell-crank levers are operated upon depression of the keys. The finger keys when in their normal position do not depress the farther ends of the bell-crank levers, and accordingly said ends do not come in contact with the inclined surfaces of the ends of the pins P', P^2, P^3, &c. These pins are arranged to slide longitudinally in the drum and in their normal position their opposite ends do not project beyond the edge or side of the drum, but when the inclined edges of the respective pins come in contact

with the inclined edges of the bell-crank levers l', l^2, &c., upon the depression of the latter, the said pins or contacts are forced outwardly and their ends project. The end of the drum opposite to that from which the pins are forced out is provided with two stops 6 and 7 with one of which the lever 8 attached to the space key L^6 is in contact when the keys are in their normal position and the machine is at rest, said lever 8 preventing the rotation of the drum. The levers L are formed in pairs each pair being connected to its corresponding lever l, and each capable when depressed, of operating the space key L^6, or the latter may be operated singly as in the ordinary instrument (see Figs. 1, 2, 3, and 4). Upon the depression of the space key brought about either by operating the same singly or by the depression of any of the levers L, the lever 8 releases the pin or stop 6 or 7 with which it may at the time be in contact, and the drum will accordingly be free to revolve. At the same time any pin P will be pushed outward by any lever l according to which finger key L of the series is depressed. As the drum revolves under the influence of the power communicating motion through the gear 5 and pinion 4, motion is communicated to the escapement 9 mounted on the shaft 3, which controls the movement of the contact lever 10 pivoted at 11. The escapement 9 is provided with one-half the number of teeth that there are pins in the drum, so that when one tooth in the escapement has been passed, the contact lever 10 has made contact on the contact point 12 and returned to the contact point 13, and the drum will have passed two pins as to the distance traveled by its periphery. It follows therefore that every tooth of the escapement 9 corresponds to two pins on the drum, and each contact of the contact lever 10 corresponds to one pin; but as each contact 12 and 13 reverses the current passing from the main battery B, the current will be positive for one contact or one pin, and negative for the next contact or the following pin. It matters not whether the pins P are pushed out or not, each pin is represented by one contact and a current of one polarity, and the succeeding pin by a second contact and a current of opposite polarity. When however, the pins are forced outwardly by the depression of any one or all of the finger levers or keys L and through the medium of the bell-crank levers l, each pin as it is forced outward from the end of the revolving drum 2 strikes the lower curved end 16 of a lever 14 pivoted at 15 and causes it to make contact with the point 17. If all the pins have been pushed out either successively or simultaneously, then, as the drum revolves their projecting ends will come successively in contact with the end 16 of the lever 14 and cause the opposite end of the same to make a succession of contacts with the point 17; but when no levers L have been depressed and consequently no pins P have been pushed out to act on the lever 14, then the opposite end of the lever makes contact with the isolated point 18 under the influence of the spring 19. It will thus be seen that motion is communicated to lever 14 by the depression of any key L, and that while all the keys may be depressed simultaneously and all pins P', P^2, P^3, &c., will respond and be set simultaneously with the depression of the levers L', L^2, L^3, &c., the combination of such levers and pins will come in contact with the lever 14 in succession, and the contacts thus made will be sent to line in succession. It will thus be apparent that any combination that can be made by depressing the keys L, and l, either singly or in combination, can be transmitted to line without conflicting. After the combination has come in contact with the end 16 of the lever 14 the pins pass on under the inclined spring 20 secured to any stationary part of the device where they are returned to their normal position. The drum shown has two sets of pins, each set being composed of six pins, one for each of the five character keys and one for the space key. However, it is not necessary to provide the space key L^6 with an inclined lever l^6, as the space key is operated by all the other keys, and consequently the pin P^6 can be fixed so that its normal position is projecting out beyond the drum (see Figs. 4 and 5). It therefore comes in contact with the curved end of the lever 14 whenever the drum is released, and if the space key is the only one depressed the space pin is the only one to operate lever 14. In practice the space pin is operated by a spring (see Fig. 5) allowing it to be pressed into the drum as it passes the spring 20 (which sets all pins back in the drum). After passing spring 20 the weak spring on the space pin pushes said pin to its normal position, where it can again engage the lever 14. The lever 8 secured to the space key L^6, and which is normally in contact with one or the other of the stops 6 or 7 is pivoted at 21, and is kept normally balanced by the arm 22 and plate 23 (which latter is always struck or operated by the depression of any of the keys or levers L). The lever 8 extends to a distance somewhat beyond the center of the rotating drum 2, but does not project beyond the periphery thereof. At its end the said lever has a right-angled projection 24. Intermediate between the pivotal point 21 and the projection 24 is a hook-shaped extension 25 bent outwardly at its junction with the lever 8 so as to allow a projecting pin to pass (see Fig. 3). This extension 25 and the projection 24 act as an escapement for the stops 6 and 7. It is to be noted that there are two sets or series or groups of pins P operated by the levers L and a stop 6 and 7 for each series. The stops are necessary to prevent repetition of any character or word at the receiving station if the finger levers L should accidentally be held down beyond the time necessary to transmit any one character. Assuming the machine to be at rest and the several parts in

their normal position, the stop 6 will be in a position as shown in Fig. 3, that is to say, resting against the angular projection 24, and between the same and the bevel 26 of the hook-shaped extension 25. Now, upon the depression of any lever L, the end of lever 8 will be depressed, the stop 6 will be disengaged, and the drum 2 will accordingly rotate in the direction as shown by the arrows in Figs. 2 and 3. The space between the projection 24 and the bevel 26 of the hook-shaped extension 25 is equal to the space between any two pins. It will be remembered that there are six pins P, five of which are operated by the levers L, and one—the space pin—having a pin already projecting from the end of the drum. The space pin follows the remaining pins P and is the last pin of the series. This arrangement is obvious since it is necessary to have a space after every word or character. As the drum 2 revolves the stop 7 will be the next to strike the bevel 26 of the hook-shaped extension 25. This it will do as the fifth pin P^5 has passed the bevel 26, that is, the stop 7 will stop the drum 2 on the fifth contact by striking the bevel 26 in its depressed position. As just stated, the drum 2 is stopped on the fifth contact. Now as the lever L^6 or levers L are allowed to resume their normal position, the bevel 26 of the hook-shaped extension 25 will be raised sufficiently to let the stop 7 pass it (a distance equal to that between two consecutive pins) and to the position previously occupied by stop 6; and thus the operation can be repeated indefinitely. In practice of course the stops 6 and 7 are placed opposite the fifth pin or contact of each series so as to cause the drum to stop on the fifth contact (the last pin of the series except the space pin). Then, when the parts are permitted to resume their normal positions the space pin, which always projects from the end of the drum will be free to act, during the interval that the stop 6 or 7 passes from the point 26 to its normal position (a distance of from one pin to the next following pin), and thus announce the end of a word or character.

Between the pivotal point of the lever 14 and the wire which extends from the point 17 to the pivotal point 11 of the contact lever 10 is interposed a resistance coil R (see Fig. 1).

From the foregoing the following will be obvious: If the drum 2 be allowed to revolve by depressing any of the levers L, (be it a character lever or the space lever,) the escapement 9 mounted on the shaft 3 will revolve and oscillate the contact lever 10, causing the end of the same to alternately make contact with the points 12 and 13 and thus alternately reverse the polarity or direction of the current with each contact; but as there are one-half the number of teeth in the escapement that there are pins on the drum, each tooth represents two pins and two contacts, and each contact one pin. Consequently each pin is represented by a current of opposite polarity or direction to that preceding or following it. Now, if we depress all the levers L simultaneously (the space lever may always be considered as depressed since its pin P^6 always projects from the end of the drum) the drum as it rotates will bring successively each projecting pin P to act on the lever 14 and force the end of the same to make contact with the point 17. Under those circumstances the resistance R would be thrown out of circuit and a series of strong currents would be sent to line. If however we depress only a part of the levers L then only a part of the pins P will be forced from the end of the drum, and only those forced out would operate the lever 14 to contact with point 17 to send a strong current to line, and those not forced out would pass the lever 14 (brought back to point 18 under the influence of spring 19), the resistance R would be brought into circuit, and only a weak current would be sent to line; and if we only depress the space lever, the remaining five character pins being untouched, then five weak currents would successively be sent to line, followed by one strong current of the succeeding sixth space pin. It will thus be seen that any lever L when depressed will send to line a strong current, the polarity or direction of which will depend upon the position of the contact lever 10, and that the immediately succeeding lever if depressed will send a strong current to line of opposite polarity, &c., and if such lever is not depressed, then a weak current of opposite polarity will be sent to line.

The present invention contemplates the employment of two species of relays, the first designated by N and capable of operation under a weak current (and also a strong current), and the second designated by O and adapted to operate only by a strong current. Hence relay O will operate only when a key or combination of keys is struck (being the only condition under which a strong current can be sent to line). The positive and negative currents of the line operate to oscillate the vibrating escapement lever 27 of the polarized relay N, and thus operate the escapement 28 mounted on the shaft 29 which is turned by a suitable motor (not shown) geared to the pinion 30 keyed to said shaft. Secured to the opposite end of the shaft 29 is an arm 31 carrying a contact brush 32, so that, as the escapement 28 revolves, the brush 32 revolves with it, both being mounted on the same shaft. The escapement 28 has six teeth, a number equal to one-half the number that the drum has pins, so that each escapement tooth corresponds to two pins on the drum, or two contacts of the contact lever 10; and as each contact will permit the escapement lever 27 to swing to one side, and the next contact will return it to its original position, the two movements will have allowed the escapement 28 to turn the distance of one tooth, and the drum will have passed two pins; and when the escapement moves three teeth, the drum has moved six

pins, that is to say, one character or word has been completed and sent to line. The number of pins in the drum is of course a common multiple of the number of contacts and the number of teeth on the escapement which go to form a character; and the number of teeth which the escapement must pass to represent a character is of course a divisor of the number of pins. It will thus be seen that the escapement 28 merely controls the movement of the contact brush 32, which latter makes electric contact with the sections c', c^2, c^3, &c., of the connecting cylinder C, the several sections c corresponding with the pins P and levers L. The cylinder C has the same number of sections c that the drum has pins and these sections are connected permanently with the local magnets m', m^2, m^3, &c., under the key of the receiving instrument, the magnets m operating the levers of the receiving instrument recorder in the ordinary manner. It will further be seen that these magnets m will be connected to one pole of a local battery by means of the brush 32, as the brush makes contact with the particular sections c corresponding to the magnets. The other pole of the battery will however, remain open until closed by the armature of relay O closing the contact points 33, 34. The local magnet m corresponding to the contact c that the brush 32 is resting on, will then respond and the lever over the magnet m will be pulled down which corresponds to the pin P at the sending station which has been thrown out by the lever L. Thus the particular lever depressed at the sending station will depress its corresponding lever R′ at the receiving station, and as each of these levers is independent of its neighbor any combination of levers can be made simultaneously, and the combinations will be sent to line in succession and will operate the corresponding levers at the receiving station in succession, but as the paper or ribbon is not moved forward until the sixth lever or current is sent, and after all other levers so intended will have been operated, and as the paper has remained stationary, the result will be the same as though all the keys were operated together at the receiving station the same as at the sending, the paper being moved forward on the last space for the next combination. It is of course necessary that when any particular finger lever or key L is depressed, that the brush 32 at that time be in contact with the section c corresponding to said lever, so that the corresponding lever R′ at the receiving station may respond thereto; but it sometimes happens owing to line or other trouble that when a lever L is operated that the escapement 28 has advanced a tooth and the brush 32 has correspondingly advanced in contact beyond the proper section c. It is obvious that under such circumstances the receiver must be brought into unison with the transmitter. This is accomplished as follows by the selecting apparatus shown in Figs. 1, 6, 7, and 9: The armature 35 of relay O is provided with a projecting arm 36 at right angles thereto; this compound armature is pivoted at 37. When the brush 32 reaches the contact c^5 it cannot turn any farther unless relay O is operated by a strong current closing contact points 33, 34 and causing lever 36 to be lowered, so that brush 32 can pass the same and out of contact with it. As a strong current always follows the fifth pin P or contact 5 (that is, the fifth contact), on account of the sixth or space pin being permanently projecting in the transmitter because the space key is operated by all the others, the brush 32 will not be retarded so long as the instrument is in unison or step with the transmitter; but suppose the space key only is operated and that line or other trouble has caused the escapement to be advanced a tooth or two. Now when the space key only is operated, the currents going to line will be five weak currents followed by a strong current (as no pins but the space will have been moved to position). The escapement being already advanced a tooth, or two pulsations (one plus the other minus) and consequently, when three of the currents have been received the brush 32 will be in contact with lever 36 and will be retarded until released by a strong current operating relay O (see Fig. 9). As two more currents follow before the sixth releases the brush, it will be seen that the brush will be held back this number of pulsations or just the amount it was advanced out of place. The machine will therefore come to unison whenever a space current only is sent, or after every word. As stated, the relay O responds only to a strong current on the line wire (a single line wire being used), and in so responding the armature 35 thereof makes contact between the points 33, 34 and thus completes the circuit from the local battery which operates the magnets m', m^2, m^3, &c., and their corresponding levers R′, R^2, R^3, &c. Now, we have seen that the depression of any lever L pushes out its corresponding pin P, and that the pins P operating the lever 14 cause the same to make contact with the point 17 and send a strong current to line; but each successive pin (whether the pins are pushed out simultaneously or in succession) sends to line a strong current of opposite polarity, and as relay O must respond to a strong current of either polarity, the coils thereof (three in number) are so wound that currents of either polarity operate to attract the armature 35 to the pole 38 on that side of the armature nearest the relay N (see Fig. 1). The armature 35 is properly weighted on the opposite side of the pivot 37 to restore it to its normal position when the current ceases.

Having fully described our invention, what we claim is—

1. In a telegraph apparatus, a single line wire, a series of revolving contacts or pins adapted to send a word or character over said line, depression keys operating said contacts,

and the means substantially as described for bringing the keys and pins into co-operation upon either a successive or simultaneous depression of the keys, substantially as set forth.

2. In an electric telegraph, a single line wire, finger levers or keys adapted to be depressed singly or simultaneously, the mechanism substantially as described co-operating with said keys for sending to line successively the record of each depression of said keys, and without conflicting, substantially as set forth.

3. In a telegraph apparatus, a single line wire, a transmitter having a series of revolving contacts or pins adapted to send a character or word over said line, a receiving station, a selecting apparatus along said line, and the means substantially as described co-operating with the selecting apparatus to bring the transmitter and receiver into unison, substantially as set forth.

4. The combination, in an electric telegraph, of keys or pairs of keys arranged for the thumbs and corresponding fingers of both hands, so that either of the thumbs or either of the corresponding fingers by action upon its proper key shall produce the same result as the thumb or corresponding finger of the other hand, a single electric contact for every alternate lever of the keys, to send to line a positive current; and a second single contact for the remaining levers of said keys, to send to line a negative current, and a single line wire, substantially as set forth.

5. The combination in an electric telegraph, of a series of depression keys, a contacting lever, intermediate mechanism for setting said contacting lever into vibration, contact points establishing successively currents of opposite polarities corresponding with the successive operation of the individual keys, and a single line wire for sending the respective currents, substantially as set forth.

6. The combination, in an electric telegraph, of a set of contact points, a series of finger levers or depression keys, intermediate mechanism between said finger levers and contact points adapted to send currents of one polarity through one of said contacts, and currents of opposite polarity through the second contact point, the currents of one polarity representing a set of alternate depression keys, and those of the opposite polarity representing the remaining keys, substantially as set forth.

7. In a telegraph apparatus, a series of depression keys, a single line wire, mechanism for sending necessary impulses along said line upon depression of any key, mechanism co-operating with any two consecutive keys for sending to line currents of opposite polarity and of the same strength upon depression of both of said keys, and of opposite polarity and variable strength upon depression of only one of said keys, substantially as set forth.

8. In a telegraph apparatus, a series of depression keys, two consecutive ones of which when depressed being adapted to send currents of opposite polarities but of the same strength, and of opposite polarities but of variable strength when only one of said two keys is depressed, a single line wire, a relay on said line made operative by currents irrespective of their strength, and a second relay made operative only under a strong current, substantially as set forth.

9. In a telegraph apparatus, a single line wire, a series of depression keys, intermediate mechanism substantially as described for sending a strong current along the line and recording a character at the receiving station on depression of any one of said keys, and the means substantially as described for indicating the non-depression or normal position of any key succeeding by sending to line a weak current, substantially as set forth.

10. In a telegraph apparatus, a single line wire, a series of depression keys, corresponding pins or contacts adapted to send electric currents over said line, electric contacts controlling the polarity of said currents, a rotating toothed escapement, a lever operated by the respective currents and controlling said escapement, the number of said keys being a multiple of the number of teeth on the escapement which constitute a character, and a common multiple of the said number of teeth and the number of contacts, substantially as set forth.

11. The combination of a double keyed transmitting instrument, in which the same characters are formed by the corresponding finger of either hand, a single line wire, necessary electrical energy, a series of step-by-step or successive contacts or pins, and a toothed escapement, the number of contacts being a multiple of the number of teeth in the escapement, a suitable divisor of which multiple represents the number of teeth the escapement has passed to record a word or character, substantially as set forth.

12. In an electric telegraph, the combination of a revolving drum, a series of depression keys controlling the motion of the same, one of which keys constitutes the space key and adapted to automatically send a strong current over the line upon the rotation of said drum, substantially as set forth.

13. The combination in an electric telegraph, of a single line wire, a transmitting device having a number of keys adapted to successively send to line impulses of opposite polarities, a selecting device along the line controlled by the respective impulses, and means on the main line for bringing said selecting device into adjustment at the end of each word or character, substantially as set forth.

14. The combination in an electric telegraph, of a single line wire, depression keys or pairs of depression keys arranged for the thumbs and corresponding fingers of both hands, electric contacts corresponding to each pair of keys for sending to line currents of opposite polarities, intermediate mechanism

co-operating with said contacts upon a simultaneous or successive depression of said keys to send said currents of opposite polarities to line, substantially as set forth.

15. The combination in an electric telegraph, of a single line wire, a series of depression keys, revolving contacts in groups or series co-operating with said keys, and adapted on depression of the space key to send a series of weak currents alternately positive and negative along the line, followed by a strong current on releasing the same, substantially as set forth.

16. The combination in an electric telegraph, of a single line wire, a transmitting device having a number of keys adapted to send successively each an impulse of opposite polarity from the one preceding, a selecting device along said wire, a relay adapted to be operated by weak currents and controlling said selecting device, a second relay operated only by a strong current, and a vibrating armature or lever connected to said second relay for adjusting the selecting device controlled by the first relay, substantially as set forth.

17. In an electric telegraph, the combination of a single line wire, a selecting device on said line having a series of contacting sections, each section being responsive to a particular impulse on said line, a revolving brush contacting successively with the several sections and connected with one end of a local battery, a series of magnets or coils having severally at one end wire connections with the respective sections, a relay operated only by a strong current, a right angled armature operated by said relay and limiting the movement of the revolving brush, the said magnets having jointly a wire connection with the armature of said relay, and the opposite end of the said armature having a wire connection with the other end of the local battery to complete the circuit and operate the magnets, substantially as set forth.

18. In an electric telegraph having a single line wire, the combination of a series of depression keys having a common pivotal axis, a series of bell-crank levers operated by said keys upon depression of the latter, a revolving drum having a series of movable pins or contacts, said bell-crank levers and pins having co-operating inclined edges by the action of which the pins are forced out from the drum when in contact with the bell-crank levers, upon rotation of said drum, substantially as set forth.

19. The combination in an electric telegraph of a single line wire, a revolving drum mounted on a suitable shaft, a series of contacts or pins movable therein and projecting from the edge of the drum when shifted from their normal position, a lever operated by the projecting ends of the pins for sending a strong current to line and recording the character represented by each pin, and means for alternating the polarity of the current for each successive pin or contact, substantially as set forth.

20. The combination in an electric telegraph of a single line wire, a transmitter comprising a revolving drum, a series of movable contacts or pins projecting from the periphery of the drum and adapted to be operated by suitable levers, an escapement wheel mounted on the shaft of the drum and turning with the same, and having one-half the number of teeth that the drum has pins, a pivoted escapement lever oscillated by said teeth, and contact points connected with the opposite poles of the main battery for reversing the current with each oscillation corresponding with each successive pin or contact, substantially as set forth.

21. The combination in an electric telegraph, of a revolving drum, fixed stops on one side of the drum, depression keys one of which is a space key, a lever connected to said space key and normally in contact with one of said stops for holding the drum stationary, substantially as set forth.

22. In an electric telegraph, a transmitter having a revolving drum, stops 6 and 7 located diametrically opposite each other at one end of the drum, a lever 8 attached to the space key and having a right angled projection against which one of the stops is normally in contact, a hook-shaped extension carried by said lever and adapted to come in contact with the following stop upon the depression of the lever, and releasing the same upon the said lever assuming its normal position, substantially as set forth.

23. In an electric telegraph, a revolving contact drum, fixed stops at one end thereof, a space key, and a lever connected thereto and normally in contact with one of said stops, substantially as set forth.

24. In a telegraph apparatus, a revolving drum having a space pin normally projecting from one end thereof, means for pushing the said pin back within the drum, and a weaker spring for restoring the space pin to its normal position, substantially as set forth.

25. In an electric telegraph, the combination of a single line wire, a revolving drum, a pivoted lever 14, means carried by said drum for oscillating said lever, a contact 17, an escapement 9 revolving with said drum, an escapement lever 10 oscillated by said escapement, contact points 12 and 13 connected to the opposite poles of the main battery, said escapement lever making contact alternately with points 12 and 13 upon rotation of the drum, a wire connection between lever 10 and contact point 17, and a resistance between said wire and lever 14, said lever 14 being connected to line wire, substantially as set forth.

26. In a telegraph apparatus, the combination of a single line wire, a selecting apparatus on said line comprising a relay N adapted to be operated by weak currents, an oscil-

lating armature controlled by said relay, an escapement mounted on a suitable shaft, said escapement being regulated by said armature, a brush revolved by said shaft, power for operating said shaft, a cylinder or disk having a suitable number of sections corresponding with the depression levers of the transmitter, said brush making electric contact with the several sections in response to the corresponding lever of the transmitter, substantially as set forth.

27. In an electric telegraph, a single line wire, a transmitter, a selecting device on said line having a revolving contact brush, a relay O operated only by strong currents, a right angled armature operated by said relay and pivoted at the right angle, the projecting arm of which armature controls the limit of travel of the revolving brush, and releases the said brush upon the passage of a strong current through the relay N, substantially as set forth.

28. In a telegraph apparatus, the combination of a single line wire, a transmitter having a revolving drum, and a space pin permanently projecting from the end of the same, a selecting device, a relay operated by weak currents and controlling said selecting device, a second relay operated by strong currents only, for adjusting the selecting device, a receiver, said permanently projecting space pin operating to send a strong current to line at the end of every word or character, thereby operating the strong relay, adjusting the selecting device, and bringing the transmitter and receiver into unison, substantially as set forth.

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

JOSIAH A. PARKER.
LELAND L. SUMMERS.

Witnesses:
F. E. BAKER,
H. C. WRIGHT,
MERRILL WATSON,
G. E. MCFADDIN.