

(No Model.)

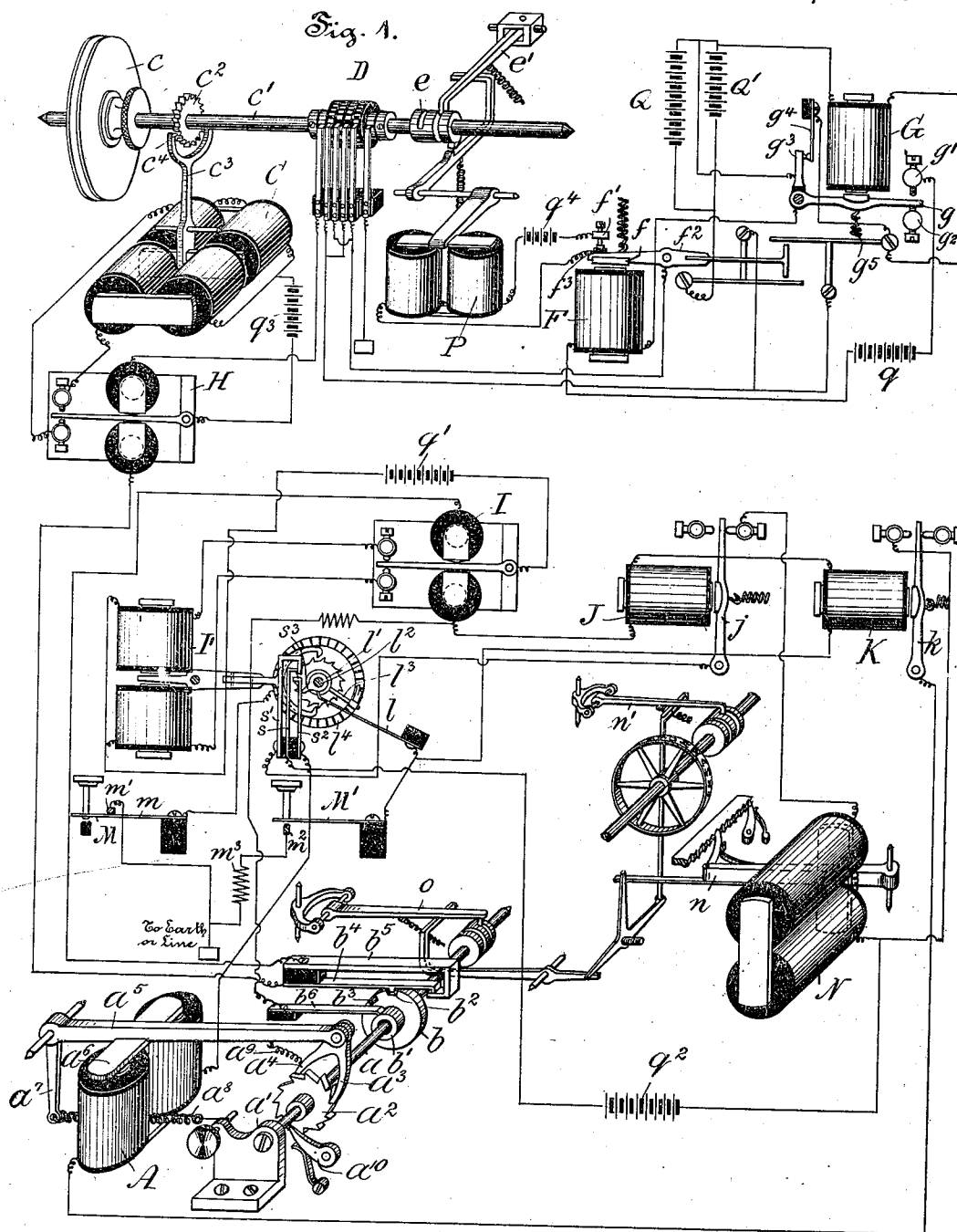
4 Sheets—Sheet 1.

S. R. LINVILLE.

INDIVIDUALIZING CUT-OUT FOR PRINTING TELEGRAPHS.

No. 477,665.

Patented June 28, 1892.



Witnesses:
Hermann Bommann
Thomas M. Smith.

Inventor:
Samuel R. Linville
by Walter Douglas
att'y.

(No Model.)

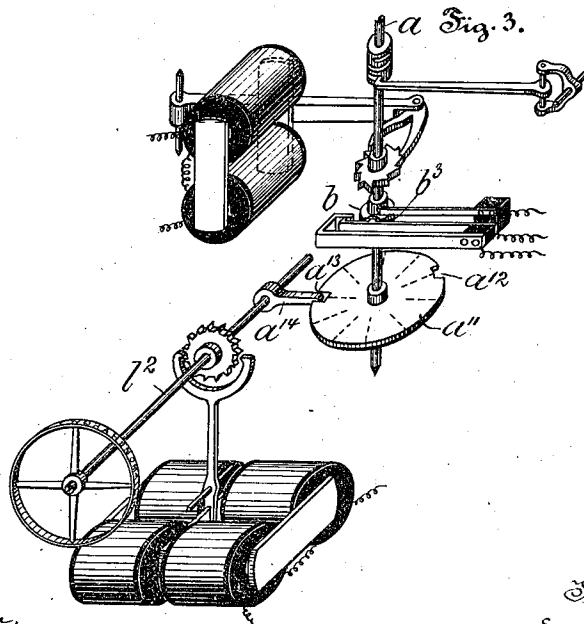
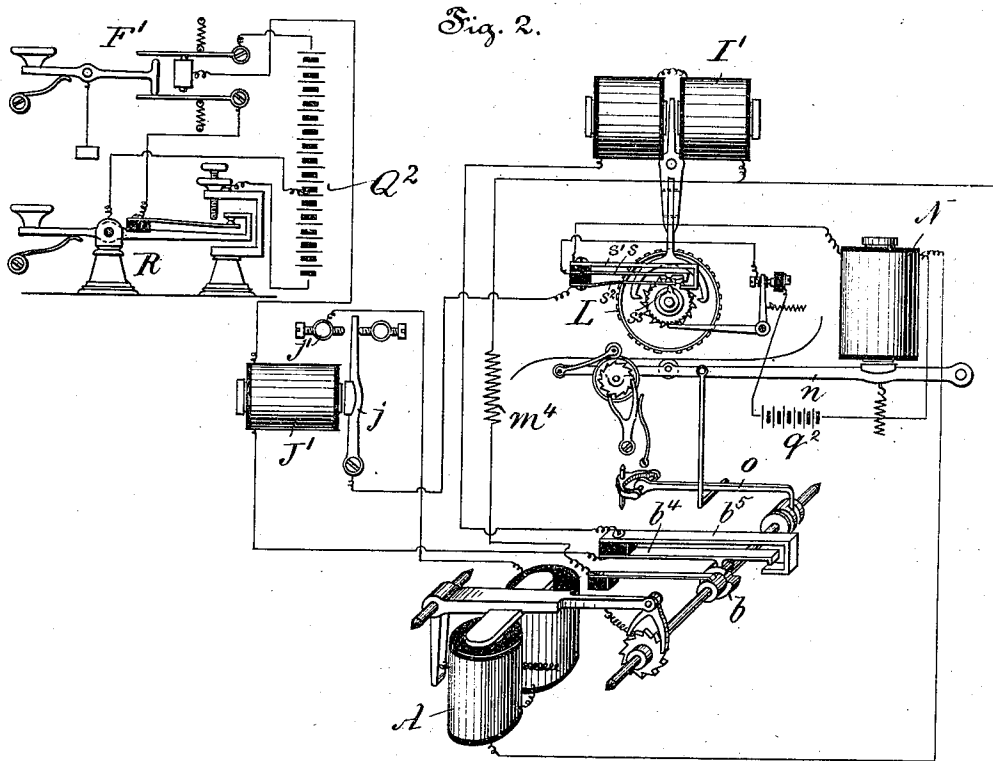
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No. 477,665.

Patented June 28, 1892.



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(No Model.)

4 Sheets—Sheet 3.

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Fig. 4.

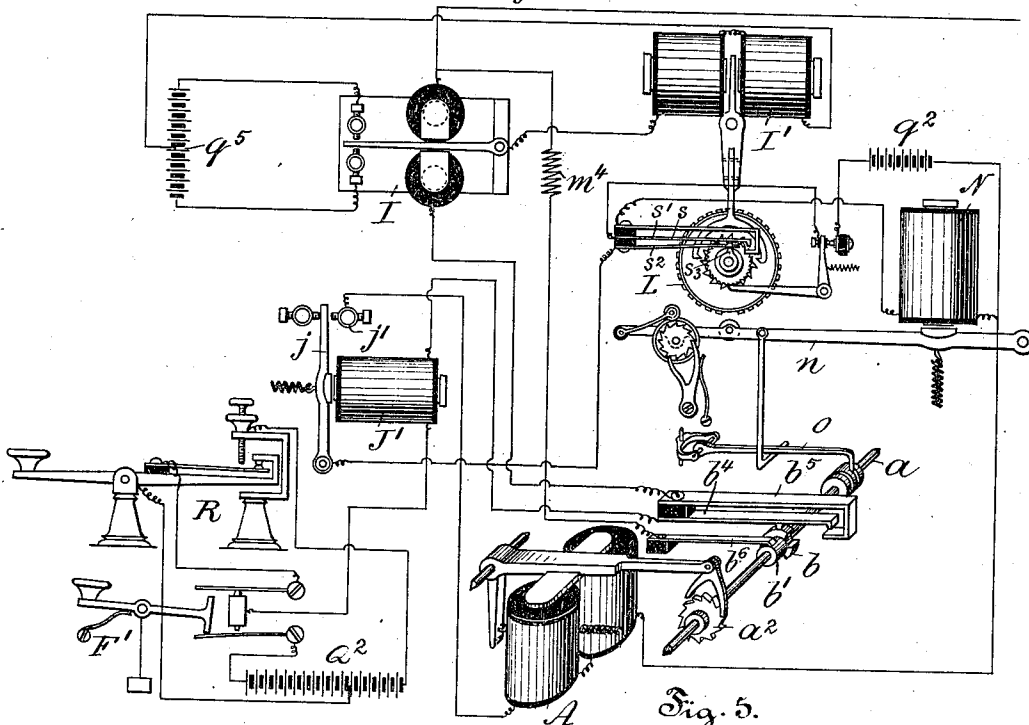
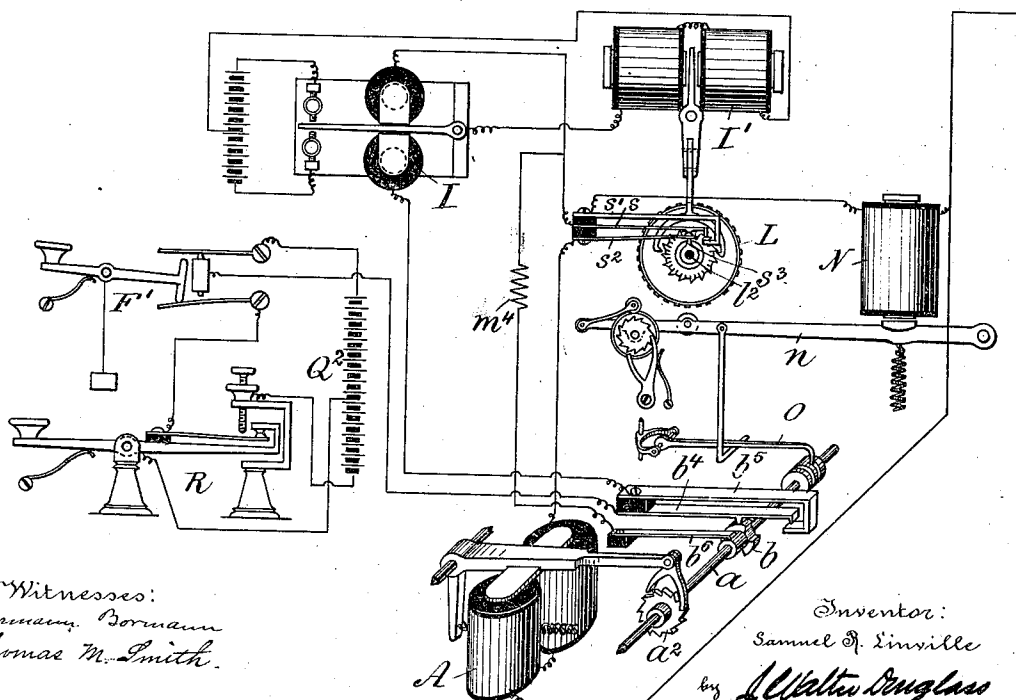


Fig. 5.



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Thomas M. Smith.

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(No Model.)

4 Sheets—Sheet 4.

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Fig. 6.

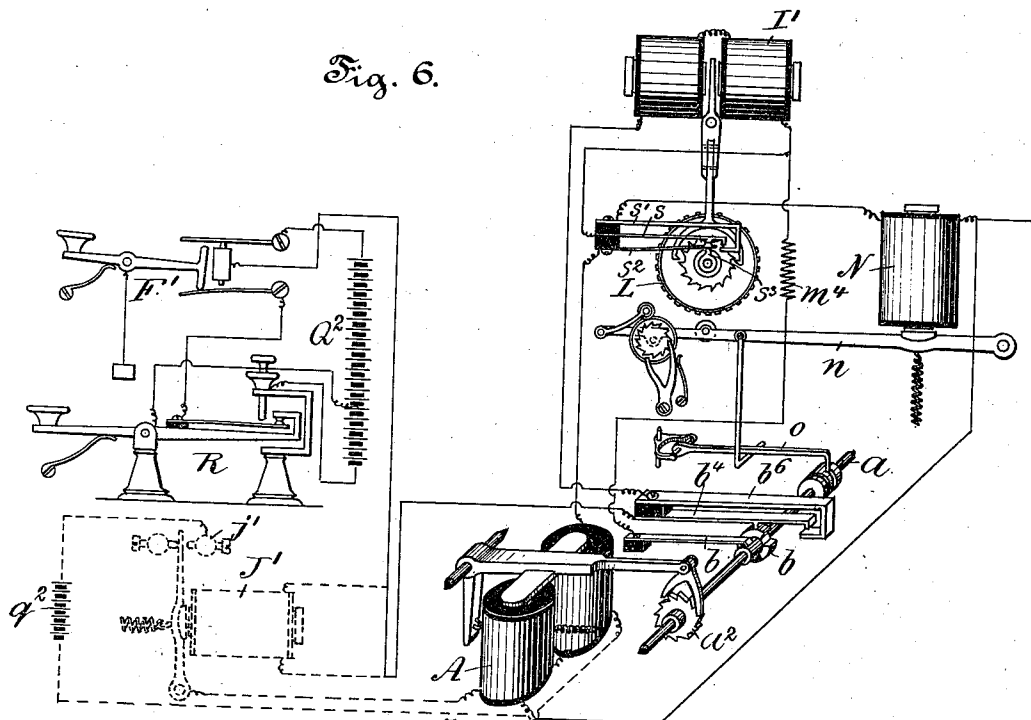
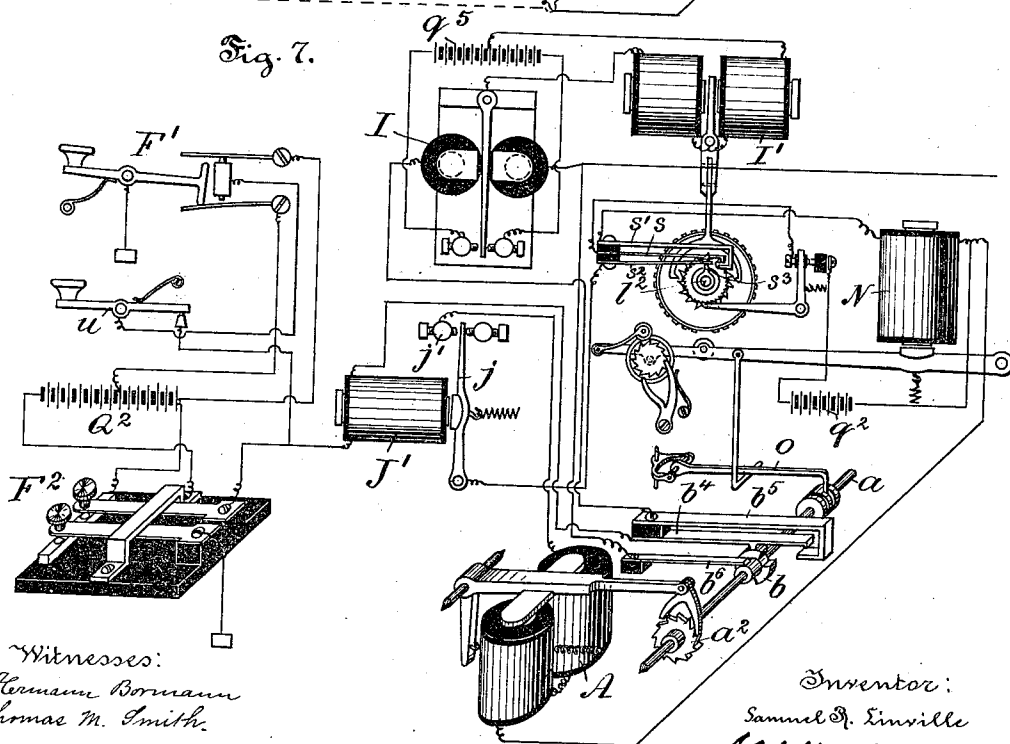


Fig. 7.



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Inventor:

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by J. Walter England

$$att^3_3.$$

UNITED STATES PATENT OFFICE.

SAMUEL RUSH LINVILLE, OF PHILADELPHIA, PENNSYLVANIA.

INDIVIDUALIZING CUT-OUT FOR PRINTING-TELEGRAPHS.

SPECIFICATION forming part of Letters Patent No. 477,665, dated June 28, 1892.

Application filed February 10, 1892. Serial No. 420,937. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL RUSH LINVILLE, a citizen of the United States, residing at the city of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Individualizing Cut-Outs for Printing-Telegraph Systems, of which the following is a specification.

My present invention is applicable in whole or in part to a single or double line system of printing telegraphy that is operated by sources of electric energy, and transmitters included in a single or double line, and either having the sources of electric energy located at the transmitters or having the sources of electric energy and pole-changing alternating and extra battery devices located at central or terminal stations, whether the type-wheels of receivers are arrested with a closed or open line circuit.

The principal object of my present invention is to provide simple, durable, and efficient means for enabling an operator at any transmitting-instrument connected in line with other transmitters and receivers to select one or more of the receivers to the exclusion of the others for receiving and recording a message, whereby secrecy in the transmission of messages is secured.

My present invention, stated in general terms, comprises a telegraph-line, a series of receiving-instruments provided, respectively, with type-wheel shafts adapted to include electrical devices responding to abnormal currents and adapted to operate individualizing cut-out mechanism, and one or more transmitting-instruments provided with apparatus for electrically controlling the type-wheels and transmitting abnormal currents to actuate the electric devices and individualizing cut-out mechanism of the receivers to include thereby the desired receiving instrument or instruments in line.

My invention may be carried into effect by short-circuiting the electro-magnets which directly control the rotation of the type-wheels or by interrupting the local circuits which control the type-wheels of any or all the receivers included in a line by means of individualizing cut-out mechanism actuated either by electro-magnets in local or line bat-

tery circuits closed through said electro-magnets by relays or electro-magnets responding only to abnormal currents in said line, so that an operator at any transmitter is enabled not only to short-circuit without interrupting the line the electro-magnetic devices controlling the type-wheels of any receivers which he requires to cut out, but also to restore said circuits when desired.

The nature and general characteristic features of my invention will be more fully understood from the following description, taken in connection with the accompanying drawings, forming part hereof, and in which—

Figure 1 is a view of a central or terminal station and a combined receiving and transmitting instrument, showing alternating and arresting devices located at the central or terminal station and also showing the printing and transmitting devices and circuit-switches and individualizing devices located at the combined transmitters and receivers and also illustrating, diagrammatically, all the circuits. Fig. 2 is a view of a combined transmitting and receiving instrument, showing the batteries and transmitting devices for alternating and increasing the strength of the current in the line, a neutral relay in said line, printing devices actuated by a local battery, type-wheels actuated by a polarized armature responding to alternating currents in the line, and individualizing devices and circuits. Fig. 3 is a perspective view of an individualizing shaft provided with a locking device embodying features of my invention and adapted to lock the type wheel or wheels of a receiving-instrument at the cut-out position. Fig. 4 is a view of a transmitting and receiving instrument, showing transmitting devices, a neutral and a polarized relay in line, an escapement-magnet having the polarized armature thereof actuated by magnets energized by alternating currents from split-battery circuits controlled by the polarized relay, and printing and cut-out magnets energized by a local battery, and also showing the individualizing apparatus and circuits. Fig. 5 is a view of a transmitting and receiving instrument, showing transmitting devices and a polarized relay, printing and cut-out magnets in the line-circuit, an escapement-magnet energized by a local battery, and a cut-out mag-

net responding to strong currents in the line. Fig. 6 is a view of a transmitting and receiving instrument, showing transmitting devices and line-batteries, escapement-magnets, printing mechanism, and switching devices for changing the line-circuit from the printing to the cut-out magnet, which latter responds only to strong currents in the line, individualizing apparatus, and the cut-out circuits, and also illustrating in dotted lines a neutral relay, which may be disposed in the line to operate the cut-out magnet by a local battery; and Fig. 7 is a view of a transmitting and receiving instrument, showing alternating devices, a circuit-breaking key, a neutral relay, and a pole-changer for sending abnormally-strong pulsations of the required polarity from the entire battery to actuate the neutral relay.

For the sake of a description of my present invention reference will be made to a system of printing-telegraphy in which the batteries, alternating, arresting, and other devices, and the combined transmitter and receiving circuits shown in Fig. 1 are substantially the same as are described in the Letters Patent of the United States No. 450,630, dated April 21, 1891, and granted to Samuel R. Linville and Louis F. Hettmansperger, and the circuit switches, individualizing apparatus, and short circuits for rendering the receiver inoperative will be described in connection with such a system of printing-telegraphy, but it must be borne in mind that my invention is applicable to other types or systems of telegraphy.

In the drawings, a is a shaft supported in bearings a' and adapted to be rotated step by step by means of a ratchet-wheel a^2 , mounted on said shaft.

a^3 is a pawl provided with a stop-arm a^4 and pivotally connected with a lever a^5 , hung on a trunnion. This lever a^5 carries an armature a^6 appertaining to the electro-magnet A, and an arm a^7 , to which a retracting-spring a^8 is attached.

When the electro-magnet A is energized, the armature a^6 is actuated and causes the pawl a^3 to rotate the ratchet-wheel a^2 one step. When the circuit through the electro-magnet A is broken, the armature a^6 will be retracted by the spring a^8 , and the pawl a^3 being held in contact with the ratchet-wheel a^2 by the spring a^9 engages the next tooth of the ratchet-wheel a^2 , it being understood that the detent a^{10} prevents retrograde movement of the ratchet-wheel a^2 .

On the shaft a are rigidly mounted a disk b and a hub b' , of conducting material, insulated from said shaft. The periphery of each of the disks b appertaining to the respective receivers in line is notched at a zero-point b^2 , corresponding with one of the teeth of the respective ratchet-wheels a^2 , and also at an additional point b^3 , corresponding with one of the successive teeth of the respective ratchet-wheels a^2 . For example, all the ratchet-wheels have as many teeth as there are receiving-stations, and the notch b^3 is in align-

ment with the first succeeding tooth of the ratchet-wheel in instrument No. 1, and is in alignment with the second succeeding tooth in instrument No. 2, and so on in the succeeding instruments.

Assuming, for the sake of a further description, that all the circuit-preserving springs b^4 at all the instruments are in engagement with the notches b^2 and that all the ratchet-wheels a^2 are rotated synchronously tooth by tooth, then the receiver No. 1 is included in line when all the ratchet-wheels a^2 have advanced one step, because the notch b^3 is shifted into position for permitting the projection on the spring b^4 to drop into the notch b^2 on the disk b , thus breaking circuit with the disk b and permitting the circuit-spring b^4 to contact with the circuit-spring b^5 . In the mean- while the other receivers are cut out of line because the projections on the springs b^4 ride upon the disks b , and thus short-circuit the line through the hubs b' and their accessories. In the individualizing apparatus at station No. 2 the projection on the spring b^4 drops into the second notch b^3 in the disk b when all the ratchet-wheels a^2 have advanced two steps, because the notch b^3 will then have been brought beneath the projection, and at the succeeding stations the projections of the respective springs will drop into the notches b^3 whenever the ratchet-wheels have advanced a number of steps equal to the number of the respective stations.

It will hereinafter be shown that any or all receivers in line can be short-circuited through the instrumentality of the shaft a by causing abnormal pulsations in the line and closing and breaking the circuit through the electro-magnets A.

Although the terminal-station circuits and devices illustrated in Fig. 1 are well known and are fully described in the patent hereinbefore mentioned, still a brief description of the same will now be given.

The pulley c is frictionally connected with the shaft c' , on which are mounted an escapement-wheel c^2 , an alternator D, and a unison-spiral e . The pulley c is constantly turned by any suitable contrivance or source of power. The battery Q is closed through the pole-changer F and alternator D, one electrode of the battery Q being connected through the coils of the relay G. The battery Q' is adapted to be closed in parallel with the battery Q. The electro-magnet F of the pole-changer is energized by a local battery q when the armature-lever g of the relay G contacts with its front stop g' , and when it contacts with its back stop g^2 this circuit is broken and the line-battery Q' is connected with the pole-changer F by closing the circuit of the positive electrode at the contacts on the lever g^3 and spring g^4 of the relay G. From the pole-changer F the electrodes are connected to the springs bearing on the alternator D, and thence one electrode goes to earth and the other is directed to line through the elec-

tro-magnets of the polarized relay II, thence to the circuit-preserving spring b^4 of the receiving-instruments, which spring must be in the position shown clear of contact with the disk b , thence through spring b^5 , thence through the electro-magnets of the polarized relay I at the receiver and through the magnets of the relays J and K to the circuit-spring l , the insulated hub l' on the type-wheel shaft l^2 , arm and brush l^3 , to line-contacts of the sunflower l^4 , key-arm m of the keys M, upper contact m' , and to earth or to line and through the other receivers to earth.

The escapement electro-magnets I' , energized by the circuit of a local battery q' , closed through contacts of the polarized relay I, control the type-wheel of the receiver. The paper-carriage and printing-pallet are actuated by the electro-magnet N, included in the circuit of the local battery q^2 , closed at the back contact of the relay J, when the line-circuit is broken by any of the keys corresponding to the contacts on the sunflower l^4 in the row of keys M. A key M' short-circuits the sunflower by closing the line at contact m^2 through the resistance m^3 to earth or to line through other receivers and then to earth. The relay K is adjusted to respond only to currents in the line stronger than the currents which actuate the relay J. The lever n of the electro-magnet N is mechanically connected with the unison-latch n' of the receiver and also with the unison-latch o of the individualizing mechanism, so that these latches will be released from their respective unison-spirals each time that the electro-magnet N is energized. The insulated circuit-springs s , s' , and s^2 are so arranged with reference to the type-wheel shaft l^2 and the arm s^3 , insulated from said shaft, that the arm s^3 collides with the spring s^2 during one step of the type-wheel at a predetermined cut-out position of said type-wheel, and at this position the spring s^2 will contact with the spring s and cause it to break contact with the spring s' , thereby breaking the circuit of the local battery q^2 through the electro-magnet N and closing the circuit through the electro-magnet A.

When the line-circuit is closed through all combined transmitters and receivers, as is normally the case, the lever or relay G at the terminal station will remain in contact with its front stop g' , and the armature f will be held in contact with the electro-magnets of the pole-changer F. Under such circumstances the alternator D will run continuously in a well-known manner, the escapement-lever c^3 and pallets c^4 being constantly vibrated by the electro-magnets C, responding alternately to the currents of the battery q^3 , closed by the contacts of the polarized relay II, the said relay being actuated through successive reversals of current by the alternator D until the alternator and the type-wheels of all the receivers in line are arrested in unison. When a key in the row

of keys M at any receiver is depressed, the line-circuit is broken and the armatures g and f of the relay G and pole-changer F fall away. The line-batteries Q and Q' are now in parallel, as has been hereinbefore described, and the circuit of the battery q^4 is closed by the contact f^3 on the pole-changer lever f^2 and contact f' through the unison electro-magnet P. At the same time the lever k of the relay K at the receivers closes the circuit of the battery q^2 through the magnet N, thereby simultaneously releasing the unison-latches of the alternator and of all the receivers in line.

The line-battery Q is alone in circuit with the relay G at the terminal station. The resistance m^3 between the key M' and earth or line must be such that the current in line from the battery Q will not cause the electro-magnets of the relay G at the terminal station to overcome the resiliency of the adjusting-spring g^5 of said relay. The line-circuits stand reversed through the pole-changer F when its armature f is retracted in consequence of a break in the line-circuit at one of the rows of keys M, and when the line is closed by the key M' through a resistance m^3 by depressing the key M' , so as to short-circuit the sunflower, and the break in the line at the row of keys M, the current of the combined batteries Q and Q', and of the same polarity as last actuated, the polarized relays at the terminal station and at the receivers will go to line without actuating said relays or the neutral relay G at the terminal station. The operation of the individualizing cut-out mechanism in connection with an automatic system, such as described, will be clearly understood from the following description. However, there must be several receivers connected in line and provided with circuits and devices, substantially such as are illustrated in Fig. 1.

An operator, say, at receiver No. 1 wishes to communicate with receiver No. 4 and to short-circuit the operative magnets of all the other receivers. The operator releases the unison-latches and presses a key in the row of keys M, called a "cut-out" key, and adapted to arrest all the type-wheels at the cut-out position, whereupon the arms s^3 on the type-wheel shafts l^2 of all the receivers will collide with the springs s^2 , closing the local circuits of the local batteries q^2 at the receivers through the electro-magnets A and breaking said circuits through the electro-magnets N. The operator, then holding down the cut-out key to maintain the break in the line through the sunflower of his receiver, causes a sufficient number of abnormal makes and breaks in line by closing and breaking the short circuit through the key M' and resistance m^3 to rotate all the individualizing-shafts a and devices thereon to the unison position. At this position all the respective disks b have notches b^2 , as has been hereinabove explained, and the line-circuits are all in normal con-

nection through the electro-magnets directly or indirectly controlling the type-wheels of the respective receivers in line. It may be remarked that in such position the unison-latches o lock the shafts a , and it is necessary to release these latches o before the shafts may again be rotated. The keys M and M' that were previously operated are released and all the type-wheels automatically run to unison with the alternator and are locked in such position by their unison-latches n' and o . During the operation the circuits of the local batteries q^2 are restored to the electro-magnets N by the movement of the arms s^3 on the type-wheel shafts l^2 to a position out of contact with the spring s^2 . A key (not shown) corresponding to the unison position is then pressed, so that the line is interrupted and the unison-latches e' , n' , and o of the alternator and of all the receivers in line are again released, as previously described, in order to permit of the rotation of the shafts a c' l^2 . The operator next arrests all the type-wheels at the cut-out position by holding down the cut-out key. In this position the individualizing electro-magnets A are again included in the circuit of the batteries q^2 at all the receivers. The operator then causes all the shafts a to advance four steps by maintaining the break in the line through the sunflower by holding down the cut-out key and at the same time sending strong currents over the line to actuate the relay K by making and breaking the line four times through the short circuit-key M' and resistance m^3 . In this position of the shaft a the spring b^4 will enter the notch b^3 and clear the disk b only at receiver No. 4, and at all others the springs b^4 will ride in contact with the metallic disks b , thereby cutting such instruments out of line. At receiver No. 4 the polar relay I will be in the line-circuit through the circuit-preserving springs b^4 and b^5 and the main line, as shown in Fig. 1, while at all the other receivers the contact between the springs b^4 and b^5 is interrupted, because the springs b^4 ride on and contact with the disks b , and thus the line is connected to the springs b^5 through the hubs b' , whereby the polarized electro-magnets I are short-circuited. The operator may now move his individualizing-shaft to the No. 1 position or employ a switch to restore the circuit through his polarized relay-magnets in a manner well known to electricians, and receivers Nos. 1 and 4 will then be in operative communication with each other to the exclusion of all the other receivers in line. If the disks b at two or more receivers have notches at corresponding radial positions, all such receivers to the exclusion of the others may be brought into operative connection with each other.

I do not limit my invention to the specific circuits and devices hereinbefore described, as it is obvious that the resistance m^3 in the line short circuit may be varied or omitted. That the form of the circuit-controlling de-

vices is not material, and that a cylinder with contacts and insulations and springs bearing thereon, or numerous other well-known devices operating to transfer the line-current from one circuit to another, may be substituted for the disk b and springs b^4 , b^5 , and b^6 . Moreover, the polarized relay I and local battery q^2 at the receivers may be omitted, in which case the line-circuit energizes the electro-magnets controlling the type-wheels, and to cut out a receiver it is of course necessary to short-circuit these magnets. A pulsator consisting of numbered contacts and insulations in dial form operating in connection with a pivoted contact-arm adapted to sweep over said contacts may be employed in lieu of the key M' . A disk a^{11} , Fig. 3, rigidly secured to the shaft a placed in relation to the type-wheel shaft l^2 , as shown, and having a unison-notch a^{12} and a notch a^{13} , through which an arm a^{14} on the type-wheel shaft l^2 may freely pass, may be employed. In this instance the notch a^{13} is arranged to correspond in radial position with the hereinbefore-described notches b^3 on the disks b , so that the disks a^{11} operate to arrest the type-wheel shafts of all the receivers in line at cut-out positions, and this result may be accomplished either with or without the employment of the line short-circuiting devices by manipulating the keys in the manner hereinbefore explained. The application of my invention to numerous well-known systems of printing-telegraphy having transmitters only at central stations or transmitters connected electrically with receivers at all stations will be apparent to electricians skilled in the art, and it may be remarked that it is immaterial whether the circuit-switch s is controlled by an arm on the type-wheel shaft or by an arm moving synchronously therewith.

The following adaptations will be briefly described:

In Fig. 2 is shown a combined transmitter and receiver provided with a type-wheel magnet I' , included in the line-circuit, and with a printing-magnet N , included in the circuit of a local battery q^2 . The alternating devices F' of these instruments are connected to the electrodes of a part only of a line-battery Q^2 , and operate when vibrated to transmit alternating currents through the relay J' and the type-wheel magnets I' to actuate and set the type-wheels. The circuit-preserving key R when depressed operates to include the entire battery Q^2 in the line-circuit, the polarity of the current to line being determined by the position in which the alternating devices F' are arrested. When the type-wheel L is arrested at the cut-out position, the arm s^3 , pressing the circuit-spring s out of contact with the spring s' , transfers the circuit of the battery q^2 from the magnet N to the magnet A , and said circuit may then be closed through the front contact j' of the relay J' by sending strong pulsations to line by alternately depressing and releasing the circuit-preserving key R . By this means

the individualizing devices shown in Fig. 2 and hereinbefore described with reference to Fig. 1, at all the receivers in line, may be turned to unison position. The unison-latches *o*, mechanically connected to the printing-lever *n*, are released by the printing-magnet *N* in the manner hereinabove described with reference to Fig. 1, and the disks *b* are set in position for breaking contact of the spring *b*⁴ with the spring *b*⁵ and making contact of said spring *b*⁴ with the disk *b* in the manner above described, whereby the type-wheel magnets *I'* are short-circuited by a line closed through a resistance *m*⁴.

In Fig. 4 the receiving and the transmitting devices are similar to those illustrated in Fig. 2; but the line-circuit, instead of passing through the coils of the type-wheel electro-magnets *I'*, is connected to the coils of the electro-magnet of a polarized relay *I*, and the type-wheel electro-magnets *I'* are energized by the alternating currents of a local battery *q*², closed by the contacts of said relay. In this case the individualizing apparatus operates to short-circuit the polarized relay *I* by interrupting the line between the springs *b*⁴ and *b*⁵ and closing it around said relay through the disk *b*, hub *b*¹, spring *b*⁶, and resistance *m*⁴, thereby arresting the operation of the type-wheel electro-magnets *I'*. It is apparent that the line between the tongue of the polarized relay *I* and the type-wheel electro-magnets *I'* may be interrupted by the individualizing-springs *b*⁴, *b*⁵, and *b*⁶, or the local battery *q*² may be short-circuited in any well-known manner by the devices employed to short-circuit the polarized relay instead of short-circuiting said relay, as shown.

In the circuits and apparatus illustrated in Fig. 5 the transmitting devices are similar to those illustrated in Figs. 2 and 4 and hereinbefore described. The neutral relay responding only to strong currents in line is omitted and the printing electro-magnet *N* and the individualizing magnet *A* are in the line-circuit, and the latter must be adjusted to respond only to abnormally-strong currents from the entire battery *Q*². The switch or circuit preserving spring *s*¹, actuated by an arm *s*³ on the type-wheel shaft *l*², operates to interrupt the line-circuit through the printing electro-magnet *N* and to close said circuit through the individualizing electro-magnet *A*. The polarized relay *I* may then be short-circuited through the spring *b*⁴, disk *b*, spring *b*⁶, and resistance *m*⁴ by rotating the individualizing devices by means of strong currents, as hereinbefore described.

In the circuits and apparatus illustrated in Fig. 6 the polarized relay is omitted, the type-wheel magnets *I'* are included in the line-circuit, and the printing and individualizing electro-magnets *N* and *A* are adapted to be included in said circuit, the printing electro-magnet *N* responding to prolonged pulsations in the line-circuit and the individualizing electro-magnet *A* responding to abnormally

strong pulsations, it being understood that short weak pulsations operate the type-wheel electro-magnets *I'*. The individualizing apparatus is adapted to short-circuit the type-wheel electro-magnets when the type-wheels are arrested at the cut-out position, as hereinbefore fully described. The dotted lines in Fig. 6 indicate a relay *J'*, responding to strong pulsations and adapted to be included in the line, if desired, in which case the individualizing electro-magnet *A* may be energized by the local battery *q*², closed through the front stop *j*¹ of said relay. The line-circuit could in such case be permanently connected through the coils of the printing electro-magnet *N*, and the circuit-switch *s* and circuit connections therefrom to the electro-magnet *A* might then be omitted.

In Fig. 7 the transmitting devices are adapted to send alternating currents of a portion of the battery *Q*² to line, and in case the transmitter runs automatically in a well-known manner by sending alternating currents through escapement-magnets *I'*, controlling the movement of a power-impelled shaft *l*², and the transmitter is arrested through the interruption of the line-circuit by the breaking of the line, as by a key *u*. However, the devices hereinbefore described for sending strong pulsations must be modified, for example, in the following manner: A current of the same polarity as last energized the polarized relays *I* or escapement electro-magnets *I'* must be sent when the line is closed around the break at the key *u*, otherwise the transmitter would start and the type-wheels of the receivers would be moved. To obviate this difficulty, a pole-changer *F*² or equivalent device must be employed to send abnormally-strong pulsations of the desired polarity from the entire battery *Q*² to actuate the neutral relay *J'*. The operation of short-circuiting the polarized relay *I* at the receiver when the type-wheel is arrested at the cut-out position has been hereinbefore described with reference to similar circuits in Fig. 4.

My invention is applicable to systems of telegraphy operating by direct currents of the same polarity, since, instead of a neutral relay responding only to strong currents, a polarized relay arranged to contact on one point by sending reversed normal currents may be included in line in a well-known manner operating to close and break the circuit through the individualizing electro-magnets.

I desire it to be understood that my invention comprises the generic feature of short-circuiting or rendering inoperative the devices controlling the type-wheels of receivers by means of currents differing in strength from the currents employed in operating the type-wheels and of restoring said circuits to normal condition when desired, and hence I do not limit myself to the use of the specific means, circuits, and systems described, because it is obvious that my invention is of general application to all systems of printing telegraphy.

Having thus described the nature and objects of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. An individualizing cut-out system for printing telegraphy, comprising a line, source of electric energy, means for transmitting normal and abnormal electric impulses through said line, a series of receiving-instruments included in said line and having type-wheels and shafts controlled by normal currents, circuit-switching devices controlled by said shafts, and individualizing-switches actuated by electro-magnets responding only to abnormal line-currents to render inoperative by normal currents any and all receivers included in said line.

2. An individualizing cut-out system for printing-telegraphs, comprising a line, means for transmitting normal and abnormal electrical currents, and a series of receiving-instruments included in said line and each provided with a type-wheel shaft operating to cut-out magnets and include individualizing line cut-out mechanism and with electrical devices responding to abnormal line-currents and operating the individualizing cut-out devices to include and exclude the required instrument or instruments in or from the line.

3. In an individualizing cut-out system for printing-telegraphs, a line and source of energy, means for transmitting normal and abnormal currents over said line, receivers having type-wheels and shafts therefor included in said line and adapted to be positioned only in response to normal currents over said line, switching devices in receivers operative at determinate cut-out positions, and individualizing switching devices actuated by magnets in circuits controlled only by magnets responding to abnormal line-currents operating to exclude or to include the circuit controlling any or all of the type-wheels of receivers in line.

4. In an individualizing cut-out system for printing-telegraphs, a line and source of energy, telegraphic receivers included in said line, circuits and appliances at receivers for positioning type-wheels and making impressions, local-circuit-switching devices operative at determinate positions of said type-wheels, individualizing electro-magnets, and mechanism, substantially as described, and magnets in said line responding only to stronger than the normal operating-currents to control said individualizing mechanism, whereby said type-wheels are rendered inoperative except in response to abnormal currents over said line.

5. In an individualizing cut-out system for printing-telegraphs, a series of telegraphic receivers having type-wheels, line-relays, and local circuits for positioning said type-wheels and making impressions therefrom, switching devices and local circuits operative at determinate positions of said type-wheels, individualizing-magnets, and devices controlled by said local circuits closed through relays in a line-circuit, said relays responding only to strong currents sent over said line operating

to short-circuit through a resistance the relays controlling said type-wheels.

6. In an individualizing cut-out system for printing-telegraphs, sources of electric energy, a line, circuits, transmitters, and receivers in said line, type-wheels in receivers, type-wheel shafts adapted to actuate switching devices at determinate positions, individualizing-magnets, and electrical and mechanical devices actuated thereby, said magnets responding only to abnormally-strong currents at determinate positions of said type-wheels and operating to arrest at a cut-out position any or all of the said type-wheels and to prevent their movement by normal operating-currents.

7. An individualizing cut-out system for printing-telegraphs, comprising a line, means for alternating and varying the strength of the current in the line, transmitters included in the line and provided with keys for breaking and closing the line, receivers included in the line and provided with shafts carrying type-wheels, electro-magnetic devices responding to currents in the line and controlling the type-wheel shafts, printing devices, local-battery circuits, local-circuit switches controlled by the type-wheel shafts, individualizing circuit-switching devices actuated by an electro-magnet, and a relay responding to abnormal currents in the line and closing said local circuit at its front stop through the individualizing-magnets to permit of the operation of the individualizing-switch.

8. An individualizing cut-out system for printing-telegraphs, comprising sources of electric energy and electrical and mechanical devices located at a station for alternating and varying the strength of current in a single line, transmitters included in said line and provided with keys for breaking and closing said line, receivers included in said line and provided with shafts carrying type-wheels, electro-magnetic devices responding to currents in said line and controlling said type-wheel shafts, local-battery circuits, mechanical circuit-switching devices controlled by said shafts and adapted to control said local-battery circuit, individualizing circuit-switching devices, a shaft having contacts actuated by an individualizing electro-magnet, and a relay responding to intermittent currents in said line and closing said local circuit at its front stop through the individualizing-magnets during the arrest of the type-wheels at a cut-out position to permit of the rotation of the individualizing-shaft and of actuation of the individualizing circuit-switch operating to cut out of circuit the electro-magnetic devices controlling the type-wheels of any or all of the receivers included in said line.

9. An individualizing cut-out for printing-telegraphs, comprising sources of electric energy, a main line, transmitters included in said line and provided with pole-changers and with keys and devices for breaking, including and permitting of abnormal currents in

said line, receivers provided with power-impelled shafts carrying type-wheels, unison devices, electro-magnetic devices responding to line-currents and controlling said shafts, local-circuit-changing switches actuated by said shafts at a determinate position thereof, individualizing-switches, shafts carrying devices for actuating said individualizing-switches, electrical and mechanical devices for releasing said unison devices, individualizing-magnets in local circuits controlled by said circuit-changing switches, and relays responding to abnormal intermittent currents in said line to close said local-battery circuits through the individualizing-magnets to effect the rotation of said individualizing-shafts, thereby actuating said individualizing-switches in response to intermittent currents included by keys at any transmitter in line.

10. An individualizing cut-out for printing-telegraphs, comprising sources of electric energy, a main line, transmitters included in said line and provided with pole-changers and with keys and devices for breaking, including and intermitting abnormal currents in said line, receivers provided with power-impelled type-wheel shafts, unison devices, electro-magnetic devices responding to line-currents and controlling said shafts, local-circuit-changing switches actuated by said shafts, individualizing-switches provided with unison devices, electrical and mechanical devices for releasing said unison devices, magnets in local circuits controlled by said local-circuit switches, and relays responding to abnormal currents in line to control the operation of line-switching devices.

11. In a cut-out for printing-telegraphs, a main line, a source of electric energy, transmitters provided with means for alternating, breaking, intermitting, and varying the strength of the current in said line, receivers having power-impelled type-wheel shafts, electrical devices actuated by line-currents for controlling said shafts, local-battery circuits normally energizing printing-magnets, means adapted to short-circuit the same and energize individualizing cut-out magnets, circuit-switches actuated by a cam on the type-wheel shaft at a determinate position thereof for including the individualizing cut-out magnets in said local circuit, individualizing switches, shafts, contacts, and ratchets, a relay responding to intermittent strong currents in line and closing said local circuits through the individualizing-magnets previously included in the local circuit by the operation of the local-circuit switch to actuate said individualizing-shaft, and switches to effect the inclusion and exclusion of the electrical devices for controlling the type-wheel in and from the line-circuit.

12. In an individualizing cut-out for printing-telegraphs, sources of electric energy, a main line having devices included therein for alternating, breaking, and varying the current

to receivers included in the line, type-wheel shafts, escapements controlling said shafts, electro-magnets actuating the escapements, printing electro-magnets and devices, local-circuit switches actuated at a determinate position of the type-wheel shafts, relays responding only to line-currents stronger than the currents actuating the escapement-magnets, individualizing line-switches located at receivers and provided with unison devices and latches, means controlled by the printing electro-magnets for releasing the unison-latches, and local circuits closed by said relays and controlling said line-circuit switches.

13. In an individualizing cut-out for printing-telegraphs, sources of electric energy, a main line having devices included therein for alternating, breaking, and varying the current to receivers included in said line, power-impelled shafts having type-wheels and cams mounted thereon at receivers, escapements controlling said shafts, electro-magnets actuating the escapements, printing electro-magnets and devices, local-circuit switches actuated at a determinate position by said cams, relays in line responding to stronger currents than the currents actuating the escapement-magnets, individualizing circuit-preserving switches located at receivers and comprising shafts and ratchet-wheels, circuit-contacts and interrupters and unison devices mounted on said shafts, unison-latches and electro-magnetic devices, means for releasing said latches, and local circuits normally closed through said printing-magnets and adapted to be closed through the front contact of said relays to energize the individualizing-magnets for operating said contacts and shafts before and after the latter have been rotated to unison and released and to short-circuit and restore successively the circuit of the escapement electro-magnets in line.

14. In an individualizing cut-out for printing-telegraphs, the combination, with sources of electric energy, a main line, and devices for alternating, breaking, and varying the strength of the current, of pole-changers, receivers included in said line, power-impelled shafts having cams and type-wheels mounted thereon, escapements controlling said shafts, electro-magnets and devices actuating said escapements, local batteries and circuits for said magnets, polarized relays in line adapted to close said circuits, local printing-batteries and circuits, circuit-controlling switches actuated by said cams at a determinate position of said type-wheels, relays in line responding only to currents stronger than the currents normally actuating said polarized relays, individualizing circuit-preserving switches at receivers, shafts therefor, ratchet-wheels, circuit contacts and interrupters and unison devices mounted thereon, unison-latches, electro-magnetic devices, means for releasing said latches, and local circuits closed through the front contact of said relay when the type-wheels

stand at a determinate position and operating when said shafts are rotated to unison said shafts, release said unison-latches, and to short-circuit and to restore successively the circuits of the polarized relay controlling the escapements of receivers.

15. In a printing-telegraph system, a source of electric energy, a main line, devices included therein for alternating and varying the strength of current, electro-magnets in said main line controlling type-wheels and printing devices, circuit-preserving switches, type-wheel shafts actuating said switches at a determinate position, electro-magnets included in a circuit closed by said switches and responding to currents stronger than currents controlling the type-wheels, individualizing cut-out switches, and devices actuated by said magnets, responding only to strong currents and operating, substantially as described, to short-circuit the electro-magnets controlling said type-wheels.

16. In a printing-telegraph system, an individualizing cut-out switching device, a source of electric energy, a main-line type-wheel, circuit devices included therein for alternating and increasing the strength of current, polarized relays in said line, local batteries and circuits controlling type-wheels and printing devices, local circuits closed by said polarized relay, circuit-preserving switches, type-wheel shafts actuating said switches at a determinate position of said shafts, electro-magnets included in circuits closed by said switches and actuating said individualizing cut-out device, a relay in line responding only to abnormally strong currents, and means for vibrating said relay to make and break the circuit through the electro-magnets operating the individualizing-switches.

17. In a printing-telegraph system, an individualizing cut-out switching device, a source of electric energy, a main-line type-wheel circuit, devices included therein for alternating and increasing the strength of current, polarized relays included in the line and closing local-battery circuits through escapement, electro-magnets, local printing-circuits, local-circuit switches closing printing-circuits, and a relay included in line responding to strong currents.

18. The combination, in an individualizing cut-out apparatus, of a shaft, a unison device, a unison-latch, a ratchet-wheel, and a circuit-contacting disk mounted on said shaft, a circuit-preserving switch actuated by said contacting disk, and an electro-magnet and its complemental devices for rotating said shaft.

19. The combination, in an individualizing cut-out apparatus, of a cut-out shaft, a unison device, a unison-latch, a ratchet, a circuit-contact disk, a notched disk on the cut-out shaft, a type-wheel shaft provided with an arm engaging the notched disk to lock the type-wheels, a circuit-preserving switch actuated by said contact-disk, and an electro-

magnet and its complemental devices for operating the cut-out shaft.

20. In a printing-telegraph, an individualizing device provided with means for locking the type-wheels, a source of electric energy, a main-line type-wheel circuit, devices included in the line for alternating and increasing the strength of the current, polarized relays in said line, local batteries and circuits controlling type-wheels and printing devices, local circuits closed by said polarized relay, local-circuit-preserving switches, type-wheel shafts actuating said switches at a determinate position of said shafts, and electro-magnets included in circuits closed by said switches and actuating said individualizing device to cause the same to lock the type-wheels and short-circuit the magnets controlling said type-wheels.

21. In an individualizing cut-out for printing-telegraphs, the combination, with a source of electric energy and line and a circuit having means interposed therein for alternating and varying the strength of current, of receivers having type-wheel shafts, type-wheels, and impression devices, polarized relays in the line-circuit controlling local circuits actuating said type-wheels, circuit-switches operated by said shafts, individualizing-switches, magnets, and devices adapted to operate said switches and relays in line-circuit responding to strong intermittent currents to short-circuit the polar relays controlling the type-wheel circuits of any or all receivers in the line.

22. In an individualizing cut-out for printing-telegraphs, the combination, with a source of electric energy and a line-circuit provided with means for alternating and varying the strength of current, of receivers included in said line and having type-wheel shafts, type-wheels, and means for setting and effecting impressions therefrom, circuit-switches controlled by said shafts, individualizing-switches and actuating devices therefor, electro-magnets adapted to operate said switches and devices, and relays in said line responding to strong intermittent currents to short-circuit the electro-magnets controlling the type-wheels of any or all receivers.

23. In an individualizing cut-out for printing-telegraphs, a source of electric energy and line-circuit, pole-changers, and means for alternating and varying the strength of current and breaking the line-circuit of receivers included therein, type-wheel shafts, type-wheels, means for setting and effecting impressions therefrom, circuit-switches controlled by said shafts, individualizing-switches and actuating devices therefor, electro-magnets adapted to operate said switches and devices, and relays in said line responding to strong intermittent currents to short-circuit the electro-magnets controlling the type-wheels of any or all receivers.

24. In an individualizing cut-out system,

the combination, with a source of electric energy, a line-circuit, and means included therein for pulsating and varying the strength and alternating the current, of receivers in circuit having type-wheel shafts, type-wheels, and magnetic devices for rotating and positioning said type-wheels, and individualizing devices operated by abnormal currents to short-circuit the magnetic devices controlling the type-wheels of any required instrument or instruments.

25. In an individualizing cut-out system for printing-telegraphs, a type-wheel shaft provided with an arm, a shaft operating a switching device, and a notched disk on said shaft, said arm adapted to pass through the notch in said disk during the operation of printing and to be arrested by said disk in the cut-out position of said type-wheel shaft.

26. In an individualizing cut-out system for printing-telegraphs, a type-wheel shaft provided with an arm, a shaft for operating a line-preserving switch, and a disk mounted on the switch-operating shaft and provided with a recess for the reception of said arm.

27. In an individualizing cut-out system embracing a receiver having a type-wheel shaft, means for positioning the same, a shaft provided with a unison-screw and adapted to operate a circuit-preserving switch, an electro-magnetic device and its accessories actuating said shaft and responding to abnormal line-currents, a disk on said shaft provided with notches in alignment with the terminal of the unison-screw, and a type-wheel shaft provided with an arm adapted to enter the recesses of the disk, operating to lock the type-wheel shaft at a determinate position.

28. In an individualizing cut-out system for printing-telegraphs, comprising a source of electric energy and line, a circuit having means interposed therein for alternating and varying the strength of current, receivers having type-wheel shafts, type-wheels, and impression devices, polarized relays in the line-circuit controlling local circuits actuating said type-wheels, circuit-switches operated by said shafts, individualizing-switches, magnets, and devices adapted to operate said switches and relays in the line-circuit responding to strong intermittent currents to short-circuit through a resistance the polarized relays controlling the type-wheel circuits of the receiver or receivers in line.

29. In an individualizing cut-out for printing-telegraphs, comprising a source of electric energy, and a line-circuit provided with means for alternating and varying the strength of current, receivers included in said line and having type-wheel shafts, type-wheels, and means for setting and effecting impressions therefrom, circuit-switches controlled by said shafts, individualizing-switches and actuating devices therefor, electro-magnets adapted to operate said switches, and devices and relays in said line responding to strong intermittent cur-

rents to short-circuit through a resistance the electro-magnets controlling the type-wheels of any or all receivers in line.

30. In an individualizing cut-out for printing-telegraphs, the combination, with a source of electric energy and circuit, of pole-changers, means for alternating and varying the strength of current and breaking the circuit of receivers included therein, type-wheel shafts and type-wheels, means for effecting impressions therefrom, circuit-switches controlled by said shafts, individualizing-switches and actuating devices therefor, electro-magnetic devices adapted to operate said switches, and devices and relays in said line responding to strong intermittent currents to short-circuit through a resistance the electro-magnets controlling the type-wheels of the receiver or receivers in circuit.

31. In an individualizing cut-out system for printing-telegraphs, a source of electric energy, a line-circuit, means including therein for pulsating and varying the strength and alternating the current, receivers in circuit having shafts carrying type-wheels, magnetic devices for rotating and positioning the type-wheels, and individualizing devices operated by abnormal currents to short-circuit through resistance the magnetic devices controlling the type-wheel of any instrument or instruments.

32. In an individualizing cut-out system for printing-telegraphs, a source of electric energy and line-circuit, means for transmitting normal and abnormal electric currents, receivers included in said line and provided with shafts having type-wheels mounted thereon, magnetic devices for controlling said type-wheels, and electrical devices responding to abnormal currents and operating individualizing cut-out devices to short-circuit through resistances the type-wheels of the required instrument or instruments included in the line-circuit.

33. In an individualizing cut-out system, the combination, with a source of electric energy, a circuit, and means included therein for pulsating and varying the strength and alternating the current, of receivers in circuit having type-wheel shafts provided with type-wheels, magnetic devices for rotating and positioning said type-wheels, and individualizing devices operated by abnormal currents to short-circuit through a resistance the magnetic devices controlling the type-wheels of any required instrument or instruments.

34. In a printing-telegraph system, a source of electric energy, a main line, devices included therein for alternating and varying the strength of current, electro-magnets in said main line controlling type-wheels and printing devices, circuit-preserving switches, type-wheel shafts actuating said switches at a determinate position, electro-magnets included in a circuit closed by said switches and responding to currents stronger than cur-

rents controlling the type-wheels, individual-
izing cut-out switches, and devices actuated
by said electro-magnets, responding only to
strong currents and operating, substantially
5 as described, to short-circuit through a resist-
ance the electro-magnets controlling said
type-wheels.

In witness whereof I have hereunto set my
signature in the presence of two subscribing
witnesses.

SAMUEL RUSH LINVILLE.

Witnesses:

W. J. BINDER,

C. H. WICKERSHAM.