

Sept. 15, 1925.

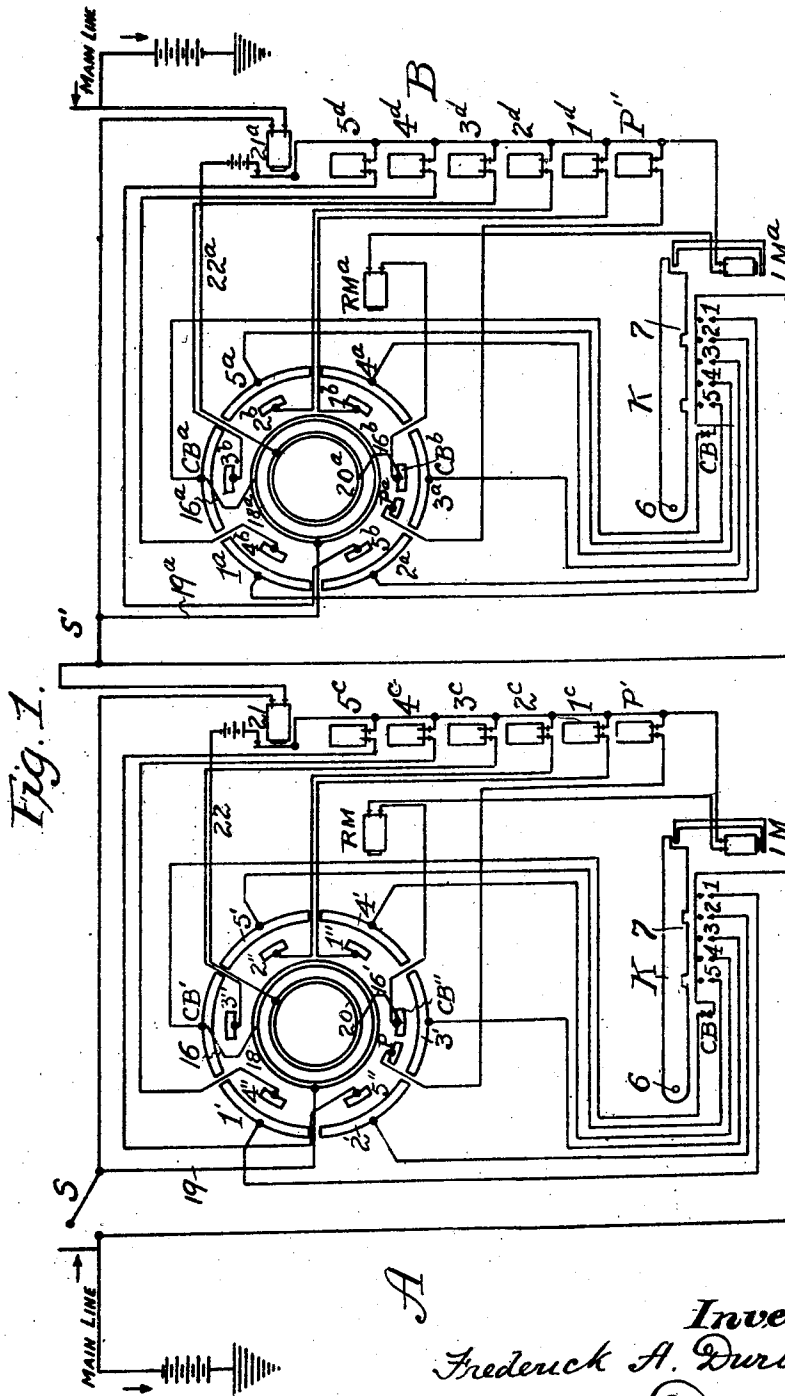
1,553,521

F. A. DURBIN

PRINTING TELEGRAPH SYSTEM

Filed May 12, 1921

5 Sheets-Sheet 1



A

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PRINTING TELEGRAPH SYSTEM

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5 Sheets-Sheet 2

Fig. 2.

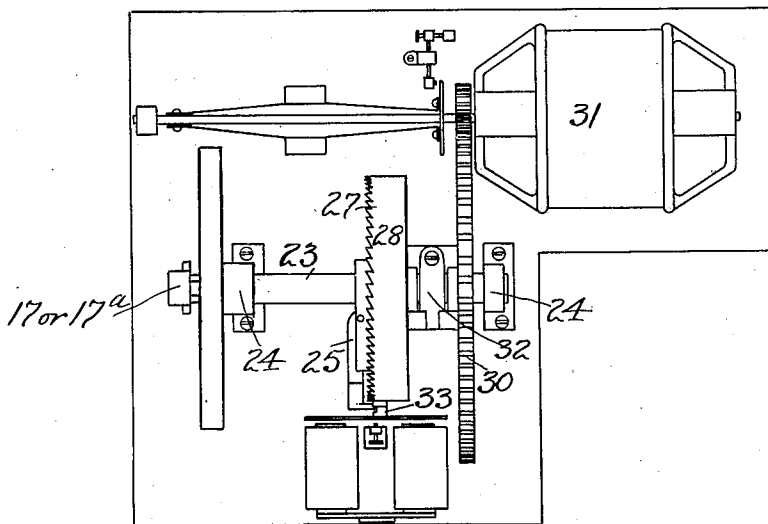
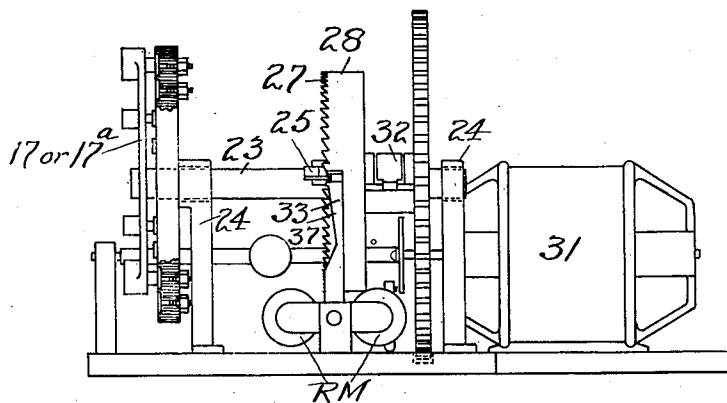


Fig. 3.



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Fig. 4.

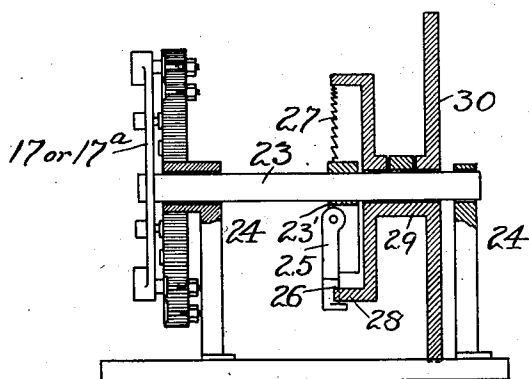
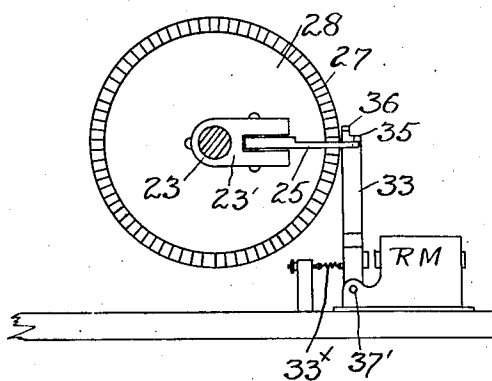


Fig. 5.



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Fig. 7.

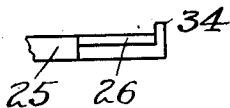


Fig. 8.



Fig. 6.

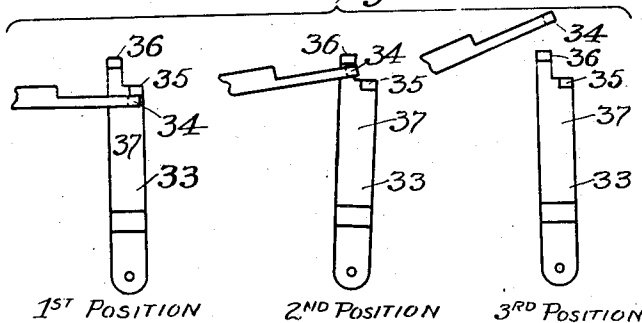


Fig. 9.

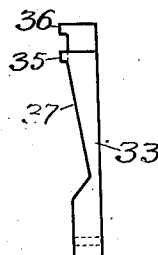


Fig. 10.

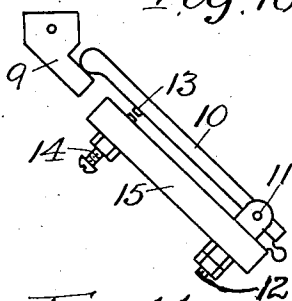


Fig. 12.

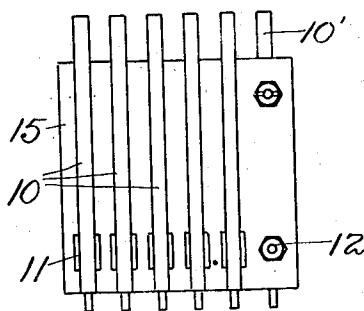
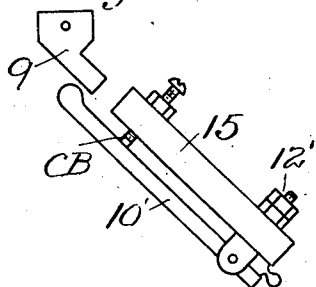


Fig. 11.



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Fig. 13.

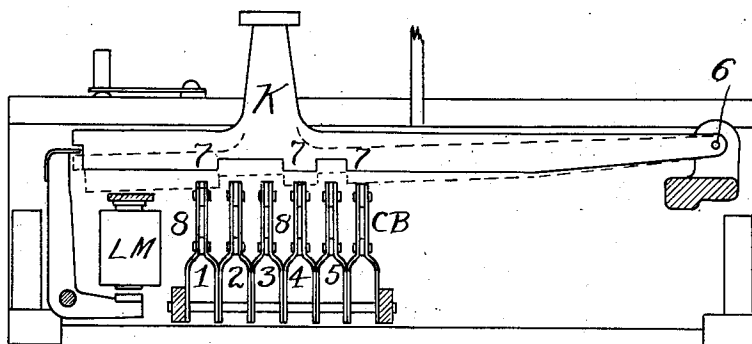


Fig. 14.

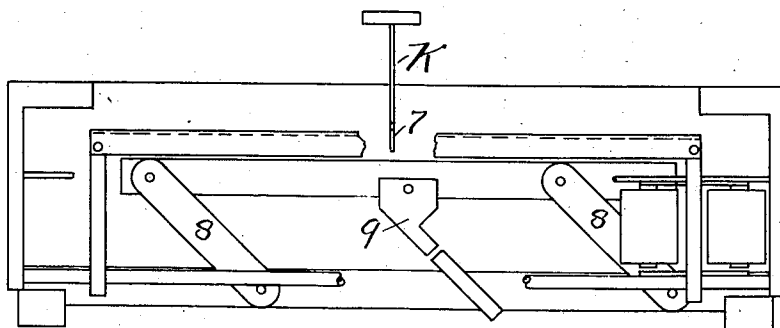
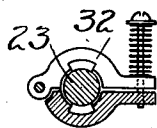


Fig. 15.



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1,553,521

UNITED STATES PATENT OFFICE.

FREDERICK A. DURBIN, OF STUTTGART, KANSAS.

PRINTING-TELEGRAPH SYSTEM.

Application filed May 12, 1921. Serial No. 469,004.

To all whom it may concern:

Be it known that I, FREDERICK A. DURBIN, a citizen of the United States, and resident of Stuttgart, Kansas, have invented certain new and useful Improvements in Printing-Telegraph Systems, of which the following is a specification.

One object of my invention is to provide a single line printing telegraph capable of being employed on any circuit used by Morse operators, whether the receiving station is cut in by a system of calls, or by an automatic selective system. My invention can be used also with duplex or quadruplex wiring or wherever a make and break method is employed.

A simple printer like the Morkrum or Multiplex printer now used by the Western Union Telegraph Company having five selective relays to set up combination and a print relay to cause combinations to be printed can be used with my invention. The printing is done direct from a keyboard at the transmitting station to the receiving apparatus without the aid of a receiving operator.

In the drawings:

Figure 1 is a diagram of the entire system showing the instruments at two stations, each instrument being capable of acting as a transmitter or a receiver.

Fig. 2 is a plan view of the segment board selective contact arm, stop arm, release magnets and associated parts.

Fig. 3 is a side view of the parts shown in Fig. 2.

Fig. 4 is a sectional view of parts shown in Figs. 2 and 3.

Fig. 5 is a face view of the ratchet wheel and stop arm, automatic release arm and release magnets.

Fig. 6 is a diagram showing the stop arm and automatic release arm in different relative positions.

Fig. 7 is a plan view of the stop arm.

Fig. 8 is a cross sectional view of the stop arm.

Fig. 9 is a side view of the automatic release arm.

Fig. 10 is a view of one of the main line key contacts. Fig. 11 is a view of the main line circuit breaker.

Fig. 12 is a plan view of the parts shown in Figs. 10 and 11.

Fig. 13 shows the keys, Fig. 14 the contact bars, and Fig. 15 is a detail view.

In these drawings A indicates generally the apparatus at one end of the line and B the apparatus at the other end of the line.

K indicates one of a series of keys at each instrument which are manipulated to initiate the operation of the selective relays of the printer at the other station.

These keys, pivoted at 6, are toothed at 7 on their lower edges so as to select, when depressed, certain ones or combinations of the contact bars 1, 2, 3, 4, 5. These bars are supported on parallel links 8 pivotally mounted in the frame, and each bar carries a contact dog 9 depending therefrom to control a contact arm 10 pivotally mounted at 11, Fig. 10, to the binding post 12 and having a contact point 13 to engage an opposed contact on a binding post 14 held in a plate 15. When the key is depressed the contact dog moves down and allows the contact arm 10 to close the circuit at 13. The key is capable of having additional movement after closing this contact, and in its extreme depressed position it depresses a contact arm 10' pivoted to binding post 12' and opens the main line circuit at circuit breaker CB.

At each station A and B there is a segment board over which a selective contact arm 17 or 17^a moves for one revolution, when a key is depressed, to transmit the current from either station to the other, for operating the printing apparatus. Each segment board has an outer row of transmitting segments, those at station A, which we will assume for purposes of this description is the transmitting station, being marked 1', 2', 3', 4' and 5', and those at the other station B being marked 1^a, 2^a, 3^a, 4^a and 5^a. There is also an outer segment CB' at the station A and a corresponding segment CB^a at the other station B, upon which respectively the transmitting brushes 16, 16^a rest when in normal position.

These segments are arranged in a circle to be traversed by brush 16 at station A and by brush 16^a at station B, and these brushes are carried by the selective contact arms 17, 17^a respectively, which are worked synchronously and make one revolution and then come to rest, performing this operation each time a key is depressed at the sending station whether this be station A or station B. These brushes 16, 16^a, also move in contact with conducting slip rings 18, 18^a respectively, each of which is electrically

connected to the main line through wires 19, 19^a. Each slip ring is common to all the transmitting contacts of the series.

At each segment board there is also an inner row of contact segments, which are for receiving the electrical impulses from the other station and those at station A are marked 1'', 2'', 3'', 4'', 5'', while those at station B are marked 1^b, 2^b, 3^b, 4^b, 5^b. A brush on each of the selective contact arms 17, 17^a traverses this inner row of contact segments, this receiving brush at station A being marked 16' and at station B 16^b. These receiving brushes also traverse a conducting or slip ring 20, 20^a respectively. This inner ring of receiving segments also includes a contact CB'' at the station A and a contact CB^b at station B and also a print contact P at station A and a like contact P^a at station B.

At each station there is also a main line relay having its magnet in the main line circuit. The armature of this relay magnet controls a local battery circuit through contact 21 or 21^a, this local circuit including wire 22 or 22^a, slip ring 20 or 20^a, receiving brush 16' or 16^b, contact CB'' or CB^b, a release magnet RM or RM^a a key lock magnet LM or LM^a and thence back to the armature of the main line relay magnet, or when the receiving brush gets on print contact P or P^a the print magnet P' or P'' is energized to do the printing.

At each station also there is a series of select relays, those at station A being marked 1^c, 2^c, 3^c, 4^c, 5^c, while those at station B are marked 1^d, 2^d, 3^d, 4^d, 5^d. These are connected respectively with the inner row of contacts segments 1'', 2'', 3'', 4'', and 5'' and 1^b, 2^b, 3^b, 4^b, 5^b. These select relays are in the printer proper and are shown in my drawings.

At each station the main line is completed through a switch S, S', either of which is in normal or closed position when receiving, at which time it shunts the transmitter. When transmitting from any station the switch S or S' thereat is open.

Driving mechanism.

I will describe one set of mechanism, this set being duplicated at the other station. The selective contact arm 17 is mounted on a shaft 23 mounted in standards 24, and the segment board is rigidly supported by one of these standards. The shaft has fixed thereto a yoke 23' in which is pivotally mounted a stop arm 25 having a sharp edge 26 to engage the teeth 27 of a ratchet wheel 28.

This ratchet wheel is on a sleeve 29 turning on the shaft 23, said sleeve being driven through a gear 30 from a motor 31. A friction adjustment is provided at 32 to apply a slight force to the shaft to move the stop

arm against the automatic release arm 33. This automatic release arm is controlled by the release magnet RM which when energized or de-energized throws projection 36 or 35 in the path of projection 34 of stop arm 25 causing it to stop in one or the other positions, 2nd or 1st, Fig. 6. The cam or incline 37 is always in the path of the projection of the stop arm so that only one revolution can be accomplished without a change from 2nd to 3rd position, Fig. 6, as when magnet RM is de-energized after stop arm has reached its normal position, or is resting against projection 36.

The stop arm is provided with a lateral projection 34 adapted to engage either one or the other of the two stop projections 35, 36 on the automatic release arm, and the latter arm is also provided with the cam or inclined portion 37 up which the stop arm rides so as to become released from the ratchet wheel. As the stop arm nears the end of its revolution its projection 34 strikes the cam or incline and as it moves along this it is swung on its pivotal mounting and thus is released from the ratchet wheel which continues in revolution. The friction connection 32 continues to act in driving the shaft 23 from the ratchet wheel so that despite the fact that the stop arm has become released from the ratchet it will continue to move until arrested by one of the projections on the automatic release arm.

The automatic release arm swings in a plane transverse to the axis of the ratchet wheel, said arm being pivoted at 37' and the stop arm travels in a plane parallel with the plane of movement of the automatic release arm, although the stop arm, as above intimated, has pivotal movement in a plane radial to the shaft 23.

When the local circuit is closed, the automatic release arm is in the second position, Fig. 6, because the release magnet is then drawing the release arm into its inclined position away from the center of the ratchet and then the stop arm is being held by the stop projection 36. Upon breaking the main line circuit at CB, and consequently the local circuit, the automatic release arm is drawn towards the center of the shaft 23 by its spring 33 into the third position, thus removing the stop projection 36 from the stop arm, which then under the action of its spring swings on its pivot, moves into engagement with the ratchet and begins its one revolution movement with said ratchet.

In the event that the local circuit is open at the end of one revolution of the stop arm the automatic release arm will be maintained in the third position and therefore the lower projection 35 on the release arm will be in the path of the projection 34 on the stop arm, thus arresting it like in the first position, Fig. 6.

Now upon closing the local circuit because of closing the main circuit at CB by the partial rise of the key the release arm will be drawn by its magnet into the second position, moving its lower projection 35 from the path of the stop arm and its upper projection 36 into said path, so that the stop arm and shaft 23 can perform a short movement until arrested by the projection 36 and thus it will have returned to normal position of rest ready for the next action when another key is depressed to its extreme limit, resulting in opening of the main and local circuit, whereupon the automatic release arm will move to the third position again and release the stop arm for another revolution.

While the above description mainly pertains to transmitting from station A to station B it will be understood that a similar action takes place at station B when this is the transmitting station. At this time the switch S at station A is closed, while that S' at station B is opened, so that the transmitting means at the receiving station will be shunted and the main line circuit will be established through the key contacts and the circuit breaking contact at the transmitting station.

While I have described only two stations any number may be plugged into the system.

Suppose we are transmitting from station A to B. Under the depression of one of the keys K a certain number of the key contacts 1, 2, 3, 4, 5 are closed according to the disposition of the teeth on the key, this combination representing a certain letter.

For instance, in the diagram Fig. 1 the depression of the key there shown will close contacts at 1, 3 and 4.

These contacts 1 to 5 are connected electrically with segments on the segment board of the instrument, and these segments are marked 1', 2', 3', 4' and 5'. The further depression of the key will open circuit breaker CB under the key. Previous to this, however, the current has been flowing from the main line battery through contact CB to segment CB', through the brush to the outside slip ring, 18, to main line, coil of main line relay 21 at station A, to line, through closed switch S', to coil of main line relay 21^a to line, and battery at distant end of main line.

All local circuits in the system, i. e., at all stations, at this time are closed and may be traced as follows: From local battery to inside slip ring 20 or 20^a, through brushes to inside contact CB'' or CB^b, to release magnet RM or RM^a to lock magnets LM or LM^a, to armatures of main line relays and back to local battery.

When circuit is broken at CB by the extreme depression of the key, the main line

circuit breaks and allows the main line relays to release their armatures, thus breaking the local circuits. When this happens, the release magnets RM, RM^a at both transmitting and receiving stations release their armatures, and as these armatures are what are termed the automatic release arms 33 which control the stop arms 25, the latter are released to rotate for one revolution and carry the brushes of the selective contact arms 17, 17^a over the segments at both the transmitting and receiving stations. As the brush 16 rotates at the transmitting station it picks up current at each of the outer transmitting segments in succession, which have been selected by the depression of the key, for instance, segments 1', 3', and 4', the circuit being closed through the segment, the brush, outside slip ring 18 to main line. Thus all main line relays are energized and close here all local selective relay circuits as the brush at the transmitting station passes over the selected segments on the segment board. For instance, let us follow the circuit through for one position of the brushes on the selective contact arms, say, the position when the said brushes at the two stations are on the segments, 4' at the transmitting station and 4^a at the receiving station. The key at the transmitting station having been depressed and the selective contact arms having been set in motion by the release of the stop arms, and the selective contact arms having arrived at and made contact with the segments 4' and 4^b at the transmitting and receiving stations respectively, the circuit is established from main line battery at transmitting station to key contact 4, transmitting segment 4' through transmitting brush 16 outside slip ring 18 to main line, through closed switch S', which shunts the outer (transmitting) segments of receiving instruments, to main line relay at receiving station thence to distant main line battery. The energizing of main line relay at the receiving end, however, closes local circuit here to the inner slip ring and the receiving brush being on segment 4^b the circuit is closed to selective relay 4^a and thence back to the local battery through the armature of the main line relay.

As the receiving brush 16^b reaches segment P^a of the receiving set, transmitting brush 16 has again reached segment CB'. Main line circuit will be closed through CB and CB' at transmitter. Local circuit will be closed by main line relay causing print magnet to be energized in a manner similar to the energizing of the select relay 4^a thus printing the combination or character set up by the select relays. However should the main line not be closed when receiving brush reaches P^a, for any reason, for instance, as key being still held in extreme de-

pressed position at transmitter and holding the line open at CB. or sending brush being a little behind in its travel, the receiving brush will be held on P^a as well as CB^b segment, at receiving end, by the projection 35 (automatic release arm Fig. 6) (first position) until main line is closed when it will close local circuit through P^a causing print magnet to be energized, at same time local circuit also is complete through CB^b, the resistance of these circuits being equal, magnet RM^a will be energized drawing release arm to 2nd position allowing stop arm to move to stop projection 36, second position, thus moving receiving brush from its position on both P^a and CB^b to CB^b only, which is the normal position. At the same time printing occurs at the receiving station B, a printing operation will take place at the transmitting station A, because its local circuit also will be closed through the armature of the main line relay closing contact at 21 and this circuit may be traced through wire 22, slip ring 20, brush 16', contact segment 4" to select relay 4^e back to contact 21 and battery and when the brush 16' gets on print contact P the print magnet P' will be energized and printing will be effected.

At the same time that the extreme depression of the key, above referred to, causes the breaking of the circuit at CB and consequently the breaking of the local circuit of the transmitting instrument and the release of the stop arm by de-energizing the magnet of the main line relay the lock magnet LM is de-energized by this breaking of the local circuit and the armature of this magnet is released to set itself in locking position with its bent end over the key which has been depressed and under the other keys which have not been depressed, thus locking the key board.

When pressure on the key is relieved it will rise part way to its normal position where it will be held by the lock bar. This upward movement will be enough to close contact at CB without, however, breaking any contact which may have been made at 1, 2, 3, 4, 5 so that the key will be held down and the contacts selected from the set 1 to 5 will remain closed while the selective contact arms 17, 17^a are making their full revolution and have moved over all of the segments on the segment boards and have returned to their normal positions of rest on segments CB', CB^a, whereupon main line will be closed through CB, CB' and brush and outer slip ring and main line relay magnets will be energized, closing local circuits through local battery, inner slip ring, inner or receiving brushes, release magnets RM, RM^a, and lock magnets LM, LM^a. Upon lock magnet being energized locking bar will be withdrawn, thus unlocking key

board allowing the operated key to return to normal position and the key board is then ready for selecting and transmitting the next character.

It will be noted that neither the release magnet RM nor the lock magnet LM can be energized except when the brushes of the selective contact arm are on the segments, CB', CB'', which is their position when the stop arm is held by automatic release arm.

It will be seen from the foregoing that the opening of the main line at contact CB starts the selective contact arms 17, 17^a in revolution for one cycle, i. e., one revolution only, no matter whether or not the line is open or closed at the completion of that cycle, and after the travelling contact arm has been arrested, it can be started again only by opening the main line.

If the line is open at the time the contact arm is about completing its cycle, the stop 35 will arrest it by stopping the movement of the stop arm 25, see 1st position, Fig. 6. It will then be necessary to close the line, so that the parts will assume the 2nd position, Fig. 6, with the stop arm and contact arm arrested by stop 36, and then in order to perform the next cycle of movement, or in other words, the next revolution of the contact arm, it will be necessary to open the main line to get the result indicated by the 3rd position, Fig. 6, i. e., with the stop arm released from the stop 36 and consequently allowing the contact arm to perform its next movement.

The apparatus returns to normal position after each character is transmitted and received.

Should the main line wire be opened up by being broken and remain so, for say an hour, the key-board at transmitting end will be locked for that length of time and upon repairing the break the keyboard will be unlocked and the operator can go ahead where he left off, only losing the character that was being depressed at the time of the trouble.

I claim:

1. A printing telegraph system comprising a contact board at each station, having a set of transmitting contacts, a set of keys, a set of contacts to be closed by the keys and respectively connected electrically with the transmitting contacts, a traveling transmitting contact brush to traverse the said transmitting contacts, a fixed contact member common to the transmitting contacts to be traversed by said travelling contact brush, a connection from said common contact member to the main line, a main line relay, local circuit connections controlled by said main line relay, a release magnet energized when said local circuit is closed by the main line relay and the brushes are at rest, power

operated means for moving said traveling contact brush, rendered effective or ineffective by said release magnet, a circuit breaker for the main line operated by the keys, to de-energize the main line relay and open the local circuit for permitting the release magnet to deenergize and release the power operated brush for performing its movement and carry the brush with it, a set of receiving contacts, a power operated travelling receiving contact brush moving in unison with the transmitting brush controlled by the release magnet and adapted to traverse the said set of receiving contacts, a contact member common to the set of receiving contacts, to be traversed by said travelling receiving contact brush and forming a part of the said local circuit closed by said travelling receiving contact brush, a set of selective relays in the local circuit controlled by the receiving brush and receiving contacts, a print relay magnet in a branch of the local circuit and a contact with which one of the brushes cooperates for controlling the circuit to the said print magnet, substantially as described.

2. In combination in a printing telegraph system, transmitting and receiving contact brushes at each station normally at rest but adapted to have travelling movement, transmitting contacts and receiving contacts at each station to be traversed by said brushes, including contacts upon which the brushes normally rest, means for driving said brushes at the different stations in synchronism, means for holding said brushes normally at rest, including release magnets, electrical connections between the transmitting brushes and the main line, main line relays, local circuit connections controlled thereby and in which local circuits the release magnets and receiving brushes, when at rest, are included, a set of selective relays at each station electrically connected respectively with the receiving contacts and with the local circuit connections, key controlled contacts in the main line electrically connected with the transmitting contacts, a main line circuit breaker controlled by the keys to break the main line circuit when said contacts in the main line are closed by said keys, whereby upon breaking the main line circuit temporarily the relay magnets will deenergize and open the local circuits, de-energize the release magnets and cause the brushes to perform their cycle of operation, causing the transmitting brush to send electrical impulses over the line, now closed, as it traverses in succession the transmitting segments, whereas at the receiving station the receiving brush will receive said impulses as it traverses the receiving contacts and energize the selective relays said release magnets also being energized to stop the movement of the brushes when they reach the

contacts upon which they are to normally rest, and means for printing from the selective relays, substantially as described.

3. In combination in a printing telegraph system, transmitting and receiving contact brushes at each station normally at rest but adapted to perform one cycle of movement and then come to rest, transmitting contacts and receiving contacts at each station, means for driving the brushes, means for holding the brushes against movement, including a release magnet, a main line relay having circuit connections through the receiving brush, when at rest, with the release magnet, selective keys, contacts in the main line circuit controlled thereby and electrically connected with the transmitting contacts, a circuit breaker controlled by the keys when depressed to their extreme limits for de-energizing the main line relay and the local circuit connections to the release magnet, to start the brushes while the keys close the main line contacts to complete circuits through the transmitting contacts, selective relays in circuit respectively with certain of the receiving contacts, a print contact to be engaged by the receiving brush, a print magnet energized by contact of the receiving brush with the print contact, said keys when partly raised from their extreme depressed position closing the main line circuit breaker, while maintaining the selected key contacts closed, whereby electric impulses may be transmitted through the selected contacts of the transmitting set and the main line relays will be energized to close the local circuit and energize the release magnet to stop the movement of the brushes when their cycle of movement has been completed.

4. In combination in a printing telegraph system, transmitting and receiving contact brushes at each station normally at rest but adapted to perform one cycle of movement and then come to rest, transmitting contacts and receiving contacts at each station, means for driving the brushes, means for holding the brushes against movement, including a release magnet, a main line relay having circuit connections through the receiving brush, when at rest, with the release magnet, selective keys, contacts in the line circuit controlled thereby and electrically connected with the transmitting contacts, a circuit breaker controlled by the keys when depressed to their extreme limits for de-energizing the main line relay and the local circuit connections to the release magnet, selective relays in circuit respectively with certain of the receiving contacts, a print contact to be engaged by the receiving brush, a print magnet energized by contact of the receiving brush with the print contact, said keys when partly raised from their extreme depressed position closing the main line cir-

cuit breaker, while maintaining the selected key contacts closed, whereby electric impulses may be transmitted through the selected contacts of the transmitting set and the main line relays will be energized to close the local circuit and energize the release magnet to stop the movement of the brushes when their cycle of movement has been completed, locking means for the keys and a magnet controlling said locking means de-energized when the depressed key breaks the main line circuit to thereby allow the locking means to lock the keys and energized to operate the lock to unlock the keys when the receiving brush has completed its cycle of movement and engages the contact on which it normally rests.

5. In combination, a series of transmitting contacts and a series of receiving contacts at each station, a brush carrier having a brush to traverse the transmitting contacts and a brush to traverse the receiving contacts, each of said series of contacts including one upon which the brushes normally rest, power operating means for the brush carriers, holding means for the said carriers, release magnets for releasing the carriers from the holding means to be driven by the power operated means, selective relays respectively in branch circuit connections with the receiving contacts, main line relays controlling circuits which include the receiving brushes, the receiving contacts, the selective relays and the release magnets, a print contact and a print magnet controlled by said receiving brush, keys, contacts selectively closed by the keys, electric connections between said key contacts and transmitting contacts respectively, and a main line circuit breaker controlled by the key and electrically connected with a contact in the transmitting series and upon which the transmitting brush normally rests, substantially as described.

6. In combination in a printing telegraph system, a set of transmitting contacts and a set of receiving contacts at each station, keys, key contacts to be closed by the keys and electrically connected with the transmitting contacts individual thereto, printing means connected with the receiving contacts which belong thereto, transmitting and receiving brushes, local circuit connections between the receiving contacts and the printing means, power operated means for driving the brushes, electromagnetic means for causing the brushes to be driven by or be freed from said power operated means, a local relay for controlling said magnet through the receiving brush, a main line circuit breaker controlled by the keys for controlling said local relay, and switches, one at each station, for shunting the transmitting means at the receiving station, said switch being closed while the switch at the transmitting station is open to establish the

main line circuit through the key contacts, the circuit breaker and the transmitting means, substantially as described.

7. In combination in a printing telegraph system, a rotary transmitting and receiving brush at each station, a circular row of transmitting contacts, including one upon which the transmitting brush normally rests, a circular row of receiving contacts, including one upon which the receiving brush normally rests, a ring shaped contact member connected to the main line and upon which said transmitting brush moves to connect the selected transmitting contacts with the main line in succession, keys, main line key contacts to be closed by the partial depression of the keys, connections from the said contacts to the transmitting contacts, a circuit breaker in the main line to be opened by the full depression of the keys, a ring shaped contact common to the receiving contacts, and upon which the receiving brush moves, a main line relay, the battery of which is in circuit with said last mentioned ring shaped contact, selective relays forming part of the printing mechanism in circuit with the main line relay and with the receiving contacts, power operated means for moving the brushes, means for holding the brushes out of connection with the power operated means, a release magnet for releasing the said brushes from the holding means, a key lock with a controlling magnet therefor, said release magnet and lock magnet being in circuit with the contact upon which one of the brushes normally rests and with the main line relay, and a switch at each station for shunting the transmitting mechanism, when said station is receiving the messages, substantially as described.

8. In combination in a printing telegraph system, a segment board having contacts, a rotary contact member to traverse said contacts, a shaft carrying said member, a drive member in constant rotation arranged coaxially with said shaft, a stop arm secured fixedly to the shaft and adapted to engage the said member to be driven thereby or to be disengaged from said drive member, a release arm having a cam portion for releasing the stop arm from the drive member and a magnet for withdrawing the release arm from the stop arm, substantially as described.

9. In combination in a printing telegraph system, a segment board having contacts, a rotary contact member to traverse said contacts, a shaft carrying said member, a drive member in constant rotation arranged coaxially with said shaft, a stop arm secured fixedly to the shaft and adapted to engage the said member to be driven thereby or to be disengaged from said drive member, a release arm having a cam portion for releasing the stop arm from the drive member and

a magnet for withdrawing the release arm from the stop arm, said drive member having frictional driving contact with the said shaft, said release arm having projections to stop the shaft, together with the stop arm, substantially as described.

10. In combination in a printing telegraph system, a segment board having contacts, a rotary contact member to traverse said contacts, a shaft carrying said member, a drive member in constant rotation arranged coaxially with said shaft, a stop arm secured to the shaft and adapted to engage the said member to be driven thereby, a release arm having a cam portion for releasing the stop arm from the member and a magnet for withdrawing the release arm from the stop arm, said member having frictional driving contact with the said shaft and the release arm having spaced apart lugs for engagement with the stop arm whereby in one position of the release arm the stop arm will engage one projection, whereas in another position of said release arm the stop arm will engage the other projection after the stop arm has advanced a short part of its revolution, substantially as described.

11. In combination in a printing telegraph system, a series of contacts, a brush moving in a circular path to traverse said contacts, a stop arm connected with the brush, means for driving the stop arm, a release arm for releasing the stop arm from the driving means, said release arm having two out of line projections for arresting the stop arm, a release magnet controlling the release arm, a local relay circuit which includes the release magnet, the brush and one of the contacts upon which the brush normally rests, one of said out of line projections being in the path of the stop arm when said release arm is released by the magnet due to the local relay circuit being opened, said release arm, when the circuit is closed, being shifted by the magnet to release the stop arm from the first projection and present its second projection in the path of the stop arm to arrest it in normal position with the brush on the contact upon which it should normally rest ready for its next cycle of movement, substantially as described.

12. A single line printing telegraph system comprising a traversing selective transmitting and a traversing selective receiving contact or brush at each station, contacts to be traversed thereby, means for arresting, holding and releasing the brushes, said means being controlled to release the traversing selective contacts by the opening of the main line, and to arrest the same after they have performed a prescribed cycle of movement, whether the line is open or closed at the completion of the said cycle.

13. A single line printing telegraph sys-

tem comprising a traversing selective transmitting and a traversing selective receiving brush at each station, contacts to be traversed thereby, those traversed by the receiving contacts controlling local relay circuits, means for arresting, holding and releasing the said traversing selective contacts, said means being controlled to release the traversing selective contacts by the opening of the main line, and to arrest the same after they have performed a prescribed cycle of operation, whether the line be open or closed at the completion of said cycle, a series of key operated contacts controlling the local circuit transmitting connections, and a key operated contact controlling the main line.

14. A single line printing telegraph system comprising a traversing selective transmitting and a traversing selective receiving brush at each station, contacts to be traversed thereby, those traversed by the receiving contacts controlling local relay circuits, means for arresting, holding and releasing the said traversing selective contacts, said means being controlled to release the traversing selective contacts by the opening of the main line, and to arrest the same after they have performed a prescribed cycle of operation, whether the line be open or closed at the completion of said cycle, a series of key operated contacts controlling the local circuit transmitting connections, and a key operated contact controlling the main line, said series of key operated contacts being closed before the main line contact is opened, substantially as described.

15. A single line printing telegraph system comprising a traversing selective transmitting and a traversing selective receiving brush at each station, contacts to be traversed thereby, those traversed by the receiving contacts controlling local relay circuits, means for arresting, holding and releasing the said traversing selective contacts, said means being controlled to release the traversing selective contacts by the opening of the main line, and to arrest the same after they have performed a prescribed cycle of operation, whether the line be open or closed at the completion of said cycle, a series of key operated contacts controlling the local circuit transmitting connections, and a key operated contact controlling the main line, the said main line contact being operated by the same keys which control the other key contacts, substantially as described.

16. In a single line printing telegraph apparatus, the combination of a traveling selective contact with driving means for giving it movement when released, means for releasing the selective contact when the main line is opened to perform its prescribed cycle of movement, and for arresting said selective contact when said movement is substantially

completed, whether the main line is open or closed at the completion of said movement.

17. In a single line printing telegraph apparatus, the combination of a travelling selective contact with driving means for giving it movement when released, means for releasing the selective contact when the main line is opened to perform its prescribed cycle of movement, and for arresting said selective contact when said movement is substantially completed, whether the main line is open or closed at the completion of said movement, said arresting means being controlled by the opening and closing of the main line, whereby if it arrests the selective contact while the line is open, the line must be closed and again opened before the selective contact is released to perform its cycle of movement, substantially as described.

18. In a single line printing telegraph apparatus, a traversing selective contact, means for driving the same when released, means for releasing the contact when the main line is opened, and for arresting it again when it has substantially performed its prescribed cycle of movement, said arresting means having two positions, i. e., one when the main line is closed, and the other when the main line is open, in either of which positions it will arrest the selective contact, but when moved from its closed line position to its open line position will release the said contact arm for the latter's performance of its cycle of operation, substantially as described.

19. In a single line printing telegraph apparatus, a traversing selective contact, means for driving the same, an arresting, holding and releasing mechanism for said contact controlled by the opening and closing of the line, said mechanism including a member having two stops, one for arresting the contact when the line is open, and the other when the line is closed, and means for moving the said member to either one of two positions, corresponding to the closed and open condition of the line, said stops being out of line with each other and at different positions along the path of the contact, whereby when the member is in one position the stop in advance will arrest the contact, and said advance stop will release the contact to be arrested by the other stop upon the movement of the member from said first position to a second position, from which the contact will be released upon the restoration of said member to its former position, consequent upon closing and again opening the main line.

20. A single line printing telegraph system comprising a traversing selective transmitting and a traversing selective receiving brush at each station, contacts to be trav-

ersed thereby, those traversed by the receiving contacts controlling local relay circuits, means for arresting holding and releasing the said traversing selective contacts, said means being controlled to release the traversing selective contacts by the opening of the main line, and to arrest the same after they have performed a prescribed cycle of operation, whether the line be open or closed at the completion of said cycle, a series of key operated contacts controlling the local circuit transmitting connections, and a key operated contact controlling the main line, the main line being opened at said contact to start the cycle while the contacts controlling the transmitting circuit connections are closed.

21. In a printing telegraph apparatus, the combination of a travelling contact with driving means for giving it movement when released, a series of contacts engaged thereby for the transmission of impulses over the line, a release magnet for releasing the driving means, a main line relay controlling said release magnet, a main circuit breaker, a key for operating the same, said circuit breaker when open causing the starting of the driving means by deenergizing the main line relay and therefore the release magnet, contacts also controlled by said key for controlling electrical impulses through the transmitting contacts and the travelling contact, locking means for the key which is set in locking position by the deenergizing of the main line relay, said locking means holding the key in its operated position, with the contacts controlled thereby closed until a complete cycle has been performed by the travelling contact, whereupon said lock is released, substantially as described.

22. In connection with claim 21, arranging the said lock to lock the keys which are not depressed when the depressed key is locked, whereby another key cannot be depressed until the cycle has been completed and the depressed key released.

23. In combination a main line, with transmitting and receiving contacts at the stations at opposite ends thereof; keys, a main line circuit breaker at each station to be opened by depressing the keys, locking means which are set to lock all the keys when one of their number is depressed, and switches at the stations whereby the main line may be opened by the operator to cut in his transmitting mechanism, and electromagnetic means for releasing the key lock when energized and for setting said lock when de-energized, substantially as described.

In testimony whereof, I affix my signature.

FREDERICK A. DURBIN.