Aug. 9, 1932. E. F. WATSON 1,870,352

TELEGRAPH SYSTEM

Filed Aug. 13, 1930 2 Sheets-Sheet 1

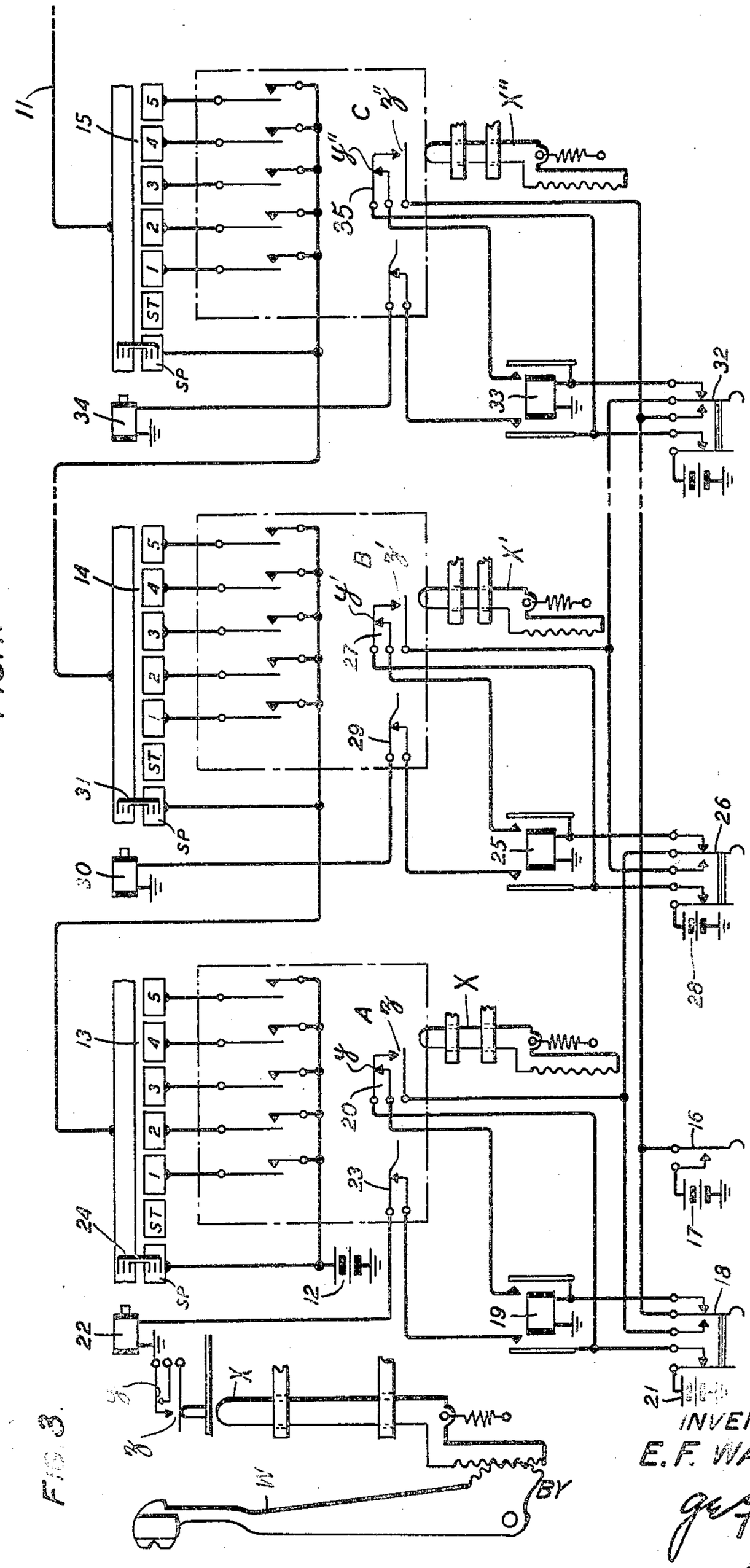

FIG. 1.

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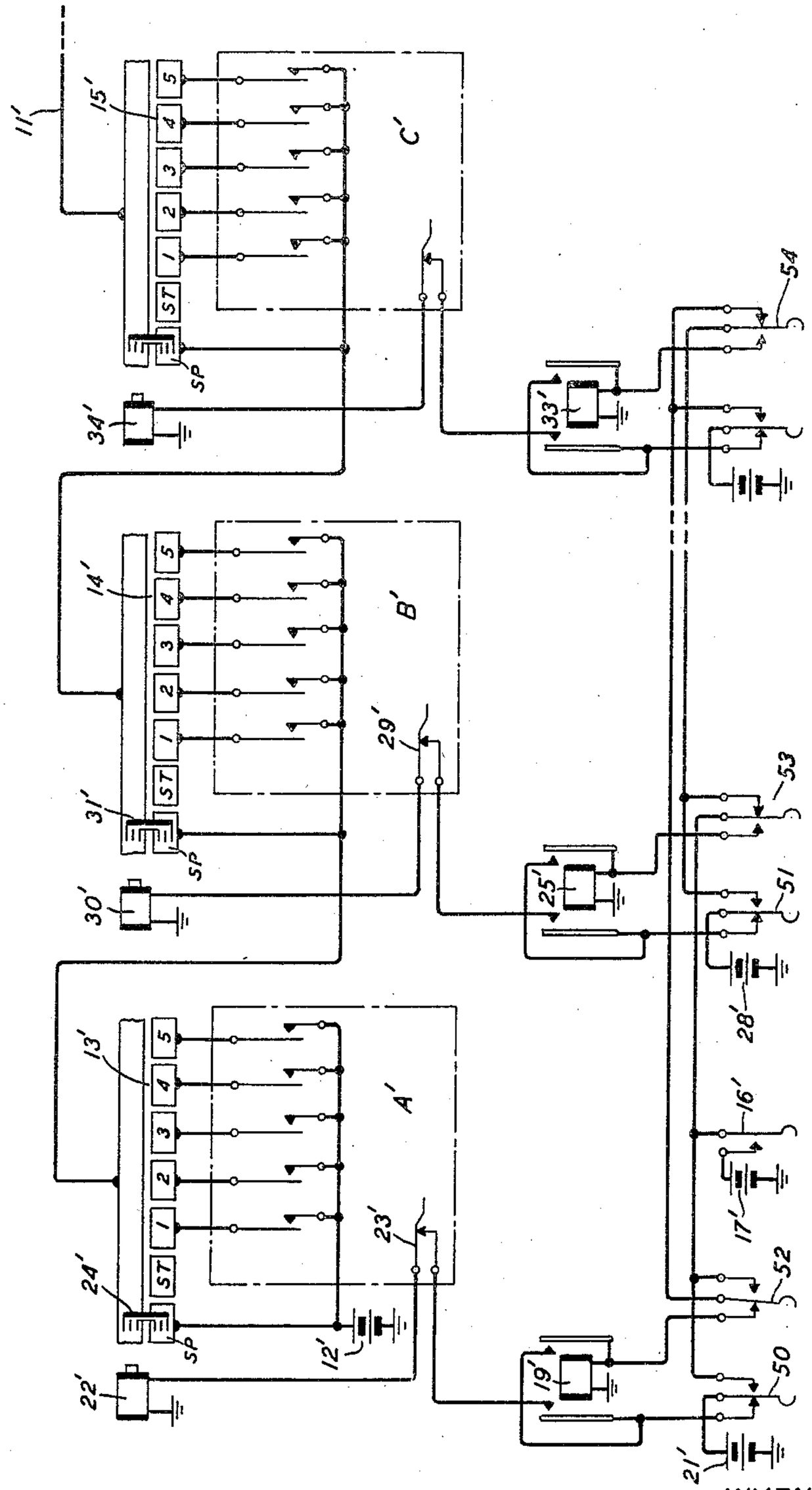
FIG. 2.



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UNITED STATES PATENT OFFICE

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TELEGRAPH SYSTEM

Application filed August 13, 1930. Serial No. 475,097.

This invention relates to printing telegraph systems and more particularly to those systems wherein multiple transmitters are used in a single printing telegraph circuit.

A general object of the invention is to utilize the full time of a single printing telegraph circuit having connected therein multiple start-stop transmitting distributors.

A more specific object is to operate multiple tape transmitters connected in a single printing telegraph circuit in any desired sequence.

Heretofore in telegraph systems wherein a plurality of transmitters were operated over a single printing telegraph circuit, the transmitters were connected to a line circuit in regular sequence through a multiplex rotary distributor. In those systems the distributor was provided with a pair of concentric rings, one solid and the other segmented, which were interconnected by a rotating brush. The segmented ring was divided into as many groups of segments as there were transmitters, and these transmitters were connected in rotation to the line circuit as the brush completed a revolution over the pair of rings. In this manner the transmitters were connected to a line whether or not they were prepared to send messages, and a considerable part of the line time was expended in sending open or spacing signals.

According to the present invention and the present tendency in printing telegraph operation toward higher speed, two or more tape transmitters are adapted to be connected to a single printing telegraph circuit in any desired sequence so that when one perforator operator begins to lag in perforating tape or stops altogether, the corresponding transmitter may be disconnected from the line and any one of the other transmitters may be connected into line without any appreciable loss of time. The speed now most commonly employed is approximately sixty words per minute and even at this speed it is somewhat difficult to obtain operators capable of perforating tape rapidly enough to keep the circuit operating at maximum capacity. In order to meet the demand for higher speed, as in stock quotation transmission work, two or more transmitters are employed and operation may be transferred from one to another by transmitting from the transmitter which is operating into the line at the time, a combination of impulses which determine the moment at which the transfer is to be effected.

A feature of the invention is the provision of means for temporarily disabling one or more transmitters so that operation may be transferred from one to another of those transmitters remaining connected in the line to maintain continuous transmission.

Other objects and features will appear in the following specification and appended claims when taken in conjunction with the following drawings:

Fig. 1 is a circuit diagram of a preferred embodiment of the present invention wherein operation is transferred from one transmitter to another automatically;

Fig. 2 is a circuit diagram of an alternative arrangement wherein operation is transferred from one transmitter to another manually.

Fig. 3 shows the arrangement of a type and a pull bar on a monitoring typewriter printer, which, when operated in response to the particular combination of impulses, effect the transfer of transmission from one transmitter to another.

Referring to Fig. 1 which represents the sending end of a telegraph system, a plurality of tape transmitters, such as A, B and C are arranged to operate over line 11 in any desired sequence as hereinafter described. Each of the transmitters has its contact levers positioned in engageable relation with grounded battery 12 in the manner shown so as to transmit impulses of current and "no current" through a start-stop distributor, such as those designated 13, 14 and 15, to the line 11. Each of these transmitters preferably comprises a keyboard tape perforator of the type disclosed in U. S. Patent 1,420,931, granted to E. E. Kleinschmidt on June 27, 1922, and a tape-operated transmitter of the type disclosed in U. S. Patent 1,567,692, granted to E. E. Kleinschmidt on December 29, 1925. The perforated tape is

arranged to pass from the keyboard perforator to the tape-operated transmitter in a manner shown and described in U. S. Patent 1,192,171, granted to A. F. Dixon, on July 25, 1916, whereby the perforated tape, when its supply to the tape-operated transmitter becomes exhausted, pulls taut against a tape lever causing the latter to close a circuit for locking the transmitter until additional tape is prepared at the perforator. The tape-operated transmitter comprises a typewriter printer for monitoring or recording at the transmitting end all the signals sent out over the line. Only such parts of these disclosures as have a direct relation to the present invention, are shown in the drawings. These disclosures are well known in the printing telegraph art.

When the system is idle the distributor brushes rest on the first or stop segments of their respectively associated distributors and the first segment of distributor 13 is connected directly to battery 12. The transmitters are connected in series with the line in the manner shown so that normally the line is closed.

Assuming that all transmitters are idle, as at the beginning of a day's run, and it is desired to transmit from transmitter A, the non-locking master start-key 16 which is common to all transmitters, is operated and thereby connects grounded battery 17, through the outer right-hand contact of stop switch 18, through the winding of start relay 19 to ground. Relay 19 operates and closes a locking circuit for itself over its right hand armature and contact, normally closed contact *y* of a special signal operated switch 20, inner left contact of switch 18 to grounded battery 21. The operation of relay 19 closes at its left hand armature and contact an operating circuit for the start magnet 22, which may be traced from battery 21, left hand armature and contact of relay 19, contact at tape lever 23, through the winding of start magnet 22 to ground. The operation of magnet 22 releases or unlatches the brush 24 which begins its course of rotation over the segments of distributor 13. The second or start segment of each distributor is left dead so that when brush 24 engages the second segment of distributor 13, the line is momentarily opened and a so-called impulse of "no current" is transmitted, which upon being received at the distant station (not shown), is effective to start thereat the start-stop distributor or printer. The next five impulses transmitted over segments 1 to 5 inclusive represent the combination of current" and "no current" impulses corresponding to the desired character to be transmitted. The last impulse transmitted is over the stop segment SP and is always of "current" which serves to stop the start-stop distributor or printer at the distant station at the end of each character. As long as there is sufficient tape perforated for transmitter A, relay 19 and magnet 22 remain operated and transmission from this transmitter continues. When the transmitter A catches up with the perforated tape supplied thereto, the tape lever 23 is raised by the tape becoming taut, and the contact thereat is opened as is disclosed in U. S. Patent 1,192,171, supra, thereby deenergizing magnet 22 and bringing brush 24 to a stop.

Should it be desired at any time to transfer transmission from transmitter A to transmitter B, as for example, when there is insufficient tape perforated to keep transmitter A operating continuously, a certain combination of impulses would be perforated in the tape for transmitter A and as the particular combination on the perforated tape passes through transmitter A, the upper or normally closed contact *y* of switch 20 is momentarily opened and the alternate or lower contact *z* thereof is closed, thereby causing an opening of the locking circuit for relay 19. Relay 19 deenergizes and the circuit for operating magnet 22 is opened thereby bringing brush 24 to rest on segment SP. The momentary closure of the alternate or lower contact of switch 20 is of sufficient duration to cause the operation of start relay 25, the circuit being traceable from positive battery 21, inner left contact of switch 18, lower contact of switch 20, outer right contact of switch 26, through the winding of relay 25, to ground. A better understanding of the method whereby switch 20 is operated, may be had by referring to Fig. 3 wherein a type bar *w* of the monitoring typewriter printer, responsive to the certain combination of impulses, is operated in the direction of the arrow to cause the pull bar *x* to move in an upward direction to thereby operate the contacts *y* and *z*, say, of switch 20. The operation of relay 25 closes a locking circuit for itself over its right armature and contact, upper contact *z'* of special signal operated switch 27, inner left contact of switch 26, to grounded battery 28. The operation of relay 25 also closes a circuit extending from battery 28, left hand armature and contact of relay 25, tape lever contact 29, through the winding of start magnet 30 to ground. Assuming that sufficient tape has been prepared or perforated for transmitter B during the time that transmitter A was operating the energization of magnet 30 releases brush 31 which begins its continuous rotation over the segments of distributor 14, to send the message impulses corresponding to the perforations prepared on the tape by the perforator (not shown) associated with transmitter B.

If no tape has been prepared, that is, the perforator for transmitter B has been idle, the stop switch 26 would have been manu-

ally thrown by the operator to its alternate position, that is, opposite to that shown, and the circuit closed at switch 20 by the certain combination prepared for transmitter A, would have been extended over the inner right contact of switch 26, outer right contact of stop switch 32, through the winding of start-relay 33 to ground. Assuming that the perforator (not shown) for transmitter C had on hand sufficient tape perforated so that the transmitter could send for an appreciable period, the start relay 33 and the start magnet 34 would operate to start transmitter C operating in a manner similar to that described above for transmitter A.

In this way transmission may be transferred from one transmitter to another regardless of sequence. It is understood, however, that as soon as tape at any transmitter is perforated the stop switches, such as 18, 26 and 32 at such transmitters, may be manually restored to the position shown in the drawings, so as to be in a position to send should a certain combination of impulses be perforated at the operating transmitter. The signal operated switch at the transmitter that happens to be operating, corresponding to switch 20 at transmitter A, closes its lower contact under the control of the perforations of such combination and thereby completes an operating circuit for the start relay associated with the next prepared transmitter which then begins transmitting the signals prepared by its associated perforator. Switches 18, 26 and 32 are of the manually operated locking type and are provided for disabling their respectively associated transmitters whenever desired, as for example, when a supply of perforated tape for the transmitter becomes exhausted or when a perforating machine is left unattended.

The operation of the arrangement shown in Fig. 2 is similar to that described above except that the transmission is transferred from one transmitted to another by manually operating a switch instead of doing it automatically by perforating a certain combination of impulses, which by itself opens a normally closed contact and closes a normally open contact to effect the operation of the next transmitter that happens to have perforated tape prepared for transmission. Like parts in both figures are similarly designated except that the designation in Fig. 2 are prime numerals and letters. The automatically operated transfer switches, such as 20, 27, etc. of Fig. 1 are respectively replaced by manually operated non-locking transfer keys 50, 51, etc. in Fig. 2, and the manually operated stop keys 52, 53, etc. which perform the same functions as stop keys 18, 26, etc., are different therefrom in structure.

Assuming that operation is to begin with transmitter A′ the locking stop key 52 at transmitter A′ will be in an operated position and the stop keys 53, 54, etc. at the other transmitters, which are also of the locking type, will be in unoperated positions, as shown in the drawings. Then when the master start key 16′ is momentarily operated to its left hand position, battery 17′ will be connected over the contact of switch 16′, right hand contacts of keys 53, and 54 in series, back over the left hand contact of key 52, through the winding of start relay 19′ to ground. Relay 19′ operates and closes a locking circuit for itself over its right armature and contact, left hand or normal contact of the non-locking transfer key 50 to battery 21′. The operation of relay 19′ also closes an operating circuit for start magnet 22′, which circuit may be traced from battery 21′, normal contact of key 50, left armature and contact of relay 19′ contact and lever 23′, through the winding of the start magnet 22′ to ground. The operation of magnet 22′ releases brush 24′ which begins rotating in the manner described above for brush 24 and continues until the tape lever breaks contact as a result of a taut tape lifting the lever 23′ and breaking the contact, or transfer to another transmitter is effected. When it is desired to transfer transmission to the next transmitter or to one which is prepared to send, a few blank tape or other distinctive non-functioning combinations are perforated in the tape at the operating transmitter A′ and as soon as these combinations reach the transmitter A′ the transfer key 50 is momentarily operated to its alternate or right hand position, thereby connecting battery 21′ over the right hand contact of key 50, left hand contact 53, (assuming that transmitter B′ is prepared to send and the stop key 53 thereat has been operated to its left hand or prepared position) through the winding of start relay 25′ to ground. Relay 25′ operates and locks up in circuit extending to battery 28′. In operating, relay 25′ closes an operating circuit for a start magnet 30′, which in turn operates and releases brush 31′ for rotation.

Should transmitter B′ not be prepared to send, the key 53 would be in the position shown and the momentary operation of transfer key 50 at transmitter A′ would have connected battery 21′ through to the left hand contact of the stop key and winding of the start relay at the next prepared transmitter.

Thus it is seen that by positioning stop keys 52, 53, 54, etc. in their left hand positions when their associated transmitters are prepared to send, transmission may be transferred at any time from an operating transmitter to the next prepared transmitter set in a prepared position by its stop key.

The system may be designed to accommodate as many transmitters as desired to utilize the entire time of transmission over the line.

This system is particularly adapted to telegraph ticker service where it is desired to maintain transmission of stock quotations at the speed of sales during an extraordinarily active period on the floor of the stock exchange.

What is claimed is:

1. In an impulse transmission system, a plurality of transmitting devices of the permutation code type, an outgoing circuit common to said devices, circuit connections whereby any one of said devices may impress impulses upon said circuit, a switch at each of said devices for conditioning its associated device to the transmitting condition, and a transfer switch at each device, characterized in this that the transfer switch of a device is connected to each of the other devices through said conditioning switches for selecting a device conditioned to transmitting condition from other devices not so conditioned and causing it to transmit over said outgoing circuit.

2. A system in accordance with claim 1, characterized in this that each transmitting device is provided with a mechanically operated lever responsive to a condition representing exhaustion of impulses to be transmitted by it, to operate its transfer switch.

3. In an intelligence transmission system, a circuit, a plurality of transmitting devices for operating over said circuit, a switch at each of said devices for transferring operation from one to another of said devices in any desired sequence, characterized in this, that means are provided at each of said devices for maintaining its associated device in an operating position when no intelligence is being sent over the circuit.

4. In an impulse transmission system, a circuit, a plurality of devices for transmitting current impulses over said circuit in a regular sequence, and means for temporarily disabling one or more transmitting devices and then restoring the disabled devices in any desired sequence whereby the full transmission time of the circuit is utilized.

5. In an impulse transmission system, a circuit, a plurality of devices for transmitting current impulses over said circuit in a regular sequence and means for transferring operation from one transmitting device to another in any desired sequence.

6. In an impulse transmission system, a circuit, a plurality of tape operated devices for transmitting current impulses over said circuit, and means for automatically transferring operation from one of said devices directly to any one of the other devices under the control of a single signal combination perforated in the tape.

7. In an impulse transmission system, a circuit, a plurality of devices for transmitting current impulses over said circuit in a regular sequence and means for temporarily disabling one or more of said transmitting devices and means for transferring operation from another of said devices to any one of the remaining devices by a single signal combination, said last mentioned means being effective regardless of the positions of the disable devices with respect to the positions of the operable devices in the circuit.

8. In an impulse transmission system, a circuit, a plurality of devices for transmitting current impulses over said circuit in a regular sequence and means requiring a single operation only for starting any one of said transmitting devices in operation when all of said devices are idle.

9. In an impulse transmission system, a circuit, a plurality of transmitting rotary distributors connected in series in said circuit and arranged to be normally held from rotating, starting devices for said rotary distributors, means for energizing said starting devices one at a time and for maintaining it in an energized condition for any desired duration.

10. In an impulse transmission system, a circuit, a plurality of perforated tape transmitting devices for operating over said circuit, a starting means common to said devices, and means at each of said devices for disabling one of said devices in an operated position, said means being automatically operated when the supply of perforated tape is exhausted, and other means independent of said disabling means for maintaining said disabled device in an operated position.

11. In an impulse transmission system, a circuit, a plurality of transmitting devices for said circuit, starting means common to said devices and effective to start only one of said devices at a time, means at each of said devices for arbitrarily transferring signal transmission over said circuit from one to another of said devices, and means at each of said devices for preventing one or more transmitters, unprepared to send signals, from being operatively connected to said circuit and for directing the transmission to the next succeeding transmitter that is prepared to send.

12. In an impulse transmission system, a circuit, a plurality of devices connected in series in said circuit for transmitting current impulses over said circuit, said devices being arranged to operate in any desired sequence, means for permitting one device only to send impulses over said circuit at a time, and means for maintaining one only of said devices in engageable relation with said circuit for an interval of any desired duration.

13. In a telegraph system, a circuit, a plurality of tape operated transmitting devices for sending signal impulses over said circuit, said devices being arranged to be operatively connected to said circuit in any desired sequence, means for preparing tape with sig-

nals for said devices, means for automatically disabling a transmitting device which happens to be sending signals over the circuit at the time its supply of prepared tape becomes exhausted, the operation of the disabling means being effected in such manner as to permit the disabled device to be maintained operatively connected to the circuit.

14. In a telegraph system, a circuit, a plurality of tape operated transmitting devices, a start-stop rotary distributor connected to each of said devices, said distributors being arranged to be operatively connected automatically to said circuit in any desired sequence, starting means common to said devices and effective to start only one of said devices at a time, switching means at each of said devices for transferring signal transmission over said circuit from one to another of said devices as desired, and means at each of said devices for disabling each of said distributors when the transmitting devices respectively associated therewith are not prepared to send impulses over the circuit.

15. In a telegraph system, a circuit, a plurality of tape operated transmitters, individual means for preparing the tape with message symbols for said transmitters, a start-stop distributor for connecting each of said transmitters with said circuit, common means for starting any one of said transmitters sending signals over said circuit, means at each of said transmitters for transferring the transmission of signals over said circuit from one transmitter to another in any desired sequence, other means at each of said transmitters for disabling its associated transmitter and restoring it to service whenever desired, although the operation of the system is continued, and still other means at each of said transmitters for disabling its associated transmitter for a short interval, whereby other transmitters are maintained idle during such interval.

In testimony whereof, I have signed my name to this specification this 11th day of August, 1930.

EDWARD F. WATSON.