

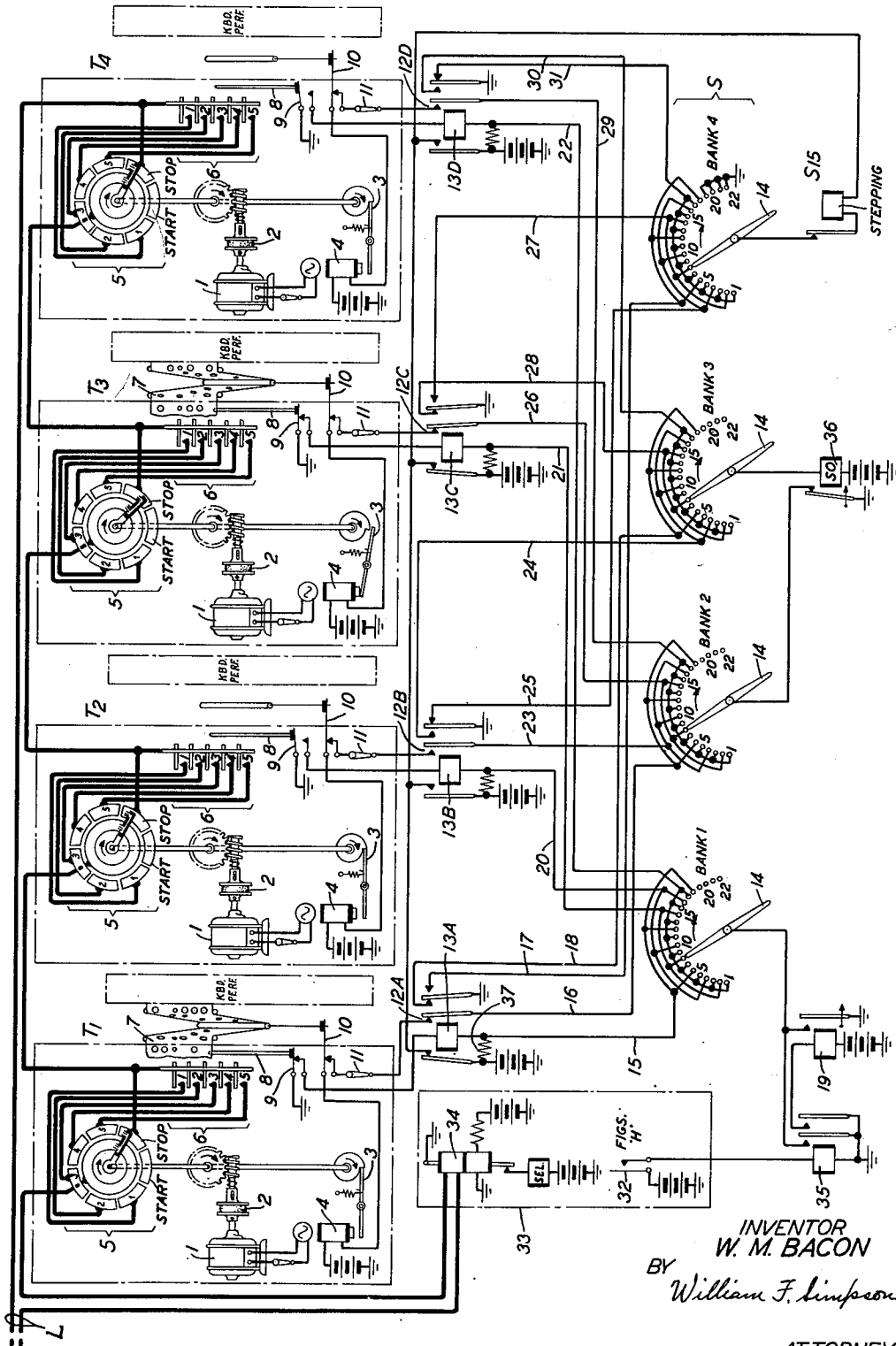
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TELEGRAPH SYSTEM

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TELEGRAPH SYSTEM

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This invention relates to systems wherein a plurality of tape or similarly controlled telegraph transmitters are connected to a line for transmission one at a time and in which one transmitter or certain transmitters may have more frequent opportunities to transmit than another or others.

Systems are known in which a plurality of transmitters are so associated with a line and with each other that one first transmitter has preference so that the others cannot transmit while the storage of the first is provided with transmissible material, and a second has preference over a third and subsequent others, etc. The present system is to be distinguished from such arrangements as it differs in its fields of possible application and mode of operation. Thus, for example, in a system of the prior type wherein many short messages are supplied to the first transmitter to keep it fully occupied for long periods of time and long messages are supplied to subsequent transmitters, the storage of the subsequent transmitters would be filled beyond the practicable limit. In accordance with the system of the present invention, each transmitter will receive occasional opportunities to transmit, whereas in a preference system one transmitter might receive sufficient transmissible material to occupy the line for indefinitely long periods of time. Thus, with the present system, short messages may be supplied to one transmitter and long messages to another, and the first could be given more frequent opportunities to transmit, thus preventing undue delay in the transmission of any of the messages.

Furthermore, systems are known in which transmitters are arranged, usually in pairs, in such a manner as to transmit messages in alternation, each beginning when an end-of-message signal stops the other. Such arrangements likewise are inflexible. Thus, in case one transmitter is supplied with or becomes supplied with a series of very long messages, whereas others are supplied with or become supplied with very short messages, the storage of one may become overloaded.

In a copending application is disclosed a system similar to the present system in which transmission is shifted from one transmitter to another by absence of tape at the one transmitter which at the moment is transmitting; in accordance with the present invention, however, transmission is shifted from one transmitter to another by a special sequence of code combinations which in a special case may be an end-

of-message signal. It therefore becomes necessary to break or cut the tape and transmission may be shifted from one transmitter to another, while the tape between each transmitter and its associated perforator or reperforator remains intact.

From the foregoing and other considerations it will appear that an object of the invention is to provide transmitter systems of increased flexibility and efficiency whereby delays in transmission are reduced or avoided.

A detailed description will be given by reference to the accompanying drawing in which the essential features are diagrammed in a single circuit diagram with conventional symbols indicating the mechanical elements.

The principal elements of the system comprise a plurality of transmitters T1, T2, T3 and T4 having their transmitting contacts included serially in a common line conductor L; a stepping switch S having four banks of contacts and a stepping magnet S15; together with interconnecting circuits and associated apparatus. Perforated tape is supplied to each transmitter by a keyboard perforator or equivalent device, such as a reperforator associated with the incoming line, the keyboard perforator being designated KBD. PERF.

Each transmitter T1—T4 comprises a driving motor 1, which may be common to all the transmitters, a clutch 2, and a start latch 3 to enable the distributors to be released to revolve one cycle for each code combination. A start magnet 4 releases the latch 3. A distributor 5 distributes the successive elements of the code combinations as sensed by tape controlled contacts 6. A tape stepping mechanism (not shown) may be of any usual or known type for stepping the tape forward between the transmission of successive code combinations. The tape 7 is perforated with code combinations to control the sensing pins in their operation of sensing the successive code combinations. A pin 8 which is pressed upwardly by a spring rides along the tape in the sensing head and as long as tape is present in the sensing head the pin 8 is held down and holds the contact 9 closed. A keyboard perforator KBD. PERF. or a reperforator may be provided in connection with each transmitter and when so provided the start magnet 4 may have included in its circuit a contact 10 which is opened by a taut tape. The circuit of the start magnet may also be opened by a manually operable switch 11. Furthermore, the circuits of the respective start magnets 4 may be opened by the respective con-

tacts 12A—12D of the several relays 13A, 13B, 13C, 13D. Each contact 12A—12D is closed only when the associated relays 13A, etc. are energized by closure of their associated contact 9.

The pin 8 is so arranged that insertion of a piece of tape in the sensing head with which the pin is associated depresses the pin and closes the contact 9 and when the tape runs out of the sensing head the pin 8 rises and opens the contact 9.

A switch S is illustrated as a 22-point type with switch arms 14 so arranged that upon stepping from point 22 it steps upon point 1 and proceeds in sequence over points 1 to 22. Other similar types of switches having the same or other numbers of contacts may obviously be used. A stepping magnet 15 opens its own circuit upon each operation and upon the return of its armature to the released position it actuates the arms 14 one step forward to the next contact. Such a switch, in and of itself, together with its stepping magnet 15, is a known instrumentality.

The relays 13A, 13B, etc., may be energized in a path from battery through a resistance, the respective relay winding, and contact 9 (when closed) to ground. A shunt path may be traced from resistance 37 over conductor 15 to the sixth, twelfth, and eighteenth points on bank 1 of switch S. When arms 14 is on these points a path is prepared to ground on the front contact of relay 19 when that relay is operated. Corresponding shunt paths 20, 21 and 22 extend from the windings of relays 12B, 12C and 12D to sets of contacts on bank 1 of switch S.

It will be noted throughout that the connections from transmitter T1 to the points of switch S extend to the sixth, twelfth and eighteenth points of the switch; connections from transmitter T2 extend to the fourth, tenth and sixteenth points of the switch; connections from transmitter T3 extend to the second, eighth and fourteenth points of the switch; and connections from transmitter T4 extend to the first, third, fifth, seventh, ninth, eleventh, thirteenth, fifteenth and seventeenth points of the switch. The nineteenth to the twenty-second points of the switch are idle but are connected to ground on the fourth bank in order to provide a stepping circuit. It will thus be seen that transmitter T4 is provided with nine turns of transmission per cycle or program of transmission represented by one cycle of the switch S; transmitter T1 is provided with three turns of transmission; transmitter T2 with three turns of transmission; and transmitter T3 with three turns of transmission. By appropriate changes in the wiring the number of turns assigned to each transmitter may be suitably varied in accordance with the traffic or nature of the messages to be handled by the various transmitters.

From the armatures of each of relays 13A, etc. three conductors 16, 17 and 18 lead to the contact points of switch S in accordance with the foregoing schedule. Conductor 16 proceeds to the points of bank 2, conductor 17 to the points of bank 4 and conductor 18 to the points of bank 3. Conductor 15, as already noted, proceeds to the points of bank 1. Corresponding groups of conductors 23, 24 and 25 proceed from the contacts of relay 12B; 26, 27 and 28 from the contacts of relay 12C; and 29, 30 and 31 from the contacts of relay 12D.

For shifting from one transmitter to another, means are provided consisting of a contact 32 which is normally opened but which may be

closed by a permutation code selector. The selector is a well-known instrument and is only diagrammatically indicated as being contained in a dotted rectangle 33. In series with the line L is a polarized receiving relay 34 to be actuated in accordance with impulses impressed upon the line L by any of the transmitters to actuate a mechanism diagrammatically indicated as a magnet of a selecting device which controls contact 32. The contact 32 may be a single contact closed or caused to be closed by a particular sequence of code combinations or it may symbolize two contacts in series which become closed simultaneously upon a particular code sequence. Such selector controlled arrangements for closing a contact, opening a contact, or closing two contacts in series by a particular sequence of codes are found in Watson Patent 1,566,295, December 22, 1925; Morgenstern 1,964,268, June 26, 1934; Swezy 2,096,145, October 19, 1937; Walker 2,154,547, April 18, 1939; or Watson 2,154,592, April 18, 1939. Any of these may be employed or adopted for the present purpose. A short but firm closure of contact 32 is all that is required. The operation of the selector is such that it closes the contact 32 only in response to a particular code combination and preferably a sequence of "upper case" followed by a particular code combination, such as "upper case H" commonly known as "Figs. H." The selector ignores all other sequences of code combination except "Figs. H." However, other sequences or groups of code combinations might be used in place thereof to accomplish the same result. It will be advantageous as an operating routine to follow "Figs. H" with several "letters" or "all marking" codes.

It may now be assumed that transmitter T3 is provided with perforated tape containing message material to be transmitted and is in the act of transmitting, that transmitters T2 and T4 are not provided with message material, and that transmitter T1 is provided with perforated tape but is awaiting a turn of transmission.

The tape of the transmitter T3 continues to control the transmitter and cause transmission. If the tape becomes taut, the contact 10 will open and transmission will temporarily cease. Ordinarily, however, it is not expected that this condition will be maintained for any substantial period of time. At the end of a message or at the end of a period of transmission assigned to transmitter T3 the operator controlling the keyboard perforator or the operator sending to a reperforator in the case of a reperforator will punch or transmit the sequence of code combinations "Figs. H." The operator may then advance the tape by punching blanks, letters signals, or other code combinations, or if desired, may begin to store a subsequent message. Messages are usually separated by one or more letters signals and one or more letters signals are inserted after each "Figs. H" code combination. When the "Figs. H" code reaches the transmitter T3 it will be transmitted over line L to operate the selector 33 and close contact 32. Closure of contact 32 will cause the operation of relay 35, which in turn will cause the operation of relay 19. Operation of relay 35 will close a path from ground on the inner front contact of relay 35 over the arm 14 of bank 1 and conductor 21 to short-circuit the relay 13C and cause the release thereof. If it had happened, contrary to our assumption, that no other transmitter was provided with message material or

tape in the sensing head, no other relay 13A—13D would be operated. However, we have assumed that transmitter T1 is provided with tape and, consequently, upon the release of relay 13C a path is closed from battery over the left-hand front contact of relay 13A through the stepping magnet S15, arm 14 of bank 4, conductor 27, the now closed break contact of relay 13C, to ground. The stepping magnet then operates one step thus advancing the arms 14 to the ninth contact point of switch S. A path is then closed from the left front contact of relay 13A to the stepping magnet, S15 and the ninth contact point to ground on the back contact of the right-hand armature of relay 12D to cause the switch to step to the tenth contact point. Ground is then supplied from the right-hand contact of relay 13B to cause the switch S to step and it continues stepping until it reaches the twelfth contact point which is a contact point associated with transmitter T1. When this contact point is reached the stepping circuit is opened at the back contact of the right-hand armature of relay 13A because relay 13A is operated. No further step of switch S occurs at this time. Upon each step of the switch the slow operating relay 36 is released and meantime, of course, relay 35 and the relay 19 become released. Relay 36 reoperates slowly and establishes a path, beginning at ground on the armature of relay 36 over arm 14 of bank 2, the twelfth contact point of bank 2, conductor 16, contact 12A of relay 13A, switch 11 (assumed to be closed), contact 10 and start magnet 4 to battery. The start magnet 4 is then energized and transmission from tape transmitter T1 begins. Transmission from transmitter T1 will now continue until the combinations "Figs. H" in the tape are transmitted at which time contact 32 will again be closed, relay 13A will be released and the switch S will proceed to operate in case some other transmitter is provided with tape containing message material to be transmitted.

Upon reaching the unassigned contacts 18 to 22, inclusive, of switch S the arms 14 will be stepped forward automatically; however, these unassigned contacts may be assigned to various transmitters T1 to T4 or to other similar transmitters connected up in a manner analogous to those shown.

It will be observed that if the tape in any transmitter should break or become exhausted, thus allowing the tape end to run through the sensing head, the pin 8 of the particular transmitter will rise and allow the contact 9 of the particular transmitter to be opened. The effect of this may be seen, by examining transmitter T3 and assuming that it is transmitting, when the contact 9 opens, the relay 13C becomes released and a sequence of operations then occurs which is essentially the same as though the operator had transmitted "upper case H," namely, the switch S will step forward, assuming some other transmitter is provided with tape containing message material to be transmitted until it reaches a contact point associated with a transmitter supplied with message material. A similar action takes place if the operator lifts the transmitter gate which in turn causes contact 9 to open.

The stepping switch and associated parts may be considered as a search device for examining said transmitters for transmissible material and initiating transmission therefrom if and when such material is found. The various transmit-

ters may be assigned numbers of turns of transmission appropriate to the frequency, length and urgency of the messages with which they are supplied. Each transmitter, however, will have one or more definite opportunities to transmit upon each cycle of the program or searching switch S so that none of them will store up an inordinate amount of message material. In a practical system, for example, as shown, short and urgent messages could be supplied to transmitter T4, while longer or less urgent messages could be supplied to the other transmitters.

What is claimed is:

1. In a telegraph system, a telegraph transmission path, a plurality of storage controlled telegraph transmitters capable of transmitting over said path, a cyclically operable program system and apparatus responsive to the supply of stored signals for each of said transmitters for conditioning said program system, and means responsive to the operation of said program system for starting each of said transmitters one at a time and at least once during each cycle of operation thereof, and circuit connections in said program system for causing one of said transmitters to transmit more frequently during said program than another of said transmitters, in combination with apparatus responsive to a certain combination of codes sent by the transmitter which is at the moment transmitting for actuating said program system to initiate transmission from another of said transmitters having a supply of stored signals.

2. A telegraph system, a telegraph transmission path, a plurality of storage controlled telegraph transmitters capable of transmitting over said path, a cyclically operable program system and apparatus responsive to the supply of stored signals for each of said transmitters for conditioning said program system, means responsive to the operation of said program system for starting said transmitters one at a time and at least once during each cycle of operation thereof, and circuit connections in said program system for causing one of said transmitters to transmit more frequently during said program than another of said transmitters, and means controlled by selected sequences of impulses sent from any one of said transmitters for initiating transmission from another transmitter provided with stored message material.

3. A channel of transmission, a plurality of transmitters for transmitting impulses over said channel one at a time, each transmitter including a distributor having a start magnet, all said distributors being connected in series with said channel, a flexible web for each transmitter supplying code combinations thereto for transmission, a sensing point for said web in each said transmitter, means for stopping transmission from one transmitter and initiating transmission from another transmitter, said means including a stepping switch which discontinues a path for the start magnet of the distributor of the transmitter to be stopped and establishes a path for the start magnet of the distributor of the transmitter to be started, a transmission enabling contact in each transmitter maintained in enabling condition by the presence of said web at the sensing point, and means controlled by selected permutation codes sent from said transmitter to actuate said means for stopping transmission.

4. A plurality of telegraph transmitters associated with an outgoing line, a system local to said transmitters for cyclically assigning opportunities to transmit to said transmitters, said system comprising means for testing each transmitter for transmissible material, and initiating transmission from it if it is so supplied with transmissible material, at least once during each cycle, means in said system for testing at least one transmitter more often than another transmitter during said cycle, and means selectively responsive to one or more selected code combinations sent from one transmitter to stop transmission therefrom and initiate testing of another transmitter for transmissible material.

5. A plurality of telegraph transmitters associated with an outgoing line, a system local to said transmitters for cyclically assigning to said transmitters opportunities to transmit in accordance with a program, said system comprising means for automatically testing each transmitter for transmissible material and initiating transmission from it if it is so supplied with transmissible material at least once during each program cycle, means in said system for testing at least one transmitter more often than the others during said cycle, and means responsive to a selected code sequence for automatically stopping one transmitter and initiating testing said other in accordance with said program.

6. A system of message transmitters, means for variably and at intervals supplying said transmitters with transmissible material, a hunting system for hunting over said transmitters according to a program whenever any one is supplied with transmissible material and initiating transmission from the first discovered to be so supplied, means whereby one of said transmitters is examined more frequently than another during said program, and means operable by and in accordance with message material transmitted from an active transmitter for stopping transmission therefrom and initiating hunting.

7. A telegraph system, a telegraph transmission path, a plurality of tape controlled telegraph transmitters capable of transmitting over said path, a cyclically operable program system and apparatus responsive to the insertion of a tape

in any of said transmitters for conditioning said program system, means responsive to the operation of said program system for starting transmission from said transmitters supplied with tape one at a time and at least once during each cycle of operation thereof, circuit connection within said program system for causing one of said transmitters when supplied with tape to transmit more frequently during said program than another of said transmitters, and means controlled by selected sequences of signaling pulses sent on any one of said transmitters for initiating transmission from another transmitter only when a tape has been inserted therein.

8. A plurality of tape controlled telegraph transmitters associated with an outgoing line, a system local to said transmitters for cyclically assigning opportunities to transmit to said transmitters, said system comprising means for testing each of said transmitters for the presence of control tape inserted therein and initiating transmission therefrom at least once during each cycle of said local system if a tape has been inserted therein, means in said system for testing at least one of said transmitters more often than another transmitter during said cycle, and apparatus electrically responsive to one or more selected code combinations sent from one transmitter to stop transmission therefrom and initiate testing of another transmitter for transmissible material.

9. In a telegraph system a plurality of tape controlled telegraph transmitters, means for variably and at intervals supplying said transmitters with control tape, a hunting system for hunting over said transmitters according to a predetermined program whenever a control tape is inserted in any one of said transmitters and initiating transmission from the first transmitter discovered having a control tape inserted therein, means whereby one of said transmitters is examined more frequently than another during each program, and means operable by and in accordance with signals transmitted by an active transmitter for stopping transmission therefrom and initiating hunting only when any transmitter is supplied with control tape.

WALTER M. BACON

Certificate of Correction

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It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, second column, lines 1-2, for "necessary" read *unnecessary*; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 28th day of May, A. D. 1946.

[SEAL]

LESLIE FRAZER,

First Assistant Commissioner of Patents.