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B. GALSTER ET AL
METHOD OF TELEGRAPHICALLY TRANSMITTING
COMMUNICATION FOR STATISTICAL PURPOSES
Filed May 27, 1940

Serial No.
337,460

3 Sheets-Sheet 1

FIG. 1

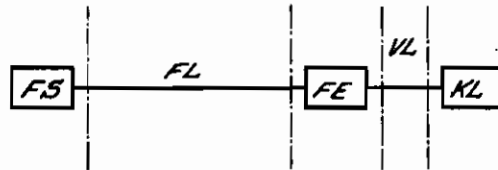


Fig. 2

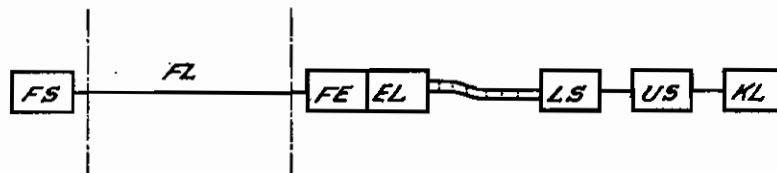
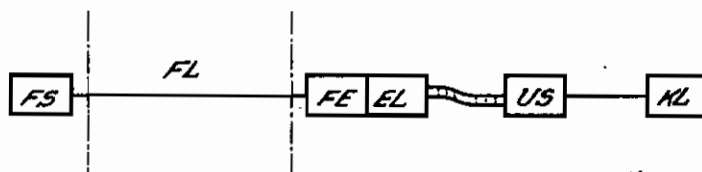


Fig. 3



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Attys
1943

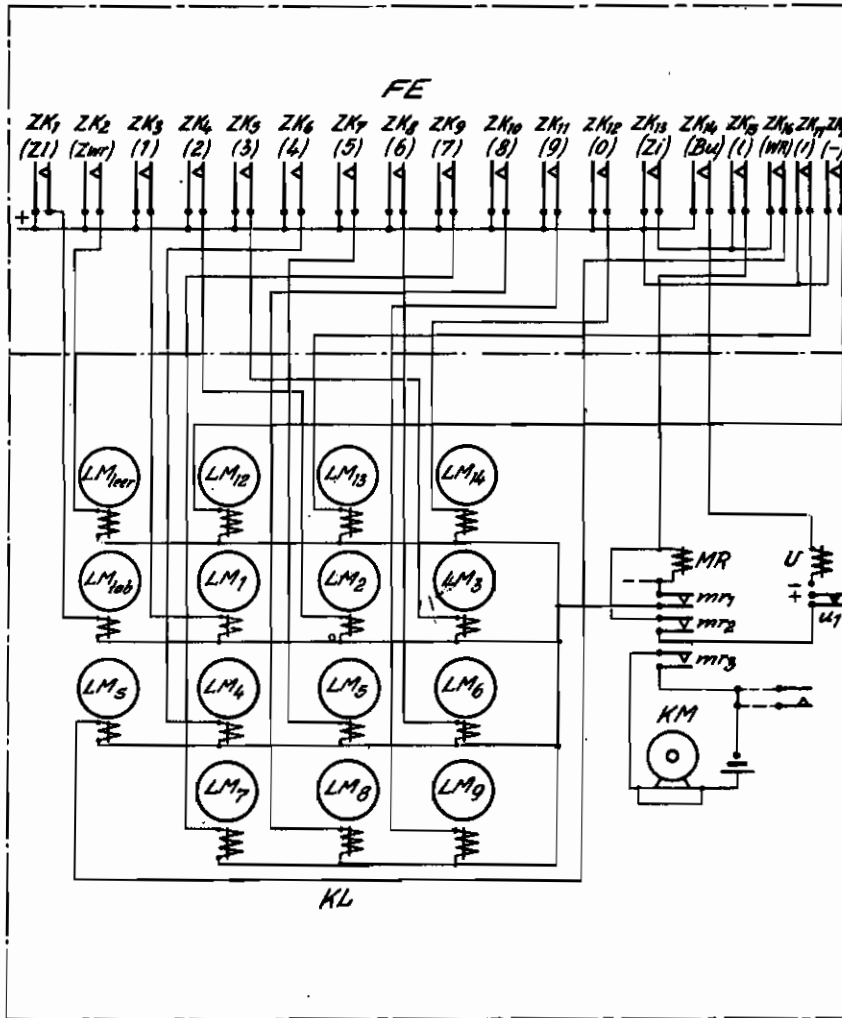
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3 Sheets-Sheet 2

FIG. 4



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By Richardson & Quare July 1943

ALIEN PROPERTY CUSTODIAN

METHOD OF TELEGRAPHICALLY TRANSMITTING COMMUNICATION FOR STATISTICAL PURPOSES

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Application filed May 27, 1940

This invention relates to a method of telegraphically transmitting communications for statistical purposes.

It is well known in the art to employ the usual telegraph codes, for instance, the five-unit code for the telegraphical transmission of communications for statistical purposes. The known apparatus present, however, the drawback in that special devices for the transmission and reception of the code combinations must be contrived which scan the record cards at the transmitting station, translate the records thereof into code combinations and directly determine the records of the cards at the receiving station on the basis of the code combinations received.

The branch offices of large industrial undertakings have, for instance, to deal with a certain amount of statistical data, for which it would, however, not pay to employ a complete equipment for perforating record cards for statistical purposes. In such cases, it has hitherto been usual to employ in a branch office at least a perforating machine and to send the record cards thus punched by mail to the head office. Another method consists in telegraphically transmitting the communications to the head office. Both methods are, however, very time absorbing.

The object of the present invention is to provide a method, whereby the standard tele-printers available, for instance, in the public tele-printer system may be employed to transmit statistical data. This method consists in transmitting the data from a standard tele-printer transmitter in the form of code combinations and then in transmitting the same to a translator at the receiving station after having been translated by a tele-printer receiver, said translator controlling a perforating machine for the production of record cards.

Further details of the invention will be apparent from the following description taken in connection with the accompanying drawings, in which Figs. 1 to 3 are schematical representations of systems for transmitting communications for statistical purposes.

Fig. 4 shows a circuit diagram of the electrical connections of a perforating machine and a tele-printer as employed in the system shown in Fig. 1.

Fig. 5 shows the manner in which a perforating machine is controlled by a translator of the special type, and in which the translator is controlled by a perforator tape on which are punched the code combinations of the usual telegraph codes.

In transmitting statistical data, the text is sent

by depressing the keys of the keyboard of the tele-printer FS (Fig. 1) and then over the long-distance line FL to the tele-printer receiver FE serving as a translating device for the impulse transmitted from the tele-printer to the perforating machine, the translating device controlling the card perforating machine KL through the line VL. By the method according to the invention a card perforating machine for the production of record cards need be employed only at the head office, where the record cards are utilized for statistical purposes. At the head office, for instance, of a large industrial undertaking, the statistical data transmitted during the slack period from the branch offices are received and punched on the record cards which may later be utilized for statistical purposes. It is then left to the discretion of the head office as to whether the latter sends back in any suitable manner the result of the various records of the data punched on the cards to the branch offices.

The simple arrangement as shown in Fig. 1 presents certain difficulties, since the standard card perforating machines cannot operate so rapidly as the tele-printer receiver is capable of receiving communications. Furthermore, the communications received by the tele-printer receiver are composed of such which only serve for the exchange of intelligence and of such which also contain statistical data. It is therefore desirable that the tele-printer receiver and the card perforating machine should not operate simultaneously, but as far as possible independently of each other.

This may be accomplished by employing the arrangements as shown in Figs. 2 and 3. As shown in Fig. 2 the communications are transmitted from the tele-printer transmitting apparatus FS over the long-distance line FL to the tele-printer receiving apparatus FE designed in the form of a receiving perforator or is combined therewith. The perforated tape produced in the receiving perforator is fed to a perforated tape transmitter LS which in turn controls a translator US. The latter translates the signals of the telegraph code into the control operations of the machine for perforating the record cards. The arrangement as shown in Fig. 2 may be simplified. The perforated tape of the receiving perforator EL (Fig. 3) is directly fed to the translator US provided with a scanning device for the code combinations of the perforated tape and which controls the card perforating machine in accordance with the code combinations.

The upper portion of Fig. 4 designated by FE

illustrates eighteen contacts zk_1 to zk_{18} controlled by the pull rods of the tele-printer in the manner, for instance, as described in the German Patent No. 588,641. Below the designation of the contacts, are indicated in parenthesis the signals of the telegraph code allotted to the corresponding pull rods. In the lower portion of Fig. 4 is schematically shown a card perforating machine KL of the usual type. Such perforating machines are disclosed in the German Patent 587,155 and provided with a keyboard as shown in Figs. 8 to 10 of the last-named patent. The keys of the perforating machine may therefore be operated by magnets designed, for instance, in the form of solenoids and denoted in Fig. 4 by the reference characters LM_1 to LM_9 , LM_{12} to LM_{14} , LM_{16er} (space bar key), LM_{1tab} . (tabulator key) and LM_5 . These magnets actuate the corresponding keys. To energize the perforating machine from the tele-printer, the energizing circuit of the driving motor KM shown at the right is employed, in which is included a relay MR with the contacts mr_1 , mr_2 and mr_3 and a relay U with the contact u_1 .

The operation of the arrangement is as follows: To transmit statistical data, the letter group of the five- or six-unit code is not employed. If during the transmission of statistical data signals of the letter group are received, the perforating machine is not simultaneously operated with the tele-printer. If the figure shift combination is transmitted by the tele-printer FS (Fig. 1), the figure shift combination is translated by the tele-printer FE and actuates the pull rod allotted to the contact zk_{13} . The contact zk_{13} is closed in the manner as described in the German patent 588,641; the code combination allotted to the signal "(" is then transmitted so that the contact zk_{15} is closed in the same manner. During the transmission of these two code combinations the following circuit is established; —, relay MR, closed contact zk_{15} , closed contact zk_{13} , +, whereby the relay MR is energized to close the contacts mr_1 to mr_3 . The circuit of the motor KM is closed by the contact mr_3 . The contact mr_1 connects the negative pole of the battery to one terminal of each of the magnets LM. Through the contact mr_2 a holding circuit is closed for the relay MR, which circuit is from +, contact u_1 , mr_2 , relay MR to —. The relay remains therefore energized till the contact u_1 is actuated in the manner as hereinafter described upon the disconnection of the perforating machine. The text to be punched on the cards by the perforating machine is now transmitted from the tele-printer FS (Fig. 1) through the long-distance line FL. Upon the closure of the pull rod contact zk_1 , the magnet ML_1 is, for instance, energized and the key 1 of the perforating machine is depressed, so that a corresponding hole is punched into the card. The other magnets of the perforating machine are controlled in a similar manner.

If a new card is to be inserted, the signal WR (carriage return) is transmitted from the tele-printer, thereby actuating the pull rod contact zk_{16} . In this manner, the magnet LM_5 of the perforating machine is again actuated so that also the carriage of the perforating machine returns to its initial position and the punches are brought into the position of rest. A new card is inserted from the card receptacle. Also a perforating machine of the standard type may be controlled in the manner just described by tele-printers of the standard type,

in which case only the tele-printer FE at the receiving station shown in Fig. 1 is to be provided with pull rod contacts as shown in Fig. 4 so as to form a translating device.

The perforating machine is disconnected upon the reception of the signal "letter shift" (Bu). The contact zk_{14} is actuated, thus opening the circuit of the relay U. The contact u_1 is opened, thus deenergizing the relay MR. The motor is disconnected and the magnet LM is deenergized. Under this condition, a normal text not serving for statistical data may be received on the tele-printer FE. Of course, the connection and disconnection of the driving motor of the perforating machine may also be made conditional upon other code combinations and under circumstances upon a considerable number of code combinations in order to prevent the perforating machine from being operated in the event of an accidental transmission from the tele-printer.

This embodiment is adapted for open-circuit operation so as to enable an alarm signal to be transmitted to the remote transmitter in the case of disturbances occurring in the receiving system, for instance, in the perforating machine. This may, for instance, be accomplished by interrupting the working current of the line at the receiving station, in case control contacts or other control devices are caused to operate. Such control devices may be designed in a manner similar to that described in connection with the following embodiment.

As mentioned above, the perforating machine must, according to the arrangement as disclosed in the embodiment shown in Fig. 4, be continuously connected to the tele-printer as long as there is a possibility that statistical data be received which are to be recorded by the perforating machine. Furthermore, in the case of a normal line speed, difficulties are presented as regards the control of the return motion of the carriage of the perforating machine. If the tele-printer receiver, for instance, in the case of a perforated tape transmission receives the statistical data at full speed, the tele-printer carriage returns during the transmission of two code combinations, i. e. "carriage return" and "line feed", which last about 280 millisecc. Other signals follow immediately. Such a speed would entail a change in the standard perforating machine. Both difficulties may be removed when employing the embodiment as shown in Fig. 5 which corresponds to the arrangement as illustrated in Fig. 3.

The tele-printer receiver Fig. 3 is equipped with a receiving perforator which is preferably combined therewith. Such apparatus are, for instance, described in the article by Wüsteney "Lochstreifenengeräte für Fernschreibmaschinen" in the "Zeitschrift für Fernsprechtechnik, Werk und Gerätebau" 1933, Vol. 3, Fig. 9, so that a description of the operation is therefore not deemed necessary. Among the various functions of this tele-printer receiver the most important consists in that the connection and disconnection of the receiving perforator, with the tele-printer receiver in operation, are effected in accordance with the reception of the figure and letter shift combination. To this end, for instance, the pull rod allotted to the figure shift combination controls also a system of levers which mechanically connects the perforating machine. A system of levers pivotally mounted on the pull rod allotted to the letter shift com-

bination serves to disconnect the perforating machine. The transmission of impulses by these systems of levers may, of course, also be effected in accordance with the motion of the carriage which in the embodiment just described is raised and lowered when shifting the type groups.

By designing the tele-printer receiver and the receiving perforator in such a manner, only the signals of the figure group are punched into the paper tape, whereas the signals of the letter group are suppressed. The perforated tape thus produced in the receiving perforator selects from a communication the text which is not utilized for producing records on the cards. The tele-printer receiver may receive signals, with the perforating machine disconnected, and the perforated tape may later be utilized to produce record cards.

The translator US is shown in Fig. 5 at the left and is designed in principle as is, for instance, disclosed in the German patent No. 650,851 in connection with telegraphic apparatus for the facsimile transmission of characters. In this patent is described an arrangement in which selector bars are displaced when a perforated tape is being scanned, which bars bring a contact lever into engagement with a revolving transmitter drum. The translating device US is designed on the above principle; however, the cam is given another shape. The cams NS1 to NS27 are given the form as shown developed in Fig. 5 at the left. A control lever for the cam contacts nk_1 to nk_{27} with the exception of nk_1 , nk_{17} and nk_{18} is selected by the selector bars of the translator. The cam contact nk_1 is the control contact, where as all other contacts nk_2 to nk_{27} with the exception of nk_{17} and nk_{18} are preparing contacts which are closed by the cams. The contacts nk_{17} and nk_{18} are closed upon each complete rotation by the corresponding cams NS17 and NS18. They serve as hereinafter described to perform control functions. The final closure of the corresponding circuit is, however, effected through the control contact nk_1 . The contacts nk_2 to nk_{11} are allotted to the figures 1 to 9 and 0, whereas the other contacts nk_{12} to nk_{27} are provided for special functions. The purpose of these contacts will be hereinafter pointed out in connection with the description of the operation of the translator, in which also the other relays and contacts shown at the left of Fig. 5 will be dealt with.

In Fig. 5 at the right is shown the perforating machine. The latter is based upon the construction shown in the German patent No. 587,155. It is provided with sixteen magnets LM1 to LM16, of which the magnets LM1 to LM10 correspond to the numbers 1 to 0 and operate the corresponding punches of the perforating machine. The other magnets have special functions to perform. The perforating machine may also be operated in the usual manner from the keyboard. To this end, a change-over switch U is provided with contacts UI to UIV. In the position of the changeover contacts, shown, the perforating machine is adjusted for automatic operation. It is changed over by the keys T1 to T15. The numbers 1 to 12 are punched with the aid of the keys T1 to T12. Furthermore, special keys are employed for the production of additional perforations. T13 is the tabulator key, which when depressed, causes the carriage to advance by a plurality of spaces until it is prevented by a stop; T14 is the space key and when the key T15 is de-

pressed, the card is punched, the carriage is caused to return and the punches are restored. The punched card is discharged and a new card is inserted.

If signals arrive over the long-distance line FL (Fig. 3) only the signals of the figure case are utilized for statistical purposes and punched into the tape by the receiving perforator machine. This perforated tape is fed to the translator US and actuates there the combination bars substantially in the manner as described in the German patent No. 650,851. In utilizing the impulse combinations for the number 1 punched into the perforated tape and which are composed according to the five-unit code of $+++--$, the control lever for the contact nk_2 is selected by the combination bars. During the rotation of the translator shaft with the cams NS1 to NS27 the following circuit is established: +battery, contact UIV, contacts nk_1 , nk_2 , magnet LM1, wk_1 , -battery. The armature of the magnet LM1 of the perforating machine is attracted and presses the punch allotted to the number 1. Accordingly, it causes the carriage of the perforating machine to advance one space. This process is repeated each time a code combination for the numbers 1 to 0 is transmitted. If the combination "space" is transmitted from the tele-printer, the contact nk_{24} is closed, thus operating the magnet LM14 which advances the carriage of the perforating machine by one space without causing a punching of the card.

To control the position of the carriage of the perforating machine, control contacts wk_1 and wk_2 are provided which are actuated by the carriage in its end position. In the initial position, the contacts wk_1 and wk_2 are operated. In Fig. 5 the contacts are shown in the position which corresponds to the initial position of the carriage. The function of the contacts will hereinafter be explained.

The punching of a complete card corresponds to a line printed on the page printer which prints the text. If the code combination "carriage return" is transmitted, the carriage of the tele-printer returns to its initial position, whereas this code combination is not utilized in the perforating machine for statistical purposes. If immediately thereafter the code combination "line feed" is transmitted to the page printer, the roller of the page printer is advanced by one line and the contact n_{25} of the translator is closed. In the end position of the carriage a circuit for the magnet LM16 which controls the punching of the record card is established: +battery, UIV, nk_1 , nk_{26} , closed contact wk_2 , UIII, LM16, -battery. The magnet LM16 causes the punching mechanism of the perforating machine to be released. The magnet is preferably so designed that it releases the coupling for the punching shaft of the perforating machine in order that a complete rotation may be effected. During this rotation the card is punched in accordance with the punches previously set and then the card is discharged and a new one is inserted.

Shortly after the punching, the coupling of the perforating machine for causing the carriage to return is released by the magnet LM15, thus bringing the carriage back into its initial position. This may be effected by the closure of the following circuit: +battery, UIV, UII, contact kur , which is closed by the cam NWR, magnet LM15, -battery. During the return motion of the carriage, the locked punches of the perfo-

rating machine are unlocked and caused to return to the initial position. During the return motion of the carriage of the perforating machine and during the punching operation of the record card, the feed mechanism for the perforated tape arranged on the translator US is stopped. This is effected by the locking magnet SPM in the following manner:

The relays B and D are connected in parallel to the magnet LM₁₅. Upon the energization of the locking magnet LM₁₅, the following circuits are closed: +battery, UIV, nk_1 , nk_{26} , wek_2 , b_2 , B, -battery and +battery, UIV, nk_1 , nk_{26} , wak_2 , d_3 , D, -battery, thereby operating the relays B and D, when the carriage is in the end position. The contacts b_2 and d_3 as well as b_3 and d_3 are changed over by the relays B and D. The contacts b_2 and b_3 as well as d_2 and d_3 are, however, designed in the form of make-before-break contacts; i. e., the contacts b_2 and d_2 change over sooner than b_3 and d_3 . Their corresponding relays B and D remain therefore energized through the closed contact wak_1 and the card control contact kk . The circuit for the relay D is from: -battery, relay D, d_2 , wak_1 , UIV to +battery; for the relay B from -battery, relay B, b_2 , kk , UIV, to +battery. Upon the closure of following circuit: -battery, b_1 , and d_1 , SPM, +battery, the locking magnet SPM is energized. The magnet SPM is so arranged on the perforated tape scanning device of the translator US that its armature locks the feed mechanism for the perforated tape.

If the operator at the tele-printer FS (Fig. 3) has erred, the signals of the line or card hitherto received must be cancelled. To this end, the key "?" is depressed and the signals "carriage return" and "line feed" are transmitted and the entire line is repeated. The selector bars of the translator are so notched that upon the transmission of the signal "?" two contact levers, i. e., the contact levers for the contacts nk_{25} to nk_{27} come into engagement therewith. Upon the actuation of the contact nk_{25} the following circuit is established: +battery, UIV, nk_1 , nk_{25} , LM₁₅, -battery, whereby the magnet LM₁₅ is energized to release the coupling of the perforating machine so as to permit the carriage to return. The carriage is pulled back and the punches are unlocked, thereby restoring the punches hitherto set. Upon the actuation of the contact nk_{27} the following circuit is established: +battery, UIV, nk_{27} , A, -battery, whereby the relay A is energized, so that the feed mechanism for the perforated tape is locked in the manner as mentioned above. By the following combinations "carriage return" and "line feed" transmitted immediately thereafter, the carriage of the page printer is caused to return, thereby causing the roller to advance in the above-described manner.

Upon the occurrence of faults there results in most cases a false position of the carriage of the perforating machine. After completion of a line, it may happen that the carriage has been advanced more or less a space. These faults may be made evident by employing control devices which indicate the position of the carriage. In this case the following conditions must be fulfilled:

(1) If the combination "line feed" is transmitted before the carriage reaches its end position, the punching magnet LM₁₅ should not be energized and the locking magnet SPM must stop the perforated tape.

(2) In the end position of the carriage only

the code combinations "line feed" or "error (?)" should be received, since the reception of other code combinations cannot take place in this position. If other code combinations should therefore arrive at this moment, the perforated tape must also be stopped by a locking magnet.

(3) If the code combination "error" arrives, the carriage of the perforating machine is brought back into its initial position and the punches previously set are unlocked. When unlocked, the code combinations "carriage return" and "line feed" must be transmitted in order that the page printer begins a new line. The carriage of the perforating machine is, however, in the initial position. Care should therefore be taken to see that the locking magnet SPM is not operated in response to the code combination "line feed".

The above requirements are met by the following arrangement.

The position of the carriage is controlled by the contacts wak_1 , wak_2 , wek_1 and wek_2 . The contacts wek_1 and wek_2 are contacts which are open in the initial position of the carriage but are closed in all other positions. In the circuit diagram is shown the initial position of the carriage. The contacts wek_1 and wek_2 are, in the position shown, in all positions of the carriage except in the end position. When the carriage reaches its end position, the contacts are changed over.

If the case under (1) occurs, i. e., if the code combination "line feed" is transmitted before the carriage reaches its end position, the contact wek_2 is open and wak_2 closed. By the closure of the following circuit: +battery, change-over switch UIV, control contact nk_1 , contact nk_{26} , wak_2 , d_3 , D, -battery, the relay D is caused to operate, thus energizing the locking magnet SPM and stopping the perforated tape. To eliminate the trouble, the operator must remove the perforated tape and insert it in such a manner as to enable the punches to be set again. Furthermore, the carriage of the perforating machine must be brought back into its initial position. The armature of the relay D then drops upon the actuation of the contact wak_1 to the open position, thus deenergizing the locking magnet.

If in the end position of the carriage as mentioned under (2) another impulse combination is received instead of "line feed" or "?", the F-relay which has a relatively high-ohmic coil is inserted in the circuit in series with the corresponding punching magnet of the perforating machine through the changed-over contact wek_1 . The coil of the relay F is so proportioned as to prevent in this case the punching magnet from being operated. The relay F remains energized through its contact f_1 , thus energizing the locking magnet SPM through its contact f_2 so that also in this case the perforated tape is prevented from advancing.

As mentioned above, the carriage of the perforating machine is brought back into its initial position when the code combination "error" is transmitted and immediately thereafter the code combinations "carriage return" and "line feed" for the page printer are transmitted. In the initial position of the carriage, the contact wak_2 is now open so that the incoming combination "line feed" cannot act upon the perforating machine owing to the contacts wak_2 and wek_2 being open. In this manner the card not punched is prevented from being discharged from the perforating machine.

To control the proper feed of the cards, the

card control contact *kk* is provided. When inserting a new card, the card control contact arranged on the punching plate of the perforating machine is momentarily opened to release the armature of the relay B. Consequently, if the supply of cards is interrupted owing to a trouble in the card receptacle or in the card supply channels, the B-relay remains energized and the armature of the locking magnet prevents the perforated tape in the translator US from advancing until the trouble is removed.

Finally, an arrangement for controlling the punching is provided. Should, for instance, the coupling of the punching shaft fail to operate so that the latter is not stopped in the zero position, but continues to rotate, the A-relay is continuously supplied with current impulses through the coupling control contact *kkk*. The latter is continuously actuated by a cam NKK during the rotation of the punching shaft so that the A-relay is thereby supplied with current impulses through the following circuit: —battery, relay A, coupling control contact *kkk*, UIV, +battery. The locking magnet is energized through the contact *a₂*, since the relay A remains energized during the momentary interruptions of the contact *kkk*, thus preventing the perforated tape from advancing.

If the transmission over the long-distance line FL is interrupted, the translator US uses up the reserve of perforated tape and the perforated tape becomes stretched. In this manner the control contact *lkk* allotted to the perforated tape is closed so that the relay A is again operated through +battery, UIV, *lkk*, relay A, —battery and the perforated tape is again prevented from advancing until *lkk* is again opened.

To control the reserve of cards in the receptacle, a receptacle control contact *mkk* is provided for the card receptacle M. If the receptacle is empty, the contact *mkk* is closed, thus establishing the following circuit: +battery, UIV, *mkk*, A, —battery, thereby energizing the relay A so that the perforated tape is again prevented from advancing.

In the record card system, so-called additional perforations are provided as already mentioned above for certain purposes. The additional perforations serve to enable a card to be punched for the registration of a larger amount of statistical data and consist in the fact that a plurality of holes are punched in one column. Any figure from 1 to 9 may be provided with an additional perforation 0=30, the additional perforation 11=20 and the additional perforation 12=10. If, for instance, in any column of the record card, the figures 5 and 0 are punched this means 5+30=35. If the additional perforations 0, 11 or 12 appear alone in a column they mean 0, 11 or 12. When perforating by hand, an additional perforation is produced on the card by the simultaneous depression of two keys. Should this method be employed for the present invention, the teleprinter would require 3×9=27 combinations, since each additional perforation would have to be combined with the other figures 1 to 9. The combinations for the additional perforation and the corresponding figures are therefore transmitted one after the other. The carriage of the page printer and perforating machine must then be prevented from advancing.

Devices for preventing the carriage of the page printer from advancing in the case of certain code combinations are well known in the art; for instance, such as are employed in page printers

for printing accents. In such printers, the accents are arranged in the figure case of the letters F, G and H. By the use of such devices for producing the additional perforation the above-mentioned conditions for the page printer may therefore be fulfilled. On the type-bars of the teleprinter, types differing from the accents may naturally be employed for producing the additional perforation.

The control of the perforating machine is effected in the following manner: When transmitting the figure 0, i. e., without additional perforation, a cam contact *nk₁₁* is closed to energize the punching magnet LM₁₀. The normal perforation 0 is produced. During the translation of the code combination, figure case F of the telegraph code, corresponding to the additional perforation 0, two cam contacts *nk₁₂* and *nk₁₃* are operated. The selector bars of the translator are correspondingly notched. Upon the actuation of the contact *nk₁₂* the following circuit is closed: +battery, UIV, *nk₁₁*, *nk₁₂*, LM₁₀, —battery, thus causing the magnet LM₁₀ to operate again. The contact *nk₁₃* closes the circuit for the relay R: +battery, UIV, *nk₁₁*, *nk₁₃*, R, —battery. The contacts *r₁* and *r₂* are actuated to the closed position. The relay R remains energized for a complete rotation through the contact *r₁*. The circuit is from —battery, relay R, contact *r₁*, *nk₁₈*, *nk₁₇*, UIV to +battery. The magnet LM₁₀ is maintained energized for a period corresponding to two rotations. The circuit is from: +battery, UIV, *nk₁₇*, *r₂*, LM₁₀ to —battery. Consequently, the carriage is prevented from advancing in the perforating machine. In the meantime the following character is set on the translator so that during the next rotation the contact is closed and the character is set on the perforating machine without there occurring a displacement of the carriage. At the end of the second rotation of the cam shafts NS, the contacts *nk₁₇* and *nk₁₈* are brought into the open position, thus deenergizing both the relay R and the magnet LM₁₀. Shortly afterwards, also the contact *nk₁* is opened, thus deenergizing the magnet LM which had set the second punch, whereupon the carriage of the perforating machine advances. The other additional perforations are effected in a similar manner with the aid of the relays S and V and the corresponding contacts *nk₁₅*, *nk₁₆* and *nk₂₀*, *nk₂₁* respectively. In this case the magnets LM₁₁ and LM₁₂ are energized.

When the perforated tape is fed directly from the receiving perforator EL to the translator US and stretches between the former and the latter, it may happen that it is stopped by the contact *lkk* within the interval elapsing between the combination allotted to an additional perforation and the next following code combination. In this case the perforated tape is not prevented from advancing, since the cams NS continue to rotate and the magnet LM is maintained only energized for one rotation for producing the additional perforation. In this case two further cams NS₂₂ and NS₂₃ are provided which just bridge the gaps of the cams NS₁₇ and NS₁₈. These cams control two contacts *nk₂₂* and *nk₂₄* arranged parallel to the cam contacts *nk₁₇* and *nk₁₈*. The control levers for the contacts *nk₂₂* and *nk₂₃* come then into engagement with the selector bars of the translator US in the event of the code combination ———— being set. This code combination will, however, be set if the perforated tape is stopped. When the perforated tape is prevented from advancing within the interval elapsing be-

tween the code combination "additional perforation" and the next following combination, the magnet LM₁₀ and the relay R are therefore supplied with permanent current so that an error cannot occur. The same process is repeated for the code combination of the other additional perforations in connection with the magnets LM₁₁ and LM₁₂.

If the change-over switch U is changed over no remote-control functions occur and the perforating machine is operated in the manner as is usual in record card systems.

In the lower portion of Fig. 5 are shown, furthermore, the supply circuit and the motors. The motor switches Sch₁ and Sch₂ may, of course, be remote controlled as is usual in connection with tele-printers.

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