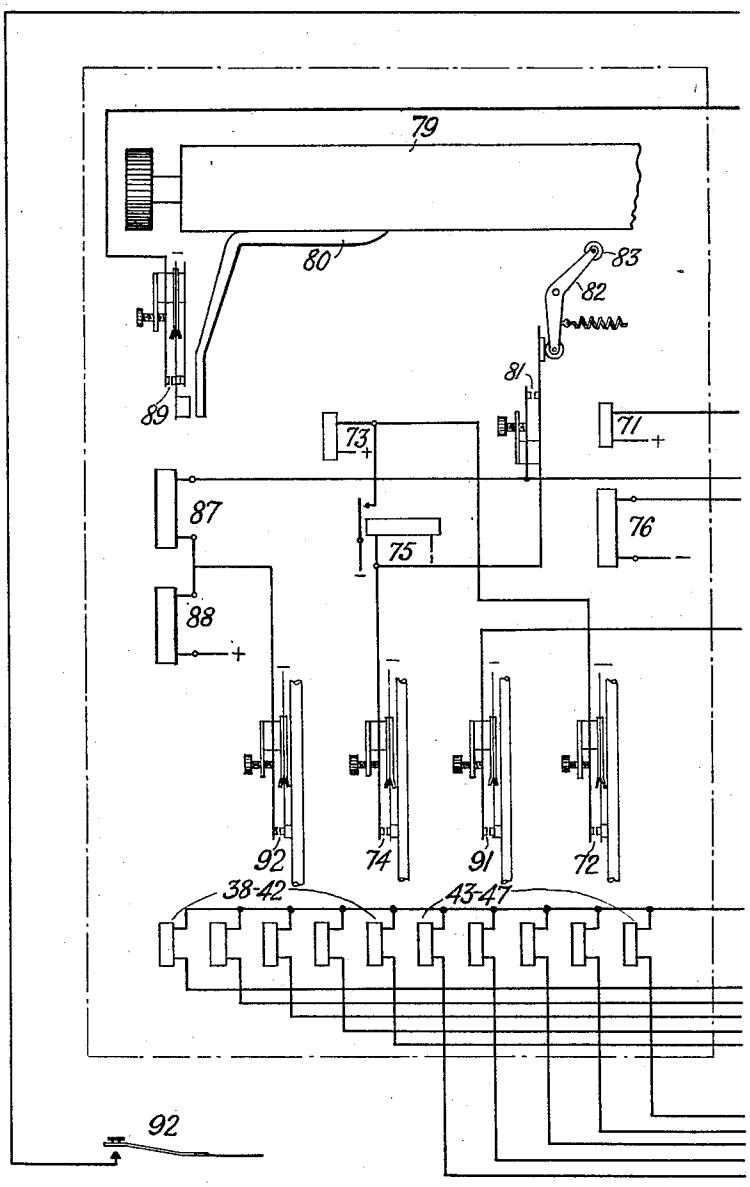
June 21, 1932. R. G. GRIFFITH 1,864,302

TELEGRAPH PRINTING AND LIKE APPARATUS

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FIG. 1-A



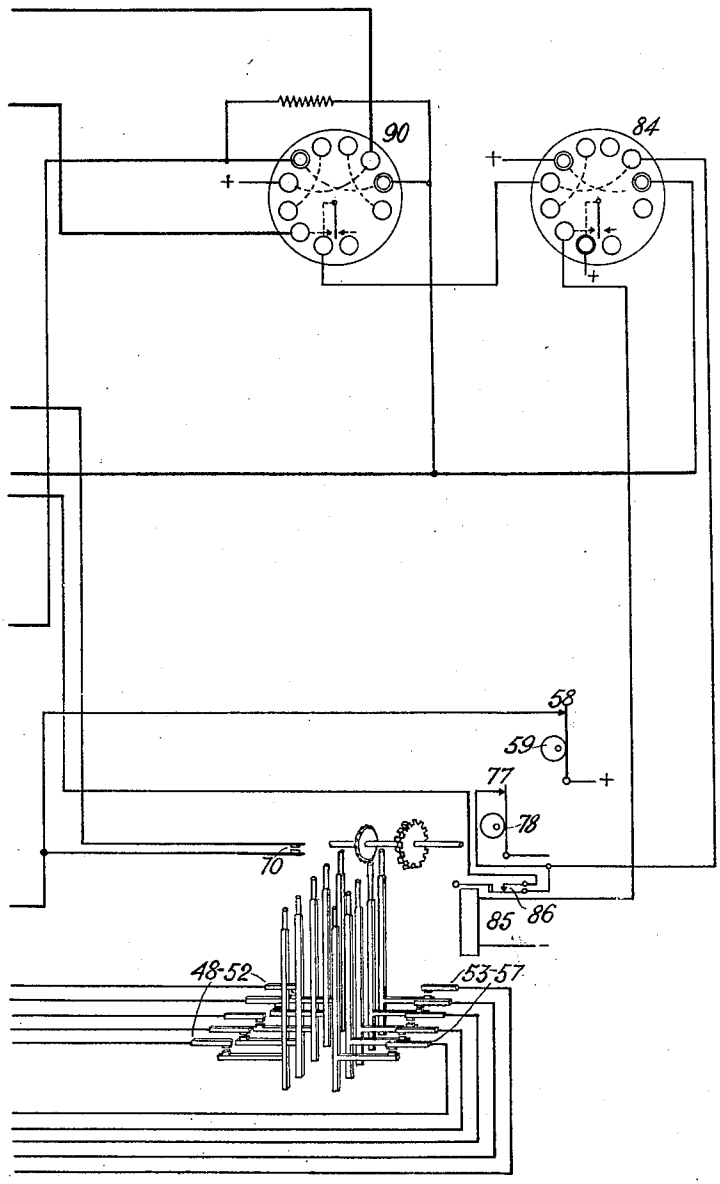
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TELEGRAPH PRINTING AND LIKE APPARATUS

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FIG. 1-B



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TELEGRAPH PRINTING AND LIKE APPARATUS

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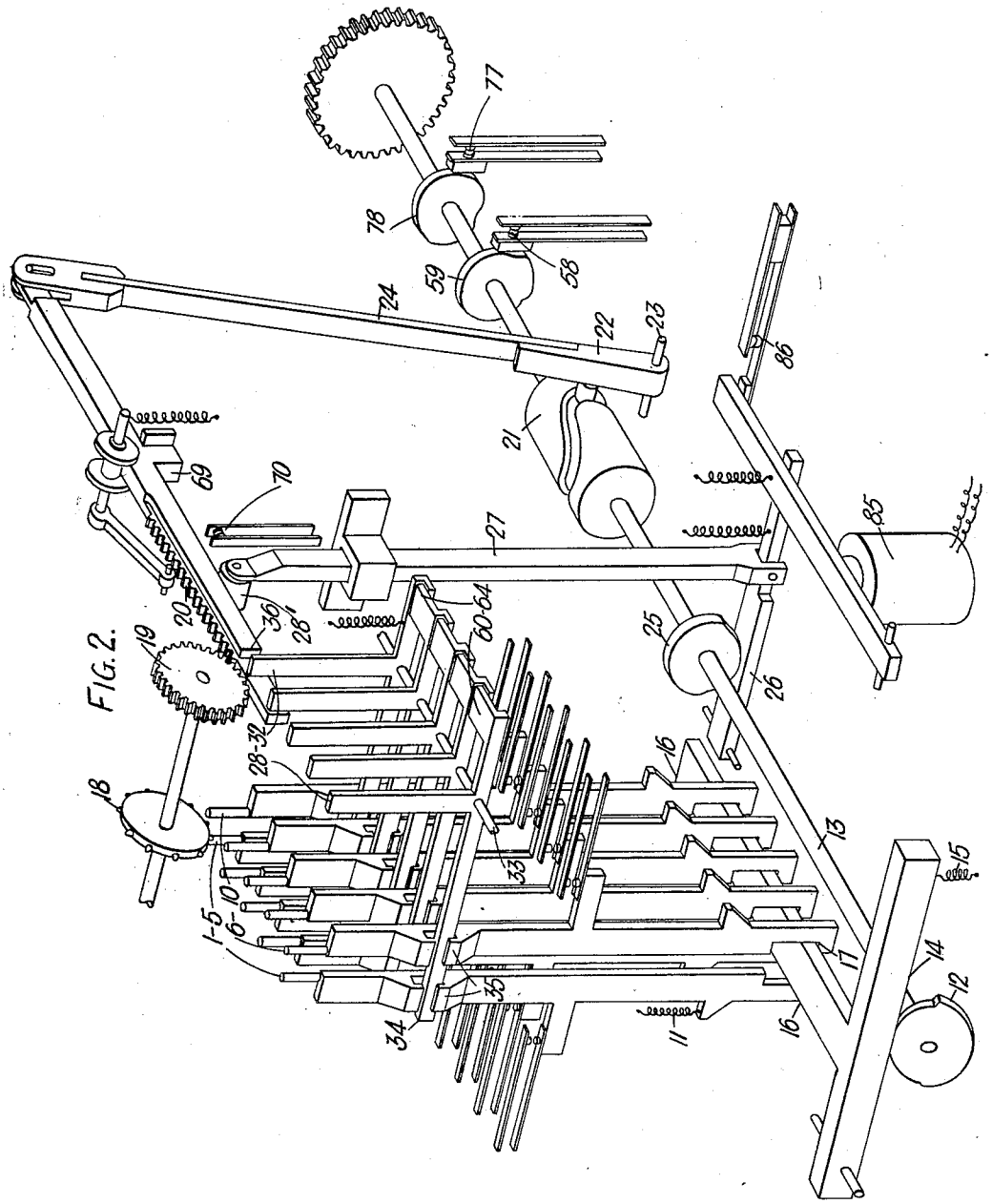


FIG. 2.

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TELEGRAPH PRINTING AND LIKE APPARATUS

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FIG. 3.

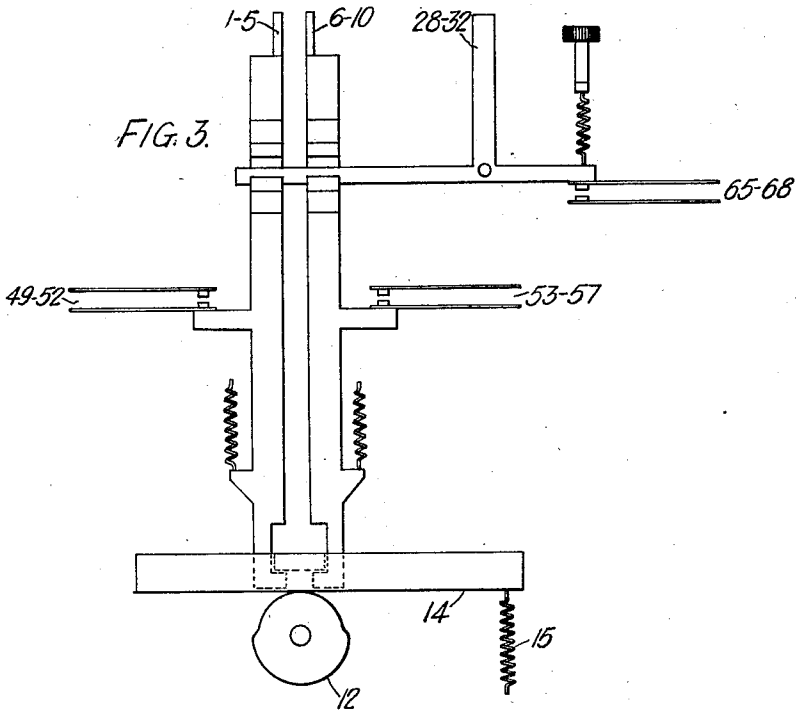
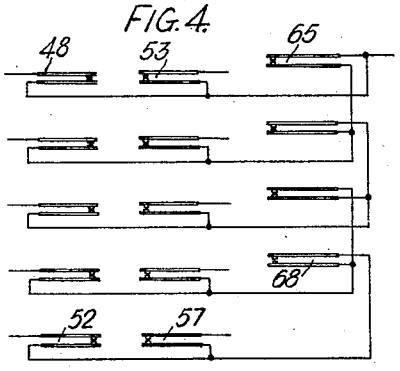


FIG. 4.



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Fig 5

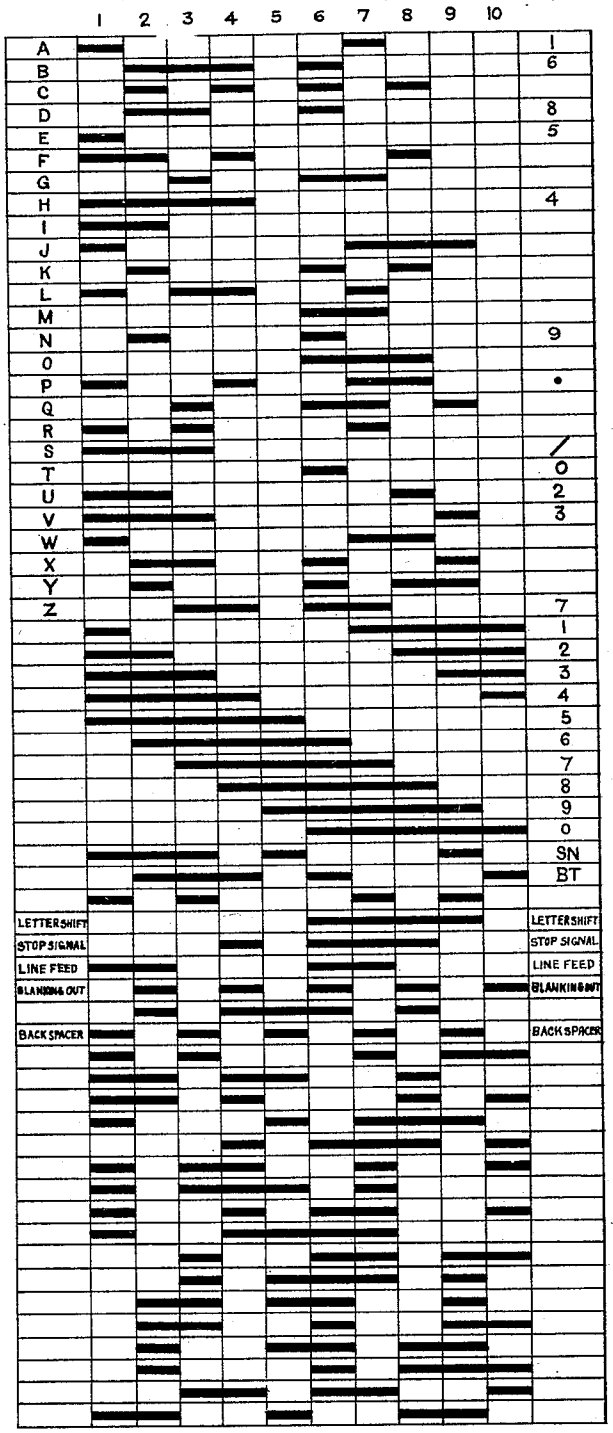
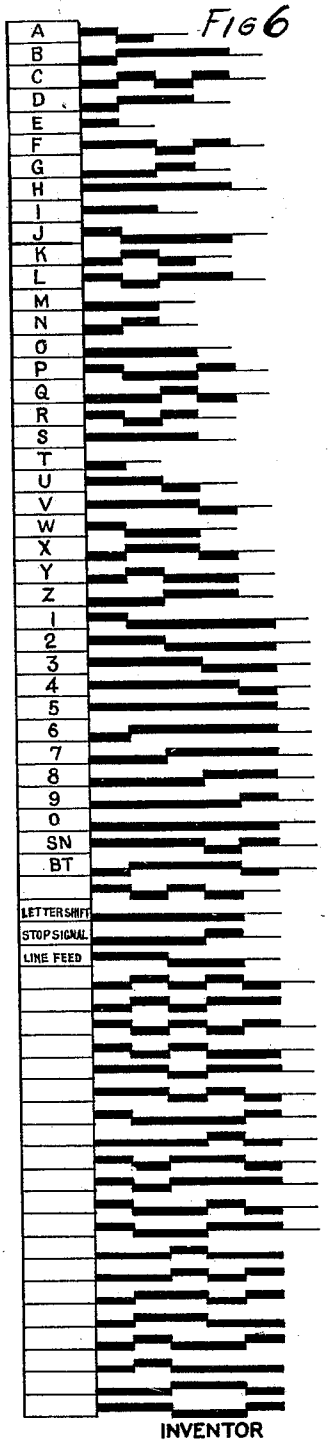


Fig 6



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1,864,302

UNITED STATES PATENT OFFICE

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TELEGRAPH PRINTING AND LIKE APPARATUS

Application filed November 18, 1930, Serial No. 496,373, and in Great Britain September 11, 1930.

This invention relates to telegraph printing and like apparatus operable under control of a perforated tape.

In telegraph apparatus of this class a distinction can be drawn between apparatus adapted for operation under control of a tape perforated in accordance with a code of which the number of elements is uniform in each combination corresponding to a character to be printed and apparatus adapted for operation under control of a tape perforated in accordance with a code of which the number of elements in each combination is not uniform. The most widely used of the unequal element codes is the Morse code, and according to its manner of adaptation to two different systems of working is known as the Wheatstone Morse code or the cable Morse code.

The present invention relates more particularly to telegraph code translating and printing devices operable under control of a tape perforated in accordance with an unequal element code and provides means for operating a series of selector magnets in combinations varying in accordance with each signal combination perforated in the tape, the selector magnets being adapted to control the selection of a character corresponding to the code elements perforated in the tape which character is printed on a paper slip, sheet or the like. The invention also provides arrangements whereby the selector magnets may effect other telegraphic operations under control of the perforated tape.

According to one feature of the invention, in telegraphic apparatus operable under control of a tape perforated in accordance with an unequal element code, a selector mechanism comprises in combination a plurality of peckers co-operating with the perforated tape, means to feed said perforated tape combination by combination, contacts closed by said peckers to actuate corresponding selector magnets in accordance with each combination perforated in the tape, and means to render inoperative the remainder of the said selector magnets corresponding to elements extraneous to each said combination.

The invention further provides according to another feature, telegraph apparatus operating under control of signals according to an unequal element code having means for selecting any one of a plurality of selectable members or characters arranged in two case groups and means responsive to the reception of a signal in excess of a predetermined number of elements for effecting change of said case group.

According to another feature, in a perforated tape controlled page printing apparatus an electrical circuit is prepared by the movement of a printing carriage near the end of each line and completed upon the occurrence of the first word space thereafter in the perforated tape, and means responsive to the closure of said circuit is provided to effect carriage return and line feed operations and to arrest the feed of the perforated tape until the completion of said carriage return.

These and further features will be evident from the following description taken in conjunction with the accompanying drawings in which Fig. 1 shows diagrammatically the arrangements for a page printing telegraph apparatus according to the invention, Fig. 2, shows in greater detail the arrangements of spring actuated peckers and feeding means for the controlling perforated tape, Figs. 3 and 4 show an alternative arrangement with reference to the peckers, whilst Figs. 5 and 6 are code charts illustrating the conversion of the unequal element Morse cable code into a uniform 10 element code suitable for operating telegraph printing apparatus.

Referring in the first place to Fig. 2, the selector mechanism here shown comprises a series of 10 independent peckers 1–5 and 6–10 arranged in two rows. One row of five of these peckers is arranged to co-operate with dot elements or signal holes perforated on one side of a central row of feed holes in a paper tape, and the other row of five peckers with dash elements or signal holes perforated on the other side of the central row of feed holes. The peckers are set in corresponding members which are longitudinally movable under tension of individual spring means, of

which only spring 11 for pecker 5 is shown in Fig. 2, to press the peckers against the paper tape. For brevity in the following description the peckers together with the respective members in which they are set are referred to collectively as peckers. Means controlled by a driving shaft is employed to retract all peckers against the tension of their springs after each selection. This means is shown in Fig. 1 as cam 12 on shaft 13 driven by an external source of power (not shown), and pivoted lever 14 under tension of spring 15. An arm 16 of lever 14 extends between and bears against shoulders 17 formed on each of all the peckers. When cam 12 raises lever 14 all the peckers are permitted to rise under tension of their individual springs to press against the perforated tape. Those peckers which encounter blank tape are prevented from rising any further, but those which encounter perforations in the tape are permitted to rise further.

The controlling paper tape is fed forward combination by combination by means such as toothed star wheel 18 engaging with a central row of feed holes. A spur wheel 19 fixed on the same shaft as star wheel 18 is engaged intermittently by a rack 20 actuated at the requisite times by a cam 21 on shaft 13 through a lever 22 pivoted at 23 and connected to rack 20 through a flat spring 24. At the appropriate times another cam 25, also on shaft 13, depresses a lever 26 and through sliding arm 27 and roller 28′ permits rack 20 to fall and withdraw from engagement with spur wheel 19. On rotation of cam 25 lever 26 subsequently rises and brings rack 20 into engagement with spur wheel 19.

In order to feed the perforated tape a distance in accordance with the number of elements in each combination representing a single character, differential feed comprising stops 28—32 are provided for rack 20. These stops of which there is one for each pair of oppositely arranged peckers may each consist of a bell crank lever, as shown in Fig. 2, independently pivoted at 33 and comprising a horizontal arm 34 engaging with its corresponding pair of peckers through suitable abutments 35 formed thereon, and a vertical arm which is movable into and out of the path of a shoulder 36 formed on the sliding rack 200. The abutments 35 on each pecker are arranged so that either of the two peckers in each pair on rising unobstructed by blank tape raises the horizontal arm of the bell crank lever and swings the vertical arm out of the path of shoulder 36 on rack 20.

The arrangement is such that as shaft 13 revolves cam 21 feeds the tape forward a distance equal to the number of elements in the combination last selected together with one centre hole for the letter space. This brings a fresh combination in the tape over the bank of peckers, the first element of the new combination being set over pecker 1 or 6. Cam 12 then permits all the peckers to rise, the ones corresponding to signal elements perforated in the tape rising the maximum distance whilst the remainder are obstructed by blank tape. At the first letter space following the combination set up both of the corresponding pair of peckers are maintained depressed, the corresponding stop in the series 28—32 will therefore be held in a position to arrest rack 20 on its return movement which will be effected out of engagement with spur wheel 19. The excess movement due to cam 21 is taken up by the yielding spring 24. Cam 25 then permits rack 20 to engage with spur wheel 19 and on the reverse movement of the rack the tape is fed, as previously described, a distance equal to the number of elements in the combination together with one centre hole for the letter space between each combination. Obviously, the feed movement of the rack 20 does not occur until after the withdrawal of the peckers from the tape perforations, the levers 28 falling back into their unoperated position when permitted to do so as the rack moves during the feed movement. The arrangement forms a mechanism for successively operating a bank of peckers in combinations varying in accordance with each signal combination perforated in a controlling paper tape, and as thus so far described may be considered to be already known.

The manner of control of a selector mechanism for effecting printing or like telegraphic operations and subordinate functions in a page printing apparatus employing pecker means substantially as outlined above will now be described.

In Fig. 1, a series of ten selector magnets 38—42 and 43—47, is shown. These magnets are connected to contacts 48—52 and 53—57 each controlled by a corresponding pecker, the circuits being completed on closure of a contact 58 operated by cam 59 on driving shaft 13. The selector magnets may control the selection of a printing character or any similar operation according to any of the methods already well known. When each signal combination in the perforated tape is set up in position over the bank of peckers it will be seen that when the selected combination is composed of (in the example described) less than four elements, peckers other than those forming the elements of the selected combination will also be able to close their respective contacts. In order to prevent the actuation of those selector magnets corresponding to these extraneous elements, either mechanical or electrical means may be employed. In Fig. 2 mechanical means is shown and consists of horizontal extensions 60—64 on the bell crank levers 28—32. Each of these extensions is shaped

so as to overlap the corresponding extension of the preceding lever. It will be seen that by this means either of the first pair of peckers is free to rise and move its corresponding bell crank lever and extension, and similarly for all the elements of the signal combination being selected. At the first letter space, however, the corresponding stop in the series 28—32 is maintained in a position to arrest rack 20, as described above, and the extension on the corresponding stop prevents all succeeding lever extensions in the series from falling and consequently the corresponding peckers from rising. The corresponding pecker contacts are thereby mechanically maintained open and only those forming the elements of the one signal combination are closed.

Alternative means such as the electrical arrangement shown in Figs. 3 and 4 may be employed. Each of the bell crank levers, with the exception of the first, is arranged to close an individual pair of contacts 65—68 which is operated by the rising of either of its corresponding peckers. Each of these pairs of contacts when closed connects battery to the next pair of pecker contacts, as shown in Fig. 4. The first space in the combination set up over the peckers will therefore effect the disconnections of battery from all pecker contacts following in the series and thus prevent the actuation of the corresponding selector magnets.

The selection of a printing character in accordance with the actuation in varying combinations of the series of selector magnets 38—47 may be effected according to any of the known methods and as this forms no part of the present invention is not here further described.

In telegraph codes in which the number of elements is not uniform the figures are usually assigned the longer signal combinations. In the Morse code, for example, no letter signal combination contains a greater number of elements than four whilst all the figures contain five elements. When long series of figures are required to be transmitted it is usual to prefix such a series with an appropriate case shift signal and then to represent each figure by a signal containing a fewer number of elements, such signal being normally reserved for a letter. The two signals to represent such figures are generally referred to as long and short figures respectively.

In the arrangement shown in Fig. 2 whenever a combination containing five elements is set up over the bank of peckers a shoulder 69 on rack 20 closes contacts 70. This energizes case shift magnet 71 (Fig. 1) to raise a printing platen or effect case shift in any convenient manner as already known and therefore not here described. The printing characters may be arranged as shown in the code chart of Figs. 5 and 6 the figure types being duplicated, as shown, in the case group to which the printer is shifted on reception of long figures. This is shown in the column to the right of Fig. 5. By this means letters are printed in one case group in accordance with Morse cable code signals as shown in Fig. 6 for the alphabet. On a figure or a five element combination being selected the case is shifted and thereafter the so-called short figure signal combinations may be employed to select corresponding figure types also. As shown in Fig. 5 the usual short figure signal combinations are employed, the two element combination for letter A, for instance, in the one case being utilized as the short combination for the figure 1.

It will be understood that when case shift is effected in response to a five element combination, characters continue to be printed in this case until reshift is effected. This may be arranged to take place either at the first word space following the case shift, or on reception of a particular combination perforated in the tape. In this latter case contacts 72 are closed consequent upon the energization of a particular combination of selector magnets 38—47 representing a case reshift signal thereby energizing reshift magnet 73, each time the selecting magnets 38—47 remain de-energized during a selecting period. Contacts 74 are closed and operate magnet 75. Each time the selecting magnets 38—47 remain de-energized during a selecting period as will occur at each word space. Magnet 75 is arranged as shown in Fig. 1, also to effect the energization of case reshift magnet 73. Any convenient manner of effecting case shift and reshift upon the operation of these controlling magnets may be adopted and as this forms no part of the present invention is not here further described.

The invention further provides arrangements for effecting certain operations incidental to printing on telegraph form blanks, and particularly the carriage feeding operations such as line feed, column feed and the insertion of fresh message blanks.

In the arrangement shown in Fig. 1 a printing magnet 76 is energized upon closure of contacts 77 operated by a cam 78 on shaft 13 of the printing apparatus. After each printing character is selected as described above contacts 77 are closed and energize magnet 76 to effect a printing impulse and subsequent letter space feed. The letter feed effects a movement step by step of a platen carriage 79. When magnet 76 is energized and a printing character has not been selected a space feed only takes place. When the platen carriage has been stopped a predetermined number of spaces and the printing approaches the end of a line, a cam strip 80 effects the closure of contacts 81 through pivoted arm 82 and roller 83. On the reception of the first following word space contacts 74 are closed

throughout a period in which printing cam contacts 77 are closed and two circuits are established. One of these circuits energizes a neutrally set relay 84 through one winding. The operation of this relay energizes a magnet 85 (see also Fig. 2) which arrests the tape feed and the attendant printing functions by withdrawing rack 20 from engagement with spur wheel 19 and simultaneously breaking the circuit of the printing magnet 76 by opening contacts 86. The other circuit is closed through carriage return magnet 87 and line feed magnet 88 in series, which magnets then operate and effect the return of the platen carriage and the rotation of the platen for one line space respectively in any known convenient manner. Immediately the platen carriage 79 is returned to the commencement of its travel it closes contacts 89, as shown in Fig. 1, by the extension of cam strip 80, for instance. This completes a circuit through contacts 77, a second winding of relay 84, tongue contacts of a second neutrally set relay 90 and contacts 89 to negative battery. Relay 84 thereupon actuates in a direction to de-energize magnet 85 which releases and allows the tape feed and printing functions which had been arrested to continue.

The line feed and carriage return operations may also be effected where desired before the end of a line by the insertion of a suitable signal in the perforated tape which effects the closure of contacts 92. This closes a circuit through magnet 88 in parallel with magnet 87 and the winding of relay 84 in series therewith. The carriage return and line feed operations together with the arrest of the tape feed and printing functions is effected and on the completion of the return of the platen carriage 79 printing functions are resumed as already described.

Means is also shown in Fig. 1 to stop the printing functions at the end of each message to provide sufficient time to permit the insertion of a fresh message blank. Upon receipt of a particular signal indicating the end of a message, contacts 91 are closed and complete a circuit through one winding of relay 90 and the first mentioned winding of relay 84 in parallel with magnets 87 and 88. The neutrally set relay 90 operates to break the starting circuit of relay 84 and thus prevents any release of the printing functions, relay 84 is actuated to complete the circuit of magnet 85 and thus arrest the printing functions and magnets 87 and 88 also operate to effect the carriage return and line feed operations, as previously described.

After a fresh message blank has been placed in position a key 92 is manually operated to complete a circuit through the starting winding of relay 90 which causes the actuation of the tongue to the opposite side and prepares the starting circuit of relay 84. This circuit is completed at the correct period during the rotation of the printer shift 13 by contacts 77 and causes the release of magnet 85 and the resumption of the printing functions.

In the above description it has not been thought necessary to describe in detail certain features of construction which are already well known. For example methods of actuating contacts 72, 74, 91 and 92 on energization of the selector magnets 38—47 in particular combinations and the necessary mechanism for effecting the carriage return, line feed, case shift and reshift, printing and other operations upon actuation of the magnets 87, 88, 71, 73 and 76 respectively will be readily apparent to those acquainted with the art.

What is claimed is:

1. In telegraph apparatus operable under control of a tape perforated in accordance with an unequal element code, a selector mechanism comprising in combination a plurality of peckers for co-operation with the perforated tape, means to feed said perforated tape combination by combination, a series of selector magnet contacts closed by said peckers to actuate corresponding selector magnets in accordance with each individual combination of perforations in the tape as fed, and means to render inoperative the remainder of said selector magnets corresponding to elements extraneous to each said combination.

2. In a telegraph printer operable under control of a tape perforated in accordance with an unequal element code, a series of peckers for co-operation with the perforated tape, intermittently operable tape feeding means, a series of individual stop members operatively associated with the peckers and with said tape feeding means to determine the feed movement thereof and movable abutment means between adjacent stop members maintained by each stop member not operated by its associated pecker or peckers in a position to prevent operation of the succeeding stop member of the series together with its associated pecker or peckers.

3. In a telegraph printer a series of peckers for co-operation with a perforated tape, intermittently operable tape feeding means, a series of independent stop members actuated by said peckers and serving to determine the feed movement of said tape feeding means in accordance with the number of elements in each combination in the perforated tape, and a corresponding series of overlapping abutments carried by said stop members disposed to prevent mechanically the actuation of the peckers in said series after those maintained depressed by the first letter space in said perforated tape.

4. In a telegraph printer operable under control of a tape perforated in accordance with an unequal element code, a series of

peckers for co-operation with the perforated tape, a corresponding series of selector magnets, contacts controlled by said peckers in the circuits of corresponding selector magnets, intermittently operable tape feeding means, a series of individual stop members operatively associated with the peckers and with said tape feeding means to determine the feed movement thereof and movable abutment means between adjacent stop members maintained by each stop member not operated by its associated pecker or peckers in a position to prevent operation of the succeeding stop member of the series together with its associated pecker or peckers.

5. In a telegraph printer a series of peckers for co-operation with a perforated tape, a series of independent stop members actuated by said peckers, a series of selector magnets, contacts controlled by said peckers and connected in the circuits of corresponding selector magnets, and other contacts actuated by said stop members for controlling the energization of the circuit of the contacts of the peckers associated with each succeeding stop member.

6. In a telegraph printer operable under control of a tape perforated in accordance with an unequal element code, a series of peckers for co-operation with the perforated tape means to feed said perforated tape combination by combination, selecting elements controlled by said peckers, means to render inoperative the selecting elements corresponding to the peckers extraneous to each individual combination of perforations in the tape as fed, and means responsive to the operation of the peckers corresponding to a combination of tape perforations in excess of a predetermined number for effecting case shift.

7. In a telegraph printer for Morse or like unequal element codes, means responsive to the reception of a signal in excess of a predetermined number of elements for effecting case shift, and means responsive to the reception of a particular signal and to word spaces for effecting case reshift.

8. In a telegraph printer a series of peckers for co-operation with a perforated tape, differential feed means for feeding the perforated tape at each step by an amount varying in accordance with the number of elements in each combination of perforations in the tape as fed, contacts closed by said differential feed means when the feed exceeds a predetermined amount, and means operated on closure of said contacts for effecting case shift.

9. In a telegraph printer operable under control of a tape perforated in accordance with an unequal element code, a series of peckers for co-operation with the perforated tape, a corresponding series of selecting elements controlled by said peckers, means to feed said tape combination by combination controlled by said peckers, means to render inoperative the selecting elements corresponding to the peckers extraneous to each individual combination of perforations in the tape as fed, means responsive to the operation of the peckers corresponding to a combination of tape perforations in excess of a predetermined number for effecting case shift, and means responsive to the operation of a particular combination of the selecting elements to effect case reshift.

10. In a telegraph printer operable under control of a tape perforated in accordance with an unequal element code, a series of peckers for co-operation with the perforated tape, a corresponding series of selecting elements controlled by said peckers, means to feed said tape combinations by combination controlled by said peckers, means to render inoperative the selecting elements corresponding to the peckers extraneous to each individual combination of perforations in the tape as fed, means responsive to the operation of the peckers corresponding to a combination of tape perforations in excess of a predetermined number for effecting case shift, means responsive to the operation of a particular combination of the selecting elements for effecting case reshift and means associated therewith operable in response to the operating condition of the selecting elements resulting from the co-operation of the peckers with a portion of the perforated tape signifying a word space to effect case reshift.

11. In a page printer operable under control of a perforated tape, contacts closed by the movement of a platen carriage near the end of its travel to prepare an electrical circuit, contacts closed in response to a word space in the perforated tape thereafter to complete said electric circuit, means operated on closure of said circuit to effect carriage return and line feed operations, and other means operated on closure of said circuit to arrest the printing functions until the completion of said carriage return.

12. In a page printer operable under control of a tape perforated in accordance with an unequal element code, a series of peckers for co-operation with the perforated tape, a corresponding series of selecting elements controlled by said peckers, means to feed said tape combinations by combination controlled by said peckers, means to render inoperative the selecting elements extraneous to each individual combination of perforations in the tape as fed, contact closing means associated with the selecting elements and disposed to be closed thereby in response to the operating condition thereof resulting from the co-operation of the peckers with a portion of the perforated tape signifying a word space, contacts closed by movement of the platen carriage near the end of its travel to

prepare an electrical circuit including said constant closing means, means for effecting carriage return and line feed operations on closure of said circuit by said contact closing means, and other means operated on closure of said circuit to arrest the tape held until completion of the carriage return.

13. In a page printer operable under control of a tape perforated in accordance with an unequal element code, a series of peckers for co-operation with the perforated tape, a corresponding series of selecting elements controlled by said peckers, means to feed said tape combination by combination controlled by said peckers, means to render inoperative the selecting elements corresponding to the peckers extraneous to each individual combination of perforations in the tape as fed, means responsive to the operation of the peckers corresponding to a combination of tape perforations in excess of a predetermined number for effecting case shift, contact closing means associated with the selecting elements and disposed to be closed thereby in response to the operating condition thereof resulting from the co-operation of the peckers with a portion of the perforated tape representing a word space, means controlled by said contact closing means for effecting case reshift, contacts closed by movement of the platen carriage near the end of its travel to prepare an electrical circuit including said contact closing means, means for effecting carriage return and line feed operations on closure of said circuit by said contact closing means, and means operated on closure of said circuit to arrest the printing functions and tape feed until completion of the carriage return.

14. In a page printer operable under control of a tape perforated in accordance with an unequal element code, a series of peckers, for co-operation with the perforated tape, a corresponding series of selecting elements controlled by said peckers, means to feed said tape combination by combination controlled by said peckers, means to render inoperative the selecting elements corresponding to the peckers extraneous to each individual combination of perforations in the tape as fed, means responsive to the operation of the peckers corresponding to a combination of tape perforations in excess of a predetermined number for effecting case shift, contact closing means associated with the selecting elements and disposed to be closed thereby in response to the operating condition thereof resulting from the co-operation of the peckers with a portion of the perforated tape representing a word space, means responsive to the operation of a particular combination of the selecting elements and also to the closure of said contact closing means for effecting case reshift, contacts closed by movement of the platen carriage near the end of its travel to prepare an electric circuit including said contact closing means, means for effecting carriage return and line feed operations on closure of said circuit by said contact closing means, means responsive to the operation of a particular combination of the selecting elements to effect carriage return and line feed operations and means operated on actuation of said carriage return means to arrest the printing functions and tape feed until completion of the carriage return.

15. In a page printer operable under control of a perforated tape, contacts controlled by the movement of a platen carriage to prepare an electrical circuit, other contacts actuated in response to each word space in the controlling tape to complete the said circuit, means responsive to the closure of said circuit to effect carriage return and line feed operations, magnet means for arresting and for releasing the printing functions, a relay controlling said magnet means energized, enclosure of said circuit to arrest the printing functions, and a controlling circuit for said relay including contacts closed on return of the platen carriage and contacts closed periodically by the printing cam for actuating said relay to release the printing functions.

16. In a page printer operable under control of a perforated tape, series of peckers for co-operation with the perforated tape, a corresponding series of selecting elements controlled by said peckers, means for feeding said tape combination by combination, contact closing means associated with the selecting elements and disposed to be closed thereby in response to the operating conditions thereof resulting from the co-operation of the peckers with a portion of the perforated tape signifying a word space, contacts closed by movement of the platen carriage near the end of its travel to prepare an electrical circuit for closure by said contact closing means, means responsive to the closure of said circuit to effect carriage return and line feed operations, magnet means for arresting and releasing the printing functions, a relay controlling the energization of said magnet means and having one winding energized on closure of said circuit to operate said relay to energize said magnet means to arrest the printing functions and a second winding in circuit with contacts closed on return of the platen carriage to operate said relay to de-energize said magnet means to release the tape feed.

17. In a page printer operable under control of a perforated tape, a series of peckers for co-operation with the perforated tape, a corresponding series of selecting elements controlled by said peckers, means for feeding said tape combination by combination, contact closing means associated with the selecting elements and disposed to be closed thereby in response to the operating condition

thereof resulting from the co-operation of the peckers with a portion of the perforated tape signifying a word space, contacts closed by movement of the platen carriage near the end of its travel to prepare an electrical circuit for closure by said contact closing means, means responsive to the closure of said circuit to effect carriage return and line feed operations, magnet means for arresting and releasing the printing functions, a relay controlling the energization of said magnet means and having one winding energized on closure of said circuit to operate said relay to energize said magnet means to arrest the printing functions and a second winding in circuit with contacts closed on return of the platen carriage to operate said relay to de-energize said magnet means to release the tape feed, and means responsive to the operation of a particular combination of the selecting elements to effect carriage return and line feed operations and to energize the first mentioned winding of said relay.

18. In a page printer operable under control of a perforated tape, series of peckers for co-operation with the perforated tape, a corresponding series of selecting elements controlled by said peckers, means for feeding said tape combination by combination, contact closing means associated with the selecting elements and disposed to be closed thereby in response to the operating condition thereof resulting from the co-operation of the peckers with a portion of the perforated tape signifying a word space, contacts closed by movement of the platen carriage near the end of its travel to prepare an electrical circuit for closure by said contact closing means, means responsive to the closure of said circuit to effect carriage return and line feed operations, magnet means for arresting and releasing the printing functions, a relay controlling the energization of said magnet means and having one winding energized on closure of said circuit to operate said relay to energize said magnet means to arrest the printing functions and a second winding in circuit with contacts closed on return of the platen carriage to operate said relay to de-energize said magnet means to release the tape feed, circuit closing means responsive to the operation of a particular combination of the selecting elements to effect carriage return and line feeding operations and to energize the first mentioned winding of said relay, circuit opening means also controlled by said circuit closing means to open the circuit of the second mentioned winding of the relay irrespective of said carriage return, and switch means for closing the last mentioned circuit irrespective of said circuit opening means.

19. In a page printer operable under control of a perforated tape, a series of peckers for co-operation with the perforated tape, a corresponding series of selecting elements controlled by said peckers, means for feeding said tape combination by combination, magnet means for arresting and releasing the tape feed, a relay controlling said magnet and having two windings for actuating a relay tongue in opposite directions to energize or de-energize said magnet for stopping or starting the tape feed, a second relay having a contact tongue in the circuit of the winding of the first mentioned relay which when energized operates the latter to effect release of the tape feed, said second relay having two windings for actuating its tongue to close or open the associated winding of the first relay, contact closing means responsive to the operation of a particular combination of the selecting elements to energize the winding of the second relay to move its tongue into open circuit position and to effect carriage return and line feed operations, and switch means for energizing the other winding of said second relay.

20. In a page printer operable under control of a tape perforated in accordance with an unequal element code, a series of peckers for co-operation with the perforated tape, a corresponding series of selecting elements controlled by said peckers, means to feed said tape combination by combination controlled by said peckers, means to render inoperative the selecting elements corresponding to the peckers extraneous to each individual combination of perforations in the tape as fed, means responsive to the operation of the peckers corresponding to a combination of tape perforations in excess of a predetermined number for effecting case shift, contact closing means associated with the selecting elements and disposed to be closed thereby in response to the operating condition thereof resulting from the co-operation of the peckers with a portion of the tape representing a word space, means controlled by said contact closing means for effecting case reshift, contacts closed by movement of the platen carriage near the end of its travel to prepare an electric circuit including said contact closing means, means for effecting carriage return and line feed operations on closure of said contact closing means, magnet means for arresting and releasing the tape feed, a relay controlling said magnet and having one winding in the circuit aforementioned for actuating the relay tongue to operate said magnet to arrest the printing functions, and a second winding for actuating said relay tongue to operate said magnet to release the printing functions, a second relay in circuit with said second winding and having two windings for actuating its tongue to open or close said second winding, contact closing means responsive to the operation of a particular combination of the selecting elements to energize the winding of the second relay

to move its contact tongue into open circuit position and to energize the first mentioned winding of the first relay and effect carriage return and line feed operations, and switch means for energizing the winding of said second relay to move its contact tongue into circuit closing position.

In witness whereof I hereunto subscribe my name this twenty-ninth day of September, 1930.

RONALD GEORGE GRIFFITH.