Dec. 20, 1960 G. E. PRINCE 2,965,716

TELEGRAPH SWITCHING APPARATUS

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FIG. 1

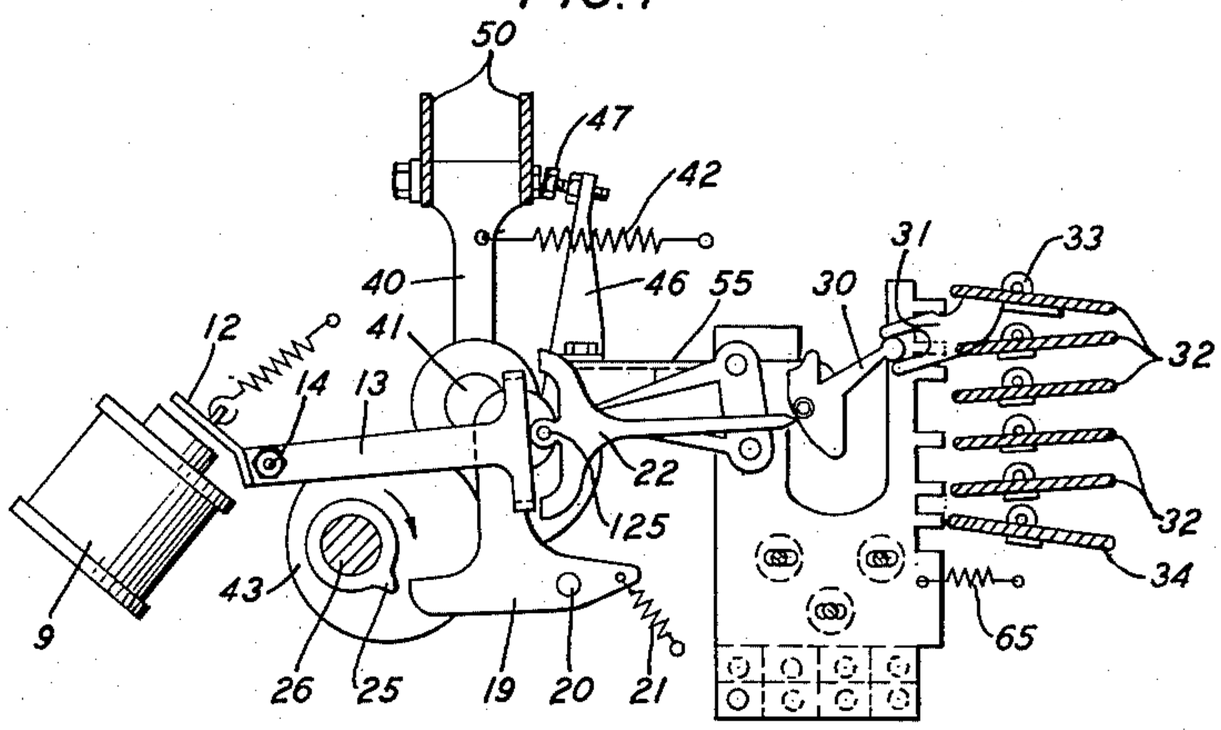

FIG. 2

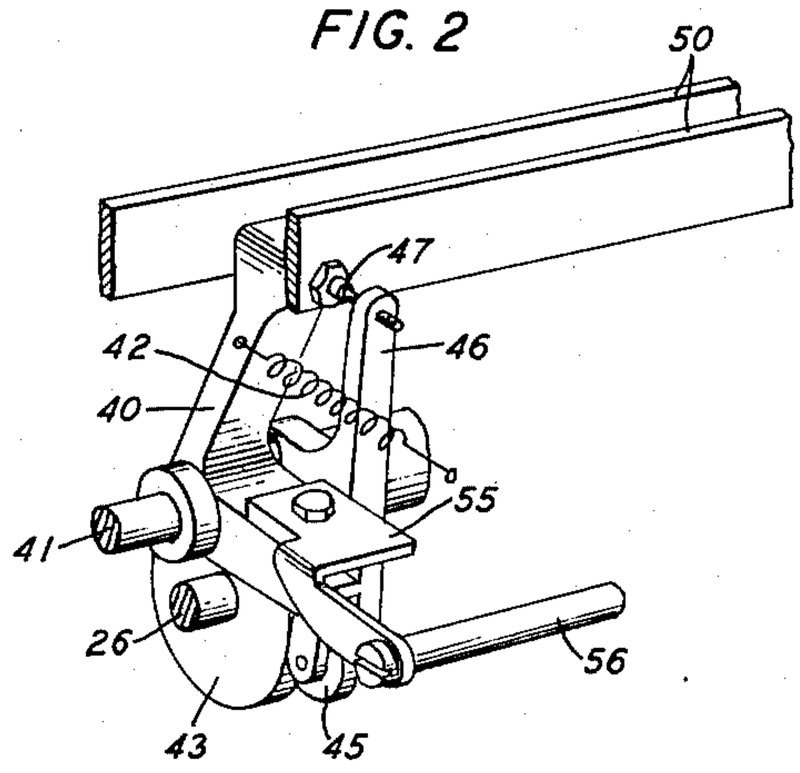

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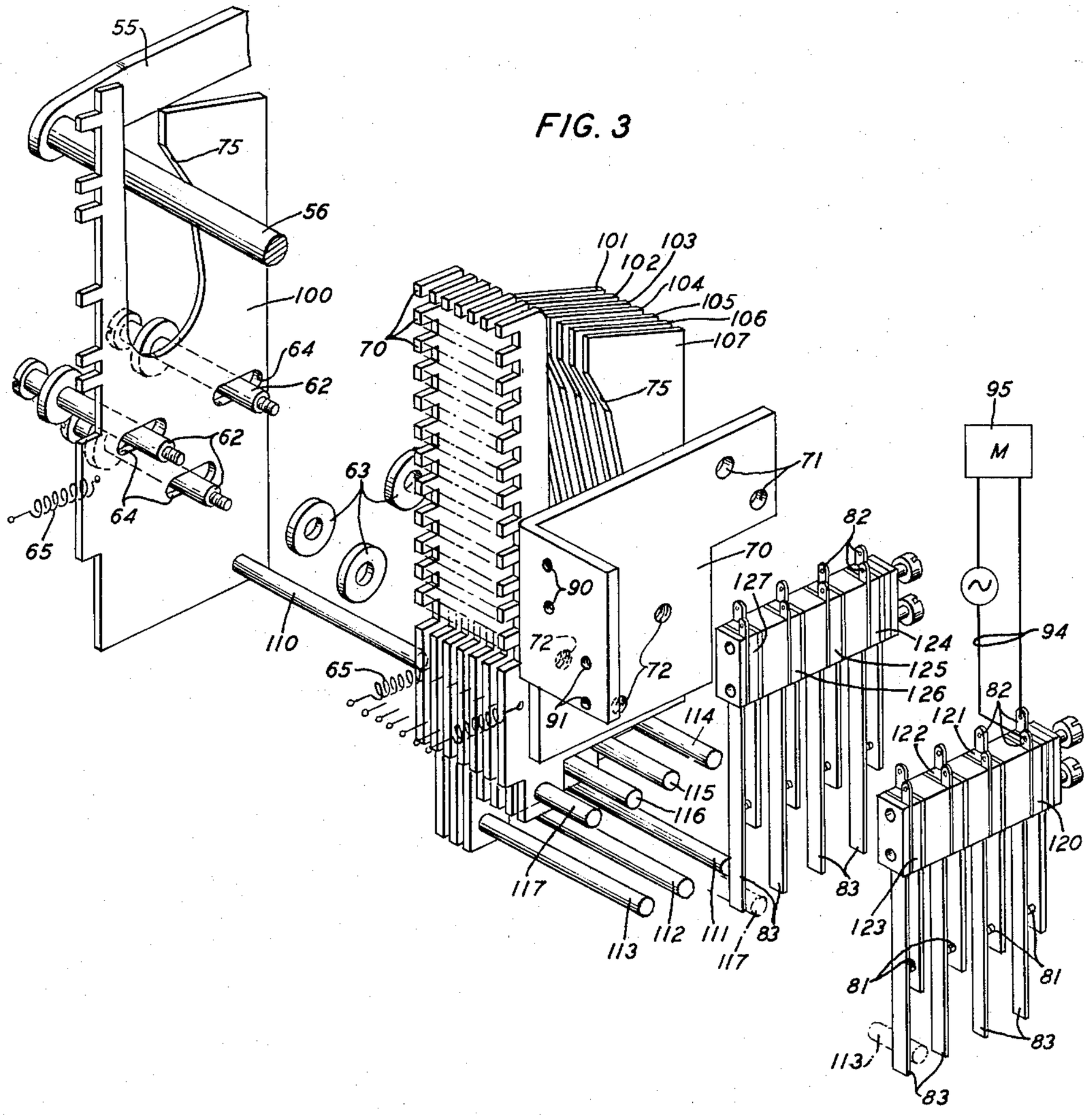
FIG. 3



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TELEGRAPH SWITCHING APPARATUS

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4 Claims. (Cl. 178—33)

This invention relates to printing telegraph receivers and particularly to signal responsive mechanisms in telegraph recorders.

A broad object of this invention is to provide a simple and reliable mechanism for telegraph receivers which is selectively responsive to received functional code signal combinations.

A further object of this invention is to provide a unitary and compact arrangement of a selective function mechanism assembly mounted at one location in a telegraph receiver which substantially increases the number of selective functions which may be performed in a given space in the receiver.

Another object of this invention is to provide a selective function mechanism assembly for a telegraph recorder, which mechanism will provide more functional operations than heretofore obtainable while reducing the space required by the selective function apparatus.

In a preferred embodiment, the telegraph receiver in which the signal responsive mechanism may be incorporated is of the type disclosed in Patent 1,904,164, granted April 18, 1933, to S. Morton et al. and the disclosure of Patent 1,904,164 is incorporated herein by reference as a part of this specification. In that patent there is disclosed a telegraph printer provided with a set of permutation code bars for selecting printing elements. These bars are controlled by a set of signal responsive selector vanes set in acordance with received code signal combinations. There is also provided a plurality of function plates to control the various functions of the telegraph receiver, such as spacing between words, line feed, carriage return, etc. Each function plate has an edge coded with an individual distinctive combination of notches in accordance with a particular assigned functional code signal combination. The plates are rotatably urged, in a limited arc, to present their coded edges to the selector vanes. When the encoded edge of a particular function plate is in proper registry with the selective encoded setting of the vanes identifying the individual function plates, the plate is permitted to rotate an additional distance and thereby actuates electrical contacts which control an individual circuit to perform a teletypewriter adjusting function, or stunt function as it is sometimes called, or a switching function, such as a called station identifying or other function.

In accordance with the present invention, all function plates are compactly mounted within the confines of a small space in the telegraph receiver and are secured on a common fixed support. A plurality of normally closed electrical contact sets are provided, one set for each individual function plate. Each contact set is disposed in a manner to permit operable engagement with an individual bar, integral with and projecting from its respective function plate. When a function plate registers with the setting of the selector vanes, the individual bar projecting from a plate engages an element of its corresponding contact set and operates the associated contact pair. In the present embodiment, the operation of a contact pair

opens the contacts of the pair and, by utilizing electrical circuits as controls for appropriate functional components, a selected circuit may be broken to enable or disable the operation of an associated functional component. It is, of course, to be understood that the contacts may be arranged in any desired manner and each set may comprise any desired combination.

Features of the present invention include:

Mounting the function plates on the common fixed support so that each is capable of independent forward and backward motion and providing intervening spacers to effectively isolate adjoining plates from frictional engagement, to afford a compact unitary laminated function plate assembly structure which includes all plates;

Mounting the electrical contact pairs on the common fixed support and providing an extension bar integral with and individual to each function plate, which bar extends at right angles from its individual plate to a position adjacent its respective contact set; and

Separating the electrical contact sets into a plurality of groups with the units of each plurality arranged in a horizontal row, each row being offset vertically from the other and disposing the extension bars correspondingly.

It is particularly pointed out that one of the important aspects of the present invention is the arrangement of the stratified function plates so that the individual contact operating bar of each may extend laterally to a position adjacent its respective contact set.

A more complete understanding of the invention will be had from the following description considered in conjunction with the accompanying drawings in which:

Fig. 1 is a vertical sectional view of the receiving and selecting portion of the telegraph receiver into which the present invention has been incorporated;

Fig. 2 is a schematic perspective view of part of the control mechanism for the function mechanism assembly; and

Fig. 3 is an exploded schematic perspective view of the function mechanism assembly.

Referring now to the drawings and particularly to Fig. 1, the reference numeral **9** indicates a selector magnet which is responsive to received telegraph code signal combinations. The magnet has an armature **12** fixed to lever **13** which is pivotally supported at **14**. The free end of lever **13**, which is T-shaped, cooperates with the rear end of a plurality of sword levers **22**, one of which is shown in Fig. 1. As is fully disclosed in the Morton et al, patent, the sword levers **22** are pivotally connected, as at **125**, to associated bell cranks **19**. Bell cranks **19**, pivoted at **20**, are successively rocked in a counterclockwise direction, once each receiving cycle, by cams **25**, one of which is shown in Fig. 1. Cams **25** are frictionally mounted on a power-driven shaft **26**.

When bell cranks **19** are rocked in a counterclockwise direction, sword levers **22** secured thereto are shifted to the left, as seen in Fig. 1, and are rocked into a counterclockwise or clockwise position, depending upon the position of armature lever **13** as determined by selector magnet **9**. When sword levers **22** are shifted to the right by bell cranks **19** as the bell cranks are restored by their individual springs **21**, the sword levers engage and rock associated T levers **30** into a clockwise or counterclockwise position, depending upon the relative position into which the sword levers **22** have been rocked. The T levers **30** are connected by means of disc and slot connections **31** to individual selector vanes **32** that are pivotally mounted as at **33**. Accordingly, selector vanes **32** are rocked into a clockwise or counterclockwise position in accordance with the relative position into which T levers **30** have been rocked.

In addition to the five selector vanes **32**, there is a sixth vane **34**. This vane is not controlled by individually

received signal impulses as are the vanes **32**, but is controlled incident to the movement of the receiving printer into the shift and unshift positions, as disclosed in the above-mentioned Morton et al. patent. When the receiving printer is moved into the shift, or figures, condition, the sixth vane **34** is locked to its counterclockwise position as is shown in Fig. 1 and it remains in this position until the receiving printer is restored to the unshift, or letters, condition.

A printing cam **43** carried by shaft **26** is engaged by a roller **45**, best seen in Fig. 2, carried by a lever **46** which is pivotally supported by rock shaft **41**. The upper end of lever **46** supports abutment screw **47** which engages the right-hand one of operating arm blades **50** as viewed in Fig. 1. Operating arm blades **50** support the printing bail, not shown, and in turn are supported by printing bail operating arm **40**.

Operating arm **40** is mounted on rock shaft **41** and cam **43** operates through lever **46** to force operating arm blades **50** and operating arm **40** into a counterclockwise position. As cam **43** is rotated by shaft **26**, a rapid drop-off of the cam surface, once for each cycle of shaft **26**, permits spring **42** to rock printing bail operating arm **40** sharply in a clockwise direction to effect the printing operation. For the remainder of the cycle of shaft **26**, cam **43** restores operating arm **40** to the counterclockwise position. Integral with arm **40** is bracket **55** which carries function selection control rod **56**. Function selection control rod **56**, shown in Figs. 2 and 3, is moved upwardly as operating arm **40** rotates in a counterclockwise direction and downwardly as operating arm **40** rocks in a clockwise direction during the printing operation.

The function selection control rod **56** extends through an opening in the upper portion of each function plate **100** through **107** as seen in Fig. 3. Function plates **100** through **107** are provided with three laterally elongated slots **64** to mount the function plates on three support rods **62** and to permit lateral displacement of the function plates from front to rear. The three support rods **62** and the formed support plate **70** comprise a unitary rigid structure on which the function plates **101** through **107** and the contact group assemblies are mounted. Also mounted on support rods **62** are intervening spacers **63** which separate the function plates to permit independent sliding motion of the closely spaced plates. Slots **64** in function plates **100** through **107** thus permit front and rear sliding motion of the function plates, allowing them to be presented to selector vanes **32** and **34**, and to register with the selector vanes as hereinafter described. The forward motion of the function plates is normally prevented by function selection control rod **56** when it is in an upward position through engagement with cammed surface **75**. When function selection control rod **56** is moved to its downward position, as previously described, it disengages from surface **75** of each of function plates **100** through **107** to permit springs **65** to draw all of the associated function plates forward for a limited distance to present the forward edge of each of the function plates to selector vanes **32** and **34** as viewed in Fig. 1. To anticipiate, when function selection control rod **56** is returned to its upward position, it cooperates with camming surface **75** of function plates **100** through **107** to withdraw the function plates from engagement with selector vanes **32** and **34** and slide the function plates back to their rearward positions.

The front edges of the function plates which are presented to selector vanes **32** and **34** are provided with a plurality of rectangular projections **70**. These projections are removable, that is to say, they may be readily broken off to provide notched depressions for registry with the selector vanes in their clockwise or counterclockwise position in accordance with an individual permutation code combination to which each function plate is

to be responsive. When the selected function plate, upon being permitted to slide forward a limited distance by disengagement from function selector control rod **56** and the action of its spring **65**, finds no selector vane blocking its projections, it will slide further forward than the non-selected function plates and, in its extreme forward position, will perform or initiate its assigned function. As viewed in Fig. 3, function plate **100** has been coded to be responsive to the FIGURES signal when the printer is in the shift or figures condition. The function levers can obviously be coded to register with any other selective positioning of the selector vanes by removing appropriate break-off projections.

Function lever support rods **62** are secured to formed plate **70** at **72**. Support plate **70** may be bolted to the printer frame throgh apertures such as **71**. Also mounted on plate **70** are electrical contact sets or pairs **120** through **127**. The electrical contact pairs **120** through **127** are provided with contact springs **83**, electrical contacts **81**, which may be make, break, transfer, continuity or other contacts, and electrical circuit connectors **82**. Electrical contact pairs **124** through **127** are compactly aligned immediately adjacent and parallel to the function plates and collectively mounted on common support plate **70** at **90**. Electrical contact pairs **120** through **123** are compactly aligned adjacent and parallel to the function plates on the common support in a similar manner to electrical contact pairs **124** through **127** with the exception that electrical contact pairs **120** through **123** are collectively mounted on support plate **70** at **91** offsetting electrical contact pairs **120** through **123** below electrical contact pairs **124** through **127** as viewed in Fig. 3. Additional aligned electrical contact pairs can, of course, be readily added, if additional electrical contact pairs are required, by collectively mounting the additional sets on support plate **70** in a similar manner to electrical contact pairs **120** through **127** by offsetting the adidtional sets below the existing electrical contact pairs.

Integral with function plates **100** through **107** and extending from each at a right angle thereto is an individual contact operating bar or extension pin **110** through **117**, each of which extends laterally from its particular function plate to its contact spring, such as spring **83** of associated electrical contact pairs **120** through **127**. As shown in Fig. 3, extension pins **110** through **113**, connected to function plates **100** through **103**, are offset below extension pins **114** through **117** and extend to the contact springs of the lower group of electrical contact pairs **120** through **123** and the upper group of extension pins **114** through **117** extend to the contact springs of the upper group of electrical contact pairs **124** through **127**. Where additional function plates are required, they may be mounted on support rods **62** to the left of function plate **100**, as viewed in Fig. 3, and their associated extension pins can be readily disposed below the existing extension pins described above in the preferred embodiment.

When a function plate is released by function selection control rod **56** to slide forward under the urging of spring **65** and engages selector vanes **32** and **34**, and its depressed coded edge registers with the selective positioning of selector vanes **32** and **34**, permitting the function plate to slide further forward, the extension pin extending from the function plate operably engages the contact spring of its asociated electrical contact pair to open the electrical contacts of the contact pair.

As an illustration of a function which may be performed by a function bar and its associated elements, it is sometimes desirable to automatically stop the motor of the telegraph printer in response to a receiver upper case FIGURES signal code combination, i.e., a FIGURES signal code combination received while the printer is in the shift condition. When the selector vanes are selectively positioned by a received upper case FIGURES signal code combination, function plate **100**, upon being urged forward, will register with the selective positioning of the

selector vanes and therefore slide forward more than the other function plates as heretofore described. Extension pin **110** of function plate **100** thereupon operably engages contact spring **83** of electrical contact pair **120** thereby opening electrical contacts **81** of electrical contact set **120**. To perform the function of stopping printer motor **95**, seen in Fig. 3, motor supply circuit **94** of printer motor **95** may be connected to electrical circuit connectors **82** of electrical contact pair **120** completing the motor supply circuit via normally closed electrical contacts **81**. When contact spring **83** of electrical contact pair **120** is operably engaged by extension pin **110** thereby opening electrical contacts **81** of electrical contact pair **120** in response to a received upper case FIGURES signal code combination, motor supply circuit **94** is broken stopping motor **95**.

The employment of the upper case FIGURES code combination to perform the function of stopping the motor circuit is by way of illustration only and is not to be interpreted as limiting the invention to any particular telegraph receiver function or any function code combination or combinations thereof. It will be apparent to those skilled in the art that the specific embodiment described herein is capable of modification and rearrangement without departing from the spirit of the invention and within the scope of the appended claims.

Attention is particularly directed to the compactness of the combined function plate and contact assembly as best shown in Fig. 3. In this figure seven plates **101** through **107** are shown arranged in what appears to be and is in effect essentially a substantially solid pile. The functional plates are in fact relatively thin laminations and the spacers **63** are also thin. The contact actuating elements are preferably circular in section of small diameter, reed-like in relation to the other elements. The two contact assemblies, also, are small and compact and neatly disposable on the supporting structure. The arrangements of the present invention contrasts markedly with presently known arrangements such as are exemplified by the mechanical structures described in the Morton et al. Patent 1,904,164.

What is claimed is:

1. In a printing teletypewriter, a plurality of selector vanes, selector means for selectively positioning said selector vanes, a fixed support, a plurality of parallel flat plates slidably mounted on said fixed support, each of said plates including an extended flat surface which includes the greatest dimensions of said plate and an edge thereof for registry with a selective positioning of said selector vanes, urging means associated with said plates for slidably urging the edges of said plates into engagement with said selector vanes, a plurality of electrical contact pairs mounted on said fixed support, and a lateral extension projecting from said flat surface of each of said plates to each of said contact pairs to effect operable engagement with one of said contact pairs when the edge of the associated plate, upon being urged into engagement with said selector vanes, registers with the selective positioning of said selector vanes.

2. In a printing teletypewriter, a plurality of selector vanes, selector means for selectively positioning said selector vanes, a fixed support, a plurality of parallel flat plates slidably mounted on said fixed support, each of said plates including an extended flat surface which includes the greatest dimensions of said plate and an edge thereof for registry with a selective positioning of said selector vanes, urging means associated with said plates for slidably urging the edges of said plates into engagement with said selector vanes, a plurality of vertically disposed groups of electrical contact pairs mounted on said fixed support and aligned parallel and adjacent to said plates and lateral extensions projecting from said flat surfaces of said plates to said contact pairs to effect operable engagement with one of said contact pairs when the edge of the associated plate, upon being urged into engagement with said selector vanes, registers with the selective positioning of said selector vanes.

3. In a printing teletypewriter, a plurality of selector vanes, selector means for selectively positioning said selector vanes, a fixed support, a plurality of parallel flat plates slidably mounted on said fixed support, a plurality of intervening spacers mounted on said fixed support, each of said plates including an extended flat surface which includes the greatest dimension of said plate and a plurality of break-off projections along an edge thereof for coding same, urging means for slidably urging the said edge of each plate into engagement with said selector vanes, a plurality of vertically disposed groups of electrical contact pairs mounted on said fixed support and aligned parallel and adjacent to said plates and a plurality of vertically disposed groups of lateral extension pins projecting from said flat surfaces of said plates to said contact pairs to effect operable engagement with one of said contact pairs when the coded edge of the associated plate, upon being urged into engagement with said selector vanes, registers with the selective positioning of said selector vanes.

4. In a permutation code signal telegraph receiver, a laminated assembly of functional code plates, comprising a closely compacted plurality of flat plates having extended flat surfaces in mutually coextensive and parallel relationship, means for selectively displacing said plates laterally in response to received code signal combinations, an individual contact operating bar integral to each plate and disposed at right angles from said flat surface of its respective plate, and individual contacts actuable by each bar responsive to said selective displacement.

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1,904,164	Morton et al.	Apr. 18, 1933
2,437,790	Roth	Mar. 16, 1948