March 3, 1942. J. A. SPENCER 2,274,911

DIRECT KEYBOARD TRANSMITTER

Filed May 31, 1941 2 Sheets-Sheet 1

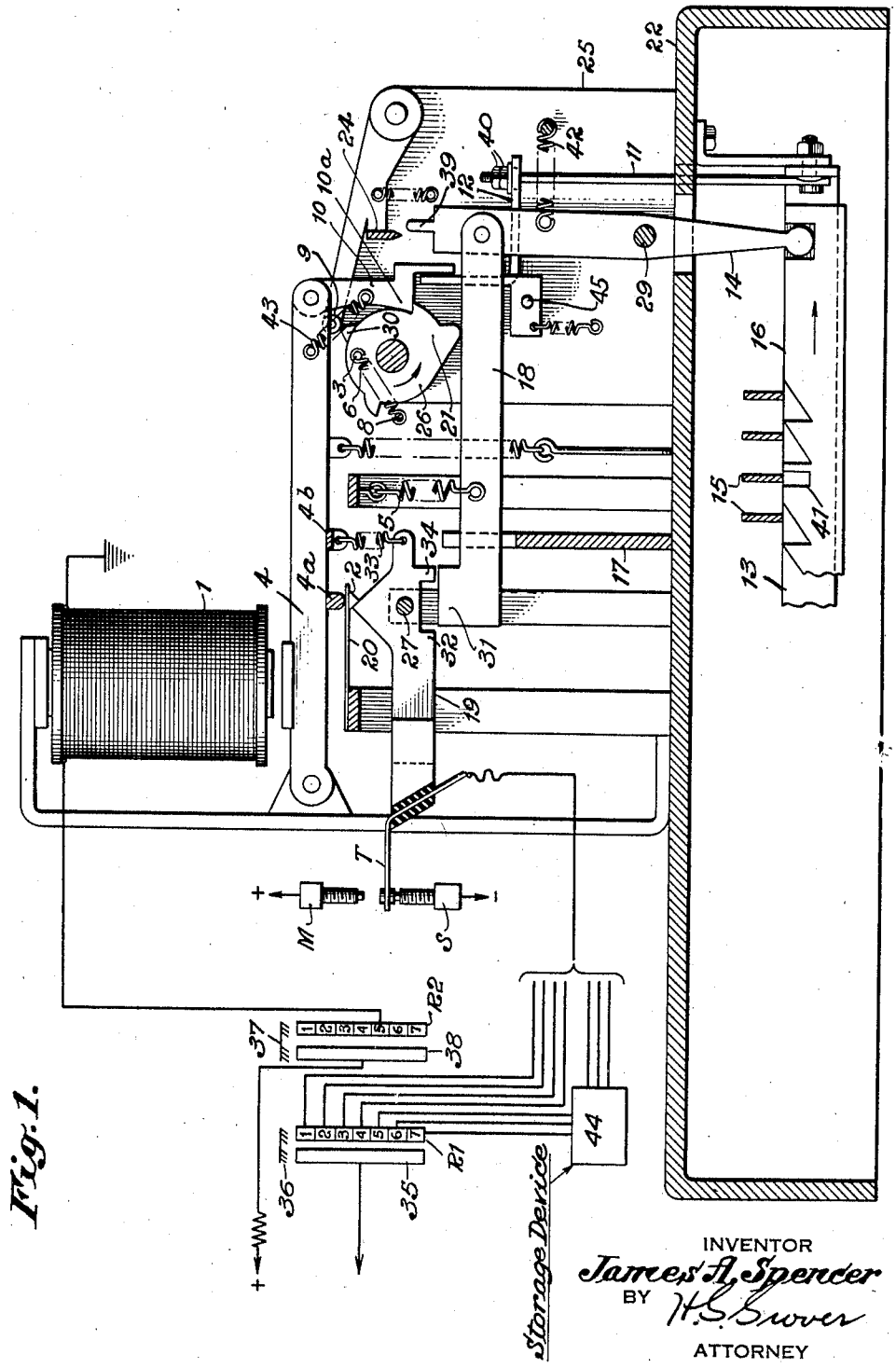


Fig. 1.

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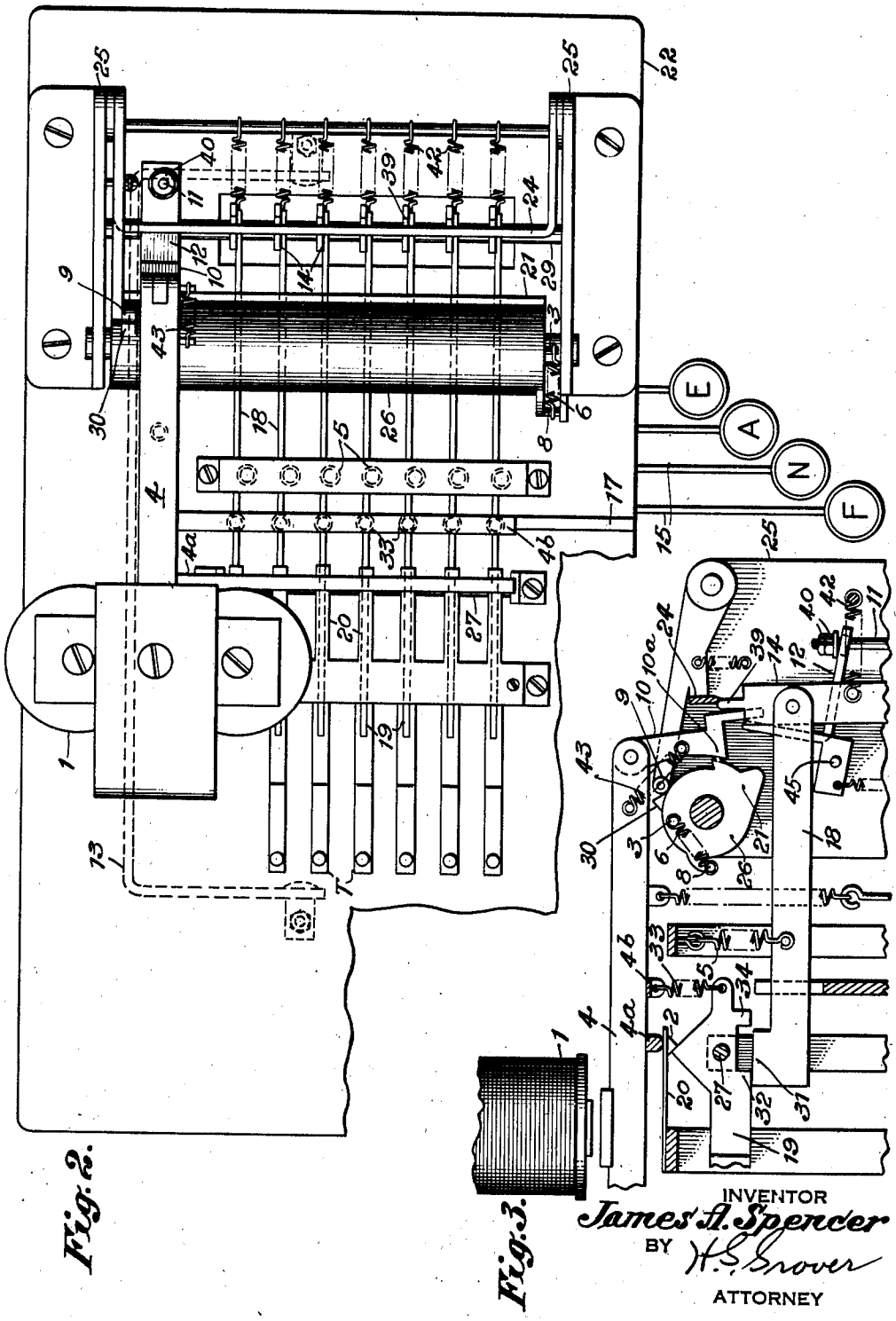


Fig. 2.

Fig. 3.

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Patented Mar. 3, 1942

2,274,911

UNITED STATES PATENT OFFICE

2,274,911

DIRECT KEYBOARD TRANSMITTER

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Application May 31, 1941, Serial No. 395,911

10 Claims. (Cl. 178—79)

This invention relates to keyboard transmitters for telegraph systems and more particularly to a transmitter of the type which is adapted to transmit synchronized signals.

In ordinary start-stop keyboard transmitters no continuous synchronization is required between the transmitting and receiving stations since the cyclic transmission of each code signal as initiated at the transmitter is closely enough followed by the speed of operation of the receiving instrumentality. The keyboard transmitter which constitutes the subject matter of the instant invention, however, is one which transmits the code signals for each character in a predetermined time relation to the operation of a time division simplex or multiplex distributor. Such a distributor may be run continuously and a receiving distributor can be maintained in synchronism wtih the transmitting distributor by well known means.

The preferred embodiment of my invention as herein shown and described is adapted for operation in conjunction with a signalling code composed of combinations of marking and spacing impulses the number of which is uniform for each character. As illustrated, the arrangement transmits code signals of the 7-unit type, although the invention itself may be adapted for use with code signals of five or more units.

The principal object of my invention is to provide a direct keyboard transmitter suitable for operation in conjunction with synchronously driven distributors. It is a further object, however, to provide a suitable means for mechanically starting code selections without unduly limiting the keyboard action.

Still another object of my invention is to provide a keyboard-actuated code signalling system which operates by depression of a key to first store the elements of a code signal, then to actuate a keying device in properly timed relation to the operation of a synchronously driven distributor.

Other objects and advantages of my invention will be made clear in the description to follow.

In describing my invention reference will be made to the accompanying drawings, in which

Figure 1 shows an elevation view of the component parts of a keyboard transmitter essential to the carrying out of the invention;

Fig. 2 shows a plan view of a portion of the same keyboard transmitter; and

Fig. 3 is a fragmentary view of certain structure which includes a magnetically operated pawl, disengaged from its cam.

For the sake of simplicity in describing the mechanical structure of a preferred embodiment, the complete assembly of parts to be found in a typical keyboard instrument has been shown in the drawings in a more or less schematic manner.

The key levers 15 are shown in cross-section in Fig. 1 and in plan view in Fig. 2. These levers are pivotally mounted inside a hollow base 22, the pivot rod common to all of the key levers being positioned in the rear of the base, but not shown in the drawings.

Underlying the key levers are seven code bars 16 and an actuating bar 13. The code bars 16 are selectively and longitudinally shifted in response to the depression of any key and different code bars are selected for actuation in accordance with the saw-tooth configuration of each one thereof in relation to the opposing key levers 15. Each key lever, therefore, selects one or more code bars 16 in accordance with the marking elements of the code signal to be transmitted. The movement of the selected code bars is in the direction of the arrow, that is, to the right as viewed from the front of the machine (Fig. 1).

The downward movement of the key levers 15 also depresses an actuating bar 13 which is mechanically connected to a vertical link rod 11. The upper portion of the rod 11 extends through an eyelet in the horizontal arm of an elbow lever 12 and carries two nuts 40, one of which bears on said arm and pulls it downwardly when any key is depressed. The elbow lever 12 is pivoted at 45.

The upstanding arm of the elbow lever 12 is arranged to withdraw a pawl 10 from engagement with a cam member 21. Mounted on the same shaft with the cam 21 are other cams which cooperate with different parts of the mechanism presently to be described. The entire assembly of the cams is urged in a counterclockwise direction by means of a spring 6 attached to pins 3 and 8.

The cam assembly 26 is journaled in the frame 25, the latter being fastened to the base 22.

Each of the code bars 16 is associated with a lever 14 pivoted on bearing 29. The lever 14 has linked thereto a horizontal lever 18, the left end of which is suitably held in position by means of a comb 17.

The left ends of the levers 18 are provided with an upstanding projection 31 which is so positioned beneath the right and left shoulders 32

and 34 of associated levers 19 as to permit of setting the latter members suitably for transmitting the necessary code elements of the signals. Thus, when a key is depressed, if the number 1 element of the code signal is to be a marking element, then a saw-tooth in code bar 16 for number 1 position in the cod seignal will be disposed underneath the selecting key bar 15. Shifting of a code bar 16 to the right will draw lever 18 to the left. In the shifted position projection 31 will come opposite the shoulder 32 on the lever 19. Almost simultaneously the actuating bar 13 will cause the connecting link 11 to be drawn down for releasing the pawl 10 so that spring 6 will turn the cam assembly 26 sufficiently to permit the cam member 21 to release a group of horizontal levers 18 for actuation by the springs 5. Those of the levers 18 which have been drawn to the left will actuate the levers 19 to tilt them in a clockwise direction on the pivot 27. Those of the levers 18 which have not been drawn to the left will, when lifted by the springs 5, engage the upstanding projection 31 with the right hand shoulders 34 on the levers 19 and so tilt them in a counter-clockwise direction.

Each of the levers 19 constitutes a mounting for a contact spring T which is movable between two stationary contacts M and S. The stationary contacts M are preferably connected to the positive terminal of a direct current source, while the stationary contacts S are likewise connected to the negative terminal of such a source. The contacts T are connected respectively to different code segments 1 to 7 inclusive of the signalling distributor ring R1. These code segments are bridged across a collector ring 35 by brush 36. The ring 35 may be connected to a suitable keying device for a radio transmitter. The keying device may be adapted for simplex or multiplex transmission of synchronized signals.

The code bars 16 have slanting walled notches beneath the key bars which are to move them to a marking selection.

Any code bar 16 which is not to be shifted by a key bar 15 (because the code element is to be a space) must have a square notch 41 beneath the key bar under consideration. The depression of the key bar into a square notch will simply lock that code bar in place for the purpose of permitting the transmission of a space signal.

The sequence of steps necessary to set the contacts T against their spacing contacts S or marking contacts M is initiated by the energization of magnet 1 when the brush 37 sweeps over contact segment 5 in ring R2 for bridging the same across the collector ring 38, the latter being connected to one terminal of a local direct current source. The other terminal of this source is grounded.

Prior to the energization of magnet 1, its armature 4 carrying a downwardly projecting bar 4a exerts sufficient pressure upon a series of detents 2 mounted on springs 20 to prevent the movement of the contact spring carriers 19. Hence, even though a key bar 15 is depressed at a certain instant, its effect will not be transmitted to the contacts T until after the next energization of the magnet 1. Those of the contacts T which are to be moved to the marking position will be shifted by the engagement of the projection 31 on the horizontal member 18 against the shoulder 32 on lever 19. Each lever 19 is connected by an individual spring 33 to a cross-bar 4b mounted transversely of the armature lever 4. These springs 33 are placed under tension only when the armature 4 is pulled up. They are weaker than the springs 5 so as to be stretched slightly when a horizontal bar 18 is pulled up by its spring 5 for the purpose of shifting the contact T to its marking contact. If the horizontal bar 18 has not been shifted to the left, as when the code element it represents is to be a spacing element, then the shoulder 34 on the lever 19 will be engaged by the projection 31 and the two springs 33 and 5 will pull in the same direction when magnet 1 is energized. Therefore, the contact T will be shifted for the code signal element under consideration to the spacing contact S, provided it was previously held against the marking contact in accordance with the code element of a previous signal.

Repeated energizations of the magnet 1 in the absence of key depressions enable the springs 33 to be utilized for restoring contacts T to the spacing contacts S so that any given code signal which has been set up by a key bar will not be repeated.

It will be seen from the above description that mechanism is provided which performs a storage function during the time necessary to transfer the effects of key depression by the selective setting of code bars 16 and until the release of the levers 19 when pressure upon the detents 2 is relieved. This relief takes place upon energization of the magnet 1 and the lifting of its armature 4. The setting of the levers 19 at that moment is held until the next energization of magnet 1.

During the pull-up and release of the armature 4 the brushes travel over segments 5, 6 and 7. It is necessary, therefore, to store the effects of marking and spacing code element selections for the 5th, 6th and 7th positions to be utilized in the complete transmission of the signals subsequently. This storage is effected by electromagnetic means as shown in my copending application Serial No. 357,109, filed September 17, 1940. Reference is here made to Fig. 1 of that application for showing how a part of the code signal may be stored and subsequently utilized. Such a storage device is herein shown as unit 44.

Another function performed by the energization of magnet 1 is to restore to normal the cam assembly 26. This operation is performed by causing the shoulder 10a on pawl 10 to first slip over the upper end of the cam projection 21 when armature 4 is lifted. Then, upon de-energization of magnet 1, the pawl 10 presses downwardly on the projection 21, being urged toward the pivot center of the cam assembly 26 by means of a spring 43. The cam assembly 26 then rotates clockwise against the tension of spring 6 and is thereafter locked in normal position until again released by either a lateral or a vertical withdrawal of the pawl 10. With this restoring movement a projection 30 rides under a roller 9 on the end of the locking lever 24 so as to free the levers 14 for restoration to their normal positions in case they have been previously set to transmit the marking elements of a signal. The projections 39 at the top of each lever are those which enable these levers to be locked in one position or the other when the locking lever 24 is lowered along the right slope of cam projection 30. Thus, when cam shaft 26 has been released by pawl 10 and tilted counter-clockwise, then the roller 9 drops down on the right hand face of the projection 30.

The utilization of the code signals as initiated

by the passage of the brush 36 over the segments 1 to 7 inclusive in distributor ring R1 forms no part of the instant invention, but it may be well understood by those skilled in the art. However, a preferred method of keying is that which is disclosed in the aforesaid copending application.

Summarizing the operation of my keyboard transmitter as above described, it will be noted that, when a key lever 15 is depressed, certain of code bars 16 move to the right. Levers 14 then rotate about pivot 29. Levers 18, which are pivoted to the upper end of levers 14, are moved horizontally so that their projections 31 are in such position that, when the springs 5 are allowed to contact, the left hand shoulders 32 of levers 19 will be lifted. Lever 12 operates near the end of the travel of key lever 15 and releases pawl 10. Cam assembly 26 then rotates in the direction of the arrow until arrested by stop 8. Levers 18 are then freed to move upward under the influence of springs 5. Locking bar 24 holds levers 14 to their selected positions until cam assembly 26 is returned to its original position through the operation of armature 4. As the brush 37 contacts segment 5 of distributor rings R2, magnet 1 is momentarily energized. As armature 4 is attracted to the magnet, detent 20 is freed and lever 19 is permitted to rotate about its bearing 27 due to the force exerted by spring 5. The tension on spring 5 will overcome that on spring 33 if they happen to be opposed. When the armature 4 is subsequently released pawl 10 rotates cam 26 in a clockwise direction, thus restoring the levers 18 to their lowered positions under tension of the springs 5.

The locking lever 24 is now caused to free the levers 14 so that they can be drawn back to normal position by their springs 42. This last operation restores the code bars 16 to their normal positions, thus preparing the same for a subsequent key selection.

Although my invention has been described with respect to a specific embodiment thereof, it will be understood by those skilled in the art that modifications of the structure may be made without departing from the spirit and scope of the invention itself. The invention is, therefore, of such scope as is permitted by the claims.

I claim:

1. In a keyboard transmitter, a group of code-element contactors settable to marking and spacing positions in accordance with the units of a code signal, a key-lever-and-code-bar assembly having mechanism linked therewith for selecting the appropriate position of each of said contactors, a cam assembly operable in response to a key depression and arranged to release said selecting mechanism from a normally locked-down position, spring actuated means for setting all of said contactors simultaneously after release of said mechanism, and electro-magnetic means cyclically operative for causing said release and for subsequently restoring said selecting mechanism to its normally locked-down position after each key depression.

2. The combination according to claim 1 and including means under control of said cam assembly for locking up the keys of the keyboard until the code combination corresponding to a depressed key has been stored for subsequent transmission.

3. In a keyboard transmitter, a group of key-actuated code selector bars, each bar being individual to one of the elements of a code combination, storage mechanism under mechanical control of said code selector bars, a cam assembly operative in response to the depression of a character key for causing the set-up of said code selector bars to be transferred to said storage mechanism, a group of keying contacts settable by the storage mechanism against marking or spacing stops, a cyclically operative distributor for collecting impulses successively in accordance with the setting of said keying contacts, and electro-magnetic means operative at a predetermined moment of the distributor cycle for terminating the period of storage of each code combination.

4. The combination according to claim 3 and including locking means operative during the period of storage of each code combination whereby said code selector bars are locked in their selected positions, thus preventing the playing of a second key of the keyboard during each storage period.

5. The combination according to claim 3 and including a pawl pivoted on an armature of said electro-magnetic means, said pawl being engageable with an abutment on said cam assembly upon energization of the electro-magnetic means, said pawl being effective to restore to normal position said cam assembly upon de-energization of said electro-magnetic means, trigger means under control of any selected key in the keyboard for disengaging said pawl from said abutment on the cam assembly, and resilient means for rotating said cam assembly when released by said pawl.

6. In a code signal keyer of the start-stop type, a keyboard having character keys, code bars selectable by the keys, a toggle lever and tilting means therefor individual to each code bar, each toggle lever bearing a contact which coacts with two stationary contacts for setting up a marking or spacing selection of a code element, an actuating bale effective upon depression of any key to prepare said tilting means for operation, a locking detent for each toggle lever, electro-magnetic means cyclically operative to release said detents, thereby to permit the operation of said tilting means in accordance with the selective setting of said code bars, and means operative upon de-energization of said electro-magnetic means for resetting said tilting means and said code bars.

7. A device according to claim 6 and including a cam assembly which carries a cam member engageable with units of said tilting means individual to each toggle lever, said cam member being effective in a non-operated position to restrain the tilting means from operation, and upon release of the cam assembly by said actuating bale said member is caused to free the tilting means for subsequent setting of the toggle levers when the latter are released by their detents.

8. A device according to claim 6 and including a synchronously operable transmitting distributor having segments appropriate to each code element of a uniform length character signal, and connections from each of the contacts carried by the toggle levers to respective ones of said segments.

9. In a code signal keyer of the start-stop type, a continuously driven distributor having segments for each element of a uniform length character signal, a set of movable contacts individually connected to said segments, stationary contacts opposing said movable contacts and fed

with signaling potentials, a key board having character keys and code bars selectively actuated thereby, means for setting said movable contacts in accordance with the code bar selection made by any one of the keys, and means operative to release said contact setting means for operation only at an instant corresponding to a predetermined phase of the distributor's operating cycle.

10. A device according to claim 9 and having means for locking said movable contacts in their set positions for one full cycle of said distributor and means for automatically restoring said contacts to their spacing positions at the end of said full cycle.

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