

May 23, 1950

J. C. WARWICK, JR

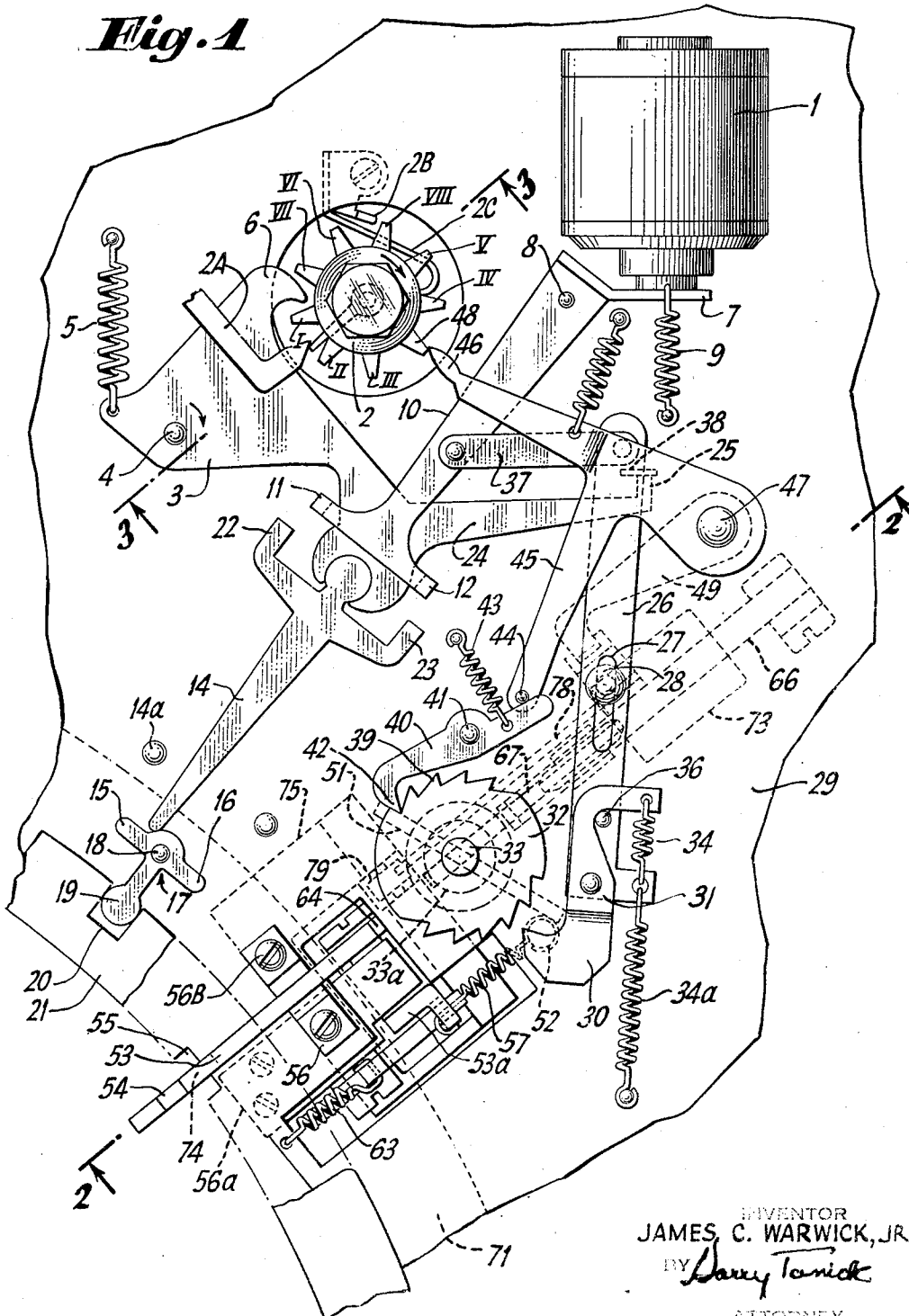
2,508,554

ERROR DETECTOR FOR START STOP TELEGRAPH PRINTERS

Filed March 6, 1948

2 Sheets-Sheet 1

Fig. 1



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2 Sheets-Sheet 2

Fig. 2

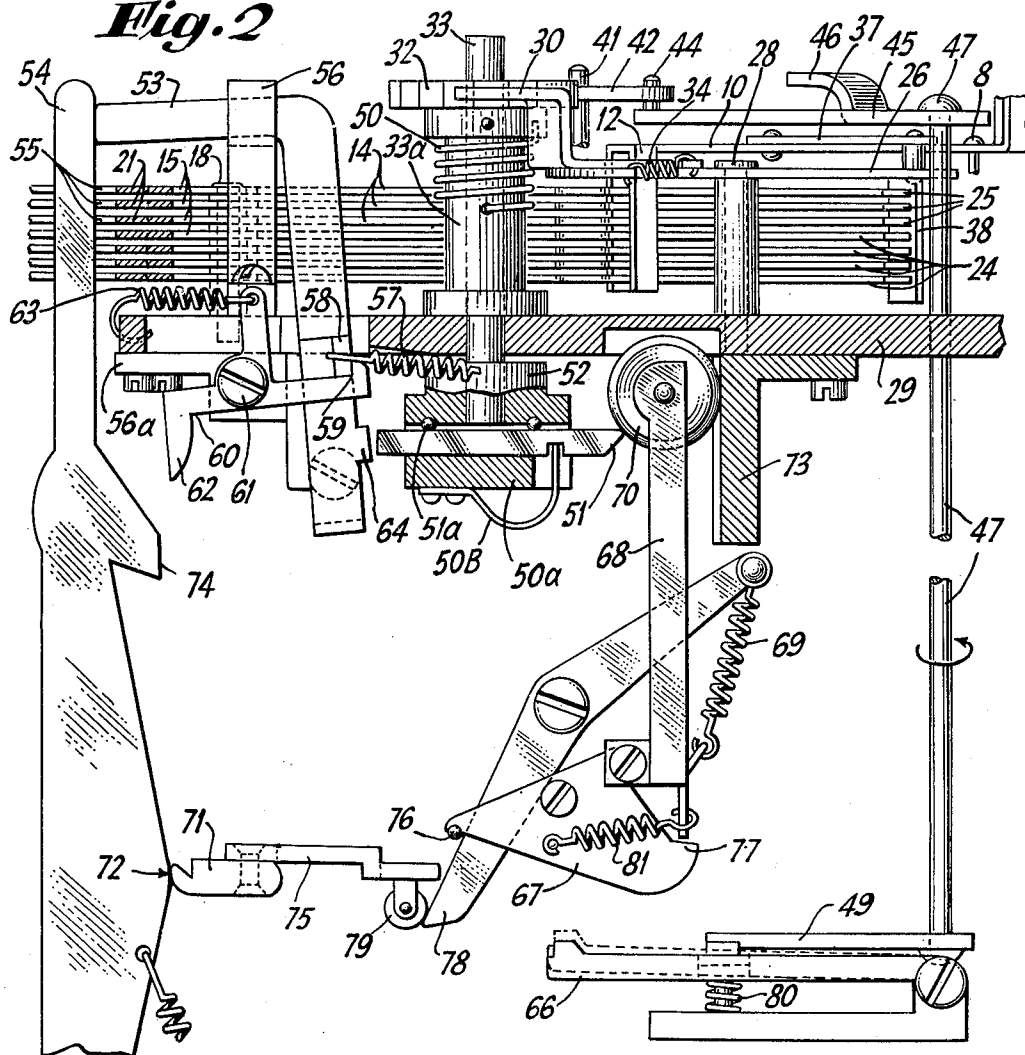


Fig. 3

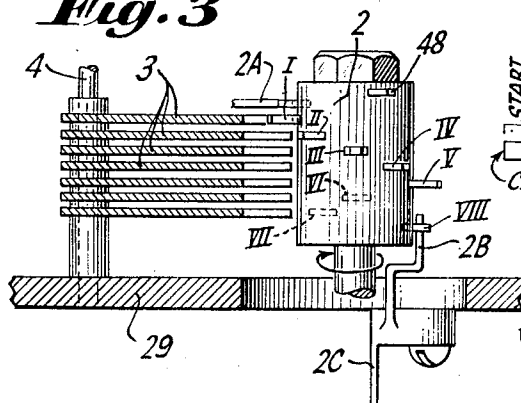
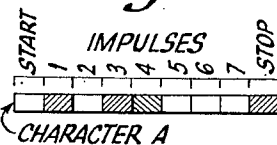


Fig. 4



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ERROR DETECTOR FOR START-STOP
TELEGRAPH PRINTERSJames C. Warwick, Jr., Beechhurst, N. Y., assignor
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10 Claims. (Cl. 178—69)

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This invention relates to error detectors for start-stop telegraph printers.

In my United States Patent No. 2,353,327, granted July 11, 1944, I disclose certain types of error detectors for start-stop printers, in which the error mechanism is controlled by the pull bars of the printer. In this application an improved type of error detector is disclosed in which the error mechanism is independent of the pull bars.

An object of the invention is to provide an error indicator controlled directly by the signal magnet in a start-stop printer.

Another object of the invention is to provide an improved step-by-step error mechanism operated by the selector levers of the start-stop printer under the control of the telegraph signal magnet.

Other objects will appear in the following description, reference being had to the drawings, in which:

Fig. 1 is a plan view of the error detector mechanism and certain associated operating parts;

Fig. 2 is an elevational view partly in section, looking in the direction of the arrows of the plane 2—2 of Fig. 1;

Fig. 3 is a section, partly in elevation, taken on line 3—3 of Fig. 1; and

Fig. 4 is a graphical representation of a seven unit code combination for the letter A.

In start-stop telegraph printer systems as distinguished from the synchronous type of printing systems, the receiving cams are all started in unison with the transmitting cams by interruption of the signal current at the transmitter. This is the start impulse of a code signal combination. The receiving cams are rotated slightly faster than the transmitting cams and automatically stop at the completion of a code signal combination so as to be in a position for this start signal impulse. Thus the transmitting and receiving cams start in exact synchronism and practically exact synchronism is obtained for the remainder of the cams due to the very short period of time required for a revolution.

In the seven unit code system chosen for one application of my invention there are nine signal impulses in each revolution of the cams. The first impulse is a starting signal; the next seven, appropriately phased with the cam member rotation, are character code signals; and the ninth is the stop signal. For each revolution of the cams there will be only, and always, three mark

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or current impulses among the seven character code signals. Hence, if more or less than three mark impulses are received, it is the result of an error and my improvement provides means for indicating such error by having an error character printed in place of the intended character.

Referring now to Fig. 1 of the drawings, when no signals are being sent, the line magnet 1 is energized and the armature 7 is held in the position indicated. At the start of each code combination the signal current is interrupted and the magnet 1 de-energized. This throws the clutch release 2A, and the cam member 2 begins rotating. If a signal is sent out to give a mark or current impulse, the magnet 1 is energized again as the cam 1 approaches the cam follower 6 of the first selector lever 3, the remaining levers being hidden from view. The armature 7 is moved to the closed position shown; the armature extension arm 10 and the sword 14 engage each other at prong 12 and side projection 23 as the lever 3 turns counter-clockwise when follower 6 rides over the cam. This shifts the selector T lever end 19 to the right for a mark signal. The above mentioned operating parts of the cam and selector mechanism are of the well-known start-stop teletype printer. These are essentially the same as those illustrated in my United States Patent No. 2,353,327, and are outlined here only to describe their relationship to the device of this invention.

The receiving cam member 2 has eight cams (I to VIII) substantially uniformly spaced at different levels around the periphery for operating the seven selector levers and also the print ball cam clutch release 2B. Only one selector lever is shown at 3 in Fig. 1, the others being omitted for clarity of illustration. The clutch and other parts are not shown, as this is not required for an understanding of my improvement. The seven selector levers are spaced, stacked one above another and pivoted on a common rod 4 as indicated by Fig. 3. Seven individual springs 5 tend to rotate their respective selector levers 3 in a clockwise direction, indicated by the arrow in Fig. 1, and also serve to keep the cam followers 6 against their individual cams I, II, III, IV, V, VI or VII. The cam member clutch release 2A and the print ball cam clutch release 2B also have individual springs (not shown). The signal magnet 1 has its armature 7 pivoted at 8 for limited movement in a counter-clockwise direction upon energization of the magnet, which is indicated in Fig.

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1 as being in the energized or mark position. When the magnet is deenergized due to a space impulse, absence of current, an adjustable spring 9 retracts the armature. The armature extension 10 has two prongs 11 and 12 located so as to engage the side projections 22 and 23, respectively, of sword 14 at each side of the end of the selector levers 3. The prongs 11 and 12 extend downward at right angles to the plane of the drawing.

The lower end of each selector lever 3 has a ball and socket engagement with its individual sword 14, which has a pointed end adapted to engage either the arms 15 or 16 of a small T-lever 17 which is pivoted at 18. The rounded end 19 of each T-lever fits in a notch 20 in its individual one of the seven code bars 21. Each sword 14 has side projections 22, 23 adapted to engage the prongs 11 and 12, respectively, on the armature extension 10 as the cam followers 6 ride over their respective cams I, II, III, IV, V, VI or VII, when the cam member 2 rotates.

When the magnet 1 is energized, as on a mark impulse, the sword 14 moves with selector lever 3 and the side projection 23 engages prong 12 as the cam follower 6 rides over its individual cam point and this movement throws the blade 14 to the left as shown in Fig. 1. Then, as the cam point moves past the cam follower, spring 5 rotates the lever and forces the point of the sword 14 against the arm 15 of the T-lever and sets its individual code bar 21 for movement to the right. If the signal magnet 1 had been de-energized; that is, if a space impulse had been received, prong 11 would have been in position to engage projection 22 on the sword as the follower moved over the cam point and the blade 14 would then have been positioned to the right in Fig. 1. The movement of the selector lever 3 under action of spring 5 then would have set the code bar 21 for movement to the left. Stop pins 14a only prevent an excess movement of blade 14. The foregoing description discloses the well-known selector mechanism of the teletype printer for seven unit code signals.

In my improved invention an extension arm 24 is added to each one of the seven selector levers 3, with a projection or lug 25 at the free end of the extension arm. A slide bar 26 has a slot 27 slidably engaging a pivot rod 28 secured to the base plate 29. A downward extending bar 38 spanning the seven selector lever lugs 25 is secured to one end of slide bar 26. This slide bar 26 also has a pawl 30 pivoted at the other end at 31, so that the pawl can engage the teeth of ratchet wheel 32 on shaft 33 journaled in bearing 33a fastened to base plate 29. A spring 34 fastened to the end of the pawl maintains the pawl against a pin 36 fastened to the slide 26. The other end of spring 34 is fastened to a finger on slide bar 26. A second spring 34A is fastened at one end to the finger of the slide bar 26 and urges the pawl and slide bar towards their foremost position, as shown in Fig. 1. The other end of spring 34A is fastened to a pin on base 29.

An armature ink 37 is pivoted at one end to the armature extension 10 and at the other end to the slide 26. This link maintains the pawl 30 in position for engagement with a first set of teeth on one portion of ratchet wheel 32 when the magnet 1 is energized and removes it therefrom by rotating bar 26 around the pivot rod 28 when the magnet 1 is de-energized. When the magnet is energized, the downward extending bar 38 on one end portion of the slide 26 is moved

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into position to engage the lugs 25 on the selector lever extensions. As the various selector levers 3 are turned counter-clockwise by their individual cams, the slide bar 26 will be moved rearward, causing pawl 30 to engage and turn the ratchet wheel 32 one step for each cam passed over while the magnet is energized due to mark or current impulses.

Ratchet wheel 32 has a second set of teeth 39 engaging a stop pawl 40 pivoted at 41. One end 42 of the stop pawl 40 engages the teeth 39 in the second portion of wheel 32 under stress of spring 43. The other end of pawl 40 engages a pin 44 on the end of a release lever 45 fixed to shaft 47 which is of sufficient length to extend below base 29. The other or cam end 46 of lever 45 is adapted to be engaged once each complete revolution of the cam member 2 by cam 48 and when so engaged, the engaging end 42 of stop pawl 40 is moved out of engagement with the second set of teeth 39; and then a helically wound spring 50 which surrounds bearing 33a (Fig. 2) rotates the ratchet wheel 32 and a lower rotor member 50a clockwise until the roller engaging bar 51 (located so as to slide in a slot as shown in Fig. 2) is brought into engagement with stop pin 52. This occurs immediately after cam tip 48 on cam member 2 has tripped the error bar blocking mechanism by rotating shaft 47 and thus moving a lever 49 fixed to the lower end of the shaft. A spring 50B maintains the roller engaging bar 51 in its normal position.

A pivoted lever 53 is provided adjacent an error pull bar 54 adapted to fall into the slots 55 in each one of the seven code bars 21. The slots 55 in each one of the seven code bars are of sufficient width to present an aligned slot for this error pull bar both on mark and space impulses of a character code combination, but the error type pull bar can enter these slots only when the lever 53 is in retracted position (not shown). As bar 54 cannot enter slots 55 when 53 is in the position shown, it is latched out at 59. This lever is slidably positioned in a standard 56 towards member 50a by spring 57 secured to stop pin 52. (Screw 56B supports standard 56 on base plate 29.) From the position shown, if not blocked by lever 53, the error pull bar 54 is permitted to drop into the wide slots 55 of the code bars only when the printing movement starts and print bail 71 moves upward. The lever 53 has a lower projecting lip 58 adapted to engage a catch 59 on a latch 60 pivoted at 61 in the standard 56a mounted under base plate 29. The latch 60 has a downwardly projecting end 62. Spring 63, with its ends fastened to the latch 60 and to the base plate 29, tends to rotate the latch counter-clockwise.

The lower rotor member 50a has a slot in which the roller engaging bar 51 is adapted to move on bearings 51A so as to engage the lever 53 at projection 64 after the ratchet wheel 32 has been stepped forward three teeth, but will not be so adapted when it has been stepped forward more or less than three teeth by action of pawl 30.

The well-known operating or print bail 71 of the usual start-stop printer has a lip 72 holding the pull bars out of the slots in the code bars, which lip is shaped to engage the hooks 74 of the pull bars upon its upward movement when the pull bars fall into the aligned slots in the code bars. Before the bail 71 reaches its uppermost position in this movement (but after it has engaged the selected pull bar for an error or

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character), the end 62 of the latch 60 is engaged and the latch is rotated clockwise to free the lip 58 on lever 53 of its engagement with the catch 59, if it has been previously moved into engaging position. An extension 75 mounted on the rear of bail 71 is so positioned as to engage arm 76 of link 67 and rotate it clockwise as bail 71 moves upward. This movement engages catch 77 in second latch 66 against the compression of spring 80 and brings down a ram 68 and a large roller 70 to their low position. Roller 70 is held to roll in its track 73 by spring 81. A small roller 79 is positioned on extension 75 to engage spring-loading lever 78 as bail 71 moves downward. This engagement rotates lever 78 counter-clockwise, tensioning spring 69 against ram 68. An arm 49 is fixed to shaft 47 and is positioned to depress latch 66 when arm 46 is moved counter-clockwise by cam 48 on cam member 2.

The operation of the improved error detector of this invention will now be described.

Suppose signals of the seven unit equal-length code are being used, as disclosed in my United States Patent 2,353,327, supra: With this code, each character always comprises three mark impulses and four space impulses. Differentiation between characters is obtained by different time positions of the mark in the cycle.

Let it be supposed, for example, that the letter A is being received. This letter consists of a mark impulse in the first, third and fourth positions of the code combination as shown shaded in Fig. 4. When the first mark is received, armature link 37 will position the bar 38 on slide 26 adjacent the lug 25 on the selector lever extension 24. It will also position the pawl 30 for engagement with the first set of teeth on the ratchet wheel 32. Immediately thereafter the cam follower 6 will ride over cam point I in the cam assembly, and selector lever extension 24 will push the slide 26 rearward and rotate the wheel 32 and its attached rotor member 50a one step counter-clockwise. Stop pawl 40 will engage one of the second set of teeth 39 and hold this advance of member 50a.

It will be understood that the movement of the selector lever 3 through the sword 14 and T-lever 15 will set the first code bar 21 for movement to the right.

The second signal impulse for letter A is a space, and magnet 1 will not be energized. Therefore, as the cam follower 6 rides over cam point II, the lug 25 on the selector lever extension 24 will not engage the bar 38 on the slide 26. Therefore there will be no movement of the slide 26 and, furthermore, the pawl 30 will not be in engagement with the lower rotor ratchet wheel 32. Thus, the member 50a will not be advanced for this second unit of the character being transmitted. It will be understood that a selector lever, sword and T-lever will set the second code bar 21 for movement to the left.

The mark impulse of the third unit of the letter A will step the member 50a forward a second notch, in the way already described, and will set the third code bar for movement to the right.

The mark impulse of the fourth unit will energize the signal magnet 1 and cause the member 50a to be stepped forward a third notch. This will move the roller engaging bar 51 in line with projection 64 on error lever 53, and will set the fourth code bar for movement to the right.

When the fifth, sixth and seventh units of

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the letter A are received, there will be no movement of the member 50a because these units are space impulses and the magnet 1 will not be energized. The fifth, sixth and seventh code bars will be set for movement to the left.

Immediately following the start of the seventh selector cam operation, cam projection 48 starts to move release lever 46 counter-clockwise, which in turn moves the lower arm 49 through shaft 47. This movement depresses latch 66, releasing link 67 so that ram 68 is shot upward by the tension of spring 69. The roller 70 on the end of ram 68 is driven upward along its track 73 and against the sloped end of roller engaging bar 51 which was rotated to this engaging position by the third marking impulse of the letter A. Roller engaging bar 51, by the action of roller 70, is pushed forward through member 50a against surface 64 on the error lever 53, and moves lever 53 counter-clockwise so that its lip 58 latches in catch 59 of latch 60. At the same time spring 50B is compressed. The latching of lever 53 blocks the entry of the error pull bar 54 into the aligned slot 55.

While lever 53 is being latched, a further counterclockwise movement of release arm 46 causes pin 44 through arm 45 to rotate stop pawl 40 clockwise, lifting its end 42 clear of holding the second set of teeth 39 on ratchet 32. Thus freed, the helically wound spring 50 will return ratchet wheel 32 and member 50a clockwise until bar 51 stops against the stop pin 52.

Seven units of the signal code having been received, no error resulted in the transmission and the code bars 21 are now set to move to their correct mark and space positions. This will align a clear slot in all the code bars adjacent the pull bar for the letter A (not shown), and this pull bar will move forward into its cleared slot in the well known way and will be elevated by the upwardly moving bail 71 to print the character A, after cam VIII has tripped the clutch release 2B to operate the print bail (not shown) cam of the printer. As the bail 71 moves upward, it cannot engage the hook 74 on error pull bar 54 because this pull bar has been prevented from entering the wide slot 55 in each code bar by lever 53 and this hook 74 will be out of the path of the lip 72. After the bail 71 has engaged the pull bar for letter A, it will then engage the end 62 of the latch 60 and rotate it clockwise. This will release the lever lip 58 from the catch 59 and the spring 57 will return the lever to its unlatched position (not shown). Thus, the letter A has been printed and the error indication was not made or printed because the error pull bar 54 was blocked out of the slot 55.

As roller engaging bar 51 is being returned to its stop pin 52, cam VIII sets the printing operation in motion. As stated above, the bail 71 moves upward. The bail extension 75 in turn raises arm 76 of link 67 until catch 77 moves behind latch 66, thus withdrawing roller 70 from its upper and drawing it down to its lower position. Here it is held until the next selection has been made by cam member 2, and cam 48 again causes roller 70 to be released and shot upward. Spring-loading lever 78 follows extension 75 in its upward travel, thus permitting link 67 to be latched under relatively light spring tension. On its return to its lower position, roller 79 depresses lever 78, thus tensioning spring 69 in readiness for the next release of link 67.

Let it be supposed, however, that an error resulted in the transmission or reception just de-

scribed and that a mark impulse was received not only for the first, third and fourth units of the letter A, but also for some other unit, say the sixth unit. This would have stepped forward the ratchet wheel 32 one additional step and the roller engaging bar 51 would have been misaligned with lever 53 and large roller 70 by the additional step. Thus when ram 68 was shot upward, roller 70 would not move roller engaging bar 51 to a forward position and lever 53 would have remained in the released condition. Then when the printing bail 71 moved upward, error pull bar 54 would have dropped into the wide slots 55 in the code bars 21 and the lip 72 would have engaged the hook 74 and printed an error indication, showing that a mistake occurred at this point. If a still further error had occurred by receiving a fifth mark impulse, the same action would have resulted, but there would be no further stepping of the wheel 32 forward, as four steps are sufficient to cause the error indicator to come into play. Therefore, provision need be made for only four steps in the stepping mechanism.

If less than three mark units have been received, this would also be an error and the fact would be indicated by the error pull bar 54 dropping into the slots of the code bars, because roller engaging bar 51 would not be stepped forward sufficiently to be aligned with large roller 70 and moved against the lever 53 to latch it in blocking position.

The proportioning of parts could be made so that the pawl 30 will be clear of ratchet wheel 32 on receipt of space signals and therefore the lug 25 on the selector lever extension 24 could be omitted. That is, this lever 24 could be so designed as to slide the pawl 26 on both marks and spaces, but it is preferable to use the lug 25 as shown in Fig. 1 for additional assurance that there will be no movement of the ratchet wheel on receipt of a space. (More particularly, this is desired in order to reduce wear on parts and load on cam assembly 2.)

It will be obvious that the ratchet and associated parts may be so designed as to operate on space instead of mark and position the roller engaging bar 51 in line with the lever 53 upon receipt of four space signals, because if less or more than four space signals are received, an error also has resulted. The major changes necessary would be to provide for one additional stepping position on the ratchet 32 and member 50a, to shorten the extension 24 so that the lug 25 would engage the bar 38 only when the armature is in the left-hand or space position, and to locate the slide 26 so that pawl 30 would engage ratchet 32 on "space" instead of "mark."

While I have described the error indicating mechanism for use with the seven unit code of a constant number of units for each character, it will be apparent that the mechanism could be designed to apply for other codes having a constant number of mark units.

Various other modifications may be made in my device without departing from the spirit and scope of the invention.

What is claimed is:

1. A telegraph printer having an error detector comprising a plurality of message selector levers, a plurality of slotted code bars linked to said message selector levers, a plurality of message type levers adapted to be selected by said selector levers for the printing of a character representative of a predetermined number of selecting elements in

a received code combination, an error type lever for printing a character to indicate any departure from the predetermined number of elements in the received code combination, means controlled by signal current for selectively moving said message selector levers to position said code bars to align their slots adjacent the selected one of said message type levers, an extension arm on each one of said message selector levers, a slide bar positioned to be actuated by said extension arms, a ratchet having a plurality of teeth, a pawl secured to said slide bar and positioned to engage the teeth on said ratchet, an engaging bar linked to said ratchet, a roller member, means including said ratchet to position said engaging bar in line with said roller member to disengage said error type lever when the predetermined number of selector elements in the received code combination properly align with code bars to permit the selected one of said message type levers to print, and to position said engaging bar out of line with said roller so as to engage said error type lever, causing it to print the character indicating a departure from the predetermined number of elements in the received code combination.

2. A telegraph printer having an error detector comprising a plurality of message selector levers, a plurality of slotted code bars linked to said message selector levers, a plurality of message type levers adapted to be selected by said selector levers for printing of a character representative of a predetermined number of selecting elements in a received code combination, an error type lever for printing a character to indicate any departure from the predetermined number of elements in the received code combination, means controlled by signal current for selectively moving said message selector levers to position said code bars to align the slots adjacent the selected one of said message type levers, an extension arm on each one of said message selector levers, a slide bar positioned to be actuated by said extension arms, a ratchet wheel having a plurality of teeth, a pawl secured to said slide bar and positioned so as to engage the teeth on said ratchet wheel, an engaging bar linked to said ratchet wheel, a roller member, means including said ratchet wheel to position said engaging bar in line with said roller member to disengage said error type lever when the predetermined number of selected code elements occur to permit the selected one of said message type levers to print, and to position said engaging bar out of line with said roller to engage said error type lever to print the character indicating a departure from the predetermined number of elements in the received code combination.

3. A telegraph printer according to claim 1, including in addition thereto a release lever, a cam assembly, means on said cam assembly for actuating said release lever, and means actuated by said release lever to place the roller member in a position to actuate said engaging bar.

4. A telegraph printer according to claim 1, having in addition thereto a latch member linked to said roller for placing the roller in line with said engaging bar, said latch member having engaging means for operating a bail printing member.

5. A telegraph printer for a seven unit code of the type having three mark and four space units of a received signal, comprising a plurality of message selector levers adapted to be selected by said selector levers for the printing of a char-

acter representative of a predetermined number of selected elements in received code combination, a plurality of slotted code bars linked to said message selector levers, a magnet and an armature coupled to actuate said selector levers, an error selector lever positioned to engage a slot in said slotted code bars, an armature link, a slide bar linked to said armature by said link, a pivot rod for pivoting said slide bar, a ratchet wheel, means on said ratchet wheel for counting the number of mark and space units of a signal, and means including said armature link for rotating said slide bar around said pivot rod, and to actuate the ratchet wheel to a position such as to have said error bar retained in the slot of said code bar to actuate and print the character indicating a departure from the predetermined elements in the received code combination when more than three mark units of a signal are received.

6. A telegraph printer having an error detector comprising a plurality of message selector levers, a plurality of slotted code bars linked to said message selector levers, a plurality of message type levers adapted to be selected by said selector levers for printing a character representative of a predetermined number of selected elements in a received code combination, an error type lever for printing a character to indicate any departure from the predetermined elements in the received code combination, means controlled by signal current for selectively moving said message selector levers to position said slotted code bars with aligned slots adjacent a selected one of said message type levers, an extension arm on said message selector levers, a slide bar positioned to engage said extension arms and to be actuated by said means controlled by the signal current, a pawl secured to said slide bar, a ratchet member having a plurality of teeth, positioned to be engaged by said pawl, an engaging bar linked to said ratchet member, a roller member, means including said ratchet member to move said engaging bar member only when said ratchet has been stepped in accordance with said predetermined number of selected elements to disengage said error type lever when the predetermined number of selected elements in the received code combination are properly received and when the code combination is not properly received to position said roller out of line with said engaging bar thus causing the error type lever to print the character indicating a departure from the predetermined number of elements in the received code combination.

7. A telegraph printer having an error detector comprising a plurality of message selector levers, a plurality of message type levers adapted to be selected by said selector levers for printing a character representative of a predetermined number of selected elements in a received code combination, a plurality of slotted code bars linked to said message selector levers, an error type lever for printing a character to indicate any departure from the predetermined elements in the received code combination, means controlled by signal current for selectively moving said message selector levers to position said slotted code bars adjacent a selected one of said message type levers, means to retain said error type lever in an engaging position in a wide slot located in said slotted code bars, an extension arm on said message selector levers, a slide bar positioned to be actuated by said extension arm, a ratchet having a plurality of teeth, a pawl secured to said slide bar and positioned to engage the teeth on said ratchet, an engag-

ing bar linked to said ratchet, a roller member, means including said ratchet to position said engaging bar in line with said roller member on receipt of the predetermined number of selected elements to move said error type lever out of its engaging position in said wide slot of said slotted code bar, thus permitting the selected one of said message type levers to print, and to position said engaging bar out of line with said roller to engage said error type lever in the wide slot in said code bars causing the error type lever to print the character indicating a departure from the predetermined number of elements in the received code combination.

8. A telegraph printer of the start-stop type particularly adapted for a fixed length code each character of which is represented by signals having a fixed number of signal elements of one nature and having error detector means, comprising a plurality of message selector levers, a plurality of slotted code bars linked to said message selector levers, a plurality of message type levers adapted to be selected by said selector levers for printing a character representative of the elements in the received code combination, an error type lever for printing a character to indicate any departure from the predetermined fixed number of elements of one nature in the received code combination, means controlled by signal current for selectively moving said message selector levers to position said code bars to align the slots adjacent the selected one of said message type levers, an extension arm on each one of said message selector levers, a slide bar positioned to be actuated by said extension arms, a ratchet having a plurality of teeth, a pawl secured to said slide bar and positioned so as to engage the teeth on said ratchet, an engaging bar linked to said ratchet, a roller member, means including said ratchet to position said engaging bar in line with said roller member to disengage said error type lever when the predetermined number of selected code elements occur to permit the selected one of said message type levers to print, and to position said engaging bar out of line with said roller to engage said error type lever to print the character indicating a departure from the predetermined fixed number of elements of one nature in the received code combination.

9. A telegraph printer of the start-stop type particularly adapted for use with seven element code each character of which is represented by a signal having three marking and four spacing elements and having error detector means, comprising a plurality of message selector levers, a plurality of slotted code bars linked to said message selector levers, a plurality of message type levers adapted to be selected by said selector levers for printing of a character representative of a predetermined number of selecting elements in a received code combination, an error type lever for printing a character to indicate any departure from the predetermined number of elements in the received code combination, means controlled by signal current for selectively moving said message selector levers to position said code bars to align the slots adjacent the selected one of said message type levers, an extension arm on each one of said message selector levers, a slide bar positioned to be actuated by said extension arms, a ratchet wheel having a plurality of teeth, a pawl secured to said slide bar and positioned so as to engage the teeth on said ratchet wheel, a pivoted lever, an error pull bar positioned to be actuated by said pivoted lever, an engaging bar linked to

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said ratchet wheel, a roller member, means including said ratchet wheel to position said engaging bar in line with said roller member and pivoted lever to disengage said error pull bar when three selected code elements occur to permit the selected one of said message type levers to print, and to position said engaging bar out of line with said roller to actuate said error pull bar when more or less than four spacing elements are received.

10. A telegraph printer of the type arranged for use with seven unit code, each character of which is expressed by three marking elements, having an error detector means, comprising a plurality of message selector levers, a plurality of slotted code bars linked to said message selector levers, a plurality of message type levers adapted to be selected by said selector levers for printing of a character representative of a predetermined number of selecting elements in a received code combination, an error type lever for printing a character to indicate any departure from the predetermined number of elements in the received code combination, a signal element magnet controlled by signal current for selectively moving said message selector levers to position said code bars to align the slots adjacent the selected one of said message type levers, an extension arm on each one of said message selector levers, a slide bar positioned to be actuated by said extension

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arms, a pivoted rod for pivoting said slide bar, a ratchet wheel having a plurality of teeth, a pawl secured to said slide bar and positioned so as to engage the teeth on said ratchet wheel to rotate the same, an engaging bar linked to said ratchet wheel, a roller member, means including said ratchet wheel to actuate said slide bar about said pivoted bar to position said engaging bar in line with said roller member to disengage said error type lever when the predetermined number of selected code elements occur to permit the selected one of said message type levers to print, and to position said engaging bar out of line with said roller to engage said error type lever to print when more or less than three marking elements are received.

JAMES C. WARWICK, Jr.

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