Sept. 29, 1970 B. SANDRONE 3,531,592

BICOLOR RIBBON CONTROL DEVICE FOR A START-STOP TELEPRINTER

Filed March 20, 1968 2 Sheets-Sheet 1

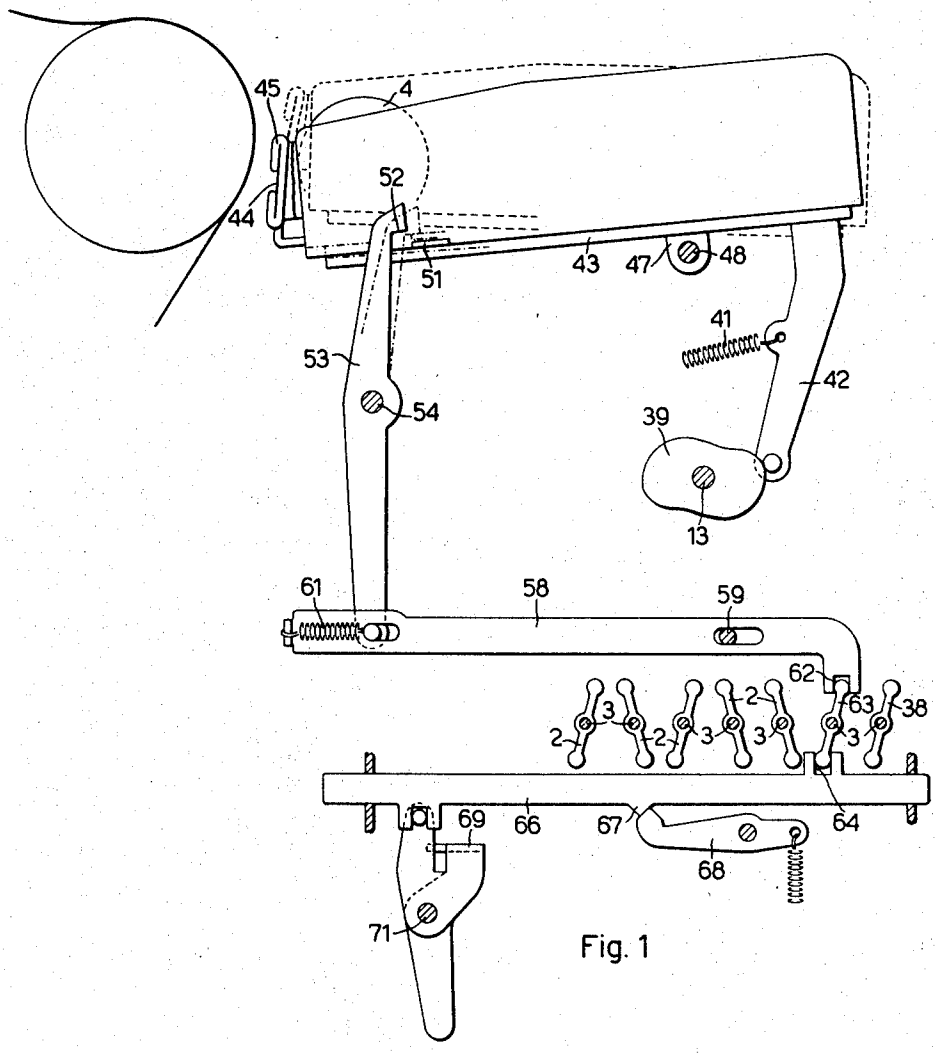



Fig. 1

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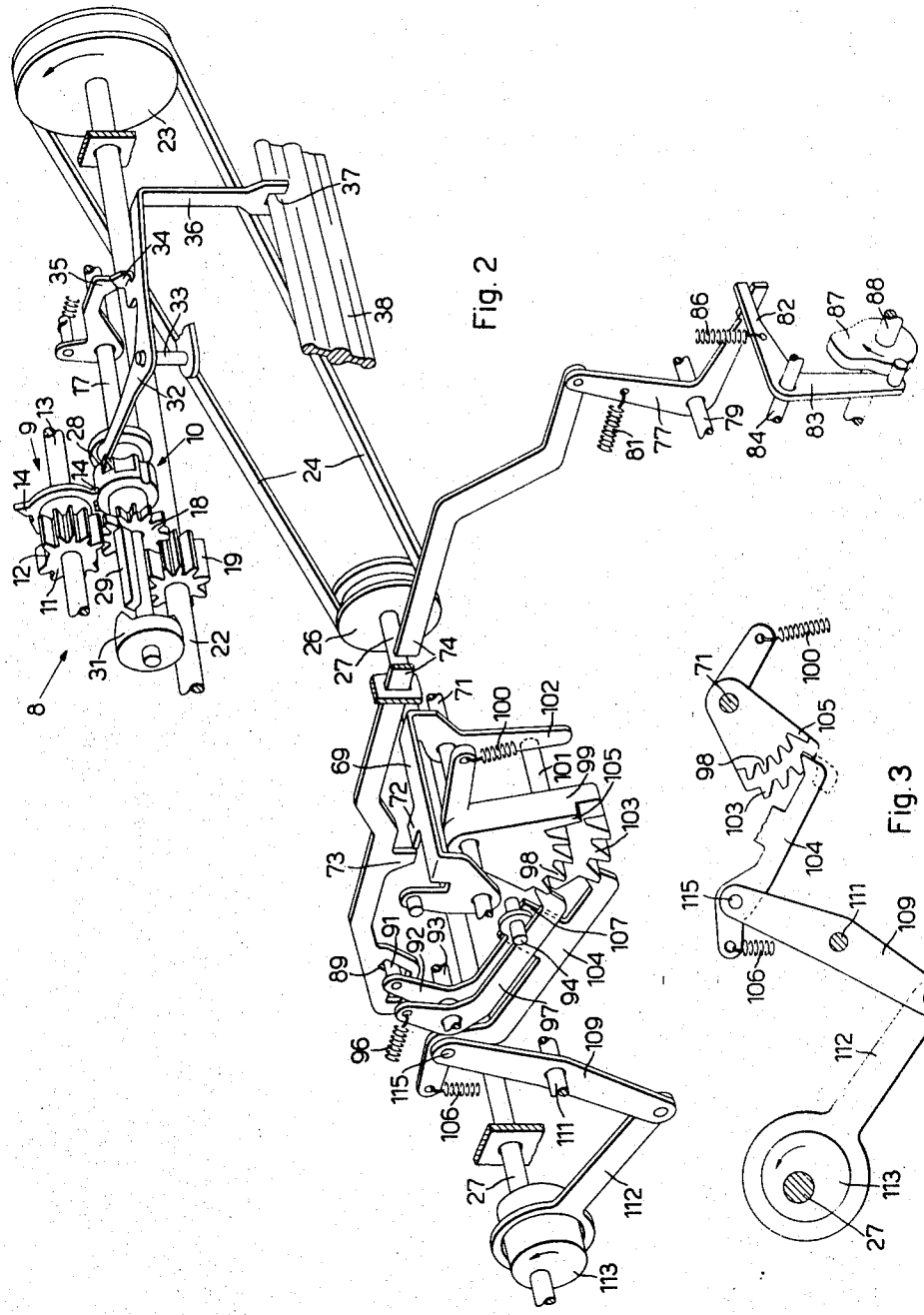


Fig. 2



Fig. 3

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3,531,592

# BICOLOR RIBBON CONTROL DEVICE FOR A START-STOP TELEPRINTER

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Int. Cl. H04l 13/02
U.S. Cl. 178—33 6 Claims

## ABSTRACT OF THE DISCLOSURE

A bicolor ribbon control device for a start-stop teleprinter, wherein a printing mechanism is operated by a continuously rotating driving shaft through a one-cycle clutch engageable in a predetermined angular position of the driving shaft, comprises an additional bar adapted to assume a first position when the teleprinter is not transmitting and to be brought into a second position by said transmission shaft when it is so rotated. The additional bar is returned to the first position under the control of a delay device restored step by step by said driving shaft after the transmission of the last code combination.

## BACKGROUND OF THE INVENTION

The present invention relates to a bicolor ribbon control device for a start-stop teleprinter having a cyclically rotatable transmission shaft, a set of receiving code bars, a printing control mechanism adapted to be operated by a continuously rotating driving shaft through a one-cycle clutch adapted to be engaged in a predetermined angular position of said driving shaft, said control device comprising a further bar adapted to assume a first position when the teleprinter is not transmitting and to be brought into a second position by said transmission shaft when it is so rotated, and a bicolor ribbon vibrator operable during the cycle of said clutch under the control of said further bar.

Teleprinters are known in which a member assumes a first position when the teleprinter is in the receiving state and a second position when it is transmitting. Normally, this member directly controls the bicolor ribbon device so as to distinguish clearly the messages received, which are printed in black, from those transmitted, which are printed in red. Moreover, this member is frequently in the form of a bar adjacent to the code bars and conventionally called bicolor bar. This latter is used in combination with the code bars to select some machine functions according to the actual receiving or transmitting state of the teleprinter. In these known teleprinters, the bicolor bar is brought into the transmission position directly by the transmission shaft and returns to the receiving position as soon as the transmission ends.

In the case a teleprinter is provided with a printing mechanism adapted to be operated through a clutch adapted to be engaged only in a predetermined angular position of a continuously rotating shaft, said clutch is engaged with a variable delay with respect to the end of the transmitting or receiving cycle, which on the contrary ends asynchronously, whereby the known bicolor ribbon control devices are unadapted to exactly indicate the transmitting or receiving state of the teleprinter.

## SUMMARY OF THE INVENTION

The main object of the invention is to provide a bicolor ribbon control device obviating the above disadvantage.



According to the present invention, a bicolor ribbon control device is provided, which comprises a further bar adapted to assume a first position when the teleprinter is not transmitting and to be brought into a second position by said transmission shaft when it is so rotated, and a bicolor ribbon vibrator operable during the cycle of said clutch under the control of said further bar, and is characterized by a delay device locked in a rest condition when the teleprinter is not transmitting and adapted to be released under the control of said transmission shaft when it is so rotated, said delay device being thereafter restored step by step toward said rest condition under the control of said driving shaft, means being provided to cause said delay device to return said further bar to said first position upon being restored a predetermined number of steps.

An embodiment of the invention will now be described by way of example with reference to the accompanying drawings.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a longitudinal section of a teleprinter of the start-stop type incorporating a bicolor ribbon control device according to the invention;

FIG. 2 is a partial front perspective view of the bicolor ribbon control device from the left; and

FIG. 3 is a side view from the left of a detail of the device of FIG. 2 in the one working position.

## DESCRIPTION OF THE PREFERRED EMBODIMENTS OF THE INVENTION

The teleprinter is of the start-stop type and comprises a set of five similar receiving code bars **2** (FIG. 1) each one rotatable by means of a pair of pivots **3** in the machine frame to assume one or the other of two different positions under the control of the signals of the received code combination. The teleprinter is moreover equipped with a printing mechanism of the type described in the U.S. application, Ser. No. 616,993, dated Feb. 17, 1967, now Pat. No. 3,404,765. The printing mechanism comprises a set of type wheels **5** selectively axially shiftable and rotatable to print the selected character on the paper, and a control printing mechanism formed of a shaft **13** adapted to be cyclically rotated 180 degrees by a clutch **8** (FIG. 2) comprising a driven member **9** and a driving member **10**.

The driven member **9** includes a pinion **11** having two portions **12** devoid of teeth and diametrically opposite. The driven member **9** is secured on the shaft **13** and is provided with two diametrically opposite starting teeth **14** disposed in the same plane. The driving member **10** is slidable axially and rotatable on a stationary shaft **17** and includes a pinion **18** engaging a corresponding pinion **19** having a width greater than that of the pinion **18** and substantially equal to that of the gear **11**. The pinion **19** is angularly fast with a shaft **22** on which a pulley **23** is secured. A belt **24** connects the pulley **23** to a second pulley **26** having a diameter half the diameter of the pulley **23**. The pulley **26** is secured to a driving shaft **27** which is rotated continuously in an anticlockwise direction by an electric motor not shown in the drawing.

The driving member **10** moreover includes a pair of teeth **28**, only one of which is visible in FIG. 2, for starting the rotation of the driven member **9**. The teeth **28** are disposed at 180 degrees from one another in the same diametrical plane, which is to the right of the plane of the teeth **34**. A peg **29** fixed to the pinion **18** is adapted to co-operate with a stationary cam **31** secured to the shaft **17**.

A groove of the driving member **10** of the clutch **8** is engaged by an end of a lever **32** pivoted on a stationary

pivot 33 and having a bent lug 34 cooperating with a spring-loaded positioning member 35. The lever 32 is provided with a bent arm 36 having a notch 37 engaging a so-called universal bar 38 similar to the code bar 2 and adapted to be turned in a counterclockwise direction in a known manner to control the printing of the character corresponding to the code combination represented by the bars 2 (FIG. 1).

Secured to the shaft 13 is a cam 39 (FIG. 1) normally contacted by an arm 42 under the action of a spring 41. The arm 42 is secured to a plate 43 supporting a ribbon vibrator 45 for a bicolor ink ribbon 44. The plate 43 is provided with two bent lugs 47 rotatable on a stationary spindle 48. To clearly distinguish the messages received from those transmitted, the characters are printed in different colours in the two cases by altering the distance by which the inked ribbon 44 is raised.

The plate 43 is moreover provided with a projection 51 adapted to cooperate with an abutment 52 of a lever 53 rockably mounted on a fixed pivot 54. The lever 53 is adapted to assume either the position shown in solid lines in FIG. 1 when the teleprinter is not in the transmitting state, that is when it is in the receiving or inoperative state, or the position shown in chain-dotted lines in the drawing when the teleprinter is in the transmitting state. The lever 53 is pin and slot connected to a slide 58 slidable on a stationary shaft 59 and further connected to the lever 53 by means of a spring 61. The slide 58 is provided with a notch 62 engaged by a further bar 63 adjacent to the receiving code bars 2 and similar to them. The bar 63 will hereinafter be called the bicolor bar.

The bicolor bar 63 engages a notch 64 of another slide 66 slidable in the machine frame and provided with a projection 67 adapted to cooperate with a spring-loaded positioning member 68. The slide 66 is moreover pin and notch connected to a bail 69 fulcrumed on a stationary spindle 71. The bail 69 is provided with a projection 72 (FIG. 2) adapted to cooperate with a tooth 73 of a connecting rod 74 pivoted to a bell crank 77 and slidable in the machine frame. The bell crank 77 is pivoted on a stationary spindle 79 and bears under the action of a spring 81 against an arm 82 of a bell crank 83 pivoted at 84. The bell crank 83 in turn, under the action of a spring 86, bears against a cam 87 secured to a shaft 88 which is the conventional transmission shaft of the teleprinter. The shaft 88 is adapted to be rotated cyclically through 360 degrees in a clockwise direction by means of an asynchronous clutch known per se for each code combination to be transmitted. The bicolor ribbon control device is provided with a delay device comprising a toothed sector 99 rotatably mounted on the spindle 71 and urged counterclockwise by a spring 100. The sector 99 is provided with a first set of ratchet teeth 98 cooperating with a latch member 97 fulcrumed on a stationary spindle 93. The member 97 is urged counterclockwise to contact the left-hand portion of a cross pin 94 secured to a lever 92 fulcrumed on the spindle 97. A pin 91 secured to the lever 92 cooperates with a cam slot 89 provided on the rear end of the connecting rod 74. In the inoperative or receiving state of the teleprinter, the sector 99 is latched by the member 97 in the position shown in FIG. 2, that is the member 97 engages the first tooth 98, and the sector 99 counterclockwise. A tooth 105 of the sector 99, having a length greater than the length of the teeth 98, is adapted to be arrested by the member 97 when this latter releases the teeth 98.

The sector 99 is moreover provided with a pin 101 cooperating with an arm 102 of the bail 69 and is furnished with a second set of ratchet teeth 103 adapted to cooperate with a pawl 104. The teeth 103 are angularly offset by half a tooth pitch with respect to the teeth 98 so that when the sector 99 is in the position shown in FIG. 2, there is a predetermined gap between the pawl 104 and the first tooth 103. The pawl 104 is pivoted at 115 on a lever 109 fulcrumed on a stationary spindle 111 and is



provided with a projection 107 normally urged by a spring 106 to bear against the right-hand portion of the pin 94. The lever 109 is linked in turn with a connecting rod 112, the head of which embraces an eccentric 113 secured to the driving shaft 27.

The bicolor ribbon control device operates as follows.

The shaft 27 normally rotates continuously counterclockwise (FIG. 2) and, by means of the eccentric 113, the connecting rod 112 and the lever 109, cause the pawl 104 to reciprocate continuously. At each revolution, the pawl 104 temporarily engages one of the teeth 103 of the sector 99, thus removing the engaged tooth 98 slightly away from the member 97. The shaft 27 moreover through the belt 24 rotates the shaft 22 together with the pinion 19 in the same direction at an angular speed which is half that of the shaft 27. The pinion 19 therefore causes the driving member 10 of the clutch 8 to rotate continuously so as to present the teeth 28 to the teeth 14 of the driven member 9 at every 180 degrees, that is in correspondence with a predetermined angular position of the shaft 27.

Each code combination received or transmitted by the teleprinter is transferred to the bars 2 (FIG. 1) with a delay variable from half a revolution to one and a half revolution of the shaft 27 with respect to the receiving or transmitting cycle for the purpose of synchronising the positioning of the bars with the rotation of the shafts 27 and 22, as described in the U.S. application, Ser. No. 655,132, dated July 21, 1967, now Pat. No. 3,450,837. Simultaneously, the universal bar 38 (FIG. 2) is rocked counterclockwise and shifts the driving member 10 to the left through the lever 32, bringing the teeth 28 into the plane of the teeth 14. This axial shift can be produced when the teeth 28 are in any angular position, with the exception of the two small arcs where one of the teeth 28 interferes axially with one of the two teeth 14, but the cycle of the shaft 13 can start only when one of the teeth 28 engages the tooth 14, that is when the shaft 27 reaches the above predetermined angular position. Therefore the cycle can start at an instant which is variable with respect to the receiving or transmitting cycle.

If the teleprinter is in the receiving state, the bicolor bar 63 is in the position shown in FIG. 1 and, by means of the slide 58 and the lever 53, holds the abutment 52 out of the path of the projection 51. During the cycle of the shaft 13, the cam 39 causes the spring 41 to rock the arm 42 together with the plate 43 clockwise on the spindle 48, whereby the plate 43 locates the ribbon vibrator 45 into the position shown by dash lines in FIG. 1, whereby the printing is effected on the black lower half of the ribbon 44. During the cycle of the shaft 13 the cam 31 (FIG. 2) causes the peg 29 to return the driving member 10 positively to the right, whereby after half a revolution the clutch 8 is disengaged automatically.

To transmit a code combination, the transmission shaft 88 is cyclically rotated one revolution in a clockwise direction. The cycle of the shaft 88 starts at any instant whatsoever with respect to the rotation of the shaft 27, that is asynchronously. During the cycle of the shaft 88, the cam 87 rocks the bell crank 83 clockwise, which in turn causes the bell crank 77 to move the connecting rod 74 forwards. In the first part of its stroke, the cam slot 89 of the connecting rod 74 rocks the lever 92 clockwise. The pin 94 then rocks both the advancing pawl 104 and the positioning member 97 clockwise, thus releasing the sector 99. Now the spring 100 rocks the sector 99 clockwise until the tooth 105 is arrested against the member 97.

Immediately afterwards, the tooth 73 of the connecting rod 74 engages the projection 72 thus rocking the bail 69 (FIG. 1) clockwise. The bail 69, through the slide 66, the bicolor bar 63 and the slide 58, causes the lever 53 to rock clockwise, thus bringing the abutment 52 into the path of the projection 51. The bail 69, the slides 66 and 58, the bar 63 and the lever 53 are now retained in the reached position by the positioning member 68. There-

after the cam **87** (FIG. 2) causes the spring **86** to return the bell crank **83** into the inoperative position. In turn the spring **81** returns the bell crank **77** counterclockwise, thus shifting the connecting rod **74** rearwards. The slot **89** of the connecting rod **74** then restores the lever **92** counterclockwise.

The cross pin **94** then simultaneously releases the member **97** and the pawl **104**, whereby the spring **96** causes the positioning member **97** to re-engage the teeth **98**. The pawl **104**, on the other hand, under the action of the spring **106** can enter the last space between the teeth **103** only if at the moment of release by the pin on the eccentric **113** is in the position shown in FIG. 3, that is with the maximum eccentricity directed along the axis of the connecting rod **112**. In this case, the pawl **104** immediately initiates to return the sector **99** step by step toward the rest position. The sector **99** is then rotated counterclockwise one step for every revolution of the shaft **27**.

If, on the other hand, when the pawl **104** is released, the eccentric **113** has been rotated beyond the position shown in FIG. 3 at least 55 degrees, the pawl **104** is temporarily arrested against the outer edge of the last tooth **103**, as indicated in dash lines in FIG. 3. The pawl **104** can therefore enter the last space between the teeth **103** only when the eccentric **113** returns to the position shown in FIG. 3.

The code combination transmitted during the cycle of the shaft **88** is transferred to the receiving bars **2** with the above stated delay with respect to the end of the cycle of the transmission shaft **88**, while the universal bar **38** (FIG. 2) causes the shaft **13** to be cycled. Now, when the cam **39** (FIG. 1) causes the plate **43** to rock clockwise, the projection **51** is arrested by the abutment **52** of the lever **53** in the position shown in chain-dotted lines in FIG. 1, whereby the printing is effected on the red upper half of the ribbon **44**.

When the sector **99** is returned counterclockwise through its last step, the pin **101** engages the arm **102** of the bail **69**, which is restored counterclockwise. Therefore the slide **66** (FIG. 1), the bar **63**, the slide **58** and the lever **53**, are restored to the initial position shown in FIG. 1. The sector **99** is now relatched in the position shown in FIG. 2 by the member **97**, while the pawl **104** is continuously reciprocated at each cycle of the shaft **27**.

If another cycle of the transmission shaft **88** is started during the step by step return movement of the sector **99**, the member **97** and the pawl **104** instantaneously release again the sector **99** which is rotated in a clockwise direction by the spring **100** until the tooth is arrested by the member **97**. The step by step return movement of the sector **99** is then initiated afresh as hereinbefore described.

What is claimed is:

**1.** In a start-stop teleprinter having a cyclically rotatable transmission shaft, a set of code receiving bars, and a printing control mechanism operable by a continuously rotating driving shaft through a one-cycle clutch adapted to be engaged in a predetermined angular position of said driving shaft, a bicolor ribbon control device comprising a further bar adapted to assume a first position when the teleprinter is not transmitting and to be brought into a second position by said transmission shaft when it is rotated, and a bicolor ribbon vibrator operable during the cycle of said clutch under the control of said further bar, wherein the improvement comprises:

(a) a delay device locked in a rest position when the teleprinter is not transmitting;

(b) means operable by said transmission shaft when it is so rotated to release said delay device;

(c) means operable by said driving shaft to restore said delay device so released step by step to said rest condition;

(d) and means operable by said delay device upon being restored a predetermined number of steps to return said further bar to said first position.



**2.** A control device according to claim **1**, comprising in combination:

(a) an abutment normally disengaged from said vibrator,

(b) and means connecting said abutment with said further bar so as to locate said abutment into a position in which it limits the stroke of said vibrator when said further bar is brought into said second position.

**3.** In a start-stop teleprinter having a cyclically rotatable transmission shaft, a set of code receiving bars,, and a printing control mechanism operable by a continuously rotating driving shaft through a one-cycle clutch adapted to be engaged in a predetermined angular position of said driving shaft, a bicolor ribbon control device comprising a further bar adapted to assume a first position when the teleprinter is not transmitting and to be brought into a second position by said transmission shaft when it is rotated, and a bicolor ribbon vibrator operable during the cycle of said clutch under the control of said further bar, wherein the improvement comprises:

(a) a spring urged toothed sector,

(b) a latch member normally latching said toothed sector in a rest position against the urge of said spring,

(c) a cam on said transmission shaft adapted to render said latch member temporarily inoperative,

(d) a pawl operable by said driving shaft to restore said toothed sector step by step to said rest position,

(e) a release member operated by said cam for causing said latch member and said pawl to temporarily release said toothed sector,

(f) means operable by said driving shaft to continuously reciprocate said pawl,

(g) and means operable by said toothed sector upon being restored a predetermined number of steps to return said further bar to said first position.

**4.** A control device according to claim **3**, comprising in combination:

(a) a first set of teeth on said toothed sector, a tooth of said set being normally latched by said latch member,

(b) a second set of teeth on said sector adapted to be engaged by said pawl, said two sets of teeth being angularly offset from one another by half a tooth pitch,

(c) and an abutment on said sector adapted to be arrested when said toothed sector is so released.

**5.** A control device according to claim **4**, comprising in combination:

(d) a connecting member adapted to be moved by said cam through a predetermined stroke,

(e) a cam slot on said connecting member,

(f) a control element riding in said cam slot for controlling said latch member and said pawl in the first part of the stroke, and

(g) an intermediate member connected with said further bar and engageable by said connecting member in the second part of said stroke to displace said further bar to said second position.

**6.** A control device according to claim **5**, comprising in combination:

(h) an element secured to said toothed sector and adapted to engage said intermediate member when said toothed sector effects the last return step to return said further bar to said first position.

No references cited.

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