Oct. 19, 1965 H. A. STICKEL 3,213,425

SINGLE DIGIT SELECTOR

Filed March 26, 1962 4 Sheets-Sheet 1

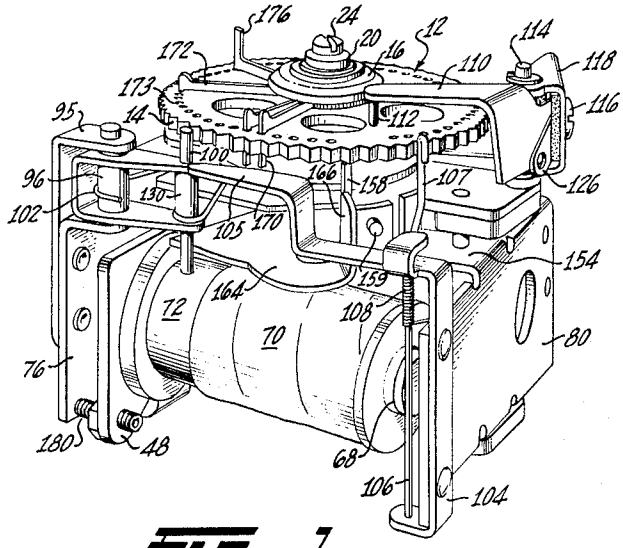


Fig. 1

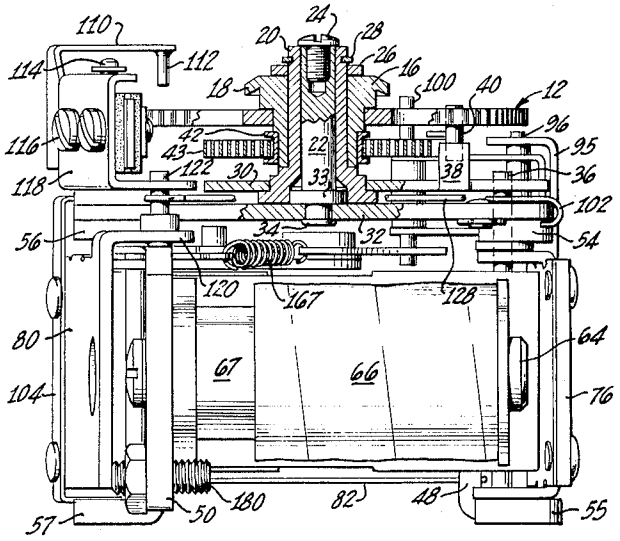


Fig. 2

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Oct. 19, 1965 H. A. STICKEL 3,213,425

SINGLE DIGIT SELECTOR

Filed March 26, 1962 4 Sheets-Sheet 2

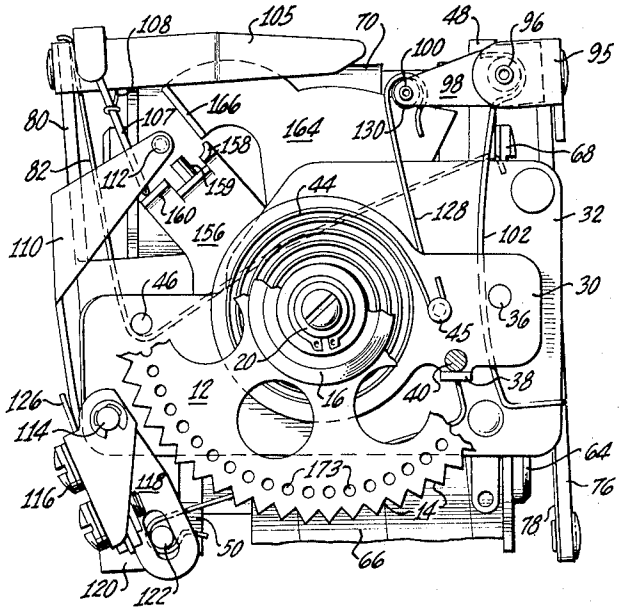


Fig. 3

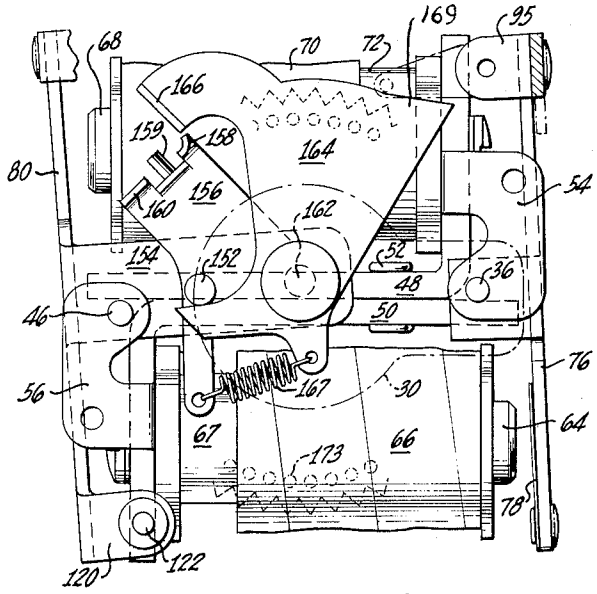


Fig. 4

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Oct. 19, 1965 H. A. STICKEL 3,213,425

SINGLE DIGIT SELECTOR

Filed March 26, 1962 4 Sheets-Sheet 3

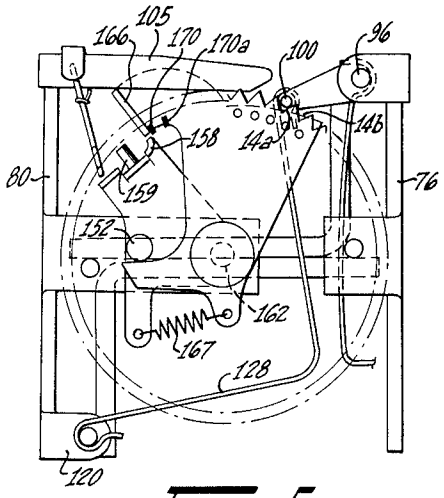


Fig. 5

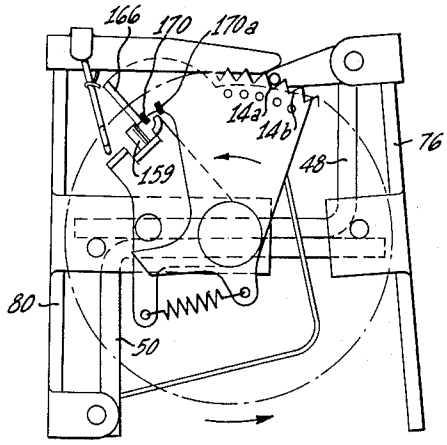


Fig. 6

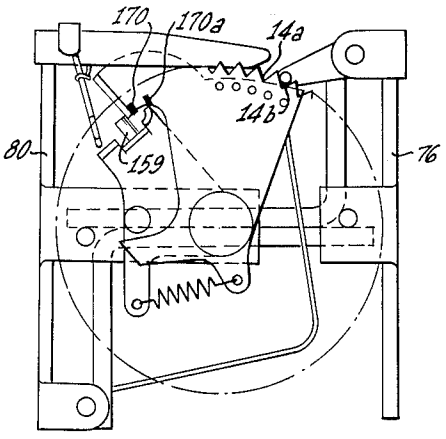


Fig. 7

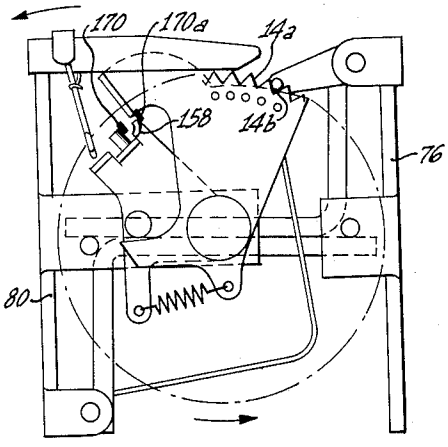


Fig. 8

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Oct. 19, 1965 H. A. STICKEL 3,213,425

SINGLE DIGIT SELECTOR

Filed March 26, 1962 4 Sheets-Sheet 4

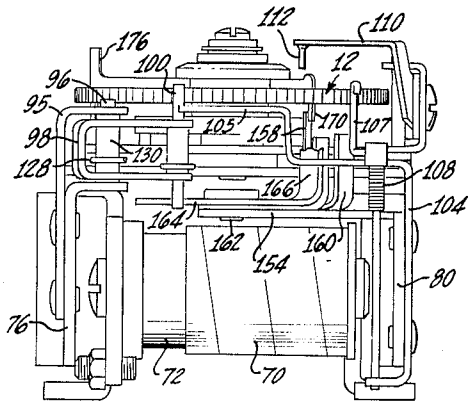


Fig. 9

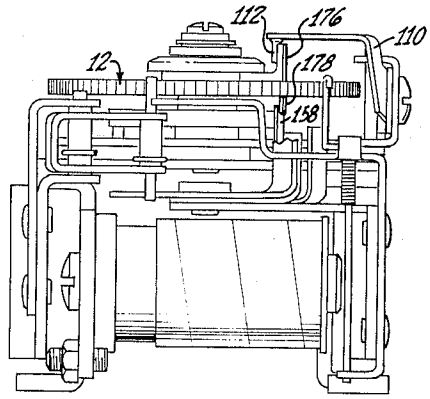


Fig. 10

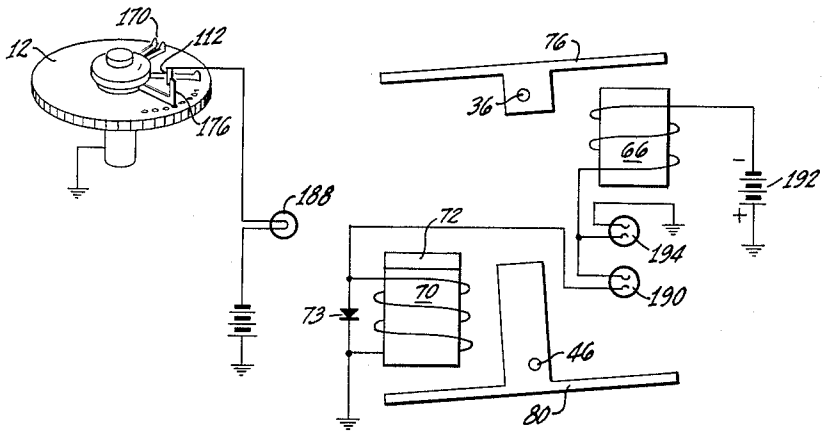


Fig. 11

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United States Patent Office 3,213,425
Patented Oct. 19, 1965

3,213,425

SINGLE DIGIT SELECTOR

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Filed Mar. 26, 1962, Ser. No. 182,557
6 Claims. (Cl. 340—164)

This invention relates in general to a selective signal receiving device and more particularly to a device capable of receiving a coded electrical signal consisting of a series of integers which may include the number 1.

Various devices have been described for receiving and decoding electrical signals consisting of a series of integers. Such devices find utility as call selectors in communications systems, e.g., telephone systems having a common wire and also in telemetering and remote control systems. See, for example, United States Patents 2,575,198; 2,595,614; and 2,947,974. Structures of the patents mentioned all have the common deficiency that they are not capable of responding accurately to integer signals containing the digit 1.

It is therefore an object of this invention to provide a selective signal receiving device which is capable of responding accurately to signals containing the integer 1, thereby making available a substantially larger number of integer signal combinations than has been available heretofore.

It is a further object of this invention to provide an electro-mechanical selective signal receiving device which is so constructed that incorrect signals cause a minimum of unnecessary motion of moving parts thereof whereby to minimize wear and maximize the useful life of the code selector.

Other objects and advantages of this invention, if not specifically set forth, will become apparent during the description which follows.

In the drawings:

FIGURE 1 is a perspective view of a preferred embodiment of the present invention.

FIGURE 2 is a partially sectional side elevational view of the structure of FIGURE 1 taken generally from the opposite side of the device shown in FIGURE 1.

FIGURE 3 is a plan view of the structure of this invention with the code plate partially broken away.

FIGURE 4 is a plan view similar to FIGURE 3 with additional parts removed whereby to reveal further the interior structure.

FIGURES 5–8 are shematic representations of the relationships of various of the moving parts at different stages during the operation of the device.

FIGURES 9 and 10 are partial side elevations showing various of the moving parts at different stages during the operation of the device.

FIGURE 11 is a diagram of a wiring arrangement.

Fundamental to the decoding procedure is the movement of a memory element or code plate from one bit or pulse position to the next by means of a drive unit control by the incoming pulses whether from a communication channel or from a pulse generator so that the incoming signal may be compared bit by bit, pulse by pulse with the code stored in the memory element. Coincidence between the incoming signal and the code stored in the memory element causes the memory element to be placed in a position which will produce an alarm signal. When so used, the following actions take place: provided that the conditions of pulse rate, pulse amplitude, percent mark time, etc., are within tolerance limits, the coded pulse selector is discriminatory only in the sense that it counts pulses in the order which they come in and compares the individual digit count to the digit count of a code which has been preset into the

memory. If each digit or consecutive train of pulses coming into the selector is identical to the digits of a code stored in the memory, the selector will code and provide an alarm signal by making an electrical contact; but not if any digit in the incoming signal is not identical in pulse count and digital position to the code which is set into the memory element.

If any stored digit at a given position in the memory element does not coincide with the incoming digits, advancement of the memory element is stopped, and the memory element is moved to the start of the first digit position which will in effect reject the incoming signal by precluding full advancement of the memory element. During the train of pulses the memory element is allowed to move only unidirectionally, the drive unit providing the forward motion and the latch unit preventing retrograde motion of the memory element. Either of two conditions will cause the memory element to reset, and thus reject the coded signal: (1) When the pulse train on any given digit of an incoming signal ceases before complete advancement of the memory element to the next digit position. This is known as "undercount." (2) Continuation of the pulse train by one or more bit positions beyond the next digit position; this is known as "overcount."

Condition (2) requires that some means be provided to prevent the memory element from advancing beyond the next digit position to preclude the possibility of moving the memory element to the digit position next in line. This is known as "overcount" protection.

In the device to be described in greater detail hereinafter, there is provided a movable control plate and propelling means for the control plate. The control plate carries two or more preset pins, and plate and pins together constitute the aforementioned memory element. The propelling means incorporates a pawl for engaging the control plate and driving the plate in small uniform increments and a pulsing armature operatively associated with the pawl whereby at the outset of each pulse of the pulsing armature, the pawl is withdrawn from engagement with the control plate and released for re-engagement with the control plate at the termination of the pulse. Advancement of the control plate is assured by the provision of a resilient means which urges the pulsing armature to a normal position on termination of the pulse, the resilient means moving the pulsing armature a sufficient distance to allow the pawl associated therewith to advance the control plate one of said uniform increments unless the control plate is blocked from advancing by the aforementioned "overcount" protection means. In this use the pawl is locked in engagement with the control plate and will urge the plate forward if the "overcount" protection means is deactivated. As in the devices described in the abovementioned patents, means are provided for assuring that the device is receptive to a predetermined code signal composed of a series of integers and at the completion of the predetermined series of integers, a contact element carried by the control plate permits a circuit to be closed whereby to operate an electrical switch or mechanism at a remote station to energize a visual or oral signal or to perform some function.

The device of the present invention differs functionally from those most closely related which have been available heretofore in that it is capable of responding correctly to integer signals containing the digit 1. In structures available heretofore, it has always been necessary that the preset pins be positioned at least two of the aforementioned uniform increments apart. In these structures, if the pins were only one increment apart, an incorrect code sequence incorporating, for example,

the integer 7 could be responded to where the decoder actually had been preset to the sequence 6–1. In other words, under certain circumstances the device could not discriminate between code signals incorporating two integers in sequence, the last of which was the digit 1, such as 5–1, and signals which incorporated at a particular position in the code sequence an integer which was the sum of the aforementioned two numbers in sequence, 6.

Referring now to the drawings wherein like characters refer to like parts throughout, there is shown a control element or plate **12** having a series of equidistantly spaced notches **14** about the periphery thereof. The plate is mounted about a hub **16** (see FIGURE 2) having a collar **18** thereon. The hub **16** is loosely mounted for rotation about sleeve **20** which is supported by spindle **22**, in turn tapped for receipt of screw **24** which serves as means for holding the sleeve **20** thereon. Circular washer **26** is held in place by the split washer **28** which retains hub **16** in place about the sleeve **20**. Plate **30** is fixed about the lower portion of sleeve **20** and will not rotate relative thereto while spindle **22** is fixed to plate **32** by means of cooperating flange **33** and head **34**. A nylon stud **36** passes through plates **30** and **32** so as to prevent relative rotation thereof. Plate **30** is provided with an upstanding flange **38** which cooperates with depending pin **40**, in turn, secured on the underside of the code plate **12** to prevent clockwise movement of the code plate **12** beyond a predetermined point.

Channel-shaped collar **42** frictionally engages hub **16**. The outstanding flanges of the collar grasp and hold the innermost portion of spiral spring **44** in place. The other end of the spring is crimped about pin **45**, in turn mounted on plate **30** (see FIGURE 3). Thus, the spring tends to rotate the code plate **12** in a clockwise direction until rotation is stopped through the action of flange **38** and pin **40**.

Plate **32** is secured to the frame of the device by stud **36**, aforementioned, and by means of an additional stud **46** (see FIGURE 3). As may best be seen in FIGURE 4, the frame consists of a pair of L-shaped steel members **48** and **50** held in a back-to-back relationship by rivet **52**. L-shaped member **48** is provided with brackets **54** and **55** (FIG. 2) and L-shaped member **50** is provided with brackets **56** and **57** (FIG. 2), each of which serve to support additional parts to be described hereinafter.

Secured to the short arm of L-shaped frame member **50** is stud **64** which supports inductor **66** and nylon spacer **67**. In like fashion, stud **68** is secured to frame member **48** and supports inductor **70** thereon. Inductor **70** is provided with means for slowing the collapse of magnetic flux when the flow of current is ceased therethrough, a copper slug **72** and/or rectifier **73** (FIG. 11) being suitable means of achieving this. Pivoted to brackets **54** and **55** by means of nylon pin **36** is armature **76** which preferably has rivetted thereto a brass facing plate **78**. To the opposite side of the device is pivoted slow-releasing armature **80** by means of pin **46** passing through holes in brackets **56** and **57**. Spring **82** is secured at one end thereof adjacent bracket **55** and to the slow-moving armature at the other whereby to urge the slow-moving armature away from the inductor **70**.

Armature **76** supports a bracket **95** on the opposite end thereof through which passes pin **96** about which pivots yoke **98** which in turn supports driving pawl **100**. Spring **102** is crimped about pin **96** at one end and crimped at the other end thereof about plate **32** (see FIGURES 2 and 3) and provides sufficient tension to return the armature **76** to a rest position when current flow through inductor **66** is terminated and the field thereof collapses. The driving pawl **100** thus advances the code plate **12** the width of one notch **14** immediately following collapse of the magnetic flux in the inductor **66**, the plate being driven through the reaction of spring **102**. The pawl is withdrawn from the notch when current is first supplied to the inductor. The result is a more uniform driving action than has been possible with the structures of the aforementioned patents in that the spring can be depended upon to move the pawl in a uniform manner, independent of current fluctuations through the windings of inductor **66**.

Armature **80** also supports a number of moving parts. The bracket **104** has an extension **105** and pivotally mounted in the bracket **104** is the rod **106** which supports the pawl **107**. The spring **108** urges the pawl **107** inwardly so that it normally rests in one of the notches **14** of the code plate **12**. Contact arm **110**, having contact pin **112** thereon, is pivoted about pivot point **114**. Screws **116** are grounded to the armature and hold the arm **110** to U-shaped bracket **118**, in turn pivoted to plate **32** by means of stud **114**. The bracket **118** is loosely secured at the opposite end thereof to flange **120** of the slow-releasing armature **80** by means of sliding pin **122**. Action of the slow-releasing armature thus causes U-shaped bracket **118** to pivot about stud **114** and arm **110** is thus similarly pivoted. The arm **110** is insulated from bracket **118** by means of fiber insulators and is also insulated from screws **116**. A soldering lug **126** is positioned between one of the fiber insulators and the surface of arm **110**.

Spring **128** is crimped at one end about pin **122** and passes directly above plate **34**, thereafter to be crimped about the sleeve **130** which is mounted coaxially about driving pawl **100**. The spring serves to insure that the driving pawl is normally maintained in engagement with one of the notches **14** of the code plate **12**.

Attention is now directed to FIGURE 4 which is similar to FIGURE 3 but which, in addition, shows the internal structure of the device, code wheel **12**, plates **30** and **34** being removed. Pin **152** is supported by a horizontal bracket **154** which is mounted midway between the ends of armature **80**. Secured partially by means of pin **152** to horizontal bracket **154** is plate **156** having an upstanding ear **158** and an outstanding (horizontal) pin **159** thereon. A second upstanding ear **160** serves as the means for contacting pawl **107** (see FIGURE 3) whereby to cause retraction thereof when the slow-releasing armature **80** returns to its normal position. Pivoted to plate **156** by means of pin **162** is a second plate **164** having an arcuate arm thereon from which extends an upright blocking element or flag **166**. Pin **162** also passes through the other end of the plate **156** and with pin **152** prevents movement of plate **156** relative to plate **154**.

Coil spring **167** is secured at either end thereof to the fingers of plates **156** and **164** so as to urge plate **164** in a clockwise direction relative to plate **156** until stopped by the action of pin **152**, as seen in FIGURE 4. Horizontal pin **159** is so positioned on plate **156** that it will contact upstanding flange **166** when the latter is pivoted to a point just beyond ear **158**, as shown in FIGURE 6 and preferably a radial distance which is equivalent to less than two notches of the code plate. Most preferably, the pin **159** or other functionally equivalent blocking means is so placed that the flag **166** can be pivoted a distance equal to just one notch **14** of the code plate **12**. Plate **164** is provided with a tangential extension **169** which is closely adjacent a downwardly depending portion of the pawl **100** and it may be seen that when the plate **164** is rotated in a counterclockwise direction, the pawl will be moved away from one of the notches **14** of the plate **12** against the resistance of spring **128**.

The code wheel **12** is provided with one or more downwardly depending pins **170** (see FIGURE 1) which represent the lowermost extremities of L-shaped coding elements **172**. A plurality of holes **173** are provided about the periphery of the code wheel **12** whereby to permit the re-positioning of the individual code pins **170** so as to make possible a selection of a wide variety of codes, precisely as described in Patent 2,947,974. There is also provided a contact pin having an upstanding portion **176** and a downwardly depending portion **178**, again similar

to the structure shown in the aforementioned patent. The location of this contact pin may also be changed at will so as to provide a variety of terminal digits. One end of each pin is forced between collar **18** and the surface of code plate **12** so as to retain the pins frictionally in the desired positions. The blocking element or flag **166** is so positioned relative to the downwardly depending pins **170** and **178** that the flag **166** will be contacted thereby as the code wheel is rotated.

Suitable adjustment screws, **180**, are provided for purposes of adjusting the throw of both the slow-releasing armature **80** and the pulsing armature **76**.

The device is adjusted so that the slow-releasing armature will not release between cycles within a code group but will release between code groups. Thus, the length of each pulse is not critical but the space between pulses within a code group must not exceed the retention time of the slow-releasing armature, while the space between code groups is not critical so long as it is long enough to allow the slow-releasing armature to assume a partially released position, as will be described hereinafter.

A code is selected as, for example, the 5–1–10–7 shown in FIGURE 1 and the armatures **76** and **80** are in the rest position of FIGURE 11 and the code wheel **12** is in a fully clockwise position, as seen in FIGURE 1. An open circuit telephone dial of the type shown in FIGURE 7 of the Stickel Patent 2,575,198, and here identified as **190**, dialed to the digit 5. Battery **192** serves as a source of direct current and five discrete current pulses are applied to inductor **66** with the result that the armature **76** is pulsed five times. At the outset of the first pulse, pawl **100** is urged into a notch **14** by the action of spring **128** and arm **105**, as seen in FIGURE 6. Inductor **70** is wired in series with inductor **66** and, therefore, the slow-moving armature **80** is also attracted to one end of the coil **70**. The flux of coil **70** decays at a slower rate than that of coil **66** following cessation of current flow due to the action of slug **72** and/or rectifier **73**. Thus, armature **80** remains continually in a closed position as armature **76** pulses the prescribed number of times. After each pulse, pawl **107** is urged into one of the notches **14** so as to prevent the code wheel **12** from being reset. Following receipt of four pulses, the relationship of certain of the moving parts will be that shown in FIGURE 5 with the lowermost portion of pin **170** approaching the blocking member or flag **166**. On receipt of the fifth pulse, the blocking member is swung counterclockwise about pivot point **162**, as shown in FIGURE 6. Cessation of the rapid series of pulses allows slow-moving armature **80** to retract somewhat to a partially released position with the result that blocking member **166** is swung out of the path of pin **170**. Upstanding ear **158** then contacts the pin **170**, as shown in FIGURE 9, so as to prevent the slow-releasing armature **80** from returning fully to its original rest position, the upstanding ear **158** being, as aforementioned, supported by plate **156**, the action of which is also dependent upon slow-releasing armature **80**. Had a signal of less than five been received, contact between pin **170** and ear **158** would not have been achieved as pin **170** would not have been in the path of ear **158** on release of slow-moving armature **80** and the slow-releasing armature would have returned to its original rest position, thereby retracting pawl **107** from one of notches **14** and allowing code wheel **12** to be reset under the influence of spring **44**. Had a larger number than five been received, passage of pin **170** would have been blocked by the action of blocking member or flag **166** which, at no time, would have had an opportunity to pivot to one side through partial release of armature **80**. The pin **159** stops the rotation of flag **166** when pin **170** is on the same radius line of the wheel **12** as at least a portion of upstanding ear **159**. Preferably, the flag **166** pivots a distance equivalent to the distance covered when the wheel **12** is advanced the width less than two notches, and most preferably, one notch and is returned to the position shown in FIGURE 1 by a spring **167** at the time the code wheel returns to its rest position. However the distance that flag **166** pivots is of no great importance as long as, at the conclusion of the pivoting action, the relationship of flag **166**, pin **170***a* and ear **158** is as shown in FIGURE 6. If further pivoting of flag **166** were permitted, release of the slow-moving armature **80** would permit ear **158** to come into contact with the second of pins **170***a*, thus responding to the incorrect digit 6 rather than solely the correct sequence of 5–1. In the preferred structure shown in FIGURES 5–8, following receipt of five sequential pulses, the relationship of parts is as shown in FIGURE 5. Pawl **100** is in notch **14***a* of code wheel **12** and spring **102** is urging armature **76** in a counterclockwies direction. The flag **166** is contacted by pin **170***a* and pivots a distance equivalent to one notch's width as spring **102** urges the pawl forward (see FIGURE 6). Another pulse causes the pawl **100** to be withdrawn and to engage notch **14***b* of code wheel **12**. The pawl **100**, as shown in FIGURE 7, cannot disengage itself from the notch **14***b* since it is already pivoted to a maximum clockwise extent while the spring **102** urges it in a counterclockwise direction exerting pressure on the pawl through assembly **98**, thus continuing to urge or bias the code wheel forwardly one notch. But such motion is prevented by the fact of ear **166** being pivoted to the point of contact with pin **159** and hence, until such time as the slow-moving armature **80** is permitted to return to a rest position on cessation of the current flow through the inductor **70**, the pulsing armature **76** will remain in a relatively fixed position wherein one end thereof is closely adjacent the inductor **66**. A further series of pulses through inductor **66** thus does not tend to wear the pivot points of armature **76** as no further substantial motion thereof can be accomplished until code wheel **12** is reset. This is accomplished by releasing slow-moving armature **80**, thereby withdrawing flag **166** from the path of the pin **170** with the result that spring **102** urges the pulsing armature **76** into a rest position, thereby causing the pawl **100** to advance the code wheel. The ear **158** which has previously been engaged with pin **170** and which is necessarily narrower than the space between two adjacent pins **170** and **170***a* mounted in adjacent holes of the code wheel passes between these two pin ends during the single notch advancement of the code plate. See FIGURE 8 which shows this taking place. The code wheel is thus released and is reset under the influence of spring **44**. If the upstanding ear **158** is slightly bent as shown in FIGURE 4, this will facilitate passage of the ear between adjacent pins **170** and **170***a* by insuring against the possibility of the ear becoming engaged with the second of the pins **170***a* rather than passing between the two adjacent pins.

When the correct code is dialed, in this case 5–1–10–7, the code wheel advances to the first position represented by a code pin **170** positioned in the fifth hole of the wheel **12**. The pulses are interrupted long enough to allow the slow-moving armature **80** to release somewhat and the flag **166** is withdrawn from the path of the first of the pins **170***a*. Thus, engagement between ear **158** and the first of the code pins **170***a* results, as shown in FIGURE 9. Continuation of the code sequence 1–10 causes repetition of the just-described sequence of events. As shown in FIGURE 1, the device here represented requires the digit 7 to complete the code. Optionally, downwardly depending pin **178** may advance and contact the blocking member **158** in the same manner as described above with respect to the pin **170**. However, on partial release of the slow-moving armature following the digit 7 the contact pin **112** supported by arm **110**, in turn dependent upon the movement of the slow-releasing armature **80**, is brought into direct contact with the upstanding portion **176** of the contact pin **174**. This condition is depicted in FIGURE 10. The circuit would thus be completed from the soldering lug **126**, through arm **110**, pin **112**,

pin 176 and finally through the body of the decoder to screw 116. As shown in FIGURE 11, current will then be supplied to lamp 188 and a signal made available for the operation of one or more switches or other mechanisms.

A pulse can be sent through inductor 66 without also passing through inductor 70 by the action of reset switch 194 and, since this does not cause the slow-moving armature to be pulsed, assures that there will be no interlocking between a pin 170 and upstanding ear 158 should there be a pin 170 in the next hole of the code plate 12. This permits the code wheel to be reset by a single pulse after receipt of a signal such as 5–1–10 which is similar to the code signal to which the selector is set, but which lacks one or more terminal integers thereof, thus causing the code wheel to be rotated to a partially advanced position as shown in FIGURE 9.

Obviously, many modifications and variations of the invention as hereinabove set forth may be made without departing from the spirit and scope thereof, and therefore only such limitations should be imposed as are indicated in the appended claims.

I claim:

1. A selective code signal receiving device responsive to a predetermined group of pulses comprising:
(a) a movable control plate;
(b) means actuated by said pulses for advancing said control plate in step-wise increments from a normal position to an advanced position corresponding to a first pulse group having a predetermined number of pulses on receipt of said first pulse group, and thereafter from said advanced position to a farther advanced position corresponding to an additional pulse group having a predetermined number of pulses on receipt of said additional pulse group;
(c) means for preventing the advancement of said control plate beyond said first mentioned advanced position operative when the pulses in said first pulse group are in excess of the predetermined number of pulses in said first pulse group;
(d) and means for biasing said control plate in the direction of advancement when said means to prevent advancement of said control plate is operative, said biasing means being inoperative when said first pulse group corresponds to said first advanced position.

2. A selective code signal receiving device comprising:
(a) a movable control plate having a series of equidistantly spaced notches along an edge thereof;
(b) a pawl for engaging the said notches and driving the said control plate solely in notch-wide increments from a normal position to an advanced position on receipt of a first pulse group, and thereafter from said advanced position to a farther advanced position on receipt of an additional pulse group;
(c) means for normally holding said pawl in engagement with a notch of said control plate;
(d) pulsing means connected to the said pawl whereby at the outset of each pulse, said pawl is withdrawn from one of said notches and engaged with a previous notch of said plate;
(e) resilient means urging said pulsing means to a normal position on termination of each of said pulses whereby to urge said pawl to advance said control plate one notch and to continue to bias said control plate in a forward direction if advance of said control plate for at least the width of one notch is blocked;
(f) a member carried by said control plate at a point corresponding to said first mentioned advanced position of said control plate;
(g) a slow-releasing element responsive once to a pulse group and releasing upon the completion of said group;
(h) a blocking element carried by said slow-releasing element, said blocking element obstructing the path of the said member when the said slow-releasing elemen is actuated and moving out of the path of the said member upon a partial release movement less than full release of the said slow-releasing element, said blocking member being pivoted to said slow-releasing element whereby to permit said blocking member to pivot a small distance less than the distance covered by said control plate as the result of two pulses;
(i) a second pawl responsive to the position of the slow-releasing element to engage said movable control plate and prevent retrograde movement of the control plate except when the slow-releasing element is fully released;
(j) a contact member carried by said control plate;
(k) and a second contact member fixed generally in the path of said first contact member, said contact members being so positioned that when said control plate is at said farther advanced position, said contact members are adjacent one another.

3. A selective code signal receiving device comprising:
(a) a movable control plate having a series of equidistantly spaced notches along an edge thereof and a plurality of holes therein each one notch apart;
(b) a pawl for engaging the said notches and driving the said control plate solely in notch-wide increments from a normal position to an advanced position on receipt of a pulse group, thereafter from said advanced position to a subsequent advanced position on receipt of an additional pulse group, and thereafter to a farther advanced position on receipt of a last pulse group;
(c) means for normally holding said pawl in engagement with a notch of the said control plate;
(d) pulsing means connected to said pawl whereby at the outset of each pulse said pawl is withdrawn from one of said notches and engaged with a previous notch of said plate;
(e) resilient means urging said pulsing means to a normal position on termination of each of said pulses whereby to urge said pawl to advance said control plate one notch and to continue to bias said control plate in a forward direction if advance of said control plate for at least the width of one notch is blocked;
(f) members mounted in adjacent holes of the said control plate at points corresponding to said two first-mentioned advanced positions of said control plate;
(g) a slow-releasing element responsive once to a pulse group and releasing upon the completion of said pulse group;
(h) a blocking element carried by said slow-releasing element, said blocking element obstructing the path of the said members when the said slow-releasing element is actuated and moving out of the path of said members upon a partial release movement less than full release of the said slow-releasing element, said blocking member being pivoted to said slow-releasing element for pivotal movement through a small distance less than the distance covered by said control plate as a result of two pulses;
(i) a second pawl responsive to the position of the slow-releasing element to engage said movable control plate and prevent retrograde movement of the said control plate except when the slow-releasing element is fully released;
(j) a contact member carried by said control plate at a point corresponding to said last advanced position;
(k) and a second contact member fixed generally in the path of said first contact member, said contact members being so positioned that when said control element is at said last advanced position, said contact members are adjacent one another.

4. A selective code signal receiving device comprising:

(a) a movable control plate having a series of equidistantly spaced notches along an edge thereof and a plurality of holes therein each one notch apart;

(b) a pawl for engaging the said notches and driving the said control plate solely in notch-wide increments from a normal position to an advanced position on receipt of a pulse group, thereafter from said advanced position to a subsequent advanced position on receipt of an additional pulse group, and thereafter to a farther advanced position on receipt of a last pulse group;

(c) means for normally holding said pawl in engagement with a notch of the said control plate;

(d) pulsing means connected to said pawl whereby at the outset of each pulse said pawl is withdrawn from one of said notches and engaged with a previous notch of said plate;

(e) resilient means urging said pulsing means to a normal position on termination of each of said pulses whereby to urge said pawl to advance said control plate one notch and to continue to bias said control plate in a forward direction if advance of said control plate for at least the width of one notch is blocked;

(f) members mounted in adjacent holes of the said control plate at points corresponding to said two first-mentioned advanced positions of said control plate;

(g) a slow-releasing element responsive once to a pulse group and releasing upon the completion of said pulse group;

(h) a blocking element carried by said slow-releasing element, said blocking element obstructing the path of the said members when the said slow-releasing element is actuated and moving out of the path of said members upon a partial release movement less than full release of the said slow-releasing element, said blocking member being pivoted to said slow-releasing element for pivotal movement through a small distance less than the distance covered by said control plate as a result of two pulses;

(i) a second pawl responsive to the position of the slow-releasing element to engage said movable control plate and prevent retrograde movement of the said control plate except when the slow-releasing element is fully released;

(j) a contact member carried by said control plate at a point corresponding to said last advanced position;

(k) a second contact member fixed generally in the path of said first contact member, said contact members being so positioned that when said control element is at said last advanced position, said contact members contact one another;

(l) and means mounted on said slow-releasing element for engaging said members mounted on said control plate and preventing full release of said slow-releasing element when in engagement therewith, said means being capable of passing between said members held in adjacent holes of said control plate.

5. An electric, selective code signal receiving device comprising:

(a) a circular, rotatably mounted biased control plate having a series of notches evenly spaced about the periphery thereof and a plurality of holes also about the periphery thereof spaced one notch apart;

(b) a pawl for engaging the said notches and driving said control plate solely in notch-wide increments from a normal position to an advanced position on receipt of a first pulse group, thereafter to a subsequent advanced position on receipt of an additional pulse group and thereafter to a last advanced position on receipt of a last pulse group;

(c) means for normally holding said pawl in engagement with a notch of the said control plate;

(d) a pulsing armature connected to the said pawl whereby at the outset of each pulse of said pulsing armature, said pawl is withdrawn from one of said notches and engaged with a previous notch of said plate;

(e) resilient means urging said pulsing armature to a normal poistion on termination of each of said pulses whereby to cause said pawl to advance said control plate one notch and to continue to bias said control plate in a forward direction if advance of said control plate for at least the width of one notch is blocked;

(f) members mounted in adjacent holes of said control plate at points corresponding to said two first-mentioned advanced positions of said control plate;

(g) a slow-releasing armature responsive once to a pulse group and releasing upon completion of said group;

(h) each of said armatures being operatively associated with an inductor;

(i) a blocking element carried by said slow-releasing armature, said blocking element obstructing the path of said members carried by said control plate when the said slow-releasing armature is actuated and moving out of the path of said members upon a partial release movement less than full release of the said slow-releasing armature, said blocking member being pivoted to said slow-release armature for pivoting movement through a distance at least equivalent to a distance covered by said control plate as the result of a single pulse of the pulsing armature and less than the distance covered by said control plate as the result of two pulses of the said pulsing armature;

(j) a second pawl responsive to the position pawl of the slow-releasing armature to engage said movable control plate and prevent retrograde movement of the control plate except when the slow-releasing armature is fully released;

(k) means mounted on said slow-releasing armature for engaging said members carried by the said control plate and preventing full release of said slow-releasing armature when in engagement therewith, said means being narrower than the distance between two adjacent holes on the said control plate;

(l) a contact member carried by said control plate at the said last advanced position;

(m) and a second contact member fixed generally in the path of said first contact member, said contact members being so positioned that when said control plate is at said last advanced position, said contact members contact one another.

6. An electric, selective code signal receiving device comprising:

(a) a circular, rotatably mounted biased control plate having a series of notches evenly spaced about the periphery thereof and a plurality of holes also about the periphery thereof spaced one notch apart;

(b) a pawl for engaging the said notches and driving said control plate solely in notch-wide increments from a normal position to an advanced position on receipt of a first pulse group, thereafter to a subsequent advanced position on receipt of an additional pulse group and thereafter to a last advanced position on receipt of a last pulse group;

(c) means for normally holding said pawl in engagement with a notch of the said control plate;

(d) a pulsing armature connected to the said pawl whereby at the outset of each pulse of said pulsing armature, said pawl is withdrawn from one of said notches and engaged with a previous notch of said plate;

(e) resilient means urging said pulsing armature to a normal position on termination of each of said pulses whereby to cause said pawl to advance said control plate one notch and to continue to bias said control plate in a forward direction if advance of said control plate for at least the width of one notch is blocked;

(f) members mounted in adjacent holes of said control

plate at points corresponding to said two first-mentioned advanced positions of said control plate;

(g) a slow-releasing armature responsive once to a pulse group and releasing upon completion of said group,

(h) each of said armatures being operatively associated with an inductor;

(i) a blocking element carried by said slow-releasing armature, said blocking element obstructing the path of said members carried by said control plate when the said slow-releasing armature is actuated and moving out of the path of said members upon a partial release movement less than full release of the said slow-releasing armature, said blocking member being pivoted to said slow-release armature for pivoting movement through a small distance less than the distance covered by said control plate as the result of two pulses of the said pulsing armature;

(j) a second pawl responsive to the position pawl of the slow-releasing armature to engage said movable control plate and prevent retrograde movement of the control plate except when the slow-releasing armature is fully released;

(k) means mounted on said slow-releasing armature for engaging said members carried by the said control plate and preventing full release of said slow-releasing armature when in engagement therewith, said means being narrower than the distance between two adjacent holes on the said control plate;

(l) a contact member carried by said control plate at the said last advanced position;

(m) a second contact member fixed generally in the path of said first contact member, said contact members being so positioned that when said control plate is at said last advanced position, said contact members contact one another;

(n) and means for separately applying an electrical pulse to said inductor associated with said pulsing armature without applying an electrical pulse to said inductor associated with said slow-releasing armature.

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