

July 30, 1946.

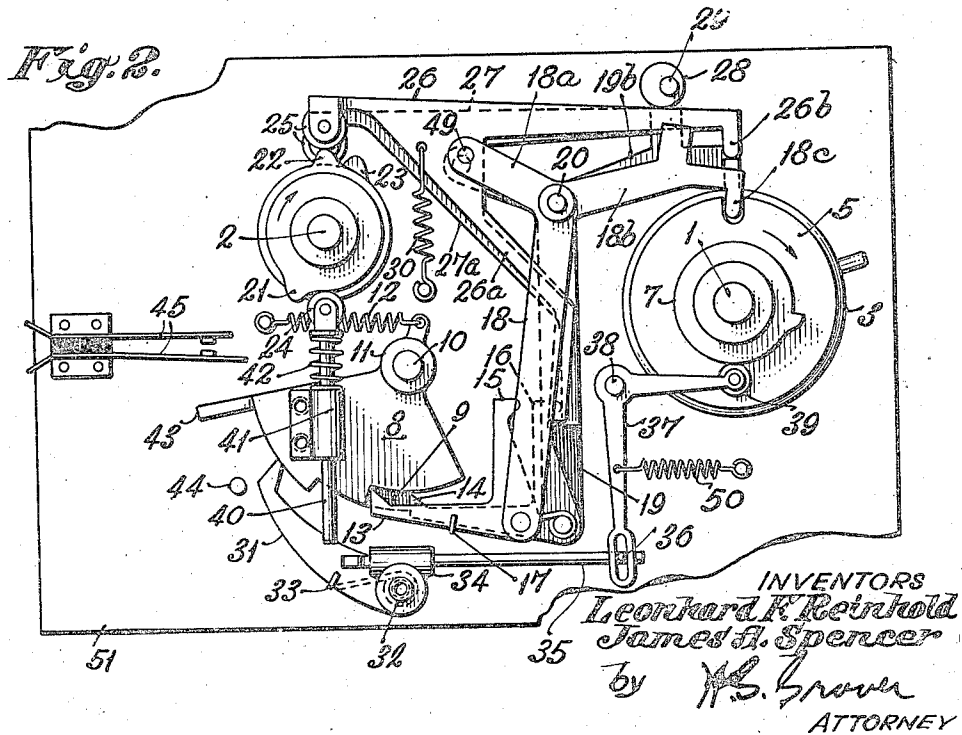
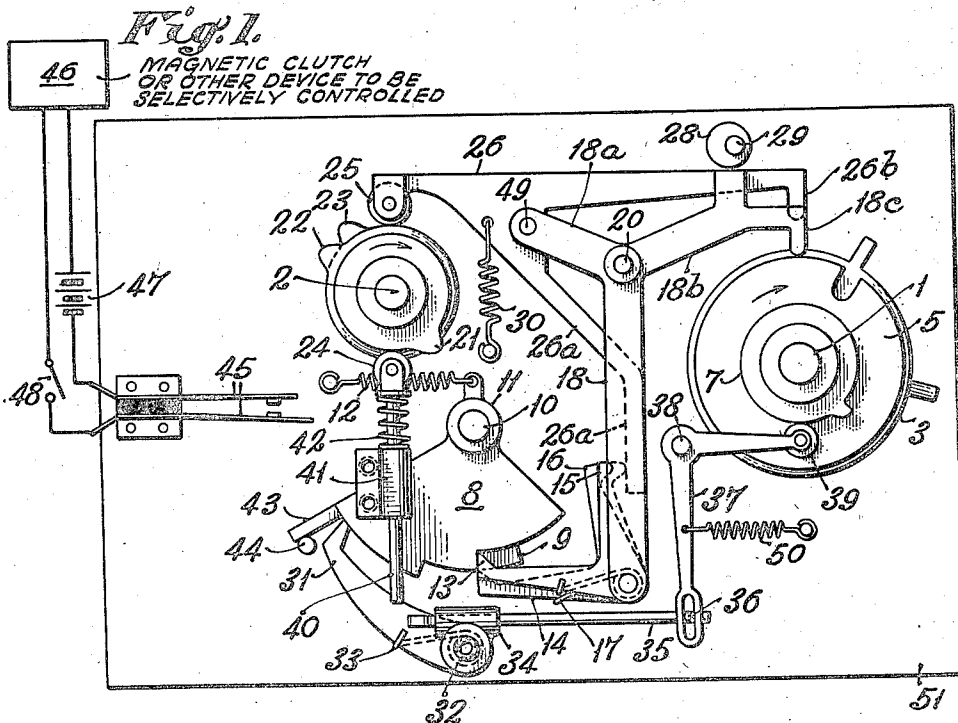
L. F. REINHOLD ET AL

2,404,814

SELECTOR

Filed Jan. 24, 1945

2 Sheets-Sheet 1



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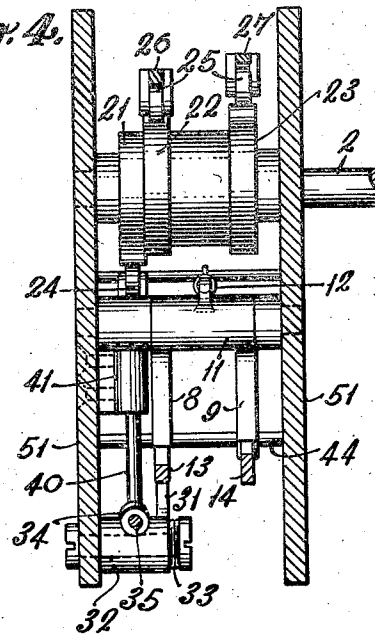
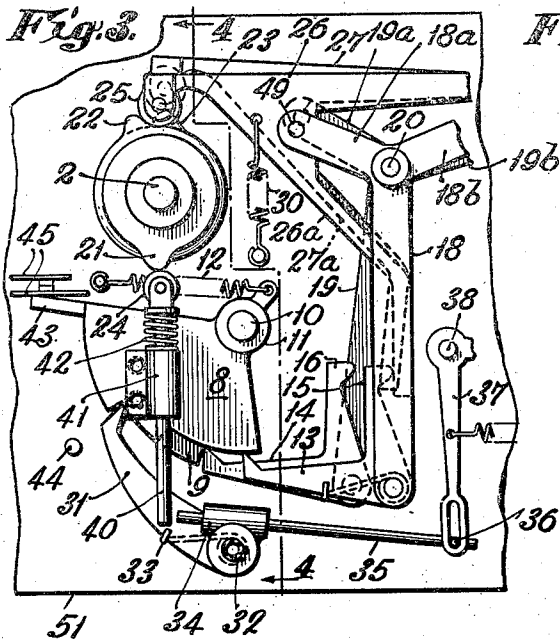
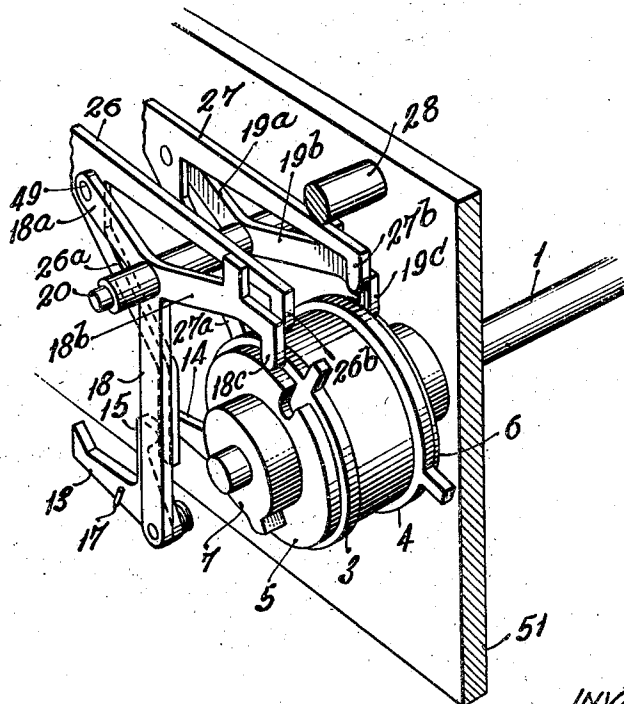


Fig. 5.



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SELECTOR

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10 Claims. (Cl. 178—69.6)

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This invention relates to selectors and more particularly to a device for conditioning apparatus to be controlled from a remote point.

In the printing telegraph art, as well as in the art relating to remotely controlled indicators, recorders and switching mechanisms, it is frequently required that a station selector be provided for conditioning the receiving apparatus to function in response to code signals. This is especially true where such apparatus is normally to be held in a standby condition which would relieve it from continuous operation until after reception of a selecting signal.

Accordingly, it is an object of our invention to provide a selector which may be suitable as a station selector in a telegraph system or in any application of remote control principles to an indicator, a recorder or a switching mechanism.

It is another object of our invention to provide auxiliary equipment to be controlled by a code selecting receiver so that that receiver, although maintained normally in condition to respond to code signals, shall require further conditioning in order to translate traffic code signals into intelligence.

It is a further object of our invention to provide a station selector which responds to the cyclic setting of an orientable shaft in different positions which are permutationally varied for different stations so that individual stations may be selected from a remote point.

Still another object of our invention is to provide a plurality of selectors each associated with one of a group of receivers in a telegraph system, and each selector having means for responding to a train of code signals individual to itself. A feature of our selector meets a certain requirement that any unwanted selectors which may respond to a given code combination of a series of code signals shall be tripped out of action upon receipt of a subsequent code combination. Thus only the one selector which is set to respond to a predetermined series of code combinations, step by step, will be conditioned for further functioning. The other selectors of the group will automatically drop out.

Our invention will now be described in more detail, reference being made to the accompanying drawings in which

Fig. 1 shows a system of cams and levers for producing selective responses to code signals and for producing an ultimate response by way of closing a circuit when the selecting function has been completed;

Fig. 2 shows the same structure as in Fig. 1 ex-

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cept that certain of the parts have been moved into operating positions;

Fig. 3 shows a fragmentary view of the structure as in Figs. 1 and 2, where a further step of operation is indicated;

Fig. 4 shows an edgewise view of the mechanism indicated in the other figures, this figure being a cross section on the line 4—4 of Fig. 3; and

Fig. 5 shows in perspective a portion of the selecting cam and associated levers.

As a background of art to which this invention relates reference is made to our co-pending application Serial Number 485,186 which was filed April 30, 1943, now U. S. Patent No. 2,375,828, patented May 15, 1945, covering a Printing telegraph receiver. In that application we described a typewheel printer having internally notched code rings which were arranged and adapted to be permutationally set in response to code signals for the purpose of orienting the printer typewheel. The typewheel shaft was caused to rotate to a printing position, the character was then printed, and the shaft was then rotated further to a homing position.

We now propose to utilize the principles of code signal selection as set forth in said co-pending application for the purpose of orienting a shaft 1 as shown in the drawings of the instant application. We also propose to utilize the structure, or its equivalent, as shown in said co-pending application for cyclically rotating an operating cam shaft 2, as shown in the drawings of the instant application. The code responsive mechanism forms no part of the instant invention and is not, therefore, shown or described herein. It is sufficient to understand that, in response to code signals as received at any given station, the shaft 1 may be rotated into a selecting position where it is arrested momentarily, and that, preceding and following the cycle of selective orientation of the shaft 1, the shaft 2 is rotated from a position of rest through one cycle and then stopped.

Any desired selecting function may be performed by the station selector as herein shown and described. The ultimate accomplishment of the selector may, for example, be the starting of a motor, or the tripping of a clutch, or the closing of a relay circuit.

Mounted on the shaft 1 are two discs 3, 4, each of which is formed with a digital projection, and two other discs 5 and 6, each of which is formed with a single notch in its periphery. The digit and notch of two discs 3 and 5 respectively are correspondingly oriented. The same is true with respect to the digit and notch of the discs 4 and

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6 respectively. At different receiving stations in a given system the angular displacements of the digits with respect to a reference point on the shaft 1 are varied so as to enable different call signals to be responded to by each station.

Another cam 7 is mounted on the shaft 1 and is used for restoring the selecting mechanism to normal.

A pair of step-cut plates 8 and 9 is shown rotatably mounted on a shaft 10. The two discs are fastened onto a hub 11 and are urged into a homing position by means of a spring 12. An operating pawl 13 is associated with the plate 8. A similar operating pawl 14 is associated with the plate 9. Pawls 13 and 14 have heel pieces 15 and 16 respectively which are positioned for engagement with restoring levers. Each of the pawls 13 and 14 is urged against the stepped face of its associated plate by means of a spring 17. These pawls are also pivotally mounted at the lower ends of operating levers 18 and 19 respectively.

The upper portions of levers 18 and 19 are somewhat Y-shaped. That is to say, they have extensions such as 18a and 18b, the functions of which will presently be described. At the end of extension 18b is a downwardly extending finger 18c which rides on the periphery of the cam 5 and may at times drop into the notch in this cam. There is also a downwardly extending finger 19c at the end of lever arm 19b as shown in Fig. 5. It rides on the cam 6 and may drop into a notch therein. The levers 18 and 19 are pivoted on a fixed shaft 20 which is secured to the frame plates 51.

The shaft 2 has mounted thereon three cams 21, 22 and 23, each of which has a single up-raised portion for controlling a cam follower. These cam followers are of roller formation and are shown respectively at positions 24 and 25. The two rollers 25 on the upper side of the shaft 2 are mounted respectively at the left ends (as viewed in the figures) of operating levers 26 and 27. These levers are pivotally mounted respectively on the arms 18a and 19a. Levers 26 and 27 each have downwardly extending arms 26a and 27a, and they have horizontally extending arms ending in fingers 26b and 27b. The fingers 26b and 27b are normally held sufficiently clear of discs 3 and 4 so that the digits on these discs may freely rotate beneath them. The clearance is, however, closely adjusted by means of a stop member 28 which spans the space between the frame plates 51 and is held by these plates in any desired position of adjustment about its eccentric bearings 29.

The rollers 25 are urged downwardly against the peripheries of the cams 22 and 23 by virtue of the spring tension in springs 30 which are fixedly mounted at the lower end and are hooked into the levers 26 and 27 respectively.

A holding pawl 31 is pivotally mounted on a shaft 32 and is urged against the periphery of the plate 8 by means of a spring 33. On the hub which carries the pawl 31 is a cylindrical member 34 which is drilled to receive a push-rod 35. At the right hand end of the push-rod 35 is a cross-pin 36 which is engaged in the slot of a bell crank 37. Bell crank 37 is pivotally mounted on a staff 38 and its right hand extension carries a cam follower roller 39 which is positioned in the same plane with, and rides on, the periphery of cam 7. A spring 50 is connected between one arm of the bell crank 37 and

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a stationary holding rod and serves to apply pressure between the roller 39 and the cam 7.

Cooperating with the cam 21 is a cam follower roller 24 which is mounted on the upper end of a push-rod 40. This push-rod is carried in a cylindrical housing member 41 which in turn is supported by the front one of the frame plates 51. A coiled spring 42 acts under compression to urge the cam follower roller 24 against the periphery of the cam 21.

The ratchet plate 8 is formed integrally with a projection 43 which normally rests on a stop pin 44 prior to being stepped forward in a clockwise direction. When, however, the plates 8 and 9 have been moved two steps the projection 43 engages one of the contact springs 45 for closing a circuit. Such a circuit may, for example, include a magnetic clutch 46, or other device to be selectively controlled. Power is supplied by a battery 47. A switch 48 is provided for opening the selecting circuit after the selecting operation has been completed. Of course the responsive device 46 may be of any desired type and may optionally be constituted as a bell, a motor, or an indicator, for example. Furthermore, when the ratchet plate 8 is moved to its second step it may be caused to actuate any sort of device mechanically instead of electrically.

The operating procedure

The operation of our selector may be illustrated by considering first that two code signals are successively received, one of which causes the shaft 1 to be rotated into position where the digit on cam 3 comes directly under the finger 26b and the notch in the disc 5 comes directly beneath the toe piece 18c. The operation presently to be described will be followed by the setting of the shaft 1 so that the digit on the disc 4 is aligned with the finger 27b at the end of lever arm 27, and the notch in the disc 6 comes directly beneath the toe piece 19c. Following each setting of the shaft 1 into a selecting position it is arrested for a sufficient time so that the selecting operation may be completed by the rotation of the cam shaft 2. After the performance of each selecting operation the shaft 1 is caused to be rotated to a homing position. The shaft 1, therefore, makes one complete but interrupted revolution in response to the reception of each code signal.

The code signals are received on a code translating device such as shown in our aforementioned co-pending patent application, Serial Number 485,186, operating as a start-stop device. The two shafts 1 and 2 are stationary until the selecting magnets of the code translator have been actuated. These shaft 1 and 2 are then simultaneously rotated, shaft 1 being given a greater velocity than that of shaft 2 so that any selected position around the circumference of the circle may be reached while shaft 2 rotates through substantially 180° more or less. Shaft 2 then brings its cams 22 and 23 up to the positions shown in Fig. 1, immediately subsequent to which the cam followers mounted on the levers 27 and 26 are successively lifted. Cam 23 has a hump which actuates lever 27 prior to the actuation of lever 26 by a similar hump on cam 22. If the first code signal to be received is such as to position the digit on disc 3 under the finger 26b, then lever 26 will be fulcrumed at the tip of finger 26b and will cause lever 18 to be rotated on its pivot bearing 20. This rotation of lever 18 is at this time permitted by the

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positioning of the notch in cam 5 so that it may be entered by the toe piece 18c. The result is to move the pawl 13 to the left and to rotate the ratchet disc 8 through an arc represented by one step, or the distance between the two steps of discs 8 and 9.

After the discs 8 and 9 have been moved one step, as above described, the shafts 1 and 2 are returned to their homing positions where they are de-clutched from their driving motor (not shown) until after reception of a second code selecting signal. Such a signal may, for example, result in the positioning of shaft 1 so that the digit on disc 4 comes directly beneath the finger 27b. This selective setting operation is then followed by the rotation of the cam shaft 2 through positions which will cause the actuation of levers 26 and 27 for a second time. Since lever 27 operates prior to lever 26 and since it is now caused to be fulcrumed at the tip of finger 27b, the pawl 14 will be moved to the left while engaged with the stop on disc 9, thus moving the discs 8 and 9 to their most advanced position where the extension 43 engages with the lower one of the contacts 45 and closes the circuit of device 46 for providing the desired response to the completed selecting operation. The advancing movement of pawl 14 is immediately followed by an ineffectual release action through the rotation of lever 26 on its pivot bearing 49. This release action is ineffective because the pawl 14 has already been engaged against the step of disc 9 and has driven the two discs 8 and 9 forward so as to be held by the pawl 31.

It should be constantly born in mind that our selector is arranged to set up conditions in any one of a plurality of receiving stations so that the subsequent transmission of intelligence signals shall be responded to at only one station. Accordingly, the selecting code signals which are to be used for making a station selection will be varied permutationally. That is to say, the digits on cams 3 and 4 will be differently disposed in angular relation to a common reference point on all of the shafts 1 at different stations to be individually served by their selectors. It is, however, within the scope of the invention to provide cams 3 and 4 and associated cams 5 and 6 so arranged that in addition to being able to respond individually at different stations to appropriate selecting signals, all stations may be simultaneously called in response to a special code signal. For enabling all stations to respond simultaneously, therefore, it is only necessary to provide two digits on each of the cams 3 and 4. The reference points of the digits which are used for individual station calling will then be as shown and described, while the reference point of the cam digits for the universal calling signal will be uniform at all stations. If desired, the two digits on cams 3 and 4 for universal calling may be given the same angular disposition with respect to the common reference point on shaft 1. Due to the fact that the humps on cams 22 and 23 are disposed at an angle to each other for sequential action of the two levers 26 and 27 it will be seen that when the digits on cams 3 and 4 are simultaneously situated under the fingers 26b and 27b that, although pawls 13 and 14 are both moved to the left, pawl 13 only will be effective in advancing the ratchet disc 8 in response to the first code signal setting of the cam 3. Pawl 14 returns in time to act as a holding pawl against the step in ratchet disc 9. The

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second step of the selecting cycle will then be completed after restoring the shaft 1 to its homing position. Then the digit on cam 4 is for a second time brought around and stopped underneath the finger 27b. At this time the pawl 14 will operate to advance the ratchet disc 9 to the end of its course where the projection 43 is brought into engagement with the under-contact 45 for closing the circuit to the device 46.

Restoration of the discs 8 and 9 to normal is accomplished at different times under varying conditions as will now be explained.

(1) The first condition to be considered is where the selector has operated at unwanted stations to advance the ratchet discs 8 and 9 through one step. At these unwanted stations the discs 8 and 9 must be returned to normal at the time of a reception of the second selecting code signal. At these unwanted stations, therefore, if they have been partially selected, the rotation of lever 27 on its pivot center 49 will kick out the pawl 14 because there is no positioning of the digit on cam 4 under the finger 27b. The selectors at the unwanted stations having been dropped out by this operation will then be in readiness for response to a full complement of selecting code signals if any one of these stations is subsequently required to be selected.

(2) After the ratchet discs 8 and 9 have been fully advanced by reception of two code signals which are capable of accomplishing this full advancement, the code discs 8 and 9 can only be restored to normal in response to a special code signal designated for this purpose. Such a signal is arranged to orient the shaft 1 so that at its point of arrest the bell crank 37 will be moved into its actuated position for driving the push rod 35 into the path of the push rod 40. The push rod 35 now stands in this position while the cam shaft 2 rotates to the point of positioning the opposing humps on cams 21 and 23 in a vertical axis. The push rod 40 is, therefore, depressed at the same instant that lever 27 is caused to rotate on the pivot center 49 and to kick out the pawl 14. Pawl 31 will be simultaneously kicked out so that the ratchet disc 8 will return half way to the point where it will be held by pawl 13. A further rotation of the cam shaft 2 now causes lever 26 to be actuated for kicking out pawl 13. The complete restoration of the cams 8 and 9 is, therefore, accomplished and all elements of the selector are returned to their homing positions.

It is contemplated that in certain instances selection of a station may require the transmission of three or more selecting code signals rather than only two as herein shown and described. In such case the lever mechanism including the combination of levers 26 and 18 and their associated pawls and cams will of necessity be increased in number. By arresting the shaft 1 in successively different positions corresponding to the digital arrangement on the cams 3, 4 and the like, the ratchet plates 8, 9 and the like may be engaged by different operating pawls, each taking its turn in producing stepwise advancement of such ratchet plates until the extreme position of advancement is reached. This modification of our invention will be readily understood by those skilled in the art without further illustration or description.

We claim:

1. A selector of the type which is controlled by a telegraph receiver responsive to code signals, said selector comprising a plurality of selecting

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discs each carrying a projecting digit and each firmly mounted on a shaft the orientation of which is selectively obtained by said telegraph receiver, an operating cam shaft having a plurality of cams thereon, each cyclic revolution of which is effected subsequent to the reception of each selecting code signal, said orientable shaft being arrested in a signal-controlled position during a part of said cyclic revolution, a ratchet and pawl combination corresponding to each of said selecting discs, the several ratchets being rotatable as a unit, an operating lever for individually supporting each pawl, the several levers having a common pivot, a cam follower lever linked to each said pawl operating lever, means operable by an appropriate one of said cams through its cam follower lever when the associated selecting disc is oriented into a selecting position for causing that cam follower lever to be pivoted at the apex of the digit on that disc, whereby the associated pawl is actuated for stepwise advancement of its ratchet, and means responsive to a condition of orienting a selecting disc into a non-selecting position for causing the associated ratchet to be released by its pawl.

2. A selector of the type which responds cyclically to the orientation of a variously settable shaft and to the driving force of a start-stop cam shaft, said selector comprising at least two ratchet discs rotatable as a unit about a fixed axis and having a staggered relation between a ratchet step of one disc and that of the other, a plurality of levers each carrying a pawl for engagement with a respective one of said ratchet discs and swung on a common axis, cams mounted on said cam shaft, a cam follower lever operatively associated with each said cam and with a corresponding digit-supporting disc which is mounted on said settable shaft, each said cam follower lever being linked to an extension arm on a respective one of said pawl carrying levers and being movable by a peripheral hump on an appropriate one of said cams in either of two modes depending upon the orientation of said settable shaft to a selecting or a non-selecting position, one of said modes being effective to advance a pawl so as to step forward its ratchet disc, and the other of said modes being effective to release a pawl from its ratchet disc, and means operable by said ratchet disc unit after advancement thereof through a predetermined number of steps for giving effect to the completion of the operational steps of the selector.

3. A selector according to claim 2 and including means operable by a third cam on said cam shaft, but subject to selective control by setting the orientable shaft into a position which is reserved for a restoring operation, whereby the ratchet disc unit is unlatched and allowed to be retracted to a homing position.

4. A selector according to claim 2 and including means for unlatching the ratchet disc at the position of an intermediate step of advancement upon rotation of the cam shaft after setting the orientable shaft to a non-selecting position.

5. A system of selector units located at different stations, each unit being mechanically coupled to a receiving telegraph instrument, each selector unit comprising ratchet discs to be rotatably advanced step-by-step in response to the reception of selecting code signals, a lever system including a plurality of pawls arranged and adapted to effect said step-by-step advancement of the ratchet discs in response to the reception

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of selecting signals, a settable rotor and a plurality of coaxially mounted cams, the rotor and cams being mounted on two different shafts for actuating each selector unit, and being subject to control by said telegraph instrument, a device to be actuated by advancement of the ratchet discs to a predetermined step, a pawl retracting system operable to disengage and release the partially advanced ratchet discs at all but a selected one of said stations, a holding pawl operable to retain the ratchet discs of the unit at the selected station in its advanced position, and code signal responsive means for unlatching said holding pawl and for restoring the entire selecting unit to normal at the selected station.

6. A selector comprising a settable rotor having two digit-carrying discs and two notched discs, the orientation of a digit and a notch being the same in one cooperating set of discs and the same in the other cooperating set, the orientation of the two digits being predetermined with respect to a reference meridian so as to render this selector alone among a group of selectors responsive to a given train of code signals, a cyclically operable cam shaft, cams on said shaft, two cam follower levers arranged to ride the peripheries of said cams, each lever having a finger for feeling the presence or absence of a rotor disc digit in a selected position, two fixedly pivoted pawl-carrying levers each linked to a respective one of said cam follower levers and having a pawl pivotally mounted on one extension thereof while a toe piece terminating another extension thereof is arranged to ride the periphery of a respective one of said notched discs and at times to seat itself in the notch, a ratchet disc assembly subject to stepwise advancement by said pawls when a toe piece enters a disc notch, and means for unlatching a pawl during a cycle of the cam shaft when the rotor is set to a non-selecting position.

7. In a cam-driven ratchet-and-pawl actuator for a selector, a rotor having a homing position and means for variably orienting the same in different selected positions, a plurality of disc sets on said rotor, each set comprising a disc having a radially extending digit and a disc having a notch the meridian of which is the same as that of said digit, the angle between two digits being predetermined in accordance with successive positions of orientation which are chosen for control of the selector, a pivoted ratchet disc assembly comprising a plurality of discs with stepped peripheries, and a lever system for advancing said assembly step-by-step through a predetermined arc, said lever system including pawl-carrying levers and pawl-unlatching levers, each pawl-carrying lever being fixedly pivoted and integrally formed with a toe-piece extension for entering the notch of one of said rotor discs respectively, each pawl-unlatching lever having a finger for opposing the digit on one of the digit carrying discs respectively, and also having a cam follower extension and a pivotal linkage with a companionate one of the pawl carrying levers.

8. In a selector, the combination according to claim 7 and including re-set devices of two types for restoring said ratchet disc assembly to a normal position, one type being effective through one of said unlatching levers to release the ratchet disc assembly from an intermediate step of advancement, and the other type including a holding pawl which engages the ratchet disc assembly only at the last step of advancement and is unlatched therefrom in response to the setting of said rotor to a controlling position for this func-

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tion, and cam driven means for producing the unlatching movement of said holding pawl.

9. In a call selector, the combination of telegraph receiving means for setting a rotor to different selected stops, at least two successive settings being required to complete a selecting operation, a cyclically operable cam shaft and lever mechanism driven by cams on said shaft under control of indexing devices on said rotor for producing either a selecting response or a non-selecting response to the reception of a code signal, a ratchet member subject to stepwise advancement by pawls which are propelled by said lever mechanism, and subject to tensional retraction upon unlatching said pawls, feeler extensions on elements of said lever mechanism for engagement with said indexing devices, thereby to differentiate between selecting and non-selecting re-

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sponses of said selector, a holding pawl effective to retain the ratchet member at the extremity of its advancement, and means responsive to the reception of a code signal of "sign-off" significance, which signal is manifested by the setting of said rotor to a special stop, whereby said holding pawl is subject to an unlatching movement which is cam-propelled upon revolution of said cam shaft.

10. The combination according to claim 9 and including means under control of said rotor when set to a non-selecting stop for causing a pawl to be disengaged from a step in said ratchet member and for preventing the stepwise propulsion of that same pawl, whereby the ratchet member is released from an intermediate step of advancement and permitted to be retracted.

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