

April 5, 1949.

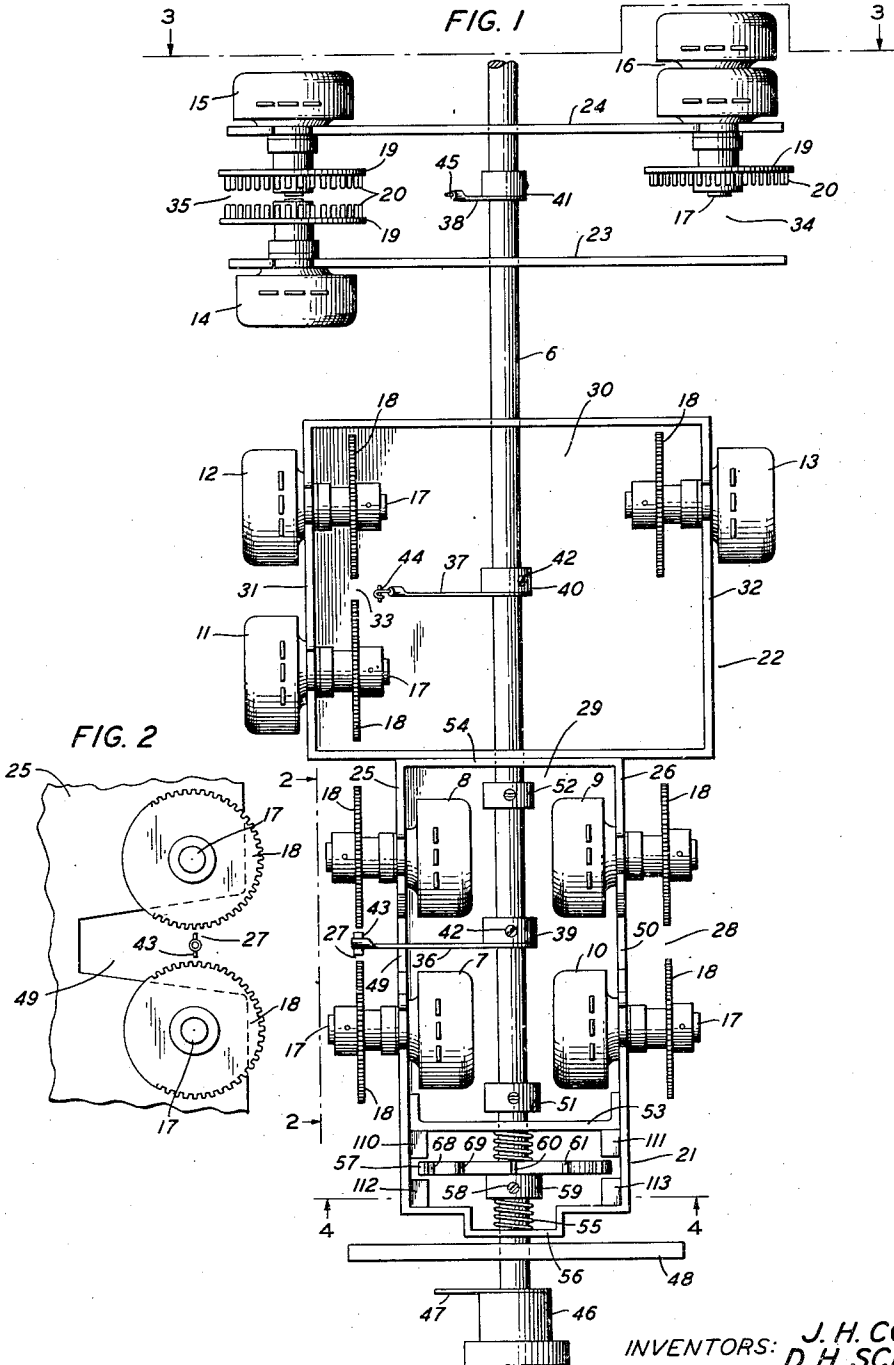
J. H. COOK ET AL

2,466,080

SELECTIVE CONTROL APPARATUS

Filed July 6, 1946

2 Sheets-Sheet 1



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FIG. 3

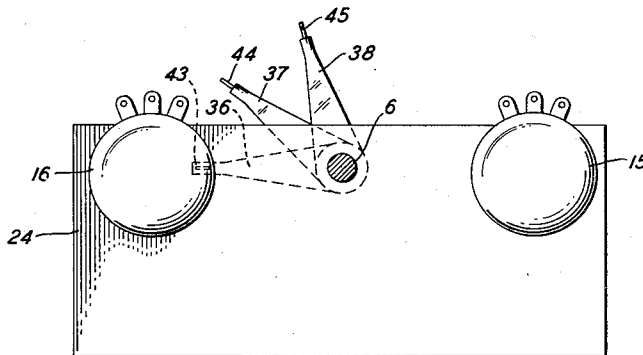


FIG. 4

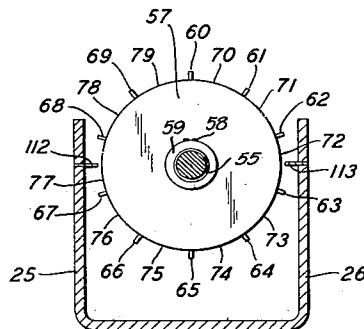
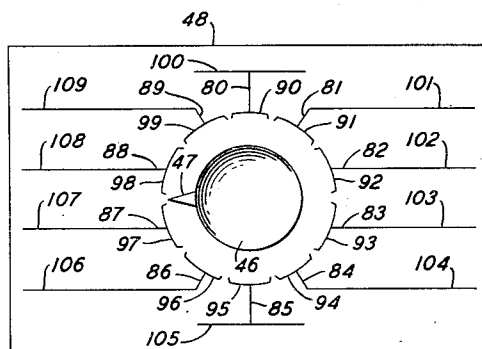


FIG. 5



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UNITED STATES PATENT OFFICE

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SELECTIVE CONTROL APPARATUS

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4 Claims. (Cl. 74-471)

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This invention relates to control apparatus and more particularly to control apparatus for selectively operating a plurality of devices.

An object of the invention is to provide improved means for selectively rotating the rotors of a plurality of potentiometers or other devices.

A feature of the invention resides in a longitudinally movable and rotatable shaft equipped with arms to turn the rotors of the devices.

Another feature resides in stop means to limit rotational movements of the above-mentioned shaft.

In the drawings,

Fig. 1 is a plan view of the apparatus of this invention;

Fig. 2 is a side view of a portion of the apparatus shown in Fig. 1 and taken on the line 2-2;

Fig. 3 is a rear elevation of the apparatus shown in Fig. 1 and taken on the line 3-3 and with some of the parts moved to different positions from the positions occupied in Fig. 1;

Fig. 4 is a front view, partly in section, of a portion of the apparatus shown in Fig. 1 and taken on the line 4-4; and

Fig. 5 is a front elevation of a control knob and panel of the control apparatus.

In apparatus involving a plurality of switches, potentiometers, variable condensers or other devices in which certain parts are required to be rotated relative to other parts, it is the usual practice to provide a manually operable control knob on the rotor shaft of each device and to have the control knobs extend forwardly of a control panel. When the number of devices is relatively large, a considerable number of control knobs are employed and the panel of the apparatus must be quite large to take care of the relatively large number of control knobs. To operate the devices the knobs for the various devices must be found by looking along the panel and then operated as required.

In the present invention a single control shaft is provided as a control means for a plurality of devices, the control shaft carries arms to engage the rotors of the devices and the control shaft may be operated to select a predetermined device and cause the rotor of the predetermined device to turn. The control shaft may be the only portion of the apparatus that extends through an apertured panel and in that case the panel space used for the plurality of devices is only such as is needed to accommodate an end portion of the single control shaft and the control knob mounted on the control shaft.

As shown in Fig. 1 the control apparatus com-

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prises a control shaft 6 which may be operated to selectively control a plurality of devices having rotor elements required at times to be rotated. To illustrate the invention and not in the sense of a limitation thereof the devices to be controlled are shown as 7, 8, 9, 10, 11, 12, 13, 14, 15 and 16 and which may be potentiometers such as illustrated or variable electrical condensers or switches, each of which has a rotor element required to be turned relative to a stator element. Each potentiometer shown in Fig. 1 has, for instance, a rotor shaft 17 on which is secured a toothed wheel 18 or a disc 19 equipped with pins 20. Box-type supports 21 and 22 are used as supports for some of the potentiometers and other potentiometers are supported on walls 23 and 24 through which the control shaft 6 extends. In Fig. 1 the potentiometers 7, 8, 9 and 10 are mounted on side walls 25 and 26 of the box-type support 21 and so that the rotor shafts 17 of the potentiometers extend outwardly of the side walls, the potentiometers 7 and 8 being mounted on the side wall 25 and the potentiometers 9 and 10 being mounted on the side wall 26. The toothed wheels 18 of the potentiometers 7 and 8 are in the same plane but are spaced apart to provide a space 27. The toothed wheels 18 of the potentiometers 9 and 10 are in the same plane but are spaced apart to provide a space 28. The potentiometers 7, 8, 9 and 10 form a group 29 of potentiometers to be selectively controlled by the control shaft 6.

The box-type support 22 is located in line with the box-type support 21 and provides a support for a second group 30 of potentiometers comprising the potentiometers 11, 12 and 13 which are arranged around the control shaft 6, the potentiometers 11 and 12 being supported on a wall 31 and the potentiometer 13 being supported on a wall 32 of the box-type support 22. The toothed wheels 18 of the potentiometers 11 and 12 are in the same plane but are spaced apart to provide a space 33. The potentiometer 13 is located directly opposite from the potentiometer 12 and is equipped with a toothed wheel 18.

The walls 23 and 24 are in parallel spaced relation and provide supports for a third group 34 of potentiometers comprising the potentiometers 14, 15 and 16, the rotors of which are equipped with discs 19 having spaced pins 20. The discs 19 of the potentiometers 14 and 15 are in spaced face-to-face relation and define a space 35 into which the pins 20 extend. The disc 19 of the potentiometer 16 is in register with the disc 19 of the potentiometer 15 but is located on an opposite side of the control shaft 6 from the position of

the disc 19 of the potentiometer 15. The potentiometer 16 may be a double potentiometer as shown in the drawing with a shaft 17 common to the rotors of the potentiometer.

Arms 36, 37 and 38 are adjustably mounted on the control shaft 6 and extend radially therefrom, the arms 36, 37 and 38 being attached to apertured body members 39, 40 and 41, respectively, which are adjustably secured to the control shaft 6 by means of set screws 42 or other suitable securing means. The free end of each arm 36, 37 and 38 is equipped with a blade 43 extending angularly of the arm or with a tip 44 or 45 constructed and arranged to engage a tooth of a toothed wheel 18 or a pin 20 of a disc 19, a blade 43, a tip 44 or 45 being provided according to which type of element is to be served by the arm 36, 37 or 38.

The arms 36, 37 and 38 are constructed and arranged to enter the spaces 27, 33 and 35, respectively, when the control shaft 6 is operated in a suitable manner. The arms 36, 37 and 38 in some cases may be made of spring material. The control shaft 6 is rotatable and is longitudinally movable and may be operated by means of the control knob 46 equipped with a pointer 47, the control knob 46 being located on one end of the control shaft 6 and the pointer 47 being located so that it may be operated near the face of a panel 48.

The arm 37 is located in a clockwise advanced position relative to the arm 36 and the arm 38 is located in a clockwise advanced position relative to the arm 37. It will, therefore, be obvious that when the free end of the arm 36 and the blade 43 thereon are in the space 27, the free end of the arm 37 and the tip 44 thereon are not in the space 33 and the free end of the arm 38 and the tip 45 thereon are not in the space 35. When the free end of the arm 36 and the blade 43 thereon are in the space 27 and the control shaft 6 is moved longitudinally and turned the blade 43 will engage the toothed wheel 18 of either the potentiometer 7 or the potentiometer 8 according to the direction in which the control shaft 6 is longitudinally moved, and the toothed wheel 18 of the potentiometer will be turned when the control shaft 6 is rotated. It will be seen by looking at Fig. 1 that with the arm 36 in the position shown the blade 43 may be moved to a position to engage the toothed wheel 18 of the potentiometer 7 by pulling the control shaft 6 in the direction of the panel 48 and that if this is done and the control shaft 6 is rotated the blade 43 will engage the toothed wheel 18 of the potentiometer 7 and cause the rotor of the potentiometer 7 to rotate when the control shaft 6 is rotated. To turn the rotor of the potentiometer 8 it is only necessary to thrust the control shaft 6 backward relative to the panel 48 and rotate the control shaft 6 while the blade 43 is in engagement with the toothed wheel 18 of the potentiometer 8. To selectively operate the rotors of the potentiometers 9 and 10 the control shaft 6 may be rotated in a clockwise direction to bring the free end of the arm 36 and the blade 43 into the space 28. The control shaft 6 may then be moved longitudinally to bring the blade 43 into engagement with the toothed wheel 18 of either the potentiometer 9 or the potentiometer 10 and the control shaft 6 rotated to turn the rotor of the selected potentiometer. The walls 25 and 26 of the box-type support 21 are apertured at 49 and 50, respectively to allow required movements of the

arm 36 in operating the toothed wheels 18 of the potentiometers in the group 29.

To selectively operate the rotors of the potentiometers in the group 30 the control shaft 6 may be rotated and longitudinally moved to bring the tip 44 on the free end of the arm 37 into engagement with a toothed wheel 18 of a predetermined potentiometer in the group 30. Upon further rotation of the control shaft 6 in a required direction the rotor of the selected potentiometer will be rotated by means of the arm 37.

To selectively operate the rotors of the potentiometers in the group 34 the control shaft 6 may be rotated and longitudinally moved to bring the tip 45 on the free end of the arm 38 into engagement with a pin 20 on a disc 19 of a predetermined potentiometer in the group 34. Upon further rotation of the control shaft 6 in a required direction the rotor of the selected potentiometer will be rotated by means of the arm 38.

In Fig. 1 the control shaft 6 is in a normal position and such that the control shaft 6 may be freely rotated without causing any of the rotors of the potentiometers to turn. When the control shaft 6 is in the position shown and is rotated, the blade 43 on the arm 36 may freely pass through the space 27, the tip 44 on the arm 37 may freely pass through the space 33 and the tip 45 on the arm 38 may freely pass through the space 35. If the control shaft 6 is longitudinally moved from the position shown in Fig. 1 and is rotated while the longitudinal thrust is maintained on the control shaft 6 certain toothed wheels 18 and discs 19 of the potentiometers will be in the paths of movement of the free ends of the arms 36, 37 and 38.

The control shaft 6 may be moved longitudinally either backward or forward and may be rotated either clockwise or counter-clockwise as required to select and operate the rotors of the potentiometers. To limit the extent of longitudinal movements of the control shaft 6, collars 51 and 52 are adjustably mounted on the control shaft 6. The collars 51 and 52 may be mounted at any convenient points on the control shaft 6 but in positions to engage a fixed part when the control shaft 6 is longitudinally moved to a required extent and in a required direction. In Fig. 1 the collar 51 is arranged to engage a fixed and apertured wall 53 when the control shaft 6 is pulled forward in the direction of the panel 48 to a required extent. The wall 53 extends across and is fixedly attached to the forward portion of the box-like support 21. The collar 52 is arranged to engage an apertured back wall 54 of the box-like support 21 when the control shaft 6 is longitudinally thrust backward of the panel 48 to a required extent.

Spring means 55 are provided to return the control shaft 6 to normal position when a longitudinal thrust or pull applied to the control shaft 6 is released. The spring means 55 may be a helical spring as shown in Fig. 1 or other suitable spring means operating on the control shaft 6. The spring 55 shown in Fig. 1 is mounted on the control shaft 6 and bears at one end against the wall 53 and at the other end against a forward and apertured end wall 56 of the box-like support 21. A stop wheel 57 extends around the spring 55 and is secured to the control shaft 6 by means of a set screw 58 or other suitable fastening means which passes through the hub 59 of the stop wheel 57 and engages the control shaft 6. The stop wheel 57, as shown in Figs. 1 and 4, has spaced teeth 60 to 69, inclusive, ex-

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tending radially from its periphery, the teeth 60 to 69, inclusive, cooperating to define spaces 70 to 79, inclusive, which may correspond in number to the number of potentiometers or other devices under control of the control shaft 6. Spaced marks 80 to 89, inclusive, are made on the outer face of the control panel 48 and in register with the teeth 60 to 69, inclusive, respectively. The spaced marks 80 to 89, inclusive, may be continued at one end in the form of brackets 90 to 99, inclusive, to indicate ranges of movement permitted by the stop wheel 57 and may be continued at an opposite end to form guide lines 100 to 109, inclusive, for labeling marks to be made on the outer face of the control panel to indicate the electrical devices controllable by operation of the control shaft 6. The marked control panel 48 and the pointer 47 serve as dial means to indicate the positions the operating arms should be in to operate the required potentiometers.

Paired stops 110, 111 and 112, 113 are arranged to be engaged by the teeth on the stop wheel 57 when the control shaft 6 is longitudinally moved and rotated predetermined distances and extents. The stops 110 and 111 are arranged so that they project into the path of movement of the teeth on the stop wheel 57 when the control shaft 6 is thrust rearwardly and the control shaft 6 and stop wheel 57 are rotated. The stops 112 and 113 are arranged so that they project into the path of movement of the teeth on the stop wheel 57 when the control shaft 6 is pulled forwardly and the control shaft 6 and the stop wheel 57 are rotated. The stops 110, 111, 112 and 113 may be secured to any suitable support or be projecting portions thereof and may project inwardly from the box-type support 21 and should be thinner than the length of the spaces between the teeth on the stop wheel 57.

When turning of a rotor of one of the potentiometers is required an operator of the apparatus may readily see by observing the control panel the point on the control panel representing the required potentiometer. The operator may then by rotation of the control knob 46 bring the pointer 47 to the position of the required point on the control panel 48. By pressing inwardly or pulling outwardly on the control knob 46 the operator may cause the control shaft 6 to be longitudinally moved as required to bring the required arm on the control shaft 6 into such position that upon rotation of the control shaft 6 the rotor of the required potentiometer will be rotated. The operator may then turn the control knob 46 either clockwise or counter-clockwise as required to make the arm turn the rotor on the selected potentiometer as required. The rotor of the potentiometer may be turned to the extent permitted by the stop wheel 57 and the stops 110, 111 or the stops 112, 113 depending on whether the control shaft 6 is thrust inwardly or pulled outwardly while the control shaft 6 is being rotated. If the potentiometer to be operated is forward of the corresponding arm on the control shaft 6 the control shaft 6 is pulled outwardly and turned. If the potentiometer to be operated is rearward of the corresponding arm the control shaft 6 is thrust rearwardly and turned. Normally the range of movement permitted is determined by the length of the space between two of the teeth on the stop wheel 57. When the rotor on the selected potentiometer must be turned more than the range permitted by the stop wheel and stops engaged

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thereby the operator may release the pressure or pull on the control knob 46. When this is done the control shaft 6 will be automatically moved longitudinally by means of the spring 55 to the normal condition shown in Fig. 1. The operator may then cause the control shaft 6 to be rotated to starting position where upon further longitudinal movement of the control shaft 6 the arm corresponding to the selected potentiometer will again be in position to cause the rotor of the selected potentiometer to turn when the control shaft 6 is again rotated.

What is claimed is:

1. A control apparatus comprising a box-type support, spaced side walls in said support, a plurality of rotors mounted in spaced relation on said spaced side walls and distributed around said support, a wheel for and secured to each rotor, a longitudinally movable and rotatable shaft extending between said spaced side walls and spaced therefrom, an arm extending radially from and secured to said shaft and operable by means of said shaft to selectively engage and turn the wheels on said rotors when said shaft is longitudinally moved and rotated as required, said arm being operable to separately engage each wheel, and means to longitudinally move said shaft to withdraw said arm from engagement with a selected wheel on a rotor when said shaft is released.

2. A control apparatus comprising a support, spaced side walls in said support, a plurality of rotors mounted in spaced relation on said side walls of said support and arranged in groups, a wheel secured to each rotor, a longitudinally movable and rotatable shaft extending through the groups of rotors and in spaced relation with the wheels on the rotors, operating arms secured to and extending radially from said shaft, said arms being individual to the groups of rotors and being operable by means of said shaft to selectively engage and rotate the wheels on said rotors when said shaft is moved longitudinally and turned as required, each of said arms extending radially from said shaft in a different direction from the others, a stop member secured to said shaft and stop means on said support cooperable to limit rotational movement of said shaft when said shaft is longitudinally moved from normal position and rotated, and spring means on said shaft and engaging said support to longitudinally move said shaft to bring an operating arm out of engagement with a wheel on a rotor when said shaft is released.

3. A control apparatus comprising a box-type support, spaced side walls in said support, a plurality of rotors mounted in spaced relation on the side walls of said support and arranged in groups, toothed wheels secured to said rotors, a longitudinally movable and rotatable shaft extending through the groups of rotors, operating arms at spaced points along said shaft and secured on and extending radially from said shaft, each arm extending in a different radial direction from said shaft, said arms being individual to the groups of rotors and being operable by means of said shaft to selectively engage and rotate the toothed wheels on said rotors when said shaft is longitudinally moved and rotated as required, a toothed stop wheel secured on said shaft and rotatable therewith, stationary stop means on said support cooperable with said toothed stop wheel to limit rotation of said shaft when said shaft is being longitudinally moved and rotated and spring means mounted on said shaft and en-

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gaging said support to longitudinally move said shaft to clear said toothed stop wheel from the position of said stop means and to clear an operating arm from engagement with a toothed wheel on a rotor when said shaft is released.

4. A control apparatus comprising a plurality of rotors mounted in spaced relation and arranged in groups, a toothed wheel secured to each of said rotors, a longitudinally movable and rotatable shaft, single lever-type operating arms at spaced points along said shaft and secured to and extending radially from said shaft, each operating arm extending in a different direction from said shaft and being individual to a group of said rotors and being operable by means of said shaft to selectively engage and rotate the toothed wheels on said rotors in that group when said shaft is longitudinally moved and rotated as required, a toothed stop wheel secured to said shaft, a fixed stop engageable by a tooth on said stop wheel when said shaft is longitudinally moved and is being rotated, said toothed stop wheel and said fixed stop cooperating to limit

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rotation of said shaft to a predetermined extent when an operating arm on said shaft is in engagement with a toothed wheel in one of the groups of rotors, spring means to longitudinally move said shaft to bring said operating arms out of engagement with the toothed wheels on said rotors when said shaft is released and dial means to show the positions to which said operating arms should be moved in operating selected rotors.

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