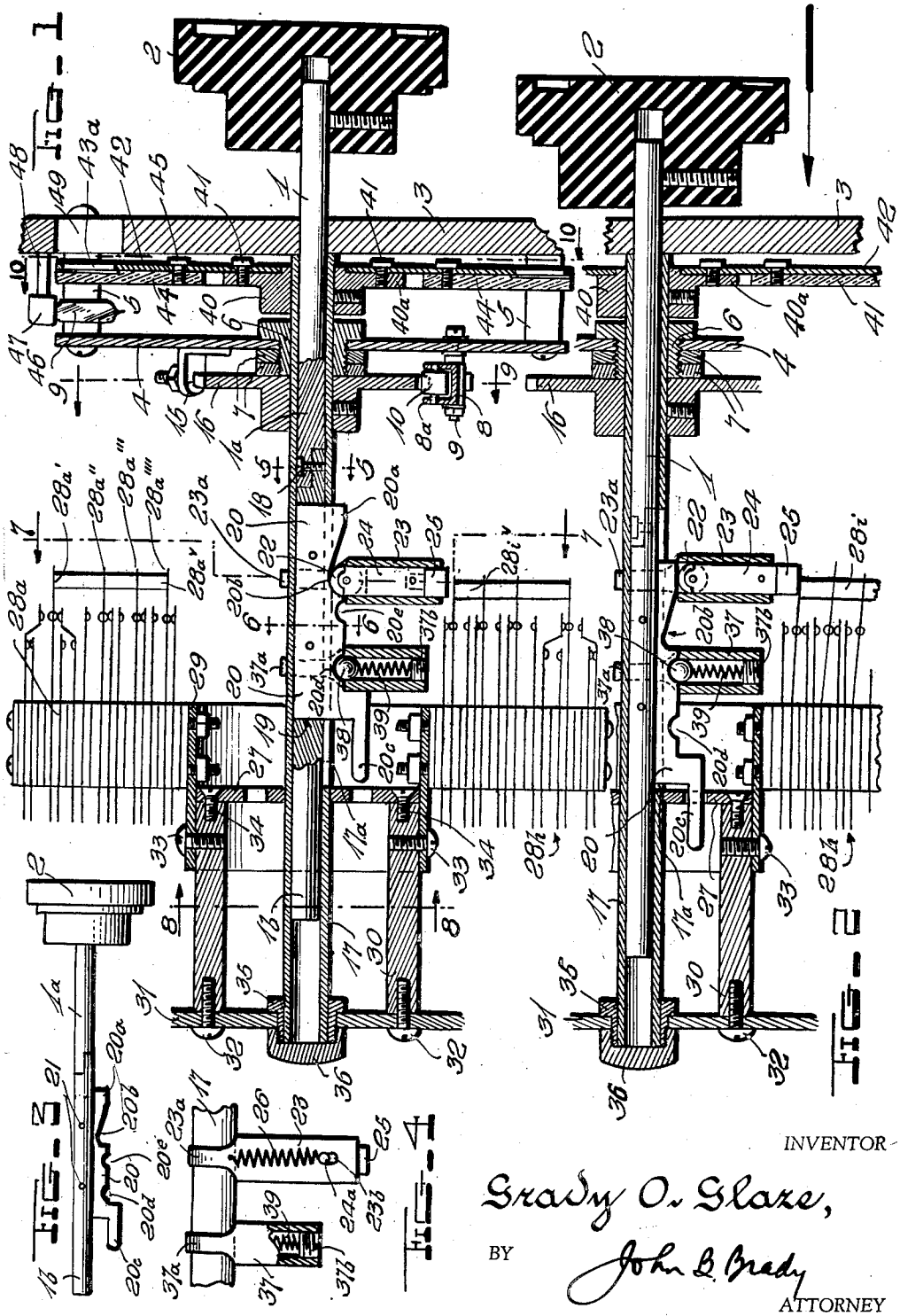
Feb. 2, 1954 G. O. GLAZE 2,668,200

ROTARY MULTIPLE SELECTOR SWITCH

Filed Dec. 24, 1951 3 Sheets-Sheet 1



INVENTOR

Grady O. Glaze,

BY John B. Brady

ATTORNEY

Feb. 2, 1954 G. O. GLAZE 2,668,200

ROTARY MULTIPLE SELECTOR SWITCH

Filed Dec. 24, 1951

3 Sheets-Sheet 2

FIG. 7

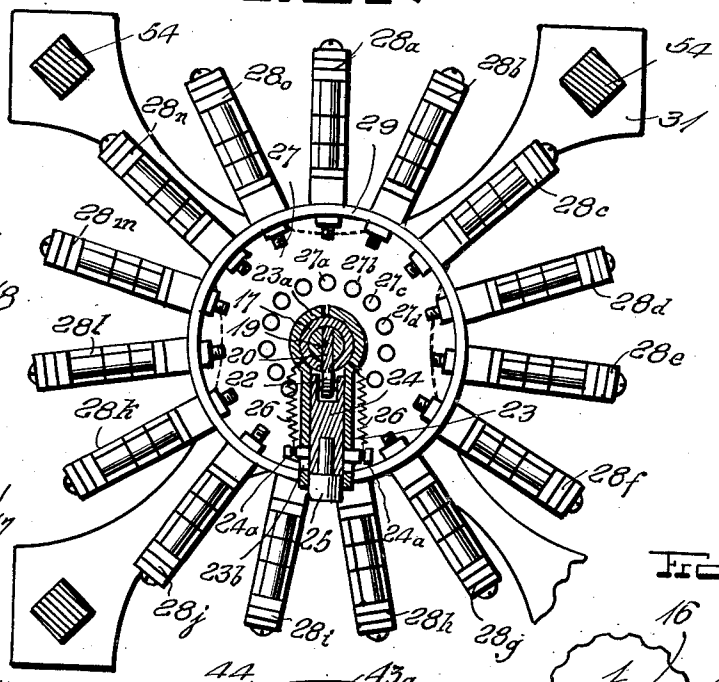



FIG. 5

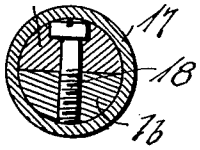



FIG. 6

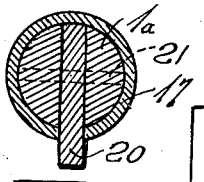



FIG. 8

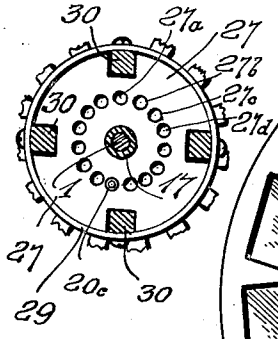



FIG. 9

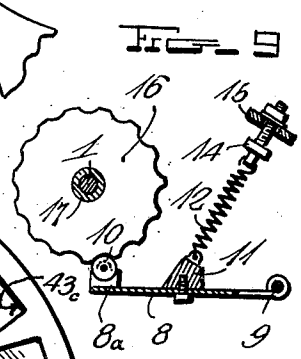



FIG. 10

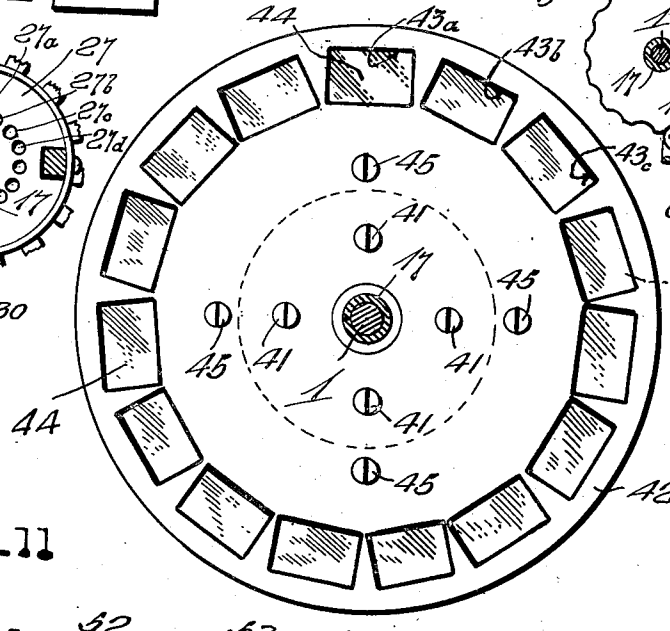
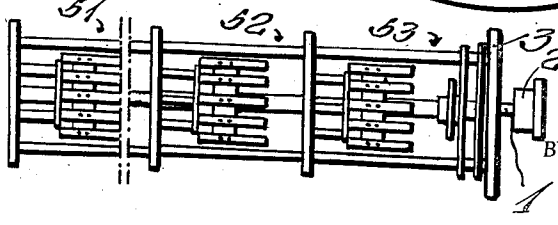



FIG. 11




INVENTOR

Grady O. Glaze,

BY

John Q. Brady

ATTORNEY

Feb. 2, 1954 G. O. GLAZE 2,668,200

ROTARY MULTIPLE SELECTOR SWITCH

Filed Dec. 24, 1951 3 Sheets-Sheet 3

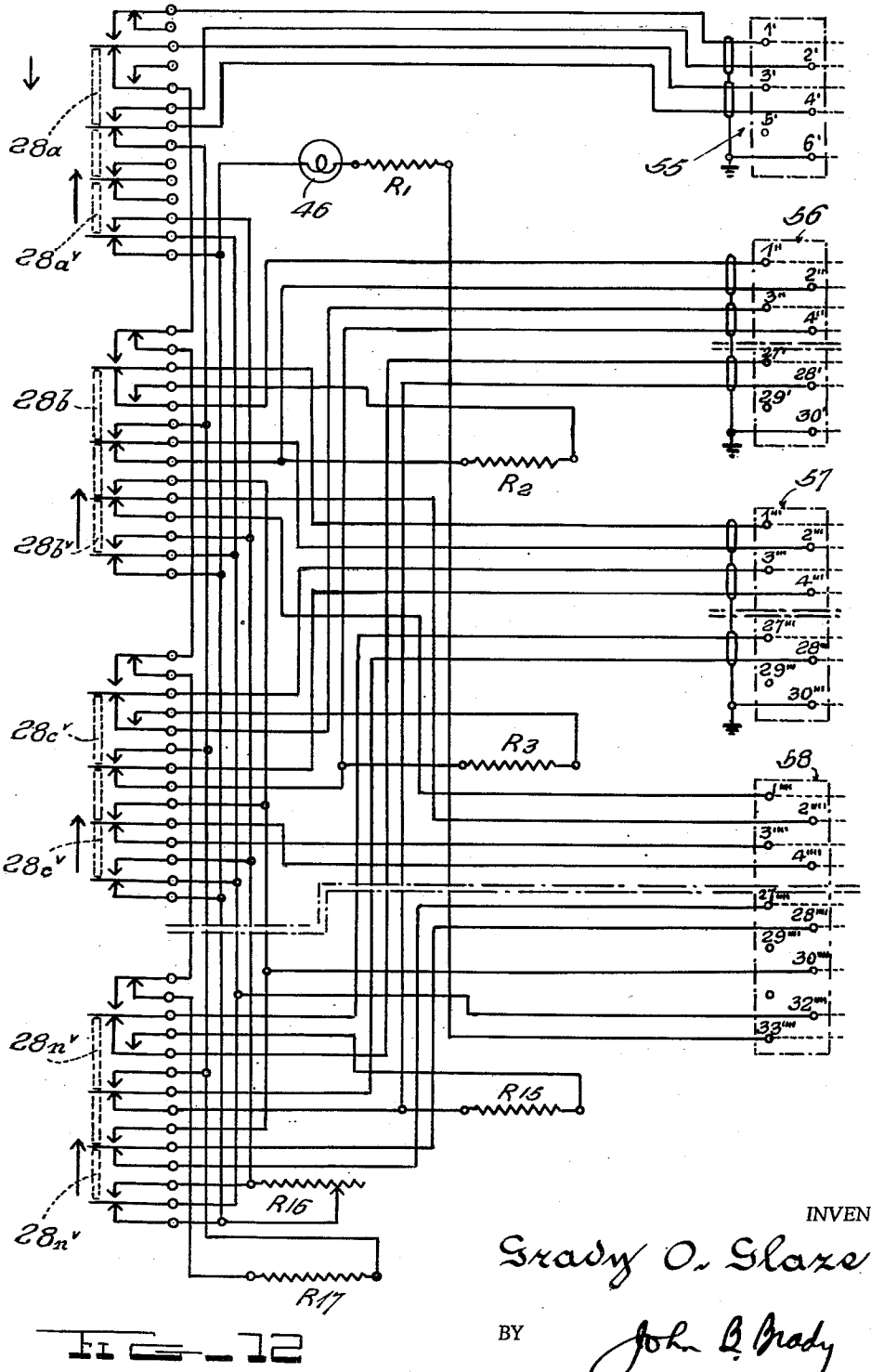



FIG. 12

INVENTOR

Grady O. Glaze,

BY John B. Brady

ATTORNEY

Patented Feb. 2, 1954

2,668,200

# UNITED STATES PATENT OFFICE

2,668,200

## ROTARY MULTIPLE SELECTOR SWITCH

Grady O. Glaze, Washington, D. C.

Application December 24, 1951, Serial No. 263,121

10 Claims. (Cl. 200—1)

1

My invention relates broadly to electric circuit controllers and more particularly to an improved construction of rotary multiple selector switch.

One of the objects of my invention is to provide an improved construction of rotary selector switch for controlling a multiplicity of electrical circuits within a minimum physical installation space.

Another object of my invention is to provide a construction of electrical switch which may be of relatively small physical dimensions for accommodating and controlling a relatively large number of switching circuits utilizing composite translatory and rotative movement for effecting the selection and completion of electrical circuits.

Still another object of my invention is to provide a construction of rotary multiple selector switch utilizing an actuator which is capable of both translatory and rotary movement for effecting, in anyone of a multiplicity of angular positions to which the actuator is adjusted, the displacement of a multiplicity of contactors upon transitory movement of the actuator.

A further object of my invention is to provide a construction of rotary multiple selector switch employing a multiplicity of spring pile-up assemblies located in angularly spaced radial positions around a slidable and rotatable actuator, the actuator including means rotatably adjustable to an aligned position with anyone of the spring pile-up assemblies and wherein the said means is radially projectable for displacing the spring contacts of the selected spring pile-up assembly and controlling the electrical circuits which are connected therewith.

A still further object of my invention is to provide a construction of rotary multiple selector switch which may be assembled in co-acting units and the units simultaneously controlled both as to selection and operation by composite, transitory and angular motion.

A still further object of my invention is to provide an arrangement of indicator mechanism coordinated with the control shaft of a rotary multiple selector switch, whereby any one of a number of spring pile-up assemblies may be individually selected and operated by composite rotary and transitory movement of the control shaft.

Other and further objects of my invention reside in the arrangement of spring pile-up assemblies adjacent and angularly shiftable and linearly slidable control shaft for effecting a displacement of the spring contacts of a selected spring pile-up assembly, as set forth more fully in the specification hereinafter following by reference to the accompanying drawings, in which:

2

Figure 1 is a longitudinal, cross-sectional view taken through a fragmentary portion of the rotary multiple selector switch of my invention, showing the actuator of the switch in a position for rotation to anyone of a multiplicity of radial positions with respect to radially disposed sets of spring pile-up assemblies; Fig. 2 shows the position of the actuator of Fig. 1 displaced lineally to a position in which the contact springs of a selected spring pile-up assembly are displaced to a circuit controlling position from the normal position thereof and the actuator latched in the selected position; Fig. 3 is a side elevational view of the actuator employed in the assembly shown in Figs. 1 and Fig. 2; Fig. 4 is a detailed fragmentary view on an enlarged scale showing the arrangement of radially disposed selector arm and the detent associated therewith; Fig. 5 is a transverse sectional view taken substantially on line 5—5 of Fig. 1; Fig. 6 is a transverse sectional view taken substantially on line 6—6 of Fig. 1; Fig. 7 is a fragmentary transverse sectional view taken substantially on line 7—7 of Fig. 1; Fig. 8 is a transverse sectional view taken substantially on line 8—8 of Fig. 1 and showing more particularly the arrangement of the locking plate in the switch assembly of my invention; Fig. 9 is a transverse sectional view taken substantially on line 9—9 of Fig. 1 and illustrating the arrangement of latching mechanism for the switch assembly of my invention; Fig. 10 is a transverse sectional view taken substantially on line 10—10 of Fig. 1 and showing more particularly in elevation the arrangement of indicator dial associated with the indicator mechanism in the switch of my invention; Fig. 11 is a schematic view illustrating the manner of assembling multiple units or stages in the rotary multiple selector switch of my invention; and Fig. 12 schematically illustrates the type of electrical circuit that the rotary multiple selector switch of my invention is capable of controlling.

My invention is directed to a compact construction of rotary multiple selector switch capable of efficient operation for audio and control circuit switching, utilizing conventional multiple leaf spring pile-up assemblies arranged in compact relationship in radial positions around a lineally slidable and rotatably adjustable actuator shaft. The actuator shaft in the construction of my invention is lineally displaceable for freeing the shaft so that it is capable of angular adjustment to a position aligned with a selected one of a multiplicity of spring pile-up assemblies and, when thus aligned, is capable of linear movement for radially projecting a member aligned with

the selected spring pile-up assembly for displacing the leaf springs and the contacts associated therewith for moving the contacts to an operated position. The switch of my invention is associated with indicator mechanism for indicating from the front of a control panel the different selected positions of the actuator for indicating the position of a member carried by the actuator, when such member is aligned with a selected spring pile-up assembly. When thus aligned, the actuator may be moved lineally for projecting the associated member radially and displacing the spring pile-up assembly which is aligned therewith to an operating position. A relatively large number of electrical circuits may be controlled through the radially aligned spring pile-up assemblies within a relatively small physical installation space. Operation of the contactors in the selected spring pile-up assembly is positive and reliable. A multiplicity of the switching units constructed in accordance with my invention may be cascaded or arranged in multiple stages for increasing the number of electrical circuits which may be controlled by the switching system of my invention.

Referring to the drawings in more detail, reference character 1 designates the main shaft of the actuator of my invention having actuating knob 2 on the end thereof which projects through panel 3 of the switching equipment. The panel 3 supports a subpanel 4, which is spaced rearwardly therefrom by means of pedestals 5. The subpanel 4 provides a mounting means for the sleeve 6, which extends through a central aperture in the panel 4 and is screw threaded to receive the securing nuts 7. The subpanel 4 also serves as a support for the pivotly mounted detent arm 8 which is pivoted in one end on the pintle 9 which projects rearwardly from the subpanel 4. The pintle 9 serves to pivotly mount the detent arm 8 with respect to subpanel 4, while the free end of detent arm 8 is formed substantially in U-shaped section 8a and serves to pivotly mount the roller 10 on an axis substantially normal to the plane of the subpanel 4. The detent arm 8 is provided with a centrally disposed spring attachment connection 11 to which one end of coil spring 12 connects. The other end of coil spring 12 connects to an adjustable screw-threaded member 14, supported by angle member 15, mounted on subpanel 4. Thus, the detent arm 8 is biased in the direction of the detent wheel 16, which is secured to the longitudinally extending tubular member 17. To facilitate assembly, shaft 1 is constructed in two parts, which I have shown in section at 1a and 1b. The sections are coupled by co-acting ends which are milled diametrically to provide offset interengaging faces through which the securing screw 18 passes. The head of securing screw 18 is countersunk in shaft section 1a so that the shaft sections 1a and 1b are free to slide longitudinally through tubular member 17. The longitudinally extending tubular member 17 is keyed to turn with the shaft 1 by reason of the arrangement of longitudinally, diametrically disposed slot 19 therein which receives the flat key 20 which projects beyond the tubular member 17 and through the longitudinally extending slot 17a therein. The cam member 20 is secured in the slot 19 of the shaft section 1b by means of rivets shown more clearly at 21 in Fig. 6. The cam 20 is formed in a composite curve having a high point 20a and a low point 20b arranged to co-act with a roller member 22 disposed in tubular sleeve 23 which is supported from the tubular member 17 by strap portion 23a, whereby tubular sleeve 23 projects radially from the tubular member 17. Tubular sleeve 23 serves as a housing in which plunger member 24 is slidable. The plunger member 24 provides mounting means for roller member 22 on the inner end thereof and is provided with a button 25 of insulation material on the outer end thereof. The plunger member 24 is biased inwardly for mounting roller member 22 in rolling and sliding contact with the high point 20a and low point 20b of cam member 20 by means of symmetrically arranged coil springs 26, shown more clearly in Figs. 4 and 7. Coil springs 26 connect at their inner ends with positions on the outer wall of tubular sleeve 23 and at their outer ends to the diametrically projecting pintles 24a carried by plunger member 24, as shown more particularly in Fig. 7. The tubular sleeve 23 is slotted at the opposite sides thereof, as represented at 23b through which the pintles 24a of plunger member 24 extend and are free to slide as roller member 22 moves with respect to high point 20a and low point 20b of cam 20.

The coil springs 26 bias plunger member 24 into a retracted position, represented in Fig. 1, subject to ejection into the projected position shown in Fig. 2 as the actuating knob 2 is moving inwardly.

The cam member 20 is also provided with a lineally extending tongue 20c on the end thereof, opposite the high and low cam faces 20a and 20b. The tongue 20c is adapted to be moved lineally with the displacement of shaft 1 and oriented by rotation of shaft 1 to a position in which tongue 20c can be aligned with and projected through a selected locking aperture in plate 27. Plate 27, which is shown more clearly in Fig. 8, is provided with a plurality of spaced apertures which I have designated 27a, 27b, 27c, 27d, etc., disposed in angular positions aligned with the spring pile-up assemblies designated at 28a, 28b, 28c, 28d, etc. The spring pile-up assemblies are supported on the exterior surface of the cylindrical member 29 which is supported by means of the pedestal members 30 which extend normally with respect to the plane of the end plate 31 of the switch assembly. The pedestal members 30 are attached to the end plate 31 by screws 32 and the cylinder 29 connects with pedestal members 30 by means of screws 33. The locking plate 27 is supported interiorly of cylinder 29 by means of screws 34 which enter the ends of pedestal members 30. The end plate 31 carries a sleeve bearing 35 therein, which is secured to end plate 31 by means of fastening nut 36 which engages screw threads on the exterior of sleeve bearing 35. The end of the tubular member 17 extends into sleeve bearing 35 and is rotatable either clockwise or counterclockwise therein as actuator knob 2 is revolved.

In addition to the tubular sleeve 23, which is attached in a radially extending position on tubular member 17, I provide a detent cylinder 37 supported in a radially projecting position on tubular member 17 by means of straps 37a. The detent cylinder 37 houses a ball detent 38 which is urged by spring 39 radially inwardly toward cam member 20. The screw plug 37b engages the end of detent cylinder 37 and serves as an adjustable abutment for the end of spring 39 for variably and yieldably urging ball detent 38 toward the cam member 20.

The cam member 20, in addition to the high point 20a, the low point 20b, and the tongue 20c

thereof, also includes a pair of spaced recesses 20*d* and 20*e* which are disposed intermediate the cam faced end of the cam member and the tongue end of the cam member. These two recesses 20*d* and 20*e* serve to alternately receive the ball detent 38 in the alternate positions shown in Figs. 1 and 2. For the normal position of shaft 1, wherein plunger member 24 within tubular sleeve 23 is free to be oriented prior to the selection of anyone of the spring pile-up assemblies 28*a*, 28*b*, 28*c*, and 28*d* respectively, the ball detent occupies recess 20*d*, as shown in Fig. 1, whereas upon movement of actuator knob 2 inwardly as represented in Fig. 2, roller member 22 is moved outwardly by displacement of the low point 20*b* of cam member 20 rearwardly until high point 20*a* of cam member 20 moves adjacent roller member 22, thus ejecting plunger member 24 radially outwardly, as represented in Fig. 2. At the same time as the outward projection of plunger member 24 is accomplished, tongue 20*c* is locked by the projection thereof through one of the locking apertures 27*a*, 27*b*, 27*c*, 27*d*, etc. in locking plate 27.

The angular positions for the angularly shiftable plunger member 24 may be determined from the front of panel 3 by the co-acting indicia mechanism shown more clearly in Figs. 1 and 2, as including the hub member 40 adjustably fixed on tubular member 17 and adapted to turn therewith. The hub 40 is provided with a suitable flange 40*a* to which there is secured by means of screws 41 the masking disc 42. The masking disc 42 is apertured at 43*a*, 43*b*, 43*c*, 43*d*, etc. A translucent light diffusing annular plate 44 is secured by means of screws 45 to the masking disc 42 for diffusing light emanating from lamp 46 supported in socket 47 mounted on bracket 48 extending from the rear of panel 3. The front of panel 3 is apertured at 49, whereby the apertures 43*a*, 43*b*, 43*c*, 43*d*, etc. are each illuminated as shaft 1 is oriented to bring a selected spring pile-up assembly into operation. The translucent annular plate 44 is provided with a suitable groove or recess located behind the apertures 43*a*, 43*b*, 43*c*, 43*d*, etc. to permit the insertion of a designating character facilitating the movement of the switch to the particular position identified by the designation. The light source 46 is disposed between panel 4 and the rear of translucent annular plate 44, so that each designation inserted between the rear of masking disc 42 and the annular plate 44 is sharply illuminated through the aperture 49 in panel 3.

The spring pile-up assemblies 28*a*, 28*b*, 28*c*, 28*d*, 28*e*, 28*f*, 28*g*, 28*h*, 28*i*, etc. are each assembled in radial positions more clearly indicated in Fig. 7 and include multiple leaf springs having various combinations of contactors. The spring pile-up assemblies are conventional and include master spring members illustrated, for example, in Fig. 1 at 28*a'* 28*a''*, 28*a'''* and 28*a''''*, which are interconnected by a lineally extending series of insulators designated generally at 28*a*$^{v}$. Pressure applied against the inner spring 28*a''''* tends to displace all of the master springs radially outwardly, effecting a displacement of the contactors controlled thereby. Similarly, the set of leaf springs in the spring pile-up assembly designated at 28*i*, that is the spring pile-up assembly which is approximately diametrically opposite the spring pile-up assembly 28*a*, is provided with master springs interconnected by space insulators 28*i*$^{v}$, subject to radial displacement by ejection of button 25 in alignment with spacing insulators 28*a*$^{v}$. In the position shown in Fig. 1, however, the roller member 22 rests against the low point 20*b* of cam member 20, so that tubular sleeve 23 is free to revolve in a plane coplanar with the planes of the spacing insulators or the ends of the leaf springs without displacing the leaf springs. The actuating knob 2 is displaced outwardly for this condition. However, upon movement of actuating knob 2 inwardly, as represented in Fig. 2, plunger 24 is ejected radially because the high point 22*a* of cam member 20 is moved beneath roller member 22 thereby projecting button 25 to a position in which the master springs and the spacing insulators which are disposed therebetween are displaced radially, thereby modifying the positions of the contactors, as represented at 28*i* in the lower part of Fig. 2. As these conditions change the ball detent 38 latches the cam member in either orienting position, as in Fig. 1, or in circuit controlling position, as represented in Fig. 2. To guard against accidental opening of circuits established by the contactors under the conditions shown in Fig. 2, the latching mechanism comprising tongue 20*c* interengaged with the selected one of the apertures 27*a*, 27*b*, 27*c*, 27*d*, etc. is engaged through the selected aperture, thus maintaining the circuits in the condition effected by operation of the spring pile-up assembly. The detent wheel 16 and roller 10 by their co-action also preclude displacement of the switch, except by positive actuation.

The system of my invention is readily applicable to multiple units or stages, as represented in Fig. 11, wherein the switch units heretofore described are connected in gangs with shaft 1 extending therethrough for actuating all of the contactors of the several groups of spring pile-up assemblies represented in the units 51, 52 and 53.

The switching system is installed within a frame constituted by end plate 31 and panel 3 with frame members 54, represented in Fig. 7, extending therebetween.

Fig. 12 shows one of the applications of my invention in the control of electrical circuits. I have shown the spring pile-up assemblies for four units with the actuating knob 2 moved out in the extreme position illustrated in Fig. 1. For purposes of explaining the invention, I have illustrated the spring pile-up contacts in positions 28*a*, 28*b*, 28*c* and 28*n*. With the actuating knob 2 moved to out position as in Fig. 1, all of the master springs and associated contactors occupy the same relative positions. It will be understood, however, that displacement of the master springs and their associated spacer insulators 28*a*$^{v}$, which would be the case if the button 25 is projected into pressure relation in alignment with spacer insulators 28*a*$^{v}$, the master springs will be displaced in an opposite direction, changing the order of the electrical contacts. This applies to all of the spring pile-up assemblies at 28*b*$^{v}$, 28*c*$^{v}$ and 28*n*$^{v}$ where pressure applied in the axial direction of the spacer insulators operates to shift the master leaf springs, effecting connection with the reverse group of contactors associated therewith. It will be observed in Fig. 12 that the endwise movement of the master springs may thus control a variety of electrical circuits and, for purposes of illustrating the invention, I have represented the contactor group 28*a* as associated with the terminal panel 55 forming part of an air traffic control system which may include terminals to a stand-by radio receiver input and a stand-by radio receiver output when

the switch is in the "off" position. The terminal connections leading to the contactors of the spring pile-up assembly 28*a* are designated at 1', 2', 3', 4', 5' and 6'. Similarly, the circuits of spring pile-up assembly 28*b*, and also circuits from associated spring pile-up assemblies, may connect to terminal panel 56, including terminals 1'', 2'', 3'', 4'', 27', 28', 29' and 30' leading from the outputs of radio receivers designated 1 to 14, for example.

Similarly, the spring pile-up assemblies 28*b*, 28*c* and 28*m* may have their contacts associated with terminal panel 57 containing terminals 1''', 2''', 3''', 4''', 27''', 28''', 29''' and 30''' leading to air traffic control receiver circuits for receivers 1 to 14 in the circuit assembly.

Terminal panel 58 may carry terminals interconnecting the leaf springs of spring pile-up assemblies 28*b*, 28*c* and 28*n*, including terminals 1'''', 2'''', 3'''', 4'''', 27'''' and 28'''' leading to the main receivers muting relays 1 to 14; and terminals 29'''' and 30'''' leading to the stand-by receiver muting relay and also terminals 32'''' and 33'''' connecting to the power supply circuit. The circuits to the spring pile-up assemblies include resistors illustrated at $R_2$, $R_3$, $R_{15}$ and $R_{17}$. Certain of the spring pile-up assemblies may also include the circuits through the dial light 46 including resistor $R_1$ and a circuit through rheostat $R_{16}$ arranged for controlling the brightness of the dial light. It will be understood that the diagram is merely representative of a variety of circuits in which the switch of my invention may be employed.

In the operation of the switching system of my invention the shaft is shifted linearly outwardly to retract the button 25 and withdraw the tongue 20*c* from the locking plate 27 so that the tubular sleeve 23 may be oriented in either direction to a position aligned with the desired spring pile-up assembly. The adjustment is step-by-step controlled by the detent wheel and associated detent and because the shaft system is capable of orientation either clockwise or counterclockwise, the desired spring pile-up can be selected rapidly by rotation of tubular sleeve 23 in that direction that is the shortest from the initial position to the position of selection. When the desired oriented position is reached, the shaft is moved linearly inwardly interlocking tongue 20*c* with the associated aperture in locking plate 27 and ejecting button 25 radially outwardly for operating the selected spring pile-up assembly. When the circuits established through the selected spring pile-up assembly are no longer required, the actuator knob 2 may be quickly pulled out to its initial position limited by the length of the slot in the sleeve member 17 allowing the previously selected spring pile-up assembly to be restored to its original position due to the inherent bias in the structure of the spring pile-up assembly. The selection operation may now be quickly repeated and another spring pile-up assembly selected and operated. The number of circuits which may be controlled by the equipment of my invention per cubic volume of installation space far exceeds any previously known type of switching device such as plug and jack switch boxes, push key cabinets, toggle switch arrangements and cord and retractible reel plug and jack systems.

I have found the switching arrangement as shown herein highly practical in manufacture and production and efficient in operation and, while I have described my invention in one or two preferred embodiments, I realize that modifications may be made, and I desire that it be understood that no limitations upon my invention are intended other than may be imposed by the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent of the United States is as follows:

1. A switching system comprising a frame structure, a shaft member journaled longitudinally of said frame structure and rotatable in either direction therein; a sleeve member extending radially with respect to said shaft member, a plunger slidable in said sleeve member, means for lineally shifting the position of said shaft member and correspondingly ejecting said plunger in a radial direction, a multiplicity of spring pile-up assemblies supported with respect to said frame structure, actuating means for each of said spring pile-up assemblies disposed in a position coplanar with said plunger, said plunger in ejected position establishing pressure contact with the actuating means of a selected spring pile-up assembly for displacing the spring pile-up assembly in a radial direction to operating position.

2. A switching system comprising a frame structure, a cylindrical member carried by said frame structure, a multiplicity of spring pile-up assemblies supported in radial positions around said cylindrical member, actuating means for each of said spring pile-up assemblies, said actuating means all being disposed coplanar in a transverse plane, a rotatable shaft member extending through said cylindrical member and selectively revolvable either clockwise or counterclockwise to a selected position aligned with the actuating means of a selected spring pile-up assembly and means associated with said rotatable shaft member and selectively projectable in a radial direction for radially displacing the aligned actuating means for operating a selected aligned spring pile-up assembly.

3. A switching system comprising a frame structure, a rotatable sleeve member journaled in said frame structure and extending longitudinally thereof, said sleeve member having a slot in one side thereof throughout a portion of its length, a rotatable shaft member disposed concentrically within said sleeve member and slidable longitudinally within said sleeve member within the limits of the aforesaid slot therein, a cam member carried by said shaft member and projecting through a portion of the slot in said sleeve member short of the limits thereof whereby said shaft member may be axially displaced longitudinally of said sleeve member with said cam member abutting with end of the slot in said sleeve member as limits, cam faces carried by said cam member, a radially extending sleeve supported by said sleeve member adjacent the position of said cam faces on said cam member, a plunger operative in said radially extending sleeve, means for biasing said plunger to retracted position, one of said cam faces on said cam member operating to radially eject said plunger when said shaft member is shifted longitudinally of said sleeve member, a multiplicity of spring pile-up assemblies mounted in radial positions around said shaft member, actuating means for each of said pile-up assemblies terminating in a plane coplanar with the plane of said plunger and in positions engageable by said plunger when in ejected position for engaging the actuating means of the selected spring pile-up assemblies.

4. A switching system as set forth in claim 3 in which said shaft member is divided into a pair of sections coupled one to another, said cam member

being carried by one of said sections and spaced from the other of said sections.

5. A switching system as set forth in claim 3, in which said cam member also includes a linearly extending tongue, and a locking plate having perforations therein extending in a plane normal to the axis of said shaft member said tongue being projectable through a selected perforation for locking said shaft member in a selected angular position.

6. A switching system as set forth in claim 3, in which said cam member includes a pair of recesses disposed intermediate the ends thereof and means selectively engageable with either of said recesses for latching said shaft member in either of two limiting, lineally disposed, displaced positions.

7. A switching system comprising a frame structure, a cylindrical member carried by said frame structure, a plurality of spring pile-up assemblies supported in spaced positions along said cylindrical member and projecting radially therefrom, each of said spring pile-up assemblies including a multiplicity of contact springs and associated contactors and actuating springs all extending generally parallel with elements of the longitudinally extending surface of said cylindrical member, means biasing said actuating springs in a radially inward direction, said actuating springs terminating in a substantially coplanar position and selectively displaceable from the inwardly biased position outwardly in a radial direction for moving the contact springs into electrical connection with the associated contactors, and a rotatable shaft member journaled in said frame structure for selective rotation clockwise or counterclockwise and extending axially through said cylindrical member, a radially projectable member carried by said rotatable shaft member and operative within said cylindrical member to positions selectively alignable with the actuating springs of a selected spring pile-up assembly and selectively displaceable in a radially outward direction for applying pressure to the actuating springs of the selected spring pile-up assembly for controlling the operation of the contactors of the said selected spring pile-up assembly.

8. A switching system as set forth in claim 7 in which the means operative within said cylindrical member includes an axially extending, rotatable sleeve member in which said longitudinally displaceable, rotatable shaft member is adjustable, said sleeve member having a longitudinally extending slot in one wall thereof, said shaft member having a longitudinally extending slot therein terminating short of the length of the slot in said sleeve member, a cam member secured in the slot formed in said shaft member and projecting through the slot in said sleeve member and beyond the limits thereof, said cam member having a length terminating short of the limits of the slot in said sleeve member whereby said cam member may be displaced axially of said sleeve member by axial movement of said shaft member with the ends of the slot in said sleeve member serving as limits to the longitudinal displacement of said cam member, a detent engageable by said cam member for maintaining said cam member in either of two limiting positions, and in which said radially projectable member comprises a radially extending sleeve supported by said rotatable sleeve member in substantial alignment with said cam member, a projectable and retractable plunger disposed in said sleeve, cam faces on said cam member for engaging the end of said plunger for effecting the projection of said plunger to a radial outward position from an inwardly biased position and means carried by said plunger for engaging the actuating springs of a selected spring pile-up assembly.

9. A switching system as set forth in claim 7 in which a latch plate, having a multiplicity of spaced perforations therein individually aligned with the said spring pile-up assemblies, is mounted interiorly of said cylindrical member and wherein said cam member includes a tongue selectively insertable through a selected perforation in said latching plate for maintaining said shaft member in a predetermined aligned position with the actuating springs of a selected spring pile-up assembly.

10. A switching system comprising a frame structure a shaft system extending longitudinally of said frame structure and orientable either clockwise or counterclockwise, a radially extending tubular arm associated with said shaft system, a plunger member radially slidably disposed within said tubular arm and normally biased to a retracted position, means associated with said shaft system for ejecting said plunger member radially outwardly subsequent to the selective orientation thereof in either direction and a multiplicity of spaced spring pile-up assemblies located in radial positions around said shaft system and including actuating springs terminating in a lateral plane coplanar with the path of orientation of said plunger member, said plunger member when in inwardly retracted position being rotatable by orientation of said shaft system in a path clearing all of said actuating springs and operating when projected to apply pressure in a radially outward direction against the actuating springs of a selected spring pile-up assembly when an ejection force is applied to said plunger member.

GRADY O. GLAZE.

**References Cited** in the file of this patent

UNITED STATES PATENTS

| Number | Name | Date |
|---|---|---|
| 2,103,792 | Peterson et al. | Dec. 28, 1937 |
| 2,433,920 | Mossman | Jan. 6, 1948 |