Sept. 21, 1965 W. L. TANCRED 3,207,859

MULTIPLE SWITCH

Filed Oct. 24, 1961 2 Sheets-Sheet 1

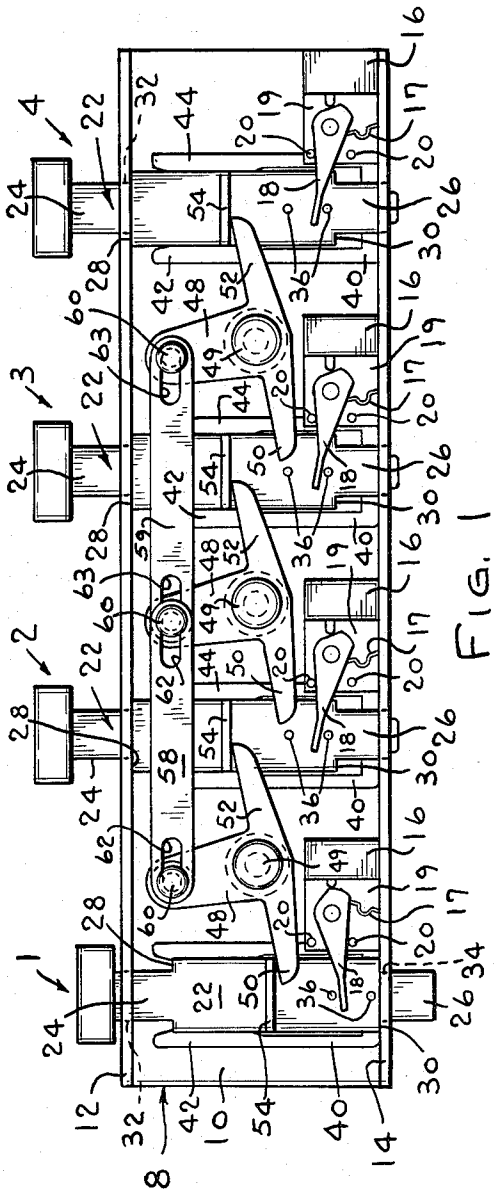


FIG. 1

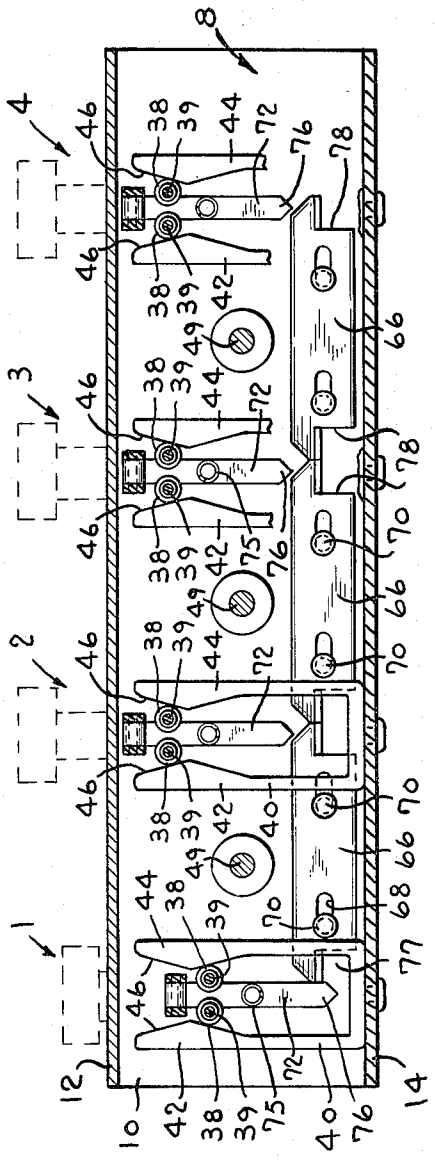


FIG. 4

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MULTIPLE SWITCH

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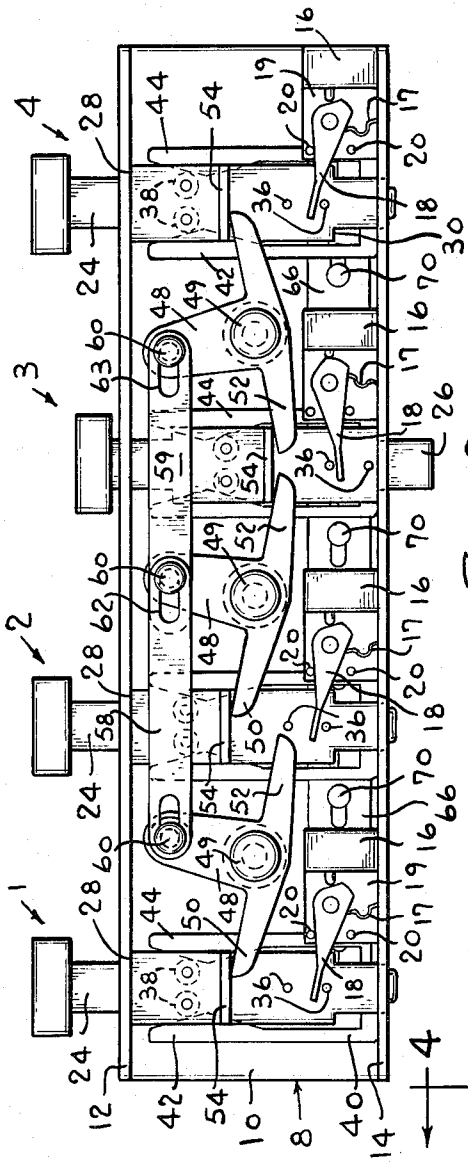


FIG. 2

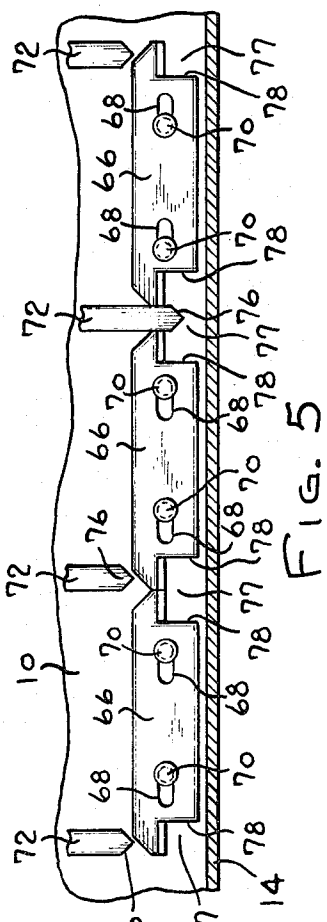


FIG. 5

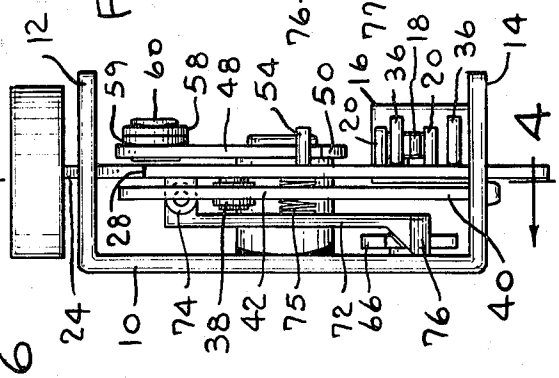


FIG. 3

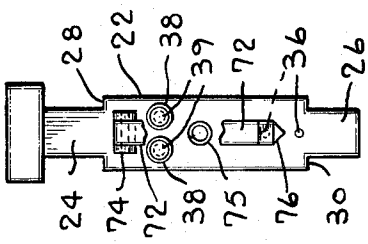


FIG. 6

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3,207,859

# MULTIPLE SWITCH

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14 Claims. (Cl. 200—5)

This invention relates to multiple station switch assemblies and, more particularly, to a new and improved actuating mechanism for a multiple station switch assembly.

Multiple station switch assemblies are well known and are generally used where a number of operations are to be selectively controlled, and in many instances are used to selectively control a continuous sequence of separate operations.

Prior art multiple station switch assemblies have been susceptible to what is known as "teasing," i.e. after one switch station has been actuated another can be urged toward actuation a sufficient amount to release the prior actuated switch but an amount which is insufficient to actuate itself. This is undesirable in many switch installations and particularly so where a continuous series of operations is to be maintained. Multiple station switch assemblies should be "tease-proof," the individual switch stations should be positively locked in both their normal and actuated positions so as to resist vibrational and shock forces, they should not be susceptible to simultaneous actuation of two or more switch stations, and a prior actuated switch should be released upon subsequent actuation of another switch.

An object of this invention is the provision of an actuating mechanism for a multiple station switch assembly which is "tease-proof," wherein two or more switch stations cannot be actuated simultaneously, wherein the individual switch stations are locked in their normal and actuated positions, and wherein a prior actuated switch is released upon subsequent actuation of another switch.

The novel features of this invention are set forth in the appended claims. The invention itself, together with additional objects and advantages thereof, will be more clearly understood from a reading of the following description in connection with the accompanying drawings wherein:

FIG. 1 is a front elevation of a preferred embodiment of this invention;

FIG. 2 is the mechanism of FIG. 1 illustrating a subsequent switch actuation;

FIG. 3 is an end view of the mechanism of FIG. 1;

FIG. 4 is a cross-sectional view along lines 4—4 of FIG. 3;

FIG. 5 is an enlarged view of the lockout mechanism; and

FIG. 6 is a view of actuating stem.

This invention is illustrated as preferably embodied in a four station switch assembly, the stations being numbered 1–4; however, the number of switch stations can be varied without departing from the scope of this invention. The assembly includes a channel shaped frame 8 having a web portion 10 and laterally extending shelves 12 and 14. Each of the stations includes a switch 16 mounted on lower shelf 14. Each of the switches 16 is actuated by an elongated lever 18 pivotally supported from a bracket 19. Pins 20 are fixed to bracket 19 and are disposed on either side of the lever 18 and act as stops to limit the travel of lever 18. An over center spring 17 is suitably seated between lower shelf 14 and lever 18 to maintain engagement between lever 18 and one of stop pins 20 depending upon the position of lever 18.

The switch actuating mechanism is identical for each station and hence only one will be described. Movement



of lever 18 and actuation of switch 16 is accomplished through a stem 22. Stem 22 has an upper end portion 24 and a lower end portion 26 formed to provide upper and lower shoulders 28 and 30 respectively. Portions 24 and 26 of the stem 22 are respectively positioned in apertures 32 and 34 in the upper and lower shelves of the frame so that stem 22 is supported in and movable relative to the frame. Shoulders 28 and 30 serve as stops to limit the travel of the stem relative to the frame.

Stem 22 carries a pair of relatively spaced apart pins 36 between which is positioned switch actuating lever 18. When stem 22 is moved down upper pin 36 engages and pivots lever 18 to actuate switch 16 and, correspondingly, when stem 22 is returned to its normal position lower pin 36 engages lever 18 to release switch 16. Pins 36 and lever 18 are so positioned relative to the lever 18 that the lever is moved to actuate the switch 16 near the end of the actuating stroke of stem 22 and the lever releases switch 16 near the end of the return stroke of stem 22.

A pair of rollers 38 are mounted on studs 39 which are rigid with stem 22, so that rollers 38 are movable with stem 22. Fixed to lower shelf 14 of the frame is a U-shaped member 40 having a pair of resilient arms 42 and 44 extending one on either side of rollers 38 and generally parallel to the direction of travel of stem 22. Arms 42 and 44 each include generally triangularly shaped camming surfaces 46. Camming surfaces 46 are biased towards engagement with rollers 38 by the resiliency of arms 42 and 44 and are disposed in the path of travel of rollers 38. When stem 22 is in its normal position, as illustrated in FIG. 1, rollers 38 are disposed on the upper inclined surface of camming surfaces 46. Due to the resiliency of arms 42 and 44 the camming surfaces urge stem 22 upwardly and lock shoulders 28 in engagement with upper shelf 12. Member 40, with camming surfaces 46, acts in the nature of an over-center spring with respect to rollers 38 and stem 22 in that as stem 22 is actuated the rollers separate arms 42 and 44 and as the rollers pass the high point, top-dead-center, on cams 46 arms 42 and 44, being biased inwardly, urge the rollers and the stem toward actuation. When stem 22 is in its actuated position, rollers 38 are disposed on the lower inclined surfaces of camming surfaces 46 so that the camming surfaces maintain engagement between lower shoulder 30 and lower shelf 14. Thus, stems 22 are capable of assuming a normal position and a switch actuating position and resilient means 40 is operative to selectively urge the stem toward and lock it in either its normal position or its switch actuating position. Once having passed the high point on camming surface 46 stems 22 are committed to either a normal or actuating position, depending on the direction of travel and are locked in that position; and it should be noted that other arrangements for achieving this over-center operation are available and can be utilized without departing from the scope of this invention.

The multiple station switch assembly also includes an interlock mechanism which interconnects the switch stations. This interlock mechanism includes an inverted T-shaped rocker member 48 positioned between each pair of adjacent switch stations and pivotally supported on web 10 by a stud 49. Each T-shaped rocker member is provided with arms 50 and 52 extending laterally on either side of stud 49 and into the path of respective ones of stems 22 of the adjacent switch stations. Stems 22 are each provided with laterally extending shelves 54 which are positioned on stem 22 to engage respective ones of arms 50 and 52 as stems 22 are moved to their switch actuating positions.

Referring to FIG. 1, wherein the switch station 1 is shown in its switch actuating position, it can be seen that shelves 54 of switch stations 1 and 2 are in engagement with arms 50 and 52 of the rocker member 48.

Should switch station 2 now be operated toward its switch actuating position rocker 48 will pivot as stem 22 of station 2 is moved downwardly and will move stem 22 of station 1 upwardly to its normal position. Adjacent switch stations are therefore interconnected so that one switch station cannot be operated to its switch actuating position without releasing the other if the other is in its switch actuating position. Furthermore, camming surface 46, rollers 38, shelf 54 and rockers 48 are preferably so constructed and positioned relative to each other that, not only is it impossible to actuate one switch station without releasing a prior actuated switch station, but in addition one switch station will not, in normal operation, be released unless another is actuated. More particularly, pivotal movement of lever 18 to actuate or release its respective switch 16, since lever 18 is not engaged except at the end of the actuating and return stroke, is not initiated until rollers 38 have passed top-dead-center on the camming surfaces 46. To release a prior actuated switch the rollers of that switch station must be moved past top-dead-center on the camming surface and to produce that amount of movement another switch station must be moved past top-dead-center on the camming surface. Once having passed that point, the switch stations are committed and, under the influence of the camming surfaces, must complete the travel to either a switch actuating or normal position and accordingly actuating one switch while simultaneously releasing another.

Rockers 48 are preferably interconnected by a pair of links 58 and 59. Rockers 48 are provided with studs 60 which are positioned in elongated slots 62 and 63 in links 58 and 59 respectively. Through the provisions of the links, all of rockers 48 are tied together so that motion can be transmitted between remotely spaced rockers. FIG. 1 illustrates the condition of the switch assembly when switch station 1 has been actuated. FIG. 2 illustrates the condition of the switch assembly just after actuation of switch station 3. It will be noted that as switch station 3 is actuated, its self member 54 engages and displaces the rocker member between stations 2 and 3. As that rocker member pivots, its stud 60 engages the end of slot 62 in link 58. Further movement of rocker 48 by the shelf displaces connecting link 58 to the right as viewed in FIGS. 1 and 2. This pivots rocker 48 between stations 1 and 2 about its axis to urge stem 22 of switch station 1 upwardly into its normal position. When switch station 3 has reached its switch actuating position, switch station 1 has been returned to its normal position. Therefore, links 58 and 59 interconnect the switch stations so that remotely positioned switch stations can be sequentially actuated and still maintain the desirable features that one switch station cannot be actuated without releasing any prior actuated switch station and that a prior actuated switch station will not, in normal operation, be released unless another switch station is actuated.

As is perhaps best illustrated in FIG. 3, each of stems 22 carries a pawl 72. A hinge member 74 pivotally supports pawl 72 from stem 22 so that the pawl is movable with stem 22 and also is pivotally mounted thereon. A spring 75 is seated between stem 22 and pawl 72 and biases and pawl away from the stem into engagement with web 10 of the frame. A number of gate members 66, in this instance three such gate members, are slidably supported on the frame by means of elongated slots 68 in the gate members and headed studs 70 which are rigid with web 10 and disposed in elongated slots 68. Pawls 72 are disposed above gate members 66 and are each provided at their lower end with a pointed camming shoe 76 preferably disposed adjacent the junctures of gate 66. Gates 66 are positioned on the frame so that they are movable to receive only one pawl at a time, i.e. the movement of gates 66 relative to the frame is limited by the length of the elongated slots and to an amount sufficient to admit only one pawl 72. As a stem 22 is moved toward its switch actuating position shoe 76 of the respective one of pawls 72 cams into the juncture between gates 66 and displaces gates 66 sufficiently to admit the pawl and permit stem 22 to assume its switch actuating position. However, only one pawl 72 can be received at a time which prevents simultaneous actuation of two or more switch stations. Although the combination of rockers 48 and links 58 and 59 will effectively prevent simultaneous actuation of two or more switch stations under normal conditions, under abnormal conditions, for example where excessive vibrational forces are encountered, it could be possible to move two switch stations toward actuation an amount sufficient to move their respective stems past top-dead-center on the camming surfaces. From this position one of the switch actuating levers can, due to the vibrational forces, creep to a switch actuating position. By incorporating the gates this is eliminated as simultaneous downward movement of more than one stem is prevented prior to passing top-dead-center. Furthermore the gates provide additional assurance of "break before make" operation of the switch stations.



Each of gates 66 are provided with reliefs 77 for receiving pawl 72 of any stem which is in its switch actuating position. These reliefs are preferably formed by notches 78 adjacent the ends of gates 66. In operation, as a subsequent switch station is actuated and the gates are moved to receive the pawl of that switch station, the pawl of the prior actuated station is received in relief 77 as the gates close over the pawl and, as the prior actuated station is moved toward its normal position by a rocker 48, its pawl is cammed inwardly toward its stem to clear the closed gates and permit return of stem 22 to its normal position.

The discussion of this invention with respect to a particular preferred embodiment thereof is intended for illustrative purposes only and not by way of limitation. Accordingly, it is intended in the appended claims to cover all modifications and embodiments of this invention as fall within the true spirit and scope thereof.

What I claim is:

1. In a multiple station switch assembly having a plurality of switches mounted on a frame, the combination with each of said switches of a stem mounted on said frame for movement relative thereto and between a normal position and a switch actuating position, means arranged for engagement by said stem for selectively actuating and releasing said switch upon movement of said stem and positioned relative to said stem such that said actuation and release occurs near the end of movement to said normal and switch actuating positions, at least one roller member fixed to and movable with said stem, a resilient arm extending on each side of said roller member, a camming surface positioned on each of said arms in opposed relative relationship, said camming surfaces biased toward engagement with and positioned in the path of movement of said roller member to selectively bias said stem toward and lock said stem in said normal and switch actuating positions, a pawl member, means hingedly connecting said pawl member on said stem for movement therewith and pivotal movement with respect thereto, a plurality of rockers, means pivotally mounting one of said rockers at a fixed pivot between each pair of adjacent stems, each of said rockers projecting into the path of movement of and positioned relative to a respective pair of adjacent stems for engagement by and movement with one of said pair of stems as it is moved toward its switch actuating position and positioned to pivot into engagement with the other of said pair of stems and move it to its normal position, link means interconnecting rockers of remote stems and arranged to transmit motion between said rockers so that upon sequential actuation of remote stems motion will be transmitted between the rockers adjacent said remote stems, a plurality of normally closed gate members, means slidably supporting

said gate members on said frame in said normally closed position and in the path of said pawls, said pawls positioned to engage and displace said gate members when their respective stems are moved toward switch actuating position, said last-mentioned means further supporting said gate members to receive only one of said pawls at a time as said stems are moved toward their switch actuating position and each including a relief portion disposed adjacent respective ones of said pawls for receipt of said pawls when said stems are in switch actuating position, said gates preventing simultaneous movement of more than one stem toward switch actuating position and upon sequential movement of said stems toward switch actuating position the pawl of a prior actuated stem being received in a respective one of said relief portions so as not to interfere with displacement of said gate members by the pawl of a subsequently actuated stem.

2. In a multiple station switch assembly having a plurality of switches mounted on a frame, the combination with each of said switches of a stem mounted on said frame for movement relative thereto between a normal position and a switch actuating position, means arranged for engagement by said stem for selectively actuating and releasing said switch upon movement of said stem and positioned relative to said stem such that said actuation and release occurs near the end of movement to said normal and switch actuating positions, a projection on and movable with said stem, resilient means disposed on opposed sides of said projection and each including a camming surface disposed in the path of movement of said stem for selectively biasing said stem toward and locking said stem in said normal and switch actuating positions, a pawl supported on and movable with said stem, a plurality of lever means, means pivotally connecting one of said lever means at a fixed point between each pair of adjacent stems and in the path of movement of said stems, said lever means positioned relative to said pair of adjacent stems to simultaneously move one of said pair of stems toward normal position as the other of said stems is moved toward switch actuating position, link means interconnecting said lever means for transmitting motion between the lever means of remote stems upon sequential actuation of remote stems so that the motion imparted to the lever means adjacent a subsequently actuated stem is transmitted to the lever means adjacent a prior actuated stem to move said prior actuated stem to its normal position, normally closed gate means, means slidably supporting said gate means on said frame adjacent said pawls and for engagement by and movement in response to movement of said pawls to receive respective ones of said pawls as they are moved toward switch actuating position, said last-mentioned means further supporting said gate means to receive only one of said pawls at a time to prevent simultaneous movement of more than one stem into its switch actuating position.

3. In a multiple station switch assembly having a plurality of switches mounted on a frame, the combination with each of said switches of a stem mounted on said frame for movement relative to thereto between a normal position and a switch actuating position, means on said stem for actuating said switch upon movement of said stem, at least one roller member fixed to and movable with said stem, a resilient arm extending on each side of said roller, a camming surface positioned on each of said arms in opposed relative relationship, said camming surfaces biased toward engagement with and positioned in the path of movement of said roller to selectively bias said stem toward and lock said stem in said normal and switch actuating positions, and a pawl member, means hingedly connecting said pawl member to said stem for movement therewith, a plurality of rockers, means pivotally mounting one of said rockers at a fixed pivot between each pair of adjacent stems, each of said rockers projecting into the path of movement of and positioned relative to a respective pair of adjacent stems for engagement by and movement with one of said pair of stems as it is moved toward its switch actuating position and positioned to pivot into engagement with the other of said pair of stems and move it to its normal position, link means interconnecting rockers of remote stems and arranged to transmit motion between said rockers so that upon sequential actuation of remote stems motion will be transmitted between the rockers adjacent said remote stems, a plurality of normally closed gate members, means slidably supporting said gate members on said frame and in the path of said pawls, said pawls positioned to engage and displace said gates when their respective stems are moved toward switch actuating position, said last-mentioned means further supporting said gate members to receive only one of said pawls at a time as said stems are moved toward their switch actuating position and each gate member including a relief portion disposed adjacent respective ones of said pawls for receipt of said pawls when said stems are in switch actuating position, said gate members preventing simultaneous movement of more than one stem toward switch actuating position and upon sequential movement of said stems toward switch actuating position the pawl of a prior actuated stem being received in a respective one of said relief portions so as not to interfere with displacement of said gate members by the pawl of a subsequently actuated stem.

4. In a multiple station switch assembly having a plurality of switches mounted on a frame, the combination with each of said switches of a stem mounted on said frame for movement relative thereto between a normal position and a switch actuating position, means controlled by said stem for actuating said switch upon movement of said stem, a projection on and movable with stem, means engagable with said projection and including a camming surface in the path of movement of said projection for biasing said stem toward and locking said stem in said normal and switch actuating positions, and a pawl supported on and movable with said stem, a plurality of lever means, means pivotally mounting said lever means at a fixed pivot between each pair of adjacent stems and in a position, relative to said pair of adjacent stems, to simultaneously move one of said pair of stems toward normal position as the other of said pair of stems is moved toward switch actuating position, means interconnecting said lever means for transmitting motion between the lever means of remote stems upon sequential actuation of remote stems so that the motion imparted to the lever means adjacent a subsequently actuated stem is transmitted to the lever means adjacent a prior actuated stem to move said prior actuated stem to its normal position, normally closed gate means, and means slidably supporting said gate means on said frame adjacent said pawls and for engagement with and movement in response to pawl movement to receive respective ones of said pawls as said stems are moved toward switch actuating position, said last-mentioned means further supporting said gate means to receive only one of said pawls at a time to prevent simultaneous movement of more than one stem into its switch actuating position.

5. In a multiple station switch assembly having a plurality of switches mounted on a frame, the combination with each of said switches of a stem slidably mounted on said frame for movement relative thereto to actuate said switch, means for biasing said stem toward and locking said stem in a normal and a switch actuating position, stop means on a movable with said stem, a plurality of lever means, means pivotally mounting said lever means at a fixed point between each pair of adjacent stems and in a position relative to said pair of adjacent stems, to simultaneously move one of said pair of stems toward normal position as the other of said pair of stems is moved toward switch actuating position, means interconnecting the lever means of remote stems for transmitting motion between the lever means of remote stems upon sequential actuation of remote stems so that the motion imparted to the lever

means adjacent a subsequently actuated stem is transmitted to the lever means adjacent a prior actuated stem to move said prior actuated stem to its normal position, gate means, and means slidably supporting said gate means on said frame in the path of movement of said stem stop means and for engagement with and movement by said stop means to receive respective ones of said stop means as said stems are moved toward switch actuating position, said last-mentioned means further supporting said gate means to receive only one of said stop means at a time to prevent simultaneous movement of more than one stem into its switch actuating position.

6. In a multiple station switch assembly having a plurality of switches mounted on a frame, the combination with each of said switches of a stem slidably mounted on said frame for movement relative thereto to actuate said switch, means for biasing said stem toward and locking said stem in a normal position and a switch actuating position, release means mounted adjacent each pair of adjacent stems and positioned relative to said pair of adjacent stems for selective engagement with said pair of stems to simultaneously move one of said pair of stems toward said normal position as the other of said pair of stems is moved toward said switch actuating position, means interconnecting the release means of remote stems for transmitting motion therebetween so that upon sequential actuation of remote stems the motion imparted to the release means adjacent a subsequently actuated stem is transmitted to the release means adjacent a prior actuated stem to move said prior actuated stem to its normal position, and means slidably supported adjacent said stems in a normally closed position and arranged for engagement with and movement by said stems to receive one of said stems as it is moved to switch actuating position said last-mentioned means further arranged to receive only one of said stems at a time to prevent simultaneous movement of more than one stem into its switch actuating position.

7. In a multiple station switch assembly having a plurality of switches mounted on a frame, the combination with each of said switches of a stem mounted on said frame for movement between a normal position and a switch actuating position, means arranged for engagement by said stem for selectively actuating and releasing said switch upon movement of said stem and positioned relative to said stem such that said actuation and release occurs near the end of movement to said normal and switch actuating positions, camming means disposed adjacent said stem and biased toward engagement therewith for selectively biasing said stem toward and locking said stem in said normal and switch actuating positions, a plurality of lever means, means pivotally mounting one of said lever means at a fixed pivot between each pair of adjacent stems and in a position relative to said pair of adjacent stems to simultaneously move one of said pair of stems toward normal position as the other of said stems is moved toward switch actuating position, and means interconnecting said lever means of remote stems for transmitting motion between said lever means of remote stems so that upon sequential actuation of remote stems the motion imparted to the lever means adjacent a subsequently actuated stem is transmitted to the lever means adjacent a prior actuated stem to move said prior actuated stem to its normal position.

8. In a multiple station switch assembly having a plurality of switches mounted on a frame, the combination with each of said switches of a stem mounted on said frame for movement between a normal position and a switch actuating position, means engageable by said stem for selectively actuating and releasing said switch upon movement of said stem and positioned relative to said stem such that said actuation and release occurs near the end of movement to normal and switch actuating positions, camming means engageable with said stems for selectively biasing said stem toward and locking said stem



in said normal and switch actuating positions, lever means fixed with respect to said frame adjacent each pair of adjacent stems and positioned relative to said pair of adjacent stems for selective engagement with said stems to simultaneously move one of said pair of stems toward normal position as the other of said pair of stems is moved toward switch actuating position, and means interconnecting said lever means of remote stems for transmitting motion therebetween so that upon sequential actuation of remote stems the motion imparted to the lever means adjacent a subsequently actuated stem is transmitted to the lever means adjacent a prior actuated stem to move said prior actuated stem to its normal position.

9. In a multiple station switch assembly having a plurality of switches mounted on a frame, the combination with each of said switches of a stem mounted on and movable relative to said frame between a normal position and a switch actuating position, means on said stem for operatively engaging and actuating said switch upon movement of said stem, at least one roller member fixed to and movable with said stem, a resilient arm extending on each side of said rollers member, a camming surface positioned on each of said arms in opposed relative relationship, said camming surfaces biased toward engagement with and positioned in the path of movement of said roller member to selectively bias said stem toward and lock said stem in said normal and switch actuating positions, a plurality of rockers, means pivotally mounting one of said rockers at a fixed pivot between each pair of adjacent stems, each of said rockers projecting into the path of movement of and positioned relative to a respective pair of adjacent stems for engagement by and movement with one of said pair of stems as it is moved toward its switch actuating position and positioned to pivot into engagement the other of said pair of stems and move it to its normal position, and link means interconnecting rockers of remote stems and arranged to transmit motion between said rockers so that upon sequential actuation of remote stems motion will be transmitted between the rockers adjacent said remote stems.

10. In a multiple station switch assembly having a plurality of switches mounted on a frame, the combination with each of said switches of a stem mounted on said frame for movement between a normal position and a switch actuating position, means controlled by said stem for actuating said switch, a projection on and movable with said stem, means disposed on opposed sides of said projection and each including a camming surface disposed in the path of movement of said stem for selectively biasing said stem toward and locking said stem in said normal and switch actuating positions, a plurality of lever means, means pivotally mounting one of said lever means at a fixed pivot between each pair of adjacent stems and in the path of movement of said stems, said lever means positioned relative to said pair of adjacent stems to simultaneously move one of said pair of stems toward normal position as the other of said pair of stems is moved toward switch actuating position, and means interconnecting said lever means of remote stems for transmitting motion therebetween so that upon sequential actuation of remote stems the motion imparted to the lever means adjacent a subsequently actuated stem is transmitted to the lever means adjacent a prior actuated stem to move said prior actuated stem to its normal position.

11. In a multiple station switch assembly having a plurality of switches mounted on a frame, the combination with each of said switches of a stem slidably mounted on said frame for movement to actuate said switch, means for selectively biasing said stem toward and locking said stem in a normal position and a switch actauting position, a plurality of lever means, means pivotally mounting one of said lever means at a fixed pivot between each pair of adjacent stems and in the path of movement of said stems, said lever means positioned relative to said pair of adjacent stems to simultaneously move one of said pair of

stems toward normal position as the other of said stems is moved toward switch actuating position, and means interconnecting said lever means of remote stems for transmitting motion therebetween so that upon sequential actuation of remote stems the motion imparted to the lever means adjacent a subsequently actuated stem is transmitted to the lever means adjacent a prior actuated stem to move the said prior actuated stem to its normal position.

**12.** In a multiple station switch assembly having a plurality of switches mounted on a frame, the combination with each of said switches of a stem mounted on and movable relative to said frame between a normal position and a switch actuating position, means on said stem of actuating said switch upon movement of said stem, at least one roller member fixed to and movable with said stem, a resilient arm extending on each side of said roller, a camming surface positioned on each of said arms in opposed relative relationship, said camming surfaces biased toward engagement with and positioned in the path of movement of said roller to selectively bias said stem toward and lock said stem in said normal and switch actuating positions, a pawl, means hingedly supporting said pawl on said stem for movement therewith, a plurality of normally closed gate members, means slidably supporting said gate members on said frame in said normally closed position and in the path of said pawls, said pawls positioned to engage and displace said gate members when their respective stems are moved toward switch actuating positions, said last-mentioned means further supporting said gates to receive only one of said pawls at a time as said stems are moved toward said switch actuating positions and each gate member including a relief portion disposed adjacent respective ones of said pawls for receipt of said pawls when said stem are in switch actuating position, said gates members preventing simultaneous movement of more than one stem toward switch actuating position and upon sequential movement of said stems toward switch actuating position the pawl of a prior actuated stem being received in a respective one of said relief portions so as not to interfere with displacement of said gate members by the pawl of a subsequently actuated stem.

**13.** In a multiple station switch assembly having a plurality of switches mounted on a frame, the combination with each of said switches of stem means slidably mounted on said frame for movement relative thereto to actuate said switch, means for biasing said stem means toward and locking said stem means in a normal position and a switch actuating position, release means mounted adjacent each pair of adjacent stem means and positioned relative to said pair of adjacent stem means to engage and simultaneously move one of said pair of stem means toward said normal position as the other of said pair of stem means is moved toward said switch actuating position, means interconnecting said relative means for transmitting motion therebetween so that upon sequential actuation of remote stem means the motion imparted to the release means adjacent a subsequently actuated stem means is transmitted to the release means adjacent a prior a prior actuated stem means to move said prior actuated stem to its normal position, said biasing means constructed and arranged relative to said stem means to maintain a force on and bias said prior actuated stem means toward its switch actuating position until said subsequently actuated stem means has moved sufficiently that the biasing force thereon is in an effective direction to complete movement of said stem means to its switch actuating position whereupon said prior actuated stem means is released for movement to its normal position, and means slidably supported adjacent said stem means in a normally closed position for engagement with and movement by said stem means to receive one of said stem means as it is moved to switch actuating position and arranged to receive only one of said stem means at a time as said stem means are moved toward said switch actuating positions to prevent simultaneous movement of more than one stem means into its switch actuating position.

**14.** The combination of claim **13** wherein said means slidably supported adjacent said stem means comprises a plurality of normally closed gates, means slidably supporting said gates in the path of movement of said stem means and for displacement in accordance with movement of said stem means toward switch actuating position, said last-mentioned means further supporting said gates to receive only one of said stem means at a time as said stem means are moved toward a switching actuating position, and each gate including a relief portion disposed adjacent selective ones of said stem means to receive and accommodate a prior actuated stem means, said gates preventing simultaneous movement of more than one stem means toward said switch actuating position at a time upon sequential movement of said stem means toward said switch actuating position a prior actuated stem means being accommodated by a respective one of said relief portions so as not to interfere with displacement of said gates by a subsequently actuated stem means.

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BERNARD A. GILHEANY, *Primary Examiner.*

# UNITED STATES PATENT OFFICE

# CERTIFICATE OF CORRECTION

Patent No. 3,207,859 September 21, 1965

William L. Tancred

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 5, line 59, strike out "to"; column 6, line 33, after "with" insert -- said --; line 66, for "a", first occurrence, read -- and --; column 8, line 22, for "rollers" read -- roller --; line 70, for "actauting" read -- actuating --;column 9, line 15, for "of", first occurrence, read -- for --; line 35, for "stem" read -- stems --; column 10, line 4, strike out "a prior".

Signed and sealed this 3rd day of May 1966.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents