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2,851,898

SELECTIVE CONTROL MECHANISM

Filed Feb. 20, 1956

2 Sheets-Sheet 1

Fig. 1.

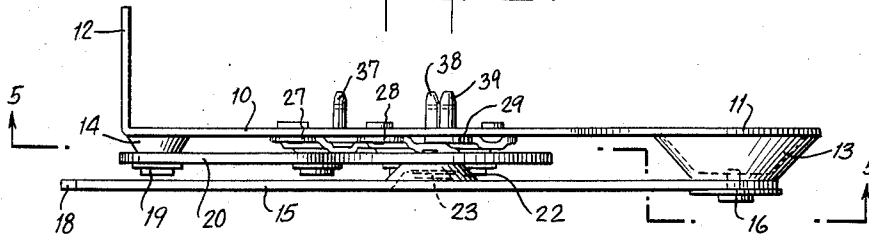


Fig. 2.

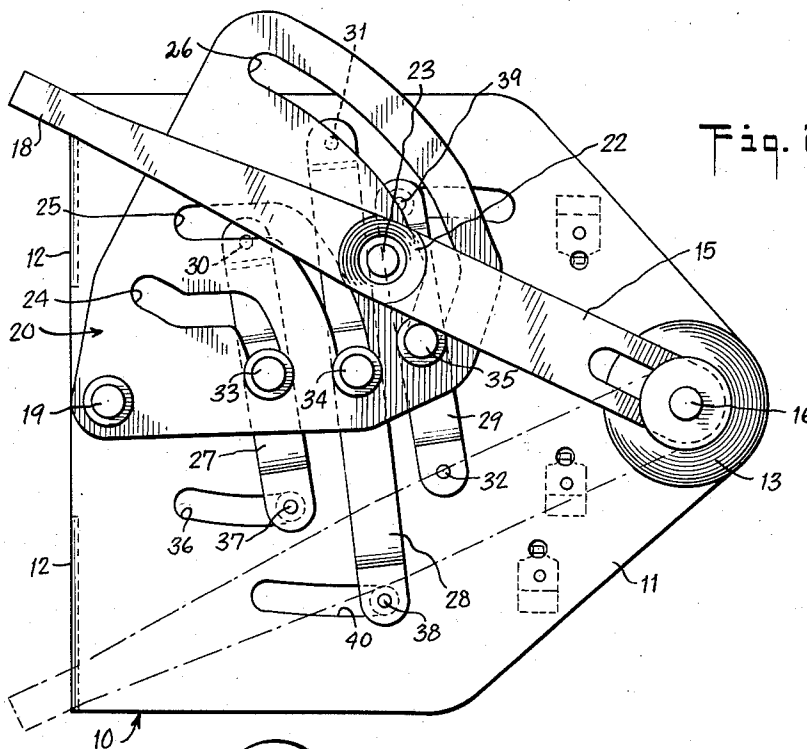
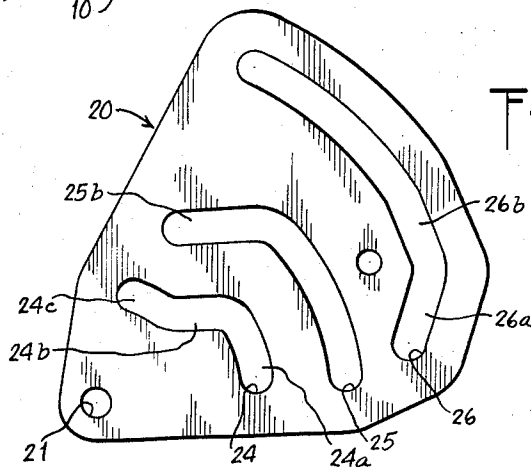


Fig. 3.



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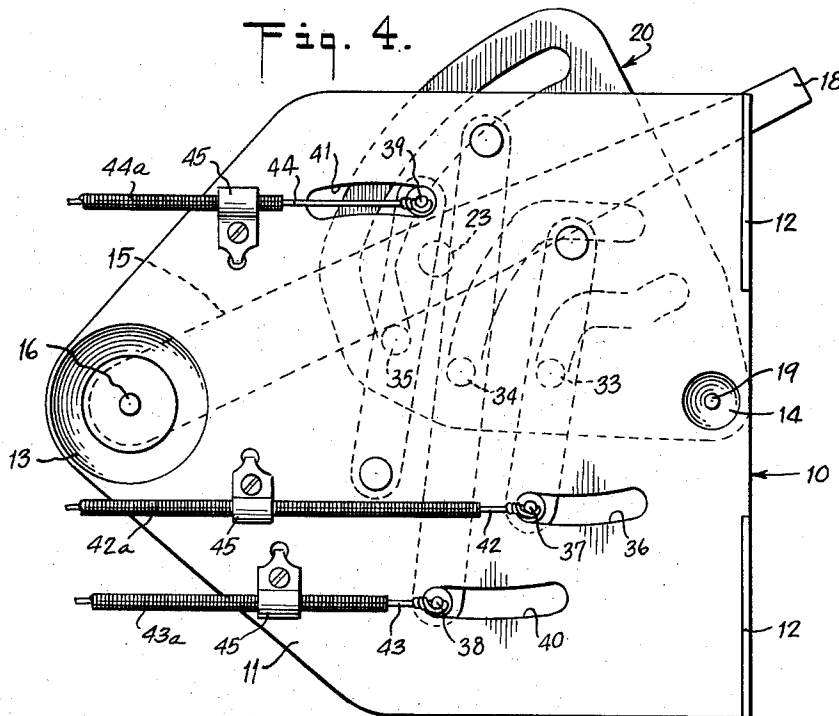
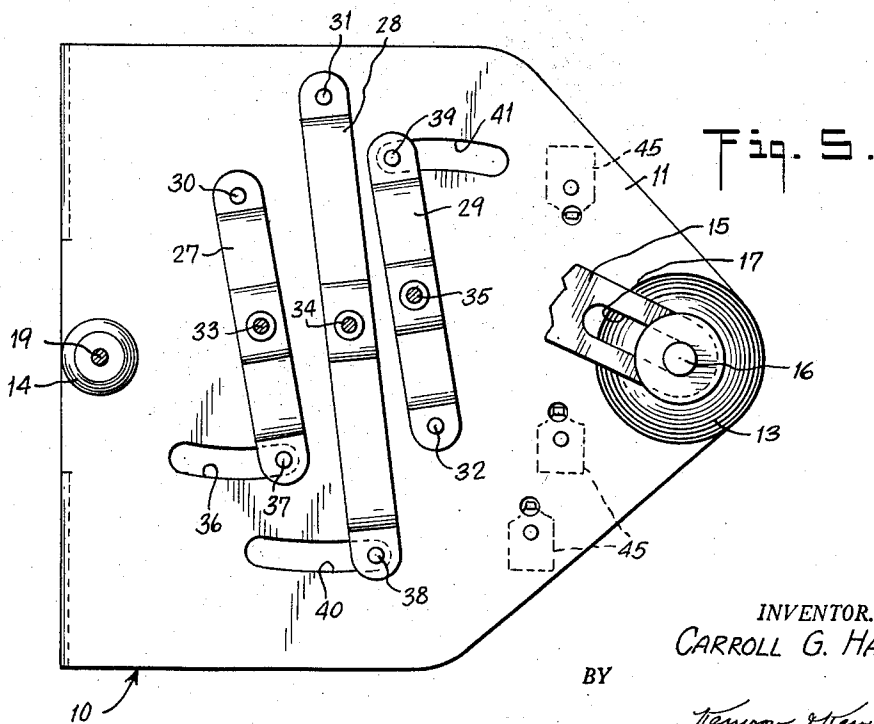
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2 Sheets-Sheet 2



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SELECTIVE CONTROL MECHANISM

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4 Claims. (Cl. 74-471)

The present invention relates generally to selective control mechanisms and more particularly to an assembly adapted to translate a single angular motion into a succession of substantially linear movements which occur in a predetermined order and direction in the course of said angular motion.

It is conventional for purposes of remote control to extend Bowden wire cables between the controllable elements of a mechanism and a control center or panel whereby a pulling force applied to the end of a given wire effects the desired operation. Where several controllable elements are involved which must be actuated or deactuated in a given sequence, the use of separate control knobs or levers for each Bowden wire makes for a relatively complicated operation. Thus in heater-defroster and air-conditioning devices, such as are now installed in automobiles, the present practice is to provide separate controls for turning on the heater, for operating blower fans and for opening defroster vents. Obviously, should one open the defroster vents before first turning on the heater and then the blower, the proper sequence of operation would not be obtained.

Accordingly, it is the primary object of this invention to provide a mechanical control assembly having a single control element whose angular motion is translated into a succession of substantially linear motions which occur in a predetermined order and direction.

More specifically it is an object of the invention to provide a control assembly including a hand-operated lever adapted to oscillate a sector plate having a plurality of cam grooves therein, each of which in a predetermined order and direction controls the movement of a pivoted arm connected to a respective Bowden wire. Selective operation of the controllable elements coupled to the various Bowden wires may be obtained simply by adjusting the angular position of the lever.

It is also an object of the invention to provide a control assembly of the above-described type which is of simple and efficient mechanical design and which may be manufactured at a relatively low cost.

Briefly stated, a selective control mechanism in accordance with the invention includes a sector plate pivotally mounted at its apex and having a plurality of cam grooves formed therein at spaced positions, each groove having an arcuate section whose center of curvature is the pivot point and having an inclined section. Also provided is a plurality of rocker arms each having a follower riding in a respective cam groove whereby when the sector plate is shifted about its pivot, the arms are shifted in an order and direction depending on the polar position of the inclined sections of the cams and the direction of inclination.

With a selective control mechanism in accordance with the invention, the operation of a single lever to shift the position of the sector plate may be used to effect multi movements and thereby control many openings, valves and perform other control functions.

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For a better understanding of the invention as well as other objects and further features thereof, reference is had to the following detailed description to be read in conjunction with the accompanying drawings wherein like elements in several views are identified by like reference numerals.

In the drawing:

Figure 1 is a side elevational view of a mechanical control assembly in accordance with the invention.

Figure 2 is a front elevational view of said assembly.

Figure 3 shows separately the sector plate component of the assembly.

Figure 4 is a rear elevational view of the assembly.

Figure 5 is a front elevational view of the assembly with the hand-operated lever and the sector plate removed therefrom to expose the rocker arms.

Referring now to the drawing, the mechanical control assembly in accordance with the invention comprises a generally rectangular mounting plate 10 having a triangular end portion 11 and an offset base portion constituted by two tabs 12 for attaching the assembly onto a control board or panel. Formed at the apex of the triangular end portion is conical boss 13 and formed at the other end of the plate in longitudinal alignment with boss 13 is a smaller conical boss 14.

One end of a hand-operated lever 15 is pivotally connected to boss 13 by means of a pivot pin 16 which passes through a longitudinal slot cut in the lever so that the lever is free to shift in the longitudinal direction within the limits of the slot as well as to rotate angularly about its pivot point. The length of the lever 15 is such that its free end 18 extends beyond the base of the mounting plate. Hence when the assembly is mounted on a control panel, the free end 18 of the lever will project through a slit in the panel to permit manipulation thereof. A suitable handle may be attached to said free end 18.

Pivotally mounted on boss 14 by means of a pivot pin 19 is a sector plate 20, the pin passing through an opening 21 in the sector plate, as shown in Fig. 3. Since the height of boss 14 is smaller than that of boss 13, the sector plate 20, as best seen in Fig. 1, is interposed between the mounting plate 10 and the hand-operated lever 15.

Formed approximately at the mid point of lever 15 is a conical boss 22 which projects toward sector plate 20 and is pivotally connected thereto by means of a pivot pin 23. Consequently, as lever 15 is angularly shifted about pivot 16 from its extreme left position, as shown in solid lines in Fig. 2, to its extreme right position, as shown in dotted lines therein, sector plate 20 is concurrently shifted about pivot 19, and when the lever is returned to its extreme left position, the sector plate is likewise returned.

Cut into sector plate 20 at spaced positions thereon are three cam slots 24, 25 and 26, slot 24 being adjacent the apex end of the sector, slot 26 being adjacent the periphery thereof and slot 25 being interposed therebetween. As best seen in Figs. 2 and 5, rocker arms 27 and 28 are pivotally secured at their left extremities to mounting plate 10 by means of pivot pins 30 and 31, whereas a rocker arm 29 is pivoted at its right extremity by means of pivot pin 32. Secured to rocker arms 27, 28 and 29 at offset central positions thereon are follower buttons 33, 34 and 35 which ride within the respective cam slots 24, 25 and 26 on the sector plate and act to shift the angular position of the arms in accordance with the cam paths.

Attached to the free end of rocker arm 27 and projecting through an arcuate slot 36 formed in the mounting plate is a connector post 37. Similarly attached to the free ends of arms 28 and 29 are connector posts 38 and

39 which project through arcuate slots 40 and 41 cut in the mounting plate. Thus oscillation of the rocker arms is limited by the length of the associated arcuate slots, the movement of the post therein being in a substantially linear path. As best seen in Fig. 4, secured to posts 37, 38 and 39 are Bowden wires 42, 43 and 44, each wire running through its respective protective sheaths 42a, 43a and 44a. Each sheath is held to the mounting plate by a suitable clip 45. As shown in Fig. 3, cam slot 24, moving from left to right, is constituted by an arcuate section 24a, a downwardly inclined linear section 24b and an arcuate section 24c. Cam slot 25 is constituted by an arcuate section 25a followed by a downwardly inclined linear section 25b. Cam slot 26a is constituted by an upwardly inclined linear section 26a followed by an arcuate section 26b. The center of curvature of all of the arcuate sections in the three cam slots is the pivot point which passes through the axis of hole 21 in the apex of the sector plate.

Thus as handle lever 15 is moved from left to right, the cam slots are shifted in the same direction, thereby causing the follower buttons 33, 34 and 35 to ride in a path determined by the respective cam shapes. When a given follower button travels in an arcuate section of a cam, its radial position relative to the pivot point remains unchanged and the associated rocker arm is not shifted. When, however, the follower button rides along an inclined section of the cam, its radial position shifts accordingly and the associated rocker arm is shifted downwardly or upwardly depending on the direction of inclination.

It will be noted that when the lever 15 is at its extreme left position, rocker arms 27 and 28 are upwardly inclined relative to their own pivots whereby connector posts 37 and 38 lie at the upper ends of slots 36 and 40, respectively, whereas rocker arm 29 which is downwardly inclined relative to its pivot 32 has its connector post 39 at the lower end of slot 41.

When lever 15 is angularly shifted toward the right, the follower button 35 riding in upwardly inclined section 26a of cam slot 26 causes rocker arm 29 to move upwardly so that post 39 is shifted to the upper position in slot 41. Follower button 34 riding in cam slot 25 causes rocker arm 28 to move downwardly when the follower button traverses downwardly inclined section 25b thereby moving post 38 to the down position in slot 40. Follower button 33 causes rocker arm 27 to shift post 37 to the lowermost position in slot 36 when the button traverses downwardly inclined section 24b of the cam slot.

Thus in the course of lever movement from left to right, post 39 is first shifted from the bottom to the top of its slot, post 37 is thereafter shifted from the top to the bottom of its slot and, finally, post 38 is shifted from top to the bottom of its slot. The order in which the post movements take place depends on the polar position of the inclined section of the cam slot with respect to the common pivot point, and the direction of these movements depends on the direction of inclination. It will be obvious that relative polar positions of the inclined sections of the cams may be made such as to obtain sequential or simultaneous operation in any desired order.

When the lever is at its extreme left position, the Bowden wires 42 and 43 connected to posts 37 and 38 are retracted in their sheaths, while Bowden wire 44 connected to post 39 is extended, as shown in Fig. 4, whereas when the lever is shifted to its extreme right position, the reverse relationship exists to provide the desired control functions.

It is to be understood that while three arcuate slots have been shown in conjunction with three rockers, a greater number may be employed within the context of the invention. It will also be appreciated that the order in which the connector posts are shifted and the direction of their shifts may be predetermined by suitably shaping the cam paths. While a hand-operated lever has been used to swing the sector plate, various other mechanical or

electromechanical expedients may be used for the same purpose, such as a rotary electromagnet.

While there has been shown what is considered to be a preferred embodiment of the invention, it will be manifest that many changes and modifications may be made therein without departing from the essential spirit of the invention. It is intended, therefore, in the annexed claims to cover all such changes and modifications as fall within the true scope of the invention.

10 What is claimed is:

1. A selective control mechanism comprising a mounting plate, a sector plate pivotally mounted at its apex on said mounting plate at a point adjacent the base thereof and having a plurality of cam grooves formed therein at spaced positions, each cam groove having an arcuate section whose center of curvature is the pivot of said sector plate and having an inclined section, a like plurality of rocker arms pivotally mounted on said mounting plate and provided with a cam follower riding in a respective cam groove, and a lever pivotally connected at one end to said mounting plate at a point thereon remote from said base and outside the area scanned by said sector plate and pivotally connected to said sector plate to effect oscillation thereof, the free end of said lever extending beyond said base to facilitate manipulation.

2. A selective control mechanism comprising a mounting plate, a sector plate pivotally mounted at its apex on said mounting plate at a point adjacent the base thereof and having a plurality of cam grooves formed therein at spaced positions, each cam groove having an arcuate section whose center of curvature is the pivot of said sector plate and having an inclined section, a like plurality of rocker arms pivotally mounted on said mounting plate and provided with a cam follower riding in a respective cam groove, the free end of each arm having a connector post projecting therefrom through an arcuate opening in said mounting plate, and a lever pivotally connected at one end to said mounting plate at a point thereon remote from said base and outside the area scanned by said sector plate and pivotally connected to said sector plate to effect oscillation thereof and thereby cause said followers to move said arms in an order and direction depending on the polar position and the direction of inclination of said inclined sections, the free end of said lever extending beyond said base to facilitate manipulation.

3. A selective control mechanism comprising a mounting plate, a sector plate pivotally mounted at its apex on said mounting plate at a point adjacent the base thereof and having a plurality of cam grooves formed therein at spaced positions, each cam groove having an arcuate section whose center of curvature is the pivot of said sector plate and having an inclined section, said inclined sections having predetermined directions of inclination and polar positions relative to said pivot, a like plurality of rocker arms pivotally mounted on said mounting plate and provided with a cam follower riding in a respective cam groove, the free end of each arm having a connector post projecting therefrom through an arcuate opening in said mounting plate, and a hand lever pivotally connected at one end to said mounting plate at a point thereon remote from said base and outside the area scanned by said sector plate and pivotally connected to said sector plate to effect oscillation thereof and thereby cause said followers to move said arms in an order and direction depending on the polar position and the direction of inclination of said inclined sections, the free end of said lever extending beyond said base to facilitate manipulation.

4. A selective control mechanism for operating Bowden wires comprising a mounting plate, a sector plate pivotally mounted at its apex on said mounting plate at a point adjacent the base thereof and having a plurality of cam grooves formed therein at spaced positions, each cam groove having an arcuate section whose center of curva-

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ture is the pivot of said sector plate and having an inclined section, a like plurality of rocker arms pivotally mounted on said mounting plate and provided with a cam follower riding in a respective cam groove, the free end of each arm having a connector post projecting therefrom through an arcuate opening in said mounting plate, and a lever pivotally connected at one end to said mounting plate at a point thereon remote from said base and outside the area scanned by said sector plate and pivotally connected to said sector plate to effect oscillation thereof, said Bowden wires being connected to said posts and being

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extended and retracted in accordance with the angular position of said lever to effect selective control, the free end of said lever extending beyond said base to facilitate manipulation.

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