

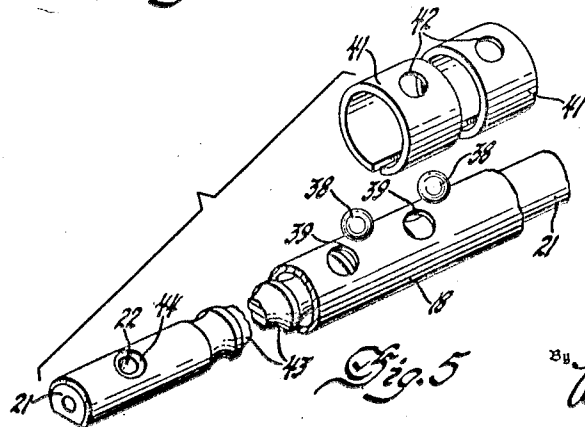
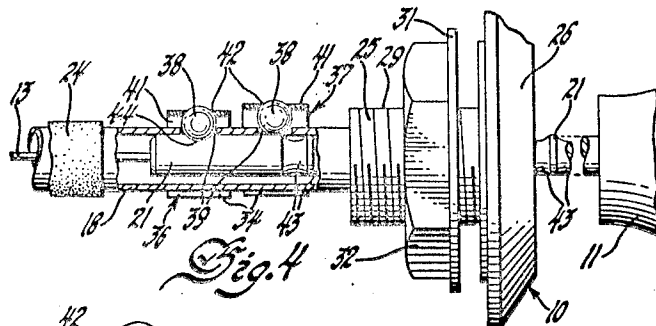
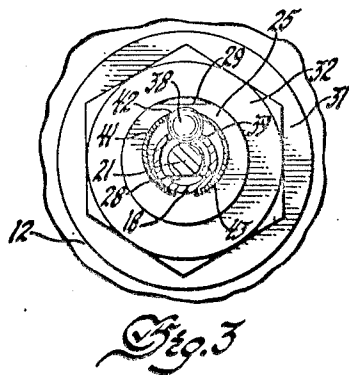
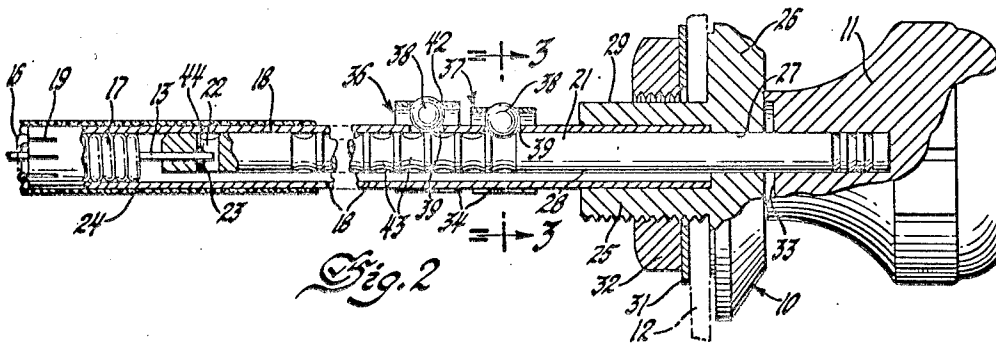
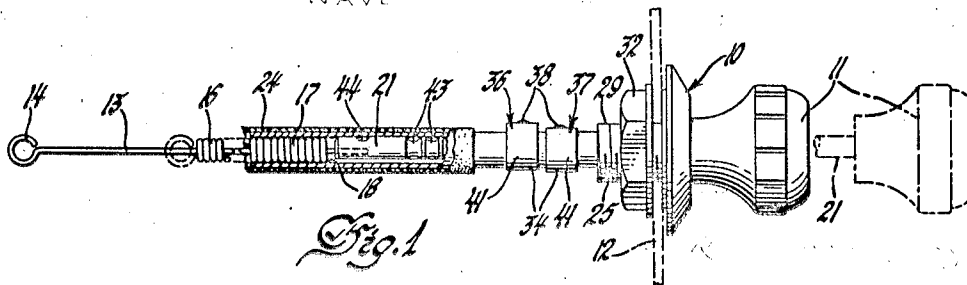
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CONTROL DEVICE

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CONTROL DEVICE

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1 Claim. (Cl. 74-503)

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This invention relates to control devices for heaters for automobiles and for other similar purposes, and has particular relation to a novel detent actuated control device for such purposes.

An object of the invention is to provide a simple, inexpensive, and reliable control device or mechanism for the purposes mentioned.

In the drawing:

Figure 1 is a view partly in elevation and partly in cross-section, illustrating a control device embracing the principles of the invention. Figure 1 illustrates the control knob and other parts of the device in different operative positions.

Figure 2 is an enlarged view of the structure illustrated by Figure 1 and having parts thereof broken away in such manner as to illustrate the greater part of the structure in longitudinal sectional view.

Figure 3 is a cross-sectional view of the structure shown by Figure 2 and taken substantially in the plane of line 3-3 of Figure 2, looking in the direction of the arrows thereon.

Figure 4 is a fragmentary view of the structure illustrated by Figure 2 with certain parts thereof shown in different operative positions.

Figure 5 is an exploded view of a part of the structure illustrated by the preceding figures and illustrating the parts of the detent mechanism in disassembled relation.

The control device 10, as illustrated in Figure 1, has an operating knob or member 11 which is adapted to be accessible upon the front part of an instrument panel or other part of an automobile, for operating the control device. The instrument panel or other part of the automobile is indicated in dot-and-dash lines by the numeral 12. The control device 10 includes a Bowden wire 13 which may have a spirally wound end 14 adapted to be attached to the operating member of a water valve for a heater for an automobile or to any other device with which it may be desirable to employ the control device 10. The Bowden wire 13 comprises a spirally wound sheath 16 having an end 17 adapted to be secured in any suitable manner within one end of a tube indicated generally by the numeral 18. The end of the tube 18 which is adapted to receive the end 17 of the spirally wound sheath 16 is formed in such a way as to provide a plurality of spaced slots 19 which project inwardly thereof for the purpose of permitting the end of the tube 18 to be contracted upon the end of the sheath 16 for securing the sheath within the tube.

The wire 13 is adapted to extend beyond the end of the sheath 16 and through an axially disposed

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opening formed in the adjacent end of a rod 21. The rod 21 is adapted to be slidably disposed within the tube 18 and is supported by contact with the interior surface of the tube 18. The end of the rod 21 which receives the wire 13 is provided with a transversely disposed opening 22 into which the wire 13 is adapted to project, so that the wire 13 may be soldered within the opening 22 as is indicated at 23.

A part of the tube 18 and a part of the sheath 16 may be covered by a flexible rubber tube indicated by the numeral 24. The tube 24 will prevent moisture from entering the tube 18 by way of spaces that may be provided between the convolutions in the sheath 16. It will be apparent that if moisture were allowed to enter or condense within the tube 18 the device might become frozen and inoperative in cold weather.

The forward end of the tube 18 is adapted to be press fitted or otherwise secured within the tubular and externally threaded end 25 of a flanged collar or support indicated generally at 26. The support 26 is closed beyond the end of the tube 18 except for an opening 27 which is formed therein for the purpose of receiving the rod 21. The opening 27 is a cylindrical opening having a flat side adapted slidably to engage the flat side 28 which is formed on the rod 21 throughout the entire length of the rod 21. The opening 27 accordingly will permit longitudinal movement of the rod 21 but will prevent rotational movement thereof. The tubular end 25 of the support 26 also is formed in such a way as to provide a flat side indicated at 29. The tubular end 25 of the support 26 is adapted to be projected through an opening formed in the wall or support 12 and which is also provided with a flat side corresponding to that indicated by the numeral 29. The flat side 29 of the support 26 is adapted to be disposed upwardly within the opening in the wall 12 for the purpose of positioning the control device in its proper operating position when the device is installed in an automobile or in a wall of any other structure. The support 26 is adapted to be secured to the wall 12 by washer 31 and a nut 32 adapted operatively to engage the threaded exterior surface of the tubular end 25. The knob 11 which is disposed beyond the support 26 is provided with an axially disposed opening having a cross-sectional configuration similar to the cross-sectional configuration of the rod 21. The knob 11 may be non-rotatably secured upon the end of the rod 21 by pressing or otherwise securing the end of the rod within the opening referred to. The end of the

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knob 11 which is adapted to engage the adjacent surface of the support 26 is internally chamfered at 33 to facilitate the proper manufacture and assembly of the parts.

It will be apparent from Figure 1 that the Bowden wire 13 may be operated within the sheath 16 by movement of the rod 21 in opposite directions within the tube 18 and by manipulation of the knob 11 between the two extreme positions thereof as these positions are illustrated by full lines and dot-and-dash lines. In the dot-and-dash line position of the knob 11 as illustrated by Figure 1, the ring 14 is adapted to engage the end of the sheath 16 to limit the movement of the wire 13 in one direction.

In order to provide means for holding the knob 11 and the Bowden wire 13 in any desired position between the two extremes illustrated by Figure 1 the control device 10 is provided with a detent mechanism which is indicated generally by the numeral 34. The detent mechanism 34 comprises a pair of detent means which are individually indicated by the numerals 36 and 37. The device 10 may be provided with any number of detents or detent means such as those indicated by the numerals 36 and 37, depending upon the extent to which it may be desirable to graduate the intervals between the resistances to the operation of the knob 11 which are provided by the detent mechanism 34.

Each of the detent means or devices 36 and 37 comprises a spherical ball 38 which is adapted to project within one of a plurality of radially disposal openings 39 which are formed in spaced relation to one another along the length of the tube 18. The balls 38 are held within the opening 39 by split tubular springs 41. The springs 41 are somewhat larger than the tube 18 and are formed in such a way as to provide intermediately disposed openings therein for receiving the balls 38. However, the openings 42 are smaller than the balls 38 so as to compress the balls 38 within the openings 39 to permit rotation of the balls 38 with respect to the springs 41 and the openings 39 when the balls 38 are secured within the springs 41. The device may be assembled by sliding the springs 41 over the ends of the tube 18 and the springs then may be extended over the balls 38 when the latter are located within the openings 39. The shaft 21 is formed in such a way as to provide a plurality of equally spaced and circumferentially disposed depressions 43. The surface of each of the depressions 43 is formed by longitudinally extending arcuate elements of curvature having radii of curvature equal to the radii of curvature of the balls 38. The grooves or depressions 43 are formed in equally spaced relation along the length of the rod 21, the distances therebetween being sufficient to permit the desired amount of movement of the knob 11. It will be apparent from Figure 2, however, that the spacing between the depressions 43 is not the same as the spacing between the detents 36 and 37 which may be described as the distance between the centers of the balls 38. If the spacing between the grooves 43 were the same as the spacing between the centers of the balls 38, then the detents 36 and 37 would operate simultaneously. In other words, the detents 36 and 37 would apply twice as much resistance to the movement of the knob 11 as might be applied by one of the detents. Such an arrangement might be desirable under some circumstances, but in the present instance, the spacing between the depressions 43 is pur-

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posely arranged in such a manner as to be unequal to the spacing between the detents 36 and 37. It will be apparent from examining Figure 2 that such unequal spacing makes the detents 36 and 37 operate alternately. In other words, in the structure disclosed by Figure 2, the ball 38 of the detent 37 will engage one of the depressions 43 at a time when the ball 38 of the detent 36 is between two of the depressions 43. While other unequal spacings may be provided, it is considered preferable in the structure illustrated, that the spacing of the balls 38 shall be equal to two and one-half times the center to center distance between depressions 43. With such spacing of the detents 36 and 37, it is possible to make the detents of larger dimensions and more rugged and so that they may be assembled and operated with less difficulty and interference with respect to one another.

As will be apparent from Figures 1, 2, and 5, there is an additional depression 44 which is formed in the rod 21 at one end of the transverse opening 22 in the end of the rod adjacent the wire 13. The depression 44 is formed in the rod 21 a considerable distance beyond the series of equally spaced depressions 43 and in such position as to vary the alternate movement of the detents 36 and 37 for the purpose of indicating that the series of depressions 43 have been passed by the detents 36 and 37. This will indicate the proper position at which to locate the end of the sheath 16 with respect to the ring or stop 14 which is formed at the end of the wire 13. Hence the device may be assembled in such manner that the ring 14 will engage the end of the sheath 16 when the knob 11 has been pulled out to such an extent that the detents 36 and 37 have passed beyond the series of depressions 43 and under which circumstances the ball 38 of the detent 36 will engage the depression 44.

When a larger number than two detents is employed in a detent mechanism such as that illustrated by the numeral 34, then the spacing between the detents will be some multiple of the center to center distance between the depressions 43 plus the center to center distance between the depressions 43 divided by the number of detents employed. Whatever number of detents may be employed, it will be possible to graduate the resistance to the movement of the knob 11 to intervals of movement that are less than the width of one of the depressions 43.

I claim:

A control device comprising a tube, a rod mounted in said tube for longitudinal movement therein, and means for restraining said longitudinal movement including a plurality of longitudinally spaced self-retained detent units formed along the tube, each detent unit cooperating with an opening formed in said tube, and comprising a split band spring embracing said tube and having an aperture therein, a ball detent of larger diameter than that of the tube opening and spring aperture, said ball detent positioned between the spring and tube and extending through the tube opening and spring aperture, said rod having longitudinally spaced depressions adapted to receive the portion of said ball detent that extends through said tube opening and thereby be restrained against longitudinal movement.

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