Nov. 5, 1940. C. C. STRANGE 2,220,130

LOCKING MECHANISM

Filed July 30, 1937 2 Sheets-Sheet 1

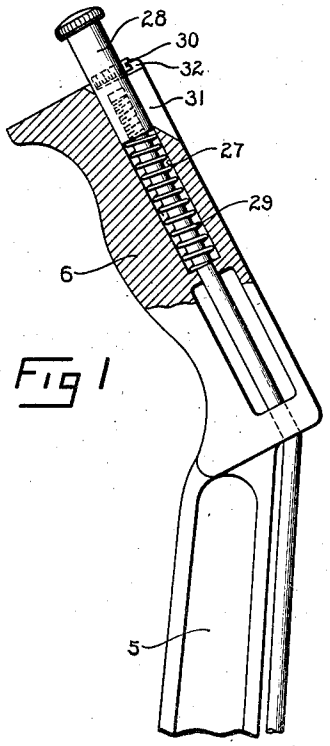


Fig 1

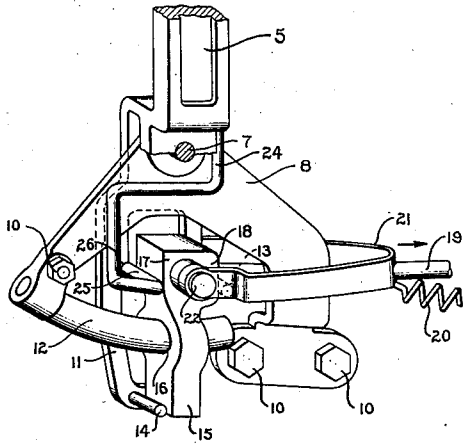


Fig 2

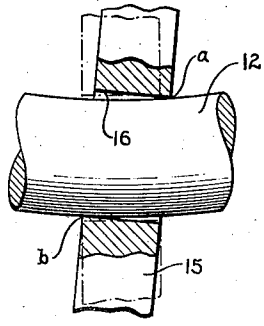


Fig 4

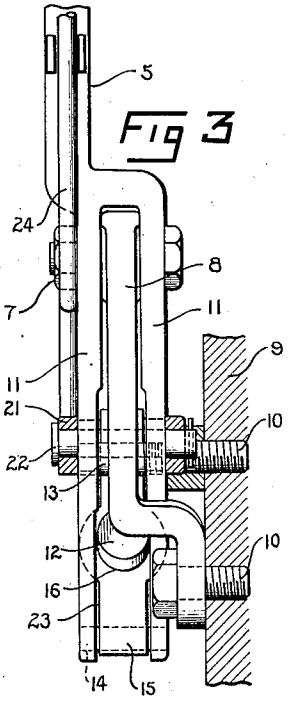
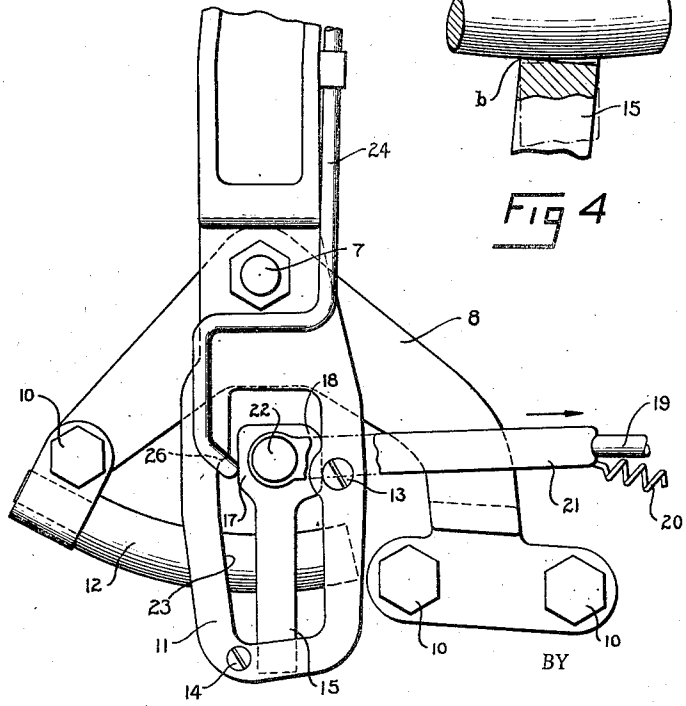


Fig 3



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LOCKING MECHANISM

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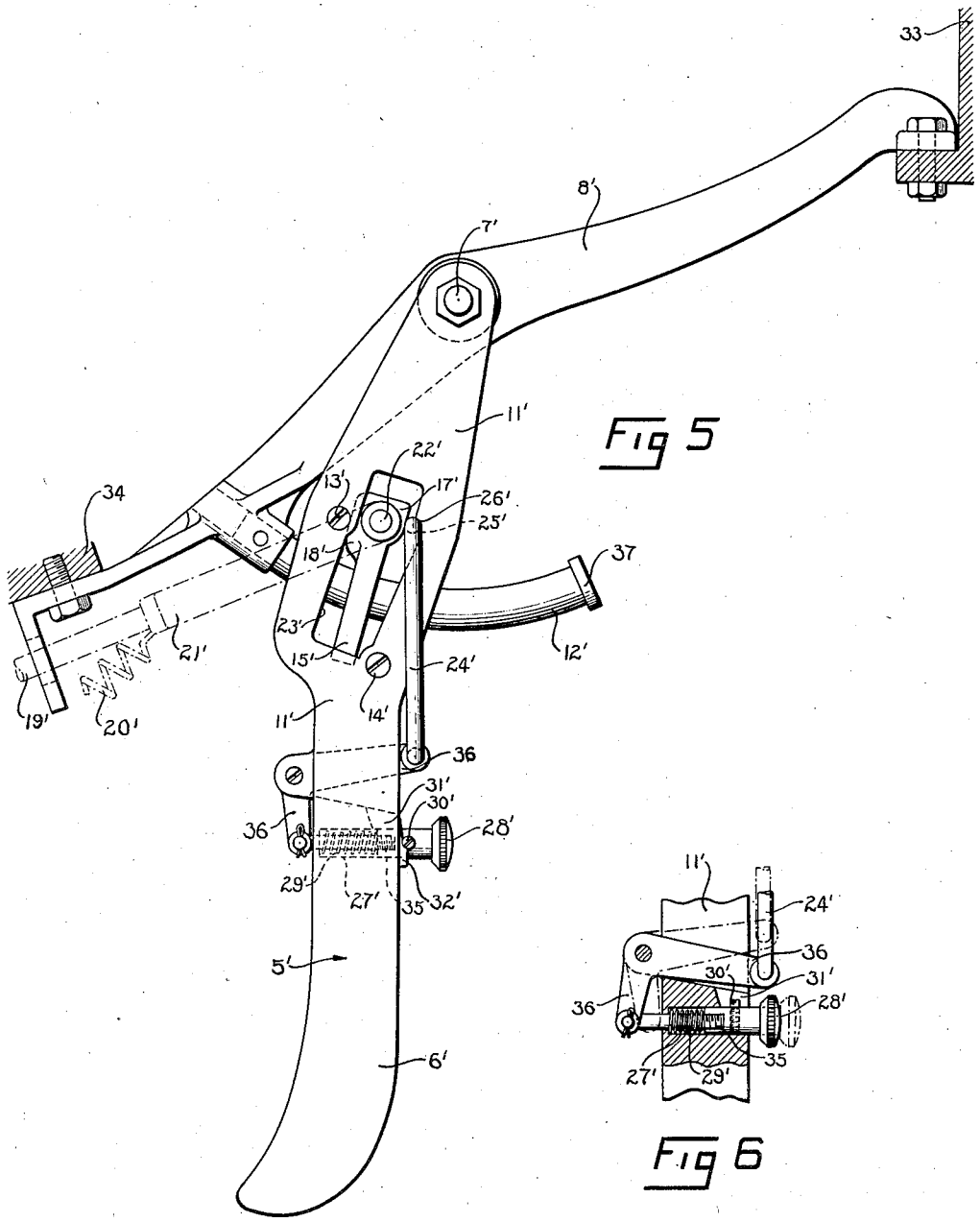


Fig 5

Fig 6

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UNITED STATES PATENT OFFICE

2,220,130

LOCKING MECHANISM

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12 Claims. (Cl. 74—531)

This invention relates to locking mechanism and more particularly to the combination therewith of control means for applying and releasing the same.

One of the objects of the present invention is to provide in combination with locking apparatus adapted to hold an element against movement in at least one direction novel means for effecting and controlling the application and release of said apparatus.

Another object of the invention is to provide novel means for actuating the brakes of a vehicle or like mechanism and holding the same in applied position.

A further object is to provide novel mechanism whereby a member which is under a tension tending to move the same in one direction may be readily moved to and held at any desired point within the range of movement thereof.

A still further object is to provide means for holding a member which is under a normal bias in one direction and novel means which is not affected by the biasing force for preventing release of the holding means.

Still another object is to provide novel brake actuating means whereby maximum braking pressure is insured and the possibility of accidental release of the same is substantially eliminated.

The above and further objects and novel features of the invention will more fully appear from the following detailed description when the same is read in connection with the accompanying drawings. It is to be expressly understood, however, that the drawings are for the purpose of illustration only and are not intended as a definition of the limits of the invention, reference being primarily had for this latter purpose to the appended claims.

In the drawings, wherein like reference characters refer to like parts throughout the several views,

Fig. 1 is a side elevation, partly in section and with parts broken away, illustrating one form of the present invention;

Fig. 2 is an isometric view, with parts broken away, of a portion of the mechanism of Fig. 1;

Fig. 3 is a side elevation, partly in section and with parts broken away, of the lower portion of the mechanism of Fig. 1 as viewed from the right;

Fig. 4 is a detail view, partly in section and with parts broken away, illustrating two positions of the locking mechanism;

Fig. 5 is a side elevation, with parts broken away, of a second embodiment of the invention; and,

Fig. 6 is a detail view, partly in section and with parts broken away, of a portion of the device of Fig. 5.

Two embodiments of the invention are illustrated in the accompanying drawings, by way of example, in the form of novel lever mechanism, adapted for applying the brakes of a vehicle, in combination with means for locking the brakes in any desired applied position, said means being operable by the lever mechanism in accordance with novel manual control means for releasing the brakes for movement to inoperative position. With the mechanism illustrated, an application of the brakes to the fullest and exact extent desired is insured and the manual effort required to release the brakes is not affected in any way by the pull exerted on the locking means by the brake mechanism. Locking means for controlling the release of the brake which may be readily and easily manipulated, but which prevent accidental release of the brakes, are accordingly provided.

In the embodiment illustrated, a lever 5 having an angularly extending handle 6 is pivotally mounted at 7 on a bracket 8 which is, in turn, rigidly secured to a frame member 9 of a vehicle by any suitable means, such as bolts 10. The upwardly extending, inverted V-shaped portion of said bracket is preferably offset or otherwise spaced from frame member 9, as best seen in Fig. 3. The lower end of lever 5 is preferably bifurcated with the arms 11, 11 thereof extending on opposite sides of bracket 8 and a rod 12 having an arcuate longitudinal axis and a circular cross section which is rigidly secured at one end to said bracket, the center of curvature of said axis being at the pivot 7 of lever 5. For purposes to fully appear hereafter, arms 11, 11 are joined together at at least two points by any suitable means, such as bolts or pins 13 and 14.

Novel means operatively associated with lever 5 and element 12 and adapted to cooperate therewith in a novel manner are provided for holding a resistance member, which is under a normal bias or tension tending to move the same in one direction, in any desired position within its range of movement. In the form shown, the novel holding means are constituted by a locking member 15 having an opening 16 through a flat, comparatively thin section thereof for slidably receiving rod 12. Opening 16 may, of course, be other than circular as shown. For example, the same may be rectangular or hexagonal in cross

section. The diameter or corresponding dimension of rod 12 is slightly less than the corresponding dimension of opening 16 in order that locking member 15 may be tilted with respect to the rod and, hence, grip the latter so as to be held against movement thereon in the direction of tilt. This result is effected by the biting or gripping of rod 12 by the corners *a* and *b* of opening 16 when locking member 15 is in a tilted or locking position as shown in full lines in Fig. 4. When the axis of opening 16 and rod 12 are coincident, i. e., when locking member 15 is perpendicular to the axis of rod 12, as shown in dotted lines in Fig. 4, the locking member is adapted to slide freely on the rod in either direction.

The upper end of locking member 15 is somewhat enlarged by providing a forwardly projecting lug or portion 17 and a rearwardly extending portion 18 which is shown as projecting between arms 11, 11 adjacent pin 13. Operatively connected to the enlarged upper end of member 15 is a resistance rod or the like 19, such as an element of the braking mechanism of a vehicle, that is normally biased for movement in the direction of the arrow by any suitable means, such as the usual brake springs shown diagrammatically at 20. The end of member 19 is bifurcated at 21, as best seen in Fig. 2, the arms of portion 21 extending around bracket 8 and arms 11, 11 and being pivotally secured to locking member 15 by any suitable means, such as a pivot pin 22. To provide for the connection at 22, arms 11, 11 of lever 5 are each provided with an elongated opening 23 or, if desired, each of said arms may be bifurcated with prongs extending downwardly to support pins 13 and 14. The pull of spring 20 is adapted to hold member 15 in tilted or locking position and thus prevent movement thereof and of rod 19 to the right, as viewed in the drawings.

The lower end of locking member 15 extends downwardly between arms 11, 11 and is adapted to be engaged and moved to released position by pin 14. When lever 5, 6 is pivoted in a counter-clockwise direction, the pressure exerted by pin 14 on member 15 tends to pivot said member in a counter-clockwise direction and, hence, move the same to non-locking position, the rod 12 functioning as a pivot by reason of the normal gripping action between said rod and member 15. As the latter member approaches a position perpendicular to rod 12, the gripping action is released and member 15 is moved along the rod by the tension of spring 20, thereby permitting the brakes to release.

Novel means are provided for preventing release, such as accidental release, of the locking member and the brakes in the above manner, except at the conscious will of the driver, which means are so constructed that the same are not affected by the tension of spring 20 and are accordingly readily releasable irrespective of the extent to which the brakes are applied. In the embodiment illustrated, said novel means are constituted by a wire-like member 24 slidably mounted on lever 5. The lower end of member 24 has a laterally projecting portion 25 (Fig. 2) which extends into openings 23 in the space between the forward or left-hand portions of arms 11, 11 and portion 17 of locking member 15. Portion 25 is of substantially the same diameter or width as said space, said portion having a sliding fit therein, and is accordingly adapted to hold lever 5 against counter-clockwise, i. e., releasing, movement relative to locking member 15 and, hence, prevent engagement of pin 14 with the lower portion of said locking member. Any suitable means, such as shoulders 26 on arms 11, may be provided for limiting the upward movement of member 24, 25 when the latter is in operative position, as illustrated in Fig. 1.

The upper end of member 24 extends into a longtitudinally extending recess 27 in handle 6 and is threadedly connected to a thumb button 28, a part of which slidably extends into said recess from the opposite end thereof. Suitable resilient means, such as a spring 29, interposed between the bottom of recess 27 and the inner end of button 28 may be provided for holding member 24, 25 in raised or operative position with portion 25 engaging shoulder 26. To release lever 5, 6 for counter-clockwise movement to apply an unlocking pressure on the lower end of member 15, it is only necessary to depress button 28, and, hence, wire 24, against the pressure of spring 29 thereby moving portion 25 below the lower edge or shoulder of lug 17. It will be seen that this movement of member 24, 25 to inoperative position is resisted only by spring 29 irrespective of the position of member 15 along rod 12 and irrespective of the pressure exerted on the locking member by force 19, 20. Portion 25 of member 24 is also normally operative to hold lever 5, 6 against any movement or vibration which would cause rattling during normal operation of the vehicle. If desired, the space into which portion 25 extends may be tapered in the direction of movement of member 24 to automatically compensate for wear.

Means are also provided whereby the depression of button 28 and, hence, member 24, 25 may be positively prevented, except at the will of the driver, thereby preventing accidental depression thereof by children, for example, or by persons getting into and out of the vehicle. It will be noted, however, that the mere depression of button 28 does not, in itself, release the brakes but merely releases lever 5, 6 so that the driver will be enabled to release the brakes by applying pressure to said lever. As shown, the means for holding button 28 against releasing movement are constituted by an element 30 threaded into the shank of button 28 and projecting radially therefrom. The projecting end of element 30 is adapted to slidably operate in a slot 31 at the upper end of recess 27 when button 28 is in the position illustrated (Fig. 1). When member 24, 25 is in operative position, a recess 32 provided in the top of handle 6 permits button 28, together with element 30, to be turned sufficiently about the longitudinal axis of the former to move said element out of register with slot 31 and, hence, prevent depression of said button and member 24, 25.

In the operation of the mechanism above described, when it is desired to apply the brakes or move rod 19, 20 to the left for any other purpose, it is only necessary to grasp handle 6 and exert a pull thereon to pivot lever 5, 11 in a clockwise direction. Upon movement of said lever in this manner, pin 13 engages lug 18 and exerts a pressure acting in substantially the same line as, but opposite in direction from, that exerted by element 19, 22. The latter element and locking member 15 are accordingly moved to the left and the brakes are applied. The instant that pressure is released on handle 6, locking member 15 grips rod 12 and holds the brakes in the exact position desired, there being no noticeable backlash when the lever is released by the driver.

If any forward pressure is now applied to handle 6, i. e., a pressure tending to pivot lever 5, 11 in a counter-clockwise direction, such pressure will be transmitted through portion 25 of member 24 to the upper end of locking member 15 and hence merely supplement and augment the pressure of spring 20 which holds said locking member in gripping engagement with rod 12.

When it is desired to release the brakes, button 28 is depressed with the thumb and pressure is simultaneously applied to handle 6 in the appropriate direction to move pin 14 into engagement with the lower end of locking member 15. Pressure so applied to the locking member is effective to pivot the same to non-gripping position during the application of such pressure and, hence, permit movement of the locking member and element 19, 22 to the right in response to the combined efforts of the tension of spring 20 and the pressure of lever 5, 11. As soon as the latter pressure is relieved, member 15 again immediately assumes a gripping or locking position.

A second embodiment of the invention which is adapted to be mounted on or beneath the dashboard of modern motor cars is illustrated in Figs. 5 and 6. The operation of said second embodiment is identical in principle with the operation of the embodiment shown in Figs. 1 to 4, inclusive, and the construction thereof is very similar, the major difference being that the actuating lever is pivoted at one of its ends rather than intermediate its ends. It is accordingly believed to be unnecessary to describe said second embodiment in detail but all of the corresponding parts in the two embodiments are designated by the same reference numerals, the latter being primed in Figs. 5 and 6.

In the form shown, said second embodiment comprises a supporting member 8', one end of which is secured to the dashboard 33 and the other end to the partition 34 between the engine and driver's compartments or other suitable part of the vehicle. Lever 5', 6' is pivotally mounted at 7' on said supporting member and depends therefrom, the bifurcated portion 11', 11' of said lever extending on opposite sides of arcuate bar 12' on which locking member 15' is slidably mounted. Said locking member is pivotally secured to tension rod 19', 21' by pivot 22' and is adapted to be engaged on opposite sides by pins 13' and 14' for applying and releasing the brakes when handle 6' is moved to the right and to the left, respectively, as viewed in the drawings.

The releasing or clockwise movement of lever 5', 6' relative to locking member 15' for releasing the brakes is normally prevented by member 24', a portion 25' of which extends through openings 23' and between arms 11', 11' and lug 17' on said locking member. Member 24', 25' is adapted to be pulled downwardly to inoperative position, i. e., to the full-line position illustrated in Fig. 6, by pressing button 28' which is threadedly secured to an element 35 against the effort of spring 29' to thereby pivot bell crank lever 36 in a clockwise direction, such operation of button 28' being possible only when element 30' is in alignment with slot 31'. To prevent depression of button 28' the same may be turned to the position shown in Fig. 5 thereby moving element 30' out of alignment with slot 31'. A portion 32' is provided on handle 6' to limit the turning movement of said button. Any suitable means, such as a collar 37 on the end of rod 12' may be provided for limiting the movement of locking member 15' along said rod.

There is thus provided novel locking means and control means therefor which are particularly adapted for use in actuating and holding the brakes of a vehicle, said locking means being so constructed as to be readily applied and released by the driver but embodying a novel safeguard against accidental release. Additionally, the locking means hereby provided are effective to hold the brakes in any desired applied position thereby permitting a sufficient application of the brakes without any excess pressure being applied thereto, as is usually necessary in ratchet-type mechanisms in common use. The novel mechanism provided comprises only a small number of parts which may be readily assembled in a compact unit and which may be readily and inexpensively manufactured.

Although only a limited number of embodiments of the invention have been illustrated and described in detail, it is to be expressly understood that the same is not limited thereto but that various changes, particularly in the design and arrangement of parts illustrated, may be made therein without departing from the spirit and scope of the invention. Members 8 and 12, for example, may be formed and mounted separately or the same may be constituted by an integral casting, and, if desired, elements 13 and 14 may be integral with lever 5, 11. Other minor changes of a similar nature will be apparent to those skilled in the art. For a definition of the limits of the invention, reference is had primarily to the appended claims.

What is claimed is:

1. The combination with a resistance member of an arcuate element, a pivoted lever, a locking member having an opening for receiving said element, said locking member being pivotally secured to said resistance member whereby the former is held in gripping engagement with said element, means on said lever for engaging one side of said locking member on one side of the longitudinal center line of said element and the other side of said locking member on the other side of said center line to move the locking member to non-gripping position to permit movement of the same by said lever in either direction along said element, and manually operable means slidably mounted on said lever whereby the latter is render ineffective to release said locking member for movement along said bar in the direction of the force applied thereto by said resistance member.

2. The combination with a movable member and means constituting a force tending to move said member in one direction of a fixed element, a locking member having an opening therethrough for slidably receiving said fixed element, said locking member being pivotally secured to said movable member whereby the former is held in gripping engagement with said fixed element for holding said movable member against movement in response to said force, means mounted independently of said locking member and movable to release the locking member and permit movement of said movable member in response to said force, and means mounted on said last-named means and movable relative thereto for normally holding said last-named means against movement for releasing said locking member.

3. The combination with a movable member and means constituting a force tending to move said member in one direction of a fixed element, a locking member having an opening there-

through for receiving said fixed element, means connecting said locking member to said movable member at one side of said element, whereby the locking member is held in gripping engagement with said element for holding said movable member against movement in response to said force, means for engaging said locking member on the other side of said element for moving the locking member to non-gripping position, and releasable means for holding said last-named means against movement for effecting engagement of said means and said locking member.

4. The combination with a movable member and means constituting a force tending to move said member in one direction of an element, a locking member slidably mounted on said element, said locking member being pivotally secured to said movable member at one side of said element whereby said locking member is held in gripping engagement with said element, pivoted means for moving the locking member to a non-gripping position, and means whereby said last-named means is rendered ineffective to move said locking member to non-gripping position.

5. In apparatus of the class described, an element, a member having an opening for slidably receiving said element, means constituting a force normally holding said member in position to grip said element whereby the member is held against movement in one direction on said element, means for moving said member to non-gripping position for releasing the same, and a part removably interposed between said last-named means and said member whereby said last-named means is rendered ineffective to release said member.

6. In apparatus of the class described, an element, a member having an opening for slidably receiving said element and adapted to be held in a position for gripping said element whereby the member is held against movement in one direction on the element, means for moving said member to non-gripping position, and a member removably interposed between said means and said member whereby said means is rendered ineffective to move said member to non-gripping position.

7. In apparatus of the class described, an element, a member having an opening therethrough for slidably receiving said element, means for yieldingly holding said member in a position for gripping said element whereby said member and element are held against relative movement in one direction, means for applying pressure to said member for moving the same to non-gripping position during the application of said pressure, and means removably interposed between said pressure applying means and said member whereby said pressure applying means is rendered ineffective to move said member to non-gripping position.

8. In apparatus of the class described, a fixed element, a locking member slidably mounted thereon and adapted to be held in gripping engagement therewith whereby said member is held against movement in one direction on said element, a pivoted lever having a portion adapted to engage said locking member for moving the latter to non-gripping engagement, means slidably mounted on said lever and having a portion adapted to extend between said lever and locking member operative for rendering said lever ineffective to move said locking member to non-gripping and resilient means for normally maintaining said slidably mounted means in operative position.

9. In apparatus of the class described, an arcuate element, a locking member slidably mounted on said element, means under tension, means connecting said first-named means to said locking member whereby the latter is held in gripping engagement with said element, pivoted lever means having a portion adapted to engage said locking member for moving the same against the efforts of said first-named means and a portion adapted to engage said locking member to move the same to non-gripping position for movement by said first-named means, and manually operable means mounted on said lever for controlling the engagement between said last-named portion and said locking member.

10. In apparatus of the class described, an arcuate element, a locking member slidably mounted on said element, means under tension, means connecting said first-named means to said locking member whereby the latter is held in gripping engagement with said element, pivoted lever means having a portion adapted to engage said locking member for moving the same against the efforts of said first-named means and a portion adapted to engage said locking member to move the same to non-gripping position for movement by said first-named means, manually operable means mounted on said lever for controlling the engagement between said last-named portion and said locking member, and resilient means for yieldably holding said manually operable means in a predetermined position.

11. In apparatus of the class described, an arcuate element, a locking member slidably mounted on said element, means under tension, means connecting said first-named means to said locking member whereby the latter is held in gripping engagement with said element, pivoted lever means having a portion adapted to engage said locking member for moving the same against the efforts of said first-named means and a portion adapted to engage said locking member to move the same to non-gripping position for movement by said first-named means, means extending between said last-named portion and said locking member and operative for rendering said lever ineffective to move said locking member to non-gripping position, and means for preventing movement of said last-named means to inoperative position.

12. In combination, an element, a locking member having an opening therein for slidably receiving said element, means adapted to hold said locking member in gripping engagement with said element, a pivoted lever for moving said locking member to non-gripping position, and means including an element interposed between said locking member ad said lever for positioning and releasably holding said lever in a predetermined position relative to said locking member, whereby said lever is rendered ineffective to move said locking member to non-gripping position.

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