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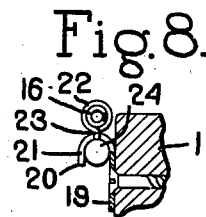
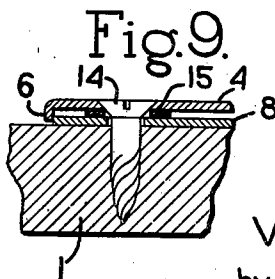
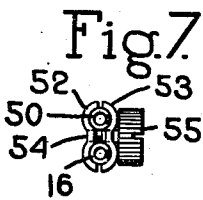
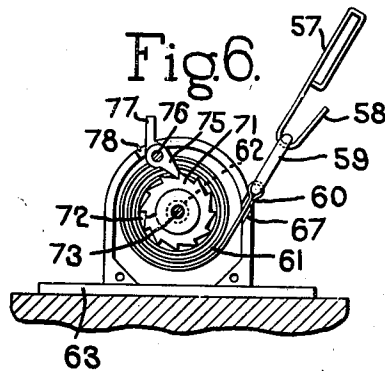
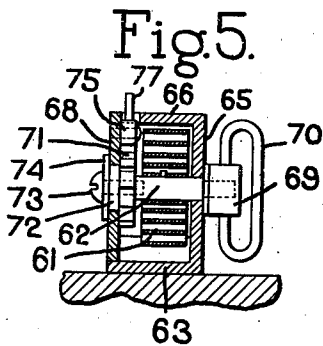
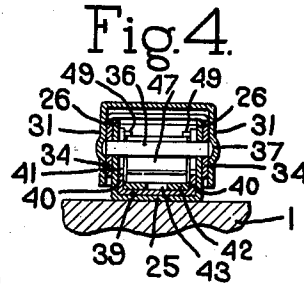
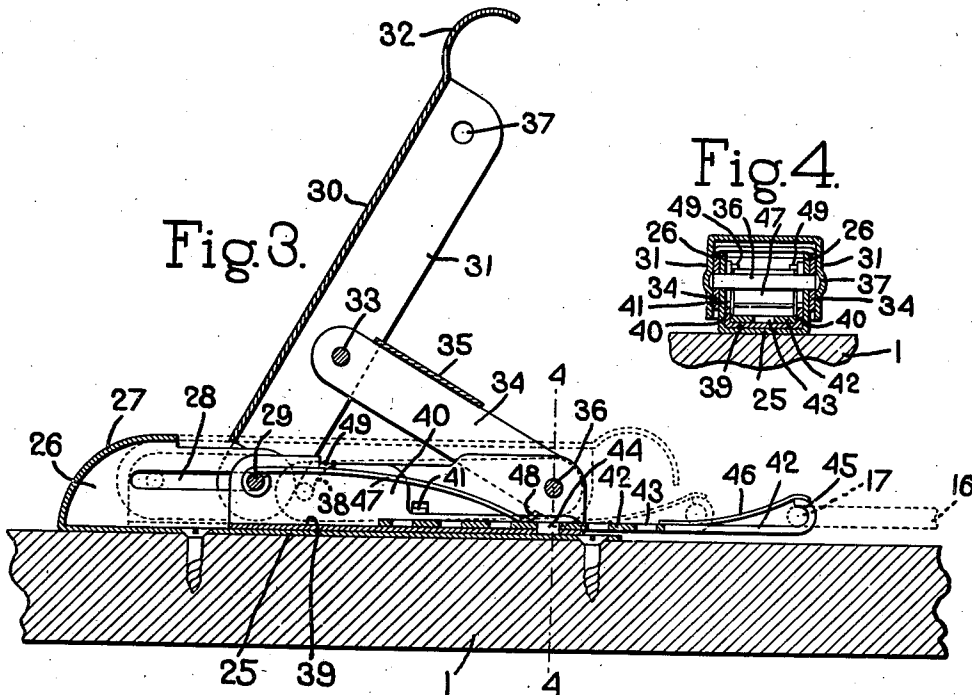
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2,259,701

BINDER MECHANISM FOR SKIS

Filed April 23, 1940

2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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BINDER MECHANISM FOR SKIS

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4 Claims. (Cl. 280—11.35)

This invention relates to ski bindings or harnesses for attaching skis to the boot of the wearer of the type which comprises a toe hold, a cable having a looped portion located in front of the toe hold with the ends of the cable connected to resilient means embracing the heel of the boot. In such ski binders means for applying tension to the cable to clamp the boot firmly in the toe hold is secured to the ski in front of the looped portion of the cable. One of the objects of the invention is to provide a novel tension-applying means embodying a lever actuated toggle for imposing tension upon a cable when the toggle is extended and which when tension is applied will be firmly locked, but which can be easily released by raising the lever.

A further object of the invention is to provide a tensioning device of the character described of streamline construction and so housing the movable parts of the tension-applying mechanism as effectively to exclude the entrance of snow and ice into the casing of the locking mechanism, thereby avoiding the freezing of the movable parts together in such manner as to interfere with the easy release of the tension-applying mechanism.

In usual ski binders the toe hold is provided with a strap which extends over the top of the toe of the boot and which is adjusted permanently tightly to hold down the toe of the boot against the ski. When the toe of the boot is wedged tightly in a toe hold having such binder difficulty has frequently been experienced in releasing the toe of the boot from the ski in case of a fall where it is necessary to free the boot from the ski. Another object of the invention is to provide a holddown for the toe of the boot which will be automatically slackened when the tension upon the cable is relieved.

In usual ski binder constructions the cable passes beneath guides which are secured to the sides of the ski at suitable points to permit the heel of the boot to be raised for touring, but where the skier is executing a slalom, or sliding down a course which requires an abrupt turn, it is desirable that the heel of the boot be held much more closely adjacent to the ski in order to permit proper manipulation thereof.

Another object of the invention is to provide a novel "hitch" construction which may be adjusted to such plurality of positions as will hold the boot in proper relation to the ski for any desired manipulation of the ski.

Another object of the invention is to provide adjustable resilient means for securing an ankle

strap to the ski rearwardly of the heel of the boot which will aid in the manipulation of the ski by insuring proper alinement of the ski with the boot of the wearer during turning movements and which will assist in holding the skis properly upon the boot during jumping.

Another object of the invention is to provide an adjustable toe hold construction which can be readily adapted to the toes of boots of different widths or different contours.

These and other objects and features of the invention will more fully appear from the following description and the accompanying drawings and will be particularly pointed out in the claims.

A preferred embodiment of the invention is illustrated in the accompanying drawings, in which,

Fig. 1 is a side view of a portion of a ski equipped with the ski binding mechanism embodying the invention, illustrating the position of the boot in dotted lines with the heel of the boot in contact with the ski;

Fig. 2 is a plan view of the construction illustrated in Fig. 1;

Fig. 3 is a detail enlarged longitudinal vertical section of the tension-applying means for the cable shown in full lines in the position in which tension upon the cable is released and in dotted lines the position in which the cable is under tension and the tension-applying means in locked position;

Fig. 4 is a detail transverse vertical sectional view on line 4—4 Fig. 3;

Fig. 5 is a view, mainly in vertical transverse section, showing a coiled spring mechanism for imposing tension upon the ankle strap;

Fig. 6 is a side elevation of the same, one side of the casing being omitted, and illustrating mechanism for adjusting the tension upon the spring which is connected to the ankle strap;

Fig. 7 is a detail view of the preferred form of adjustable clamping device for securing the holddown for the toe of the boot to the cable of the binder mechanism; and,

Fig. 8 is a detail view partly in vertical section of the hitch; and,

Fig. 9 is a detail vertical sectional view showing the manner in which the laterally adjustable toe-holding members are secured to the ski.

The preferred embodiment of the invention illustrated in the accompanying drawings comprises a ski 1, which usually is made of hard wood, having properly positioned upon and secured to its upper face a metal plate 2 upon which the heel and part of the sole of the boot

3 of the wearer rests. A plate 4, which is mounted immediately in front of and preferably abutting the front end of the plate 2, is provided with downwardly extending front and rear flanges 5 and 6 of such length as to position the upper surface of the plate 4 flush with that of the plate 2. Screws 7 located centrally of the width of the plate 4 secure it firmly to the ski.

The toe hold comprises complementary members having flat sections 8 which lie beneath the plate 4 and upwardly extending sides or wings 9 to engage the sides of the toe portions of the sole and shoe. These upwardly extending side or wing members are provided with upwardly extending downwardly curved flanges 10 desirably arranged in an arcuate curve and an upper forward and inwardly extending flange 11, the flanges 10 and 11 acting as guides for a toe hold hereinafter to be described. The flat sections of the toe hold are provided near their ends with oppositely arranged arcuate slots 12 and 13 through which clamping screws 14 passing through the plate 4 and seated in the ski are mounted. By reason of this construction the width of the toe-holding members may be adjusted to fit any size or form of shoe and when thus adjusted can be fixedly secured in place by setting up the screws 14. A washer 15, which desirably has roughened upper and lower faces, is interposed between the plate 4 and the flat sections 8 of the toe hold, as illustrated in Fig. 9, and serves when the screws are set up to afford such friction between the plate 4 and the flat sections 8 of the toe hold as to prevent lateral slippage when the parts are clamped together by the screws 14.

Any other suitable frictional device such as a spring washer may be employed for the same purpose.

The ski binding mechanism for holding the toe of the boot firmly in the toe hold comprises a flexible wound main cable 16 having at its forward end a loop 17 adjustably connected at its free ends to a flexible member such as a coiled spring 18 which embraces the usual groove in the heel of the boot.

Inasmuch as it is desirable to enable the heel of the boot to be raised from the ski during touring and to hold the heel in contact with or closer to the ski for jumping or executing slalom, hitches are provided which will enable the proper adjustment of the heel relatively to the ski to be maintained for such purpose. In some usual constructions a number of such hitches are independently attached to the sides of the shoe. One of the objects of the present invention is to provide means which will permit a greater number of adjustments of the hitch mechanism and in the preferred embodiment of the invention this comprises complementary plates 19 which are properly positioned upon and secured to opposite sides of the ski, each of the plates having an outwardly and downwardly curved upper portion 20 provided with a series of slots 21 at suitable intervals. The complementary portion of the hitch mechanism comprises cylindrical slides 22 which are mounted upon the cable 16 and provided with downwardly extending shanks 23 connected to an integral cylindrical bar 24 adapted to fit in the downwardly curved upper portion 20 of the plates 19, the shanks being sufficiently narrow to be inserted through the slots 21 so that the bars 24 will anchor the slides in the selected slots to give the desired freedom of movement of the

shoe or to maintain the heel substantially in contact with the ski.

One of the principal objects of the invention is to provide novel means for imposing proper tension upon the cable to maintain the toe of the boot in firm engagement with the toe hold, the mechanism being such as to be readily manipulated to impose tension upon the toe hold and retained in locked position, and also so constructed as to permit adjustment of the tension which is to be applied to the toe hold.

This mechanism is also so constructed as to exclude snow and ice from accumulating and freezing upon the relatively movable parts of the tension applying mechanism so that the tension applying mechanism can be readily released when the skier finds it necessary or desirable to detach the boot from the ski.

In the preferred construction illustrated the tension applying mechanism comprises a channel-shaped casing having a base 25 and parallel side walls 26; the front end of the casing having an upwardly curved streamline section 27 which closes the front end of the casing. Each of the side walls 26 is provided near its forward end with a slot 28 in which a shaft 29 is slidably mounted. The lower end of a manually operated channel-shaped lever 30 is pivotally connected to the ends of the shaft 29 outside of the side walls 26 of the casing. The side members 31 of the channel-shaped lever are of sufficient width when the lever is in depressed position, as illustrated in dotted lines in Fig. 4, to enclose the side walls 26 of the casing, and the upper end of the lever desirably is provided with a hooked extension 32 adapted to be easily grasped by the finger of the operator. The lever 30 is provided at a suitable position intermediate of its length with a transverse pin 33 which is mounted in the side members 31 of the lever and is pivotally connected to a link, the opposite end of which is pivotally mounted upon the side walls 26 of the casing.

The preferred form of the link illustrated in the drawings is of integral construction comprising a plate having parallel side members 34 connected by an integral bridge portion 35 which extends from near the upper portion of the link to approximately the middle of its length and the lower end of the side members 31 of the link is pivotally mounted upon a rod 36 which in turn is mounted in the side walls 26 of the channel. In this construction the forward ends of the links are located within the side members 31 of the lever and outside of the side walls 26 of the casing. Desirably the ends of the rod 36 extend slightly beyond the side members 34 of the links and the lever 30 is provided with indentations or sockets 37 adapted to engage the ends of the rod 36 and lock the lever in the downwardly depressed position illustrated in dotted lines in Fig. 3.

This construction is such that the lever 30 is fulcrumed upon the rod 33 which is mounted in the end of the side members 34 of the link, so that when the lever is swung to upright position, illustrated in full lines in Fig. 3, the rod 29 at its lower end will be moved to the inner or right hand end of the slots 28. When the lever is swung downward to locked position the rod 29 will be moved outwardly or to the left, as illustrated in dotted lines Fig. 3, bringing the flat top of the lever 30 into the same plane with the rear end of the streamline end 27 of the casing, and the sides 31 of the lever which then enclose

the casing will prevent entrance of snow and ice into the casing and protect the movable parts contained therein.

The rod 33, which forms the fulcrum for the lever 30, is so positioned that when the lever is depressed to the position illustrated in dotted lines in Fig. 3 the fulcrum will lie below a plane passing through the rods 29 and 36 and thereby act to lock the toggle-like construction formed by the lever 30 and link 34 against release until the lever is swung upwardly by lifting up the hooked end 32 thereof.

In order to permit the rod 33 to be thus depressed the walls 26 of the casing are provided with recesses 38 as shown in dotted lines in Fig. 3.

The tension applying means which is actuated by the lever 30 comprises a channel-shaped slide having a base 39 which is slidably mounted upon the bottom 25 of the casing and is provided with upwardly extending side walls 40 which fit within the side walls of the casing and are provided adjacent the forward ends with apertures or bearings in which the rod 29 is mounted. The rear portions of the side walls 40 are cut away to provide relatively narrow side walls which form ways to receive the edges of a tension bar, and lugs or flanges 41 punched from and extending inwardly from the side walls of the casing overlies and form guides for the relatively narrow side walls of the slide. The tension bar 42 is in the form of a flat plate fitting between the narrow portions of the side walls of the slide and is provided with a series of holes 43 adapted selectively to be engaged by a stud 44 which is fixedly secured to and extends upwardly from the rear end portion of the bottom portion of the slide. The tension bar is provided with an upwardly curved or hook-shaped end 45 which is adapted to engage the looped portion 17 of the cable and desirably a retaining spring 46, which is secured to the bar 42, cooperates with the hooked end portion to provide a snap hook by which the cable can be readily attached or detached to the bar.

Suitable means are provided for holding down the tension bar 42 to maintain it in contact with the bottom 39 of the slide so that the stud 44 which projects upwardly from the bottom of the slide will be maintained in the selected hole in the tension bar and cause the tension bar to be moved with the slide. In the construction illustrated this is accomplished by a leaf spring 47 the forward end of which is mounted upon the rod 29 and provided with an upwardly curved rear end 48 which engages the tension bar 42. Suitable lugs or flanges 49 extending inwardly from the sides of the casing press upon the upper surface of the spring 47 and maintain the curved end thereof firmly in engagement with the tension bar, thus preventing detachment of the tension bar from the lug 44, but enabling the tension bar to be adjusted by raising the rear end of it and moving it longitudinally relatively to the slide to enable the lug 44 to be positioned in a selected hole in the tension bar.

A further object of the invention is to provide a holddown for the toe of the boot which is automatically clamped upon the toe when tension is applied to the cable 16. In the preferred construction illustrated the holddown is in the form of a flexible cable 50 having a looped portion 51 which extends over the toe of the boot with the sides of the looped portion guided in an arcuate direction by the flanges 11 and 10 on the sides of the toe holding members 9. The

ends of the cable 50 are adjustably connected to the looped portion 17 of the main cable 16. Any suitable means may be provided for thus adjustably connecting the ends of the toe holddown cable 50 to the main cable 16. A preferred construction is illustrated in Figs. 1 and 2 and in detail in Fig. 7 which comprises two complementary plates 52 and 53 having arcuate end portions adapted to embrace opposite sides of the end of the holddown cable 50 and the main cable 16, the plates having intermediate flat portions 54 which are connected by a machine screw 55 which in addition to having a slot to receive the screw driver may also be provided with a cylindrical knurled surface to be grasped by the fingers. By setting up the machine screws 55 firmly the clamping members will secure both ends of the toe holddown cable firmly to the main cable.

In the operation of the device the lever 30 of the tension applying device is swung upwardly to the position illustrated in full lines in Fig. 3, thereby swinging the lever 30 about its fulcrum 33 and withdrawing the rod 29 rearwardly in the slot 28. This moves the slide and tension bar 42 rearwardly and slackens the cable so that when the toe of the boot is placed in the toe hold the resilient portion 13 of the binder may be easily passed over the heel and seat in the groove thereof.

In order to clamp the boot firmly upon the ski the lever 30 is swung downwardly to the dotted line position illustrated in Fig. 3, thereby swinging the lever 30 about its fulcrum 33 and moving the rod 29 forwardly in the slot 28 and consequently drawing forwardly the slide to which the rod 29 is connected, and consequently drawing forwardly the tension bar 42 which is connected to the slide. This imposes a tension upon the main cable 16 and firmly locks the boot to the ski, but in such manner that the heel of the boot may be raised in accordance with the adjustment of the hitches. At the same time the toe holddown cable is drawn forwardly so that its looped portion 51 is clamped firmly upon the toe of the boot. When the lever 30 is swung down to the dotted line position illustrated in Fig. 3 it is locked in such position by reason of the fact that the fulcrum 33 passes below a plane passing through the rods 29 and 36 and forms a toggle lock. In addition to this the sockets 37 in the side walls 31 of the lever engage over the projecting ends of the rod 36 and further insure the tight locking down of the lever.

The forward movement of the lower end of the lever as it is swung down brings the end of the flat upper portion of the lever into engagement with the streamline end 27 of the casing, while the sides 31 of the lever cover the side walls of the casing and the slots 28 thereby preventing the admission of snow or ice into the casing, so that the movement of the slide will not be obstructed by accumulation of ice. When it is desired to remove the boot from the ski the lever 30 can be swung upward easily thus releasing not only the tension upon the main cable but also releasing tension upon the holddown cable and permitting the boot readily to be detached from the ski.

A further object of the invention is to provide novel means for maintaining the shoe in alignment with the ski, which is particularly important in executing slalom and in jumping. This is accomplished by providing an ankle strap which is releasably attached by resilient means to the ski rearwardly of the heel of the boot. The

preferred construction comprises an adjustable ankle strap 56 which passes over the instep of the shoe and has secured to it rearwardly of the heel a metallic member having a loop 57 embracing the strap and terminating in a hook 58 which is detachably secured to a loop 59 which is pivotally secured to the end 60 of a flat steel coil spring 61 the other end of which is mounted upon and secured to a shaft 62 and wound thereon like a clock spring. The shaft 62 is mounted in a casing having a flat base 63 which is secured to a central portion of the ski rearwardly of the boot heel by screws 64 and has a vertical wall 65 and an arcuate wall 66 enclosing the spring 61 and provided with a suitable slot 67 through which the end of the spring 61 passes. The casing is closed by a flat cover plate 68. The shaft 62 is mounted in a suitable bearing in the vertical wall 65 of the casing and has secured to it adjacent the wall 65 a hub 69 provided with a loop 70 which may be operated to wind up the spring 61 to produce any desired tension upon the ankle strap. The opposite end of the shaft 62 has mounted upon it a ratchet 71 which is provided with a hub 72 mounted in a suitable bearing in the cover plate 68 and forming a journal for the shaft 61. The shaft 62 is secured in place by a screw 73, a washer 74, of greater area than the hub 72, being interposed between the head of the screw 73 and the hub 72.

A pawl 75 which is mounted upon a stud 76 secured to the cover plate 68 of the casing has a tail piece 77 extending through a slot 78 in the casing, thereby providing means by which the pawl can be released from the ratchet to permit unwinding of the spring.

In the operation of this device the pawl may thus be released from the ratchet to slacken the tension upon the spring while the ankle strap is being strapped about the boot and the spring then wound up by rotating the loop 70 in a clockwise direction until the desired tension is applied to the ankle strap.

It will be understood that the embodiment of the invention shown and described herein is of an illustrative character and that various changes in construction and arrangement of parts may be made within the spirit and scope of the following claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. A ski binding, for releasably securing a boot to a ski, having a metal toe hold, a cable having a loop located in front of said toe hold and resilient means connected to the ends of said cable embracing the heel of the boot, means for releasably applying tension to said cable comprising a channel-shaped casing mounted in front of said loop, a slide mounted in said casing, means for guiding said slide longitudinally thereof, means connecting said slide to the loop of said cable, toggle mechanism connecting said slide to said casing including a link pivotally mounted at one end on said casing, and an inverted channel-shaped lever fulcrumed intermediate of its length upon the other end of said link with the parallel side walls of the channel outside of and pivotally connected at their ends to said slide operable when the lever is forced downwardly to locked position move said slide forward and thereby impose tension upon said cable with the channel-shaped lever when in locked position enclosing the top of the channel-shaped casing, thereby providing a streamline construction

which will prevent accumulation of snow and ice in the casing.

2. A ski binding, for releasably securing a boot to a ski, having a metal toe hold, a cable having a loop located in front of said toe hold and resilient means connected to the ends of said cable embracing the heel of the boot, means for releasably applying tension to said cable comprising a channel-shaped casing mounted in front of said loop, a slide mounted in said casing, means for guiding said slide longitudinally thereof, means connecting said slide to the loop of said cable, toggle mechanism connecting said slide to said casing including a link pivotally mounted at one end on said casing, and an inverted channel-shaped lever fulcrumed intermediate of its length upon the other end of said link with the parallel side walls of the channel outside of and pivotally connected at their ends to said slide operable when the lever is forced downwardly to move said slide forward and thereby impose tension upon said cable, the fulcrum of said lever being so positioned that when the lever is forced downwardly said fulcrum will lie below a plane passing through the pivotal connection of the lever to the slide and the pivotal connection of the link to the casing, thereby effectively locking the slide in tension-applying position with the channel-shaped lever when in locked position enclosing the top of the channel-shaped casing, thereby providing a streamline construction which will prevent accumulation of snow and ice in the casing.

3. A tension device for a ski binding for releasably securing a boot to a ski having a toe hold and a cable having a loop located in front of said toe hold with resilient means connected to the ends of the cable embracing the heel of the boot, comprising a channel-shaped casing mounted upon the ski in front of said cable loop and provided at its front end with an outwardly curved streamline cover portion, the side walls of said channel being provided near its front end with complementary hollow slots, a slide mounted in said casing, means for guiding the slide longitudinally thereof, a metal strap adjustably secured to said slide having means to engage the loop of said cable, toggle mechanism for actuating said slide comprising a channel-shaped link pivotally connected to the rear end portions of the side walls of said casing, a channel-shaped lever fulcrumed upon the other end of said link and having side walls adapted to embrace the side walls of said link, a rod slidably mounted in the slots in said casing pivotally connected to the front end of said slide and to the lower end of the vertical sides of said channel-shaped lever, whereby upon depression of said lever to horizontal position the rod pivotally connecting the slide and lever will be moved forwardly in said channel to impose a tension upon the lever and simultaneously causing the channel-shaped lever to enclose the casing and slide and telescopically engaging the top of the casing, thereby providing a streamline housing protecting the mechanism within the casing from entrance of snow and ice.

4. A tension device for a ski binding for releasably securing a boot to a ski having a toe hold and a cable having a loop located in front of said toe hold with resilient means connected to the ends of the cable embracing the heel of the boot, comprising a channel-shaped casing mounted upon the ski in front of said cable loop and provided at its front end with an outwardly

curved streamline cover portion, the side walls of said channel being provided near its front end with complementary hollow slots, a slide mounted in said casing, means for guiding the slide longitudinally thereof, an upwardly projecting lug on said slide, a metal strap having a series of holes selectively fitting said lug adjustably securing said strap to said slide having means to engage the loop of said cable, toggle mechanism for actuating said slide comprising a channel-shaped link pivotally connected to the rear end portions of the side walls of said casing, a channel-shaped lever fulcrumed upon the other end of said link and having side walls adapted to embrace the side walls of said link, a rod slidably mounted in the slots in said casing pivotally connected to the front end of said slide and to the lower end of the vertical sides of said channel-shaped lever, a holddown spring mounted on said rod engaging said strap, means on said casing for maintaining the spring in engagement with said strap, the construction being such that upon depression of said lever to horizontal position the rod pivotally connecting the slide and lever will be moved forwardly in said channel to impose a tension upon the lever and simultaneously causing the channel-shaped lever to enclose the casing and slide and telescopically engaging the top of the casing, thereby providing a streamline housing protecting the mechanism within the casing from entrance of snow and ice.

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