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Stauffer

[11] **3,830,510**

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[54] **RELEASABLE HEEL HOLDDOWN MECHANISM FOR SKI BINDINGS**

[75] Inventor: **Rudolf Stauffer,** Bottenwil, Switzerland

[73] Assignee: **Samuel Wyss,** 3801 Kleine Scheidegg, Switzerland

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Oct. 27, 1971 Switzerland 15671/71

[52] **U.S. Cl.** ..... **280/11.35 T**

[51] **Int. Cl.** **A63c 9/08**

[58] **Field of Search** ..... 280/11.35 T

[56] **References Cited**

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Primary Examiner—Robert R. Song

Attorney, Agent, or Firm—Werner W. Kleeman

[57] **ABSTRACT**

A releasable heel holddown mechanism for ski bindings embodying a spring-loaded holding element serving for holding down the heel of the ski boot and pivotably mounted within a frame which can be connected through the agency of an attachment plate with the ski. Means serve to guide the pivotal movement, said means imparting to the holding element an upward forwardly directed movement until reaching a release position.

2 Claims, 4 Drawing Figures

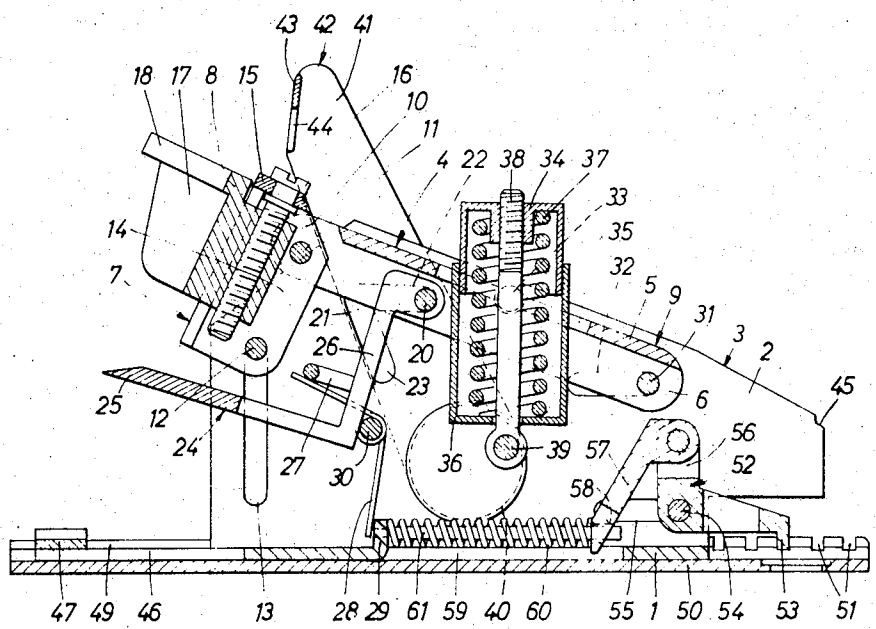

FIG. 1

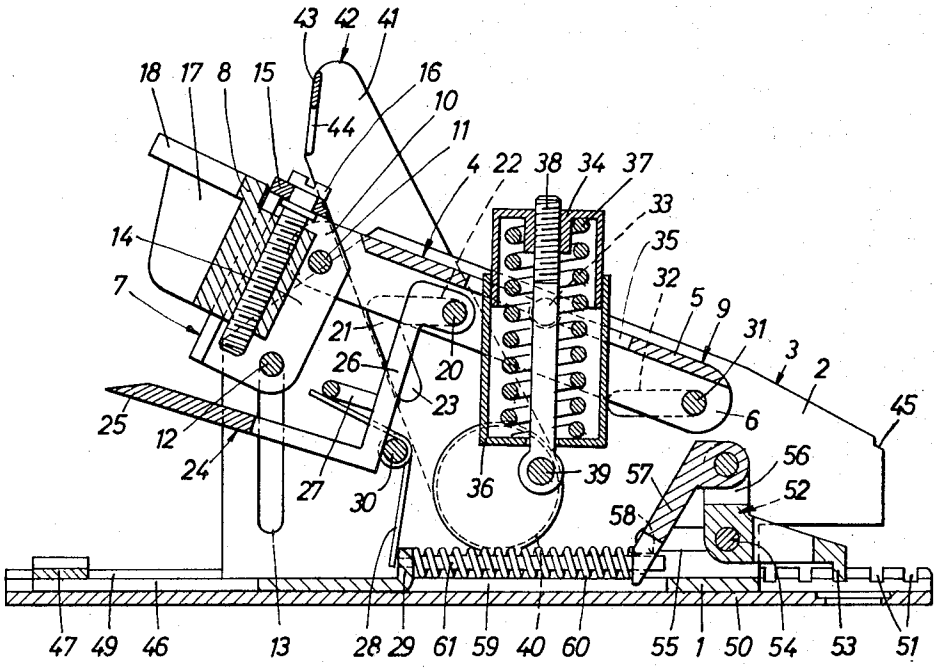
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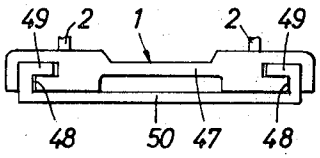
FIG. 4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48 50 47 48

FIG. 2

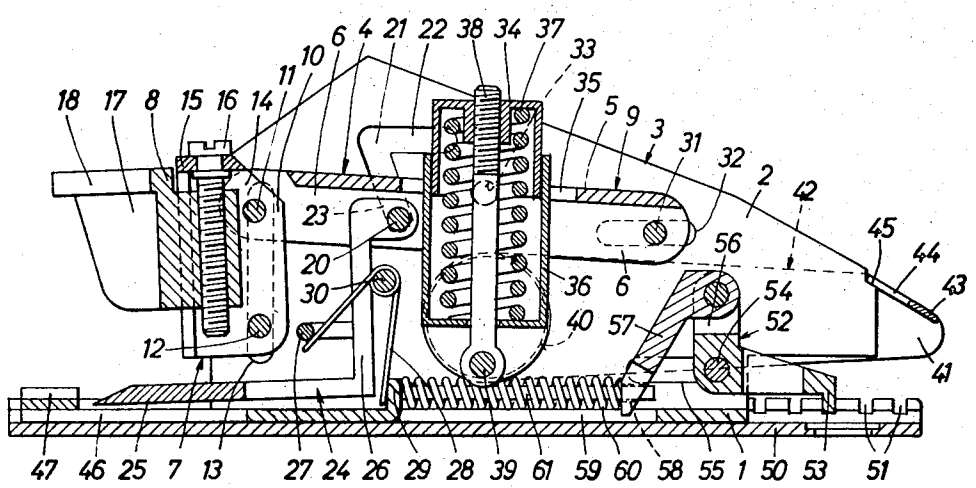
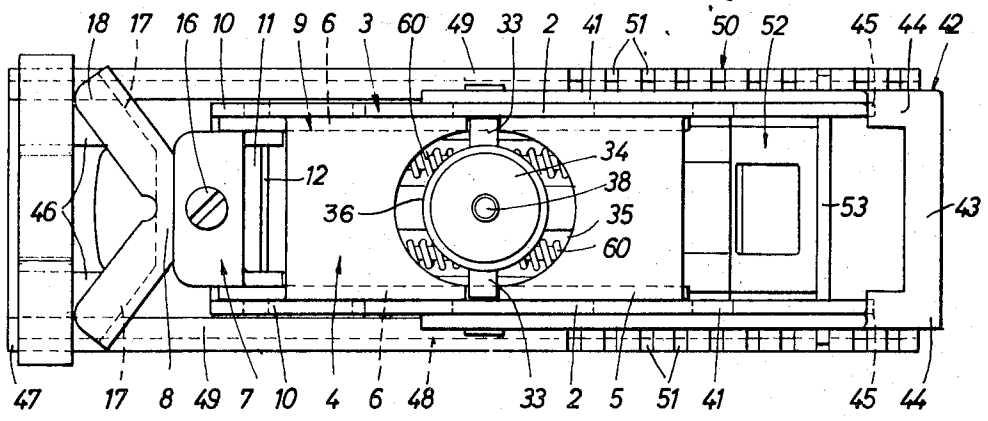

18 17 8 15 16 14 11 10 6 4 21 22 38 34 37 33 35 5 9 3 31 32 2 42 45 44 43
23 20 30 12 36 6 40 57 56 54 52 41
47 46 25 7 13 27 24 26 29 28 39 61 59 60 58 55 1 50 53 51

FIG. 3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12 34 38 36 35 60 46 53 43
47 17 8 49 7 10 4 6 48 33 2 5 51 41 45 44

RELEASABLE HEEL HOLDDOWN MECHANISM FOR SKI BINDINGS

BACKGROUND OF THE INVENTION

The present invention relates to a new and improved construction of releasable heel holddown mechanism for ski bindings incorporating a spring-loaded holding member or element serving for holding down the heel of the ski boot and pivotably mounted within a frame which can be connected through the agency of an attachment plate with the side of the ski.

It is a known desire in this art to construct the components serving for attachment of a ski boot with the ski so as to be long-stroke, that is to say, in such a manner that they accompany for as long as possible path the ski boot which, through the action of external influences, is brought out of the normal position and, in the event that the external influences do not remain, to again bring such back into the normal position. Such longstroke bindings have already been realized in a number of different constructional manifestations with respect to the front jaws.

As far as the releasable heel holddown mechanism is concerned there is already known to the art, for instance, from German patent publication No. 1,803,997 a tiltable arrangement which enables the binding to release during falling of the skier towards the front. With this known holddown mechanism there are provided grooves, one edge of which forms a locking or arresting means, where however such grooves only allow for a purely pivotal movement of the holding member. In German patent publication No. 1,428,964 there is disclosed a similar holddown mechanism wherein one branch of a guide groove extends perpendicular to the base plate and therefore allows for a lifting movement of the holding member, Yet this construction cannot really be considered as an actually long-stroke binding since the holding member only tends to participate in one direction in the movement of the raising ski boot heel, so that the holding member slides at the sole, and thus occurring variable friction forces which are dependent upon, the properties of the sole, the inermediate layer of snow and so forth, are not therefore predeterminable and therefore do not render possible an exact adjustment of the safety binding.

SUMMARY OF THE INVENTION

Hence, it should be apparent from what has been discussed above that this particular field of technology is still in need of a releasable heel holddown mechanism for ski bindings which is not associated with the aforementioned drawbacks and limitations of the prior art constructions. It is therefore a primary object of the present invention to provide a new and improved construction of releasable heel holddown mechanism for ski bindings which effectively and reliably fulfills the existing need in the art and is not associated with the aforementioned drawbacks and limitations of the prior art proposals.

Another and more specific object of the present invention aims at a new and improved construction of releasable heel holddown mechanism for ski bindings of the previously mentioned type and serving as a long-stroke binding by means of which it is possible to at least extensively eliminate, up to the point of release,

relative movement between the ski boot sole and the sole holddown mechanism.

Still a further significant object of the present invention relates to a new and improved construction of releasable heel holddown mechanism for ski bindings which is relatively simple in construction and design, extremely reliable in operation, economical to manufacture, and provides good safety for the skier.

Now in order to implement these and still further objects of the invention, which will become more readily apparent as the description proceeds, the inventive releasable heel holddown mechanism for ski bindings is manifested by the features that there is provided means for guiding the pivotal movement of the holding element, said means imparting to the holding element, until assuming a release position, an upwardly forwardly directed movement.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be better understood and objects other than those set forth above, will become apparent when consideration is given to the following detailed description thereof. Such description makes reference to the annexed drawings wherein:

FIG. **1** is a vertical sectional view, in the direction of the lengthwise axis of the ski, through the automatic step-in heel holddown mechanism of this development in its open position;

FIG. **2** is a view similar to the showing of FIG. **1**, but this time showing the heel holddown mechanism in the closed position;

FIG. **3** is a top plan view of the automatic step-in heel holddown mechanism depicted in FIGS. **1** and **2**; and

FIG. **4** is a front view of the base plate which is pushed onto the attachment rail of the heel holddown mechanism of this development.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Describing now the drawings, the exemplary illustrated embodiment of automatic step-in heel holddown mechanism will be understood to comprise a frame **3** consisting of a base plate **1** and two jaws **2.** Between both jaws **2** there is mounted a movable holding element or member **9** formed of a substantially U-shaped control rail **4** with the web plate **5** and the angled or flexed side plates **6** forming the legs, a guide piece or element **7** and a jaw element **8.** The guide element **7** is pivotably connected with the control rail **4** by means of a shaft **11** retained between two ears or flaps **10** of the control rail **4** and possesses a bolt **12** which enters by means of its laterally protruding ends in a respective one of the vertical guide grooves **13** of both jaws **2.** The guide element **7** possesses a su1stantially U-shaped head **14,** into the web **15** of which there is threaded a screw **16.** Screw **16** serves for attaching the jaw element **8** provided with two forwardly angled jaws **17,** wherein the upper edge of each of the jaws **17** is forwardly flexed for forming a contact element **18** cooperating with the upper face or top of the heel sole.

By rotating the screw **16** it is possible to elevationally adjust the jaw component or element **8** and thus to accommodate such to the thickness of the ski boot sole.

Continuing, between both side plates **6** of the control rail **4** there is fixedly arranged the shaft or axle **20.** The

ends of such shaft **20** which protrude past such side plates **6** are seated in an associated guide groove **21** of each jaw **2.** Each of these guide grooves **21** is essentially constructed to be angle-shaped and possesses a release branch or section **22** which extends at least approximately parallel to the base plate **1** and a return branch or section **23** which is directed from the front end of the release branch **22** downwardly at an inclination towards the rear and thus form a knee-type slot arrangement within which is guided the holding element or member **9.**

A foot or step-on lever **24** is pivotably mounted about the shaft **20,** the forward end of which foot lever **24** is designed as a foot or step down plate **25,** from which lead to the bearing or support location two angularly flexed support arms **26,** only one of which is visible in the drawing. The arms **26** are connected by a bracket **27** against which bears one end of a spring **28,** the other end of which bears against a locking or arresting means **29** of the base plate **1.** The spring **28** which is wound about contact shaft **30** strives to rock the foot lever **24** in the clockwise direction until assuming the position depicted in FIG. **1** in which the spring **28** is free of stress or tension. Moreover, the dimensions are chosen such that with a forced rotation of the foot lever **24** in the counterclockwise direction both of the arms **26** bear against the contact or impact shaft **30.**

Both of the rear ends of the side plates **6** of the control rail **4** are connected with one another by a further bolt **31,** the two laterally protruding ends of which are seated in a respective slot **32** of each jaw **2,** each of which slot extends parallel to the base plate **1.**

Between both of the jaws **2** there is arranged by means of the laterally protruding pivot bolts **33** a container **36** for the closure spring means **37.** The container **36** is closed by the screw cover **34** and penetrates via the opening **35** through the web plate **5** of the control rail **4.** The closure spring or spring means **37** bears, on the one hand, against the base or floor of the container **36** and, on the other hand against the cover **34.** This cover **34** is threaded onto the upper threaded end of a guide rod **38** contructed as a single-arm lever which piercingly extends through the floor of the container **36** and is pivotably mounted about a shaft **39,** wherein both of its outer ends are eccentrically anchored in a respective arm **41** of a closure bracket **42** which is rotatable about a pin **40.** Both free ends of the arms **41** are connected with one another by a web **43.** This web **43** possesses two contact portions or stops **44** intended to bear against appropriate shoulders **45** of both jaws **2** in the closed position of the holddown mechanism as depicted in FIG. **2.** In this regard the arrangement is undertaken such that in the closed position illustrated in FIG. **2** the support or bearing locations of the shaft **39** beneath the pin **40** can be pivoted up to a point past the vertical into a dead-center position.

The base plate **1** possesses two forwardly directed arms **46,** the ends of which are interconnected by a transversely extending member **47,** this transversely extending member laterally engaging over the ends of these arms **46** in such a manner that there is formed at each side an angle-shaped guide **48** in which engage the twice flexed edges **49** of an attachment plate **50,** which flexed edges **49** are constructed as rails. The attachment plate **50** possesses at its rear end a number of arresting means or locking grooves **51** which cooperate with a locking or arresting element **53** designed as an arm of an essentially angle-shaped locking lever **52** for determining the relative lengthwise position between the frame **3** and the attachment plate **50.** The locking lever **52** is rotatably mounted about the shaft **54** at its point of flexing or angling, and both ends of the shaft **54** are movably retained in a respective guide slot **55** extending parallel to the base plate **1.** At the other arm **56** of the arresting or locking lever **52** there is hingedly connected a transmission element **57** which possesses at its free end two bifurcated or forked members **58,** only one of which is visible in the drawing. Each bifurcated member **58** engages with an appropriate lengthwise extending slot or opening **59** of the base plate **1** and serves to support one end of a respective spring **60,** only one of which is visible. Each spring **60** is supported about a rod **61** arranged in the direction of the lengthwise axis of the relevant opening **59** and bears its other end against the end of the associated opening **59** which faces away from the bifurcated or forked member **58.**

Now for securing the automatic step-in heel holddown mechanism at the heel of the ski boot there is conventionally proceeded in such a manner that, starting from the open position of the heel holddown mechanism depicted in FIG. **1,** the heel of the ski boot is placed upon the foot plate **25** and pressed down. Owing to pressing down of the foot plate **25,** during which time the arms **26** bear against the contact or impact shaft **30,** the shaft **20** articulated to the ends of such arms are moved forwardly within the release branch or section **22** of the associated guide groove **21.** This movement is transmitted to the control rail **4** which is pierced by such shaft, the control rail, owing to the fact that it is additionally guided by means of the bolt or shaft, being displaced forwardly essentially parallel to itself.

In the release position depicted in FIG. **1** the geometric axis of the guide rod **38** is only slightly inclined towards the rear, so that there is exerted upon the control rail **4** essentially a downwardly directed force, that is to say, a rotational moment in the counterclockwise direction, wherein the control rail **4** is unable to participate in such rotational moment for such length of time as the shaft **20** bears at the release branch or section **22** of the guide groove **21.** The forwardly directed component is so slight that it is compensated by the bearing friction. Now if, however, owing to the aforementioned movement off the control rail **4** the pivot bolts **33** are likewise moved towards the front, then the guide rod **38** rotates in the counterclockwise direction past the vertical, so that the closure spring **37** exerts upon the control rail a force which acts downwardly towards the rear. This has the result that when the shaft **20** has reached the return branch or section **23** of the associated guide groove **21,** such will be drawn into such return branch and depending upon the relatively slight spring force will remain stationary at some location of such return branch or section **23.** In this position the contact portions or elements **18** of the jaws **17** already engage over the upper edge of the ski boot sole, without in the meantime however pressing the sole fixedly against the top surface of the ski. Now the closure bracket **42** is pivoted or rocked back into the closed position depicted in FIG. **2** and owing to the shaft **39** exceeding the deadcenter point it is held in this position and pressed by means of its stops **44** against the shoul-

ders 45. Consequently, the rod 38 is now drawn downwards and the closure spring 37 is stressed, that is to say, the holding element 9 is downwardly pressed through the agency of the two-part spring container or sleeve 36 and the pivot bolts 33 so that the shaft 20 is drawn down to the base of the return branch or section 23 of each associated guide groove 21 and is retained in this position by the closure spring 37.

There exists however the possibility of initially bringing the closure bracket 42 into the closure position and thus stressing the closure spring 37 and only thereafter, of course with great expenditure of force, pushing down the foot plate 25 by means of the heel of the ski boot.

Now if in the closed position of the mechanism there is exerted a force which extends in the vertical central plane of the ski with a forwardly directed force component, as such would be the case when confronted with abrupt decelerations in the direction of skiing, for instance when skiing over moguls or bumps, and if as a result thereof the heel of the ski boot lifts upwardly from the ski, then by virtue of the jaws 17 engaging over the ski boot heel the holding element is moved forwardly-upwards along the return branches 23 of the guide grooves 21. The jaws 17 of the jaw element 8 accordingly follow the heel of the ski boot, without relinquishing the connection therewith. This movement towards the front and upwards brings with it, in turn, a pivoting of the guide rod 38, by virtue of which the closing spring 37 now exerts a rearwardly and downwardly directed force upon the holding element and the control rail 4, so that the shaft 20 is pressed against the rear wall of the associated return branch 23. If the aforementioned action of the force upon the ski boot stops, before the shaft 20 has reached the release branch 22, then under the action of the closure spring 37 the heel is again returned back into its normal position, since owing to the forwardly and upwardly directed movement of the jaws 17 there has never been relinquished the contact with the heel of the ski boot. On the other hand, if the load is maintained and if it is greater than the rotational moment transmitted by the closure spring 37 upon the holding element, that is to say, if the shaft 20 has reached the release branch 22, then the shaft 20, owing to the rearwardly directed component of the force of the closure spring 37 will suddenly push back into the release branch 22, wherein in a similar sudden manner there is relinquished the connection between the jaws 17 and the heel of the ski boot and the ski boot is effectively released.

The path described by the contact locations of the sole of the ski boot heel which is held down by the jaws during raising of the ski boot from the surface of the ski, of course depends upon the length of such ski boot, which essentially corresponds to the radius of the relevant circular path. Now since the forwardly directed movement component of the holding element or member is determined by the angle of the return branch 23 of the guide groove 21 with regard to the base plate 1, it is possible for the situation to arise that with a comparatively large radius of the movement path the contact surfaces of the ski boot heel bind and therefore prevent release of the binding. In order to eliminate such the frame 3 is resiliently displaceably mounted in axial direction upon the attachment plate 50, the displacement of such frame 3 being ensured for by the spring 60, the locking lever 52 as well as the transmission element 57. The entire frame 3 together with the holding element is accordingly in a position to deviate towards the rear. In so doing the jaws 17 are always retained by means of the closure spring 37 in contact with the heel of the ski boot, so that the return action in this case is also not lost.

This resilient return movement occurs moreover also always then when — such as for instance during skiing over moguls — the ski is bent through towards the top.

It would be also possible to realize an embodiment in which the return branches 23 of the guide grooves 21 extend perpendicular to the base plate 1, in which case then the forwardly directed movement component of the jaws 17 by the springs 60 is brought about via the frame 3.

By virtue of the disclosed embodiments of this development it is possible to obtain a releasable heel holddown mechanism which enables, up to certain limits, returning a ski boot heel which has raised from the ski back into the normal skiing position without having to take into account any appreciable relative movement between the sole of the ski boot and the holding element.

While there is shown and described present preferred embodiments of the invention, it is to be distinctly understood that the invention is not limited thereto, but may be otherwise variously embodied and practiced within the scope of the following claims.

Accordingly, what is claimed is:

1. A releasable heel holddown mechanism for ski bindings, comprising a frame means slidably mounted with respect to an attachment plate adapted to be connected to the surface of a ski, spring-loaded holding means pivotably mounted in said frame means for releasably securing the heel of a ski boot down against the ski, spring means for resiliently biasing said frame means in one direction parallel to said attachment plate thereby permitting restrained shifting of said mechanism along the longitudinal axis of the ski, guiding means interrelated between said frame means and said holding means for constraining said holding means to pivotably move through a path of yielding restraint against lifting of the heel of the ski boot away from the ski until reaching a release position, groove means formed in said frame means extending substantially perpendicularly with respect to said attachment plate and cooperating with a guide element for guiding said holding means up to the release position.

2. A releasable heel holddown mechanism for ski bindings, comprising a frame means mounted with respect to an attachment plate adapted to be connected to the surface of a ski, spring-loaded holding means pivotably mounted in said frame means for releasably securing the heel of a ski boot down against the ski, guiding means interrelated between said frame means and said holding means for constraining said holding means to pivotably move through a path of yielding restraint against lifting of the heel of the ski boot away from the ski until reaching a release position, said interrelated guiding means including slot means formed in said frame means and cooperating shaft means extending from said holding means slidable in said slot means, said slot means having an upwardly inclined return branch portion and a rearwardly directed release branch portion merging with said upwardly inclined return branch portion, said holding means being spring-

loaded by a spring enclosed in a two-part housing pivotably mounted in said frame means, a rod defining a single-arm lever extending through said housing substantially in the direction of the geometric axis of said spring, said housing having an upper part fixed to said rod and a lower part displaceably mounted upon said rod under the force of said spring, a closure bracket rotatably mounted in said frame means and operatively connected to said holding means for pivoting said holding means between the release position and a closed position, said rod being rotatable about a shaft eccentrically mounted with respect to the axis of rotation of said closure bracket and being located on opposite sides of the dead-center position of said eccentrically mounted shaft in the closed position and in the release position of said holding means respectively.

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