

- [54] **CLOSURE DEVICE FOR SHOES, ESPECIALLY FOR SKI SHOES**
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 [51] Int. Cl. **A43b 11/00**
 [58] Field of Search **36/50, 2.5 AL; 24/68 R, 68 SK**

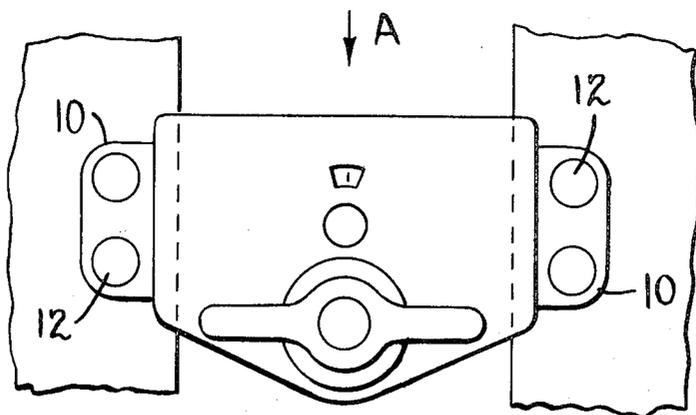
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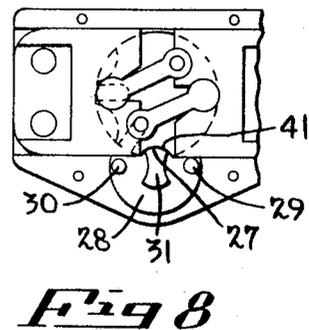
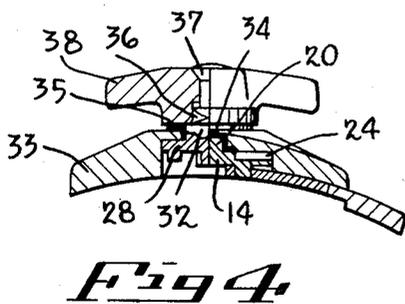
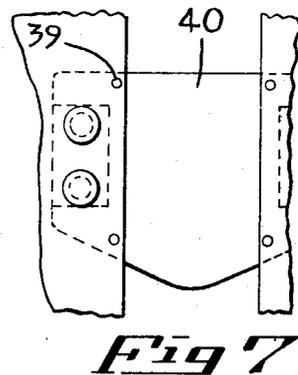
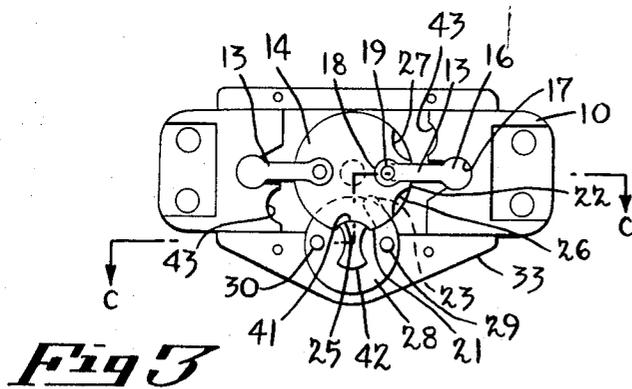
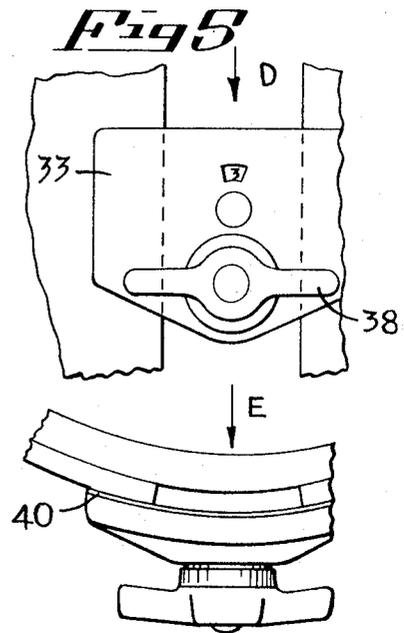
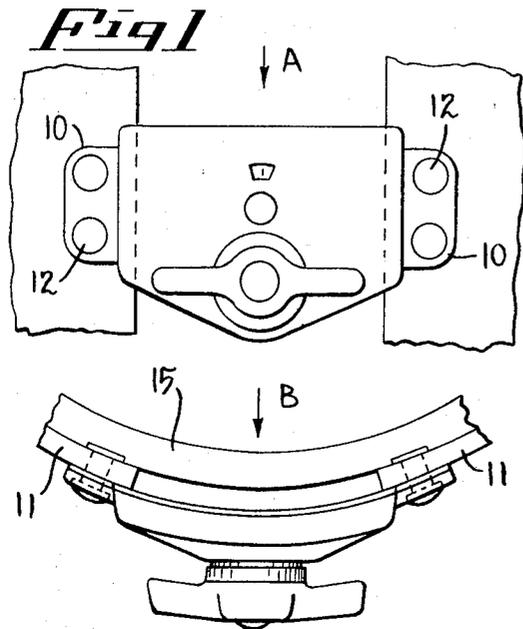
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[57] **ABSTRACT**

In a shoe having a pair of closure flaps, a closure device comprising a pair of pull members coupled each to one of the closure flaps at one end thereof, a central member comprising a rotatably mounted disc at least partially formed as a maltese cross having leg portions with recesses formed between adjacent leg portions and groove means formed on the leg portions, a driving member disposed adjacent the disc and having pins formed thereon, the pins during rotation of the driving member engaging a predetermined one of the groove means, a cam member on the driving member having convexly shaped end portions for engagement with a predetermined one of the recesses formed on the maltese cross shaped disc and forming a latch therewith, the cam member having concavely shaped side surfaces connecting the end surfaces for allowing unimpeded passage of the end portions of the legs of the disc during rotation of the disc by the pins, whereby a rotation of the driving element causes the associated pins entering the groove means and thereby rotating the disc, and as a result, the pull members being displaced along a straight line closing or opening the shoe flaps. The central member can be mounted on the shoe tongue and the pull members can be cables.

16 Claims, 20 Drawing Figures





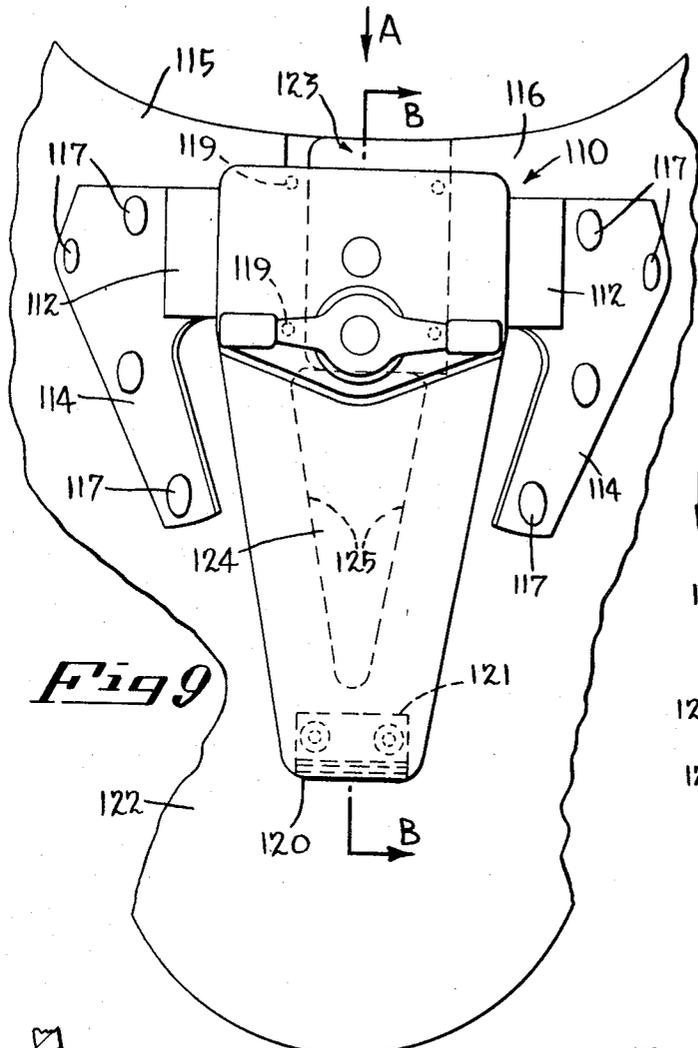


Fig 9

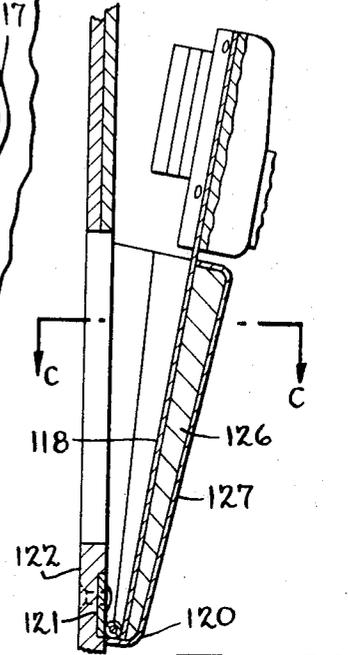


Fig 11

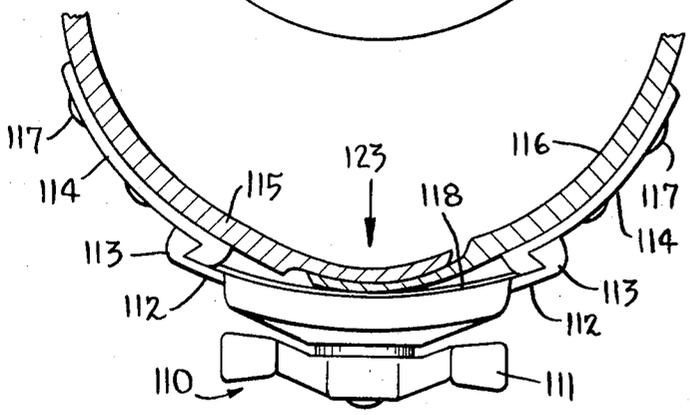


Fig 10

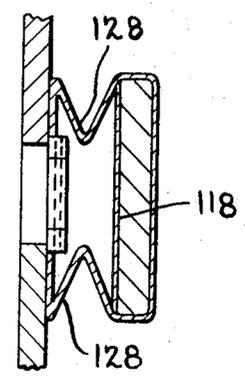


Fig 12

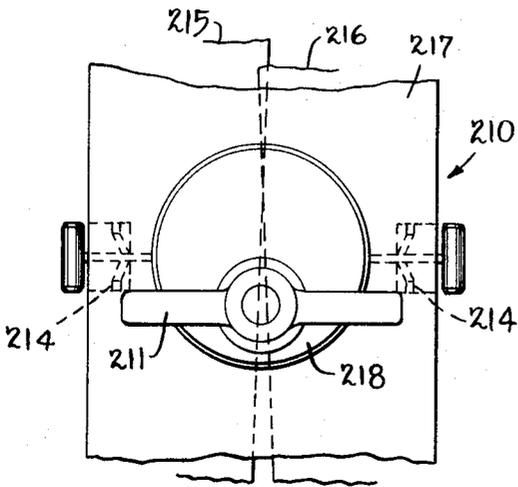


Fig 13

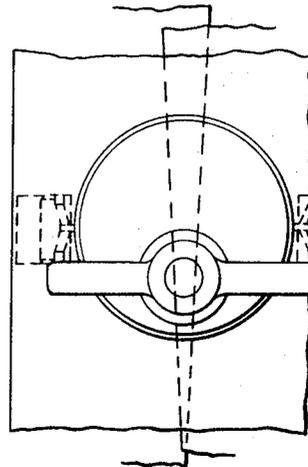


Fig 14

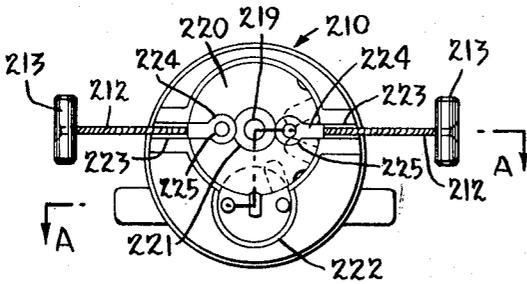


Fig 15

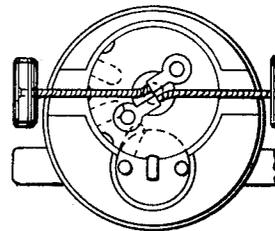


Fig 16

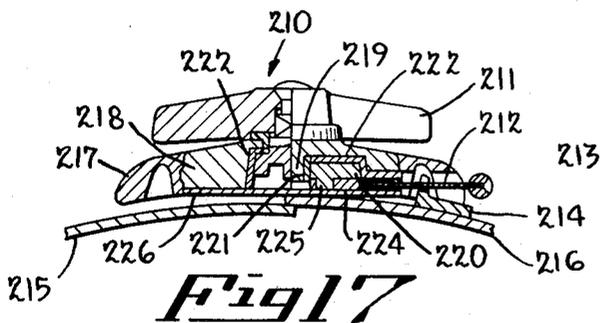


Fig 17

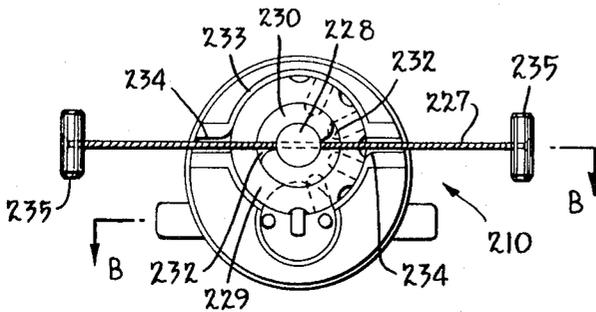


Fig 18

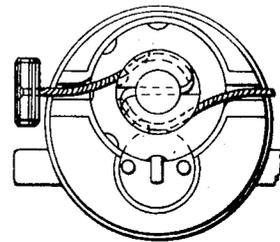


Fig 19

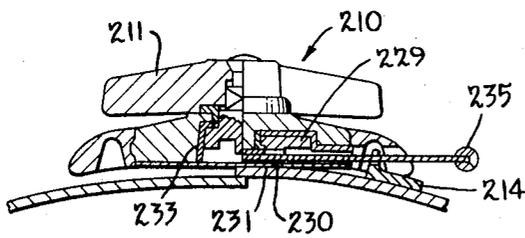


Fig 20

CLOSURE DEVICE FOR SHOES, ESPECIALLY FOR SKI SHOES

FIELD AND BACKGROUND OF THE INVENTION

The present invention relates to a closure device for shoes, especially for ski shoes, in which on the edge portions of the closure flap of the shoe which are to be pulled together, pull members or straps are secured and such pull members are jointly coupled with a rotatably mounted disc lying between the straps, such coupling being in an off-centered fashion and in such a manner that during the rotation of the disc the pull straps are either pulled in or pushed outwardly.

SUMMARY OF THE INVENTION

A shoe closure means according to the present invention is characterized in that the above-mentioned rotatably mounted disc at least in portions is formed as a maltese cross and that the pull members or straps are coupled with the disc by connecting straps and wherein on the leg portions of the maltese cross radial guide groove means are provided into which pin means disposed in an off-center fashion on a driving member are adapted to enter; such driving member being rotatably mounted in a plane parallel with respect to the plane of the disc, and when rotated, the pins operatively engage the groove means; the driving member including a pair of pin means and a cam member having a pair of convexly shaped front or end surfaces which, during the rotation of the driving member, alternately engage recess means formed on the maltese cross with a radius similar to those of the convex end portions of the cam member and being retained therein to form a latch means together with such recess means and define a rest position of the closure device thereby.

The disc which is formed as a maltese cross is preferably a circular disc with two leg portions, and consequently it has three recess means formed thereon which, in turn, allow for three rest or intermediate positions of the pull member as hereinafter described. If two leg portions are formed on the maltese cross with a displacement of 60° with respect to each other, then the disc has also two guide grooves formed thereon for engagement with the pin means of the driving member.

As in the embodiment broadly described above the driving member has a round disc and only a single pin means formed thereon, then in order to arrive from one of the three rest positions of the closure means to another rest position thereof, there will be necessary a full rotation of the driving member. In the case of a pair of pin means it is sufficient that a rotation of 180° takes place between adjacent rest or latch position. The driving member preferably is provided with a pair of pin means which are lying opposite each other.

It is within the scope of the present invention to provide a plurality of rest or latch positions, such as four or more, wherein the disc should have three or more leg portions and accordingly the same number of guide grooves thereon; however, such disc may require an enlarged shape which may not be desirable for every condition.

The camming member between its two convex end or front surfaces has concave side surfaces on each side connecting the front surfaces which, during the rotation of the disc, allow entry of the sharp end corners of the leg portions of the maltese cross and an unimpeded passing of them over such concave surfaces.

According to the present invention the closure device is placed in a housing.

In another aspect of the present invention the shoe closure device is characterized in that the pull members or straps are secured on the edge portions of the closure flaps of the shoe by means of retaining devices in a releasable fashion, and that the center closure member is secured at one end of a tiltable tongue which, in turn, at the other end thereof is secured in the region of the upper of the shoe where the separation of the closure flaps of the shoe begins.

The latter embodiment of the ski shoe closure device according to the present invention has the advantage that a skier can close or open his shoe by means of an individual or single closure member. During the putting on of the shoe he puts his foot into the shoe while the tongue of the shoe is tilted forwardly, the closure flaps of the shoe are pulled apart and the center closure element of the closure device is open; then he flips the tongue back into its position, whereupon the pull straps or members of the closure device will engage the retaining devices or portions provided on the edge portions of the closure flaps, and then he pulls together the pull members or straps of the closure device by operating the center closure element of the closure device. During the taking off of the shoe the above described operational steps are performed in the opposite direction. In the event that the center closure element of the device is provided with three rest positions, the shoe can be latched in an intermediate position of the closure element in such a manner as the skier may desire, for example, for the downhill skiing. In this intermediate position the pull members or straps remain still in engagement with the retaining portions on the edges of the shoe flaps. The same holds true also for the center closure element having four rest positions.

The retaining or securing members of the flap of the shoe can be provided, for example, with a button means which enters into an opening on the free or unsecured end of the pull members or straps and becomes secured to the pull members or straps in this manner. It is also possible and within the scope of the present invention that the retaining or securing members are provided with two or more button means. In accordance with a very advantageous embodiment according to the present invention, the free or unsecured ends of the pull members or straps are formed in a hook shape and cooperate with the appropriately formed, that is, hook-shaped retaining or securing members on the flaps. It can be advantageous to shape the retaining or securing members resiliently in the pulling direction by means of a metallic spring or a rubber-like resilient element.

The shoe tongue can be made of leather, synthetic material or metal. In the latter case it is preferably provided with a hinge means. Even if the tongue is made of leather or synthetic material, it still can be provided by a hinge means. It is also within the scope of the present invention to provide that if the tongue is made of metal, it is preferably covered with leather or with a synthetic material or similar material.

In order to prevent snow or water getting into the shoe in the event that the shoe flaps are not overlapping each other or if they overlap each other only partially, the forwardly tiltable tongue should be provided on each side thereof with a bellows-like sealing flap which

can be extended or returned to a compressed state with the flapping or closing of the shoe tongue.

According to still a further aspect of the present invention, the pull members or straps and the connecting rod-like coupling element are replaced by a pull cable.

According to this last-mentioned aspect of the present invention, the securing or retaining member on the flaps of the shoe can be provided with a button which can enter into a lug means provided on the free or unsecured end of the pull cable and thereby be coupled with the pull cable. According to a very advantageous embodiment of this aspect of the present invention, the free ends of the pull cable are fixedly coupled with a nipple and cooperate with appropriately shaped retaining members. It is also within the scope of the present invention with respect to this embodiment that the retaining members in the pull direction can be made resilient by means of a metallic spring or by means of a rubber-like resilient element.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will become more readily apparent from the following description of preferred embodiments thereof shown in the accompanying drawings, in which:

FIG. 1 is a top view in open position of one embodiment of the present invention;

FIG. 2 is a view in the direction of the arrow A in FIG. 1;

FIG. 3 is a view of the closure device without cover when viewed in the direction of the arrow B of FIG. 2;

FIG. 4 is a sectional view along the line C—C of FIG. 3;

FIG. 5 is a top view in the closed position;

FIG. 6 is a view in the direction of the arrow B of FIG. 5;

FIG. 7 is a view in the direction of the arrow E of FIG. 6;

FIG. 8 is a similar view as illustrated in FIG. 7, however, without cover;

FIG. 9 illustrates another embodiment of the present invention in top view and in closed position;

FIG. 10 is a view in the direction of the arrow A in FIG. 9;

FIG. 11 is a sectional view along the line B—B of FIG. 9 with the tongue tilted forward;

FIG. 12 is a section along the line C—C of FIG. 11;

FIG. 13 is a top view of the closure element according to another embodiment of the present invention, in open position;

FIG. 14 is a top view of the closure element in closed position;

FIG. 15 is a back view of the closure element similar to FIGS. 13 and 14 with the cover removed and in open position;

FIG. 16 is a back view of the closure element similar to FIGS. 13—15 with the cover removed and in closed position;

FIG. 17 is a sectional view along the line A—A in FIG. 15 with the cover replaced;

FIG. 18 is a back view of the closure element in open position with the cover removed;

FIG. 19 is a back view of the closure element in closed position with the cover removed; and

FIG. 20 is a sectional view along the line B—B of FIG. 18 with the cover replaced.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

With reference to FIGS. 1—8, it is seen that a pair of pull members or straps 10 are secured at one end thereof, each to the respective closure flap 11 of the shoe by means of rivets 12 and at their other ends are coupled by means of connecting rod-like coupling elements 13 with a disc 14. Between the closure flaps 11 of the shoe there is the tongue 15. Each of the coupling elements 13 has a partially circular end portion 16 which is journaled in a correspondingly partially circular recess 17 of the associated pull member 10 and can be rotated in the recess about a wide angle. The other end 18 of each coupling element 13 is rotatably journaled about an axle 19 of the disc 14 so that during a rotation of the disc 14 about a shaft butt 20 the pull members or straps 10 are either pulled together or pushed outwardly. One-half of the circular disc 14 is formed as a maltese cross. It has two cross legs 21, 22, a pair of guide grooves 23, 24 and three recesses 25, 26 and 27. The disc 14 is coupled with a driving element 28 having a pair of pins 29, 30 and a camming member 31 thereon. The driving element 28 which has the shape of a circular disc is rotatably journaled about a shaft butt 32 in a housing 33. The pull members or straps 10 are guided within the housing 33 and both discs 14 and 28, as can be seen in the drawings, are journaled about their shaft butts 20 and 32, respectively. In order to attain a good sliding journaling, a synthetic material bearing 34 for the shaft butt 20 and a bearing 25 of similar material for the shaft butt 32 is provided. The shaft butts 20 and 32 are fixedly coupled with the disc with which they are associated, namely, with discs 14 and 28, respectively, and as preferred, in an integral fashion therewith. The shaft butt 32 is fixedly secured with a square shaped stud 36 and with a cylindrical pin 37. On the square shaped stud 36 and on the pin 37 an operating handle 38 is secured by being riveted thereto.

The grooves 23 and 24 formed on the leg portion of the maltese cross shaped disc 14 can be also in the form of open slots.

The housing 33 can be covered with a cover 40 which is then riveted thereto.

By rotating the driving element 28, which is illustrated in FIG. 3 in a rest position with the closure device open, into a counter-clockwise direction, the pin 29 engages, or enters into, the guide groove 23 of the disc 14 and causes thereby a rotation of the disc 14 into the clockwise direction. The camming member 31 is provided with a pair of cam surfaces 41 which are convexly shaped and which, in the rest position, serve as a latch means. Such convex end surfaces 41 during rotation of the disc 28 leave the recess 25 of the disc 14 by sliding out of it. By a rotation of the driving element 28 amounting to 180°, the disc 14 having the maltese cross shape undergoes a rotation of 60°. The pin 30 assumes now the position of the pin 29 which the latter had in FIG. 3, and the convex front surface 42 of the cam member 31 lies now in the recess 26 of the disc 14 so that the cam 31 serves again as a latching means in this intermediate rest position. As a result it is, therefore, impossible to move the pull members or straps 10 either by longitudinally pulling on them or pushing them. By rotating the disc 14 for 60° the pull members 10 have been pulled together to an intermediate position

which might be a desirable position for the skier during downhill skiing in order to loosen up the ski shoes. The attained intermediate position of the closure device can be transferred into a further closed or into an open position of the closure device by rotating the operating handle 38.

By further rotating the driving element 28 in the counter-clockwise direction, the pin 30 engages the guide groove 24 and thereby causes a further rotation of the disc 14 in the clockwise direction. The convex end surface 42 leaves now the recess 26 of the disc 14 by sliding out of it. After this new rotation of the driving element 28 by 180° it has with its maltese cross shape undergone a further rotation of 60° and the closure device assumes the position illustrated in FIG. 8, which is the closed position. The pin 29 is now again to the right, as seen in FIG. 8, and the convex end surface 41 of the cam member 31 abuts against the recess 27. Both connecting rod-like coupling elements 13 lie now parallel with respect to each other. Their end portions 18 find a rest position in the recesses 43 formed in each of the pull traps 10.

As seen more particularly in FIGS. 1 and 5, each of the rest positions, that is in addition to the initial position 1, the following intermediate positions of the closure device associated with a particular latching position of the cam member 31 with respect to one of the recesses on the disc 14, may be numbered and such numbers associated with each of the positions may appear in a window cut in the cover of the closure device, as particularly seen in FIGS. 1 and 5.

With reference to FIGS. 9-12 illustrating another embodiment of the present invention, the central closure element 110 has a construction similar to the central closure element described in connection with FIGS. 1-8 and for the sake of clarity will not be repeated here. By rotating the operating handle 111, the pull members or straps 112 are here at their free or unsecured ends provided with a hook-shaped member 113 each of which is to cooperate by correspondingly hook-shaped securing or retaining elements 114 which, in turn, are secured on the closure flaps 115 and 116 of the shoe by means of rivets 117. The retaining or securing elements 114 each has an extension pointing toward the tip of the shoe which provides for a better pulling together of the shoe closure flaps 115 and 116.

The central closure element 110, as indicated at points 119, is riveted to the free end of a shoe tongue 118 which in the illustrated embodiment is shown to be made of metal. The other end of the tongue 118 is coupled with the shoe upper 122 in a tiltable fashion by means of a hinge device 120 and a metallic plate 121.

As seen in FIG. 10 at the location 123, the closure flaps 115 and 116 of the shoe are overlapping each other in a closed position. At 124 the shoe is indicated with its closure flaps 125 under the tongue 118 covering each other although the closure device may be open.

The metal tongue 118 of the shoe is provided by an intermediate layer 126, such as a synthetic material layer having a coating 127 thereon which, on both sides of the tongue 118, is formed into the shape of an accordion or bellows 128; and the free longitudinal edge portions of which are connected with the shoe upper 122 and also with the closure flaps 115 and 116 to form a water tight connection in order to prevent entry of snow or water into the shoe. It is obvious that the coat-

ing 127 can be put directly onto the metal tongue 118 and the intermediate layer 126 can be omitted.

By using permanent magnets, pressure devices or other type of arrangement, the tongue 118 may remain in its inwardly flapped position even when the closure device 110 is open.

With reference to FIGS. 13-17 it is noted that the central closure element 210 has a construction which is the same as the central closure element described in connection with FIGS. 1-8; therefore, the details of such construction will not be repeated here for the sake of clarity of the description. By rotating the operating handle 211, the pull cables 212, which in this embodiment of the invention replace the pull members or straps described in connection with FIGS. 1-8, are pulled together or pushed apart. In this embodiment the pull cables 212 are provided at their free ends with a nipple 213 each, which are to cooperate by correspondingly shaped retaining or securing members 214 on each side. The securing members 214 are secured to the closure flaps 215 and 216 of the shoe by means of rivets.

The central closure element 210 is secured to the free end of the shoe tongue 217 by being snapped on it or by similar retaining devices, while the other end of the tongue 217 is coupled with the shoe upper in a tiltable fashion so that the tongue 217 can be tilted forward or inward. At their upper ends the closure flaps 215 and 216 of the shoe overlap each other in the closed position.

The housing 218 (which is identified by the reference numeral 33 in FIGS. 1-8) is provided, in contrast to the bore shown in FIGS. 1-8, with a rotatable pin 219 about which a disc 220 (the similar disc is identified by the reference numeral 14 in FIGS. 1-8) is rotatable by means of a spacing sleeve 221 and by means of upsetting the rotatable pin 219. An insert 222 made from nylon (Registered Trade Mark) makes it easier to perform the sliding movement. In addition the disc 220 is provided with guiding grooves 223 for the cables 212. Instead of the rod-like connecting element 13 provided in the embodiment described in FIGS. 1-8, the pull cables 212 are jointed to the axle 225 (corresponding to the part 19 in FIGS. 1-8) by means of nipple lugs 224. The housing 218 and the cover 226 are, in contrast to the corresponding parts of FIGS. 1-8, circular.

With reference to FIGS. 18-20 which illustrate a still further embodiment of the present invention which is similar to the one shown in FIGS. 13-17 and employs the pull cable again. It is noted here also that the central closure element identified by the reference numeral 210 is similar in construction to the central closure element illustrated in FIGS. 1-8 and its detailed construction will not be repeated here for the sake of clarity. As follows from the description of the embodiment illustrated in FIGS. 13-17, the closing of the closure element 210 is performed by means of a cable on each side. The cable identified here by 227 is made as a single cable having at its mid portion a cylindrical nipple 228 welded or soldered thereto. In contrast to the embodiment illustrated in FIGS. 13-17, the disc 229 (corresponding to the disc 14 in FIGS. 1-8) is in the axial direction integrally formed with a cable roller 230 and in the bore 231 of which the nipple 228 is inserted. Both arms of the cable 227 lie in opposite recesses 232 of the cable roller 230. The insert 233 which is made of nylon has guide grooves 234 formed therein pro-

vided for both cable arms 227. By rotating the operating knob or handle 211, the disc 229 and thereby the cable roller 230 will also be rotated, whereby depending from the direction of rotation, the cable is either reeled up or off. In accordance with the present embodiment a longer pull can be attained here than with the embodiment illustrated in FIGS. 13-17. This is aided also by the fact that the number of the recesses of the maltese cross here have been increased. On both ends of the cable 227 nipples 235 are welded or soldered thereto or fixedly connected therewith and engage correspondingly formed retaining devices 214 similarly as the ones described in connection with the embodiment illustrated in FIGS. 13-17.

The pull members 10 and the disc 14 can be made, for example, from hot pressed brass or steel. The connecting elements 13 can be made from sheet metal by punching. The housing 33, the disc 28 and the operating handle 38 are preferably made from an aluminum alloy in a hot pressing process. The cover 40 can be made from anodized aluminum sheet, or from brass or steel or even from a synthetic material.

From the above, it is apparent that although the invention has been described hereinbefore with respect to certain specific embodiments thereof, it is evident that many modifications and changes may be made without departing from the spirit of the invention. Accordingly, by the appended claims, I intend to cover all such modifications and changes as fall within the true spirit and scope of this invention.

Having thus described the invention, what I claim as new and desire to be secured by Letters Patent, is as follows:

1. In a shoe having a pair of closure flaps, a closure device comprising a pair of pull members coupled each to one of said closure flaps at one end thereof, a central member comprising a rotatably mounted disc means, means coupling said pull members to said disc in a manner that rotation of said disc causes a longitudinal displacement of each of said pull members, said disc means being at least partially formed as a maltese cross having leg portions with recesses formed between adjacent leg portions and groove means formed in said leg portions, a driving member disposed adjacent said disc means and having pin means formed thereon, said driving member being mounted for rotation, said pin means during rotation of said driving member engaging a predetermined one of said groove means, a cam member on said driving member, said cam member having convexly shaped end portions for engagement with a predetermined one of said recess means formed on said maltese cross shaped disc and forming a latch means therewith in a rest or intermediate position of said closure device, said cam member having concavely shaped side surfaces connecting said end surfaces for allowing unimpeded passage of the end portions of said legs of said disc means during rotation of said disc means by said pin means, whereby a rotation of said driving element causes the associated pin means entering said groove means and thereby rotating said disc means, and as a result, said pull members being displaced along a straight line.

2. The combination as claimed in claim 1, wherein said coupling means comprises a pair of connecting strap means each journaled on said disc means, said coupling strap means being journaled in recesses formed in said pull members and during rotation of said

disc means moving said pull members along a straight line in the opposite direction.

3. The combination as claimed in claim 1, wherein retaining means are provided on each of said shoe flaps for releasably engaging each of said pull members, said central closure device being mounted at the free end of the shoe tongue, means coupling said shoe tongue to the shoe upper in a hinged fashion for permitting said shoe tongue moving inwardly and outwardly.

4. The combination as claimed in claim 3, wherein said coupling means for said tongue is placed at a point on said shoe where the separation of said closure flaps begins.

5. The combination as claimed in claim 3, wherein the free ends of said pull members are provided with a hook shaped portion to cooperate with hook shaped portions provided on said retaining means.

6. The combination as claimed in claim 3, wherein a sealing bellows is provided on each side of said tiltable tongue for preventing entry of snow or water into the shoe.

7. The combination as claimed in claim 3, wherein said means securing said tongue to said shoe are hinge means.

8. The combination as claimed in claim 3, wherein said retaining means comprise a resilient material.

9. The combination as claimed in claim 3, further including means for retaining said tongue of said shoe in an inwardly flapped position even at an open position of said closure device.

10. The combination as claimed in claim 3, wherein said closure device is secured to said tongue by means of snapping means.

11. The combination as claimed in claim 3, wherein said pull members comprise cable means including a pair of pull cable means each having a free end provided with nipple means.

12. The combination as claimed in claim 11, wherein said cable means is coupled to said disc means by lug means.

13. The combination as claimed in claim 11, wherein said retaining means are shaped for cooperation with said nipple means.

14. The combination as claimed in claim 1, wherein said pull members comprise a pull cable means.

15. The combination as claimed in claim 14, wherein said cable means is a single piece cable, a roller means axially coupled with said disc means for taking up or reeling off said cable during rotation of said disc means.

16. A closure device for a shoe having a pair of closure flaps, said closure device comprising a pair of pull members coupled each to one of said closure flaps at one end thereof, a central member comprising a rotatably mounted disc means, means coupling said pull members to said disc in a manner that rotation of said disc causes a longitudinal displacement of each of said pull members, said disc means being at least partially formed as a maltese cross having leg portions with recesses formed between adjacent leg portions and groove means formed in said leg portions, a driving member disposed adjacent said disc means and having pin means formed thereon, said driving member being mounted for rotation, said pin means during rotation of said driving member engaging a predetermined one of said groove means, a cam member on said driving member, said cam member having convexly shaped end portions for engagement with a predetermined one

of said recess means formed on said maltese cross shaped disc and forming a latch means therewith in a rest or intermediate position of said closure device, said cam member having concavely shaped side surfaces connected to said end surfaces for allowing unimpeded passage of the end portions of said legs of said disc dur-

ing rotation of said disc by said pin means, whereby a rotation of said driving element causes the associated pin means entering said groove means and thereby rotating said disc means, and as a result, said pull members being displaced along a straight line.

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