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Labor et al.

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[54] **HEEL GRIPPING DEVICE FOR SKI BINDINGS**

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

[51] **Int. Cl.** **A63c 9/00**

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

[56] **References Cited**

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[57] **ABSTRACT**

A heel gripping device for a ski binding comprises a housing attachable to the ski and carrying a slidable element which is urged forwardly by a spring to project from the housing and engage a groove in the heel of the ski boot to hold the same against the ski in a downhill skiing configuration. A rotatable cam is mounted in the housing and is turned by an external actuating handle to retract the slidable element and permit the boot to be lifted in cross-country skiing.

10 Claims, 3 Drawing Figures

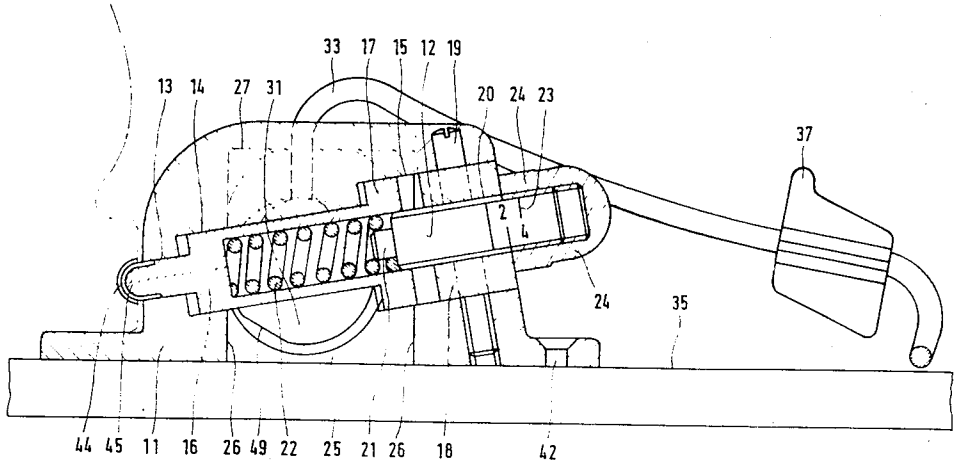
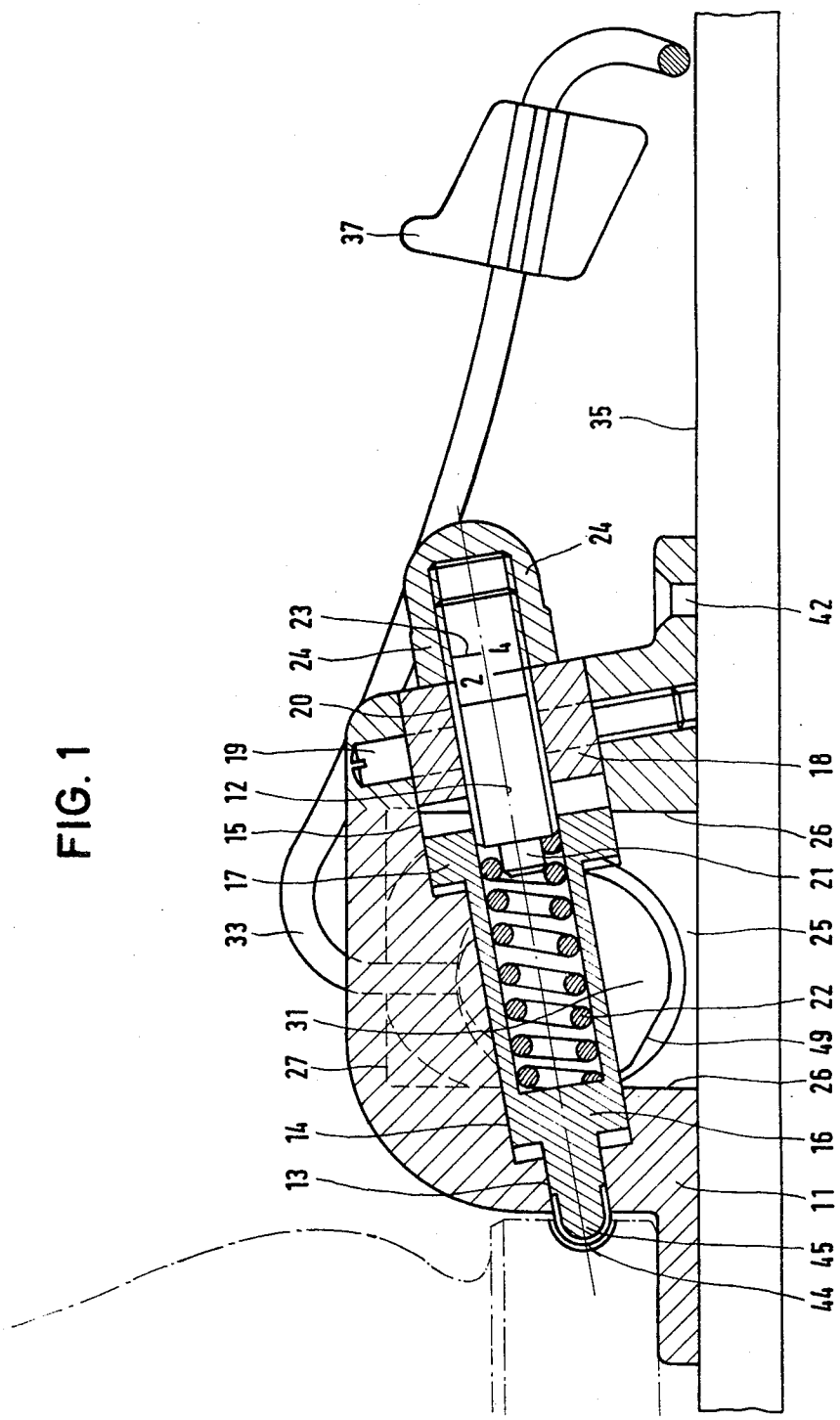


FIG. 1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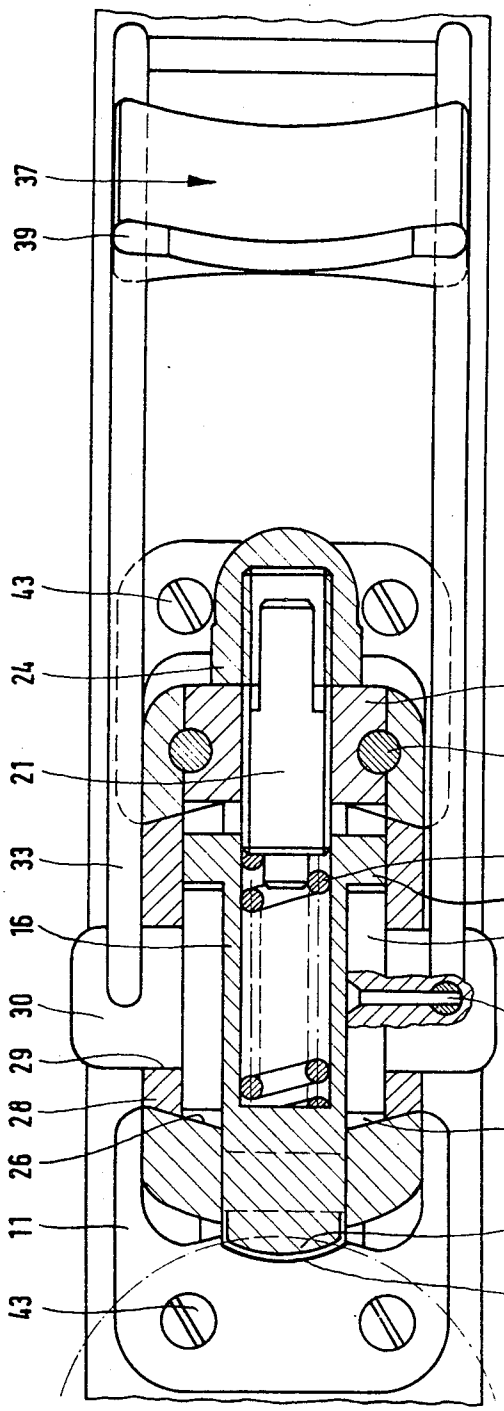

FIG. 2

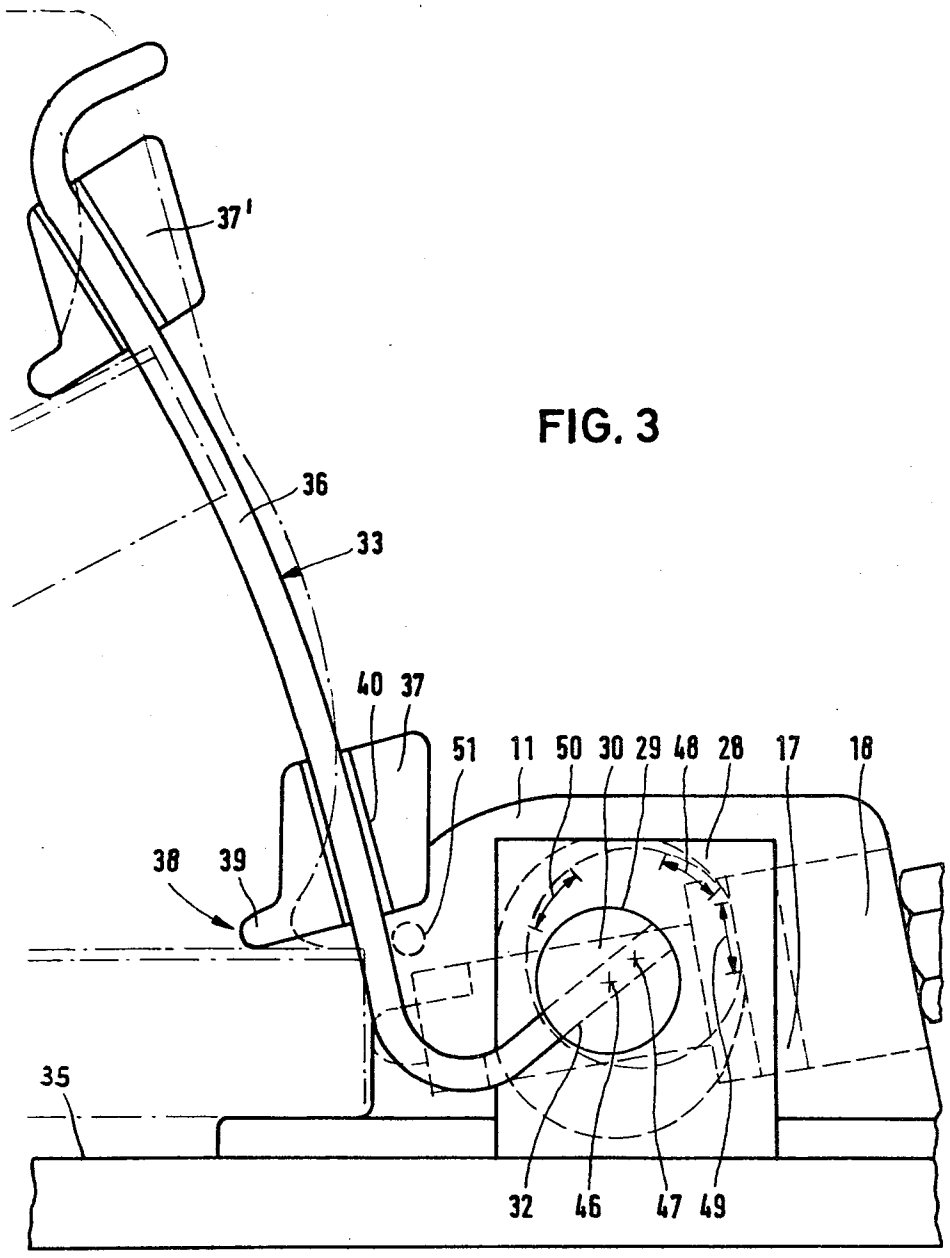

FIG. 3

HEEL GRIPPING DEVICE FOR SKI BINDINGS

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to heel gripping devices for ski bindings.

2. Prior Art

There are known heel gripping devices which disengage for safety purposes when the forces exerted upon them exceed a pre-determined value. Such gripping devices incorporate a plurality of elements and they are expensive to manufacture.

SUMMARY OF THE INVENTION

It is an object of the invention to provide a heel gripping device which is composed of just a few elements which can be manufactured inexpensively and whose operation is not impaired by corrosion.

It is another object of the invention to provide a heel gripping device which can easily be converted from a downhill binding gripping configuration to a cross-country binding gripping configuration, the heel of the ski boot in the latter configuration being capable of being lifted from the surface of the ski without losing lateral stability.

The invention contemplates a heel gripping device for ski bindings comprising a housing which can be attached to the ski, a sliding member which is supported in the housing for slidable movement in a direction generally longitudinally of the ski, said sliding member projecting from an opening provided in the front portion of the housing when in the gripping position and being held in this position by means of a spring. An eccentric cam is rotatably supported in the housing by means of an axle extending transversely to the longitudinal direction of the ski, said eccentric cam being connected to an actuating handle which is arranged outside of the housing. The cam is provided with at least two surface portions, one of which has a smaller, and the other a larger, distance from the axis of rotation of the eccentric cam, the latter portion being in contact with the sliding member in its open position in which the ski boot can be inserted into the binding, and in which position the front portion of the sliding member is retracted into the housing against the action of the spring.

According to one of the features of the invention, the actuating handle is constructed as a guiding device with a concave curvature, when observed from the front, for travel of a sliding element which can be engaged with the ski boot. The actuating handle is able to assume a position in which it is directed upwardly and slightly forwardly, in which position, a third portion of the surface of the eccentric cam engages the sliding member, said third portion having such a large radial distance from the axis of rotation of the eccentric cam that the front portion of the sliding member does not substantially project from the housing whereby a universal binding is constructed in a simple manner which is equally suitable for down-hill skiing and for cross-country skiing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a vertical cross-section through the gripping device in a heel gripping position for downhill skiing,

FIG. 2 is a substantially horizontal cross-section of the gripping device in the heel gripping position for downhill skiing, and

FIG. 3 is a side elevation view similar to FIG. 1, wherein, however, an actuating handle and the gripping device are in position for cross-country skiing.

DETAILED DESCRIPTION

Referring to the drawing, the gripping device comprises a one-piece housing **11** made of synthetic resinous material such as nylon or the like, the housing being provided with a continuous longitudinal bore having an axis **12** which is slightly inclined toward the front and downwardly. The bore consists of three portions **13, 14** and **15** whose cross-sections increase stepwise from front to rear, said cross-sections preferably being circular and serving for guiding a sliding member **16.** An insert **18** is engaged in the rear portion **15** of the bore, and secured therein by means of two screws **19.** The insert **18** is provided with an inner thread **20** into which a bolt **21** is threadably engaged, the front end of bolt **21** engaging a spring **22** whose other end presses against the front surface of a coaxial blind hole in the sliding member **16.** The depth of threaded engagement of the threaded bolt **21** in the insert determines the resistance to disengagement of the gripping device and the depth can be read from a scale indicator **23** on bolt **21.** A jam nut **24** secures the bolt in its pre-determined position.

The housing **11** is provided with two lateral recesses **25** bounded by opposed vertical guiding surfaces **26** and an upper surface **27.** A fitting plate **28** is inserted from below into each of the recesses and defines an inner chamber therewith. Each plate **28** is provided with a transverse bore **29.** An eccentric cam **31** is disposed in each inner chamber, said eccentric cam being made of a one-piece body of synthetic resinous material with a bearing journal **30** rotatably supported in the bore **29.** The axes of rotation **46** of the bearing journals **30** are aligned transversely with respect to the central vertical plane of the housing **11.** A U-shaped actuating handle **33** has an end inserted in a radial hole **32** in each of the journals **30,** and the end is secured in hole **32** by means of a securing pin **34.**

The actuating handle **33** has two parallel arms, each with a middle portion **36** which is of concave curvature when viewed from the front (from the left in the drawing).

A sliding element **37** is mounted on the handle **33,** the element **37** being provided with lateral grooves **40** slidably receiving portions **36** of the arms of the actuating handle **33.**

The sliding element **37** has two front tongues **39** which hold the sliding element against the ski boot at **38** when the actuating handle **33** is in the position for cross-country skiing as illustrated in FIG. **3.** Therein the center of curvature of the guiding portion **36** is located approximately at the surface of the ski **35** and its distance from the guiding portion **36** is approximately equal to the length of the sole of the ski boot.

The housing **11** is provided with front and rear bottom flanges which are provided with bores **42,** through which screws **43** extend in order to attach the housing to the ski. At the rear surface of the sole of the ski boot, there is provided a concave groove **44** (or there is mounted a corresponding fitting provided with a concave groove) into which the front, convex end **45** of the sliding member **19** is pressed in the gripping position of FIG. **1.** The groove **44** has a larger width as compared to its height, so that, consequently, the vertical curva-

ture is larger than the horizontal curvature. As a result, disengagement is assured in such a manner that a larger force is needed for disengagement in the case of a frontal fall than in the cases of diagonal or rotational falls.

The cam **31** is approximately circular and has a geometric mid-point **47** which is spaced from its axis of rotation **46.** As a result, the portion of the circumference of the eccentric cam **31** with the largest eccentricity is located in the immediate prolongation of a connecting line drawn through axes **46, 47** toward the right and upwardly (FIG. **3**). This portion of the surface is designated as **48.** In FIG. **3,** a portion of the surface **49** with a slightly smaller distance to the axis of rotation adjoins portion **48** in the clockwise direction for a purpose to be explained later. The portion **49** of the surface of the eccentric cam is flattened. In FIG. **3,** the portions **49** of both eccentric cams **31** engage an annular shoulder **17** of the sliding member **16.** As can be seen in FIG. **2,** the width of the annular shoulder **17** of the sliding member **16** corresponds to the width of the eccentric cams **31.** The portion **49** of the eccentric cams **31** holds the sliding member **16** in a position in which it is retracted in the housing **11** (FIG. **3**). The ski boot, whose front end is held in position by means of a front clamp (not illustrated) consequently, can tilt upwardly about this front clamp (as shown in FIG. **3** in chain dotted lines), whereby the sliding element **37** is displaced to the position **37'**. The ski boot is laterally guided and supported when the ski boot is lifted from the surface of ski **35,** by means of the sliding element **37** which slides along the guiding portions **36** of the actuating handle **33.** If the radius of curvature of the guiding portion **36** is not exactly equal to the length of the sole of the ski boot, the actuating handle **33** will swivel slightly in the course of upward and downward movement of the ski boot.

The actuating handle **33** cannot freely rotate in the clockwise direction from the position in FIG. **3,** as in such case the portion **48** of the eccentric cam with the largest eccentricity would come into contact with the annular shoulder **17** of the sliding member **16.** The spring **22** resists undesirable backward movement of the guiding member **33** based on the different eccentricity of the portions **48** and **49** of the surface of the eccentric cam, the actuating handle thus being securely held in the position as shown in FIG. **3.** Additionally, this position of handle **33** for cross-country skiing can be locked by means of a pin inserted in transverse bores **51** in the housing.

In order to convert the heel gripping device from its cross-country skiing position in FIG. **3** to its position for downhill racing (FIG. **1**), the actuating handle **33** is forceably rotated in the clockwise direction, whereby the spring **22** is first slightly compressed, whereafter it is almost entirely freed of stress as a result of decreasing eccentricity of the surface of the eccentric cams **31,** whereby the sliding member **16** moves forwardly under the thrust of spring **22.** The actuating handle is moved clockwise until it abuts against the upper surface of the ski **35.** The portions **50** of the surfaces of the eccentric cams **31** which now face the annular shoulders **17** of the sliding member **16** either touch the said annular shoulders slightly or are out of contact therewith, whereby the forward position of the sliding member **16** is only limited by the abutment of the front end **45** in the groove **44** in the ski boot and by the clamping of the ski boot in the front clamp (downhill racing position). The angle between the portion **48** of the eccentric cam surface with the largest eccentricity and the portion **50** with the smaller eccentricity is approximately 90°.

If the actuating handle is rotated in the counterclockwise direction upwardly to an approximately vertical position, the portions **48** of the eccentric cams with the largest eccentricity come into engagement with the annular shoulders **17** of the sliding member, so that the sliding member **16** is retracted into the housing to its maximum extent for permitting insertion of the ski boot into the binding. If the handle **33** is moved further to a position slightly inclined toward the front from the vertical (FIG. **3**), and if it is ensured that the sliding element **37** is engaged with the ski boot in the region between the heel and the sole, the heel gripping member is in its cross-country skiing position.

The heel gripping device is composed of a small number of uncomplicated structural elements, all of which with the exception of the conventional helical springs, can be made of synthetic resinous materials. The gripping device can be manufactured inexpensively and it also does not require servicing during operation, and moreover it makes possible an exactly pre-determined setting of the force for disengagement for safety reasons in the downhill racing position. Also, it can easily be converted for use as a cross-country ski binding by actuating only the single actuating handle, in which position the ski boot receives excellent lateral guidance.

What is claimed is:

1. A heel gripping device for ski bindings, said device comprising a housing which can be attached to a ski, a sliding member mounted in the housing for sliding movement in a generally longitudinal direction, said sliding member including a front projection which extends from the housing to engage a groove in the rear portion of the heel of a ski boot when in gripping position for downhill skiing, spring means acting on the sliding member to urge the same to said gripping position, rotatable means supported in the housing for rotation about a transverse axis for moving the sliding member rearwardly against the opposition of the spring means to retract the front projection, an actuating handle extending outside the housing and engaged with said rotatable means to rotate the same, said actuating handle having a lowered position in which the rotatable means is released from the sliding member to permit the projection to extend from the housing under the action of the spring means in a heel gripping position for downhill skiing, said actuating handle being raisable to an elevated position in which said rotatable means moves the sliding member to retract the same into the housing in a cross-country skiing position; and sliding means on said actuating handle for holding the heel of the boot on the ski and for sliding on said actuating handle as the boot is lifted to guide said boot relative to said handle.

2. A heel gripping device as claimed in claim **1** wherein said actuating handle, when observed from the front, includes a curved portion which is of concave curvature, a sliding element being slidably mounted on said curved portion and engageable with the upper surface of the heel of the ski boot, said actuating handle having an upwardly and slightly forwardly inclined position in the cross-country skiing position.

3. A heel gripping device for ski bindings, said device comprising a housing which can be attached to a ski, a sliding member mounted in the housing for sliding movement in a generally longitudinal direction, said

sliding member including a front projection which extends from the housing to engage a groove in the rear portion of the heel of a ski boot when in gripping position for downhill skiing, spring means acting on the sliding member to urge the same to said gripping position, eccentric cam means supported in the housing for rotation about a transverse axis for moving the sliding member rearwardly to retract the front projection, an actuating handle extending outside the housing and engaged with said cam means to rotate the same, said cam means including at least two surface portions, one of which has a greater radial distance to the axis of rotation of the cam means, the latter cam portion being in contact with the sliding member in its retracted position to enable the ski boot to be inserted into the binding, said sliding member being retracted against the opposition of the spring means, said housing being provided with two inwardly open, and mutually opposite, lateral recesses, each with a transverse bore, the transverse bores being coaxially aligned, said cam means comprising an eccentric cam in each recess, said sliding member including a shoulder portion in each recess, said eccentric cam means including a cylindrical journal rotatably supported in each transverse bore and laterally projecting from the housing, the actuating handle comprising a two armed member having ends attached to respective journals.

4. A heel gripping device as claimed in claim **3**, wherein said housing is formed as a one-piece body provided with two lateral openings, and a plate dismountably inserted into each opening, to define said inner recess.

5. A heel gripping device as claimed in claim **3**, wherein said actuating handle has a lowered position in which the cam means is released from the sliding member to permit the projecting portion to extend from the housing under the action of the spring means in a heel gripping position for downhill skiing, said actuating handle being raisable to an elevated position in which said one surface portion engages the sliding member to retract the same into the housing in a cross-country skiing position; and sliding means on said actuating handle for holding the heel of the boot on the ski and for sliding on said actuating handle as the boot is lifted to guide said boot relative to said handle.

6. A heel gripping device as claimed in claim **5**, wherein the cam means has a third surface portion engaging the sliding member in the elevated position of the actuating handle, said third portion being at a radial distance from the axis of rotation of the eccentric cam means that the front projection of the sliding member is substantially retracted into the housing.

7. A heel gripping device as claimed in claim **6**, wherein said third surface portion has a slightly smaller radial distance from the axis of rotation of the eccentric cam means than said one surface portion.

8. A heel gripping device as claimed in claim **7**, wherein said third surface portion is flattened.

9. A heel gripping device as claimed in claim **3**, wherein at least said housing is made of a synthetic resinous material.

10. A heel gripping device as claimed in claim **3**, wherein the actuating handle, when observed from the front, includes a curved portion which is of concave curvature, a sliding element being slidably mounted on said curved portion and engageable with the heel of the ski boot, and wherein the center of curvature of the curved portion is located approximately at the surface of the ski and its distance from said curved portion is approximately equal to the length of the sole of the ski boot.

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