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(54) **Roller skate assembly with braking device**

(57) The skate assembly has a bogie frame (5) including a brake pad (17), a pad support (19) and a wear compensation system. Such a system includes an articulation, enabling the pad support (19) to be lifted relative to the rest of the frame (5), and a movable locking lever (21). During braking, the lever (21) is fastened into the slots (23) provided for fastening the lever (21). When the pad (17) has worn out, the user can unlock the lever (21) and rotate the support (19) so as to bring again the pad close to the ground (T). In this way, notwithstanding the wear of the pad (17), the need for excessively tilting the skate for braking is avoided. The adjustment system is very simple from the manufacturing standpoint, and is easy and quick to lock.

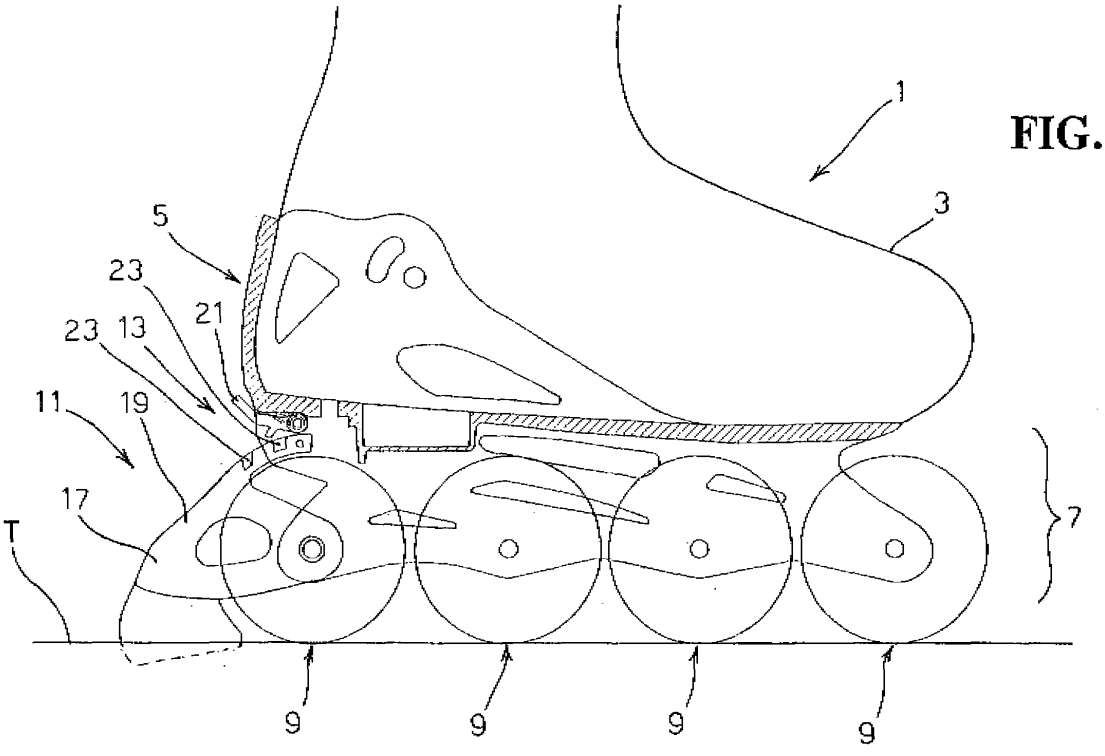


FIG. 1

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## Description

### Field of the invention

**[0001]** The present invention relates to a roller skate assembly with a braking device, equipped with a system for compensating the wear of the brake pad.

### State of the art

**[0002]** The problem of braking the wheels in order to stop the roller skate or to adjust the speed thereof is currently felt in conventional roller skates, whether constituted by a shoe associated with a supporting frame for two pairs of mutually parallel wheels, or by a shoe associated with a supporting frame for multiple in-line wheels.

**[0003]** Conventional skates are equipped with pads or blocks, usually made of rubber and secured to supports that are located close to the heel or tip region of the shoe.

**[0004]** When the user tilts the shoe backwards or forwards, respectively, depending on the brake type, the pad interacts with the ground and performs braking.

**[0005]** Yet, in several conventional skate models, the support on which the pad is mounted is integral or rigidly coupled with the rest of the wheel-supporting frame and, as the pad wears down, the user, in order to brake, must tilt the skate more and more, with consequent difficulty in keeping balance.

**[0006]** In order to solve that problem, European Patent Application EP 687 487 proposes a system for adjusting the distance of the braking surface of the brake pad relative to ground, so as to compensate the pad wear. According to that solution, the brake pad is secured to a pivoting support pivotally connected to the rest of the skate so as to pivot about the rotation axis of the rearmost skate wheel. The tilt of the pivoting support is adjusted by an assembly of two toothed bars or levers and a locking cam lever. Yet, in such a system, depending on the design and the manufacturing tolerances, the cam lever may spontaneously unlock while the skate is being used, or it can be too stiff and difficult to open while keeping the skate on. Generally, the cam locking system requires, for a good operation, considerably precise working tolerances. Such a difficulty increases if the skate is to be manufactured by molding and generally at low cost as a mass product.

**[0007]** It is an object of the present invention to provide a system for compensating the wear of the brake pad of a roller skate, which system is easier and handier to unlock and lock if compared with the prior art system described above.

### Summary of the invention

**[0008]** The above object is achieved, according to the invention, through a roller skate assembly having the features as claimed in claim 1.

**[0009]** The advantages afforded by the present invention will become more apparent to the skilled in the art from the following detailed description of a particular and non-limiting exemplary embodiment, given with reference to the following schematic Figures.

### Brief description of the drawings

**[0010]**

Fig. 1 is a side view of a roller skate equipped with an embodiment of the braking system according to the invention, with the locking lever in unlocked condition;

Fig. 2 is a side view of the skate of Fig. 1, with the locking lever in locked condition;

Fig. 3 is a side view of a detail of the locking lever of the wear compensation system of the skate of Fig. 1;

Fig. 4 is a perspective view of the heel portion of the skate of Fig. 1.

### Detailed description

**[0011]** In Fig. 1, reference numeral 1 generally denotes a roller skate with in-line wheels according to an embodiment of the present invention. In the present description, the term "in-line wheels" is to be intended as meaning that wheels 9 enabling the skate to roll on ground T are arranged in a single row parallel to the rolling direction of the same wheels.

**[0012]** Skate 1 comprises a boot or skate shoe 3 and a bogie frame, generally denoted by reference numeral 5, arranged to secure and support shoe 3 on its top portion. Bogie frame 5 also defines, in its bottom portion, a bogie portion 7 to which there are secured a plurality of wheels 9, enabling skate 1 to rest and roll upon the ground, a floor or another rolling surface T.

**[0013]** In the present exemplary embodiment, bogie frame 5 is also equipped, in its rear portion, of a brake 11 comprising a brake pad 17, made for instance of an elastomeric or suitably soft material, and a pad support 19 to which pad 17 is secured. Roller skate 1 further includes a wear compensation system 13 enabling reversibly adjusting the distance of brake pad 17 from ground T and the pad position relative to the rest of bogie frame 5, so as to compensate the reduction in the volume of pad 17 caused by wear during use. Such a wear compensation system 13 includes a pivotal connection 15 (Fig. 4) by means of which pad support 19 is secured the rest of bogie frame 5 so as to be pivotable (arrow FS in Fig. 2) about a pivotal axis coinciding, in the present example, with horizontal rotation axis AR (Fig. 4) of rearmost wheel 9.

**[0014]** According to the present invention, wear compensation system 13 further includes a position adjustment system, which in turn includes locking lever 21 (in the present exemplary embodiment pivotally mounted in a region below the heel of bogie frame 5) and the plurality of fastening slots 23 arranged in the top portion of pad

support 19. Locking lever 21 includes, in the present exemplary embodiment, a locking tooth 25 and a grasping tongue or a grasping extension or part 27.

**[0015]** By pivoting about rotation axis AL (Figs. 3, 4), lever 21 can reversibly move from an unlocking position (Fig. 1), in which support 19 freely rotates about rotation axis AR of rearmost wheel 9 relative to the rest of bogie frame 5, to a locking position (Fig. 2), in which such rotation of support 19 is prevented. To move from the locking position to the unlocking position, lever 21 turns in a so-called "unlocking" direction, that is, with reference to the views of Figs. 1 and 2, it turns in clockwise direction, as shown by arrow FL1. Conversely, to move from the unlocking position to the locking position, lever 21 turns in a so-called "locking" direction, that is, with reference to the views of Figs. 1 and 2, it turns in counterclockwise direction, as shown by arrow FL2. Locking lever 21 and fastening slots 23 are so shaped that they mutually engage so as to substantially prevent a mutual pivotal movement between pad support 19 and the rest of bogie frame 5 due to the push of pad 17 during braking.

**[0016]** According to the present invention, locking lever 21 and fastening slots 23 are moreover so shaped that, due to the push of pad 17 during braking (arrow FS in Fig. 2), locking lever 21 is pushed further in the locking direction, or at least is maintained in the locked condition, against the portion of support 19 adjacent to lever 21 itself.

**[0017]** In order to obtain that effect, in the exemplary embodiment of Figs. 1 to 4, lever 21 and support 19 are so arranged and shaped that pad support 19, when it tends to rotate to become lifted and presses against tooth 25 inserted in a slot 23 during braking, causes tongue 27 to rest against support 19 itself, thereby preventing further counterclockwise rotation of lever 21 and hence further clockwise rotation of support 19. The forces applied by support 19 to lever 21 in locked condition and during braking produce a resultant moment on lever 21 tending to more strongly fasten the lever to support 19.

**[0018]** Moreover, according to the present invention:

- pivotal connection 15 may be more generally replaced by an articulation, where the latter term in the present description is intended to include also articulated joints or other mechanical connections enabling also telescopic extensions and/or movements of mere translational nature of pad support 19 relative to the rest of bogie frame 5, and not only rotational or roto-translational movements;
- lever 21 may be more generally replaced by a movable fastening member 21 arranged to reversibly move from a locked condition, in which pad support 19 substantially cannot be lifted or lowered relative to the rest of bogie frame 5, to an unlocked condition, in which pad support 19 substantially can be displaced relative to the rest of bogie frame 5, wherein movable fastening member 21 can move to the locked condition by moving in a locking direction, e.g. through the counterclockwise rotation discussed above, and can move to the unlocked condition by moving in an unlocking direction, e.g. through the clockwise rotation discussed above;
- the plurality of slots 23 may be more generally replaced by a fastening part 23;
- movable fastening member 21 and fastening slots 23 are arranged to mutually engage so as to prevent the displacement of pad support 19 caused by the push of brake pad 17 during braking, and are further arranged so that, when they are mutually engaged, movable fastening member 21 is pushed further towards or in any case kept in the locked condition due to the push of brake pad 17 during braking. Consequently, during braking, lever 21, or another movable fastening member 21, is kept in the locking position by the same forces as applied by pad 17 to pad support 19. Thus, the position adjustment system can be made with a very simple and little cumbersome mechanical construction, if compared e.g. to the solutions disclosed in documents EP 687 487 A2 or US 5 741 017, and by using few components, while providing a robust and reliable fastening.

**[0019]** Preferably, but not necessarily, locking tooth 25 has an height H (Fig. 3) that substantially is not lower than about 2 mm. More preferably, height H of locking tooth(s) 25 is not lower than about 3 mm. Still more preferably, height H of locking tooth(s) 25 is not lower than about 4 mm.

**[0020]** In the exemplary embodiment of Fig. 3, locking tooth 25, or another locking projection 25 of movable fastening member 21, has a contact surface 31 onto which pad support 19 pushes during braking thereby discharging the braking forces. Preferably, but not necessarily, contact surface 31 is so arranged, more particularly inclined, that the resultant of the forces applied to it by support 19 tend to rotate the tooth downwards or, more generally, to push tooth 15 towards the locking position. In the exemplary embodiment of Figs. 1 to 4, the resultant of the forces applied to contact surface 31 by support 19 passes in a space region between rotation axes AL of lever 21 and AR of pad support.

**[0021]** Such features of tooth 15 improve the fastening reliability.

**[0022]** An exemplary operation and use of the wear compensation system described above is now disclosed.

**[0023]** In use, wear compensation system 13, and in particular lever 21, is in its locking position illustrated in Fig. 2.

**[0024]** Assuming that, after a certain period of use, pad 17 has worn out and the surface by which it rubs against ground T during braking corresponds, with reference to the side view of Fig. 2, to dashed line L2 instead of solid line L1, in turn corresponding to the ground-rubbing surface of a pad when new, the user decides to adjust pad 17 to a position closer to ground, so that he/she is to raise the tip of skate 1 with a reduced tilt when braking.

**[0025]** To this end, the user lifts locking lever 21 by its fingers, by grasping it by means of grasping tongue 27 and turning it upwards, with reference to Figs. 1 and 2. Tooth 25 comes out of fastening slot 23 in which it was inserted, and releases pad support 19. The user can now turn pad support 19 in counterclockwise direction about the pivotal axis of the support (which, as said, coincides in the present example with the rotation axis of rearmost wheel 9) so as to bring the pad closer to ground T to the extent the user deems suitable for compensating the size reduction caused by wear, and to bring tooth 25 in correspondence of the most suitable fastening slot 23. When grasping tongue 27 is released, return spring 29 (Fig. 3) pushes lever 21 downwards, thereby fastening tooth 25 into a new fastening slot 23 and firmly locking pad support 19 with the desired inclination relative to the line of wheels 9 and generally relative to the rest of bogie frame 5. Clearly, the different fastening slots 23 are arranged at a suitable mutual spacing, corresponding to a wear amount that is optimum for a new positioning of pad support 19 by means of the compensating device. In an embodiment not shown, pad 17 has one or more notches or other marks, each corresponding to a pad wear limit whose attainment makes it advisable, according to the manufacturer, to move pad support 19 to a new position by means of the compensating device.

**[0026]** It is apparent from the above description that the invention allows making a system for adjusting the position of a brake pad in skates, which system does not demand particularly precise working tolerances and also enables making position adjustment systems that can be locked and unlocked in an easier, quicker and handier manner if compared to the systems disclosed e.g. in documents EP 687 487 A2 and US 5 741 017. Such handiness also results from the fact that return spring 29, rather than to keep tooth 25 in slots 23 during braking, is primarily intended to: a) ensure that lever 21 is fastened again when adjustment has ended; and b) keep tooth 25 firmly fastened in slots 23 when the brake pad is not being used. Thus, it is sufficient that return spring 29 applies relatively weak forces, so that releasing lever 21 is handy for the user.

**[0027]** Several changes and modifications can be made to the exemplary embodiments described above, without departing from the scope of the present invention.

**[0028]** For instance, an assembly according to the present invention may be used for making not only a roller skate with in-line wheels, but also a roller skate whose wheels are not in line, such as the more traditional roller skates with four wheels arranged at the corners of a rectangle. Fastening slots 23, or another fastening part 23, may also be arranged on a bogie frame portion different from pad support 19, and not only on pad support 19. Moreover, fastening slots 23 may be replaced by a fastening part 23 of different kind, e.g. by teeth or projections instead of slots or recesses. Pivoting lever 21 may be replaced by a different kind of movable fastening member, e.g. a rotating cam, a rotating balance, a tooth or a moving pin, e.g. removably mounted, a translating cam. In order to engage fastening part 23, movable fastening member 21 may be equipped with a suitable recess, opening or hole in place of tooth 25 or other kind of projection. Furthermore, movable fastening member 21 may rest against pad support 19, or another fastening part 23, not only by means of grasping portion 27 but also by means of a different kind of suitably shaped projection or recess. While in the example of Fig. 3 locking lever 21 is indicatively Y- or fork-shaped, in other embodiments it may have a different shape, e.g. an L, T, cross or more or less rounded shape. The lever or other movable fastening member 21, and/or pad support 19, may move from the locked to the unlocked condition, and vice versa, not only through a rotation relative to each other and relative to the rest of bogie frame 5 of the skate, but also through a translational or roto-translational movement. In the embodiment of Figs. 1 to 4, lever 21 has a single tooth 25, but in other embodiments it may have multiple fastening teeth or projections 25, e.g. two, three or four teeth or projections. Return spring 29 may be replaced by a different return member, e.g. a different kind of resilient member. Of course, brake pad 17 and pad support 19 may be integrally formed as a single piece, for instance by simultaneous molding.

## Claims

**1.** A roller skate assembly with a braking device, the assembly including a bogie frame (5), arranged to receive and secure a shoe (3) in its top portion and a plurality of wheels (9) in its bottom portion, which wheels enable the roller skate assembly to rest and roll upon a rolling surface (T), wherein the bogie frame (5) further includes:

- a brake pad (17), arranged to brake the roller skate by interacting with the rolling surface (T);
- a pad support (19), secured to the rest of the bogie frame (5) and having the brake pad (17) secured thereto;
- a wear compensation system (21, 23), arranged to enable adjusting the position of the brake pad (17) relative to the rest of the bogie frame (5) so as to compensate the wear of the brake pad, wherein the wear compensation system includes:

  - an articulation (15), arranged to enable the pad support (19) to be displaced relative to the rest of the bogie frame (5);
  - a movable fastening member (21) arranged to reversibly move from a locked condition, in which the pad support (19) substantially cannot be displaced relative to the rest of bogie frame (5), to an unlocked condition, in which the pad support (19) sub-

stantially can be displaced relative to the rest of bogie frame (5).

2. The assembly as claimed in claim 1, wherein the wear compensation system further includes a fastening part (23), wherein the movable fastening member (21) can move to the locked condition through a displacement in a locking direction, and can move to the unlocked condition through a displacement in an unlocking direction, and wherein the movable fastening member (21) and the fastening part (23) are arranged to mutually engage so as to prevent displacement of the pad support (19) caused by the push of the brake pad (17) during braking, and are further arranged so that, when they are mutually engaged, the movable fastening member (21) is pushed further towards or is maintained in the locked condition due to the push of the brake pad (17) during braking.

3. The assembly as claimed in claim 1 or 2, wherein the movable fastening member (21) and the fastening part (23) are arranged so that, when they are mutually engaged, the movable fastening member (21) is pushed further against the fastening part (23, 19) in the locking direction due to the push of the brake pad (17) during braking.

4. The assembly as claimed in one or more of the preceding claims, wherein the movable fastening member (21) and the fastening part (23) are arranged so that, when they are mutually engaged, the movable fastening member (21) rests against the fastening part (23, 19) in the locking direction due to the push of the brake pad (17) during braking, so that said member cannot be substantially displaced further in the locking direction.

5. The assembly as claimed in one or more of the preceding claims, wherein at least one out of the movable fastening member (21) and the pad support (19) is arranged to move from the locked condition the unlocked condition and/or vice versa by a rotation and/or a translation relative to the rest of the bogie frame (5).

6. The assembly as claimed in one or more of the preceding claims, wherein the pad support (19) and the movable fastening member (21) are so arranged that the forces applied by the pad support (19) to the movable fastening member (21) when the brake pad (17) is being operated produce a resultant moment tending to keep or to push the movable fastening member (21) in or to the locked condition.

7. The assembly as claimed in one or more of the preceding claims, wherein the pad support (19) and the movable fastening member (21) are so arranged that the forces applied by the pad support (19) to the movable fastening member (21) when the brake pad (17) is being operated produce a resultant force tending to keep or to bring the movable fastening member (21) in or to the locked condition.

8. The assembly as claimed in one or more of the preceding claims, wherein the fastening part (23) is located on either of the following parts: the pad support (19); a portion of the bogie frame (5) other than the pad support (19).

9. The assembly as claimed in one or more of the preceding claims, wherein the movable fastening member (21) includes one or more of the following members: a pivoting lever, a rotating cam, a rotating balance, a fastening tooth (25), a translating lever or pin or cam.

10. The assembly as claimed in one or more of the preceding claims, wherein the movable fastening member (21) includes a first projection (25) or recess, arranged to engage a recess (23) or a projection, respectively, in the pad support (19) so as to prevent the latter from being raised or lowered relative to the rest of the bogie frame (5).

11. The assembly as claimed in claim 10, wherein the movable fastening member (21) includes a second projection (27) or recess, arranged to rest against the fastening part (23, 19) in the locking direction (FL2) due to the push of the brake pad (17) during braking, so as to make the first projection (25) and/or recess substantially prevent the pad support (19) from being lifted or lowered relative to the rest of the bogie frame (5).

12. The assembly as claimed in claim 10 or 11, wherein the fastening tooth (25) and/or the first projection (25) of the movable fastening member (21) has a height substantially not lower than about 2 mm, and preferably substantially not lower than about 3 mm.

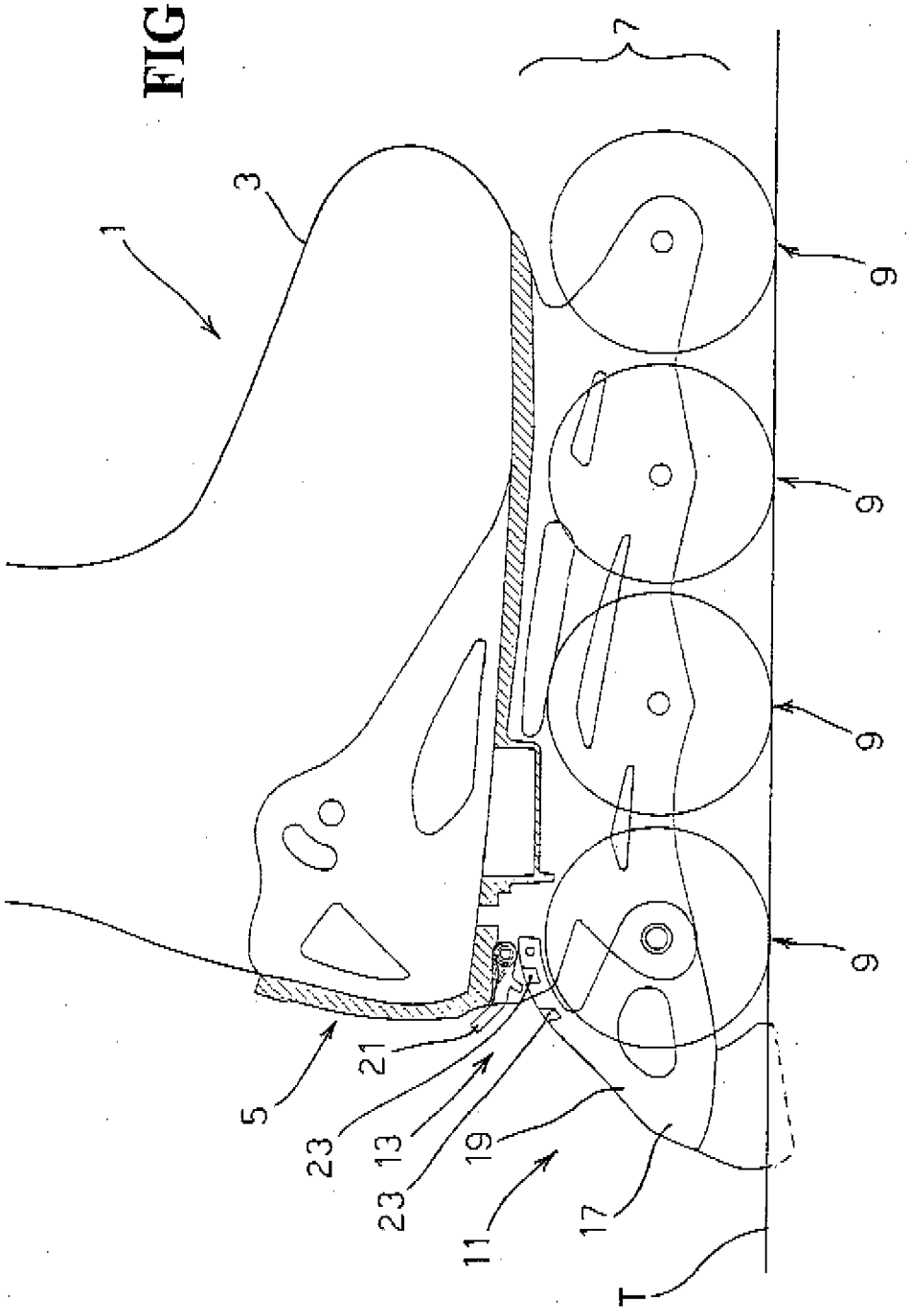
13. The assembly as claimed in one or more of claims 9 to 12, wherein the movable fastening member (21) has from one to four fastening teeth (25) and/or first fastening projections (25).

14. The assembly as claimed in one or more of the preceding claims, wherein the wear compensation system includes a resilient return member (29) arranged to push the movable fastening member (21) in the locking direction.

15. The assembly as claimed in one or more of the preceding claims, wherein the assembly defines a heel region in correspondence of the heel region of the shoe (3), and the movable fastening member (21) is

arranged to pivot about a rotation axis (AL) passing close and/or below the heel region or the roller skate assembly.

FIG. 1



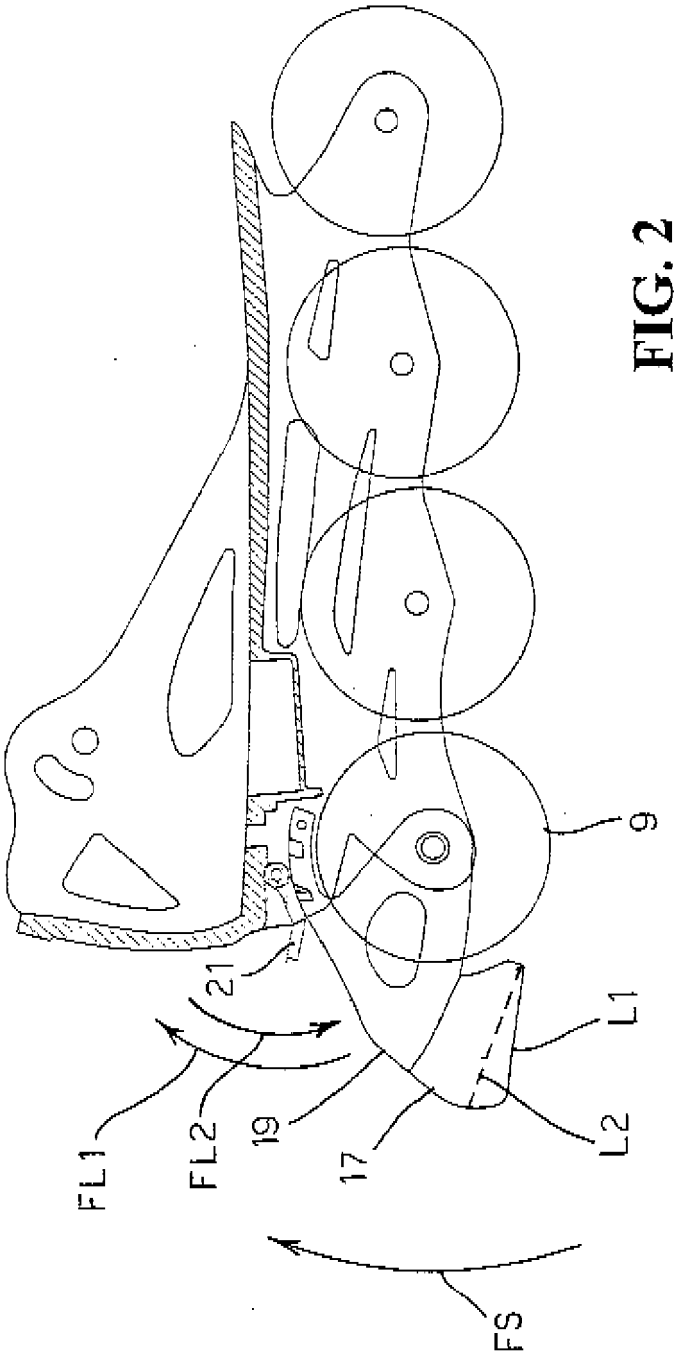
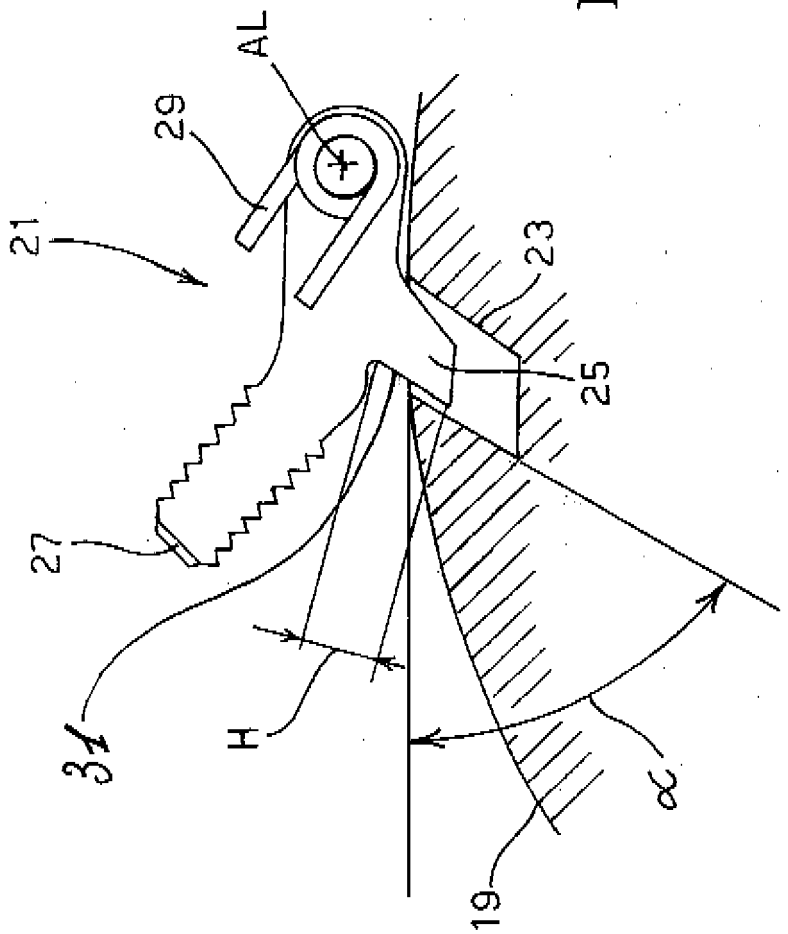



FIG. 2

FIG. 3



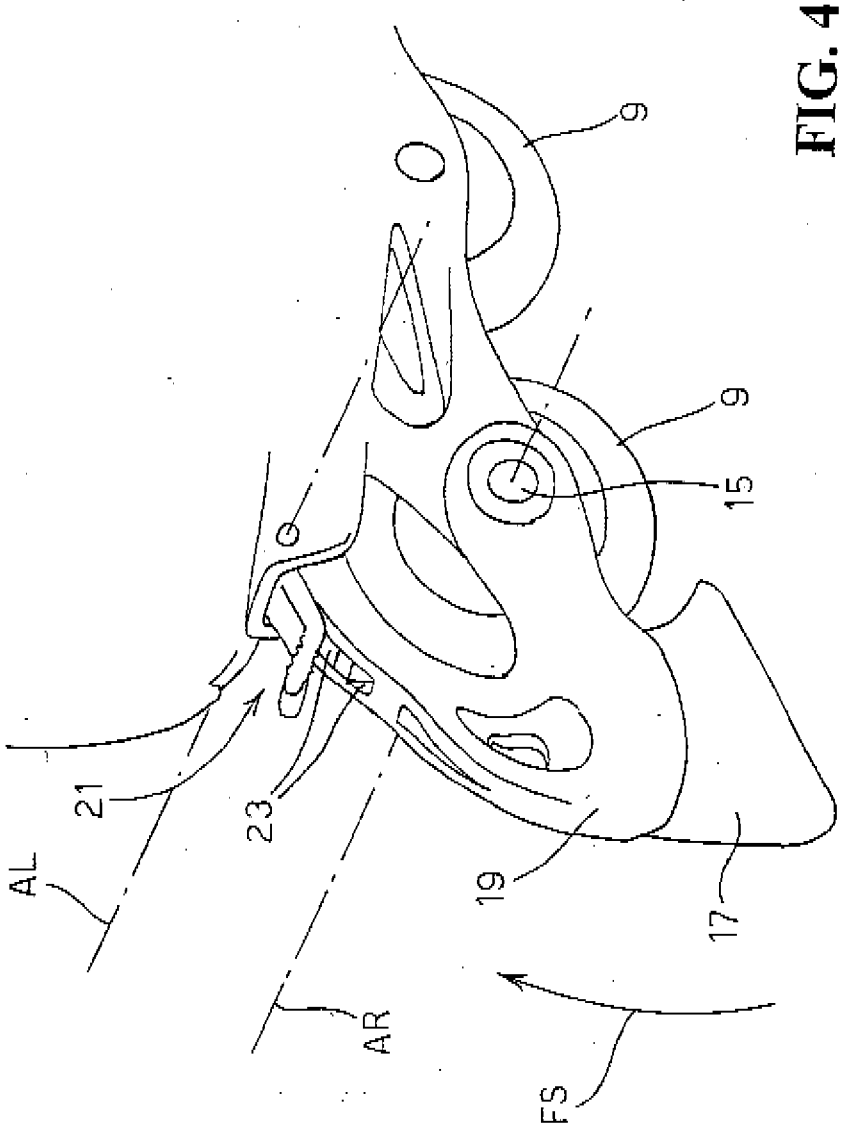



FIG. 4

## REFERENCES CITED IN THE DESCRIPTION

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### Patent documents cited in the description


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- EP 687487 A2 **[0018] [0026]**
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