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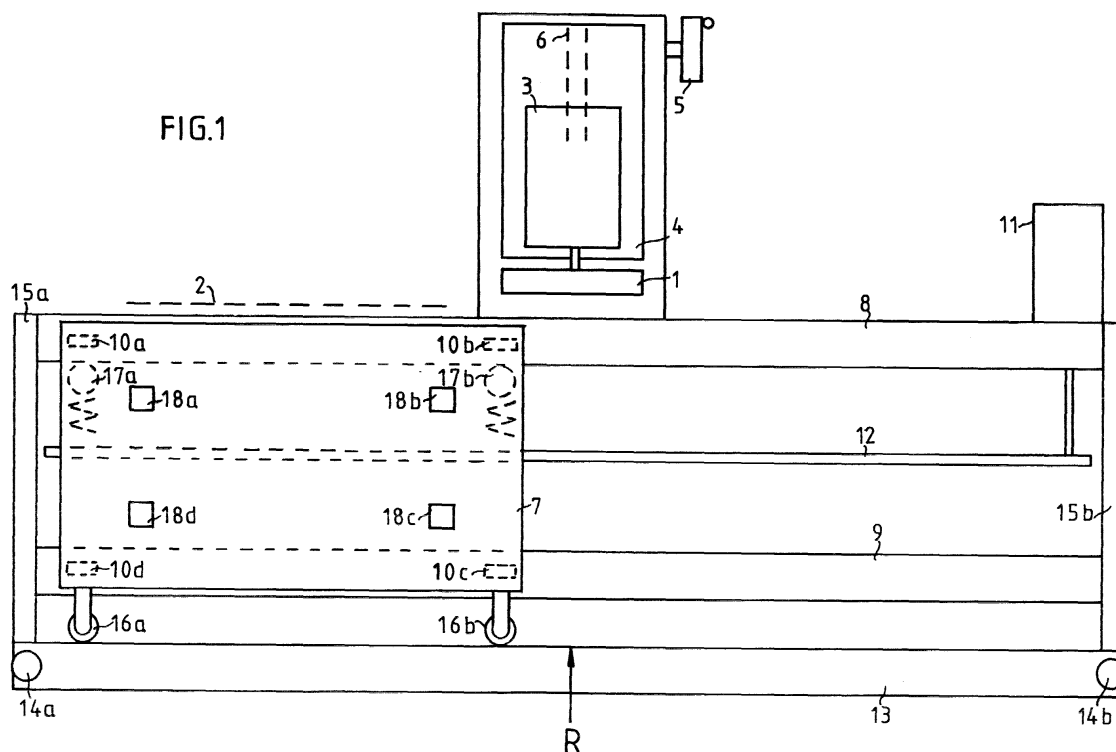
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(54) **Apparatus and method for grinding skates**

(57) Apparatus and method for grinding skates, in the process of which a pair of skates are clamped in a clamping arrangement after which both skates are

ground simultaneously. During grinding, the skates are mounted onto a carriage and fed between a rotating grinding wheel and a curved guiding strip, for obtaining lengthwise a previously determined radius of curvature.



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Description

[0001] The invention relates to an apparatus for grinding skates, comprising a grinding wheel, mounted for rotation, drive means coupled to the grinding wheel, a clamping arrangement for clamping a skate and a bed across which the clamping arrangement can be moved past the grinding wheel.

[0002] An apparatus of this type is known for example from US-A-5,601,473. According to the inventive thought which forms the basis of the present invention, it is very important, especially for the skilled skater, that both skates show exactly the same behaviour, which means that they should be ground the same way with a high degree of precision. For that reason, the apparatus is according to an aspect of the invention characterised in that the clamping arrangement is arranged for clamping two skates and that the grinding wheel is arranged for simultaneously grinding two skates. An additional advantage is that in one operation two skates are ground, which significantly reduces the time necessary for grinding a pair of skates.

[0003] A favourable embodiment according to another aspect of the invention is characterised in that the apparatus is provided with a carriage which can be moved over the bed in a longitudinal direction and that the clamping arrangement is detachably mounted onto the carriage. By doing so, it is possible to grind one pair of skates and to finish a previously ground pair in the meantime, for example by whetting the freshly ground surfaces. Moreover, a next pair may already be placed in a clamping arrangement, which means that skates can be ground in a substantially continuous process. In order to have a free hand to perform these parallel activities, it is advantageous to provide the apparatus with additional drive means, for moving back and forth the carriage with an at least substantially constant speed. The constant speed moreover attributes to the quality of the result of the grinding process.

[0004] A favourable embodiment according to another aspect of the invention, by which it becomes possible to provide the skate with a previously determined radius of curvature in a longitudinal direction, is characterised in that a curved guiding strip is provided, mounted at least substantially parallel to the bed, for steering the carriage in a cross direction. Preferably, the guiding strip is detachably mounted, such that for each type of skate a suitable guiding strip can be mounted.

[0005] A favourable embodiment according to another aspect of the invention is characterised in that the carriage is provided with at least two feelers for following the guiding strip, which feelers are preferably provided with wheels. By providing the carriage in this way with two reference points with respect to the guiding strip, the movement of the carriage is entirely determined.

[0006] A favourable embodiment according to another aspect of the invention, which substantially eliminates the effect of any clearance present in the apparatus on

the result of the grinding process, is characterised in that the carriage is arranged for moving substantially between the guiding strip and the grinding wheel.

[0007] The invention also relates to a method for grinding skates. The inventive method is characterised in that two skates are placed in a clamping arrangement and are simultaneously moved across a bed, past one rotating grinding wheel.

[0008] A favourable realization of the inventive method is characterised in that the clamping arrangement is mounted onto a carriage and that the carriage is moved along the bed in a longitudinal direction with an at least substantially constant speed.

[0009] A further favourable realization is characterised in that the carriage is fed between a curved guiding strip and the grinding wheel and that the guiding strip steers the carriage in a cross direction, for grinding the skates such as to obtain a previously determined longitudinal profile.

[0010] The invention will now be further explained with a reference to the following figures, in which:

Fig. 1 schematically shows an apparatus according to the invention in top view;

Fig. 2 schematically shows a clamping arrangement in side view.

[0011] Fig. 1 schematically shows an apparatus according to the invention in top view, which apparatus is provided with a grinding wheel 1, intended for grinding a skate iron 2 in order to give it a previously determined radius of curvature R. Grinding wheel 1 is coupled to a motor 3, which is mounted on a slide 4, which slide 4 can be moved with a hand wheel 5 via a wire shaft 6.

[0012] During the grinding process, two skates to be ground are mounted one above the other on top of a carriage 7, which can roll across a bed consisting of two profiles 8,9 by using four small wheels 10a,10b,10c,10d. Carriage 7 is preferably driven by a second motor 11, coupled to it by a chain or a toothed belt 12. It is also possible to use only motor 3, by coupling a transmission and a clutch to it for driving the chain or toothed belt 12.

[0013] In order to bring about carriage 7 to follow a trajectory in the horizontal plane with a radius of curvature R, a curved guiding strip 13 is detachably mounted parallel to profiles 8,9, with the aid of two screw-threaded turning knobs 14a,14b and two transverse connections 15a,15b, which in turn are rigidly mounted to profiles 8,9. At least one side of curved guiding strip 13 is provided with the desired radius of curvature R, for example 15 metre, and carriage 7 is provided with two small wheels 16a,16b which precisely follow the radius of curved guiding strip 13. In order to further improve this following, two spring-mounted press-on rollers 17a, 17b are mounted underneath carriage 7, which press against a side of profile 8 and bring about a constant pressure to wheels 16a,16b. This is especially important at the beginning and at the end of a longitudinal grinding

movement because during the actual grinding, grinding wheel 1 itself will exert a sufficiently large force, which has as a result that the tolerances will be determined only by the distance between grinding wheel 1 and curved guiding strip 13.

[0014] Carriage 7 is moreover provided with four supporting columns 18a,18b,18c,18d, onto which a clamping arrangement can be mounted during the grinding process, in such a way that the skate irons 2 of the skates to be ground are positioned substantially in the plane of grinding wheel 1. In a next step, hand slide 4 is moved with the aid of wheel 5, such that grinding wheel 1 will just touch skate irons 2, after which motor 11 is started. If a pair of skates only needs some regrinding, it suffices to move carriage 7 back and forth a number of times, in the process of which hand wheel 5 is slightly rotated such as to move grinding wheel 1 towards the skate irons. If more serious overhaul operations are necessary, it is advantageous to provide the apparatus with end stops which automatically reverse the direction of motor 11, and with an automatic feed, well known in the art, for slightly rotating wire shaft 6 every time carriage 7 passes.

[0015] Fig. 2 schematically shows a clamping arrangement in side view, consisting of two profiles 19a, 19b, of which profile 19b cannot be seen in this figure as it is situated behind profile 19a, and two transverse connections 20a,20b. The distance between profiles 19a,19b is chosen such that they can clamp the front end and the back end of the skate irons 2a,2b of two skates 21a,21b. The actual clamping means consist of two fixed jaws 22a,22b which are part of profile 19a and two movable jaws 23a,23b which are hingedly mounted to profile 19a. Before the skates are ground, they are positioned between the fixed jaws 22a,22b and the movable jaws 23a,23b and the movable jaws 23a,23b are clamped onto the skate irons 2a,2b by turning knobs 24a,24b with threaded ends which end in profile 19a. Of course, one may use quick-fasteners instead, which are well known in the art.

[0016] In an completely corresponding manner skate irons 2a,2b are mounted between the fixed jaws which are part of profile 19b and the movable jaws, after which profiles 19a,19b and skates 21a,21b are in fact united to one single part. In order to mount this part to carriage 7, profile 19a is provided with two cylindrical projections 26a,26b and profile 19b with two projections 27a,27b which cannot be seen in the figure. These projections co-operate with supporting columns 18a,18b,18c,18d, mounted onto carriage 7, which are for that purpose provided with a notch in which the cylindrical projections 26a,26b,27a,27b can be fitted and be fixed with four screws or clamps, not shown here.

[0017] During the grinding process the skate irons 2a, 2b are moved past one rotating grinding wheel 1, in such a manner that skate iron 2a contacts an upper part of a side of grinding wheel 1 and skate iron 2b contacts a lower part of the same side, which guarantees that they

will be ground in exactly the same manner. It remains possible though to make the end faces of fixed jaws 22a, 22b and movable jaws 23a,23b slightly oblique, for slightly bevelling the skate irons 2a,2b crosswise.

[0018] After grinding, one may place the ends 27a, 27b of profiles 19a,19b in a holding fixture, not shown here, in such a manner that the skate irons are positioned in a horizontal plane, in which position one may easily whet the fresh ground surfaces.

Claims

1. Apparatus for grinding skates, comprising a grinding wheel, mounted for rotation, drive means coupled to the grinding wheel, a clamping arrangement for clamping a skate and a bed across which the clamping arrangement can be moved past the grinding wheel, **characterised in that** the clamping arrangement is arranged for clamping two skates and that the grinding wheel is arranged for simultaneously grinding two skates.
2. Apparatus according to claim 1, **characterised in that** the apparatus is provided with a carriage which can be moved over the bed in a longitudinal direction and that the clamping arrangement is detachably mounted onto the carriage.
3. Apparatus according to claim 2, **characterised in that** additional drive means are provided, for moving back and forth the carriage with an at least substantially constant speed.
4. Apparatus according to claim 2 of 3, **characterised in that** a curved guiding strip is provided, mounted at least substantially parallel to the bed, for steering the carriage in a cross direction.
5. Apparatus according to claim 4, **characterised in that** the carriage is provided with at least two feelers for following the guiding strip.
6. Apparatus according to claim 5, **characterised in that** the feelers are provided with wheels.
7. Apparatus according to claim 4, **characterised in that** the carriage is arranged for moving substantially between the guiding strip and the grinding wheel.
8. Method for grinding skates, **characterised in that** two skates are placed in a clamping arrangement and are simultaneously moved across a bed, past one rotating grinding wheel.
9. Method according to claim 8, **characterised in that** the clamping arrangement is mounted onto a car-

riage and that the carriage is moved along the bed in a longitudinal direction with an at least substantially constant speed.

10. Method according to claim 9, **characterised in that** 5
the carriage is fed between a curved guiding strip and the grinding wheel end that the guiding strip steers the carriage in a cross direction, for grinding the skates such as to obtain a previously determined longitudinal profile. 10

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