March 18, 1924. 1,487,142

V. A. BOKER

SKATE GRINDING MACHINE

Filed April 5, 1922 3 Sheets-Sheet 1

Fig. 1

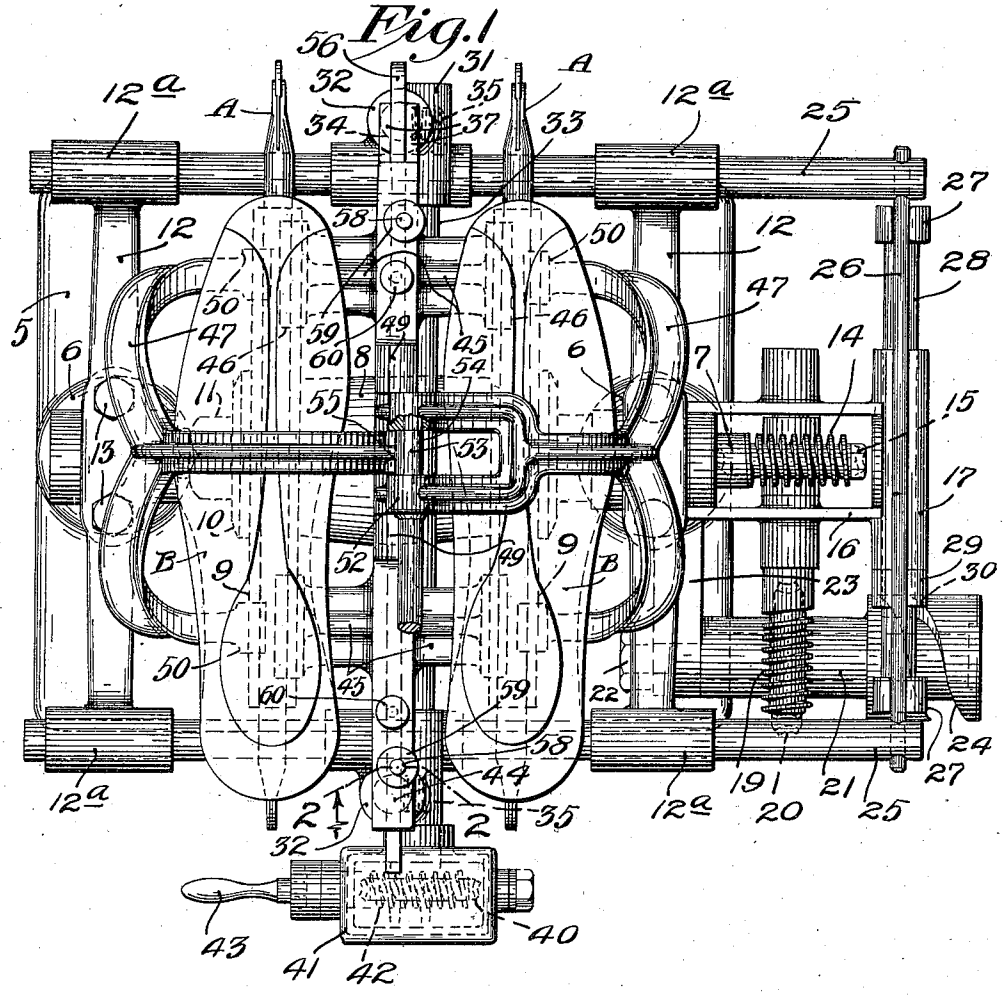
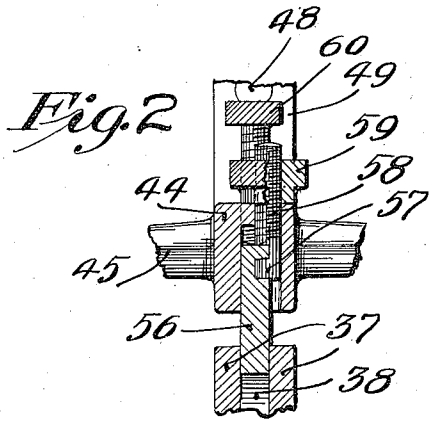


Fig. 2



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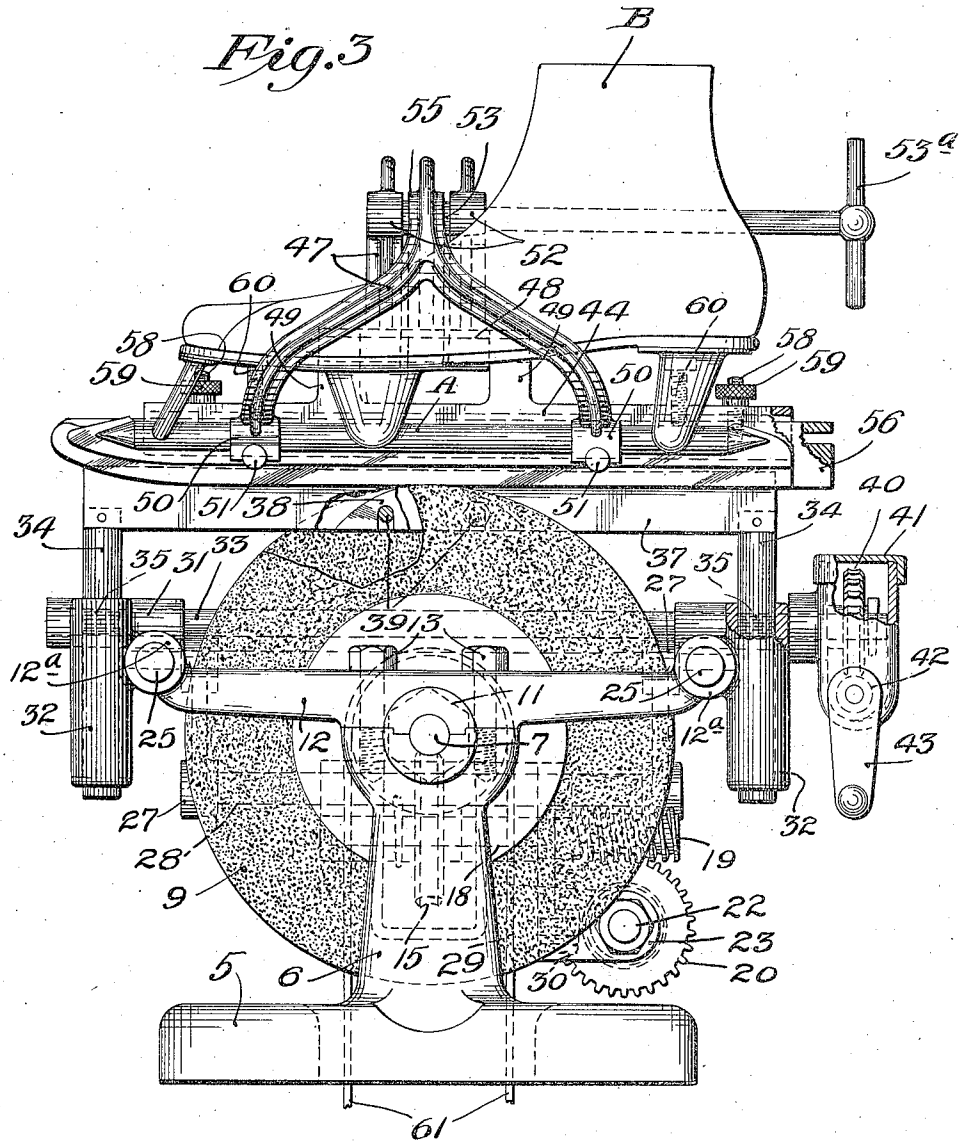
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Fig. 3



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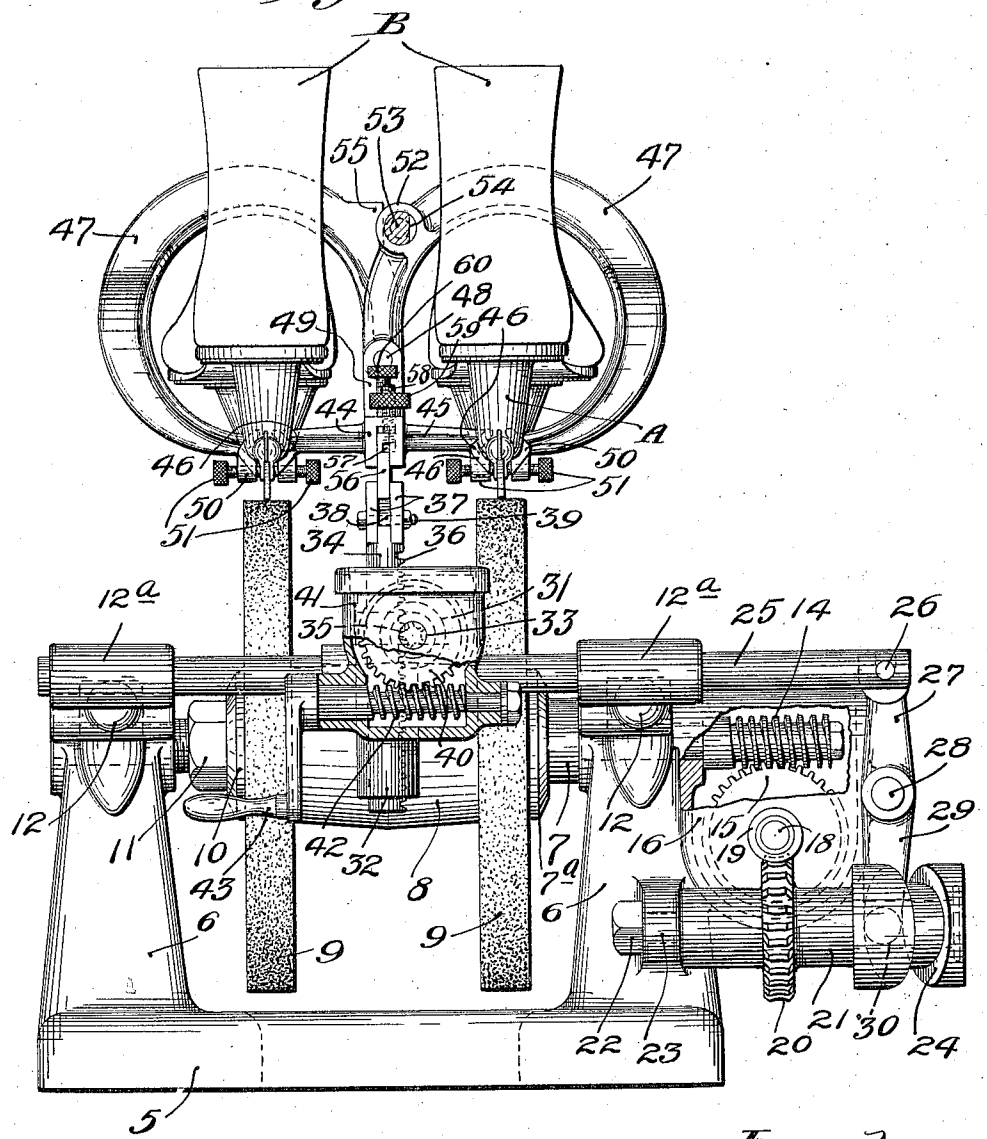
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Filed April 5, 1922 3 Sheets-Sheet 3

Fig. 4



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Patented Mar. 18, 1924. 1,487,142

UNITED STATES PATENT OFFICE.

VITUS A. BOKER, OF MINNEAPOLIS, MINNESOTA.

SKATE-GRINDING MACHINE.

Application filed April 5, 1922. Serial No. 549,787.

To all whom it may concern:

Be it known that I, VITUS A. BOKER, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Skate-Grinding Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to skate grinding or sharpening machines and has for its object to improve the same in point of simplicity and high efficiency. Generally stated, the invention consists of the novel devices and combinations of devices hereinafter described and defined in the claims.

This improved skate grinding machine is adapted both for use in factories for the initial grinding or sharpening of the skates and for use elsewhere for commercial regrinding or sharpening skates. The improved machine has various important novel features which make the rapid and accurate grinding of the skates possible and which will hereinafter appear in connection with the description of a commercial machine embodying my invention. This commercial machine, as illustrated and as preferably designed, will simultaneously grind two skates to exactly the same lines, but certain of the features of the invention might readily be incorporated in a more simple form of machine arranged to grind but one skate at a time.

In the drawings, which illustrate the commercial machine, like characters indicate like parts throughout the several views.

Referring to the drawings:

Fig. 1 is a plan view of the improved grinding machine showing two shoe-equipped skates clamped in position for grinding of the skate runners;

Fig. 2 is a fragmentary detail in vertical section on the line 2—2 of Fig. 1;

Fig. 3 is a left side elevation of the machine and skates shown in Fig. 1, some parts being broken away; and

Fig. 4 is a front elevation of the parts shown in Figs. 1 and 3, some parts being sectioned and some parts being broken away.

The running parts of the grinding machine are directly or indirectly mounted on a cast base 5 provided with laterally spaced pedestals 6 in which is journaled a wheel shaft or spindle 7. This shaft 7, midway between the pedestals 6, is provided with a pulley 8 that serves to space apart two similar grinding wheels 9. The pulley 8 will slide on and off from the shaft 7 but may have a key for positively causing the same to rotate therewith. One of the grinding wheels 9 is clamped against a flange 7^a fixed on the shaft 7 and the other wheel is pressed by a washer 10 that is subject to a nut 11 that works with threaded engagement on said shaft 7. This provides an arrangement in which the grinding wheels and the pulley may be easily removed from and applied to the shaft 7, when said shaft is lifted out of its bearings in the pedestals 6. To permit this latter operation, the upper halves of the pedestal bearings are made removable and, as shown, they are formed integral with cross arms 12 detachably secured to said pedestals by machine screws 13.

At one projecting end, the wheel shaft 7 is provided with a worm 14 that meshes with a worm gear 15 located within a housing rigidly secured to one of the pedestals 6 and, at its outer end, supporting a long transversely extended bearing sleeve 17. Said worm gear 15 is secured on a shaft 18 journaled in the bearing plates 16 and provided at one end with a worm 19 that meshes with a worm gear 20 carried by a sleeve 21 journaled on a long stud 22 secured to a lug 23 on the adjacent pedestal 6. At its extended end, the sleeve 21 carries a cam hub having a peripheral cam groove 24 that performs a function presently to be noted.

Mounted to slide horizontally through bearing sleeves 12^a, at the ends of the cross bars 12, is a pair of horizontally parallel plungers or endwise movable rods 25, which, at the right-hand side of the machine, are cross-connected by a tie-rod 26. This tie-rod, close to the plungers 25, is engaged by the forked upper ends of arms 27 rigidly secured to a rock shaft 28 mounted in the bearing sleeve 17. The rock shaft 28 has a depending arm 29 provided at its lower end with an offset pin 30 that works in the cam slot 24.

Rigidly secured to the plungers 25, between the aligned bearing sleeves 12^a, are shaft bearings that are formed with horizontally aligned bearing sleeves 31 and with vertical bearing sleeves 32. A cross shaft 33 is journaled in the aligned bearing sleeves 31 and vertically movable plungers or sup-

porting posts 34 are arranged to move vertically in the vertical sleeves 32. The shaft 33 is cut to form small pinions 35 that mesh with rack teeth 36 cut in the vertically movable plungers or posts 34, so that, under rotation of said shaft 33, the two plungers 34 will be given simultaneous and equal vertical movements.

Laterally spaced parallel and horizontally extended guide rails or bars 37 are rigidly secured to the reduced upper ends of the plungers 34. A narrow guide channel, extending from front to rear of the machine, is formed between the upper portions of the guide rails 37. In this preferred arrangement, a segmental guide block 38 is rigidly secured for vertical adjustments to and between the central portions of the guide rails 37, by means of nut-equipped bolts 39 that work in vertical slots in said guide block. The curvature of this guide plate 38 should be somewhat less than that of the grinding wheels 9, but its uppermost portion should be set tangential to a horizontal plane that is also tangential to the tops of said grinding wheels.

At its front end, the shaft 33 is provided with a worm gear 40 that is located within a housing 41 that is rigidly secured to the adjacent shaft bearing 31—32. This worm gear 40 is engaged by a worm 42, the shaft of which is journaled in the housing 41 and is provided at one projecting end with an operating crank 43.

The skates A illustrated in the drawings are of the tubular type and are shown as secured to shoes B. The skate clamp for holding two such skates with the shoes applied, with their runners parallel, is preferably designed as follows: The numeral 44 indicates the so-called "carriage bar" that is formed on both sides, near its ends, with short outstanding arms 45 that terminate in heads 46 formed with V-shaped channels to fit the tubes of the skates. The numeral 47 indicates curved clamping jaws, which, as viewed in front elevation, Fig. 4, are approximately C-shaped and extend two hundred and seventy-five degrees, more or less, of a circle. At their inner ends, said clamping jaws 47 are pivoted at 48 to upstanding lugs 49 on the carriage bar 44. The outwardly and downwardly extended free ends of said jaws 47 are pronged or bifurcated, as best shown in Fig. 3, and the free ends of said prongs are formed with heads 50 that have V-shaped grooves opposed to the V-shaped grooves of the heads 46 and co-operating therewith to clamp the tubes of the skates. The said heads 46 and 50 are preferably, and as shown, provided with clamping screws 51 that are adapted to be set so that they will clamp the runners of the skates.

At the point where the clamping jaws 47 converge, as viewed in Fig. 4, and down to the pivot 48, one of said jaws 47 is bifurcated so that it embraces the other jaw, and this bifurcated jaw is provided with bearing sleeves 52 in which is detachably journaled a clamp-actuating shaft 53. This shaft 53 is flattened at 54, from its inner end rearward, so that said shaft may be freely inserted to position when its flattened portion 54 is turned into alignment with a lug 55 on the other clamping jaw. At its extended end, the clamping shaft 53 has a hand piece 53a, by means of which it may be readily turned.

For co-operation with the carriage bar 44 and the guide rails 37 for moving the skates in the planes of the grinding wheels 9 and for properly guiding the skate runners to said grinding wheels, I provide a template bar 56, the lower edge of which will have approximately the line or desired line of the edges of the skate runners to be sharpened and, of course, there may be different templates for different skate runners. The template 56 fits a channel formed in the under side of the carriage bar 44 and is of the proper width to fit quite closely but to move freely between the guide rails 37. As a means for securely but detachably and adjustably holding the template 56 to the carriage bar 44, said template is formed with a longitudinal groove that receives the notched heads 57 of adjusting screw-threaded studs 58 mounted for free vertical movements in the ends of the carriage bar 44 and provided at their threaded upper ends with adjusting nuts 59. Also, the carriage bar 44 is provided with set screws 60 that work with threaded engagement through the top thereof and are adapted to press against the upper edge of the template. By vertical adjustments of the studs 58, the template may be vertically adjusted in respect to the carriage bar, and by tightening the set screws 60, said template may be locked in any set adjustment and securely held against wabbling or other movements in respect to the carriage bar.

The use and operation of the machine in sharpening skates is substantially as follows:

While the carriage bar 44 with its attached skate clamp is removed from working position and the jaws of the clamp are opened up, the two skates may be clamped, as shown in the drawings. The jaws of the clamp may be freely opened up when the clamping shaft 53 is pulled out of the sleeves 52 and when the clamping jaws 47 are thus released, they may be freely moved so as to embrace the skates and shoes and properly position the clamping heads 46 and 50 against the two skates. When the flat surface 54 of the shaft 53 is turned into alignment with the edge of the lug 55, it

may be freely inserted into the sleeves 52 and then, when given about a half rotation, the uncut portion of said shaft will be forced against the lug 55, thereby clamping the heads 46 and 50 tightly against the skates, thus clamping the two skates with their runners parallel and with the edges of the runners transversely aligned. By then placing the runners of the skates on a flat surface, the lower edge of the template 56 can be adjusted so that it will be approximately in transverse alignment with the edges of the two runners. It is assumed that the uppermost portion of the guide segment or block 38 is in transverse alignment with the uppermost portions of the two grinding wheels 9.

When the skates are to be ground, the lower edge of the template is inserted between the guide rails or bars 37 and, when the conditions are as above described, if the carriage bar 44 be moved horizontally back and forth with the template running in the channel between the rails 37 and resting on the guide segment 38, the lower edges of the runners will be moved over the upper surface of the grinding wheels and will be ground to a form corresponding to the lower edge of the template. This grinding of the runners to the form of the template need not be made by one cut or movement, but may be produced by several to and fro movements. In fact, it is of the utmost importance that the skate runners be allowed to slide freely and lightly over the grinding wheels, so as to sharpen the runners without overheating the same, for it has been found that where the runners are positively held and the weight of the grinding wheels, for example, is exerted in the grinding action, there is sure to be an overheating such as will take the temper out of the skate runners and materially damage the same.

It may be here noted that while it is true that if the carriage bar 44 be held absolutely horizontal while moving to and fro, the skate runners will be ground to the outline of the template; it is, nevertheless, a fact that by rocking the template on the guide block or segment 38 as the ends of the template approach said block, the runners may be given a somewhat greater curvature than the template at the front and rear ends.

Where it is not deemed necessary or desirable to change the curvature of the skate runners or to give an exact form thereto, the guide segment or block 38 may be removed, in which case the grinding of the skates must be regulated by the operator, although, even in this event, the guide rails 37 direct the skate runners for true movements in the planes of the grinding wheels.

It is evident that if the skate runners should be moved back and forth for a considerable time over the grinding wheels without shifting their positions laterally, grooves would soon be formed in the grinding wheels. This is prevented by the action of the cam groove 24 on the lever made up of the arms 27—29 and shaft 28, which constantly but slowly moves the plungers 25 endwise, first in one direction and then in the other, and causes the skate runners to slowly drift back and forth over the grinding faces of the wheels 9 throughout the grinding action.

By rotation of the worm 42, the vertically movable plungers or posts 34 and the guide rails 37 and guide segment 38 carried thereby may be vertically adjusted and set in any desired or proper operative position. The guide rails 37, throughout the operation of the machine, keep up a slow lateral shifting movement, first in one direction and then in the other, so that, operating on the template 56, they cause the carriage bar 44, the clamp and the skates to partake of the above noted lateral to and fro movements.

The numeral 61 indicates a power-driven driving belt which, as shown in Fig. 3, passes through an opening in the base 5 and runs over the pulley 8. This belt 61 is considerably more narrow than the distance between the grinding wheels.

What I claim is:

1. In a skate grinding machine, the combination with a grinding wheel, of a guideway extended parallel to the plane of said grinding wheel, and a skate holder movable on said guideway above said grinding wheel and operating to direct the skate blade against the upper portion of said grinding wheel, said skate holder being held against lateral shifting movement and angular movement in a horizontal plane but free for vertical movement and displacement and adapted to be moved endwise by hand operations.

2. The combination with an upright grinding wheel working in a vertical plane, of an approximately horizontal guideway extended in a plane parallel to the plane of said grinding wheel, a skate holder normally free for vertical displacement from said guideway but having a template arranged to run in said guideway and adapted to direct the skate runner against the grinding wheel under the action of gravity and hand operations applied to said skate holder, said skate holder being held against lateral shifting movement and angular movement in a horizontal plane.

3. The structure defined in claim 2 in further combination with a guide block associated with said guideway and set with its upper portion transversely aligned with the upper portion of said grinding wheel.

4. The structure defined in claim 2 in

which said template is secured to said skate holder with freedom for adjustments in the plane parallel to the plane of the skate runner.

5. The combination with an upright grinding wheel working in a vertical plane, of an approximately horizontal guideway extended into a plane parallel to the plane of said grinding wheel, a skate holder normally free for vertical displacement from said guideway but having a template arranged to run in said guideway and adapted to direct the skate runner against the grinding wheel under the action of gravity and hand operations applied to said skate holder, and a guide block associated with the said guideway and set with its upper portion transversely aligned with the upper portion of the grinding wheel, said guide block being vertically adjustable in respect to the guideway.

6. The structure defined in claim 2 in further combination with means for vertically adjusting said guideway.

7. The structure defined in claim 2 in further combination with means for automatically moving said guideway laterally so as to shift the skate runner on the face of the grinding wheel during the skate grinding action.

8. The combination with two laterally spaced grinding wheels and means for rotating the same, of a guideway extended in a plane that is parallel to but between said grinding wheels, a skate holder having clamps for holding two skates with their runners in parallel relation, said skate holder having a template freely movable in said guideway and arranged to direct the two skate runners against the two grinding wheels under the action of gravity and hand operations applied to said skate holder.

9. The structure defined in claim 8 in which said template is vertically adjustable in respect to said skate holder.

10. The structure defined in claim 8 in further combination with a segmental guide block secured in respect to said guideway and against which said template is adapted to move.

11. The combination with two laterally spaced grinding wheels and means for rotating the same, of a guideway extended in a plane that is parallel to but between said grinding wheels, a skate holder having clamps for holding two skates with their runners in parallel relation, said skate holder having a template freely movable in said guideway and arranged to direct the two skate runners against the two grinding wheels under the action of gravity and hand operations applied to said skate holder, and a segmental guide block vertically secured in respect to the guideway and against which the template is adapted to move, said guide block being vertically adjustable in respect to the guideway.

12. The structure defined in claim 8 in further combination with means for automatically moving said guideway laterally so as to shift the skate runners on the grinding wheels during the grinding action.

13. The combination with two laterally spaced grinding wheels and means for rotating the same, of a guideway extended in a plane that is parallel to but between said grinding wheels, a skate holder having clamps for holding two skates with their runners in parallel relation, said skate holder having a template freely movable in said guideway and arranged to direct the two skate runners against the two grinding wheels under the action of gravity and hand operations applied to said skate holder, and a segmental guide block vertically secured in respect to the guideway and against which the template is adapted to move, said guide block being vertically adjustable in respect to the guideway, said segmental guide block being curved on the arc of a circle of less diameter than the grinding wheel, thereby permitting the skate holder to be rocked thereon to increase the curvature of the skate runner over that of said template.

14. In a skate grinding machine, the combination with a shaft and laterally spaced grinding wheels carried thereby, of a laterally movable guideway located between the said grinding wheels and extended horizontally in a plane parallel to the planes of said wheels, and a skate holder having clamps for holding two skates, said skate holder being guided by said guideway but being freely removable therefrom.

15. The structure defined in claim 14 in which said guideway is vertically adjustable and extends in a horizontal plane in the vicinity of the tops of said grinding wheels.

16. The combination with a shaft and a pair of laterally spaced grinding wheels carried thereby, of a pair of horizontal parallel plungers extended one at front and the other at the rear of said grinding wheels, means for simultaneously moving said plungers endwise first in one direction and then in the other, a horizontal guideway located between the upper portions of said grinding wheels and carried by said plungers, and a skate holder having clamps for holding two skates, said skate holder having a template detachably engageable with said guideway to guide the skate runner against said grinding wheels.

17. The structure defined in claim 16 in which said guideway is adjustably supported from said plungers by nut-equipped posts, a co-operating pinion-equipped shaft and a worm and worm gear.

In testimony whereof I affix my signature.

VITUS A. BOKER.