March 6, 1973 R. VEZEAU 3,719,006

SKATE SHARPENING MACHINE

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Fig. 1

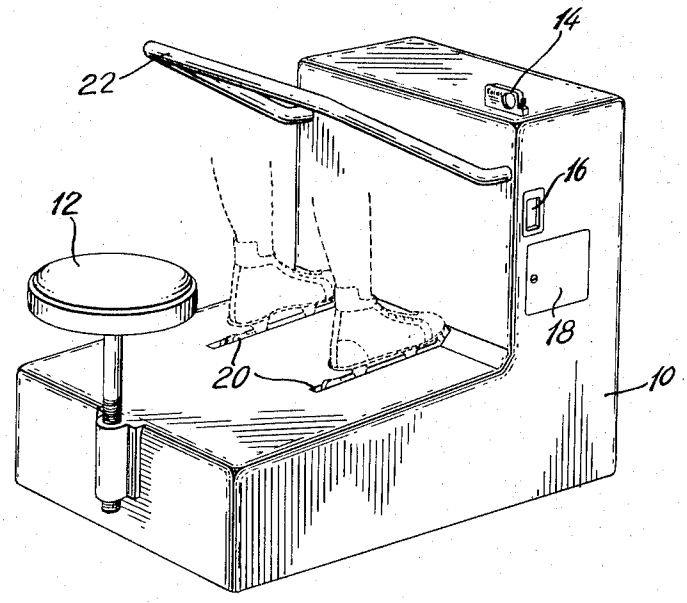
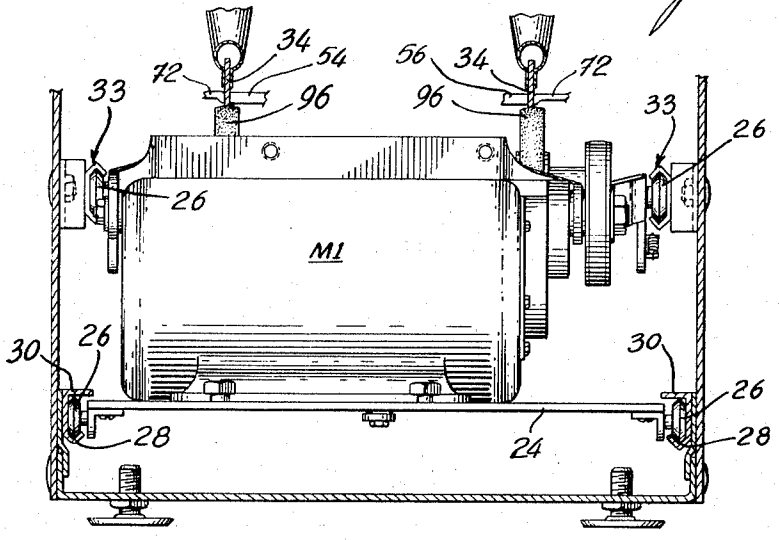


Fig. 3



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Fig. 2

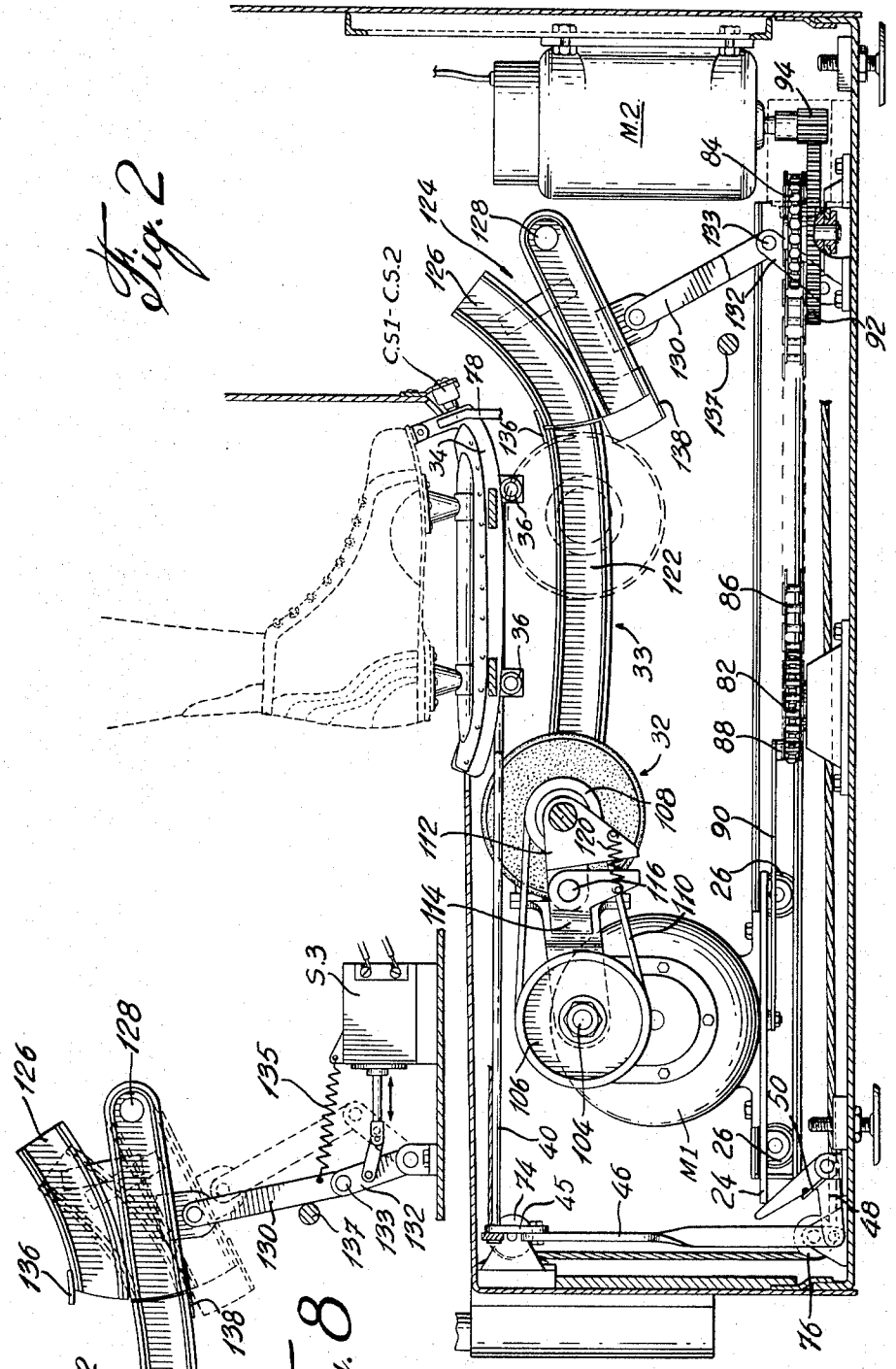


Fig. 8

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SKATE SHARPENING MACHINE

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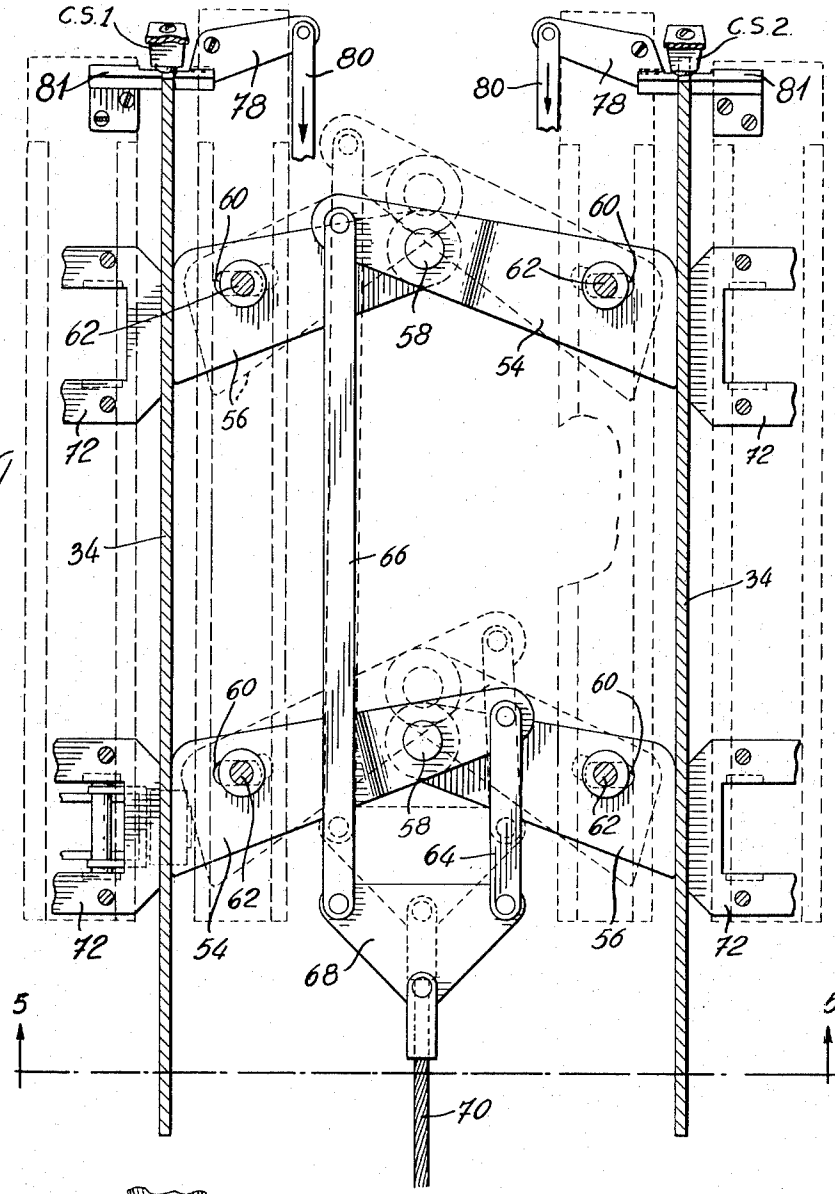


Fig. 4

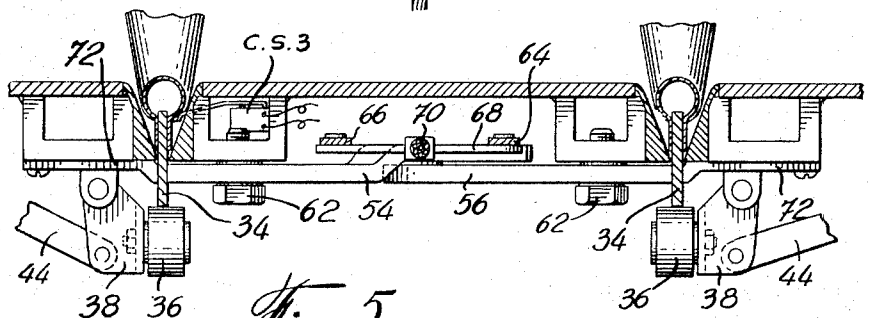


Fig. 5

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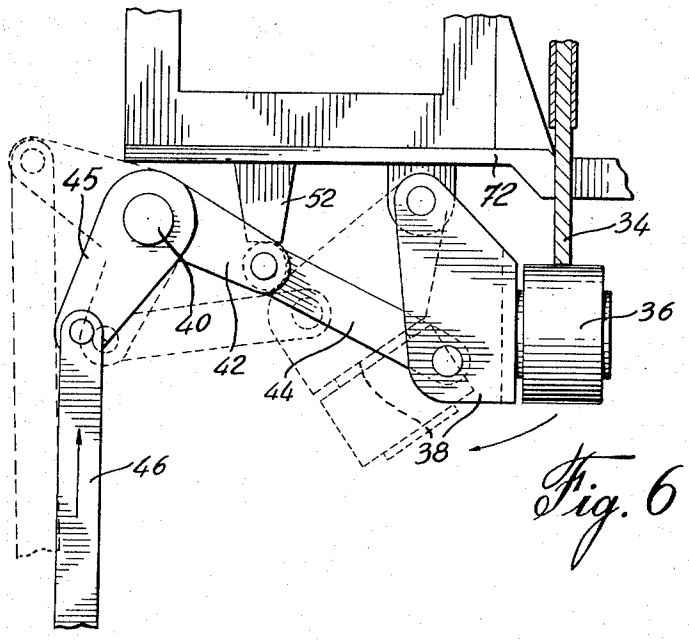
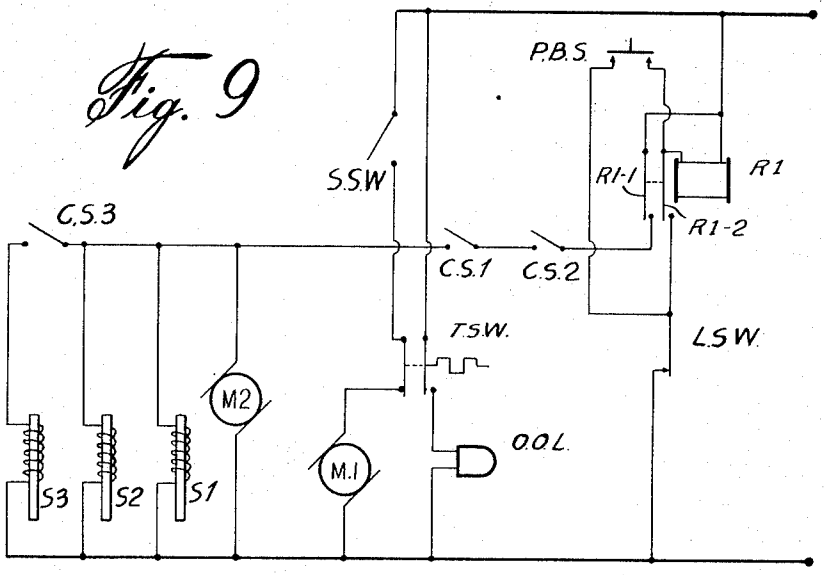


Fig. 6

Fig. 9



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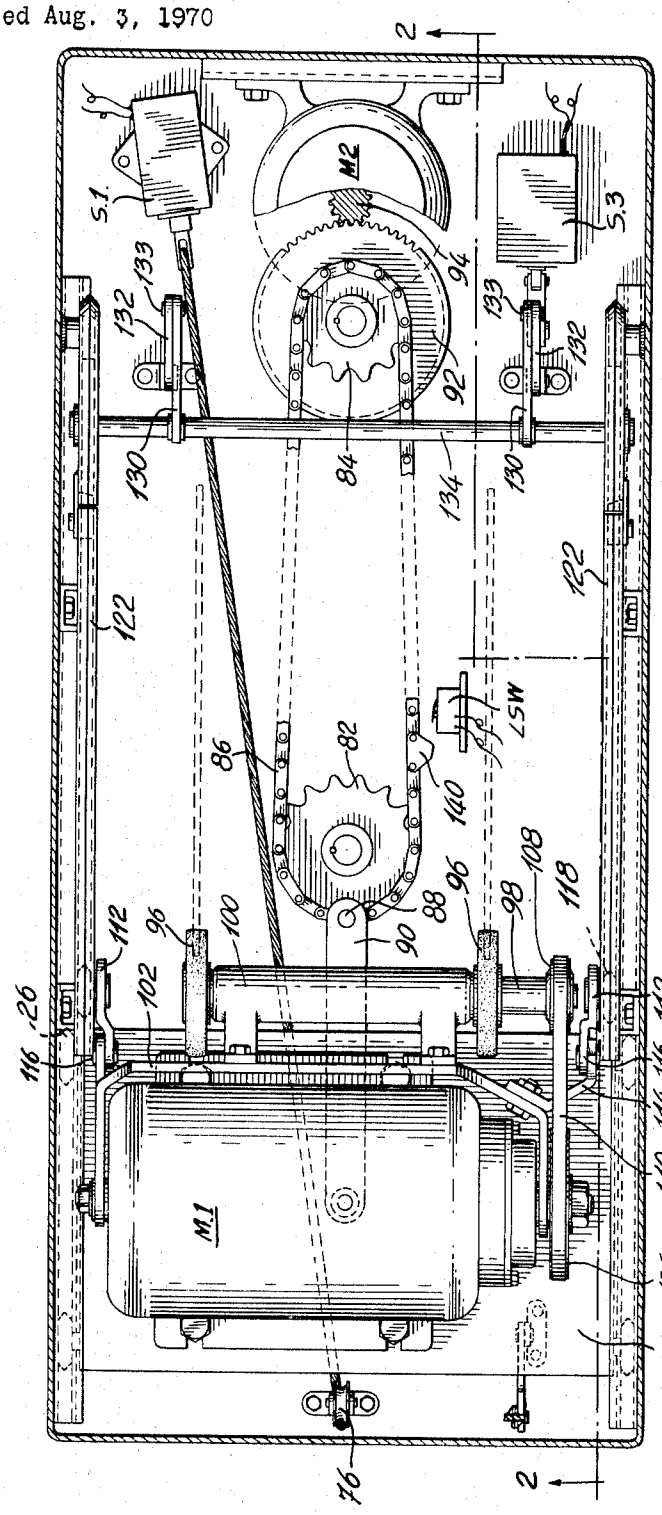


Fig. 1

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SKATE SHARPENING MACHINE

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Int. Cl. B24b 19/00
U.S. Cl. 51—34 A 11 Claims

ABSTRACT OF THE DISCLOSURE

A skate sharpening machine including a housing and means for clamping the blade of the skate at a fixed position on the housing. A carriage is slidably mounted in the housing and carries a power-driven grinder. The carriage is arranged to be moved back and forth in the housing and guide means conforming to the shape of the bottom of the blade are provided for guiding the grinder whereby the grinder follows the shape of the bottom of the blade when moved back and forth by the carriage.

The invention relates to an automatic skate sharpening machine.

It has always been the usual practice to sharpen skates manually. The commonly known devices for sharpening skates comprise a fixed grinder and a jig into which the blade of the skate is mounted so as to be moved in contact with the grinder. In operation, the jig is moved back and forth on a flat surface by an operator to sharpen the blade of the skate.

The main drawback of the above sharpening machines is that they require an operator. Furthermore, they do not ensure an even sharpening of the blade of the skate because the operator does not necessarily apply an even pressure on the grinder.

It is the main feature of the invention to provide a machine for sharpening skates automatically wherein the only manual operation needed will be the one of positioning the skates at a predetermined location on the machine. Such machine may easily be coin-operated since it does not require an operator, the positioning of the skate being easily done by the client.

The machine, in accordance with the invention, includes a housing and means for clamping the blade of the skate at a fixed position on the housing. The carriage is slidably mounted in the housing and carries a power-driven grinder. Means are provided for driving the carriage back and forth in the housing and guide means conforming to the shape of the bottom of the blade are located on the side walls of the housing for guiding the grinder whereby the grinder follows the shape of the bottom of the blade when moved back and forth by the carriage.

The means for clamping the blade of the skate include means contacting the bottom of the blade of the skate for positioning the blade of the skate at a predetermined distance from the means for guiding the grinder. Such a positioning means is pivotally mounted on the housing for permitting removal thereof from the path of the grinder when the blade is clamped in position.

Guide tracks are provided on each side of the housing for receiving rollers secured to the carriage so as to permit sliding movement of the carriage. The carriage may be moved back and forth by a driving arrangement including a pair of toothed wheels secured to the housing and coupled by a chain one point of which is secured to the carriage. One of the wheels is driven by a motor to cause rotation of the chain and movement of the carriage back and forth.

The guide means for the grinder may be a track into

which a roller may slide. The grinder is pivotally mounted on the carriage by means of a first bracket member. A second bracket member is provided for rotatably supporting the above roller and such second bracket member is pivotally attached to the first bracket member. A spring is connected between the first and the second bracket members to bias the grinder against the bottom of the blade of the skate. Such spring ensures an even pressure of the grinder on the bottom of the blade of the skate.

In addition, the track for guiding the grinder may be made in two parts for accommodating girl skates which, as commonly known, have ice grips at the front thereof which must not be touched by the grinder. The first part of the track is fixed but the second part is movable and includes two track portions which may be alternately moved in position depending on the type of skate to be sharpened.

The invention will now be disclosed with reference to the accompanying drawings which illustrate a preferred embodiment of the invention and in which:

FIG. 1 is a perspective view of the skate sharpening machine in accordance with the invention;

FIG. 2 illustrates a longitudinal cross-sectional of the machine of FIG. 1;

FIG. 3, which appears on the same sheet as FIG. 1, illustrates a transversal cross-section of the machine of FIG. 1;

FIG. 4 is a partial top view of the machine of FIG. 1 with the housing removed and illustrating the clamping mechanism for the blades of the skates;

FIG. 5 illustrates an end view along line 5—5 of the machine of FIG. 4;

FIG. 6 illustrates the positioning device of the clamping mechanism of FIGS. 4 and 5;

FIG. 7 illustrates a top view of the machine of FIG. 1 with the top housing portion cut away;

FIG. 8, which appears on the same sheet as FIG. 2, illustrates the mechanism for moving the front portion of the track guiding the grinder; and

FIG. 9, which appears on the same sheet as FIG. 6, illustrates a circuit diagram of the electrical equipment of the machine.

Referring to FIG. 1, there is shown a housing 10 equipped with a bench 12 upon which the person wanting to have his skates sharpened may sit if such person does not wish to remove his skates. The housing is further equipped with a coin slot 14, a coin return receptacle 16, and a door 18 for collecting the money. It is to be understood that the machine may not be coin-operated but this has the advantage of rendering the operation completely automatic. The housing has two slots 20 for inserting the blades of the skates and a handle 22 for helping the persons who wish to step on the machine to have their skates sharpened without taking them off.

Referring to FIGS. 2 and 3, a carriage 24 is slidably mounted in the housing 10. The carriage is equipped with a pair of rollers 26 on each side thereof which are adatped to slide in tracks 28 secured to the side walls of the housing. Each track has a dust guard 30 on the upper portion thereof for preventing particles of metals from entering the track to hinder the movement of the carriage. The carriage 24 supports a motor M1 to which is coupled a grinder 32 which will be disclosed more fully in a later part of the description. In addition, the housing further supports a pair of tracks 33 which is located a predetermined distance from the bottom of the blades of the skates for guiding the grinder 32.

Referring to FIGS. 2 and 4 to 6, there is illustrated a mechanism for clamping each blade 34 of the skates in position. Such clamping mechanism includes an arrangement comprising a pair of rollers 36 for each blade. Each

roller 36 is rotatably mounted on a support member 38 which is pivotally mounted on the housing. A torsion bar 40 is rotatably mounted on the housing and includes a pair of levers 42 secured thereto. Each lever 42 is pivotally connected to a second lever 44 which is itself pivotally connected to support member 38. A lever 45 is secured to torsion bar 40 at the rear end of the housing. Such lever 45 is pivotally connected to a second lever 46 which itself is pivotally connected to a third V-shaped lever 48. V-shaped lever 48 is biased in a clockwise position by spring 50.

In the rest position of the carriage, V-shaped lever 48 is maintained in the position illustrated in FIG. 2 by carriage 24 against the biasing force of spring 50. Lever 46 is pulled down by V-shaped lever 48 and the torsion bar 40 is kept in the position illustrated in FIG. 6 wherein the pivot point of levers 42 and 44 is slightly out of alignment with the levers. The end of each lever 44 contacts an abutment 52 and rollers 36 are thereby locked in position. With the rollers 36 in such a position, the machine is ready to receive the blades of the skates and the position of the bottom of such plates with respect to track 33 is therefore accurately determined.

The clamping mechanism also includes a system of levers for clamping each blade of the skates in position once the bottom of the blades has been place in contact with rollers 36. Referring more particularly to FIGS. 4 and 5, there is illustrated two pairs of levers 54 and 56 which are pivotally connected at point 58. Each lever carries a slot 60 and is slidably secured to the housing by means of a bolt 62. A lever 64 is pivotally attached to the end of the lever 54 belonging to the back pair of levers, and a lever 66 is likewise pivotally attached to the lever 54 of the front pair of levers. The two levers 64 and 66 are pivotally attached to a plate member 68. Finally, a rope 70 is pivotally attached to plate member 68 for differentially operating both pairs of levers to ensure clamping of the blades against stop members 72 which are secured to the housing. Rope 70 passes around pulleys 74 and 76 (FIG. 2) and is operated by a solenoid S1 (FIG. 7) as it will be disclosed more fully in a later part of the description.

If required, a further arrangement of levers such as illustrated schematically by levers 78 and 80 are provided for each blade for ensuring that the blade is maintained in a vertical position against stop members 81. Levers 80 may be interconnected by a plate member (not shown) and operated by a second solenoid S2 (FIG. 9).

Once the blades of the skates are clamped in position, the carriage is set into movement as it will be disclosed later. Referring to FIGS. 2 and 6, V-shaped lever 48 moves clockwise under the biasing force of spring 50 and causes the upward movement of lever 46 connected to V-shaped lever 48. Lever 45, which is pivotally connected to lever 46, will rotate clockwise and levers 42 and 44 will consequently remove rollers 36 from the path of the grinder 32.

Referring now to FIGS. 2 and 7, there is illustrated an arrangement for moving the carriage 24 back and forth including two toothed wheels 82 and 84 which are rotatably mounted on the housing and coupled by a chain 86. Chain 86 is attached at a point 88 to a lever 90 which is attached to the carriage 24. It will be easily understood that rotation of the chain will cause the carriage 24 to move back and forth. Toothed wheel 84 is secured to a large gear 92 which is coupled to a gear 94 secured to the shaft of motor M2. Gears 92 an 94 act as reduction gears for the motor.

Referring again to FIGS. 2 and 7, it may be seen that the grinder 32 includes two abrasive wheels 96 fixed on a shaft 98 rotatably mounted in a casing 100. Casing 100 is bolted to a U-shaped bracket member 102 which is pivotally mounted at point 104 on the housing of motor M1. A pulley 106, which is coupled to the shaft of the motor M1, is also pivoted at point 104. Such pulley 106 is coupled to a pulley 108 secured to the end of the shaft 98 of the grinder. Pulleys 106 and 108 are coupled by a belt 110 for driving the grinder. It is to be understood that other arrangements for supporting the grinder may be envisaged, the only requirement being that it be positioned on the carriage 24.

Referring to FIGS. 2, 3 and 7, the movement of the grinder is guided by the tracks 33 which, as mentioned previously, are located on each side of the housing and positioned at a predetermined distance from the bottom of the blades 34. A second bracket member 112 is pivotally attached either directly or through an extension member 114 to each end of the first mentioned bracket member 100 at pivot point 116. Rollers 118 are rotatably mounted on such second bracket member 112 and adapted to slide into the tracks 33. In order to ensure an even pressure of the grinder on the bottom of the blades, a spring 120 is attached between the two bracket members 100 and 112 for biasing the bracket member 100 upward around pivot point 104.

In order to accommodate girl skates which, as commonly known, have front ice grips which must not be touched by the grinder, each track 33 is made in two sections 122 and 124 as illustrated in FIGS. 2, 7 and 8. Section 122 is fixed on the housing but section 124 is movable and made of two track portions 126 and 128 secured to each other one above the other. The two track portions 126 and 128 are moved vertically by two levers 130 and 132 which are pivotally connected to each other at pivot point 133. Lever 130 is pivotally attached to track portions 126 and 128 whereas lever 132 is pivotally attached to the housing. Lever 132 is operated by a solenoid S3. Both levers 130 are coupled by a shaft 134 which permits movement of the movable track portions 126 and 128 located on each side of the housing simultaneously by a single solenoid S3. It is to be understood, however, that two solenoids could be used. In the deenergized condition of the solenoid S3, track portion 126 is pulled down by a spring 135 acting on lever 130. Track portion 126 carries a stop means 136 adapted to contact fixed track 122 in order to prefectly align fixed track 122 with movable track portion 126. In the energized condition of the solenoid S3, lever 130 is pushed against a stop 137 for aligning movable track portion 128 with fixed track 122. Track portion 128 also carries stop means 138 for ensuring perfect alignment of both tracks.

The general operation of the skate sharpening machine will now be disclosed with additional reference to the circuit diagram of FIG. 9. When a coin is deposited into coin slot 14 or alternatively, when push button switch PBS is depressed, relay R1 is energized operating contacts R1–1 and R1–2. Relay R1 locks operated over its own contacts R1–2 and the push button switch PBS may be released.

Motor M1 may then be energized by closing switch SSW to rotate the grinder 32.

Upon positioning the blades 34 of the skates on the rollers 36 through the slots 20 of the housing and pushing the skates forward as far as they will go, switches CS1 and CS2 (see also FIG. 2) will be closed thereby energizing solenoids S1 and S2 to clamp the blades of the skates in position. At the same time motor M2 is energized to start the back and forth movement of the carriage 24. When the carriage 24 starts to move forward, the V-shaped member 48 rotates clockwise under the action of biasing spring 50, and such causes the removal of the rollers 36 from the path of the grinder 32 as mentioned previously.

The back and forth movement of the carriage 24 will cause the grinder 32 to contact the bottom of the blades of the skates to sharpen the skates. Chain 86 carries an actuating device 140 which contacts a limit switch LSW and operates the same after a predetermined number of rotations of the chain 86. The opening of switch LSW brakes the holding path of relay R1 and such relay is

deenergized to break the circuit of motor M2 and solenoids S1 and S2. Motor M2 is equipped with a braking device (not shown) which is adjusted to stop the carriage **24** at the left end of tracks **28** thereby operating the V-shaped lever **48** and positioning the rollers **36** in their upward position ready for the next sharpening operation.

Switch SSW may then be opened to stop the machine.

If motor M1 should heat up due to jitter or jam, thermo-switch TSW will be operated to deenergize motor M1 and light up out-of-order light OOL to indicate that the machine is defectuous.

Finally, switch CS3 may be a normally closed switch which is opened by the tube portion of a man skate as illustrated in FIG. 5. As commonly known, girl skates do not have tube portions and consequently switch CS3 will remain closed and energize solenoid S3 for inserting track portion **128** in alignment with fixed track **122**, as mentioned previously.

It is to be understood that a number of modifications may be made to the above disclosed embodiment of the invention. For example, other types of clamping mechanisms could be used and the chain and sprocket arrangement for driving the carriage could also be replaced by an equivalent arrangement. Furthermore, the means for guiding the carriage and the grinder could be provided by arrangements equivalent to the track and roller assembly disclosed.

I claim:

1. A machine for sharpening the blade of a skate comprising:

(a) a housing;

(b) means for clamping the blade of the skate at a fixed position on said housing;

(c) a carriage slidably mounted in said housing;

(d) a power driven grinder mounted on said carriage;

(e) means for driving said carriage back and forth in said housing; and

(f) guide means conforming to the shape of the bottom of the blade for guiding the grinder whereby the grinder follows the shape of the bottom of the blade when moved back and forth by said carriage, said guide means including a track secured to each side of said housing and further comprising a first bracket member for pivotally holding said grinder on said carriage, a second bracket member pivotally mounted with respect to said first bracket member, a roller rotatably mounted on said second bracket member and sliding in said track, and spring means interconnecting said first and second bracket members for biasing said grinder against the bottom of said blade.

2. Machine as defined in claim **1**, wherein said means for clamping said blade at a fixed position on said housing includes means secured to said housing for positioning the bottom of the blade of said skate at a predetermined distance from said guide means.

3. A mechanism as defined in claim **2**, wherein said positioning means includes a pair of rollers pivotally mounted on said housing and further comprising means for pivoting said rollers.

4. A machine as defined in claim **3**, wherein said means for pivoting said rollers include lever means operated by said carriage when located in its rest position for positioning said rollers underneath the blade of the skates and further comprising spring means connected to said lever means for moving said rollers out of the path of the grinder when the carriage is moved away from its rest position.

5. A machine as defined in claim **1**, wherein said means for clamping said blade includes stop members secured to said housing, a solenoid, and lever means operated by said solenoid for pressing said blade against said stop member.

6. A machine as defined in claim **1**, further comprising guide tracks for said carriage secured to each side of said housing, and rollers rotatably mounted on said carriage and adapted to roll in said tracks.

7. A machine as defined in claim **1**, wherein said means for driving said carriage includes a pair of toothed wheels rotatably mounted on said housing, a chain coupling said wheels, means for attaching one point of said chain to said carriage, and means for driving one of said wheels so as to impart a back and forth movement to said carriage.

8. A machine as defined in claim **1**, wherein said track comprises a fixed section and a movable section for accommodating girl skates, said movable section including two track portions and further comprising means for moving each one of said movable track portions into alignment with said fixed track section.

9. A machine as defined in claim **5**, further comprising a motor for driving said carriage back and forth, and a control switch located in the energizing path of said motor and said solenoid for closing said path when the skate is positioned in its proper location for being sharpened.

10. A machine as defined in claim **1**, further comprising a motor for driving said grinder, a thermoswitch located in the energizing path of said motor and adapted to deenergize said motor upon jittering or jamming thereof, and an out-of-order light adapted to be energized by said thermoswitch upon defectuous operation of the motor for providing an alarm.

11. A machine as defined in claim **8**, further comprising a solenoid for operating said movable track portions and a switch located in the energizing path of said solenoid and responsive to positioning of a girl skate on the machine for energizing said solenoid.

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U.S. Cl. X.R.

51—100 R, 102