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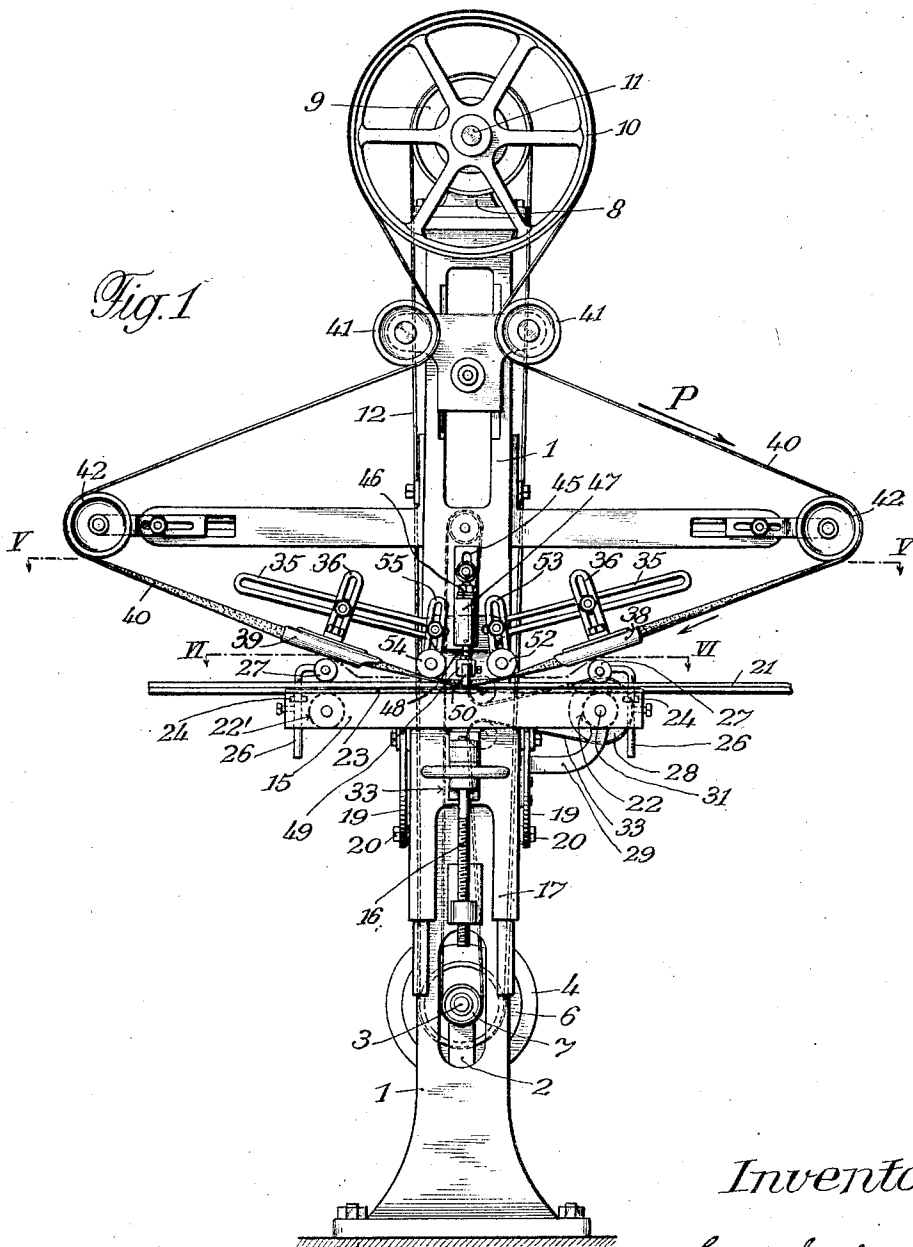
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C. SEEL

BELT ABRASIVE MACHINE

Filed Nov. 23, 1925

3 Sheets-Sheet 1



Inventor:

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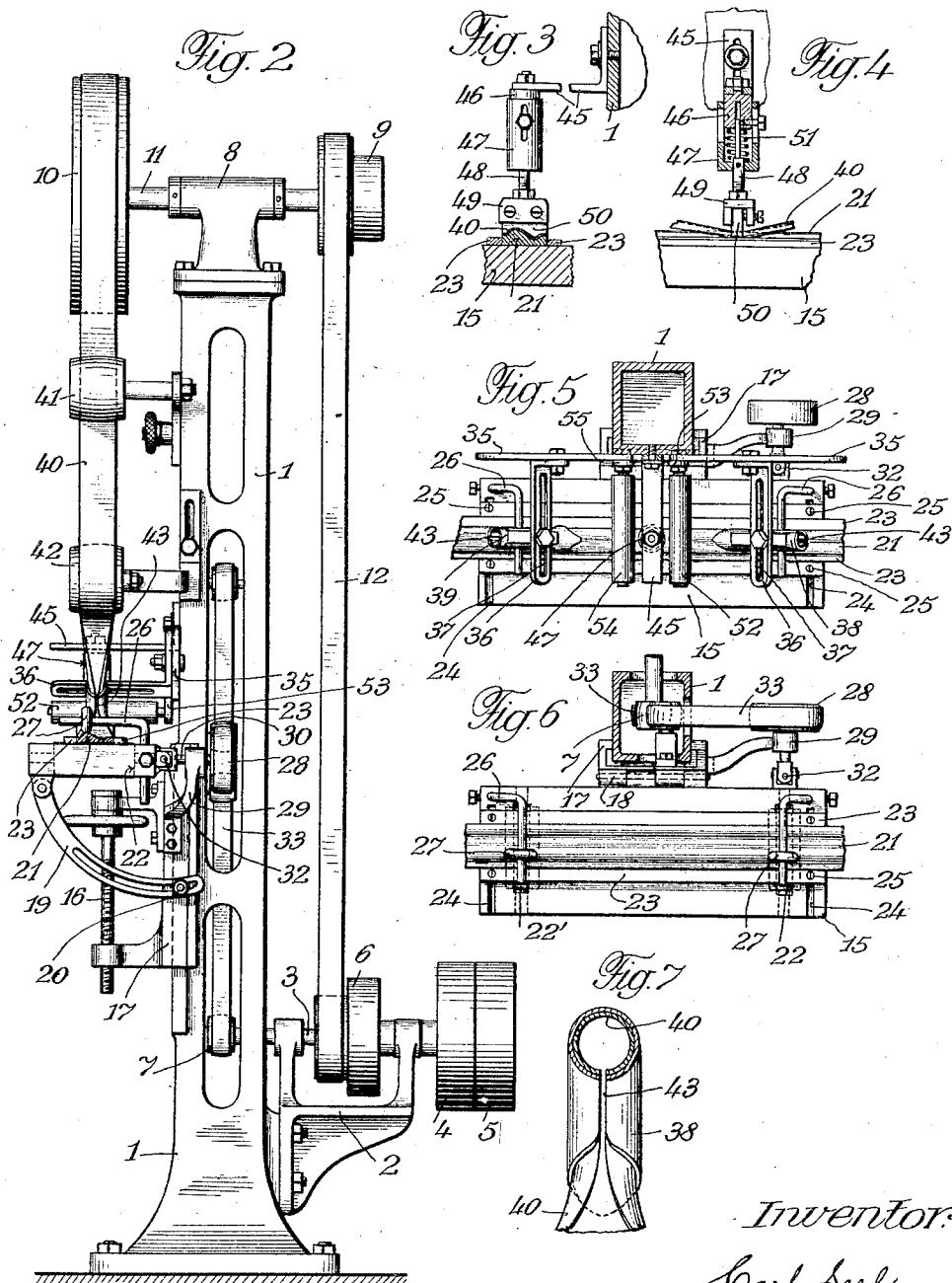
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BELT ABRASIVE MACHINE

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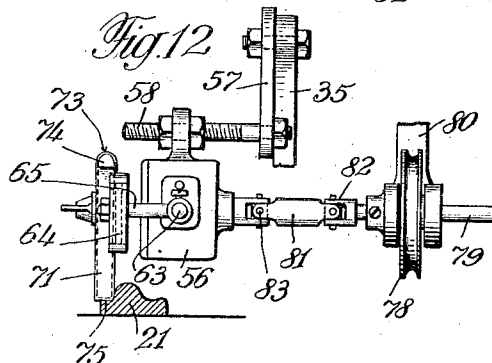
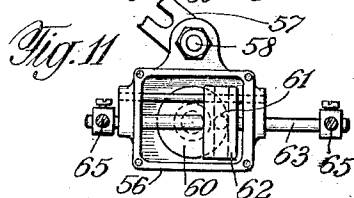
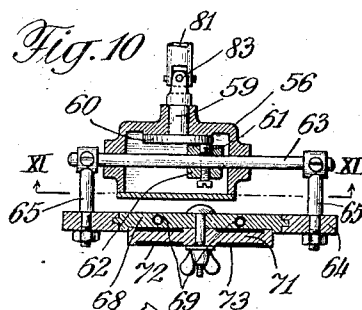
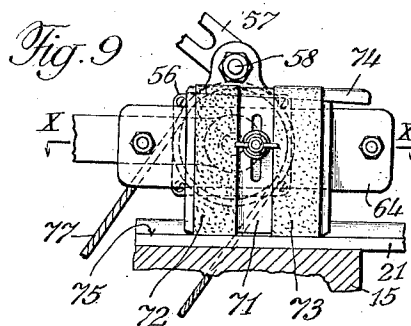
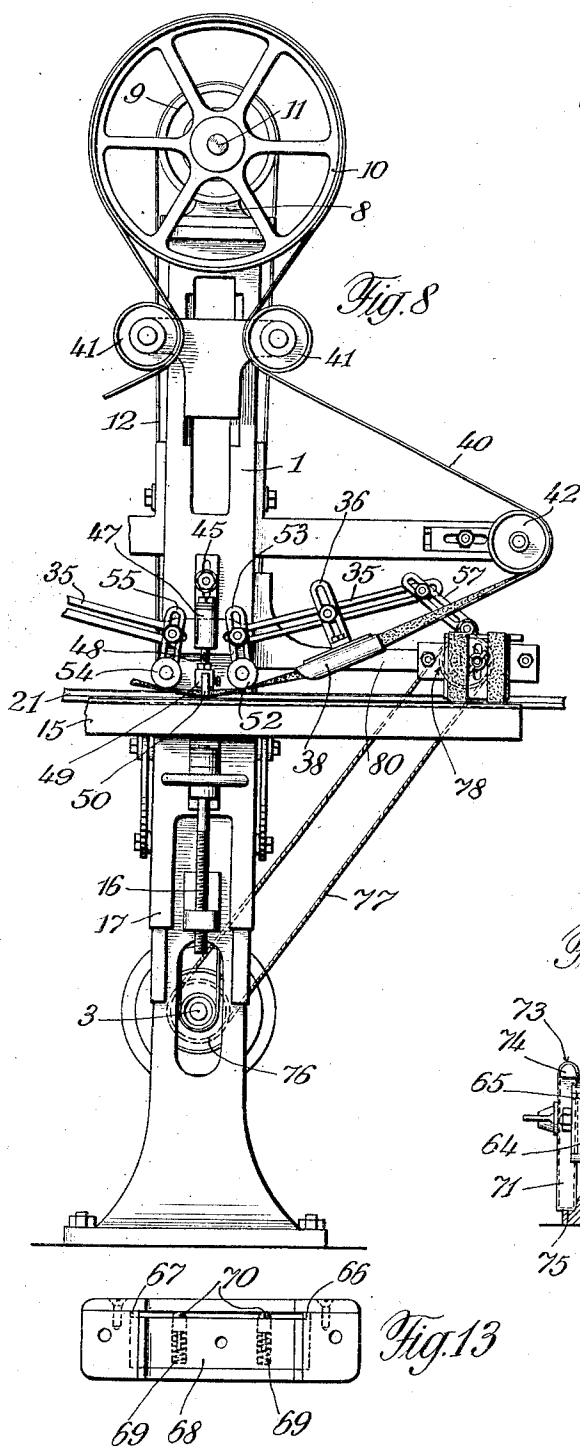


Fig. 13

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UNITED STATES PATENT OFFICE.

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BELT ABRASIVE MACHINE.

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The known machines for sanding by means of a traveling abrasive belt for instance profiled bars of any material present the disadvantage that only profiled bars having simple wide profile surfaces can be smoothed as for guiding the abrasive belt disproportionately large guidances are required so that the possibilities of utilizing these machines are very limited.

With the machine according to the present invention these disadvantages are overcome inasmuch as the abrasive belt is caused to assume a shape that approximates the shape needed in the operative part of the belt in contact with the molding block pressing the belt against the work to be smoothed, by the provision of guide members arranged in front and at the rear of the molding block and causing the abrasive belt to assume a tubular shape and further by means of elements arranged intermediate of the molding block and of said guide members, said elements in cooperation with said guide members cause the abrasive belt to be brought into a shape that approximately corresponds to the profile at the molding block whereby the belt is spread and shaped, and stresses are produced within the belt which tend to keep it in its operative position in front and at the rear of the operative place.

Constructional examples of the subject matter of the present invention are illustrated on the accompanying drawings in which:

Fig. 1 is a front elevation of the belt abrasive machine,

Fig. 2 is a side elevation seen from the right in Fig. 1,

Fig. 3 shows in a side elevation and partly in section the moulding block and the means for holding it in position,

Fig. 4 is a front elevation with parts shown in section of Fig. 3,

Fig. 5 is a horizontal section along line V—V in Fig. 1,

Fig. 6 is a section along line VI—VI in Fig. 1,

Fig. 7 shows the tubular guidance in detail,

Fig. 8 is a front elevation of the belt abrasive machine shown in Figs. 1-7 provided with an apparatus for smoothing re-entering edges,

Fig. 9 is a front elevation on a larger scale of this apparatus,

Fig. 10 is a section along line X—X in Fig. 9,

Fig. 11 is a section along line XI—XI in Fig. 10,

Fig. 12 is a side elevation of the means for actuating the apparatus and

Fig. 13 shows a detail in elevation.

At the rear side of the hollow standard 1 of the machine is fixed a bracket 2 in which the driving shaft 3 is rotatably mounted. The driving shaft carries the driving pulley 4, the loose pulley 5, the step pulley 6 and a small driving pulley 7. A pedestal bearing 8 is fixed to the top of the standard 1 in which the shaft 11 carrying the step pulley 9 and the pulley 10 is rotatably mounted; 12 denotes the belt connecting the step pulleys 6 and 9.

The table 15 is hinged at 18 (Fig. 6) to a slide 17 which is adjustable in the vertical direction along the standard 1 in a known manner by means of the screw threaded spindle 16; the hinge joints 18 permit the table to be inclined in the downward direction and to be adjusted into any desired inclined position. To this end segment shaped supports 19 are pivoted to the table 15 and are provided with a curved slot with which screws 20 cooperate whereby the table may be fixed in any inclined position.

21 denotes the work, consisting in the present case of a molded bar, which is placed on the table 15 so that the molded surface points in the upward direction and the bar rests on the feed rollers 22, 22' which project slightly above the table; lateral guide rails 23, which are adjustable in the transverse direction of the table and fixed to the latter by means of screws 25 cooperating with transverse slots 24, guide the bar 21. The supports 26 which are adjustable in the vertical direction carry rollers 27 adapted to press the work against the feed rollers 22, 22'. The feed roller 22 mounted on the shaft 31 is driven from the belt pulley 28 fixed to the shaft 30 rotatably mounted in the bracket bearing 29. The two shafts 30 and 31 are connected to each other by a universal joint 32, the axes of which and the axis of the hinge joint 18 being arranged in the same plane so that a proper drive of the feed

rollers is ensured with any inclination of the table 15. The pulley 28 is driven from the pulley 7 by means of the belt 33. Above the table 15, the carrier arms 35 are fixed to the standard 1; the arms 35 are provided with longitudinal slots; angular brackets 36 are fixed to said arms 35 and are laterally adjustable along the arms and in the vertical direction. To these angular brackets 36 the tubular guide members 38, 39 are secured and a longitudinal slot 37 in said brackets permits an adjustment of said guide members relatively to said brackets 36. Each guide member is provided with a longitudinal slot 43 (Fig. 7) by means of which the endless abrasive belt 40 may be inserted in the guide member. The abrasive belt 40 passes over the driving pulley 10 the outer surface of which may be provided with a rubber coating to increase the frictional driving contact with the belt and the latter passes over the pairs of guide and tension pulleys 41 and 42 to the guide members 38 and 39. Obviously the tubular guide members 38 and 39 may be replaced by one or more rings. To the angular bracket 45 which is fixed to the standard 1 and which is adjustable in the vertical direction, a plunger 46 is secured which acts as guide to a hollow cylinder 47 (Figs. 3 and 4). The rod 48 passes through the bottom of the cylinder 47 and the upper end of the rod is guided in a bore of the plunger 46 whilst to the lower end of the rod 48 a head 49 is screwed which carries the molding block 50 the profile of which is the complement of the profile of the bar to be smoothed. The rod 48 is rigidly connected to the cylinder 47 and the molding block 50 is continuously pressed against the work by the action of a helical spring 51, whereby the abrasive belt 40 which is guided below the molding block between the guide members 38 and 39 is pressed in a resilient manner corresponding to the force of the spring against the work 21. The abrasive belt 40 travels in the direction of the arrow P indicated in Fig. 1. It has now been found that the known disproportionate guidances may be dispensed with if the abrasive belt on its part near the work is caused to assume and to maintain at least approximately the shape which it takes up below the molding block. This is obtained by causing the abrasive belt to be bent to a tubular shape by the guide member 38 before it reaches the point where it operates on the work, and by the guide member 39 after that operative point and by providing between said guide members 38 and 39 and the molding block 50 further guide bodies preferably rollers 52, 54. These guide bodies cause to a greater or lesser extent a momentary flattening of the abrasive belt to which the tubular guide members have imparted a tubular shape, whereby the belt is also secured against a lat-

eral displacement, and the belt tends to assume again the tubular shape so that internal stresses are generated across the belt which cause the latter to readily assume a shape which corresponds or very nearly corresponds to the profile of the molding block already before it reaches the latter. The molding block has thus not the task of shaping the belt according to its profile but it serves mainly to improve the shape of the belt which is already preformed and to press the latter against the work. Thereby it is possible to use a molding body of an approximately simple design and to grind or sand any desired profile with great accuracy. After the belt has passed the guide member 39 it spreads itself automatically by running over the tension pulley 42.

In order to sand complicated profiles such as heretofore had to be finished by milling tools, many experiments have been necessary, and I have discovered that by transversely curving the belt to cylindrical shape and then passing the belt over a pulley just before it reaches the molding block the belt will assume the shape of the block more accurately, so that I am enabled to sand profiles having small radii of curvature that form fillets either concave or convex of the profile shapes.

From my observation of a great many experiments I believe that this novel phenomenon is due to the following: The belt curved transversely to a maximum extent, i. e., to a cylinder, has a natural tendency to flatten and then reverse its curvature in rapid succession after a certain distance from the guide member that gives it its cylindrical form. The belt, so to say, is in rapid transverse motion, and the distance from the guides at which such action takes place depends upon the material of the belt, its width, thickness, speed and tension, consequently the guide rollers 52 and 54 that tend to flatten the belt must be adjustable to and from the point of abrading contact.

While the rollers 52 and 54 tend to flatten the belt and prevent reverse curvature, the speed of the belt permits the rollers to act only momentarily to damp the transverse movement so that the persistence of the transverse movement is carried past the rollers by the speed of the belt to the mold, and by reason of the rapid, now damped, vibration of low amplitude, the belt rapidly and very much more accurately conforms to the profile of the mold.

This discovery I believe to be new, but whether my explanation of the cause of the novel action is correct or not, I have found that my construction embodying the tubular guides 38, 39, and the rollers 49, 52 gives unusual results; the belts last longer and do not have so pronounced a tendency to split. The guide body or roller 52 is mounted in

a bracket 53 and the latter is provided with a slot which permits an adjustment of the roller 52 in the vertical and in the lateral directions; the roller 54 is mounted in a similar bracket 55.

In using the above described machine the table 15 is lowered by turning the spindle 16 so that it is below the abrasive belt whereupon the work to be sanded is placed on the table. The guide rails 25 are then fixed in the proper position to effect a guidance of the work moved along the table by the action of the feed roller 22; preferably the work is so positioned that the outermost lateral edges of the work are at the same elevation which is effected with some profiles by turning the table 15 into an inclined direction. A molding body 50 the profile of which is the complement of the profile of the work to be sanded is then screwed to the head 49 and the abrasive belt is passed between the molding block 50 and the work; the rollers 52 and 54 and the tubular guide members 38 and 39 are then so adjusted that the abrasive belt 40 assumes approximately the profile of the molding block, and the latter and the table are then so adjusted that the abrasive belt is slightly pressed against the work. When the drive of the machine is cut in the work is passed below the abrasive belt by the action of the feed rollers 22 and 22' and the rollers 27 in opposite direction to that of the operative part of the belt but at a much slower speed than that of the abrasive belt.

Figs. 8-13 illustrate an additional apparatus provided on the belt abrasive machine and utilized for sanding edges and particularly re-entering edges of the work. To the carrier arm 35 a casing 56 is secured in an adjustable manner by means of the bracket 57 and screw bolt 58. A shaft 59 mounted in the rear wall of the casing, carries a crank disc 60 having a crank pin 61. The latter is in engagement with a body 62 fixed to a rod 63 which is guided in the casing and is thus reciprocated by the rotating shaft 59. A frame 64 is fixed to said rod 63 by means of bolts 65 and the frame is provided with vertical guidances 66, 67 in which a plate 68 is slidably mounted. Springs 69 acting on bolts 70 tend to press the plate 68 in the downward direction. On the plate 68 a further plate 71 is adjustably fixed and endless abrasive bands 72 and 73 are placed around the plate 71 and fastened to the latter by means of a wedge 74. Preferably one of the abrasive bands will bear a coarse abrasive material and the other a fine abrasive material. The lower edge 75 of the plate 71 is shaped according to the particular portion of the molded bar 21 which has to be smoothed by the reciprocating apparatus. In the example illustrated a re-entering edge, which the

abrasive belt 40 can only exactly smooth by causing excessive stresses in the abrasive belt is conveniently and accurately smoothed by means of the apparatus. Obviously the lower edge of the plate 71 may have any other shape.

The shaft 59 is driven from the driving shaft 3 of the machine by means of a cord pulley 76 mounted on the latter, a cord 77 and a cord pulley 78 fixed to a shaft 79, the latter being rotatably mounted in a bracket 80 secured to the standard 1 of the machine. Between the shaft 79 and the shaft 59 an intermediate shaft 81 provided with two universal joints 82 and 83 is interposed to ensure a proper driving connection with the apparatus adjusted in any position relatively to the molded work to suit a particularly molded work to be acted upon.

The abrasive bands 72 and 73 may conveniently be shifted for replacing their worn parts situated at the operative edge of the plate 71, the wedge 74 permitting the convenient shifting or the complete replacement of the abrasive bands 72 and 73.

I claim:

1. A belt abrasive machine, comprising in combination, an abrasive belt, a table for supporting the work, a plurality of guide and tension pulleys over which said belt passes, a molding block engaging the back of said belt and pressing the latter against the work, tubular guide members through which said belt passes and arranged on both sides of said molding block, and further guide means interposed between said tubular guide members and the molding block and adapted to momentarily flatten to some extent the belt to which a tubular shape is imparted by said tubular guide means so that it readily assumes the shape of the molding block.

2. A belt abrasive machine, comprising in combination an abrasive belt, a table for supporting the work, a plurality of guide and tension pulleys over which said belt travels, a molding block engaging the back of said belt, resilient means acting on said molding block for pressing the latter against the work, tubular guide members through which said belt passes, arranged on both sides of said molding block and securing the traveling abrasive belt against displacements in the transverse direction, and further guide means interposed between said tubular guide members and the molding block and adapted to momentarily flatten to some extent the belt to which a tubular shape is imparted by said tubular guide means so that it readily assumes the shape of the molding face.

3. A belt abrasive machine, comprising in combination, an abrasive belt, a table for supporting the work, a plurality of guide and tension pulleys over which said belt travels, a molding block engaging the back

of said belt, resilient means acting on said molding block for pressing the latter against the work, tubular guide members through which said belt passes, adjustable in the vertical and lateral directions and arranged on both sides of said molding block and securing the traveling abrasive belt against displacements in the transverse direction, and further adjustable guide means interposed between said tubular guide members and the molding block and adapted to momentarily flatten to some extent the belt to which a tubular shape is imparted by said tubular guide means so that it readily assumes the shape of the molding face.

4. A belt abrasive machine comprising in combination a standard, a slide adjustable in the vertical direction along said standard, a table for supporting the work and hinged to said slide, means adapted to fix said table in any inclined position relatively to said slide, an abrasive belt, a plurality of guide and tension pulleys over which said belt travels, a molding block engaging the back of said belt, resilient means acting on said molding block for pressing the latter against the work, tubular guide members through which said belt passes, arranged on both sides of said molding block and securing the traveling abrasive belt against displacements in the transverse direction, and further guide means interposed between said tubular guide

members and the molding block and adapted to momentarily flatten to some extent the belt to which a tubular shape is imparted by said tubular guide means so that it readily assumes the shape of the molding face.

5. A belt abrasive machine, comprising in combination, a standard, a slide adjustable in the vertical direction along said standard, a table for supporting the work and hinged to said slide, means adapted to fix said table in any inclined position relatively to said slide, an abrasive belt, a plurality of guide and tension pulleys over which said belt travels, a molding block engaging the back of said belt, resilient means acting on said molding block for pressing the latter against the work, tubular guide members provided with a slot for the insertion of the abrasive belt and arranged on both sides of said molding block and securing the traveling abrasive belt against displacement in the transverse direction, and further guide means interposed between said tubular guide members and the molding block and adapted to momentarily flatten to some extent the belt to which a tubular shape is imparted by said tubular guide means so that it readily assumes the shape of the molding face.

In testimony whereof, I have signed my name to this specification.

CARL SEEL.