Sept. 11, 1956 P. BÖTTCHER 2,762,173

BELT GRINDING MACHINE FOR WOODWORK

Filed Nov. 16, 1955

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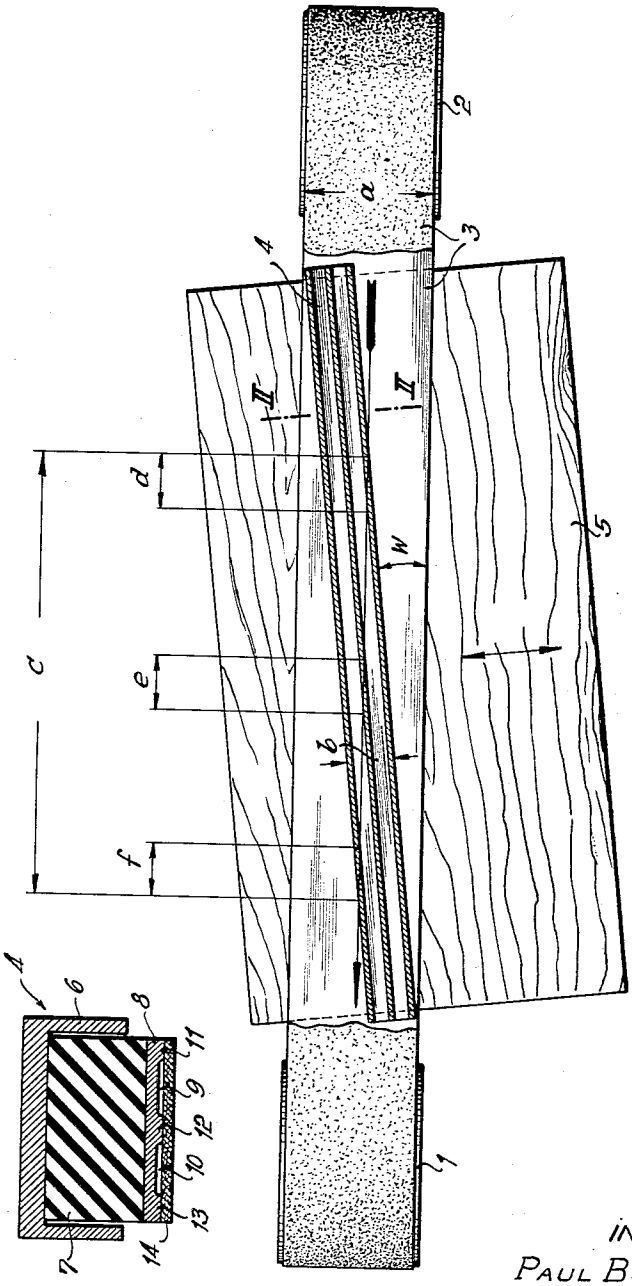


FIG. 1

FIG. 2

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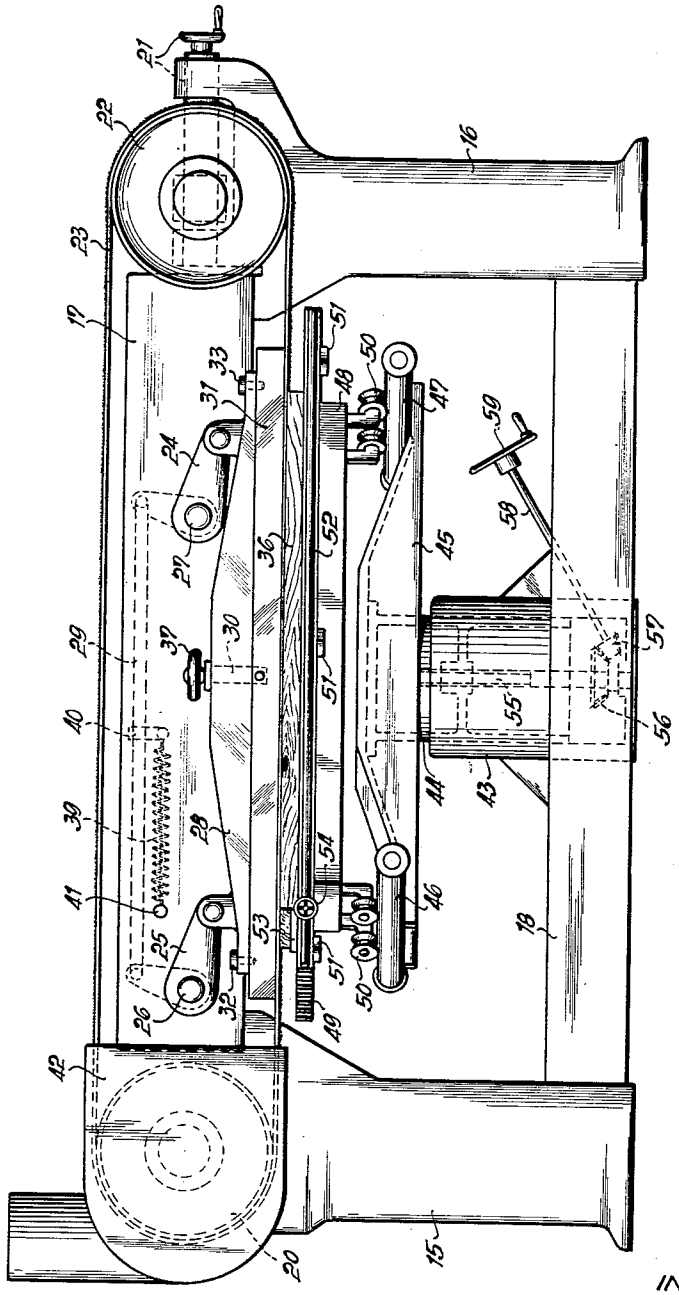
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FIG. 3



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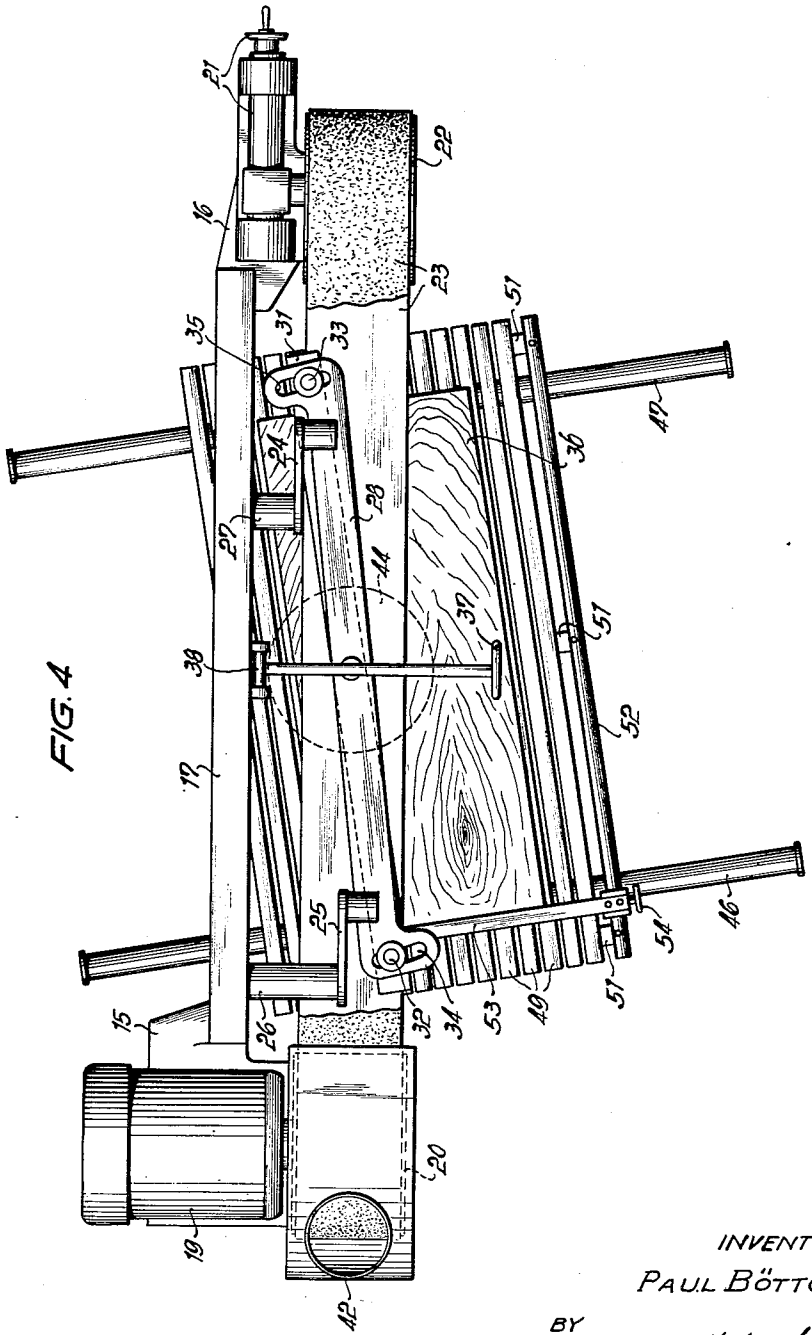


FIG. 4

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United States Patent Office 2,762,173 Patented Sept. 11, 1956

2,762,173

BELT GRINDING MACHINE FOR WOODWORK

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Application November 16, 1955, Serial No. 547,156
Claims priority, application Germany December 15, 1954
4 Claims. (Cl. 51—141)

The present invention relates to an improved belt grinding machine for woodwork.

In conventional belt grinding machines having a long grinding belt, a relatively short pressure shoe executes a reciprocating movement parallel to the direction of movement of the belt while the work is advanced in a direction perpendicularly to the running belt.

A pressure shoe which is reciprocated from one end to the other end of the workpiece, does not produce uniform machining, because the individual parts of the surface to be worked stay a longer or shorter time beneath the shoe, depending on the coaction of the transverse advance of the workpiece and of the longitudinal movement of the pressure shoe.

Even if pressure shoe and workpiece move automatically, the reciprocating pressure shoe returns only periodically to the same spot during each stroke while the workpiece, even if it advances uniformly, is pushed forward a correspondent step relative to the pressure shoe. It is therefore very difficult to obtain a smooth and uniform finish and one depends on the skill of the attendant. Compared with a cylinder grinding machine, working continually over the whole width of the machine, a belt grinding machine is very inefficient. Moving the pressure shoe by hand requires great muscular effort.

An object of the invention is the provision of a belt grinding machine, in which, similar to a cylinder grinding machine, the abrasive is continuously in contact with the surface of the workpiece over the whole effective width of the machine to produce a uniform surface on the advancing workpiece.

A simple lengthening of the pressure shoe to correspond with the width of the machine does not produce any useful results because of the great lengths of the workpieces.

The extent of contact between the grinding belt and the surface to be ground is limited by the filling up of the abrasive with grinding dust. A satisfactory grinding effect of the leading end of the machine does not continue to the middle part of the machine and disappears almost completely at the trailing end. The high pressure and power required by the rather large pressure surface exceeds the capacity of the belt driving means and much heat is developed during a great part of the travel of the belt because the accumulation of grinding dust makes the abrasive belt blunt and ineffective.

It is an object of the present invention to provide a grinding machine which overcomes the above described difficulties by furnishing the machine with a pressure beam extending over the whole width of the machine and by arranging the abrasive belt in such position relatively to the beam that the individual abrasive grains sweep only over a part of the beam. This is accomplished by making the pressure beam relatively narrow and the abrasive belt relatively wide and by mounting the beam at a slant with respect to the belt. Thus the length of the grinding path for each grinding grain is no longer determined by the length of the pressure beam, but by its width in

combination with its slanting position. With this arrangement sharp grinding grains act uniformly along the whole length of the pressure beam. The thus obtained shorter grinding path may be further shortened by providing recesses in the pressure surface of the pressure beam.

The machine according to the invention produces a continuous grinding effect over the whole length of the pressure beam without excessively lengthening the path of the grinding grains below the pressure surface or enlarging the latter. The slanting position of the pressure beam is so chosen, that the grinding belt is uniformly effective over its whole width and over the whole length of the workpiece.

The known advantages of the belt grinding machine can only be maintained with such a long and stationary pressure beam, if the latter is uniformly, elastically, and softly pressed on to the belt over the whole length of the beam. To this end the pressure body of the beam may be constructed of any material having appropriate natural elasticity or additional elastic elements, for example, springs or pneumatic means may be provided.

The novel features which are considered characteristic of the invention are set forth with particularity in the appended claims. The invention itself however and additional objects and advantages thereof will best be understood from the following description of one embodiment thereof when read in connection with the accompanying drawing, in which:

Fig. 1 is a schematic top view of the vital parts of a belt grinding machine according to the invention;

Fig. 2 is a sectional view of a pressure beam or bar forming part of the machine shown in Fig. 1, the section being taken along line II—II in Fig. 1;

Fig. 3 is a front elevation of a machine according to the invention;

Fig. 4 is a top view of the machine shown in Fig. 3.

The same numerals designate the same parts in all figures.

In Fig. 1 the relative positions of a workpiece 5, a grinding belt 3, and a pressure bar 4 are shown. The grinding belt 3 runs over two pulleys 1 and 2 in the conventional manner. The center part of the upper run of the belt 3 is broken away to make visible the parts lying beneath. The pressure bar 4 is placed at an angle w obliquely to the running direction of the belt 3 which has a smooth rear surface abutted by the pressure bar and an abrasive front surface which is pressed onto the work. The workpiece 5 is below the belt 3 and is moved at a right angle to the pressure beam 4, as shown by the double arrow.

Fig. 2 shows in section a simple construction of the beam 4, consisting of a pressure case 6 and a pressure body made of two parts 7 and 8. The actual pressing is done by the lower part 8 of the body which part consists a material flexible in longitudinal direction and somewhat stiff in transverse direction. The desired great elasticity of the pressure bar is produced by the part 7, which is mounted between the pressure case 6 and the lower part 8, and which is made of very elastic material. As seen in the figure the pressing surface of the part 8 is provided with grooves 9 and 10, leaving longitudinal ribs 11, 12 and 13 to engage the belt 3. In order to reduce friction and heating the active surface of the part 8 is covered with a layer of felt 14 or a similar substance, in the conventional manner.

As seen in Fig. 1, the width a of the grinding belt 3 is considerably greater than the width b of the pressure bar 4. The slanting position of the latter is such that the pressure bar, though being narrow, covers the whole width of the grinding belt, making operative the full width of the belt. A grinding grain moving in the direction of the arrow on the belt from right to left over the total

length of the workpiece travels under the pressure beam over a distance *c*, which is considerably shorter than the length of the workpice. This effective path *c* is not determined by the length of the workpiece, but by the width *b* of the pressure bar and by the angle *w*. Since the pressure surface of the bar is provided with grooves **9** and **10** (Fig. 2), the abrasive grain is active only while passing over the ribs **11**, **12** and **13** and while traveling the distances *d*, *e* and *f*. With the arrangement according to the invention a considerably shorter grinding path, consisting of the three sections *d*, *e*, and *f*, is obtained than in conventional machines in which the grinding path is as long as the workpiece.

Figs. 3 and 4 show a belt grinding machine incorporating the above described features of the present invention.

The frame of the machine includes a left upright **15** and a right upright **16** interconnected by top and bottom traverses **17** and **18**, respectively. An electric motor **19** having a belt drive pulley **20** is mounted on the left side of the machine. A suction hood **42** is provided for removing dust. On the right hand side of the machine, an idler pulley **22** is mounted to a tensioning device **21** of the usual kind. A grinding belt **23** is running over the two pulleys **20** and **22**. Angle levers **24** and **25** swing on stationary pivots **26** and **27**, respectively, which are mounted to the upper traverse **17**. A pressure beam **28** is articulated to the horizontal arms of these angle levers **24** and **25**. The vertical arms of the levers **24** and **25** are connected by a bar **29**, so that the beam **28** moves up and down in its horizontal position upon rotation of the levers **24** and **25**. A pressure beam case **31** is pivotally mounted on a bolt **30** and is connected by means of screws **32** and **33** to the bottom side of the beam **28**. Slots **34** and **35** afford rotation of the beam case **31** on the bolt **30** for adjusting the position of the case **31** relative to the beam **28** according to the width of the grinding belt and of the length of the workpiece **36**. A hand lever **37** is pivotally mounted at **38** to the upper traverse **17** for pressing the pressure bar **28** onto the workpiece **36**. The weight of this pressure and suspension system is counterbalanced by a spring **39** arranged within the upper traverse **17** between a nose **40** connected with the bar **29** and a stationary bolt **41**.

A shaft **44** carrying a supporting frame **45** is longitudinally slidable in a vertical guide **43** which is connected with the bottom traverse **18**. The frame **45** carries two round bars **46** and **47**, which serve as a guide way for rollers **50** of a work table consisting of a frame **48** and laths **49** screwed thereto. A round bar **52** is mounted on three supports **51** at the front side of the frame **48**, an abutment rule **53** being attached to the bar **52** which rule may be shifted as required and fixed in the desired position by manipulating a hand-wheel **54**. The workpiece **36** rests on the laths **49** and abuts against the rule **53**. The elevation of the shaft **44** together with that of the work table can be adjusted according to the thickness of the workpiece by rotating a threaded spindle **55** which is provided with bevel gears **56** and **57** for this purpose, the latter being rotated by a shaft **58** provided with a hand-wheel **59**. By turning the shaft **44** the work table can be so positioned that the direction in which the workpiece is advanced is at a right angle to the respective position of the obliquely arranged pressure beam case **31**.

In the illustrated embodiment of the invention the feed of the workpiece is effected by a reciprocating work table. This table may be reciprocated by any known automatic means and may also be replaced by continually driven endless chains or caterpillar chains. Such feed elements are no objects of the invention.

What is claimed is:

1. A belt grinding machine for working wood including a stationary pressure bar extending over the working width of the machine, a grinding belt having an abrasive front surface and a smooth rear surface, the latter being abutted by said pressure bar for pressing the front side of said belt onto the workpiece, said belt being substantially wider than said pressure bar and the longitudinal axis of the latter being placed at a slant to the longitudinal axis of said belt.

2. A belt grinding machine as defined in claim 1 in which the surface portion of said bar which abuts against the rear side of said belt is provided with longitudinal recesses.

3. A belt grinding machine as defined in claim 1 including a work table which is adapted for advancing the work in a direction which is at a right angle to the longitudinal axis of said pressure bar.

4. A belt grinding machine according to claim 3 in which said work table as well as said pressure bar are rotatable on an axis which is perpendicular to the grinding plane for adjusting the relative position of said grinding belt, of said work table and of said pressure bar to suit work of different width.

No references cited.