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GRINDING MACHINE

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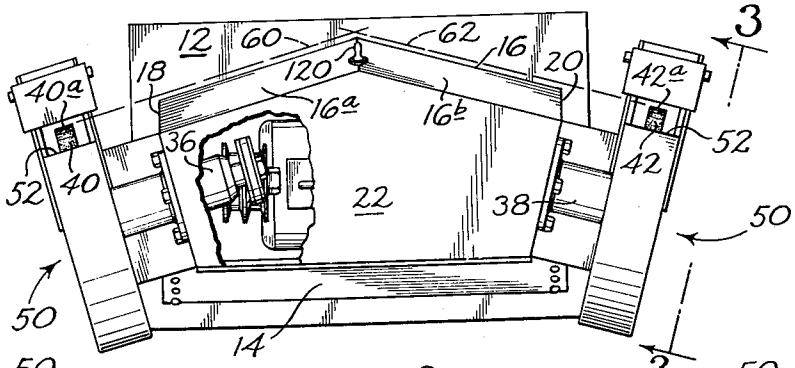


Fig. 2.

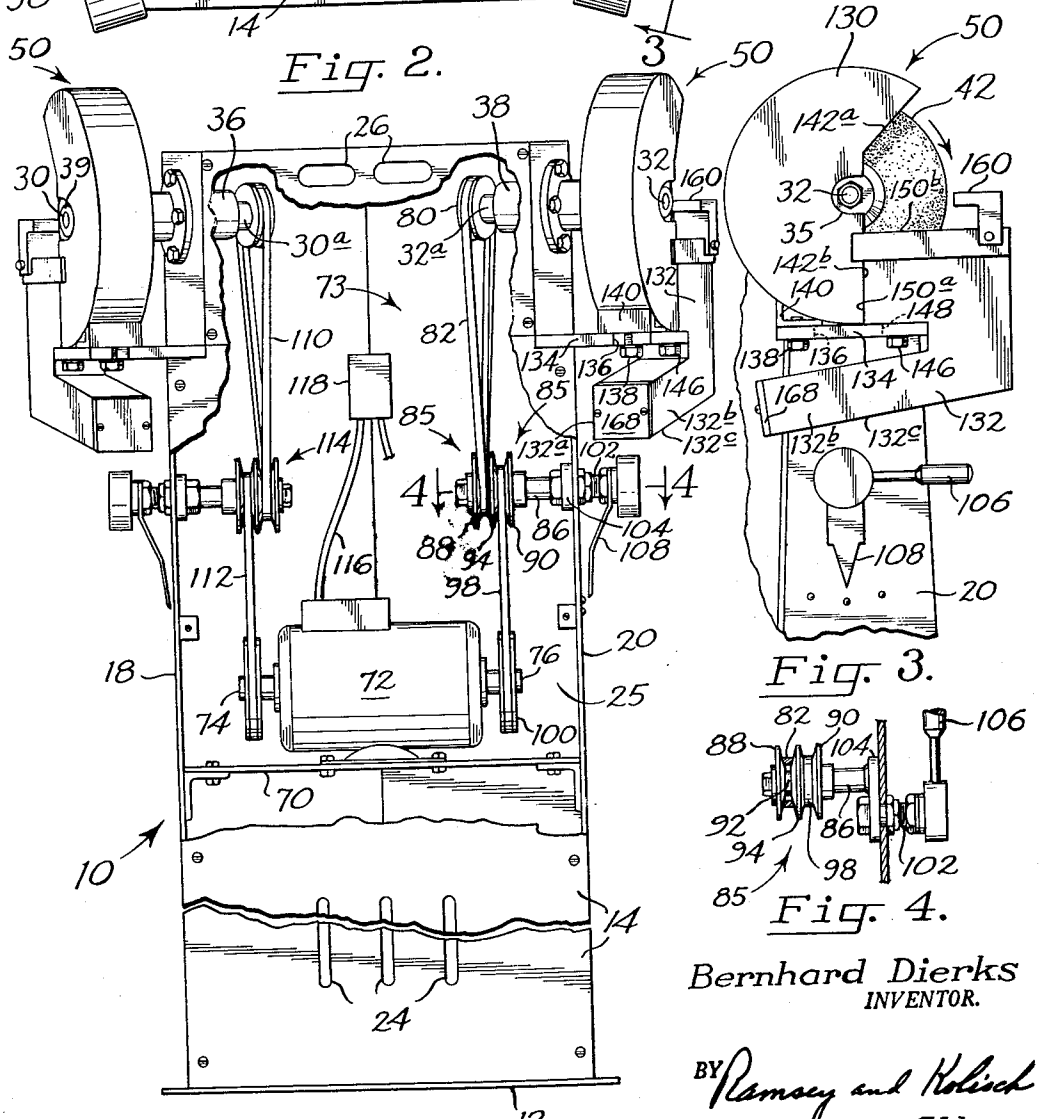


Fig. 1.

Fig. 3.

Fig. 4.

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GRINDING MACHINE

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This invention relates to grinding machines, such as may be used in a machine shop and the like for smoothing and finishing work. It more particularly relates to an improved grinding machine having a pair of grinding wheels mounted so that each can be used with equal facility, and with the presence of one wheel not appreciably affecting the usefulness of the other. The machine of the invention also features novel hood structure covering the grinding wheels, and novel drive means for the grinding wheels enabling them to be rotated at various speeds.

A general object of the invention is to provide an improved grinding machine that has a pair of grinding wheels disposed with one off to one side of the other, and arbors disposed at oblique angles mounting the wheels. The position of the arbors and wheels is such that one end of an elongated object can be ground on one wheel without interference caused by the other end of the object engaging the unused wheel.

Another object is to provide an improved grinding machine having a pair of grinding wheels or arbors set at oblique angles, that also includes novel drive mechanism for rotating the arbors constructed so that the speed of each wheel is adjustable independently of the other.

Another object is to provide such a grinding machine wherein the grinding wheel arbors are powered by a single motor with an output shaft extending from opposite ends, each of these being connected by a belt and pulley construction to a grinding wheel arbor disposed thereabove, and each belt and pulley construction having means for varying the driven speed of its arbor.

A related object is to provide a grinding machine where such belt and pulley constructions are fully protected from abrasive particles such as might damage them.

Another object is to provide novel hood structure for a grinding wheel, that is operable to trap substantially all material thrown off by a wheel, and that easily may be removed completely to expose the wheel.

Other objects and advantages are attained by the invention, and the same is described hereinbelow in conjunction with the accompanying drawings, wherein:

FIG. 1 is an elevation of a grinding machine constructed according to an embodiment of the invention, illustrating the rear of the machine, and with portions of housing structure present broken away to illustrate details of construction;

FIG. 2 is a top view looking down at the grinding machine illustrated in FIG. 1;

FIG. 3 is a side view of the machine illustrated in FIG. 1, along the line 3—3 in FIG. 2; and

FIG. 4 is a cross-sectional view taken along the line 4—4 in FIG. 1.

Referring now to the drawings, 10 indicates generally an upstanding frame for the machine. This comprises a base plate 12, which normally rests on a floor, and extending up from the base plate and defining a hollow housing structure a rear wall 14, front wall 16, and side walls 18, 20. The top of the housing structure is closed off by a plate 22. Openings 24, 26, adjacent the bottom and top of rear wall 14, provide for the circulation of air through space 25 within the housing structure. The housing structure completely encloses space 25, save for these openings. In FIG. 1, portions of wall 14 have been broken away better to illustrate the interior of the housing structure.

Adjacent the top of the housing structure and protruding out from side walls 18 and 20 are a pair of horizontal grinding wheel arbors 30, 32. Wheel arbors 30, 32 are journaled in suitable bearing structure, indicated for arbor 30 at 36 and for arbor 32 at 38. At the outer end of each grinding wheel arbor, and secured thereon as by a nut 39, is a grinding wheel, indicated for the two arbors at 40 and 42.

The grinding wheel arbors have an inner, adjacent set of ends, indicated at 30*a* and 32*a*, respectively. The arbors extend away from each other progressing from their adjacent ends and terminate at outer ends that are spaced apart. It will also be noted, with reference to FIG. 2, that the arbors are disposed at an obtuse angle. Because of this position of the arbors, the planes of the grinding wheels 40, 42 secured to the outer ends of the arbors diverge from each other progressing outwardly from one side of the arbors toward the front of the grinding machine.

Hood structure, indicated generally at 50, is provided each grinding wheel, and the hood structure substantially completely surrounds the edge of the grinding wheel save for an opening 52 exposing an edge portion of the wheel adjacent the front of the grinding machine. Such edge portions are indicated at 40*a*, 42*a*. These edge portions constitute the working edge portions of the grinding wheels, as these engage work while the same is ground.

Referring again to FIG. 2, front wall 16 comprises a pair of inclined portions 16*a*, 16*b*. These are disposed at an obtuse angle, and diverge from each other progressing from the center of the machine outwardly toward its sides in FIG. 2. It will also be noted that grinding wheels are selected having diameters of such size that the exposed, working edge portions of the wheels protrude forwardly of the planes of the inclined wall portions that are adjacent. Straight lines (indicated at 60, 62) paralleling the saw arbors and touching the exposed edge portions of the wheels when extended inwardly intersect in front of the machine without encountering obstruction by the machine. Because of this, elongated pieces may be ground on either of the wheels, without interference caused by the unused wheel. For example, if the left wheel in FIG. 2 (wheel 40) is used to grind a piece, and it extends out to the right a considerable distance, such piece will clear wheel 42. This is true even though the piece is inclined somewhat relative to the plane of wheel 40, as is often done when grinding a piece.

The grinding wheel arbors are driven by an electric motor 72 and a power-transmitting means 73 disposed in space 25 within the housing structure. Thus, the parts are protected from the usual dust that results from grinding. A pulley belt power-transmitting means is desirable, since it provides flexibility and is easy to operate and to maintain.

More particularly, and with reference to FIG. 1, secured to side walls 18, 20 of frame 10 is a horizontal platform 70. This platform provides a mounting for electric motor 72 with the motor directly below the inner ends of arbors 30, 32. Motor 72 has a pair of output shafts extending out from opposite ends, and indicated at 74, 76. Output shaft 74 is below and approximately parallels arbor 30, and shaft 76 is below and approximately parallels arbor 32.

Explaining now power-transmitting means 73, and considering first the driving connection of shaft 76 with arbor 32, secured to the inner end of arbor 32 is a pulley 80. Trained over the pulley and extending down therefrom is a pulley belt 82. The lower part of belt 82 is trained over a pulley assembly 85.

With reference to FIGS. 1 and 4, pulley assembly 85 has a pair of outer pulley halves 88, 90 fixed to a hub 92.

Hub 92 is journaled on a stub shaft 86. Between the pulley halves and shiftable axially on hub 92 is a pulley element 94. The lower part of belt 82 travels around assembly 85 while passing between pulley half 88 and element 94.

Trained over pulley assembly 85 and extending downwardly therefrom is a pulley belt 98. This travels around the assembly while passing between pulley half 90 and pulley element 94. The lower part of belt 98 is trained over a pulley 100 connected to output shaft 76 of the motor.

Stub shaft 86 is secured to a turn shaft 102 through a link 104. The turn shaft extends through a side wall of frame 10, and has a handle 106 connected thereto, as well as an indicator arm 108. On swinging of the handle the shaft is rotated, and this swings link 104 together with stub shaft 86 affixed thereto.

In FIG. 1 the pulley assembly 85 is positioned to one side of turn shaft 106 at aproximately the level of the turn shaft. On swinging the outer end of link 104 upwardly in FIG. 1, pulley assembly 85 is raised, and this tensions belt 98 and relaxes belt 82. As a result, belt 98 tends to move into assembly 85 between element 94 and pulley half 90, causing shifting of element 94 to the left and movement of belt 82 outwardly between element 94 and pulley half 88. The shiftable pulley element will adjust itself automatically so that tensions in the two belts are approximately equal, and with this adjustment the effective diameters of the means training the two belts is changed. Swinging of handle 106 in the opposite direction produces shifting of element 94 in the opposite direction. The construction provides a way for controlling and varying the speed of wheel 42 using a constant speed electric motor 72.

The driving connection of shaft 74 with arbor 30 is substantially the same as the one just described. Here belts 110, 112 pass over a pulley assembly 114 similar to pulley assembly 85. Assembly 114 permits control in the speed of wheel 40, and this is independent of any variation in the speed of wheel 42.

Electric motor 72 is supplied current through line 116 which connects with a switch box 118 used in turning the motor on and off. Switch box 118 encloses a switch (not shown) actuated by toggle handle 120 (see FIG. 2).

Considering now hood structures 50 enclosing the wheels, these are similar to each other and only one will be described in detail. With reference to the right hood structure in FIG. 1, and referring to FIGS. 1 and 3, this comprises a top cover section 130 and a bottom cover section 132. The two cover sections together surround a major portion of the periphery and sides of wheel 42. This is done in order that substantially all material thrown by the wheel during grinding be caught within the hood structure. Joined to frame 10 and extending out from a side is a mounting bracket 134, and this mounting bracket is used to mount cover section 130, 132 in covering relation about the wheel.

Bracket 134 has extending in from its rear edge a slot 136. Slot 136 accommodates the shank of a screw 138 that passes through the slot with section 130 mounted in place. Screw 138 is connected to cover section 130 by screwing it into an accommodating threaded bore provided in a mounting 140 which is part of cover section 130.

To remove cover section 130, screw 138 is loosened on mounting 140, which allows the cover section to be shifted to the left in FIG. 3 and perpendicularly of the axis of wheel 42 to a position off the machine and completely withdrawn from the wheel. During the removal of the section, screw 138 passes out through slot 136 until it is free of bracket 134. Cover section 130 on separation from section 132 has an opening defined by edges 142*a*, 142*b* that is larger than the wheel diameter, so that it can be completely withdrawn from the wheel by such shifting.

Cover section 132 is mounted on bracket 134 in a similar manner, by means of screw 146. Screw 146 extends through a slot 148 in mounting bracket 134 extending in from the front edge of the bracket. When the screw is loosened, the section may be backed off from wheel 42, with edges 150*a*, 150*b* defining an opening of sufficient size to enable complete withdrawal of the cover section from the wheel.

A workpiece is supported during grinding by a support 160 joined to cover section 132. This supports the workpiece at approximately the level of the center axis of the wheel.

During operation of the grinder, a wheel rotates in the direction of the arrow in FIG. 3. This tends to throw material from the wheel into a cover section, with the majority of such material dropping into the bottom cover section 132. The bottom cover section has walls 132*a*, 132*b*, 132*c* that define a rectangularly shaped collecting chamber for collecting such material. This chamber, as can be seen in FIG. 3, inclines downwardly from the grinding wheel, and is provided with a detachable plate 168 that can be removed from section 132 to leave an opening in this chamber. With the plate 168 removed, it is a simple matter to clean material from the cover section.

The hood structure described enables easy removal or replacement of a grinding wheel when such is necessary. All that need be done is to loosen screws 138, 146, which permits the top and bottom cover sections to be separated from each other thus completely to expose a wheel. While the sections are easily detached, they provide an excellent shield when properly mounted in place.

While an embodiment of the invention has been described, variations and changes are possible without departing from the invention. It is intended to cover all modifications and variations that would be apparent to one skilled in the art, and that come within the scope of the claims below.

It is claimed and desired to secure by Letters Patent:

1. In a grinding machine; an upstanding frame including a hollow housing; a motor with horizontally disposed output shafts extending from the ends thereof mounted within the housing; a pair of substantially horizontal grinding wheel arbors mounted adjacent the top of the housing having adjacent inner ends and an outer spaced-apart set of ends; one of said arbors being vertically above and angularly positioned relative to one of said output shafts, and the other of said arbors being vertically above and angularly positioned relative to the other of said output shafts; variable speed pulley and belt means connecting the inner end of said one arbor and said one shaft, and variable speed pulley and belt means connecting the inner end of said other arbor and said other shaft; each of said variable speed pulley and belt means comprising a double pulley assembly spaced between the arbor and shaft, a belt connecting the double pulley assembly and arbor, and a belt connecting the double pulley assembly and shaft; said double pulley assembly having a mounting whereby the same is shiftable in a vertical direction and including means whereby on shifting of its position the tension of the belts remains substantially the same.

2. In a grinding machine, a frame, a pair of grinding wheel arbors journaled on the frame with one set at an angle with respect to the other, a motor including output shaft means disposed at an angle with respect to at least one of said grinding wheel arbors, and means producing a driving connection between the output shaft means of said motor and each of said grinding wheel arbors, said last-mentioned means comprising, for said one of said arbors, a belt driving the arbor, a belt driven by the output shaft means of said motor, and means drivingly interconnecting the belts and adjustable to produce a change in the ratio of the speeds of the two belts.

3. In a grinding machine, a frame, a pair of substantially horizontal grinding wheel arbors journaled on the

frame with one arbor disposed at an angle relative to the other, a motor mounted to one side of said arbors on said frame and including output shafts extending out from opposite ends thereof, and means producing a driving connection between each of said grinding wheel arbors and an output shaft of said motor, said means comprising a belt driving the grinding wheel arbor, a belt driven by the output shaft of the motor, and a double pulley assembly interconnecting the two belts whereby one drives the other, said double pulley assembly being adjustable to produce a change in the ratio of the speed of the two belts, and including means whereby on adjustment the tension of the belts remains substantially the same.

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