

May 7, 1957

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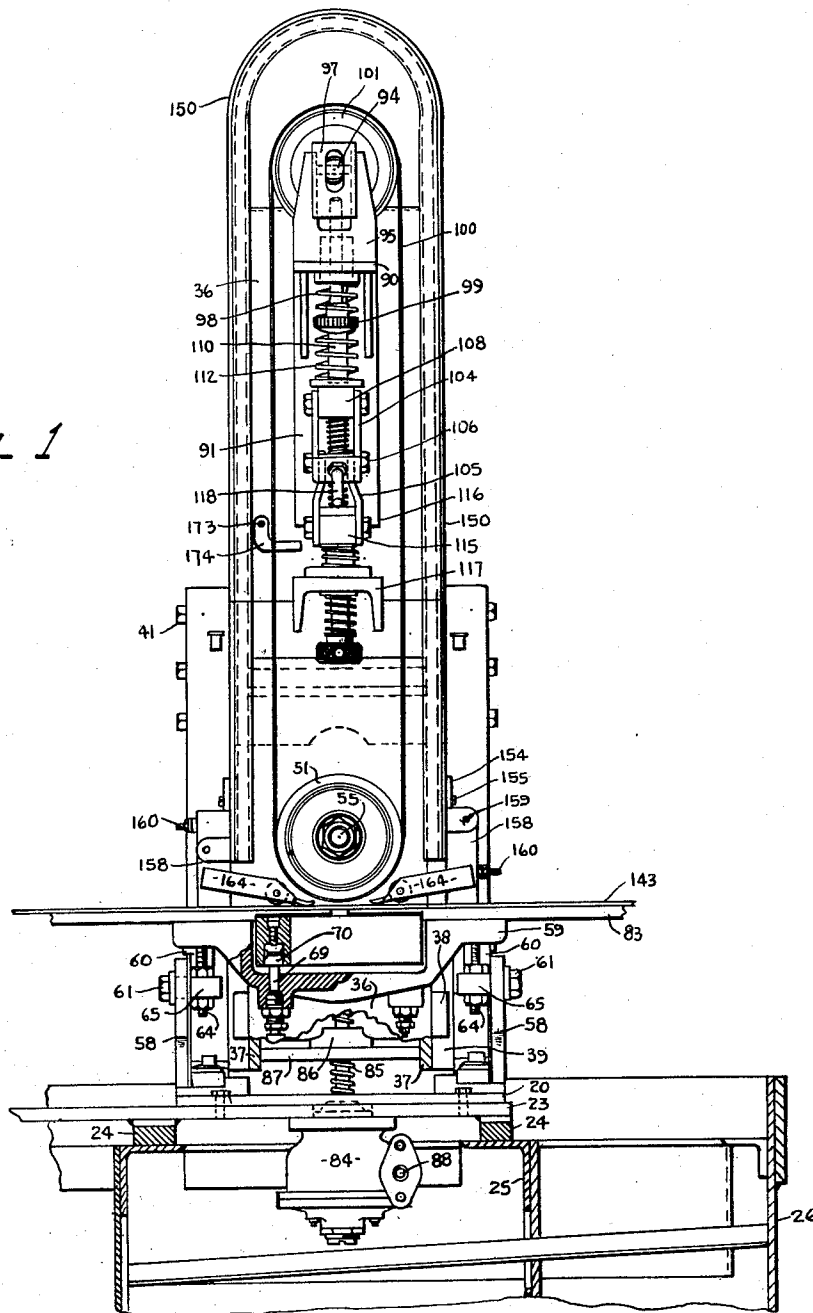
2,791,070

ABRADING MACHINE

Filed March 23, 1956

6 Sheets-Sheet 1

Fig. 1



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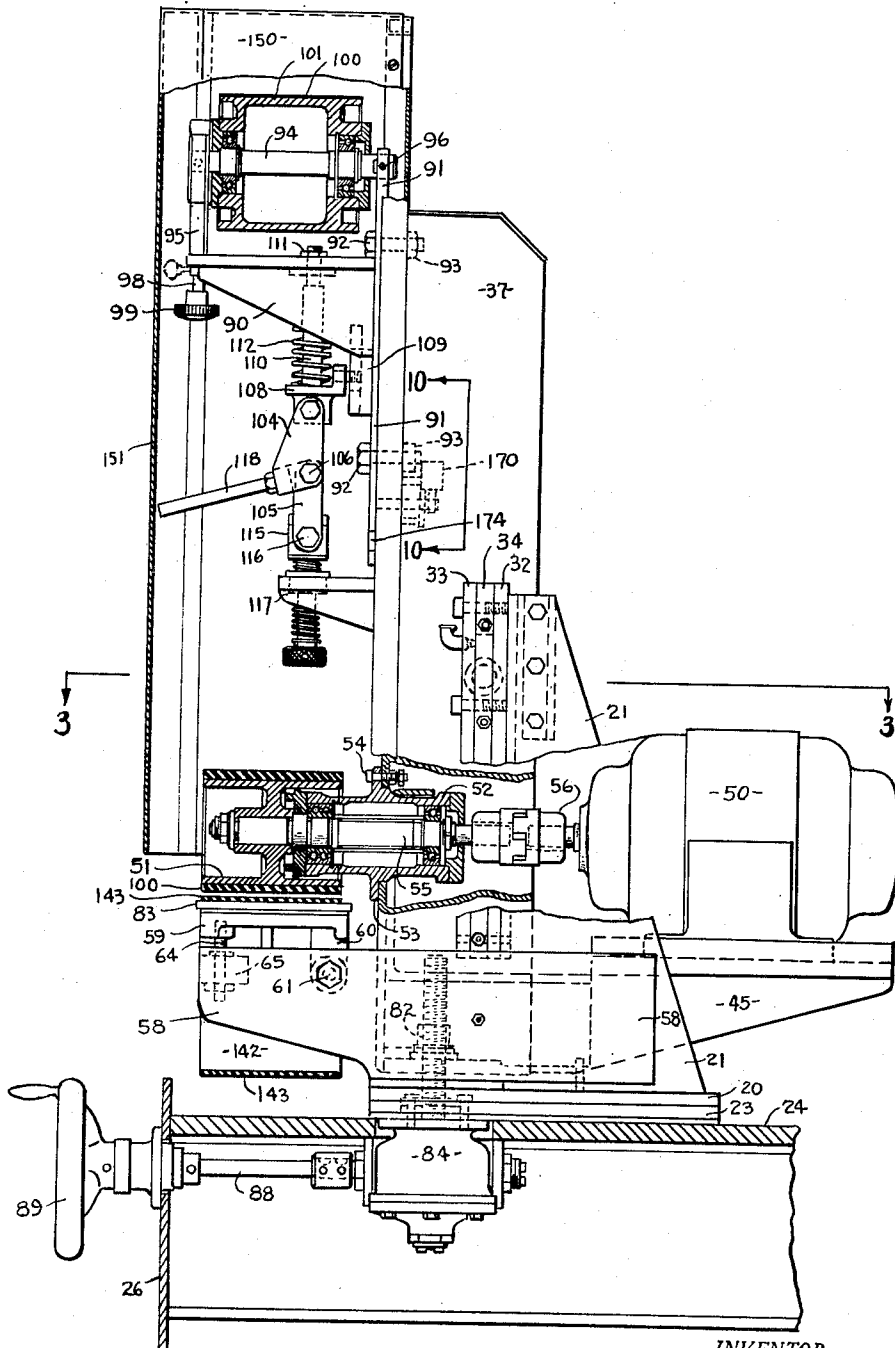


Fig. 2

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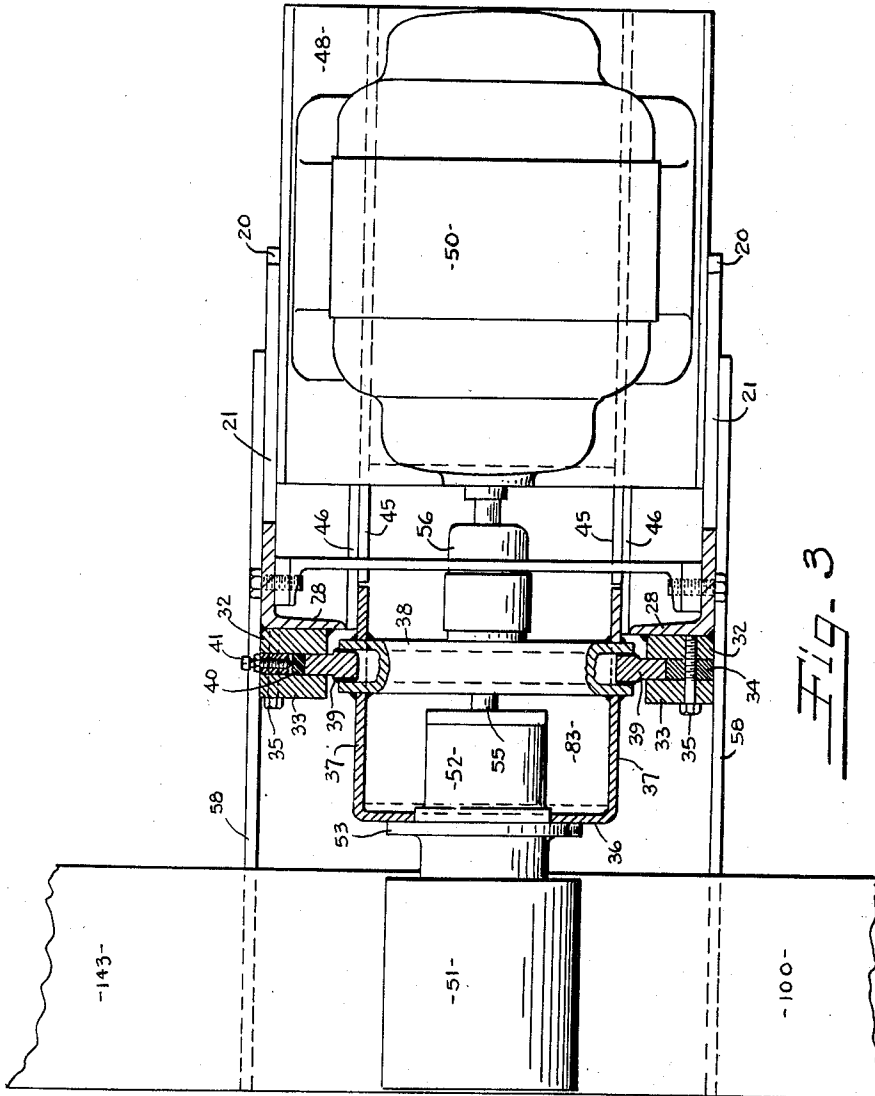


Fig. 3

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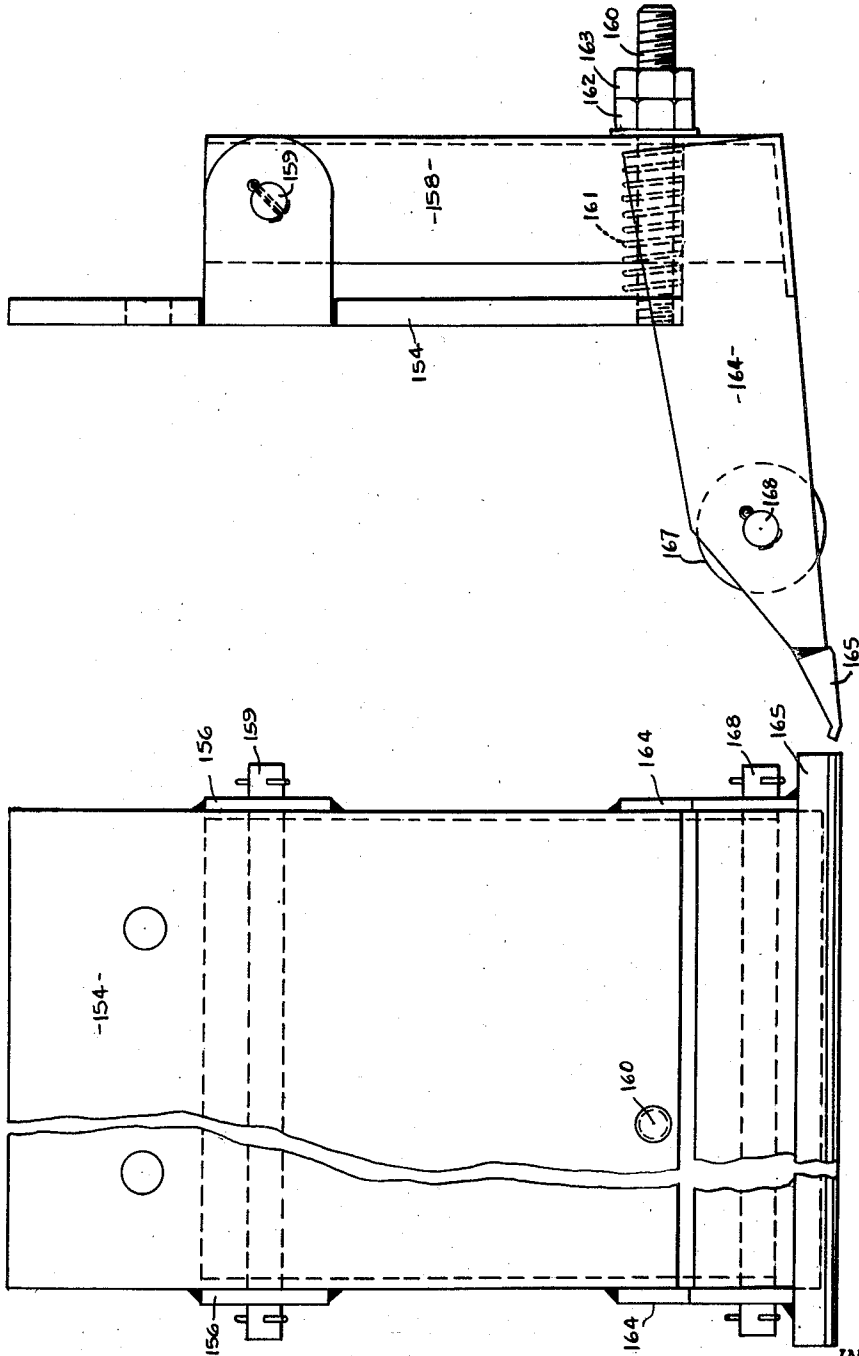


FIG-6

FIG-7

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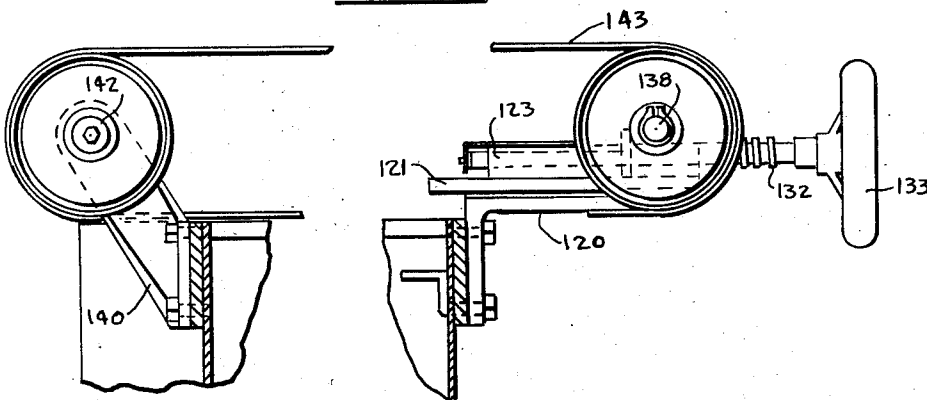
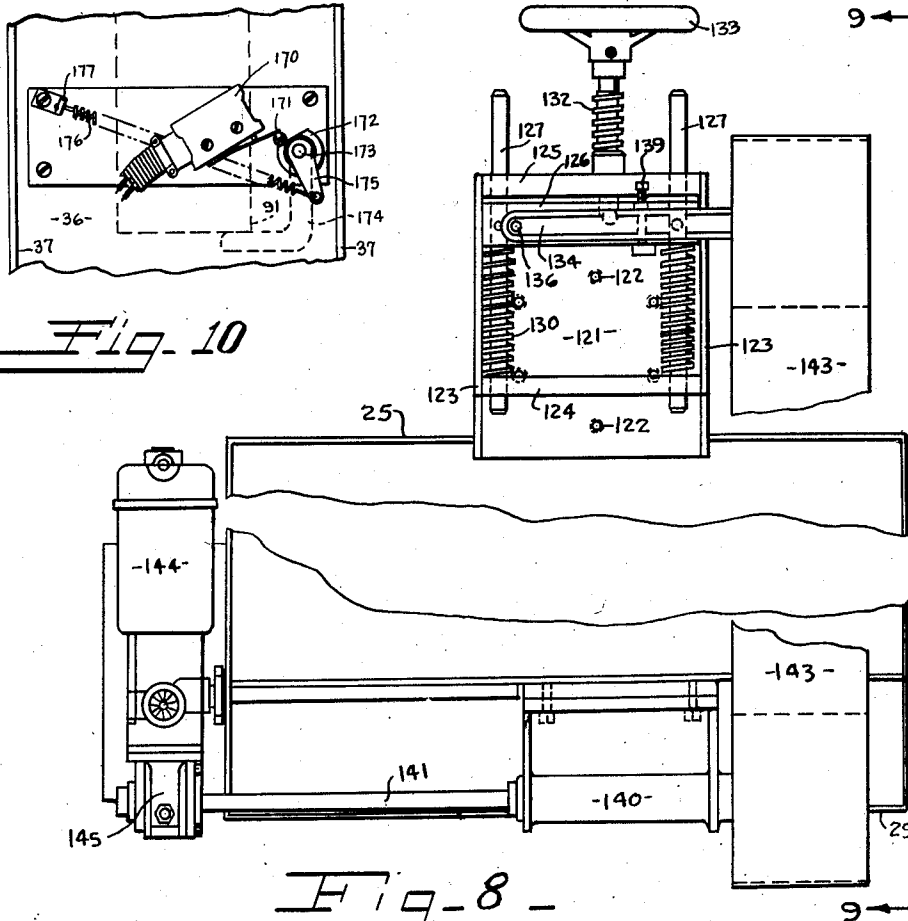


Fig. 9

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2,791,070

ABRADING MACHINE

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11 Claims. (Cl. 51—138)

This invention relates to abrading machines of the type wherein the abrading is performed by an endless abrading belt trained over a contact roll and an idler roll. The work pieces are advanced by a conveyor belt toward and under the contact roll whereby the work pieces have tangential contact with the abrading belt as it travels about the contact roll. Such abrading machines are used extensively for grinding and polishing work pieces having a surface or surfaces on one side in a plane extending parallel to a surface or surfaces on the opposite side of the work piece. The conveyor belt is supported below the contact roll by a platen, and the machine embodies means for effecting relative movement between the contact wheel and the platen for accommodating work pieces of different thicknesses.

This invention has as an object an abrading machine of the type described embodying a particularly compact and efficiently operating structure for abrading work pieces formed of ferrous or non-ferrous materials and especially work pieces having a small thickness dimension.

The invention consists in the novel features and in the combinations and constructions hereinafter set forth and claimed.

In describing this invention, reference is had to the accompanying drawings in which like characters designate corresponding parts in all the views.

In the drawings—

Figure 1 is a front elevational view with parts in section and parts omitted.

Figure 2 is a side elevational view looking to the left, Figure 1, with parts in section.

Figure 3 is a view taken on line 3—3, Figure 2.

Figure 4 is a top plan view of the platen.

Figure 5 is a view taken on line 5—5, Figure 4.

Figure 6 is a front elevational view of one of the work hold down members.

Figure 7 is a view looking to the left of Figure 6.

Figure 8 is a top plan view of the conveyor mechanism.

Figure 9 is a front elevational view of the conveyor mechanism, as indicated by the line 9—9, Figure 8.

Figure 10 is a view taken on a line corresponding to line 10—10, Figure 2, of the switch actuating mechanism for controlling the circuit to the operating motor.

The base of the machine consists of a plate 20 to each side of which there is fixedly secured a vertically extending side plate 21 of general triangular shape, see Figures 2 and 3. The base plate 20 is mounted on a plate 23 positioned on bars 24 supported by angle members 25 extending transversely of a tank structure 26 which serves as a support for the machine and also a cabinet for containing coolant liquid. The plates 21 are bent inwardly at their forward edges to form inwardly extending flanges 28, see Figure 3. A bar 32 is fixedly secured to each of the flanges 28 as by welding and forms part of vertical guideways, these guideways being completed by outer gib members 33 and spacer bars 34, the assembly being held together by cap screws 35 threading into the bars 32.

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A vertically disposed frame is slidably mounted in these guideways. This frame consists of a U-shaped member having a front wall 36 and side walls 37. At spaced intervals, tubular members 38 extend transversely through the side walls 37 of the frame and are welded thereto. The outer projecting end portions of the tubular members 38 are slotted and guide bars 39 are positioned in these slots and welded to the tubular members 38. These bars extend into and have slidable relation with the guideways 32, 33, 34. One of the guideways is provided with a gib 40 engaging the outer edge of the contiguous bar 39, and the gib 40 is adjustable by screws 41.

The frame further includes a pair of rearwardly extending plates 45 arranged in abutting relation to the lower end portions of the side walls 37 and being fixed thereto by overlapping patch members 46, see Figure 3. A plate 48 is mounted upon the members 45 and forms a support for a motor 50 which provides power for effecting rotation of a contact roll 51.

The front wall 36 of the frame is apertured to receive a spindle housing 52 having a radial flange 53 overlying the end wall 36 and being secured thereto as by bolts 54, see Figures 2 and 3. A spindle or shaft 55 is journaled in the housing 53 in suitable antifriction bearings, and the contact roll 51 is operatively connected to the motor 50 by a coupling 56. A plate 58 is fixedly secured to the outer surface of each of the plates 21 at the lower end portion thereof, see Figures 2 and 3. These side plates 58 of the base structure extend forwardly below the contact roll 51 and serve to support a platen 59. The forward portion of the platen is engaged by adjusting screws 64 threaded in bosses 65 secured to the inner surface of the side plates 58. These screws 64 serve to level the platen or move it about the pivot bolts 61 to bring the platen in parallel relation to the axis of the contact roll 51.

In the embodiment shown, the platen 59 consists of a yoke-like structure having a centrally located recess. A magnetic chuck member is mounted in the recesses of the yoke, see Figures 4 and 5. The bottom wall of the platen recess is formed with bosses 66 threaded to receive sleeves 67 having hexagonal heads 68. These sleeves are internally threaded to receive adjusting screws 69. These screws are formed with enlarged head portions 70 mounted in recessed bosses 71 formed in the chuck body. The screws are fixedly secured in the bosses by screws 72. The threads on the sleeves 67 and screws 69 are of different pitch to provide for fine adjustment upon rotation of the sleeves. The sleeves and screws are locked in adjusted position by jam nuts 73, 74.

The chuck body is formed with a transversely extending rib 75. Metal plates 76 are secured to the sides of the chuck body as by screws 77, and to the rib 75 by screws 78. Magnets 79 are supported by the plates 76 by screws 80. A division member 81 of non-magnetic material is interposed between the confronting edges of the plates 76 and the chuck assembly is overlaid by a thin steel plate 82. Plates 83 are secured to the side portions of the yoke member to form a marginal surface flush with the plate 82.

The base plate 23 has secured to it a worm gear housing 84, Figures 1 and 2, and from which vertically extends a screw 85 threading into a nut 86 mounted in a plate 87 fixedly secured in the bottom of the U-shaped frame member 36, 37. The worm of the reduction gearing mounted in the housing 84 is actuated by a shaft 88 extending outwardly through the front wall of the cabinet 26 and provided with a hand wheel 89. With this arrangement the frame, including the contact roll 51 and the motor 50, may be adjusted toward and from the platen 59.

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A bracket 90 is mounted on an elongated plate 91 which is formed with elongated lengthwise extending slots to receive screws 92 which are threaded into the front wall 36 of the frame column and are provided with jam nuts 93. The plate 91 extends upwardly above the bracket 90 and forms an inner support for a shaft 94. A plate 95 extends upwardly from the front end of the bracket. The shaft 94 is pivotally mounted to the plate 91 on a pin 96. The forward end of the shaft 94 is mounted on a pin positioned in a block 97 which is slidably mounted in the plate 95. The block 97 is adjusted vertically by means of a screw 98 provided at its lower end with a hand wheel 99. This arrangement is to adjust the angularity between the axis of the shaft 94 and the contact roll shaft 55 to effect proper tracking of the abrasive belt 100 which is trained about the contact roll 51, and an idler roll 101 journalled on the shaft 92.

The bracket 87 is moved vertically, relative to the frame, by toggle links 104, 105, joined together at like ends by a pivot pin 106. The upper ends of the links 104 are pivotally connected to a collar 108 also having a sliding connection with a block 109 carried by plate 88. This collar carries an upwardly extending stem 110 extending through the bracket 87, and being provided at its upper end with a nut 111. The stem 110 is encircled by a helical compression spring 112 acting between the collar 108 and the bracket.

The lower ends of the links 105 are pivotally joined to a collar 115 by pin 116. This collar 115 is supported by a stem threaded into a bracket 117 fixedly mounted in the frame. The links 104 are provided with an operating handle 118 which, when moved upwardly from the position shown in Figure 2, breaks the toggle formed by links 104, 105, effecting downward movement of the collar 108 and the bracket 87. This effects downward movement of the idler roll 101 to permit for the convenient replacement of the abrading belt 100. Downward movement of the handle 118 effects straightening of the broken toggle, moving the roll 101 upwardly, and tension is maintained on the belt by spring 112. This tension may be adjusted by manipulation of the stem in the bracket 117.

A bracket 120 is fixedly secured to the side wall of the tank 26 at the right. A plate 121, Figures 8 and 9, is secured to the bracket 120, as by screws 122, and is formed with side members 123 and cross members 124, 125. A cross member 126 is fixedly mounted on a pair of guide pins 127 slidably mounted in the cross members 124, 125. The member 126 is urged outwardly by helical compression springs 130 mounted on the pins 127 and acting between the cross member 124 and the movable member 126. The cross member 126 is moved toward the member 124 against the action of the springs by a screw 132 operated by hand wheel 133. A bar 134 is positioned on the cross member 126 and is pivotally secured thereto at one end on a pin 136. This bar extends laterally from the bracket and has a pulley 138 journalled on it. The bar 124 is movable about the pin 136 by an adjustment screw 139.

A bracket 140 is fixedly secured to the opposite side wall of the tank 26 and has journalled in it a shaft 141 carrying another pulley 142. A conveyor belt 143 is trained over the pulleys 138, 142, with the upper run of the belt passing over the platen 57, or the magnetic chuck 70 carried thereby. The function of the belt 143 is to convey work pieces below the contact roll 51 so that the abrasive belt 100 can act upon the upper surface of the work pieces. The function of the magnetic chuck 70 is to pull work pieces of ferrous material more tightly against the conveyor belt. The conveyor belt 143 is tensioned by springs 130 and is properly tracked by screw 139.

The pulley 142 is rotated by a motor 144 connected to a gear reduction 145 which, in turn, is connected to the

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shaft 141. The abrasive belt 100 is contained within a casing 150 provided with a door 151, the door being removed in Figure 1. The machine is provided with hold down members for securing work pieces, formed of other than ferrous material, to the upper run of the conveyor belt. These hold down members, better illustrated in Figures 6 and 7, consist of a plate 154 secured to the side walls of the casing 150, as by screws 155, see Figure 1. The plates 154 are formed with out-turned ears 156 between which a channel member 158 is mounted for pivotal movement on pins 159. A bolt 160 is threaded into the lower end portion of each of the plates 154 and projects outwardly through an aperture in the bottom wall of the channel members 158. A helical compression spring 161 is interposed between the plates 154 and the bottom wall of the members 158 to urge the same outwardly from the plates about the pivot pins 159, this outward movement being limited by nuts 162 and lock nuts 163 threaded on the bolts 160.

Side plates 164 are fixedly secured to the sides of the channel members 158 and extend toward the contact roll 151. A shoe 165 is fixedly secured to the ends of the side plates 164, this shoe extending transversely of the upper run of the conveyor belt and a roller 167 is disposed between the plates 164 and is journalled on a pin 168 carried by the side plates. The arrangement is such that a work piece advancing on the conveyor belt towards the contact roll is engaged by the rollers 167, and upward movement of the rollers is yieldingly opposed by the springs 161. The shoes 165 are positioned in close proximity to the tangential engagement of the work piece by the belt 98 passing about the contact roll 51. In this manner, thin work pieces of other than ferrous material are maintained in tight engagement with the conveyor belt, and the belt is maintained against the surface of the platen and/or the magnetic chuck 70.

A switch 170 is mounted upon the wall 36 of the frame structure and has an actuator 171 engaging a cam 172. This cam is mounted on a shaft 173 journalled in the wall 36 and provided at its opposite end with an angle lever 174 positioned to be engaged by the lower edge of the plate 91 when the toggle is broken to effect downward movement of the bracket 90 to permit changing of the abrasive belt 100. The shaft 173 also has affixed to it a lever 175, and a tension spring 176 is secured at one end to this lever and at its opposite end to a bracket 177 fixed to the wall 36 of the frame. When the toggle is broken and the plate 91 is moved downwardly, it engages the lever 174 effecting oscillation of the shaft 173 and actuation of the switch 170. The switch 170 is connected to the starter for motor 50 and accordingly, when the toggle is broken to lower the pulley 101 to effect changing of the abrasive belt 100, the motor 50 can not be started.

The machine structure described, while economical to manufacture, provides a rigid arrangement permitting vertical adjustment of the frame toward and from the platen 59.

What I claim is:

1. An abrading machine comprising a base, a pair of vertically disposed plates fixedly secured to said base, each of said plates being provided with a vertically extending guideway, a second pair of plates fixedly secured to said base and extending forwardly therefrom, a platen mounted between said forwardly extending plates, a vertically disposed frame member U-shaped in cross section mounted between said guideways, the side walls of said frame being provided with ways having sliding engagement with said guideways, a shaft journalled in the front wall of said frame and extending forwardly over said platen, a contact roll mounted on the forwardly extending portion of said shaft, the lower portion of the side walls of said frame extending rearwardly, a horizontally disposed plate carried by the rearwardly extending portion of the side walls of said frame, a motor mounted on said plate and being operatively connected to said

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shaft to effect rotation of said contact roll, a bracket slidably mounted on the front wall of the frame adjacent the upper end thereof for movement toward and from said contact roll, toggle mechanism operable to effect such movement of said bracket, an idler roll journaled on said bracket, and an abrasive belt trained over said rolls.

2. An abrading machine comprising a base, a platen fixedly mounted on said base, a pulley journaled on the base at each side of said platen and a conveyor belt trained over said pulleys with the upper run of the belt extending over said platen, a pair of spaced apart guideways fixedly secured to the base and extending upwardly therefrom, a frame U-shaped in cross section with the side walls thereof extending vertically between said guideways and having ways slidably mounted in said guideways, a shaft journaled in the front wall of said frame and extending forwardly therefrom over said platen, a contact roll mounted on the extending portion of said shaft, a plate fixedly secured to the side walls of said frame, a motor mounted on said plate and being operatively connected to said shaft to effect rotation of said contact roll, a bracket slidably mounted on the front wall of said frame adjacent the upper end thereof, an idler roll journaled on said bracket, toggle mechanism operable to effect vertical movement of said bracket toward and from said contact roll, an abrasive belt trained over said rolls, and power means for operating said conveyor belt for the advancement of work pieces below said contact wheel.

3. An abrading machine comprising a base, a platen carried by said base, a frame extending upwardly from the base, a contact roll journaled in the lower portion of said frame and overhanging said platen, an idler roll journaled in the upper portion of said frame, an abrading belt trained over said rolls, said platen being formed with a recess below said contact roll, a magnetic chuck mounted in said recess, a conveyor belt movable over said platen for the advancement of work pieces beneath said contact roll for engagement by said abrading belt, and means operable to adjust said frame toward and from said platen to accommodate work pieces of varying thicknesses.

4. An abrading machine comprising a base, a platen secured to the base, a frame extending upwardly from the base, a contact roll journaled in the lower portion of said frame and overhanging said platen, an idler roll journaled in the upper portion of said frame, an abrading belt trained over said rolls, said platen being formed with a recess below said contact roll, a magnetic chuck mounted in said recess, means operable to adjust said chuck toward and from said contact roll and to lock said chuck in adjusted position, a conveyor belt movable over said platen for the advancement of work pieces beneath said contact roll for engagement by said abrasive belt, and a motor carried by said frame and operable to effect rotation of said contact roll.

5. An abrading machine comprising a base, a platen fixedly mounted on said base, a vertically disposed frame mounted on the base for movement toward and from the platen, a shaft journaled in the lower portion of said frame, a contact roll mounted on said shaft, said contact roll being disposed above said platen and extending transversely thereof in parallel relation thereto, an idler roll journaled in the upper portion of said frame, an endless abrasive belt trained over said rolls, a pulley journaled on the base at each side of said platen, a conveyor belt trained over said pulleys with the upper run of the belt extending over said platen for the conveyance of work pieces beneath said contact roll, a motor carried by the frame and being operatively connected to said contact roll, and means operable to adjust said frame vertically toward and from said platen.

6. An abrading machine as defined in claim 1 and including a magnetic chuck mounted in said platen below said contact roll.

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7. An abrading machine comprising a base, a platen secured to the base, a frame extending upwardly from the base, a contact roll journaled in the lower portion of the frame and being disposed above said platen, an idler roll journaled in the upper portion of the frame, an abrasive belt trained over said rolls, a conveyor belt movable over said platen to advance work pieces past said contact roll, work hold down members mounted on the frame at opposite sides of said contact roll and being operable to yieldingly press work pieces against said conveyor belt.

8. An abrading machine comprising a base, a platen secured to the base, a frame, a contact roll journaled in the frame above said platen, an idler roll journaled in the frame, an abrasive belt trained over said rolls, a conveyor belt movable over said platen to advance work pieces past said contact roll, means operable to adjust said frame toward and from the platen, a support mounted on the frame at opposite sides of said contact roll, a roller journaled in each of said supports, said rollers being disposed for engagement with said conveyor belt in close proximity to said contact roll, and means yieldingly urging said rolls against the surface of said conveyor belt.

9. An abrading machine comprising a base, a platen secured to the base, a frame extending upwardly from the base, a contact roll journaled in the lower portion of the frame and being disposed above said platen, an idler roll journaled in the upper portion of the frame, an abrading belt trained over said rolls, means operable to adjust said frame toward and from said platen, a conveyor belt movable over said platen to advance work pieces in engagement with the abrasive belt passing about said contact roll, a work hold down member mounted on the frame at each side of said contact roll, a roller journaled in each of said hold down members, and means yieldingly urging said rollers against the surface of said conveyor belt.

10. An abrading machine comprising a base, a platen secured to said base, a frame extending upwardly from the base, a contact roll journaled in the lower portion of the frame, an idler roll journaled in the upper portion of the frame, and an abrasive belt trained over said rolls, a conveyor belt movable over said platen for advancing work pieces beneath said contact roll, a work hold down member mounted on the frame at each side of said contact roll, said hold down members including a pair of spaced apart side plates, a work engaging shoe secured to said side plates and extending transversely of the conveyor belt, a roller journaled between said side plates in proximity to said shoe, and means yieldingly moving said side plates downwardly to maintain said shoes and rollers in engagement with said conveyor belt.

11. An abrading machine comprising a base, a platen fixedly secured to said base, a frame extending upwardly from the base, a contact roll journaled in the lower portion of said frame, a bracket mounted in the upper portion of said frame for movement toward and from said contact roll, an idler roll journaled on said bracket, an abrasive belt trained over said rolls, a switch mounted on said frame, switch actuating mechanism operable upon movement of said bracket toward said contact roll to actuate said switch, a motor mounted on said frame and being operatively connected to said contact roll to effect rotation thereof, and a control circuit for said motor including said switch, said switch being operable upon actuation to render said motor inoperative.

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