Sept. 28, 1971 R. G. FAIR, JR., ET AL 3,608,245

BELT SANDING MACHINE

Filed Sept. 4, 1969 4 Sheets-Sheet 1

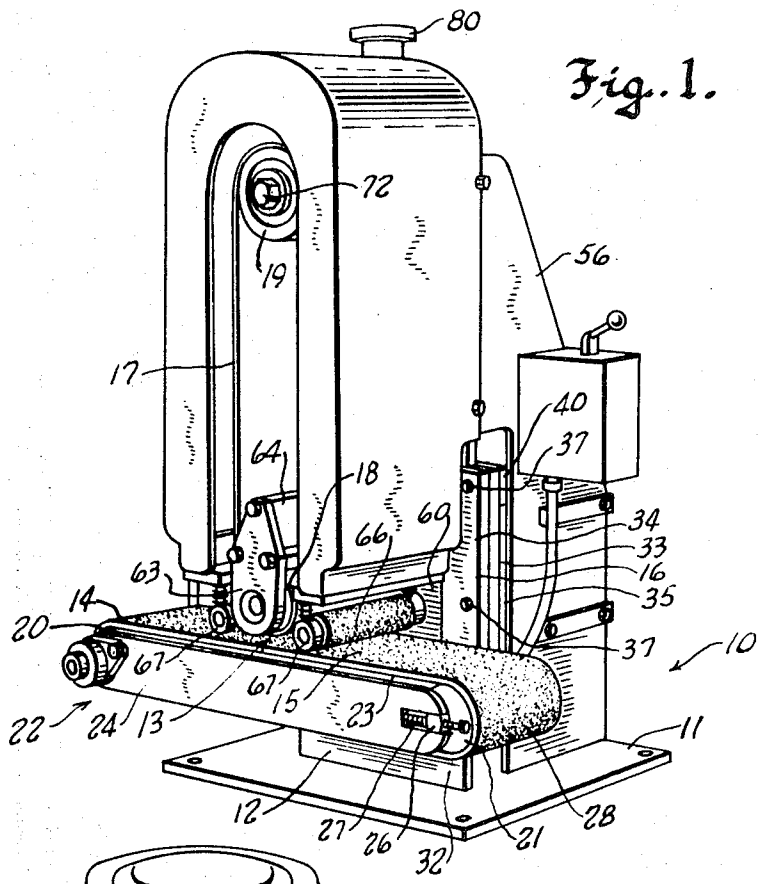

Fig. 1.

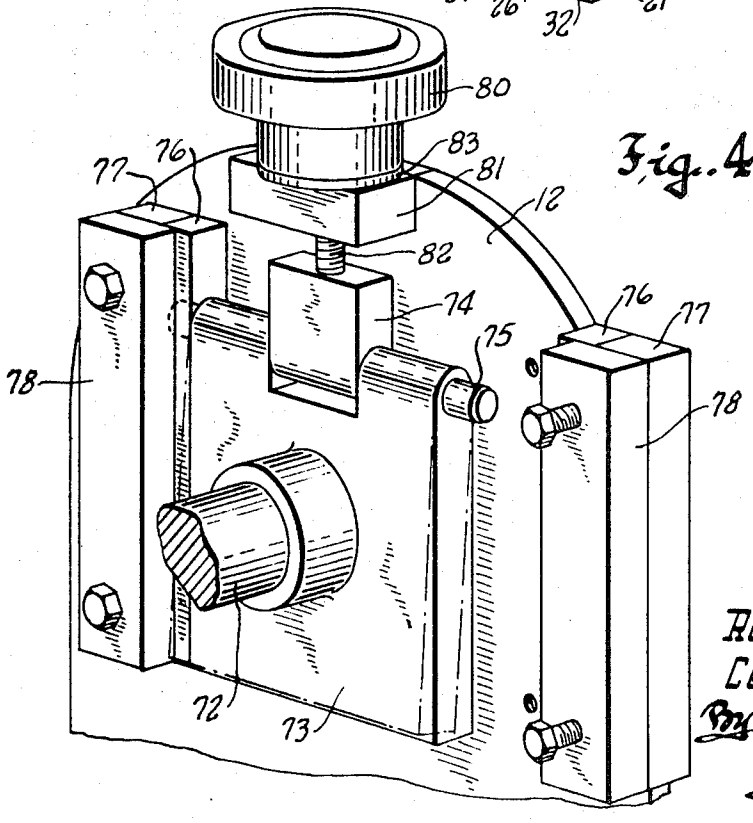

Fig. 4.

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Fig. 2.

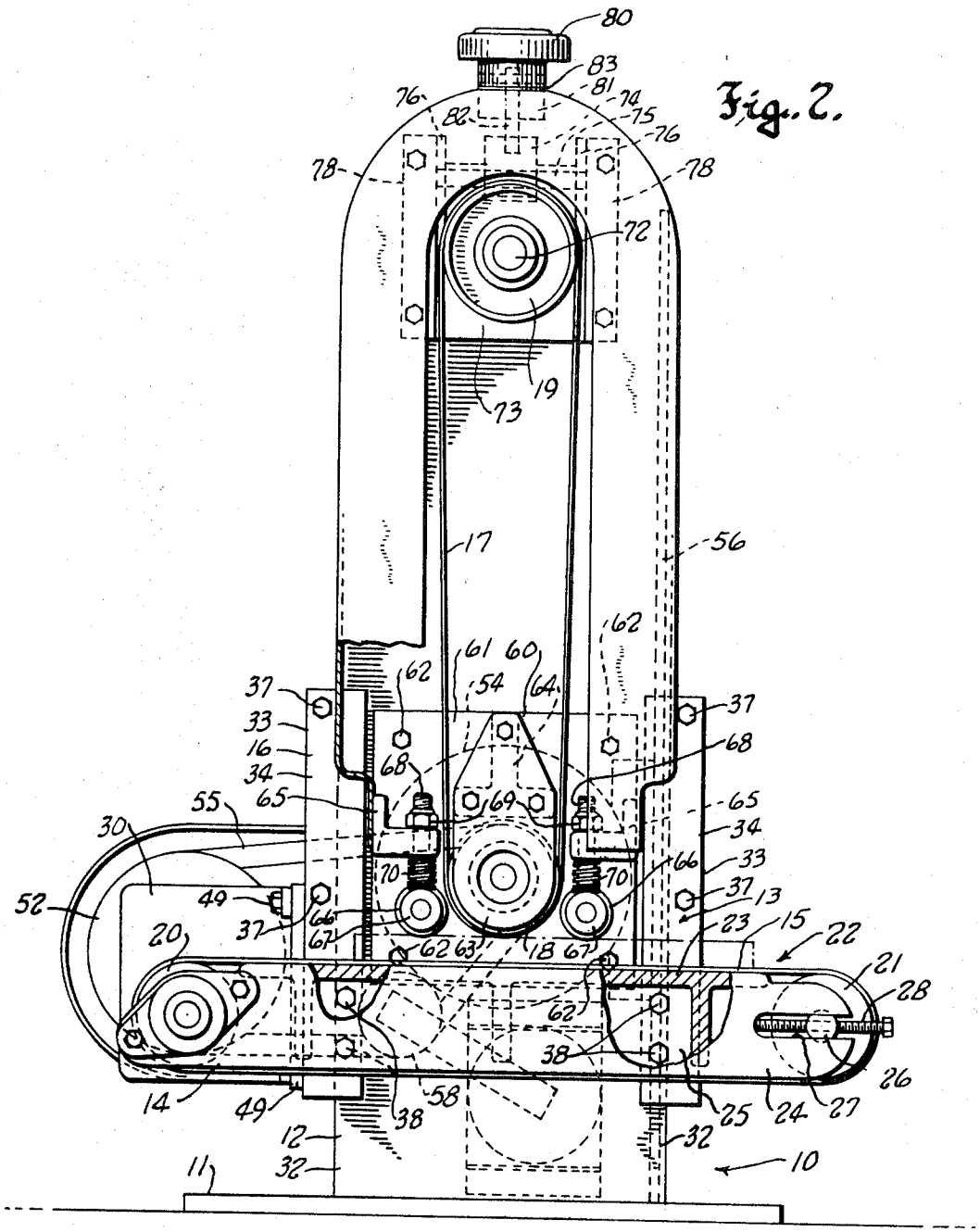

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Fig. 3.

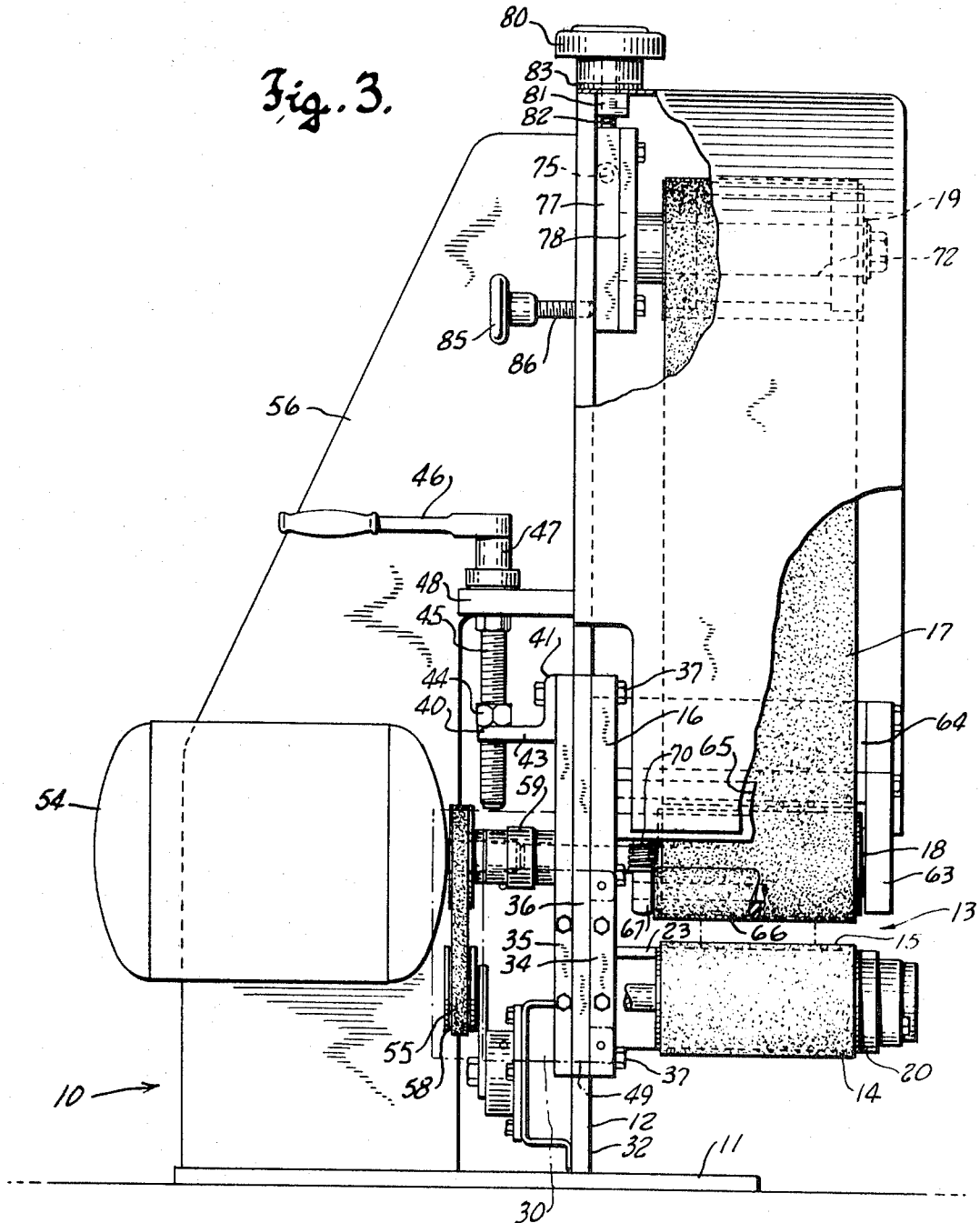

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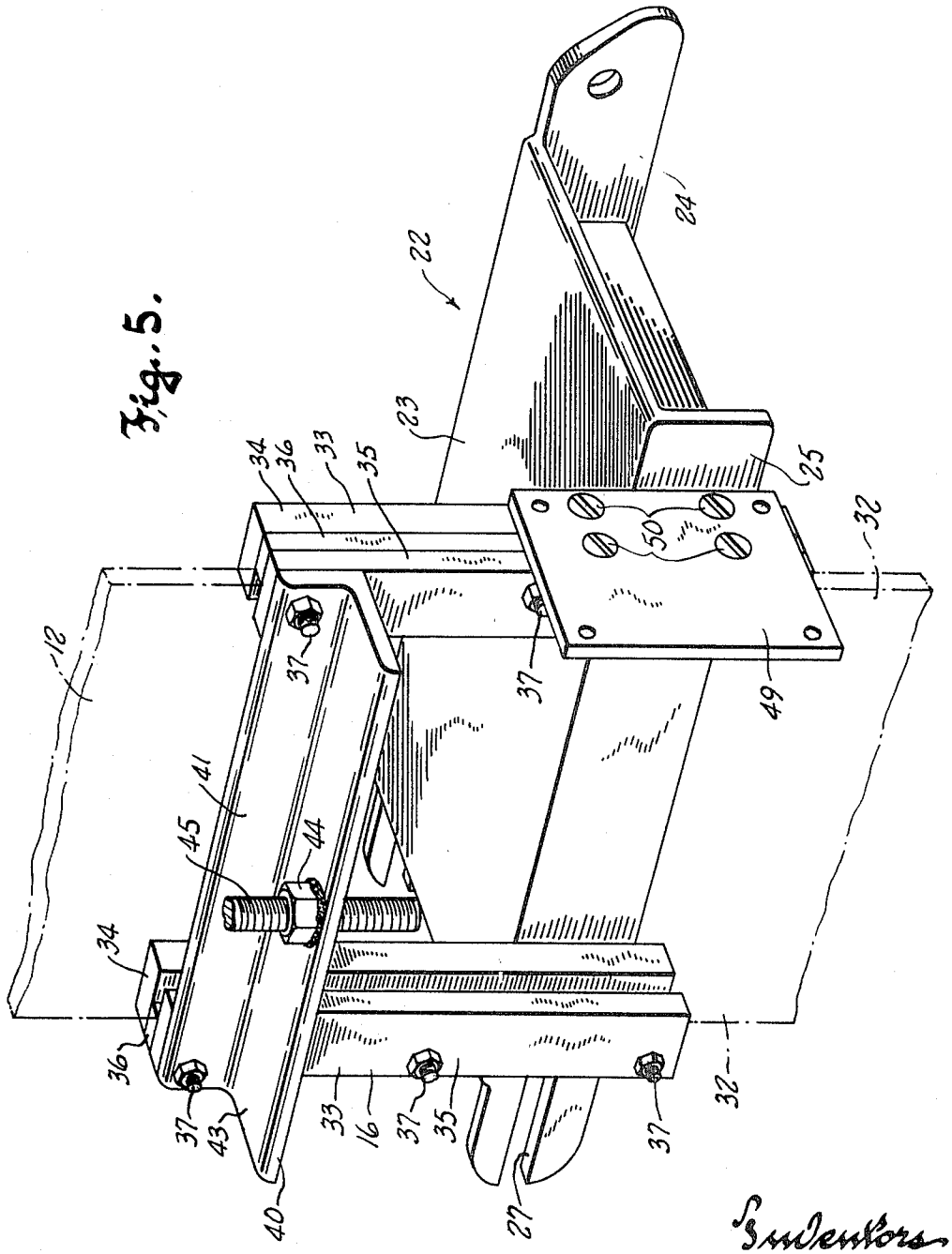
Fig. 5.



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BELT SANDING MACHINE

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U.S. Cl. 51—135 3 Claims

ABSTRACT OF THE DISCLOSURE

The idler drum of a belt sanding machine is supported cantilever style from an upright wall of the machine frame at a location a distance above a power driven contact drum, both for vertical motion relative to the contact drum and for tilting motion about a horizontal axis disposed close to said wall. The bed along which articles to be sanded are advanced under the contact drum, is mounted on a slide unit which is constrained to vertical adjusting motion along rails provided by the opposite side edges of the upright frame wall. A plain endless conveyor belt on the bed can be replaced by an abrasive belt of the same type and size provided for the contact and idler drums.

This invention relates to belt sanding machines of the type having an endless abrasive belt trained over contact and idler drums which are constrained to rotate on parallel axes with the driving drum spaced a distance below the idler drum but above the top stretch of an endless conveyor belt that travels over a horizontal work supporting bed. Articles to be sanded are placed upon the conveyor and advanced thereby through a sanding zone under the contact drum.

One of the objects of the invention is to provide a belt sanding machine of the character described with simplified and inexpensive adjusting mechanism that enables the idler drum to be readily moved bodily for the achievement of the proper tension on the abrasive belt trained thereover, and to also enable the idler drum to be tilted lengthwise as needed to keep the endless abrasive belt running true on the drums.

Another object of the invention resides in the provision of simplified structure that can be readily fabricated at low cost from ordinary bar stock, by which the work supporting bed can be mounted on an upright wall of the machine frame in an exceptionally stable fashion and for accurate adjustment toward and from the contact drum over which the abrasive belt is trained.

Still another object of the invention resides in the provision of a belt sanding machine of the character described with a work conveyor belt that can be removed and replaced by an endless abrasive belt of the same size and type provided for the driving and idler drums.

With these observations and objects in mind, the manner in which the invention achieves its purpose will be appreciated from the following description and the accompanying drawings. This disclosure is intended merely to exemplify the invention. The invention is not limited to the particular structure disclosed, and changes can be made therein which lie within the scope of the appended claims without departing from the invention.

The drawings illustrate one complete example of the physical embodiment of the invention constructed according to the best mode so far devised for the practical application of the principles thereof, and in which:

FIG. 1 is a perspective view of a belt sanding machine of this invention;

FIG. 2 is a front elevational view of the machine, at an enlarged scale;

FIG. 3 is an elevation of the machine, viewing the same from its delivery side;

FIG. 4 is a fragmentary perspective view of the idler drum adjusting mechanism; and

FIG. 5 is a fragmentary perspective view illustrating the slide unit which carries the conveyor bed for vertical adjustment on the machine frame.

Referring now to the accompanying drawings, the numeral **10** generally designates the frame of a belt sanding machine of this invention. The frame shown comprises a horizontal base plate **11**, and a flat plate-like supporting wall **12** secured to the base and rising vertically therefrom.

Castings having burrs that can be removed by sanding, or other articles to be sanded, are conducted through a sanding zone generally designated **13**, by means of a feed conveyor **14** comprising an endless belt having a horizontal top stretch **15** extending lengthwise across the front face of the wall **12**, and upon which the articles are placed.

As will be described later, the upright supporting wall **12** of the machine frame is provided with a slide structure **16** to mount the conveyor thereon for up and down adjusting motion along the front face of said wall.

Articles to be sanded are loaded onto the right hand end of the conveyor, as viewed in FIG. 2, and as they travel through the sanding zone **13**, they are engaged with and acted upon by an endless abrasive belt **17** as it passes around the underside of a power driven contact drum **18**. The drum **18** is spaced above the upper stretch **15** of the conveyor belt **14**, and it extends forwardly thereacross from the wall **12**. It rotates on a horizontal axis parallel to but spaced a distance below that of an idler drum **19** over which the upper portion of the abrasive belt is trained. The idler and contact drums are both carried by the upright wall **12** of the frame, and they cooperate to constrain the opposite stretches of the abrasive belt **17** to substantially vertical travel.

The endless feed conveyor belt is trained over spaced apart driving and driven rolls **20** and **21**, respectively, which are constrained to rotate on axes lying in a common horizontal plane and parallel to the axes of the contact and idler drums **18** and **19**. The rolls **20** and **21** have an axial length substantially equal to that of the contact and idler drums, and the conveyor belt **14** also has a width substantially equal to that of the endless abrasive belt **17**. As will be discussed again hereinafter, it is a feature of this invention that an abrasive belt such as a replacement for the belt **17** can be used interchangeably with the conveyor belt **14**.

The belt conveyor **14** comprises part of a work supporting bed, generally designated **22**, of inverted channel shape providing a flat back or web **23** and opposite front and rear side flanges **24** and **25**, respectively, depending from the web and substantially parallel to the front face of the upright wall **12** of the frame. The bed flanges are spaced apart a distance slightly greater than the axial dimension of the rolls **20** and **21**. The driven roll **21** is freely rotatably mounted on a spindle **26** which extends axially between portions of the channel flanges that extend beyond the web of the channel at the feed end of the conveyor. Flattened ends on the spindle **26** are slidably received in horizontal slots **27** in the flange

extensions that allow the spindle and the driven roll thereon to be moved bodily toward and from the sanding zone, for belt tightening purposes, and also to enable removal and replacement of the conveyor belt. Adjusting screws **28** threaded through the opposite ends of the spindle and bearing against the bottoms of the slots **27** provide for such adjustment of the driven roll.

The drive roll **20** is fixed to the output shaft **29** of a speed reduction unit **30**, which output shaft has its forward end rotatably journalled in an extension of the forward channel flange **24** at the delivery end of the conveyor.

As will now be described, the speed reducing unit is fixed to the same slide unit **16** to which the work supporting bed is secured. Hence, the speed reducer can be considered a part of the supporting bed assembly.

The slide unit **16** is of exceptionally simple construction in that it can be fabricated entirely from bar stock. However, it requires the upright wall **12** of the frame to have straight and parallel opposite side edge portions of uniform thickness, and each to define a rail **32**. The slide unit comprises a channel shaped guide **33** slidingly embracing each rail and constrained thereby to vertical motion relative to the frame. Each channel shaped guide **33** has opposite front and rear flanges **34** and **35**, respectively, which slidingly engage over the rails and which are provided by a pair of elongated flat bars. Each guide also has an elongated web **36** in lengthwise juxtaposition to the adjacent edge of the wall **12**, and which web is confined as a spacer bar between the flange bars, being secured thereto by bolts **37**.

The rear flange **25** of the work supporting bed **22** bears flatwise against the front flanges **34** of both guide channels, and it is secured to the lower portions of the latter by screws **38** which are threaded into tapped holes in the guide flanges **34**. Such securement of the supporting bed to the guide channels serves to hold their lower portions opposite one another and at the proper spacing for free sliding motion along the opposite side edges of the frame wall **12**.

The guide channels are also joined together at their rear, by a cross bar **40** of angle shaped cross section. The upright leg **41** of the cross bar **40** extends horizontally between upper portions of the rear flanges **35**, to which it is flatwise secured by the upper ones of the bolts **37** which fasten the slide bars **34**, **35** and **36** together. The horizontal flange **43** of the cross bar extends rearwardly from the slide unit **16** and has a nut **44** secured to its top, for the reception of a vertically disposed adjusting screw **45**. Rotation is imparted to the screw **45** in one direction or the other by a hand lever **46** which has a ratchet connection **47** with the screw. The ratchet mechanism, which is located at the inner end of the hand lever **46**, is supported on a ledge **48** secured to the back of the supporting wall **12** above the angle bar **40**. The ledge has a hole therein sized to loosely receive the adjusting screw.

From the description thus far, it will be apparent that the slide unit **16** and the feed conveyor thereon will be bodily lifted up or lowered as desired, merely by rotation of the adjusting screw **45** in the proper direction. This, of course, enables the throat under the contact drum, at the sanding zone, to be set to a dimension having the proper relationship to the thickness of the article to be sanded.

The speed reducer **30** is shown in solid lines in FIG.2 but only in broken lines in FIG. 3. It is fastened to a mounting plate **49** which in turn is secured by screws **50** to the bars **34** and **35** of the slide unit at the delivery side of the machine. These screws are threaded into tapped holes in the outer edges of said bars. Consequently, the speed reducer is adjusted up and down in unison with the feed conveyor.

The input shaft of the speed reducer is provided with a V pulley **52** and it is driven from an electric motor **54** through a V belt **55**. The motor **54** is secured to an upright gusset plate **56** which in turn, is fixed to the base plate **11** and to the back of the supporting wall **12** to reinforce the same. The V belt **55** is also trained over a belt tightener pulley **58** which functions to maintain good tension on the belt **55** despite the more or less limited range of up and down movement allowed the speed reducer and the feed conveyor in unison with one another. While the motor shaft is connected with the drive roll **20** of the feed conveyor through a speed reducing unit, it is directly drivingly connected with the contact drum through a coaxial coupling **59**.

The contact drum **18** is rotatably carried by a bracket **60** which has a flat mounting flange **61** secured to the supporting wall **12** by bolts **62** which flatwise clamp the flange against the front face of the wall. The end portion of the contact drum which is coupled to the motor shaft is supported by a bearing carried by the bracket flange **61**. The front end of the contact drum is rotatably carried by an outboard bearing **63** secured to the forward end of a hanger **64** cast integrally with the bracket **60**. The hanger overlies the contact drum, and it is substantially centrally located with respect to a pair of flanking hanger members **65** that are also cast integrally with the bracket **60** and serve to support pinch rolls **66**, one at the feed side of the contact drum and the other at the delivery side of the contact drum.

A trunnion on each end of each pinch roll is journalled in a bearing **67** which is welded to the bottom of a screw **68**. The screws **68** pass loosely upwardly through suitable holes in the hangers **65**, to have nuts **69** threaded on their upper ends. Springs **70** encircling the screws **68** and confined between the hangers and the bearings **67** to serve yieldingly resist upward motion of the pinch rolls as articles being sanded pass through the sanding zone.

The upper or idler drum **19** is supported from the wall **12** for adjustment bodily up and down, toward and from the contact drum, and for tilting adjustment about a horizontal axis adjacent to the front face of the supporting wall **12** and the inner end of the roll. The purpose of this is to enable the idler drum to be set to whatever position is necessary to keep the endless abrasive belt **17** properly tensioned and running true on the contact and idler drums.

The idler drum **19** is freely rotatably mounted on an idler shaft **72** having its inner end fixed to the front face of a subsantially flat rectangular flange **73**. The upper edge of the flange is centrally notched to receive a supporting block **74**, from which the flange is hingedly suspended by a transverse pivot pin **75**. The ends of the pivot pin project from the opposite side edges of the flange and are engaged in holes in the upper end portions of upright slide bars **76**, between which the flange is received.

The slide bars **76** are confined between the opposite side edges of the flange **73** and upright bars **77** which are fixed on the supporting wall **12**, and they lie beneath outer bars **78** each of which is fixed to and overlies one of the fixed bars so as to overlap a portion of the slide bar **76** thereunder laterally outwardly of the adjacent side edge of the flange **73**.

Hence, it will be apparent that the bars **76**, **77**, and **78** provide cooperating stationary and movable guide means for the flange **73** and the idler shaft **72** carried thereby. The guide means, in turn, cooperate with the front face of the supporting wall **12** to provide spaced apart guide channels that oppose and open toward one another, to slidably guide the bars **76** therein.

In this manner, the shaft flange is constrained to vertical motion along the front face of the supporting wall **12**, without interfering with hinging motion of the flange relative to the guide channels, about the axis of the hinge pin **75** so as to provide for whatever tilting adjustment of the idler drum is necessary to make the abrasive belt **17** run true on the idler and contact drums. The engagement of the shaft flange **73** with the front face of the supporting

wall **12**, of course, limits downward tilting motion of the idler shaft on its hinge pin.

Again in this case, it will be noted that the guide means comprising the bars **76**, **77** and **78**, is provided by inexpensive bar stock, as is true also of the shaft flange **73** and the block **74** from which the idler drum is hingedly suspended.

Up and down adjusting movement of the idler drum is effected by turning a rotatable knob **80** in one direction or the other. The knob is seated on the top of a lug **81** on the supporting wall **12**, which lug projects forwardly of the front face of the wall and has a vertical hole therethrough to loosely receive a screw **82**. The upper end of the screw is secured to the knob, and the lower end of the screw is threaded into a tapped hole in the block **74** opening to the top thereof. A thrust washer **83** is preferably confined between the underside of the knob **80** and the lug **81**, since the weight of the idler drum and the tension on the abrasive belt **17** can represent a substantially force pulling the knob **80** downwardly against the lug.

Tilting motion can be imparted to the idler shaft about the axis of the pivot pin **75** by turning the enlarged head **85** of an adjusting screw **86**. The screw is threaded into the supporting wall **12** from its rear, and it has its extremity arranged to bear centraly upon the back face of the idler shaft flange **73** at a point below the pivot pin **75**.

Turning of the screw **86** in the direction to propel it forwardly will thus effect upward tilting of the outer end of the idler drum; while turning of the screw in the opposite direction will effect lowering of the outer end of the idler drum.

Another feature of the invention is achieved by so determining the sizes and spacing of the drums around which the abrasive belt **17** is trained with respect to the sizes and spacing of the rolls around which the feed conveyor belt **14** is trained, that the two belts will have substantially the same length and width. Because of this, an abrasive belt such as is provided as a replacement for the belt **17** can be trained around the feed conveyor rolls **20** and **21** as a substitute for the rubberized belt normally used for the feed conveyor. Hence, the conveyor belt **14** seen in FIG. 1 can, if desired, be identical to the abrasive belt **17**. This can be highly advantageous when articles having certain peculiar characteristics are to be sanded.

From the foregoing description, together with the accompanying drawings, it will be readily apparent that this invention provides a belt sanding machine in which substantial simplification of the mechanism has been achieved without in any way sacrificing strength, or loss of accuracy in the adjustment of its components or of the sanding operations of which the machine is capable.

We claim:

1. A belt type sanding machine of the type having an endless abrasive belt trained over driving and idler drums that rotate on horizontal axes at different elevations, and means defining a horizontal bed over which articles can be advanced through a sanding zone beneath the bottom drum to be acted upon by the abrasive belt trained thereover, said machine being characterized by:

(A) a frame having an upright supporting wall from one face of which the drums project axially;

(B) means supporting the bottom drum from said wall for rotation on a fixed axis;

(C) a shaft rotatably carrying the idler drum;

(D) structure mounting the idler shaft on an upper portion of said wall for bodily up and down motion relative to the bottom drum, and for tilting motion about a substantially horizontal axis crosswise of the idler shaft axis and close to said wall, said structure comprising

(1) a flange secured to the end of the shaft adjacent to said face of the wall, said flange having opposite upright side edges,

(2) a block from which the flanged end of the shaft is suspended, and to which the flange is pivotally connected to provide for said tilting motion of the shaft,

(3) supporting and actuating means connected to the block to mount the same on said wall and to provide for up and down adjustment of the block as well as retention thereof in any desired position of such adjustment,

(4) cooperating stationary and movable guide means on said wall, the movable guide means being constrained to vertical motion on said wall,

(5) and means connecting said flange to the movable guide means so that said up and down motion of the idler shaft is guided thereby;

(E) said flange and block having portions that are interleaved along the upper edge of the flange;

(F) a hinge pin pivotally connecting said interleaved portions of the flange and block to provide for said tilting motion of the shaft, said hinge pin providing said means connecting the flange to the movable guide means;

(G) and said movable guide means comprising a pair of bars in lengthwise juxtaposition to the opposite side edges of the flange, and having portions into which the opposite ends of the hinge pin extend.

2. A belt type sanding machine having an endless abrasive belt trained over driving and idler drums which rotate on horizontal axes at different elevations, and a horizontal bed over which articles can be advanced through a sanding zone beneath the bottom drum, said machine being characterized by:

(A) a frame having an upright supporting wall with a substantially flat front face from which the drums project axially;

(B) means on said wall supporting the bottom drum for rotation on a fixed axis;

(C) and means including a shaft to support the idler drum from said wall for bodily up and down motion relative to the bottom drum, and further comprising

(1) a flange on the inner end of the shaft having opposite side edge portions,

(2) a pivot pin on which the flange is mounted for tilting motion about a horizontal axis with the shaft axis spaced below the pin and with the opposite end portions of the pin projecting from said opposite side edge portions of the flange,

(3) a pair of vertically disposed slide bars located in juxtaposition to said opposite side edge portions of the flange, and into which the opposite end portions of the pivot pin extend to connect the flange therewith,

(4) and guide means on said wall which define vertical guide channels for said bars and which cooperate with said face of the supporting wall and with said opposite side edge portions of the flange to confine the bars in the channels and to thereby constrain the idler drum to up and down motion without interfering with tilting motion thereof about the pin axis;

(D) and manually adjustable means carried by the supporting wall and connected with said pin for holding the idler drum in different positions of vertical adjustment.

3. A belt type sanding machine which is characterized by:

(A) a frame;

(B) means on the frame defining a rigid elongated bed having a horizontal top over which articles can be advanced through a sanding zone from one end of the bed to the other;

(C) driving and driven drums carried by the frame for rotation on horizontal axes at different elevations above the bed, with one of said drums at a

location adjacent to the top of the bed and in said sanding zone;

(D) two identical endless abrasive belts, one of which is trained about said drums;

(E) and conveyor means on the bed operable to conduct articles through the sanding zone, comprising roll means rotatable on axes substantially parallel to those of the drums and having the second one of said belts trained thereabout, said roll means being disposed close to the ends of the bed top and to constrain one stretch of the second belt to travel along the top of the bed where it can receive and carry articles to be sanded through the sanding zone during operation of the conveyor means.

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U.S. Cl. X.R.

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