July 21, 1959 J. A. NYLUND ET AL 2,895,262

COMBINATION DRUM AND BELT SANDING SURFACING MACHINES

Filed June 3, 1957 4 Sheets-Sheet 1

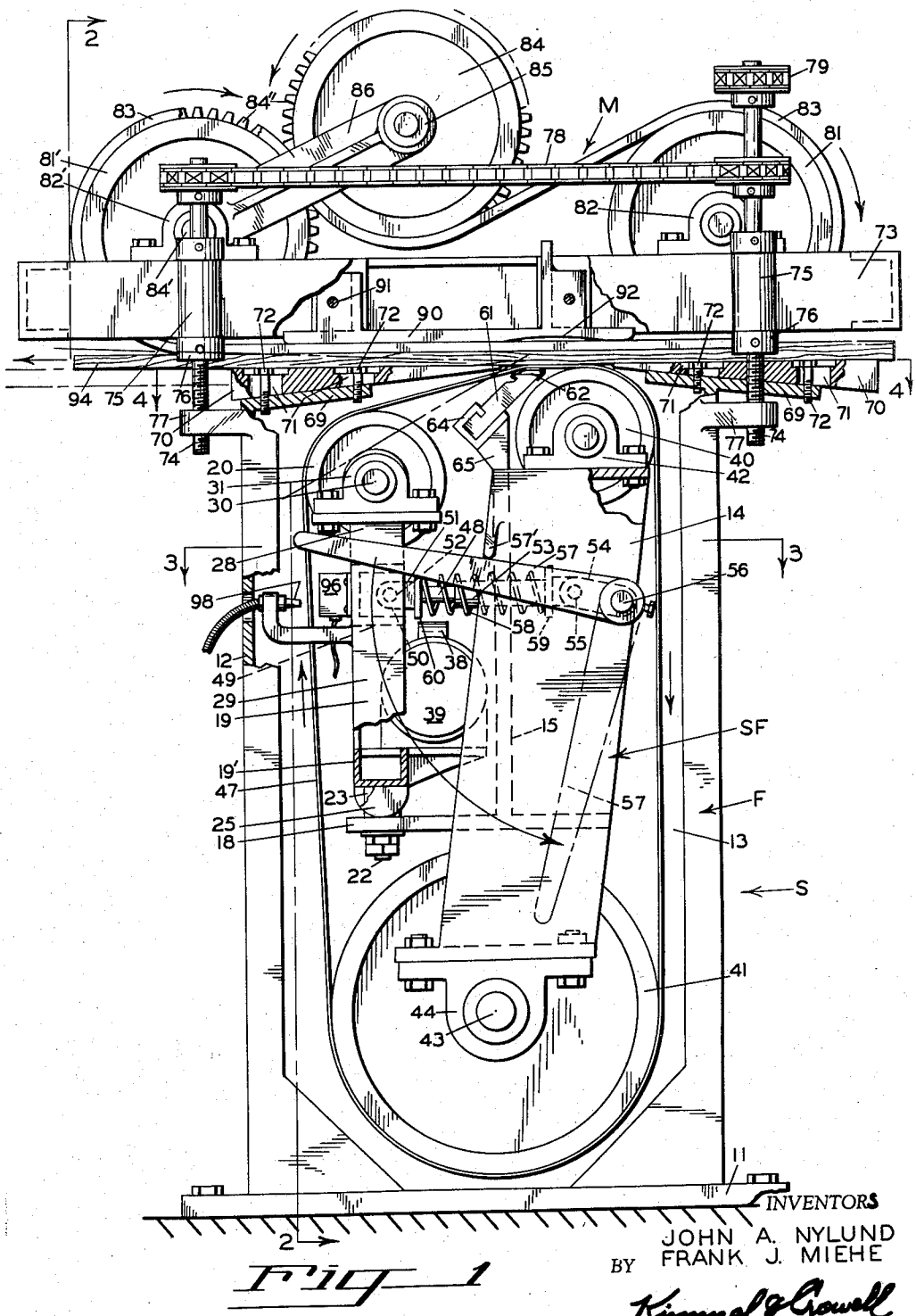


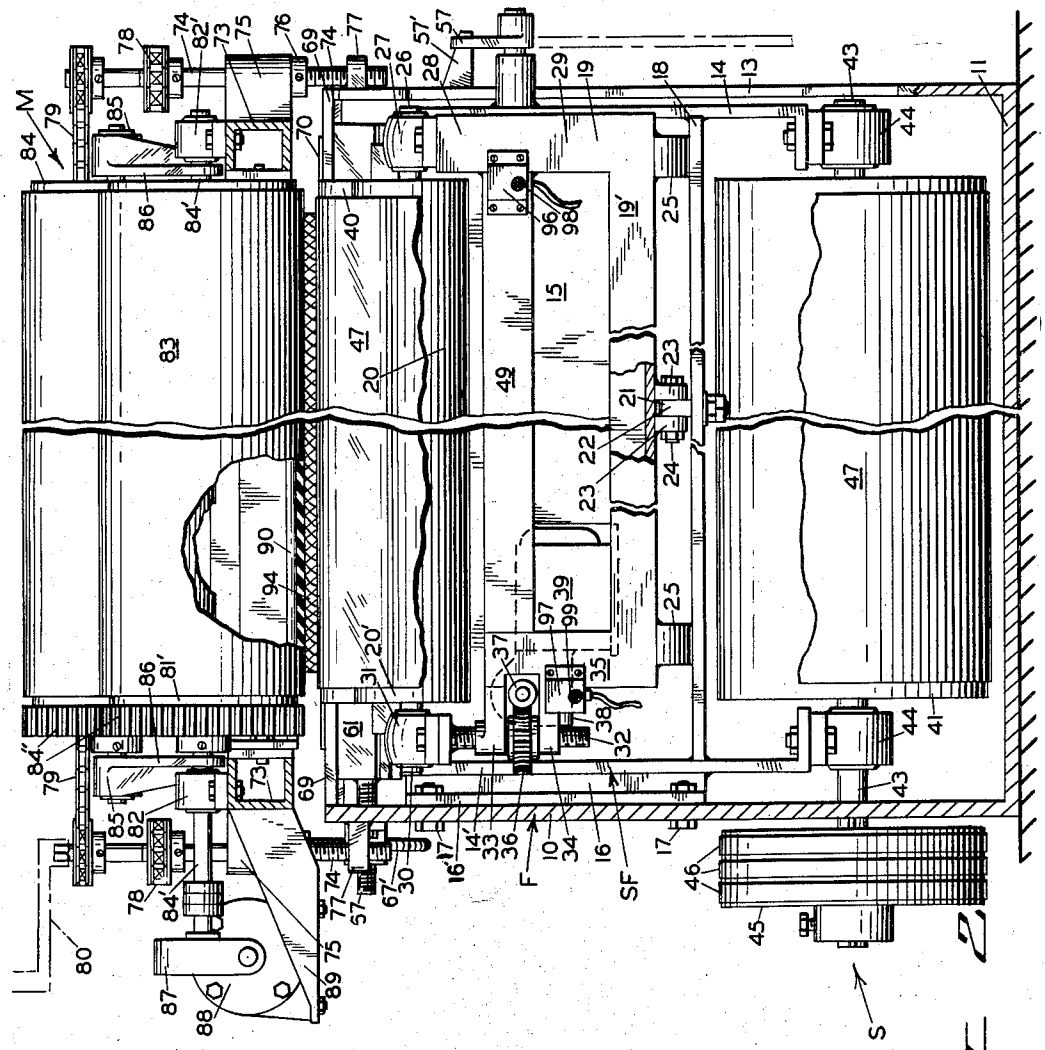
Fig 1

INVENTORS
JOHN A. NYLUND
FRANK J. MIEHE
BY Kimmel & Crowell
ATTORNEYS

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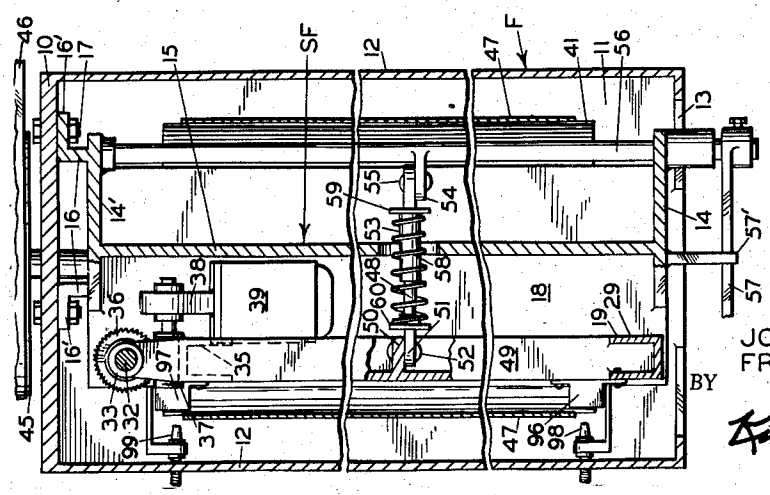


Fig. 3

Fig. 2

INVENTORS
JOHN A. NYLUND
FRANK J. MIEHE

BY Kummel & Crowell

ATTORNEYS

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COMBINATION DRUM AND BELT SANDING SURFACING MACHINES

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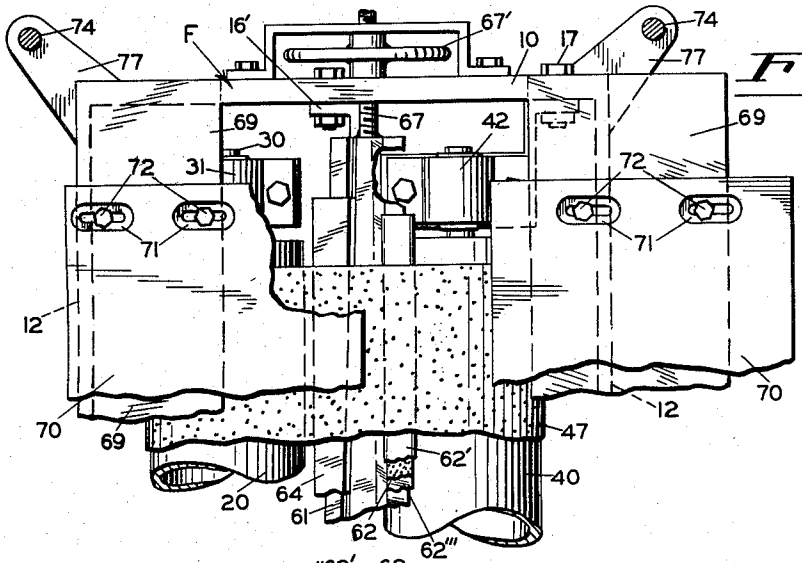


Fig 4

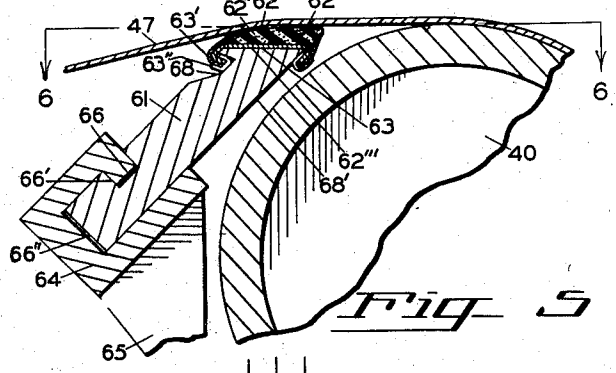


Fig 5

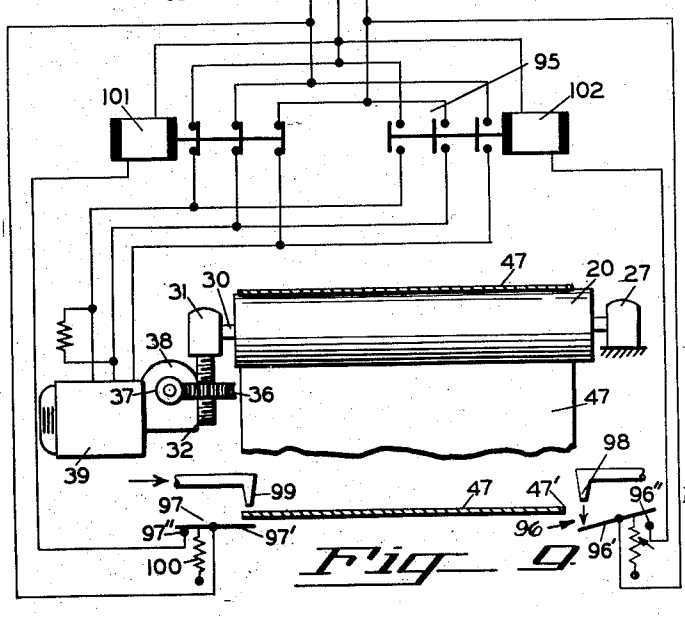


Fig 9

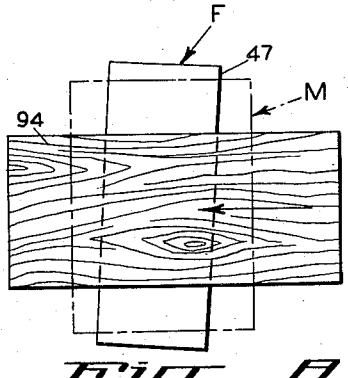


Fig 8

INVENTORS
JOHN A. NYLUND
FRANK J. MIEHE

BY Kimmel & Crowell

ATTORNEYS

July 21, 1959 J. A. NYLUND ET AL 2,895,262

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Fig 6

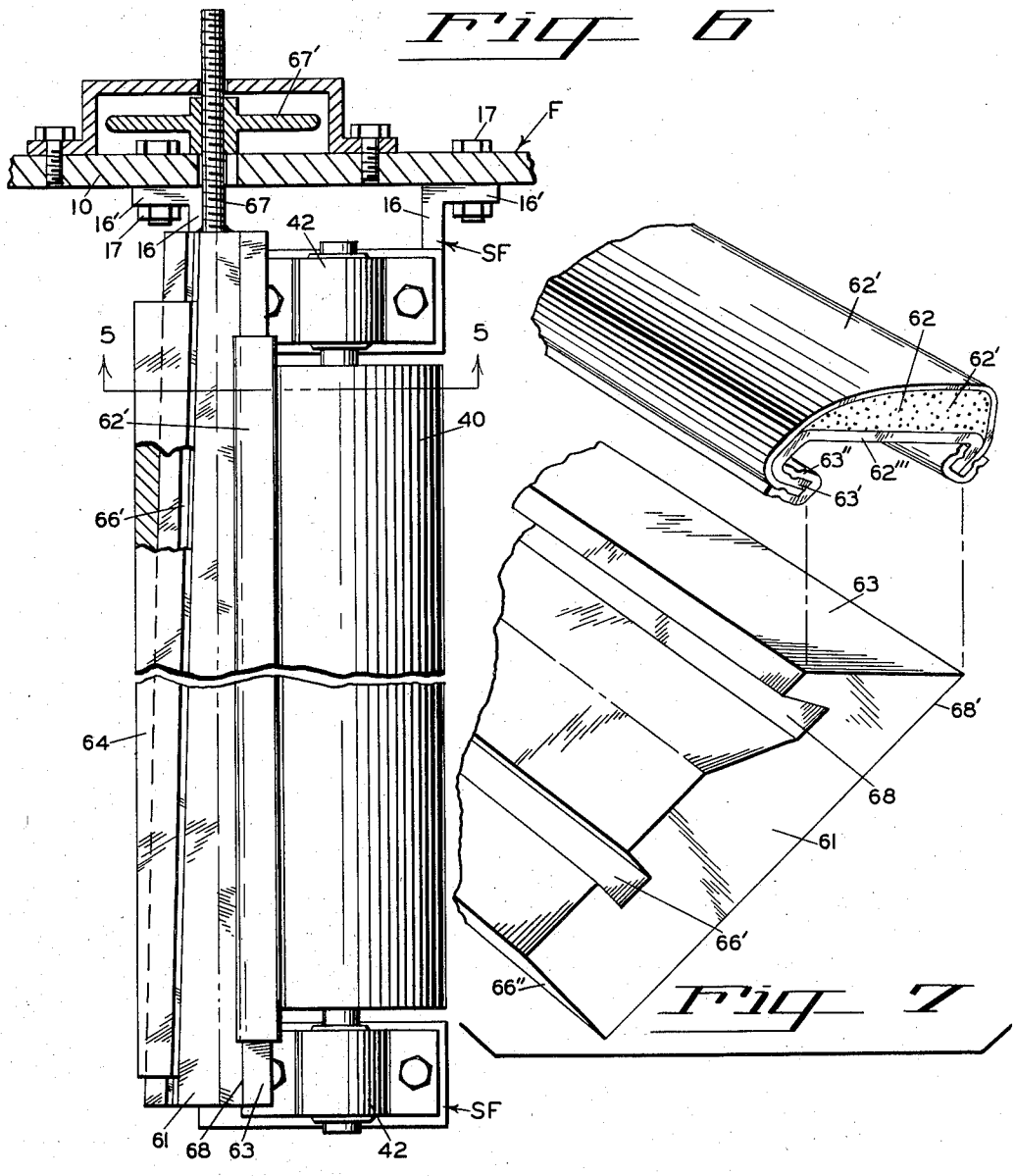


Fig 7

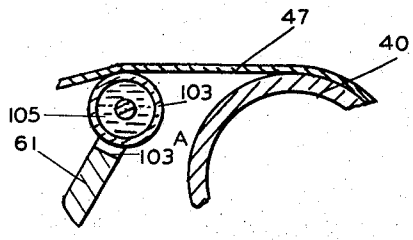


Fig 10

INVENTORS
JOHN A. NYLUND
FRANK J. MIEHE
BY Kimmel & Crowell
ATTORNEYS

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COMBINATION DRUM AND BELT SANDING SURFACING MACHINES

John A. Nylund, Portland, and Frank J. Miehe, Lake Grove, Oreg.

Application June 3, 1957, Serial No. 663,152

4 Claims. (Cl. 51—137)

The present invention relates to combination drum and belt sanding surfacing machines, particularly those adapted to the surfacing, sizing and smoothing of plywood, sheet steel and the like.

The primary object of the invention is to provide a surface sanding machine including an endless sanding belt having a fast cutting station and a smoothing station arranged in spaced relation so that fast cutting and smoothing are accomplished by the same belt successively on the work on a single pass through the machine.

An additional object of the invention is to provide a structure of the character described above in which the fast cutting station includes a drum over which the sanding belt moves and a resilient pressure bar arranged in spaced relation to the drum and also engaging the sanding belt.

Another object of the invention is to provide means directing the work over the sanding belt at a slight angle thereto, preventing striations being formed on the work being sanded.

A further object of the invention is to provide a resilient pressure bar for applying pressure to the back of the sanding belt while sanding the surface of the work, means being provided for adjusting the resilient pressure pad to various kinds and types of work.

Another object of the invention is to provide a combination of a sanding drum with a sanding belt assisted by a resilient pressure pad for governing the operation of the sanding belt in relation to the work being processed.

A further object of the invention is to provide a means of causing a sanding belt to maintain a centralized running position over a driving drum and associated idler drums in its operation.

A still further object of this invention is to provide means for starting work over the sanding belt, drum and pressure bar without beveling or contouring the leading edge of the work on first entering the position for sanding or surfacing. The above action also applies when the trailing edge of the work being processed leaves contact with the working area of the sanding drum, belt and pressure bar.

Another object of this invention is to provide a pressure applicator behind the sanding belt, consisting of a revolvable cooled roller, particularly adapted for high speed precision grinding and finishing.

Other objects and advantages will become apparent in the following specification when considered in the light of the attached drawings, in which:

Figure 1 is a side view of this new and improved combination drum and belt sanding machine, parts broken away for convenience of illustration.

Figure 2 is a transverse sectional view, taken on the line 2—2 of Figure 1, looking in the direction indicated, parts broken away for convenience of illustration.

Figure 3 is a horizontal sectional view, taken on the line 3—3 of Figure 1, looking in the direction indicated.

Figure 4 is a fragmentary horizontal sectional view,

taken on the line 4—4 of Figure 1, looking in the direction indicated.

Figure 5 is an enlarged fragmentary sectional view, taken on the line 5—5 of Figure 6, looking in the direction indicated.

Figure 6 is a horizontal sectional view taken on the line 6—6 of Figure 5, looking in the direction indicated.

Figure 7 is an exploded fragmentary perspective view of the pressure bar and the resilient pad.

Figure 8 is a diagrammatical plan view showing the work passing over the sanding belt under the work feeding mechanism, illustrating the principle of feeding the work over the sanding belt at a slight angle.

Figure 9 is a schematic layout of the electric and mechanical control for maintaining the sanding belt in alignment over the sanding drum, pressure bar and idler rollers.

Figure 10 is a longitudinal cross-section similar to Figure 5 of a modified form of sanding belt pressure applicator.

The new and improved combination drum and belt sander indicated generally by the reference character S includes a base frame F. Fixedly mounted within the frame F is a sub-frame SF and mounted upon the upper surface of the base frame F is a work feeding assembly M.

The base frame F preferably includes a vertical web 10 mounted on a base 11. Extending transversely of the sander S are webs 12. The finished base frame F being of box-like structure. Access is obtained by way of the open side 13 of the frame F.

The sub-frame SF consists of parallelly disposed legs 14 and 14' joined by a web 15. The sub-frame SF is secured to the vertical web 10 of the base frame F by feet 16, which are formed integral with the side frame 14' of the sub-frame SF, as best illustrated in Figures 2 and 3. The feet 16 have flanges 16' formed thereon and bolted to the leg 10 of the base frame F by bolts 17. According to the above method of mounting the frame SF within the base frame F, a cantilever system of mounting the frame is achieved permitting free entry from one side of the base frame F for ease of servicing.

Extending between the legs 14 and 14' of the sub-frame SF is a horizontal web 18. The web 18 provides a base for supporting a U-shaped bracket 19, referring particularly to Figures 1 and 2. The bracket 19 supports the idler belt roller 20. A base 19' of the U-shaped bracket assembly 19 is pivotally mounted to the web 18 by a hinged connection 21.

The hinge connection 21 includes an eye bolt 22, secured to the web 18 and ears 23 forming part of the base 19' positioned on opposite sides of the eye bolt 22 and pivotally secured thereto by a pivot bolt 24. The base 19' is maintained in a level position in regard to the web 18 by downwardly extending rockers 25 which form part of the base 19'. The lower ends of the rockers 25 ride on the web 18, permitting the U-shaped bracket 19 to be rocked about the eye bolt 22, and at the same time maintaining the structure 19 in a level transverse position on the sander S. The operation of which will be further described later on.

A shaft 26, forming part of the idler roller 20 is journalled within a self-aligning bearing 27 fixedly mounted to upper end 28 of an upwardly extending leg 29 forming part of the U-shaped bracket assembly 19. The opposite end of the roller 20 has a stub shaft 30 journalled within a self-aligning bearing 31 mounted upon a vertical threaded shaft 32.

The shaft 32 is journalled at its opposite end portions in spaced bearings 33, 34 forming part of an upwardly extending leg 35 of the U-shaped bracket 19. A worm wheel 36 is threaded on the shaft 32 and operates between

bearing 33 and bearing 34. A worm 37 drives the worm wheel 36 from a reduction gear box 38 forming part of a motor 39, referring to Figures 1, 2 and 9.

The motor 39 is mounted to the base member 19' of the U-shaped bracket assembly 19. When the motor 39 operates in one direction it will raise the bearing 31, together with the end 20' of the idler roller 20 and when operated in the opposite direction the bearing 31 will be lowered. The reason for this movement is to maintain a sanding belt 47 in alignment with a sanding drum 40, the idling drum 20 and a driving drum 41 by an automatic means to be described later on.

The sanding drum 40 is journalled within bearings 42 mounted to the side frames 14 and 14' of the sub-frame SF. The bearings 42 remain stationary at all times. The driving drum 41 has its shaft 43 journalled within bearings 44 mounted to the lower ends of the side frames 14 and 14'. The shaft 43 may be driven by any suitable means through a sheave 45, which in turn may be driven by driving belts 46 from a source of power (not shown).

The sanding belt 47 is trained over the driving drum 41, the sanding drum 40 and over the idler drum 20. The belt 47 is maintained in a taut condition by the action of spring loaded plunger 48, which is pivotally mounted to a cross member 49 connecting the legs 29 of the U-shaped bracket assembly 19 through ears 50, which have the end 51 of a plunger 48 pivotally connected thereto by a pin 52.

The spring loaded plunger 48 operates within a tubular member 53, which has one of its ends pivotally mounted to a crank 54 at 55. The crank 54 forms part of a shaft 56 which extends between the side frames 14 and 14' of the sub-frame SF. The shaft 56 is journalled within the frames 14, 14' and is rotated by a lever 57, which is shown by full and broken lines in Figure 1, and in full lines in Figure 3.

In Figure 1, it will be noted that the pivot point 55 is past the center line of the tubular element 53 and the spring loaded plunger 48. This mounting maintains the pressure of a spring 58 against a shoulder 59 of the tubular member 53 and a shoulder 60 of the plunger 48, which forces the arms 29 of the U-shaped bracket 19 towards the belt 47, maintaining the belt 47 in a taut and tight condition. The movement of the pivot point 55 beyond the center line above referred to, is limited by the lever 57 contacting an outwardly extending stop 57'.

The eye bolt 22 permits the forward movement of the arms 29 about the pivot pin 24 towards the belt 47. When the lever 57 is moved in the direction of the arrow, it will pull the arms 29 carrying the tightening roller 20 away from the belt 47 so that the belt 47 can be removed through the open end 13 of the base frame F, referring particularly to Figures 1 and 3. Being able to remove the belt 47 through the open end 13 of the base frame F is one of the features of this sander S.

Mounted transversely to the upper ends of the side frames 14 and 14' is a pressure bar 61. The bar 61 has a pressure strip 62 fixedly secured along its upper edge 63 by suitable means, best illustrated in Figures 5, 6 and 7. The pressure bar 61 is positioned in parallel closely spaced relation to the sanding drum 40 and serves to hold the sanding belt 47 against the work for a smoothing or a polishing action following the heavy cutting action of the drum 40.

The pressure bar 61 is slidably mounted within a transverse supporting beam 64 mounted to the upper ends of the frames 14 and 14' by legs 65. The transverse beam 64 is U-shaped in cross-section, as best illustrated in Figure 5, and has a reversed tongue 66 formed along one of its edges. The tongue 66 operates within the longitudinal groope 66' of the pressure bar 61. The lower edge 66'' of the pressure bar 61 is disposed at an angle to the transverse plane of the sander S, as best illustrated in Figure 6, the tongue 66 and groove 66' are disposed parallel to the lower edge 66'' and at an angle to the transverse plane of the sander S.

A threaded rod 67 forms part of one end of the pressure bar 61 and is adapted to be moved endwise by a hand wheel 67'. When this is done, due to the angle of the lower edge of the bar 61 and the tongue 66, the upper edge of the bar 61 will be raised and lowered in reference to the sanding belt 47 while remaining parallel to the sanding drum 40.

Referring to Figure 5, the pressure strip 62 includes an elongated retaining clip 62''' having one edge engaged over the upper edge of the pressure bar 61, and its opposite edge engaged in a groove 68 formed in the pressure bar 61. The pressure strip 62 may be made of resilient material, a semi-resilient material or a hard material, or a combination thereof, depending upon the material being surfaced.

The pressure pad 62 includes a resilient or semi-resilient strip 62'' resting upon the elongated clip 62'''. The resilient strip 62'' is further encased within the elongated strip material 62'. Both the wearing strip 62' and the base clip 62''' have their edges brought together at 63' and clipped together by an elongated clip 63''. The edges of the strip 62' and clip 62''' are brought around in return bends to slip over the upper edge of the pressure bar 61 entering on one side a groove 68 and at the other embracing the side 68' of the bar 61, as best illustrated in Figure 5, maintaining the pressure pad 62 in place so as to be removed or placed on the pressure bar 61 in an assembled condition.

Extending transversely of the base frame F on its top are bed plate supports 69, forming part of the webs 12 of the base F. Adjustably mounted on the bed plate supports 69 are bed plates 70 extending the complete width of the sander S. The plane of the bed plate support 69 and the longitudinal plane of the bed plates 70 lie at an angle to the horizontal plane of the sander S. This plane tends to slope upwardly towards the center line of the sander S, as best illustrated in Figures 1 and 4.

The bed plates 70 have slots 71 formed in their upper surface in which cap screws 72 engage and are threaded into the bed plate supports 69 so that the height of the upper plane of the surface of the bed plate 70 can be varied in reference to the upper surface of the sanding drum 40 and the belt 47. On moving the bed plates 70 towards the center of the sander S, the upper surface of the bed plate 70 will be raised and on moving the bed plate 70 away from the center of the sander S, the upper surface of the bed plates 70 will be lowered.

We will now describe the work feeding assembly M, which includes the feeding mechanism for feeding the work to be sanded over the bed plates 70 and over the sanding belt 47. A rectangular frame 73 is supported on each of its four corners by threaded screw jacks 74. The screw jack 74 passes through supporting bearings 75 which are centered on the screw jack 74 by collars 76.

The lower ends of the screw jacks 74 are threaded into their supports, consisting of ears 77, which form part of the four corners of the base frame F, referring particularly to Figures 1, 2 and 4. There are four threaded screw jacks 74, one located on each corner of the sander S. The threaded jacks 74 are geared together by any suitable means, as for instance sprocket chains 78, which couple one set of jacks 74 on one side of the sander together, while the transverse chain 79 connects both sets of jacks 74 located on both sides of the work feeding assembly M.

Referring to Figure 2, one of the vertical screw jacks 74 may have a crank 80, adapted to be connected thereto for rotating the jacks 74, which in turn will rotate all of the jacks 74, raising the frame 73 vertically or lowering the same for maintaining the same on a parallel plane with the bed plates 70. Transverse rollers 81 and 81' are journalled within bearings 82 and 82' fixedly mounted to the frame 73.

A feed belt **83** of resilient material is trained about the rollers **81** and **81'** and under a tightening roller **84**, which is journalled to one end of arms **86** by bearing **85**. The opposite end of the arm **86** is journalled to the shaft **84'** of the roller **81'**. The shaft **84'** and the roller **81'** are driven through a gear reduction box **87** driven by a motor **88**, the reduction gear box **87** and motor **88** are mounted upon an outwardly extending base bracket **89** forming part of the frame **73**, referring to Figure 2.

The roller **84** is driven by the driving roller **81'** by inter-meshing gears **84''**. The roller **84** maintains the feeding belt **83** in a working taut condition. The more resistance offered to the movement of belt **47** the greater will be the pressure applied to the roller **84** by the roller **81'** due to the action of the driving gears **84''**.

A feed belt backing plate **90** is fixedly secured between the side frame members **73** by cap screws **91**. A transverse concave portion **92** extends transversely of the lower surface of the backing plate **90** above the position of the pressure pad **62**. The object of this relief is to allow the leading or trailing edge of the work **94** to pass thereunder without forcing the edge down against the sanding belt **47**, leaving a square leading and trailing edge to the work **94**.

The work **94** is fed through the sander S in the direction of the arrow, referring particularly to Figures 1 and 8. In Figure 8 the outline of the work feeding assembly M is indicated by broken lines and square with the direction of travel of the work, while the boundaries or line of the sanding belt **47** is indicated in full lines in an exaggerated angle to the direction of travel of the work **94**. As a matter of fact this angle is very slight, but it prevents striations on the face of the work being sanded and polished.

To maintain the sanding belt in a central position over the driving roller, sanding rollers and idlers, the following mechanism is employed, referring particularly to Figure 9. The raising and lowering of the bearing **31** by the action of the motor **39**, worm **37**, worm wheel **36** and the vertical threaded shaft **32** which raises and lowers the idler shaft **20** relative to the bearing **27**, will carry out the object of centralizing the sanding belt **47**.

The motor **39** is a reversible motor and is controlled from a reversing switch **95** by switches **96** and **97** located adjacent the edges **47'** of the sanding belt **47**. The switches **96** and **97** are operated in the following manner. A jet of air is directed from nozzles **98** and **99** from a source not here shown, towards the pivotally mounted switch vanes **96'** and **97'**. When the belt **47** is running in a central position, this air contacts the switch vanes **96'**, **97'**, opening their contacts **96''** and **97''**, causing the reversing switch to be in open position and the motor **39** at a standstill, but when the sanding belt **47** moves to one side of the roller assembly, as shown in Figure 9, the air delivered from the nozzle **99** will be interrupted by the belt **47** and the switch **87** will be moved to the position shown, by a spring **100** closing the contact **97**, energizing a solenoid **101** of the reversing switch **95** completing an electric circuit through the motor **39**, which will continue to operate in one direction until the belt **47** returns to its position between the nozzles **98** and **99**, when the switch vane **97'** will be opened by this stream of air.

When the motor **39** was energized, it either raised or lowered the bearing **31** by driving the worm gear **36**, threading the jack screw **38** either up or down, which in turn raised or lowered one end of the idler roller **20**, shifting the belt **47** in the opposite direction. The same action takes place when the belt **47** moves in the direction opposite to that above described, only that the solenoid **102** of the reversing switch **95** will be energized, causing the motor **39** to operate in the opposite direction, which will lower the bearing **31** causing the belt **47** to re-center itself again.

Referring to Figure 10, a modified form of pressure pad is illustrated, which consists of a horizontal drum or roller **103** journalled to brackets **103*a*** forming part of the pressure plate **61**. This form is used preferably for high speed finishing work, and is cooled by circulating a cooling fluid **105** therethrough. In the operation of a high speed sanding belt **47** over the roller or pad, heat is developed within the same, therefore a cooling medium is used to carry this heat away from the pad.

The operation of this new and improved combination drum and belt sanding surfacing sander S is as follows. The elevation of the bed plates **70** are first adjusted in regards to the elevation of the sanding drum and belt to correspond to the depth of cut to be made in the work **94**. The elevation of the polishing and finishing pressure pad **62** is then adjusted by a hand wheel **67'**, referring to Figures 5 and 6 particularly. The object of this adjustment is to apply the proper amount of pressure against the back of the sanding belt **47** to effect the desired smoothness and finishing of the work **94**.

The elevation of the work feeding mechanism M is then adjusted by the jack screws **74**, as by the rotation of the crank **80** indicated in broken lines in Figure 2, to correspond to the thickness of work **94** to be processed through the sander S. The work **94** is fed in as viewing Figures 1 and 8 under the feeding belt **83** and over the bed plates **70** in the direction of the arrows.

By referring particularly to Figures 5, 6 and 7, the design of the pad **62** is such that it is completely self-contained and can be removed and replaced from the pressure plate **61** when necessary.

The principles involved in this sander S are of such a nature that the working parts of the sander S can be used in tandem with the present disclosed sander S for sanding both sides of the work.

When it becomes necessary to remove or replace the sanding belt **47**, referring to Figures 1, 2 and 3, the lever **57** is moved in the direction of the arrow, moving the idler roller **20** towards the sub-frame SF, permitting the belt **47** to be removed out the open end **13** of the base frame F.

Having thus described the preferred embodiments of the invention, it should be understood that numerous structural modifications and adaptations may be resorted to without departing from the scope of the appended claims.

What is claimed is:

1. A sanding machine comprising a base frame having a pair of upstanding spaced parallel webs, a single upstanding web secured to said base and extending between adjacent ends of said parallel webs, a sub-frame secured to said single upstanding web between said parallel webs, means on said base frame for feeding work horizontally through said machine, a roller journalled on said sub-frame with its axis perpendicular to the direction of travel of work through said machine, said roller having its peripheral surface positioned closely adjacent the work feeding through said machine, a second roller spaced from said first roller and journalled on said sub-frame with its peripheral surface spaced below the work feeding through said machine, a third roller journalled on said sub-frame intermediate said first and second rollers and spaced substantially therebelow, said rollers having their axes substantially parallel, a work contacting sanding belt trained over said rollers, said first named roller supporting said sanding belt in initial work contacting position, means controlled by the position of said belt on said rollers for tilting said second roller to move said belt to a central position with respect to said roller, a resilient pressure bar positioned adjacent said first named roller between said first and said second named rollers supporting said sanding belt in a secondary work contacting position and manually operated means connected to said pressure bar for vertically adjusting said pressure

bar with respect to the work feeding through said machine.

2. A device as claimed in claim 1 wherein the means feeding work across said sanding belt includes an endless belt positioned above said base frame in opposed relation to said sanding belt.

3. A device as claimed in claim 1 wherein the manually operated means includes an elongated cam support engaging said pressure bar for vertical adjustment.

4. A device as claimed in claim 1 wherein the means feeding work in contacting relation to said sanding belt includes a conveyor belt arranged in spaced parallel relation to said sanding belt.

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