Jan. 1, 1957 J. B. JONES 2,775,853

SANDING APPARATUS

Filed Dec. 2, 1955 2 Sheets-Sheet 1

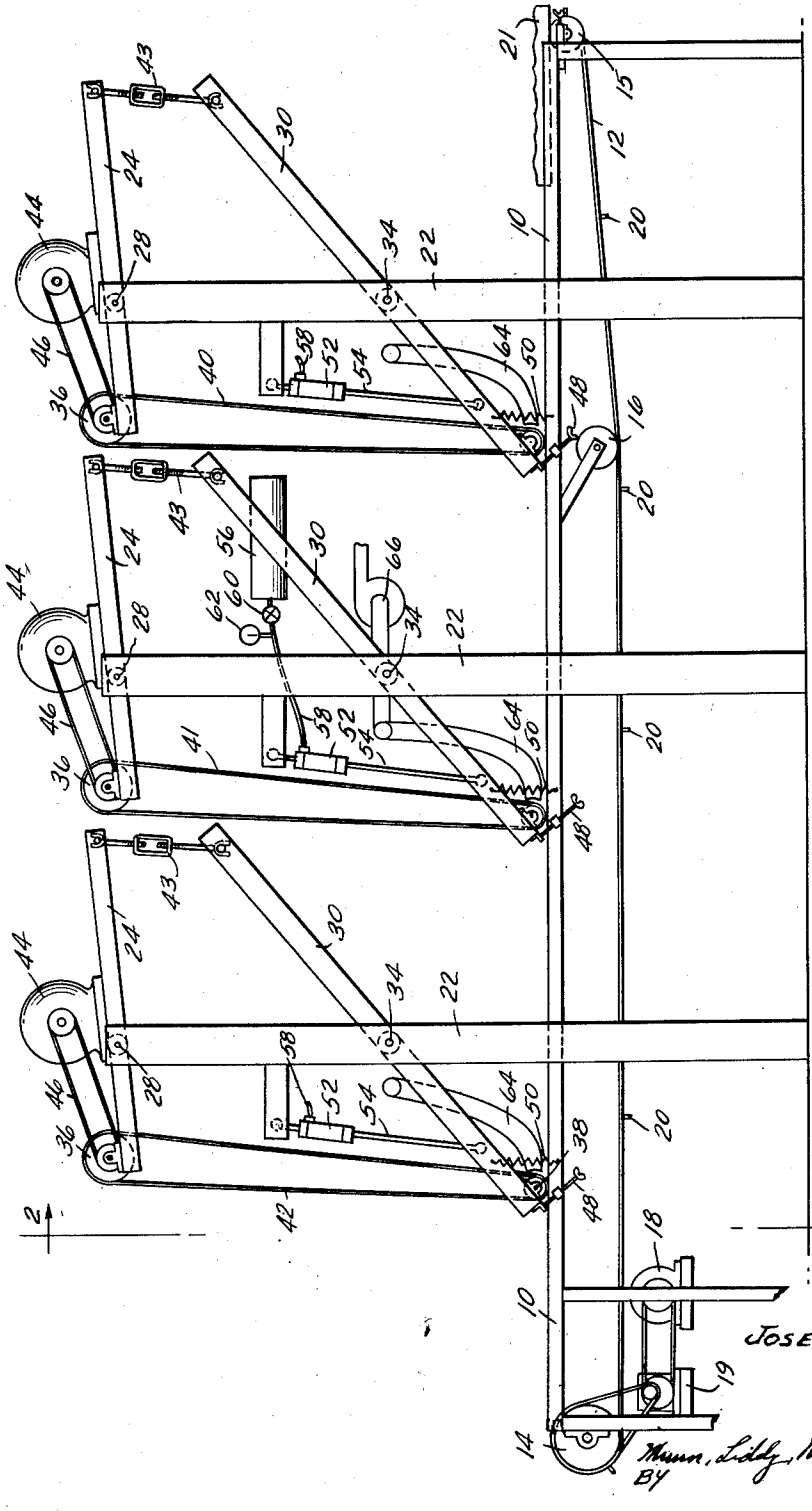


Fig. 1

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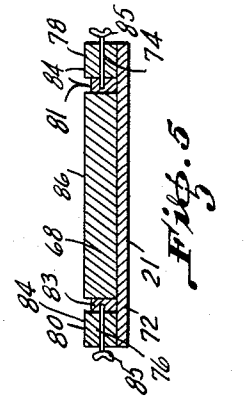


Fig. 5

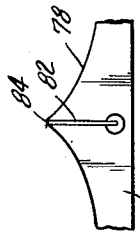


Fig. 4

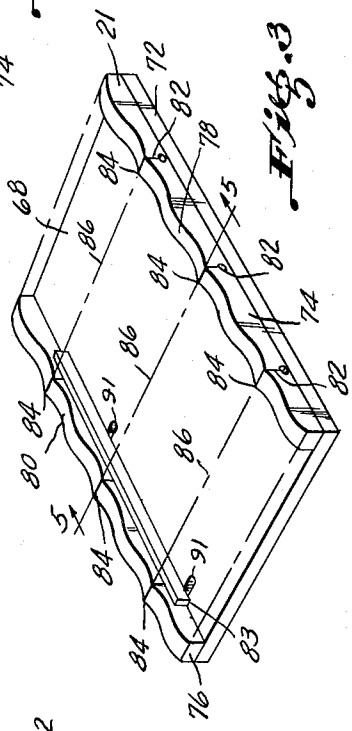


Fig. 3

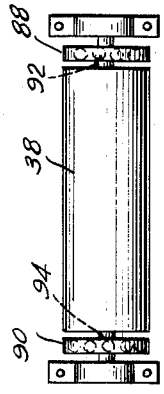


Fig. 6

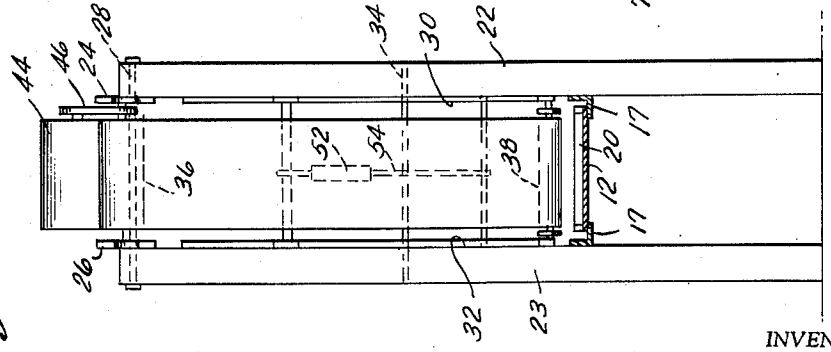


Fig. 2

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2,775,853

SANDING APPARATUS

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Application December 2, 1955, Serial No. 550,542

10 Claims. (Cl. 51—138)

The present invention relates to belt sanding and finishing apparatus and more particularly to such apparatus adapted for treating curved surfaces, including those irregularly shaped surfaces having relatively sharp edges or sharply defined designs.

Heretofore irregularly shaped wooden furniture had to be laboriously sanded and finished by hand. This procedure is time consuming and frequently with ornate work which is desirably produced with sharply defined irregular surfaces sharp edges are dulled, chipped or broken. This is particularly true with careless or inexpert sanding. Mechanical arrangements for belt sanding curved or rounded surfaces are well known; however, known arrangements suffer from the disadvantage that no provision is made for treating articles having the aforementioned sharply defined edges of designs without rounding off or blunting the edges or elevated portions of the design. Such machines were adapted only for sanding and finishing comparatively shallow surfaces or gently curved surfaces, and accordingly were not capable of sanding or finishing articles or workpieces having edges that, before the present invention, required the most careful and expert manual sanding.

Therefore, it is an object of the invention to provide means in a belt sanding apparatus for efficiently sanding or finishing articles having sharply defined irregular surfaces incorporated in the ornate detail thereof.

Another object of the invention is to provide a belt sanding apparatus capable of sanding or finishing articles having relatively sharp edges or sharply defined designs without rounding off or chipping such edges.

Yet another object of the invention is the provision of means associated with belt sanding apparatus for accurately and rapidly sanding articles having irregularly shaped surfaces.

A further object of the invention is the provision of belt sanding apparatus having efficient means for handling and controlling the movements of the articles to be sanded or finished.

Still another object of the invention is the provision in a belt sanding apparatus of means for imparting successive degrees of fineness to the sanded surface of the article undergoing sanding and finishing.

Other objects and advantages of the invention disclosed herein will readily become apparent during the ensuing description of one illustrative form of the invention adapted for utilization in connection with sanding furniture, said description being presented with the accompanying drawings wherein:

Figure 1 is a front elevational view of one form of belt sanding apparatus constructed in accordance with the principles of the present invention.

Figure 2 is a sectional side elevational view taken along lines 2—2 of Fig. 1, parts having been removed for clarity.

Figure 3 is a perspective view of one form of article holding and guiding device utilizable with the belt sanding apparatus of Fig. 1 and having an article to be sanded inserted therein.

Figure 4 is an enlarged fragmentary elevational view of the insert 82 of Fig. 3.

Figure 5 is a sectional elevational view taken along lines 5—5 of Fig. 3.

Figure 6 is a detailed view of the bottom roller 38 of Fig. 2.

Similar reference characters represent similar parts in the several figures.

In accordance with the present invention means are provided for guiding the position of a sanding means relative to the irregular surface of the article to be sanded or finished and for varying the pressure of the sanding means on the article being sanded in accordance therewith and for adjusting the tension of the sanding belt.

Referring now more particularly to Figs. 1 and 2 of the drawings, the illustrative form of the invention shown therein comprises a frame 10 having a substantially horizontal conveyor belt 12 carried by the pulleys 14 and 15 mounted respectively adjacent extremities of frame 10 and having means including the idler roller 16 to maintain the conveyor belt 12 under the desired tension. Conveyor belt 12 has one flight thereof rigidly supported by the L-shaped brackets 17 (Fig. 2) and is driven at the desired speed by a motor 18, a gear reduction unit 19 and associated belts connecting to pulley 14. Transversely mounted relative to conveyor belt 12 are a plurality of cross-pieces 20 each adapted to engage a workholder or sanding form 21 for purposes presently to be described. Frame 10 includes a plurality of pairs of upstanding supports 22 and 23 (Fig. 2) each of said pairs terminating respectively in a pair of upper supporting arms 24 and 26 which are pivotally mounted thereon by means of the axle 28. Spacedly mounted on each pair of upstanding supports 22 and 23 are a lower pair of supporting arms 30 and 32, likewise pivotally mounted thereon by means of axle 34.

Disposed adjacent the forward extremities of the upper and lower pairs of supporting arms 24 and 26, 30 and 32, respectively, are upper and lower sanding belt pulleys 36 and 38 each adapted to engage the sanding belt 40, 41 or 42. The aforesaid belts 40, 41 and 42 may desirably include relative to one another, successively finer grained sandpaper or other abrading material coated or otherwise affixed thereon. Alternatively, one or more of said belts may be provided with the aforementioned abrasive material, while others include buffing or polishing means. It will be appreciated that the belt sanding apparatus of the invention may be provided with a greater or lesser number of sanding belts 40, 41, or 42. A turnbuckle 43 is mounted adjacent the opposite extremities of the upper and lower supporting arms 24 and 26, 30 and 32, respectively, for the purpose of varying the tension applied to the sanding belts 40, 41, or 42, by the varyingly divergent upper supporting arms 24 and 26 and lower supporting arms 30 and 32. Motion is imparted to the aforesaid sanding belts through appropriate driving mechanism including the motors 44 and the pulley and belt arrangements indicated generally at 46.

Individually adjustable stops 48 mounted on frame 10 are provided to limit the movement of the belts toward the work and to prevent accidental contact of pulleys 38 and associated sand belts 40, 41 or 42, with the conveyor belt 12 when no articles or workpieces are passing therebetween to be sanded or finished. Each sand belt pulley 38 may be biased downwardly toward the conveyor belt 12 by means of springs 50 fastened to one or both of the lower supporting arms 30 and 32 and the framework 10 for the purpose of maintaining sanding or buffing belts 40, 41 and 42 under tension. Pressure exerted by the pulleys 38 and associated sanding belt upon the article or workpieces passing thereunder and supported by the work holder or sanding form 21, is controlled through

the medium of a pneumatic cylinder 52 connected by means of piston rod 54 to each of the lower supporting arms 30 and 32. A variable gas or air pressure is supplied to each pneumatic cylinder 52 from a storage tank 56 through the duct 58. The flow of air or gas to the cylinder 52 is controlled by a suitable valve 60 and measured by means of the gauge 62. The sawdust produced in the sanding operation may be removed by means of the conduits 64 connected to a suction fan 66.

For conducting an article or workpiece 68 through the sanding apparatus on conveyor belt 12 a workholder or sanding form 21, shown in greater detail in Figs. 3 and 5, is provided. The sanding form has a base 72 and upstanding side portions 74 and 76. Side portions 74 and 76 are provided respectively, for purposes hereinafter made more apparent, with cam surfaces 78 and 80 each having a configuration corresponding to the ornate design or irregular surface of the article or workpiece 68. Although only one article 68 is illustrated in connection with the sanding form 21, obviously more than one such workpiece having an identical configuration may be inserted in the sanding form and secured by the clamping bars 81 and 83 compressed against the article or articles 68 by means of clamping bolts 85 (Fig. 5). Cam surfaces 78 and 80 may be fabricated from metal or other suitably hard material, or alternatively may be formed from wood and provided with a plurality of metallic inserts 82 (Fig. 4) individually inserted at the edges 84 of the cam surfaces 78 and 80 corresponding to the edges or sharply defined detail 86 of the workpiece 68.

Figure 6 illustrates a bottom pulley assembly in which each sanding belt bottom pulley 38 is provided with a central shaft and pair of cam followers individually adapted to engage cam surfaces 78 and 80 of the sanding form 21, thereby causing each pulley 38 and the sanding belt 40, 41, or 42, respectively, to assume the proper elevation relative to the irregular surface of the workpiece 68. One form of cam followers includes the ball bearings 88 and 90 mounted coaxially with the associated bottom pulley 38 and spacedly and antifrictionally arranged in relationship therewith through the use of the ball-bearing assemblies 92 and 94 or other suitable bearing members or collars inserted between each roller 88 and 90, pulley 38 and the bearing blocks used to mount the assembly on arms 30. The base 72 of workholder or sanding form 21 may desirably be provided with a plurality of slots 91 to permit lateral adjustment of side portions 74 and 76 relative to rollers 88 and 90. For the purpose of gauging the amount of material to be abraded from the workpiece 68, shims (not shown) may be added or subtracted between side portions 74 and 76 and base 72 of the workholder or sanding form 21.

In operation, sanding form 21 having associated therewith a workpiece or article 68, or a number of articles of similar configuration, to be sanded or finished is placed on the conveyor belt 12. Backward movement of sanding form 21 and article 68 while passing successively under sanding belts 40, 41, or 42, is prevented by cooperation with one of the cross pieces 20 affixed transversely to the conveyor belt 12. The sanding form or workholder 21 and article 68 are carried on conveyor belt 12 toward and under the sanding belts 40, 41, and 42, preferably passing under the coarser sanding belt first. Thereupon rollers 88 and 90 engage the cam surfaces 78 and 80 respectively, to guide each pulley 38 and the associated sanding belt 40, 41 or 42, into the proper grinding relationship with each portion of the irregular surface of the workpiece 68. As indicated heretofore, the tension exerted on the sanding belts 40, 41, and 42 by the respective pairs of pulleys 36 and 38 may be varied by manipulating the turn-buckle 43, while the pressure exerted upon the workholder 21 and article 68 can be readily changed by varying the pressure of the air or gas supplied to cylinder 52. The stops 48 maintain the sand belt above the belt 12 while no workpieces are beneath the belts.

Although the invention has been described herewith with reference to belt sanding apparatus adapted for sanding and finishing furniture, it is obvious that the invention is readily adaptable to other applications involving materials other than wood and a wide selection of irregular surfaces.

In addition to the exemplary forms of the present invention illustrated herein, other arrangements and embodiments of the invention will occur to those skilled in the art without departing from the spirit and scope thereof. Furthermore, it is to be understood that certain features of the invention may be utilized without a corresponding use of other features.

I claim:

1. In a belt sanding and finishing apparatus adapted for treating articles having an irregularly shaped configuration, at least one pair of spacedly and resiliently mounted pulleys; an endless belt passing over said pulleys, said belt having an abrasive material disposed thereon, means for biasing said pulleys to a tension-producing position relative to said belts, means for rotating one of said pulleys, at least one workholder adapted to receive said articles and arranged for movement relative to said belt, said workholder having a cam surface corresponding to said configuration; means mounted adjacent one of said pulleys and spatially movable therewith for engaging said cam surface, whereby said pulley and said sanding belt are guided into proper sanding relationship relative to each portion of said configuration, and means for moving said workholder relative to said belt.

2. In a belt sanding and finishing apparatus adapted for treating articles having an irregularly shaped configuration, at least one pair of first and second spacedly and resiliently mounted pulleys; an endless belt passing over said pulleys, said belt having an abrasive material disposed thereon, means for variably biasing said pulleys to a tension producing position relative to said belt; means for rotating said first pulley, at least one sanding form adapted to receive said articles and arranged for movement relative to said belt and said second pulley, said sanding form having a cam surface corresponding to said configuration, means mounted adjacent said second pulley and spatially movable therewith for engaging said cam surface, means for moving said sanding form relative to said belt, and pressure adjusting means for adjusting the pressure exerted by said second pulley and said belt on said articles.

3. In a belt sanding and finishing apparatus adapted for treating articles having an irregularly shaped configuration, at least one pair of spacedly and resiliently mounted pulleys, an endless belt passing over said pulleys, said belt having an abrasive material disposed thereon, means for biasing said pulleys to a tension-producing position relative to said belt, means for rotating one of said pulleys; at least one workholder adapted to receive said articles and arranged for movement relative to said belt, said workholder having at least one cam surface corresponding to said configuration, a cam follower mounted adjacent one of said pulleys and spatially movable therewith, said cam follower including a roller mounted coaxially with said pulleys and arranged for engagement with said cam surface, and means for moving said workholder relative to said belt.

4. A belt sanding and finishing apparatus adapted for treating articles having an irregularly shaped configuration, said apparatus including a frame, an endless movably mounted conveyor belt having one flight thereof arranged for substantially horizontal movement relative to said frame; a plurality of movably mounted sanding belts disposed substantially vertically of said conveyor belt, each said sanding belt having surface treating material disposed thereon, pairs of upper and lower resiliently mounted pulleys arranged to support each said sanding belt, means for biasing said upper and lower pulleys to positions of tension-producing relationship with said sand belts, respectively; means for rotating said upper pulleys, at least one sanding form adapted to receive said articles

and removably mounted on said conveyor belt, said sanding form having a cam surface corresponding to said configuration, and individual means mounted adjacent each said lower pulleys and spatially movable therewith for engaging said cam surface.

5. A belt sanding and finishing apparatus adapted for treating articles having an irregularly shaped configuration, said apparatus including a frame, an endless movably mounted conveyor belt having one flight thereof arranged for substantially horizontal movement relative to said frame, a plurality of movably mounted sanding belts disposed substantially vertically of said conveyor belt, each said sanding belts having surface treating material disposed thereon, a pair of upper and lower resiliently mounted pulleys arranged to support each said sanding belts, means for biasing said upper and lower pulleys to positions of tension-producing relationship with said sanding belts, respectively, means for rotating said upper pulleys, at least one sanding form adapted to receive said articles and removably mounted on said conveyor belt, said sanding form having a cam surface corresponding to said configuration, and individual cam followers mounted adjacent each said lower pulleys and spatially movable therewith, said cam followers including individual rollers mounted coaxially with each said lower pulleys and arranged for successive engagement with said cam surface.

6. In a belt sanding and finishing apparatus adapted for treating articles having an irregularly shaped configuration, at least one pair of first and second spacedly and resiliently mounted pulleys, an endless belt passing over said pulleys, said belt having an abrasive material disposed thereon, means for variably biasing said pulleys to a tension producing position relative to said belt, said means including a pair of varyingly divergent pivotally mounted arms each having an extremity thereof connected to said first and second pulleys, respectively, and having the opposite extremity thereof connected to a turn buckle arrangement, means for rotating said first pulley, at least one sanding form adapted to receive said articles and arranged for movement relative to said belt and said second pulley, said sanding form having a cam surface corresponding to said configuration, means mounted adjacent said second pulley and spatially movable therewith for engaging said cam surface, means for moving said sanding form relative to said belt and pressure adjusting means for adjusting the pressure exerted by said second pulley on said articles, said pressure adjusting means including a pneumatic cylinder having a reciprocating piston mounted therein, a connecting rod attached to said piston and to one of said pivoted arms, and a valved source of compressed gas connected to said cylinder.

7. In a belt sanding and finishing apparatus adapted for treating articles having an irregularly shaped configuration, at least one pair of first and second spacedly and resiliently mounted pulleys, an endless belt passing over said pulleys, said belt having an abrasive material disposed thereon, means for variably biasing said pulleys to a tension producing position relative to said belt, means for rotating said first pulley, at least one sanding form adapted to receive said articles and arranged for movement relative to said belt and said second pulley, said sanding form having a cam surface corresponding to said

configuration, means mounted adjacent said second pulley and spatially movable therewith for engaging said cam surface, means for moving said sanding form relative to said belt, pressure varying means for varying the pressure exerted by said second pulley on said articles, said pressure varying means including a pneumatic cylinder having a reciprocating piston mounted therein, a connecting rod attached to said piston and to one of said pivoted arms, a valved source of compressed gas connected to said cylinder, and means connected to said second pulley and to said valve for varying the gas pressure in said cylinder in response to spatial displacement of said second pulley.

8. A belt sanding and finishing apparatus adapted for treating articles having an irregularly shaped configuration, said apparatus including a frame, an endless movably mounted conveyor belt having one flight thereof arranged for substantially horizontal movement relative to said frame, a plurality of movably mounted sanding belts disposed substantially vertically of said conveyor belt, at least one of said sanding belts having polishing material thereon, the balance of said sanding belts having progressively finer abrasive material thereon relative to one another, a pair of upper and lower resiliently mounted pulleys arranged to support each said sanding belts, means for biasing said upper and lower pulleys to positions of tension-producing relationship with said sanding belts, respectively, means for rotating said upper pulleys, at least one sanding form adapted to receive said articles and removably mounted on said conveyor belt, said sanding form having a cam surface corresponding to said configuration, and individual means mounted adjacent each said lower pulleys and spatially movable therewith for engaging said cam surface.

9. In a belt sanding and finishing apparatus adapted for treating articles having an irregularly shaped configuration, said apparatus including a sanding belt supporting pulley having cam-follower members associated therewith, a sanding form adapted to receive said articles, said form including a base and a pair of upstanding side portions each having a cam surface thereon corresponding to said configuration, said side portions being adjustably mounted on said base, said cam surfaces being individually arranged for engagement with said cam-follower members.

10. In a belt sanding and finishing apparatus adapted for treating articles having an irregularly shaped configuration, said apparatus including a sanding belt supporting pulley having cam-follower members associated therewith, a sanding form adapted to receive said articles, said form including a base, a pair of upstanding side portions each having a cam surface thereon corresponding to said configuration, said side portions being adjustably mounted on said base, said cam surfaces being individually arranged for engagement with said cam-follower members, a plurality of metallic inserts mounted at the prominences of said cam surfaces, and clamping means mounted on said sanding form for clamping said articles in said sanding form.

No references cited.