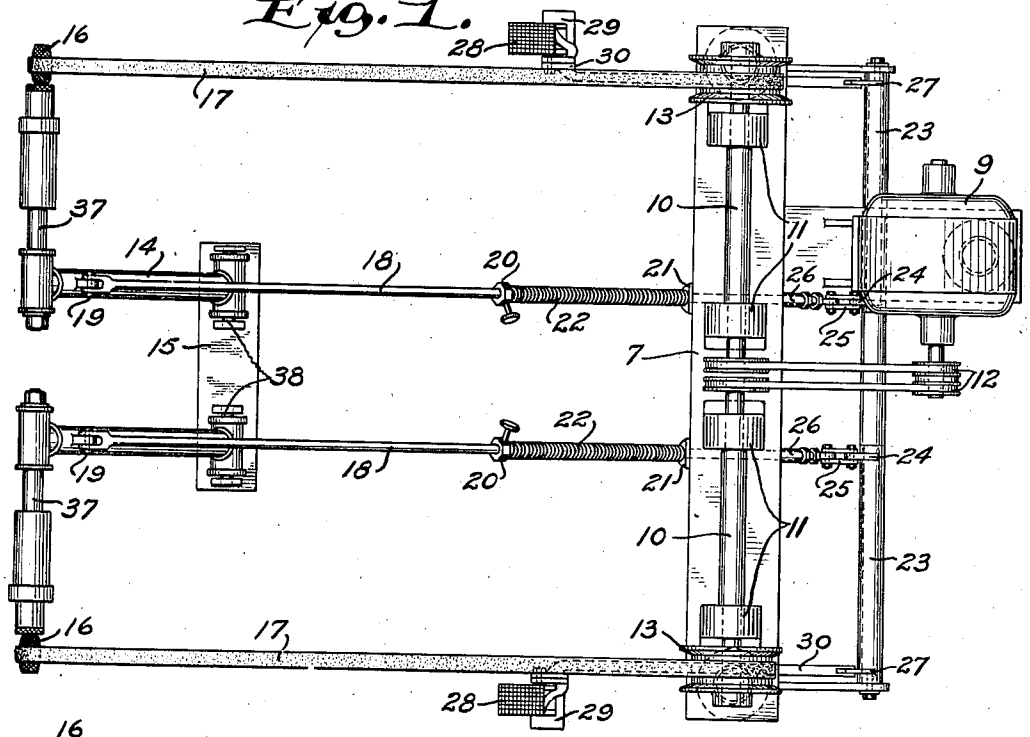
Nov. 3, 1942. D. H. BOSTWICK ET AL 2,300,643

SANDING MECHANISM

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Fig. 1.



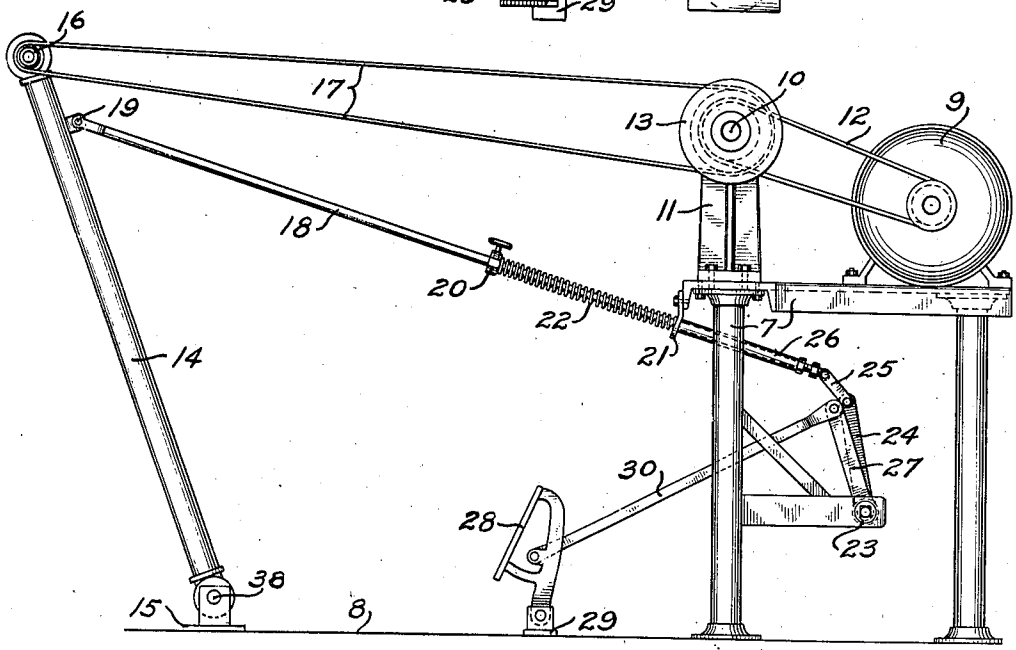


Fig. 2.

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Fig. 4.

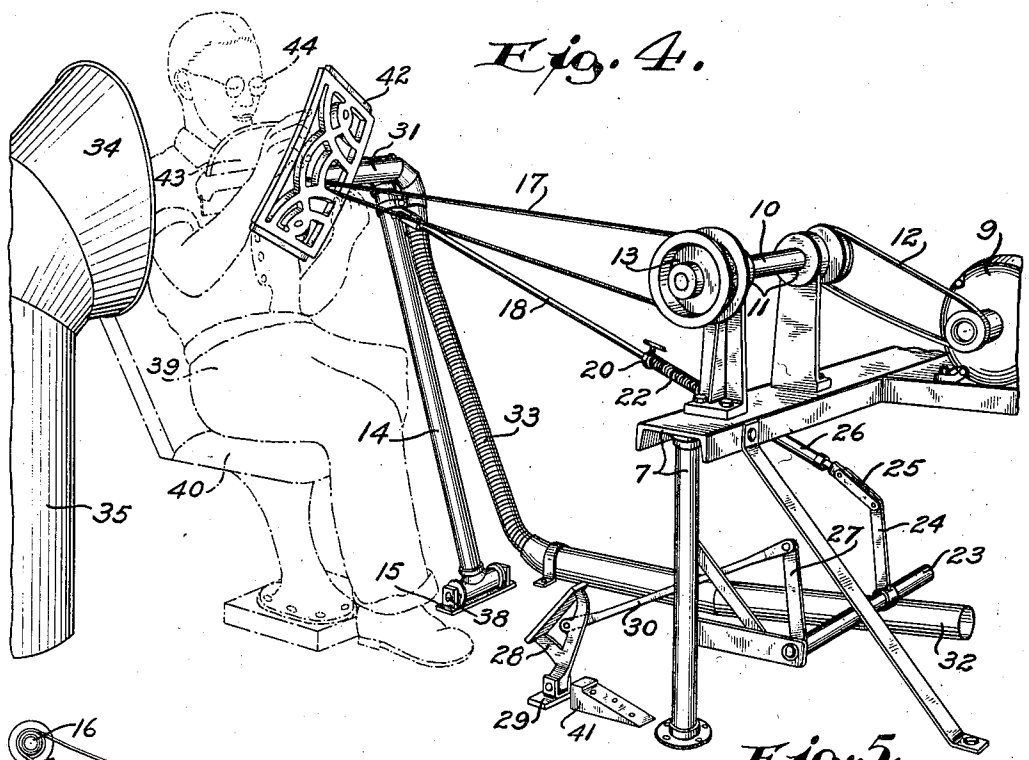


Fig. 5.

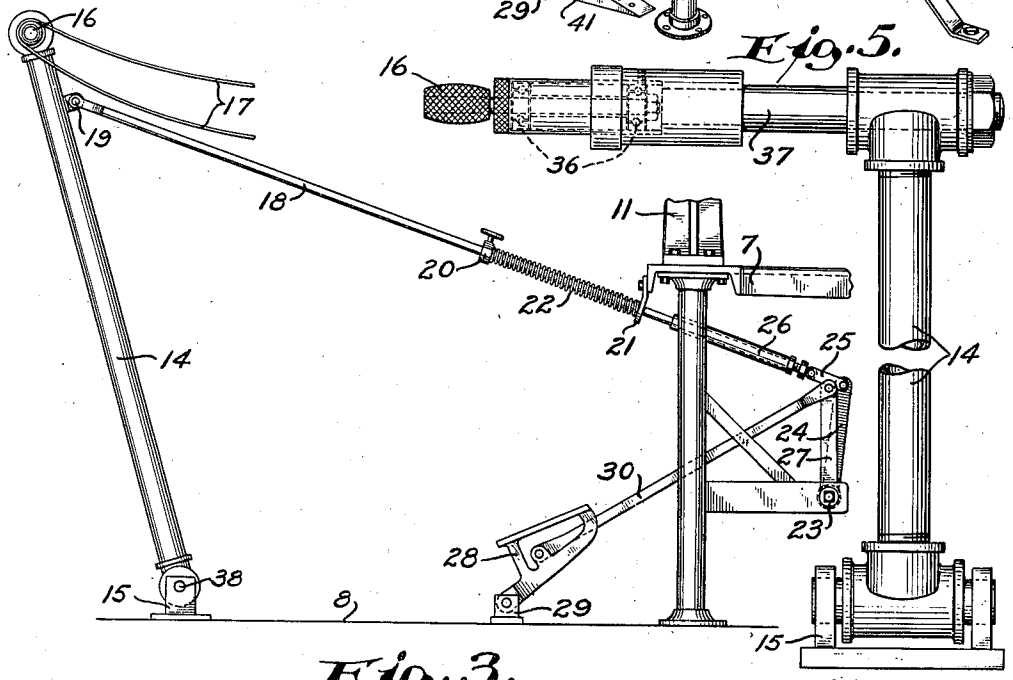


Fig. 3.

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UNITED STATES PATENT OFFICE

2,300,643

SANDING MECHANISM

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Application August 16, 1940, Serial No. 352,832

3 Claims. (Cl. 51—135)

The present invention relates in general to improvements in the art of dressing the surfaces of diverse articles preparatory to the application of coatings or to final finishing thereof, and relates more specifically to various improvements in the construction and operation of mechanism for sanding the surfaces of objects such as component parts of furniture.

An object of our present invention is to provide improved sanding mechanism which is simple in construction, and which is also flexible and highly efficient in use.

In the manufacture of furniture from wood, it is frequently desirable to dress the various parts by sandpapering the surfaces, preparatory to final finishing of such surfaces. While some of these surfaces are flat, many others are very irregular, and a great many of the objects are provided with through openings having compound curves and relatively sharp corners which it is extremely difficult to dress. Although it has heretofore been attempted to sandpaper such perforated or grilled objects with the aid of continuous sandpaper belts driven by pulleys, it was only possible with these previous belt sanding machines, to utilize one stretch of the belt at one time, and the active surface of this stretch was always moving in the same direction; so that in order to secure most effective reversed sanding action on the surfaces, it was necessary to reverse the object relative to the belt. This procedure entailed considerable loss of time and therefore increased the cost of production, and also prevented most effective utilization of the sanding belts. While some of the prior sanding assemblages also made crude provision for removing the dust, sand and wood fiber from the zone of action of the sandpaper, these previous dust removers were also relatively inefficient and did not properly protect the workers; and the prior sanding equipment for dressing wooden objects has also been quite objectionable and unsatisfactory for various other reasons.

It is therefore a more specific object of the present invention to provide a new and useful sandpapering assemblage, especially adapted to dress objects having irregular curves, sharp corners, and intricate grille work, and whereby such objects may be quickly, conveniently and effectively sanded without endangering the operator.

Another specific object of the invention is to provide improved sanding apparatus which is durable in construction and readily manipulable, and wherein diverse articles may be efficiently dressed at minimum cost.

A further specific object of our invention is to provide an improved endless abrasive belt type of dressing machine, wherein both stretches of the belt advancing in opposite directions relative to the work, may be simultaneously utilized, thereby insuring most efficient sanding action and complete utilization of the belts.

An additional specific object of this invention is to provide an improved sanding machine wherein the sand and dust are constantly and completely removed from the abrasive zone, and in which the operator is most effectively protected against possible injury and inhalation of dangerous particles.

Another additional object of our invention is to provide a new and highly useful method of dressing wooden parts by sanding.

Still another specific object of the present invention is to provide an improved endless belt sanding device, wherein the sanding belts may be quickly and conveniently applied to and removed from the work, and in which the belts may be most effectively utilized to dress any type of surface.

These and other specific objects and advantages of our improvement, will be apparent from the following detailed description.

A clear conception of the several features constituting our present invention, and of the mode of constructing and of operating sanding mechanisms built in accordance with the improvement, may be had by referring to the drawings accompanying and forming a part of this specification wherein like reference characters designate the same or similar parts in the various views.

Fig. 1 is a top view of a duplex sanding machine comprising two laterally adjoining units, the dust removal conduits having been omitted for the sake of clearness;

Fig. 2 is a side elevation of the mechanism shown in Fig. 1, with the sanding belt in taut condition, and the dust conduits likewise omitted;

Fig. 3 is a fragmentary side elevation similar to that of Fig. 2, but showing the sanding belt released of tension;

Fig. 4 is a perspective view of one of the sanding units in actual operation, and showing the dust removal conduits; and

Fig. 5 is an enlarged fragmentary front elevation of one of the pivotally suspended idler pulley carrier arms.

While the invention has been shown herein as

being embodied in an electric motor driven assemblage especially adapted to dress grilled wooden furniture parts, it is not our desire or intent to thereby unnecessarily restrict the scope or utility of the improvement for other purposes.

Referring to the drawings, each of the improved sanding mechanisms specifically shown therein comprises in general a structural main frame 7 adapted to be mounted upon a floor 8 or other suitable support, and having a driving motor 9 supported thereon; a drive shaft 10 journalled in alined bearings 11 carried by the frame 7 and having one end drivingly connected to the motor 9 by means of a V-belt drive 12, while its extreme opposite end is provided with a driving sheave or pulley 13; an idler pulley carrier arm 14 pivotally suspended from the floor 8 remote from the frame 7 by means of a pivot bracket 15, and having an idler pulley 16 journalled in its upper swinging end, in line with the corresponding driving pulley 13; an abrasive coated belt 17 coacting with the cooperating pulleys 13, 16; a belt tensioning rod 18 pivotally attached to the upper swinging end of the arm 14 by a pin 19, and having thereon an adjustable collar 20 between which and an adjacent guide plate 21 on the frame 7, a compression spring 22 is interposed; a pivot shaft 23 carried by the frame 7 and having thereon a swingable arm 24 which is connected to the lower end of the adjacent rod 18 by means of a set of links 25; a stop collar or sleeve 26 embracing the lower end of the rod 18 between the link 25 and the fixed guide plate 21; a lever arm 27 secured to the pivot shaft 23 laterally adjacent to the arm 24; a foot pedal 28 swingably suspended from a bracket 29 supported on the floor 8, and being connected to the lever arm 27 by means of a link 30; a blower nozzle 31 carried by the swinging upper end of the arm 14 and being connected to an air pressure supply pipe 32 by means of a flexible conduit 33; and a suction cone or funnel 34 connected to a suitable vacuum zone by means of a duct 35, and being disposed in horizontal alinement with the nozzle 31.

The frame 7 may be formed of channel irons, metal plate, piping and standard pipe flanges, and of any desired shape and size, so as to accommodate either one or more of the improved sanding units, and when the driving motor 9 is operating, the shafts 10 are rotating continuously unless the corresponding drives 12 are disconnected so as to make one or more of the units inactive. The driving sheaves 13 are preferably flanged so as to retain the abrasive belts 17 thereon, but the driven or idler sheaves 16 are not flanged, being crowned and roughened as shown in Fig. 5 in order to permit rapid application and removal of the belts 17. The idler sheaves 16 are moreover of relatively small diameter so as to bring the upper and lower stretches of the belts 17 close to each other at the zone of sanding, and these sheaves 16 are preferably journalled in anti-friction or ball bearings 36 carried by stub shafts 37 secured to the swinging upper ends of the tubular arms 14. The arms 14 may be formed of standard tubing and pipe fittings, and are swingable about pivots 38 carried by the floor brackets 15, and the compressed air ejector nozzles 31 may be secured to the stub shafts 37 in any suitable manner.

The sanding or abrasive belts 17 may be of any desired width, being torn or ripped from a relatively wide sheet of stock of continuous band formation, and these belts 17 are formed of heavy and rather durable fabric having the abrasive material applied to the outer surface thereof. The belt tensioning mechanism comprising the rod 18, collar 20 and spring 22, normally resiliently urges the arm 14 away from the frame 7, thereby keeping the belt taut but permitting ready deflection of the belt stretches. The collar 20 may be adjusted along the rod 18 so as to vary the tension of the spring 22 and to thereby vary the tension on the belt 17, and the stop sleeve 26 coacts with the fixed guide plate 21 so as to definitely limit the swinging movement of the arm 14 away from the frame 7. The upper end of the sleeve 26 will not ordinarily engage the stop plate 21, when the belt 17 is in use and one or both stretches thereof are deflected by contact with the work, but will thus engage the stop when the belt 17 has been released and is stretched to maximum length.

The foot pedal 28 which serves to release the tension on the belt 17, is preferably positioned within easy reach of an operator 39 who may be seated upon a chair 40 as illustrated in dot-and-dash lines in Fig. 3, and the swinging motion of the pedal 28 may be limited by a fixed stop 41. The pedal 28 is normally released as in Fig. 2 so as to permit the spring 22 to tension the belt 17; but when the pedal 28 is depressed as in Fig. 3, the shaft 23 will be rocked or rotated in a clockwise direction by the lever arm 27, and the arm 24 will exert a pull on the lower end of the rod 18 through the links 25, thereby compressing the spring 22, swinging the arm 14 forward, and releasing the belt tension. The endless abrasive belt 17 may then be freely laterally removed from the idler pulley 16 and inserted through a selected opening of a grilled work-piece 42 being held by the operator 39, after which the belt 17 may again be applied to the pulley 16 and the arm 14 may be released to permit the belt tensioning spring to become active.

The air nozzle 31 is preferably directed across the active portion of the sanding belt 17 between the operator and the work closely adjacent to the zone of sanding, and the suction funnel 34 has a relatively large mouth and is adapted to receive all dust, sand and wood fiber removed from the sanding zone by the air jet. In order to additionally protect the operator against flying splinters and other particles, a transparent shield 43 supported on the operator's chest between the sanding zone and the operator's face, may also be provided; and the operator's eyes may be additionally protected by goggles 44. It should be noted that while the work-piece 42 is of typical formation, these pieces may be of diverse shapes and sizes, and the through openings or holes therein may be of various sizes and shapes.

During normal operation of the improved sanding mechanism, the operator 39 may be seated upon the chair 40, the motor 9 is operating to drive the shaft 10 and pulley 13, air under pressure is being delivered from the pipe 32 through the flexible connection 33 and nozzle 31 across the sanding zone, and this air together with any impurities picked up at the sanding zone is being constantly withdrawn from this zone through the funnel 34 by suction. The operator 39 may remove the belt 17 from the idler pulley 16, at will, and may insert this belt through selected openings in the work-piece 42 and reapply the same to the pulley 16, in an obvious manner. With the belt 17 positioned as shown in Fig. 4, the operator may freely turn the work-piece 42 and move the same in any desired direction so

as to cause the outer abrasive surfaces of the belt 17 to dress the surfaces of the grille work. Since the belt 17 is relatively flexible and may be easily deformed by the application of pressure, sanding of sharp corners and compound curves is made readily possible. Because of the fact that the upper and lower stretches of the belt 17 are moving in opposite directions, it is also possible for the operator to subject the surfaces of the work-piece 42 to sanding in either or both directions. Because of non-uniformity of the grain, it is frequently desirable to subject these surfaces to reverse sanding, and the improved mechanism makes it readily possible for the operator to thus apply the abrasive surfaces. When the surface of one opening has been satisfactorily dressed, the operator by utilizing the foot pedal 28 may readily release the belt 17 for removal thereof to another opening, and all of these operations can be quickly and conveniently effected. The blast of air delivered from the nozzle 31 and across the path of travel of the belt 17 closely adjacent to the sanding zone, insures removal of all impurities and prevents dust and other debris from reaching the operator's face. In this manner the operator 39 is effectively protected against injury and inhalation of impurities, and when the successive work-pieces 42 are completed they may be piled or stacked upon the floor next to the operator, thereby permitting him to rapidly dress successive objects.

From the foregoing detailed description it will be apparent that our present invention provides an improved sanding mechanism which is extremely simple, compact and durable in construction, and which is also highly efficient and flexible in normal use. The improved sanding apparatus may be readily adjusted and manipulated and is especially adapted to dress objects having irregular curves, sharp corners, and intricate grille work. The dressing operation may be performed without in any way endangering the operator, and when the belts 17 become excessively worn, they may be readily replaced by new belts. The fact that the upper and lower stretches of the belts 17 may be used either alone or simultaneously, permits most effective application of the sandpaper to the work, and also permits sanding in either or both directions so as to most effectively dress surfaces having the grain running in different directions. The fact that the sandpaper belts 17 may be readily deflected both longitudinally and laterally, permits most effective sanding of compound curved surfaces and corners. The improved apparatus has proven highly satisfactory and efficient in actual commercial use, and the capacity of the equipment may be increased by arranging the units in groups of one or more which may be driven by a common motor 9. While the improved assemblage has been described as being especially adapted to dress wooden objects, it may of course be used for dressing objects constructed of other materials such as fiber compositions, paper or the like. Applicants' improved method comprising the application of abrasive surfaces traveling in opposite directions, to the interior bounding surfaces of openings in grille work and the like insures most effective dressing of relatively rough surfaces having the grain disposed in diverse directions, and has also made it possible to utilize sanding belts for a longer period and without waste of sanding stock.

It should be understood that it is not desired to limit this invention to the exact details of construction or to the precise mode of operation, herein shown and described, for various modifications within the scope of the appended claims may occur to persons skilled in the art.

We claim:

1. Sanding mechanism comprising, a driving pulley rotatable about a fixed horizontal axis, an arm pivotally suspended at its lower end so that its upper end will swing toward and away from said pulley in close proximity to the horizontal plane of said fixed axis, a small driven pulley journalled for rotation in said swinging arm end and being disposed a considerable distance laterally of said arm in approximately the vertical plane of said driving pulley, an abrasive belt coacting with said pulleys, a nozzle swingable with said arm for delivering a jet of air across said belt in close proximity to said driven pulley, and a fixed suction funnel for withdrawing air from said belt in line with said air jet and within the range of movement of said swinging arm end.

2. Sanding mechanism comprising, a driving pulley rotatable about a fixed horizontal axis, an arm pivotally suspended at its lower end so that its upper end will swing toward and away from said pulley in close proximity to the horizontal plane of said fixed axis, a small driven pulley journalled for rotation in said swinging arm end and being disposed a considerable distance laterally of said arm in approximately the vertical plane of said driving pulley, an abrasive belt coacting with said pulleys, a nozzle carried by and swingable with said arm for delivering a jet of air from one side across said belt in close proximity and in fixed relation to said driven pulley, and a stationary suction funnel disposed on the opposite side of said belt for withdrawing air from said belt in constant alinement with the air jet and within the range of movement of said swinging arm end.

3. Sanding mechanism comprising, a driving pulley rotatable about a fixed horizontal axis, an arm pivotally supported from beneath and remote from said pulley so that its upper end can swing toward and away from the pulley in proximity to the horizontal plane of said fixed axis, a driven pulley carried by the upper arm end a considerable distance laterally of the arm and in approximately the vertical plane of said driving pulley, an abrasive belt coacting with said pulleys, a nozzle swingable with said arm for delivering a jet of air across said belt close to said driven pulley, and suction means for withdrawing air from said belt in line with said nozzle.

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