SCUFFING MACHINE FOR FINISHING WOOD PRODUCTS

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Abstract
A scuffing machine is provided for finishing the surfaces of continuously advancing wood products. The machine includes a frame defining a scuffing station, with a conveyor for transporting the wood products through the scuffing station in a generally horizontal feeding direction. A plurality of scuffling brushes are mounted on the frame at the scuffing station for rotation about vertical axes. Each scuffing brush includes a plurality of elongated, vertically extending bristles which terminate in distal ends for engaging the wood products.
SCUFFING MACHINE FOR FINISHING WOOD PRODUCTS

FIELD OF THE INVENTION

[0001] This invention generally relates to the art of surface preparation of workpieces and, particularly, to a scuffing machine for surface-finishing wood products such as cabinet doors and the like.

BACKGROUND OF THE INVENTION

[0002] Machines have been designed for preparing surfaces of workpieces for various applications. In the art of wood finishing techniques, machines have been in use in attempting to smooth or polish wood products, such as cabinets doors and the like. Typically, wood finishing machines have been provided as devices which use an abrasive such as sandpaper in an attempt to finish the wood. One type of sanding machine may use a sanding belt entrained around a sanding platen. Some sanding machines use orbital sanding heads which are moved back and forth across the wood product abrading its surface. Other sanding machines use finishing wheels which rotate on generally horizontal axes (i.e., parallel to the finishing surface), and the wheels are fabricated of a plurality of layers of split and edged sanding paper. Still further sanding machines use a plurality of horizontal finishing wheels which rotate on horizontal axes, with the horizontal wheels, themselves, mounted on and rotate about a common, central vertical axis. The wheels are fabricated of a plurality of layers of split-edged sanding paper.

[0003] These sanding machines are not able to sand into the contours of a typical cabinet door, for instance, and they also are prone to leave cross-grain scratches. Such machines may provide marginal sanding in the door’s contours, but final finishing is required by hand sanding.

[0004] As a result of the problems which continue to plague such wood finishing machines, wood products often are simply finished by hand techniques which are very labor intensive, time consuming and expensive. The present invention is directed to solving these problems by providing a unique scuffing machine for wood products which uses a plurality of scuffing brushes having elongated bristles.

SUMMARY OF THE INVENTION

[0005] An object, therefore, of the invention is to provide a new and improved a scuffing machine for finishing the surfaces of continuously advancing wood products.

[0006] In the exemplary embodiment of the invention, the machine includes a frame defining a scuffing station. Conveying means are provided on the frame for transporting wood products to be finished through the scuffing station in a generally horizontal feeding direction. A plurality of scuffing brushes are mounted on the frame at the scuffing station for rotation about vertical axes. The axes of some of the brushes are spaced transversely of the feeding direction. The axes of some of the brushes are spaced generally parallel to the feeding direction. Some of the brushes overlap transversely of the feeding direction to prevent transverse finishing gaps on the wood products. Each scuffing brush includes a plurality of elongated, vertically extending bristles which terminate in distal ends for engaging the wood products.

[0007] As disclosed herein, the scuffing brushes are disposed in at least two generally parallel rows extending transversely of the feeding direction. The axes of the brushes in one row are offset transversely of the axes of the brushes in the other row. The adjacent brushes on transversely spaced axes include bristles which intermesh when the brushes are rotated. Preferably, the adjacent brushes rotate such that the outer peripheries thereof move in the same direction.

[0008] Some of the parameters of the scuffing brushes are that the bristles are on the order of 2-4 inches long. The bristles are on the order of 0.20-0.050 inch in diameter. The bristles are fabricated of an abrasive impregnated plastic material having an abrasion factor on the order of 60-240 grit. The bristles herein are of a nylon/silicone carbide material.

[0009] The scuffing machine includes a cleaning station on the frame down-line of the scuffing station. At least one cleaning brush is located at the cleaning station, and the cleaning brush comprises a roller brush rotatable on a horizontal axis extending transversely of the feeding direction. Motor means are provided for rotating the cleaning brushes on the order of 100-500 rpm. A single motor is provided for conjointly rotating a plurality of the cleaning brushes.

[0010] A further feature of the invention is that the bristles of the scuffing brushes have proximal ends fixed to a base of the brush. An elastic band is positioned about the brush around the proximal ends of the bristles to control outward flaring of the distal ends of the bristles.

[0011] Other objects, features and advantages of the invention will be apparent from the following detailed description taken in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] The features of this invention which are believed to be novel are set forth with particularity in the appended claims. The invention, together with its objects and advantages thereof, may be best understood by reference to the following description taken in conjunction with the accompanying drawings, in which like reference numerals identify like elements in the figures and in which:

[0013] FIG. 1 is a perspective view of a scuffing machine incorporating the concepts of the invention, looking toward the in-feed end of the machine;

[0014] FIG. 2 is a perspective view looking toward the out-feed end of the machine;

[0015] FIG. 3 is a top plan view of the machine;

[0016] FIG. 4 is a side elevational view of the machine;

[0017] FIG. 5 is an end elevational view, looking toward the in-feed end of the machine;

[0018] FIG. 6 is an end elevational view, looking toward the out-feed end of the machine;

[0019] FIG. 7 is a vertical section taken generally along line 7-7 of FIG. 3;

[0020] FIG. 8 is an enlarged top perspective view of the two banks or clusters of scuffing brushes of the machine; and
FIG. 9 is an enlarged side elevational view of one of the scuffing brushes installed with a band to prevent excessive bristle flaring.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings in greater detail, the invention is embodied in a scuffing machine, generally designated 10, for finishing the surfaces of continuously advancing wood products, such as cabinet doors or the like. In actual practice, the machine has been used very effectively to scuff the wood products between the sealing coat and the top finishing coat of a finished wood product, including cabinet doors having three-dimensional or contoured surfaces to be finished. However, the scuffing machine of the invention is readily applicable for a wide range of finishing processes on wood products.

With that understanding, FIGS. 1 and 2 best show that scuffing machine 10 includes a frame, generally designated 12, defining a scuffing station, generally designated 14, and a cleaning station, generally designated 16. A conveying means in the form of an endless conveyor, generally designated 18, is provided for transporting the workpieces, such as the wood products, to be finished through the scuffing station and the cleaning station in a generally horizontal feeding direction as indicated by arrow “A” (FIG. 1). The conveyor, therefore, defines an in-feed end 20 of the machine and an out-feed end 22 of the machine. The conveyor may be a vacuum conveying system having orifices to hold the wood products down on a conveyor belt as they continuously advance through the machine. To that end, a vacuum system, generally designated 24, is provided to effect the vacuum at the conveyor surface.

Referring to FIG. 3 in conjunction with FIGS. 1 and 2, the invention contemplates the use of a plurality of scuffing brushes, generally designated 26 in FIG. 2, mounted on the frame at scuffing station 14. The brushes are rotatable about vertical axes defined by vertical rotating shafts 28. The brushes are mounted in two banks or clusters of five brushes in each bank. In FIGS. 1-3, one of the clusters of brushes is exposed and can be clearly seen. The other cluster of brushes is covered by a cover 30. In actual practice, the exposed cluster of brushes also will be located beneath a cover 30 which has been removed in the drawings to facilitate the illustration. As shown, each cluster of brushes include two brushes in a front row (i.e. closer to in-feed end 20) and three brushes in a rear row. All of the brushes in each cluster are driven by a common electrical motor 32 and an endless drive belt 34 which is trained around a plurality of pulleys or sprockets 36 fixed to rotating shafts 28. The shafts are journaled in a frame plate 38 of frame 12.

Before proceeding with the details of scuffing brushes 26, cleaning station 16 is provided to remove the fine particles from the wood products resulting from the scuffing operation. Specifically, a pair of exhaust hoods 40 each have an outlet 42 which is connected to an appropriate vacuum source. As seen in FIG. 7, a horizontal roller brush 44 is mounted within each exhaust hood 40 for rotation on a horizontal axis 46. Each roller brush has a plurality of fairly soft bristles for gently wiping the surface of the finished wood products as the particles are lifted and exhausted through outlets 42. A pair of electrical motors 48 (FIGS. 1-3) are provided for rotating roller brushes 44 at the cleaning station. FIG. 7 also shows an electrical motor 50 for driving conveyor 18.

Referring to FIG. 8 in conjunction with FIG. 3, all of the ten scuffing brushes 26 in both clusters thereof can be seen in FIG. 8. Frame plate 38 which supports shafts 28 of the scuffing brushes is fixed to the top of a pair of cross beams 52 and a plurality of supporting braces 54 of the machine. The rotating shafts define vertical axes of rotation for the scuffing brushes. With the brushes mounted in plural rows in plural clusters, it can be seen that the axes of rotation of some of the brushes are spaced transversely of the feeding direction “A”. The axes of rotation of some of the brushes are spaced generally parallel to the feeding direction. As best seen in FIG. 3, some of the brushes in different rows overlap transversely of the feeding direction to prevent transverse finishing gaps on the wood products. In other words, the brushes in the front row in each cluster are offset transversely of the feeding direction relative to the brushes in the second row. This provides a continuous scuffing medium transversely of the entire surfaces of the wood products as they are continuously advanced by conveyor 18 through scuffing station 14 in the feeding direction “A”.

FIG. 9 shows a single scuffing brush 26 which includes its rotating shaft 28 projecting from the top thereof. The shaft extends from a brush head, generally designated 60, through a bearing housing 62. Each brush head 60 includes a plurality of elongated, vertically extending bristles 64 which terminate in distal ends 64a for engaging the wood products to be finished. Proximal ends 64b of the bristles are attached or inserted into a circular base plate 66 which may be fabricated of wood, plastic or the like. The circular base plate is fixed to a bottom end 28a of rotating shaft 28 by a bracket 68.

Some of the parameters of brush head 60 of each scuffing brush 26 is that bristles 64 be on the order of 2-4 inches long. The bristles are on the order 0.20-0.050 inch in diameter. The bristles are fabricated of an abrasive impregnated plastic material, such as a nylon/silicone carbide material. The bristles have an abrasion factor on the order of 80-240 grit. It is contemplated that motors 32 be able to rotate brush heads 60 conjointly on the order of 100-500 rpm, through drive belt 34 and pulleys or sprockets 36 described in relation to FIGS. 1 and 2.

FIG. 9 also shows a feature of the invention in the form of an elastic band 70 which is mounted about circular base plate 66, as by a press-fit. In actual practice, the arrangement and spacing of scuffing brushes 26 and the size of brush heads 60 are such that bristles 64 of adjacent brush heads in the transverse rows of scuffing brushes flare out during rotation, so that the bristles of adjacent brushes intermesh when they rotate. In addition, drive belt 34 is trained around pulleys or sprockets 36 so that the peripheries of the adjacent intermeshed brushes rotate in the same direction. Band 70 is fabricated of plastic or yieldable material so that it is flexible and can be used to control outward flaring of the bristles. For instance, it can be understood that by raising and lowering the band on base plate 66, the “free” or exposed distal ends of bristles 64 can be lengthened or shortened which would vary the flaring of the brushes under centrifugal forces. Alternatively, different bands of different flexibility could be provided.
It will be understood that the invention may be embodied in other specific forms without departing from the spirit or central characteristics thereof. The present examples and embodiments, therefore, are to be considered in all respects as illustrative and not restrictive, and the invention is not to be limited to the details given herein.

1. A scuffing machine for finishing the surfaces of continuously advancing wood products, comprising:
   a frame defining a scuffing station;
   conveying means on the frame for transporting wood products to be finished through the scuffing station in a generally horizontal feeding direction;
   a plurality of scuffing brushes mounted on the frame at the scuffing station for rotation about vertical axes, the axes of some of the brushes being spaced transversely of the feeding direction, the axes of some of the brushes being spaced generally parallel to the feeding direction, and some of the brushes overlapping transversely of the feeding direction to prevent transverse finishing gaps on the wood products; and
   each scuffing brush including a plurality of elongated, vertically extending bristles which terminate in distal ends for engaging the wood products.

2. The scuffing machine of claim 1 wherein said scuffing brushes are disposed in at least two generally parallel rows extending transversely of the feeding direction.

3. The scuffing machine of claim 2 wherein the axes of the brushes in one row are offset transversely of the axes of the brushes in the other row.

4. The scuffing machine of claim 1 wherein at least a pair of adjacent brushes on transversely spaced axes include bristles which intermesh when the brushes are rotated.

5. The scuffing machine of claim 1 wherein adjacent brushes on transversely spaced axes rotate such that outer peripheries thereof move in the same direction.

6. The scuffing machine of claim 1, including a cleaning station on the frame down-line of the scuffing station, with at least one cleaning brush located thereat, the cleaning brush comprising a roller brush rotatable on a horizontal axis extending transversely of said feeding direction.

7. The scuffing machine of claim 1 wherein the bristles of at least some of said scuffing brushes are on the order of 2-4 inches long.

8. The scuffing machine of claim 1 wherein the bristles of at least some of said scuffing brushes are on the order of 0.20-0.050 inch in diameter.

9. The scuffing machine of claim 1 wherein the bristles of at least some of said scuffing brushes are fabricated of abrasive impregnated plastic material.

10. The scuffing machine of claim 9 wherein said bristles have an abrasion factor on the order of 80-240 grit.

11. The scuffing machine of claim 9 wherein said bristles are of a nylon/silicone carbide material.

12. The scuffing machine of claim 1, including motor means for rotating said scuffing brushes on the order of 100-500 rpm.

13. The scuffing machine of claim 1, including a single motor for conjointly rotating a plurality of said scuffing brushes.

14. The scuffing machine of claim 1 wherein the bristles of at least one of said scuffing brushes have proximal ends fixed to a base of the brush, and including a band about the brush around the distal ends of the bristles to control outward flaring of the bristles.

15. A scuffing machine for finishing the surfaces of continuously advancing wood products, comprising:
   a frame defining a scuffing station;
   conveying means on the frame for transporting wood products to be finished through the scuffing station in a generally horizontal feeding direction;
   a plurality of scuffing brushes mounted on the frame at the scuffing station for rotation about vertical axes, the axes of some of the brushes being spaced transversely of the feeding direction; and
   each scuffing brush including a plurality of elongated, vertically extending bristles which terminate in distal ends for engaging the wood products, at least a pair of adjacent brushes on said transversely spaced axes including bristles which intermesh when the brushes are rotated.

16. The scuffing machine of claim 15 wherein the bristles of at least some of said scuffing brushes are on the order of 2-4 inches long.

17. The scuffing machine of claim 15 wherein the bristles of at least some of said scuffing brushes are on the order of 0.20-0.050 inch in diameter.

18. The scuffing machine of claim 15 wherein the bristles of at least some of said scuffing brushes are fabricated of abrasive impregnated plastic material.

19. The scuffing machine of claim 18 wherein said bristles have an abrasion factor on the order of 80-240 grit.

20. A scuffing machine for finishing the surfaces of continuously advancing wood products, comprising:
   a frame defining a scuffing station;
   conveying means on the frame for transporting wood products to be finished through the scuffing station in a generally horizontal feeding direction;
   a plurality of scuffing brushes mounted on the frame at the scuffing station for rotation about vertical axes, the axes of some of the brushes being spaced transversely of the feeding direction;
   each scuffing brush including a plurality of elongated, vertically extending bristles which terminate in distal ends for engaging the wood products, the bristles of at least one of the scuffing brushes having proximal ends fixed to a base of the brush; and
   a band about the brush around the distal ends of the bristles to control outward flaring of the bristles.

21. The scuffing machine of claim 20 wherein the bristles of at least some of said scuffing brushes are on the order of 2-4 inches long.

22. The scuffing machine of claim 20 wherein the bristles of at least some of said scuffing brushes are on the order of 0.20-0.050 inch in diameter.

23. The scuffing machine of claim 20 wherein the bristles of at least some of said scuffing brushes are fabricated of abrasive impregnated plastic material.
24. The scuffing machine of claim 23 wherein said bristles have an abrasion factor on the order of 80-240 grit.

25. A scuffing machine for finishing the surfaces of continuously advancing wood products, comprising:

a frame defining a scuffing station;

conveying means on the frame for transporting wood products to be finished through the scuffing station in a generally horizontal feeding direction;

a plurality of scuffing brushes mounted on the frame at the scuffing station for rotation about vertical axes, the axes of some of the brushes being spaced transversely of the feeding direction; and

each scuffing brush including a plurality of elongated, vertically extending bristles which terminate in distal ends for engaging the wood products, the bristles of at least some of the scuffing brushes being fabricated of an abrasive impregnated plastic material on the order of 2-4 inches long and 0.20-0.050 inch in diameter.

26. The scuffing machine of claim 25 wherein said bristles have an abrasion factor on the order of 80-240 grit.

27. The scuffing machine of claim 25 wherein said bristles are of a nylon/silicone carbide material.

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