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J. J. ROBINSON, JR., ET AL
AIR CONTROL FOR SANDING MACHINES

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2 Sheets-Sheet 1

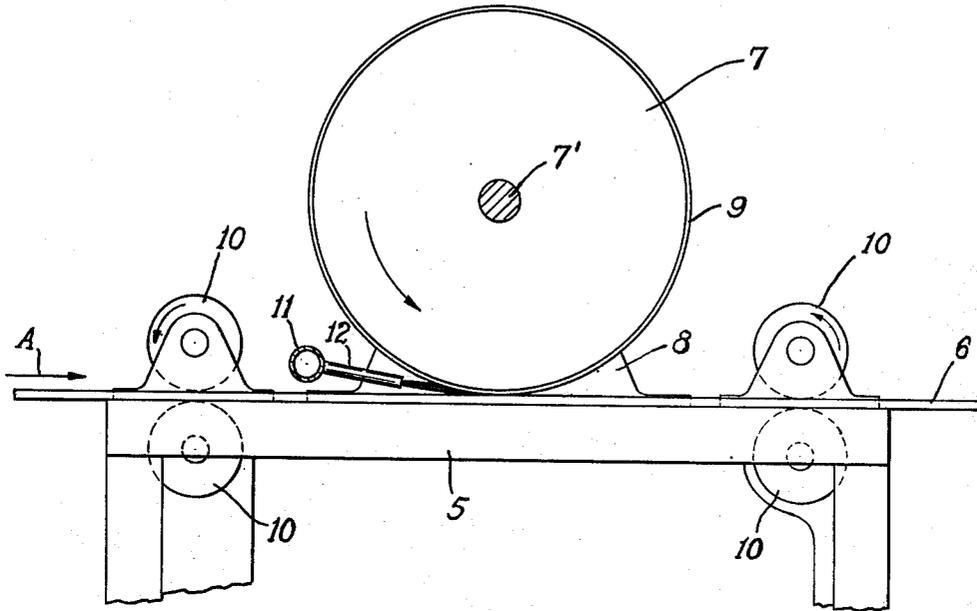


Fig. 1

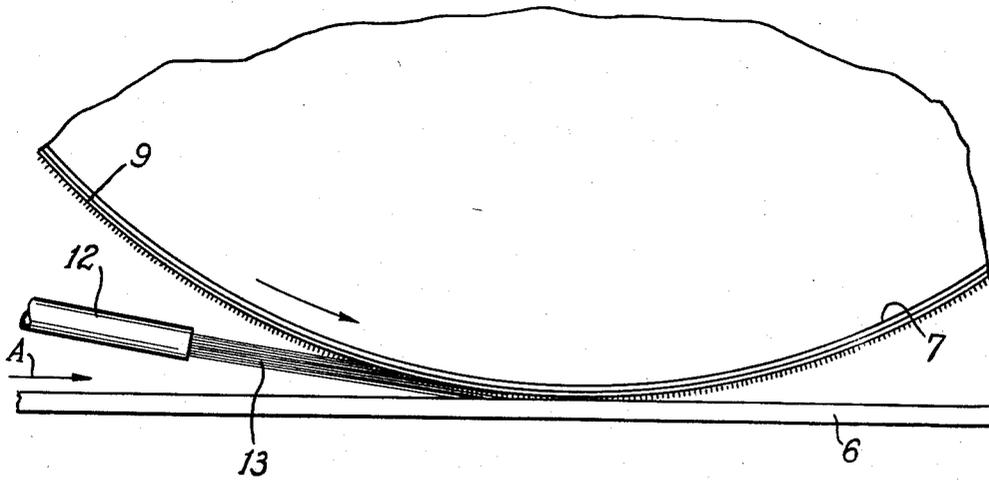


Fig. 2

INVENTORS
Joseph J. Robinson, Jr. and
Howard Max Wassem
BY *Freese and Bishop*
ATTORNEYS

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Fig. 3

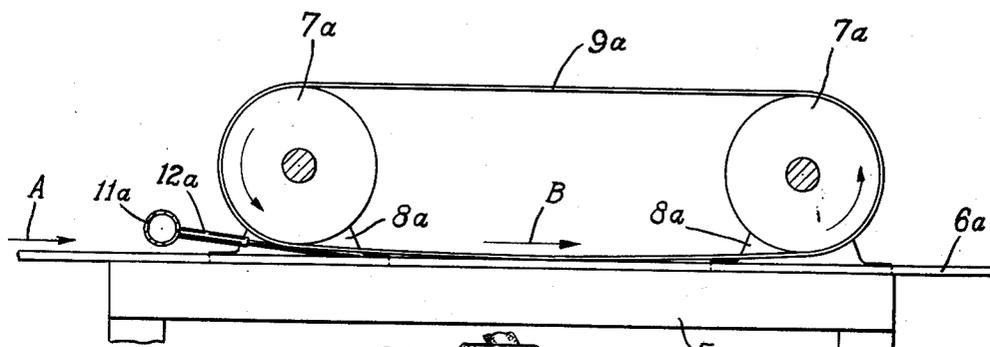


Fig. 5

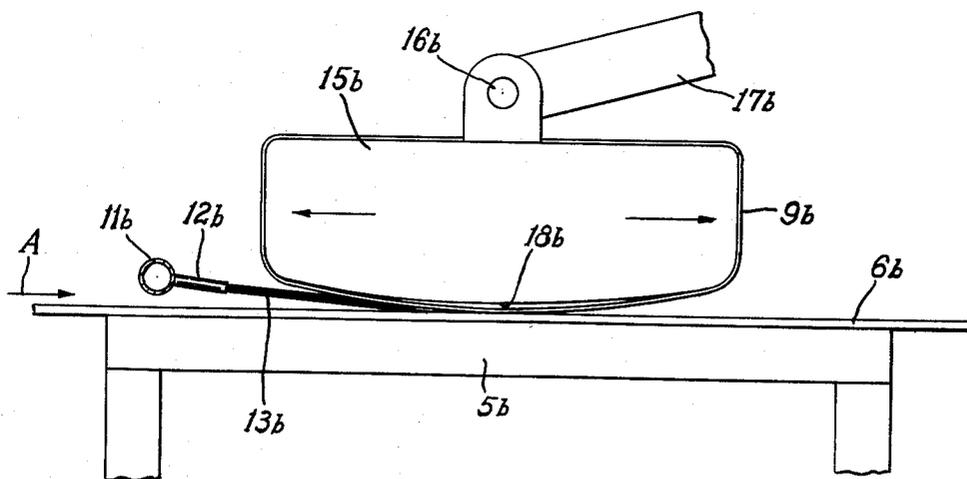
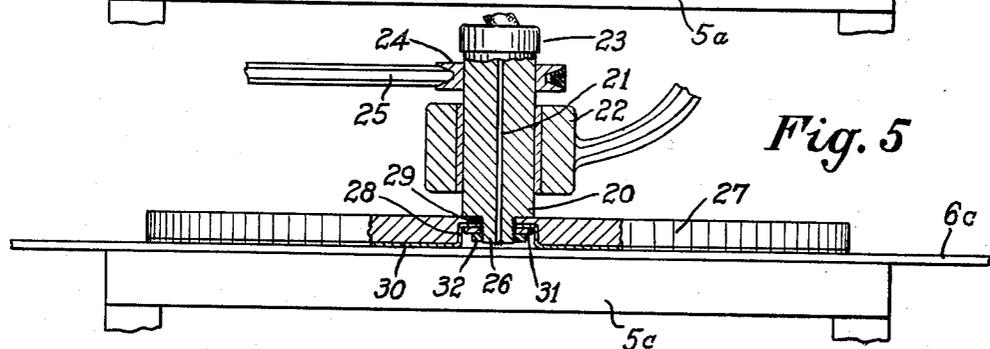


Fig. 4

INVENTORS
Joseph J. Robinson Jr. and
Howard Max Wassem
BY *Freese and Bischof*
ATTORNEYS

UNITED STATES PATENT OFFICE

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AIR CONTROL FOR SANDING MACHINES

Joseph J. Robinson, Jr., and Howard Max Wasserm, Dover, Ohio, assignors to Marsh Wall Products, Incorporated, Dover, Ohio, a corporation of Ohio

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2 Claims. (Cl. 51—281)

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The invention relates generally to sanding machines and sanding operations performed thereby, and more particularly to a method and apparatus for controlling the depth of the sanding cut by means of compressed air.

Sanding machines embody a band, strip or sheet of abrasive material which is moved over the work surface to be sanded. In many cases it is necessary to provide for adjusting or controlling the depth of the cut made by the abrasive, for performing relatively light or heavy sanding operations.

It has been proposed to make such adjustment by moving the band toward or away from the work, but accurate adjustment has been difficult because the required adjustment is so fine. Moreover, where the abrasive band is wrapped around a rotating drum, centrifugal force throws the band radially outward against the work, and adjustment of the drum does not accurately control the position of the band at the point where it contacts the work.

Another way of controlling the depth of the cutting action is to flow water or oil over the abrading surface constantly during the sanding operation, such liquid acting also as a coolant, but this method is not satisfactory for wood and like products because the water or oil permanently stains or discolors the work.

It is a primary object of the present invention to provide a novel method and apparatus for controlling accurately the depth of cut made by a moving abrasive band in a sanding machine.

A more specific object is to provide accurate control of the sanding action of the abrasive band at the point where the band contacts the work.

Another object is to provide novel control means which also acts as a coolant for the abrading surfaces without wetting or staining them.

A further object is to provide a novel sanding control for preventing building up or loading of loose grains on the abrasive band, which would prematurely destroy the effectiveness of the abrasive.

A still further object is to provide a novel air blast control especially adapted for sanding wood and the like, where water or oil would stain the wood.

Finally, it is an object of the present invention to provide a novel method of controlling the depth of cut in a dry sanding operation, which method is easily applicable to substantially all types of existing sanding machines.

These and other objects are accomplished by

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the parts, arrangements, combinations and methods which comprise the present invention, the nature of which is set forth in the following general statement, and preferred embodiments of which are set forth in the following description and illustrated in the accompanying drawings, and which is distinctly pointed out and defined in the appended claims forming part hereof.

In general terms, the present invention consists in providing in a sanding machine having an abrasive band moving at a predetermined distance from the work, a jet or blast of compressed air directed between the abrasive band and work surface, setting up an air cushion between the surfaces, for controlling accurately the distance between the band and the work by regulating the pressure of the air blast.

Referring to the drawings forming part hereof, in which preferred embodiments of the invention are shown by way of example;

Figure 1 is a more or less schematic elevational view showing the manner of directing an air blast between the surface of a piece of work being sanded and the abrasive band on a rotating drum;

Fig. 2 is an enlarged fragmentary view similar to Fig. 1;

Fig. 3 is a schematic elevational view showing the manner of directing an air blast between the work surface and an abrasive band traveling over spaced rollers or drums;

Fig. 4 is a schematic elevational view showing the manner of directing an air blast between a work surface and the abrasive band on a reciprocating band or holder; and,

Fig. 5 is a similar view showing an air blast directed between a work surface and a disc of abrasive material.

Similar numerals refer to similar parts throughout the several views of the drawings.

Referring first to Figs. 1 and 2, the sanding machine represented therein includes essentially a work supporting table indicated generally at 5 over which the work to be sanded 6 is moved in a rectilinear direction indicated by the arrow A. The work 6 may be a relatively thin panel of pressed fiberboard known as Masonite, which is required to be sanded between coats of paint or enamel. The sanding operation following the prime coat must necessarily be adjusted to give a very light cut so as not to cut through the prime coat while removing particles of dust or dirt adhering thereto.

The sanding drum indicated generally at 7 has a shaft 7' which is preferably rotatively mounted on suitable brackets indicated at 8 on the table

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top, the drum having a band of abrasive material 9, such as sand paper or the like wrapped around the outer periphery of the drum and tensioned thereon by suitable and well known clamping means (not shown).

The work table 5 may have mounted thereon, at opposite sides of the sanding drum, pairs of rollers indicated at 10 which serve to guide the panel material 6 flatwise across the top of the table. If desired, one or more of the rollers may be driven so as to feed the material under the drum at a desired uniform rate. The sanding drum 7 is mounted so that the outer surface of the abrasive band 9 passes closely adjacent to the upper surface of the panel 6 when the drum is slowly rotated. As the speed of rotation of the drum is increased, the centrifugal force acting on the abrasive band 9 will force the band slightly radially outward from the drum, as indicated in Fig. 2, to cause the grains of abrasive to cut into the top surface of the panel.

The novel means for controlling the depth of the cut made by the rotating drum includes preferably a supply pipe or manifold 11 for conducting compressed air. The pipe is supported in a suitable manner and extends parallel with the axis of the drum. Extending laterally from the pipe 11 are one or more jet pipes or nozzles 12 communicating with the pipe 11 for discharging a blast or blasts of compressed air.

As shown, the pipes 12 are inclined in a slightly angular direction so as to be directed between the bottom of the drum 7 and the top of the panel 6 at the point where the two contact each other, so that the compressed air forms a thin cushion tending to raise the band 9 slightly off the top surface of the panel, thereby reducing the depth of the cut. By increasing the pressure of the air blast which is indicated diagrammatically at 13, the depth of the cut is decreased, and by decreasing the pressure of the air blast the depth of the cut is increased. Thus, a fine and accurate adjustment is easily obtained at the point of contact between the band and the work by regulating the pressure of the blast so that the depth of the cut may be varied to suit the required conditions.

By using the compressed air blast 13, it is not necessary to adjust the position of the drum nor to use liquids between the abrading surfaces which would stain or discolor the surface of the work piece. Moreover, the air blast acts as a coolant and also keeps the contacting surfaces free of loose abrasive grains which would otherwise build up or load the surface of the abrasive band and prematurely destroy its effectiveness.

The sanding machine represented in Fig. 3 has a table 5a for supporting the work 6a which is moved across the table in the direction of the arrow A. The band 9a of sandpaper or other abrasive material is in the form of an endless belt supported by the drums or rollers 7a rotatively mounted on the table by means of the brackets 8a. Preferably one of the rollers is driven to move the belt in the direction of the arrow B, and the lower run of the belt is adapted to contact the upper surface of the panel 6a substantially midway between the rollers.

The compressed air manifold 11a extends parallel to the axis of the rollers 7a, and is positioned at one end of the belt 9a as shown. One or more nozzles 12a extend laterally from the manifold for discharging compressed air along the under side of the lower run of the belt and between the belt and the upper surface of the panel 6a. Thus

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the air blast is directed toward the point of contact between the belt and the work.

The sanding machine represented in Fig. 4 has a work supporting table 5b for supporting the work 6b which is moved across the table in the direction of the arrow A. The band of abrasive material 9b for sanding the workpiece 6b is preferably a strip of sandpaper or other abrasive material which is wrapped around a mounting pad 15b, and the pad is pivotally connected at 16b to an actuating lever 17b which is driven by suitable power means for reciprocating the pad back and forth over the surface of the work as it is passed across the table and under the pad.

The strip 9b is wrapped around the pad loosely enough to provide a slight amount of slack at the central portion of the bottom surface of the strip as indicated at 18b, so that the air blast 13b will vary or adjust the depth of the cut made by the abrasive band by varying the pressure of the air blast. The air blast is directed, by one or more nozzles 12b communicating with a compressed air manifold 11b, toward the point of contact at 18b between the abrasive material and the panel 6b.

In the device shown in Fig. 5, a work supporting table 5c is provided for supporting the work indicated at 6c, which may be moved across the table in any direction as desired. A vertical shaft 20, having a central bore 21 extending there-through, is journaled in a bearing 22 located above the table, and any suitable means, such as indicated generally at 23, may be provided at the upper end of the shaft 20 for discharging air under pressure through the bore 21 of the shaft and out of the lower end thereof.

Any suitable means may be provided for rotating the shaft 20 at the desired speed, a pulley 24 and belt 25 being shown for this purpose. The lower end of the shaft 20 may be reduced and threaded, as shown at 26, and a metal disc, centrally recessed as at 28 and apertured as at 29, is mounted thereon.

An abrasive disc 30, of sandpaper or the like, is placed against the lower surface of the disc 27 and is provided with a central aperture which receives the reduced, threaded end 26 of the shaft. A washer 31 and nut 32 are shown upon the threaded portion 26 of the shaft for retaining the discs 27 and 30 thereon.

As the work is moved across the table the sanding disc 30, rotating in contact with the top surface of the work, will cut into the surface of the work. The air blast discharged from the lower end of the hollow shaft 20 will form a thin cushion between the abrasive disc 30 and the work, controlling the depth of the cut. By increasing the pressure of the air blast the depth of the cut is decreased, and by decreasing the air pressure the depth of the cut is increased, so that an accurate adjustment of the cut may be obtained by regulation of the air pressure.

In all embodiments of the invention, the air blast provides for accurate control of the depth of cut made by the moving abrasive band, or sheet, merely by regulating the pressure of the blast, and a very fine adjustment can be obtained because the blast is directed at the point of contact so as to form a thin air cushion at that point for adjusting the band toward or away from the work surface.

The present invention provides a novel method of nicely controlling the depth of cut in a dry sanding operation, and the method is easily applicable to substantially all types of existing sanding machines merely by installing a compressed

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air manifold having nozzles directing an air blast between the abrasive band, or sheet, and the work at the point of contact. In addition to controlling the depth of cut, the air blast acts as a coolant for the abrading surface without the use of any liquid, and prevents the building up of loose grains on the abrasive band, thus greatly prolonging its useful life.

In the foregoing description, certain terms have been used for brevity, clearness and understanding, but no unnecessary limitations are to be implied from such terms beyond the requirements of the prior art, because such terms are used for descriptive purposes and are intended to be broadly construed.

The embodiments of the invention illustrated and described herein are by way of example, and the scope of the present invention is not to be limited to the exact details.

Having now described the invention, the construction, operation and use of preferred embodiments thereof and the new and useful results obtained thereby, the novel methods and construction, and reasonable mechanical equivalents thereof obvious to those skilled in the art, are set forth in the appended claims.

We claim:

1. The method of controlling the depth of cut in a sanding machine having a moving abrasive band for sanding the work, which consists in di-

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recting a blast of air between the band and the work at the point of contact therebetween, whereby the compressed air forms a thin cushion between the abrasive sheet and the work tending to raise the abrasive sheet off of the surface of the work and regulating the pressure of the air blast to control the depth of cut.

2. The method of controlling the depth of cut in a sanding machine having a moving abrasive band yieldably contacting the work to be sanded, which consists in directing a blast of air between the band and the work to form an air cushion at the point of contact therebetween tending to raise the abrasive band off of the surface of the work and regulating the pressure of the air blast to control the thickness of said air cushion.

JOSEPH J. ROBINSON, JR.
HOWARD MAX WASSEM.

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