Jan. 28, 1969

H. L. WARD

3,423,881

SANDING APPARATUS

Filed June 10, 1965

Sheet 1 of 3

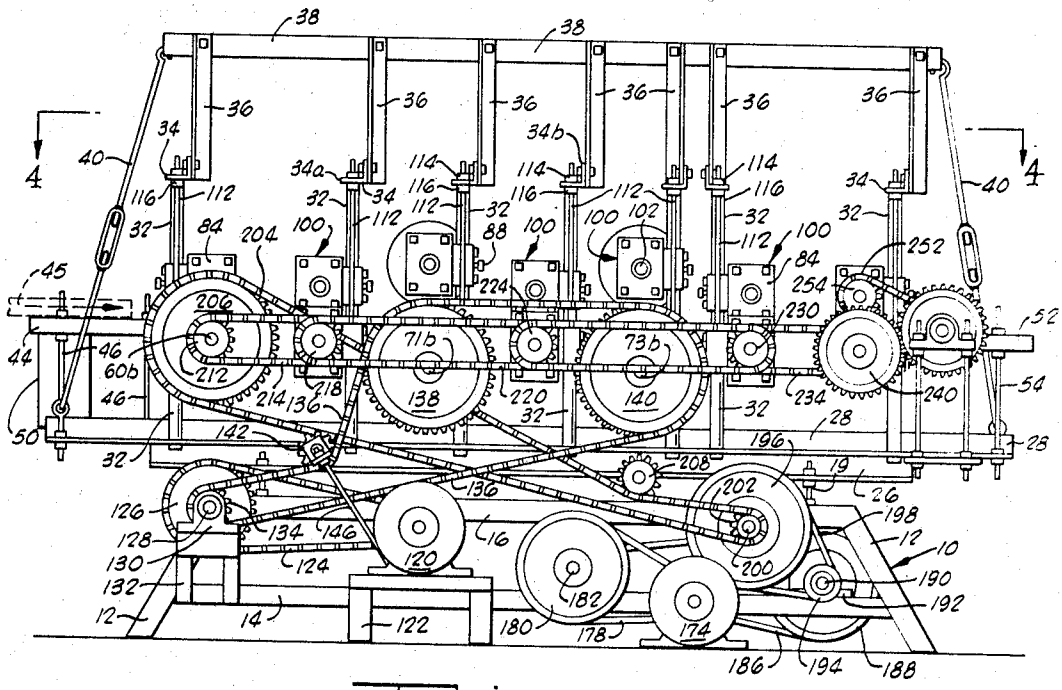

Fig. 1

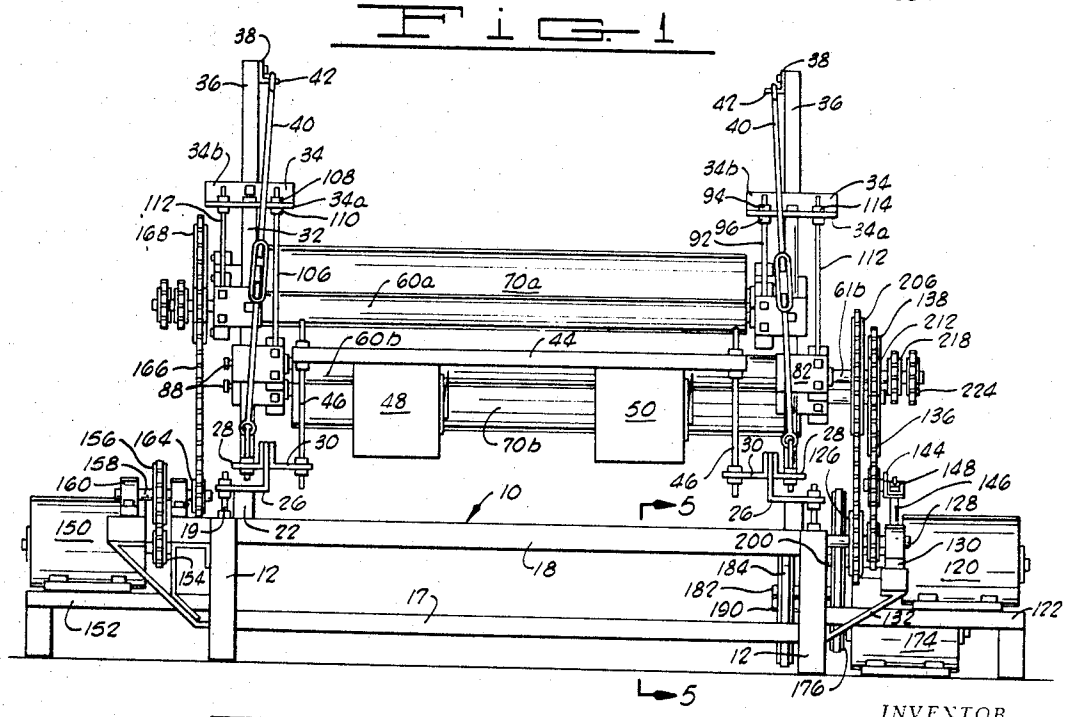

Fig. 3

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SANDING APPARATUS

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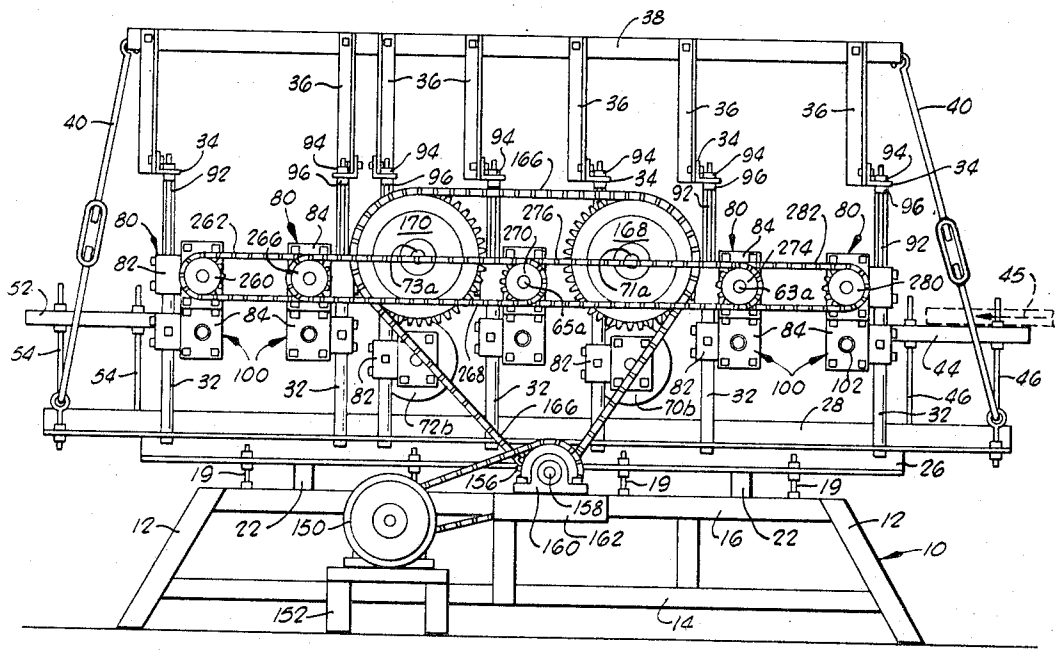

Fig. 2

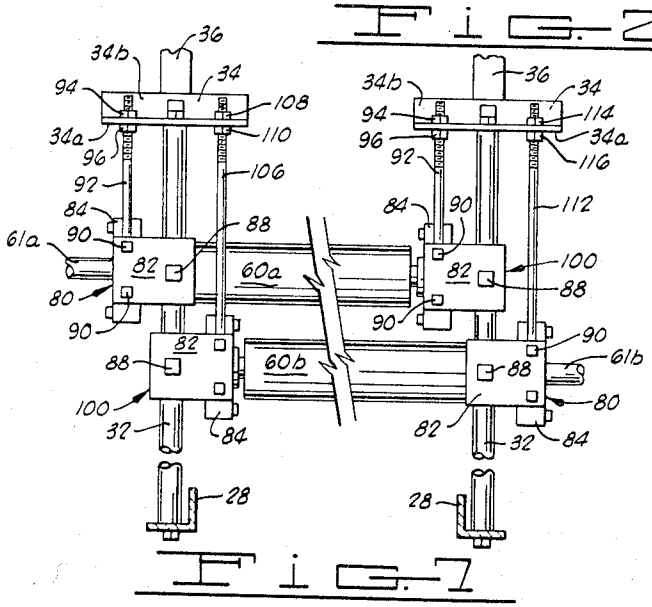

Fig. 7

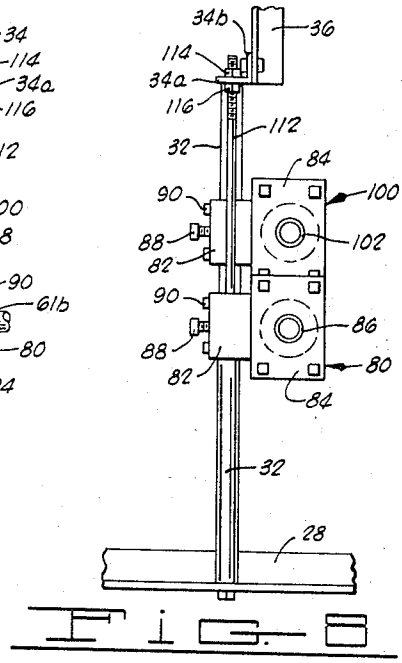

Fig. 8

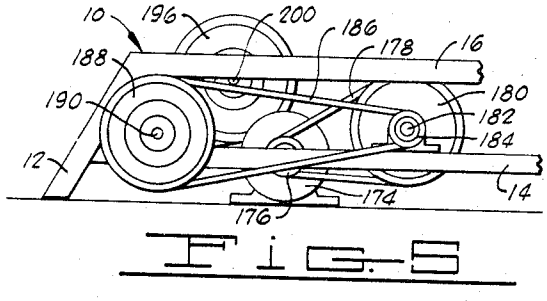

Fig. 5

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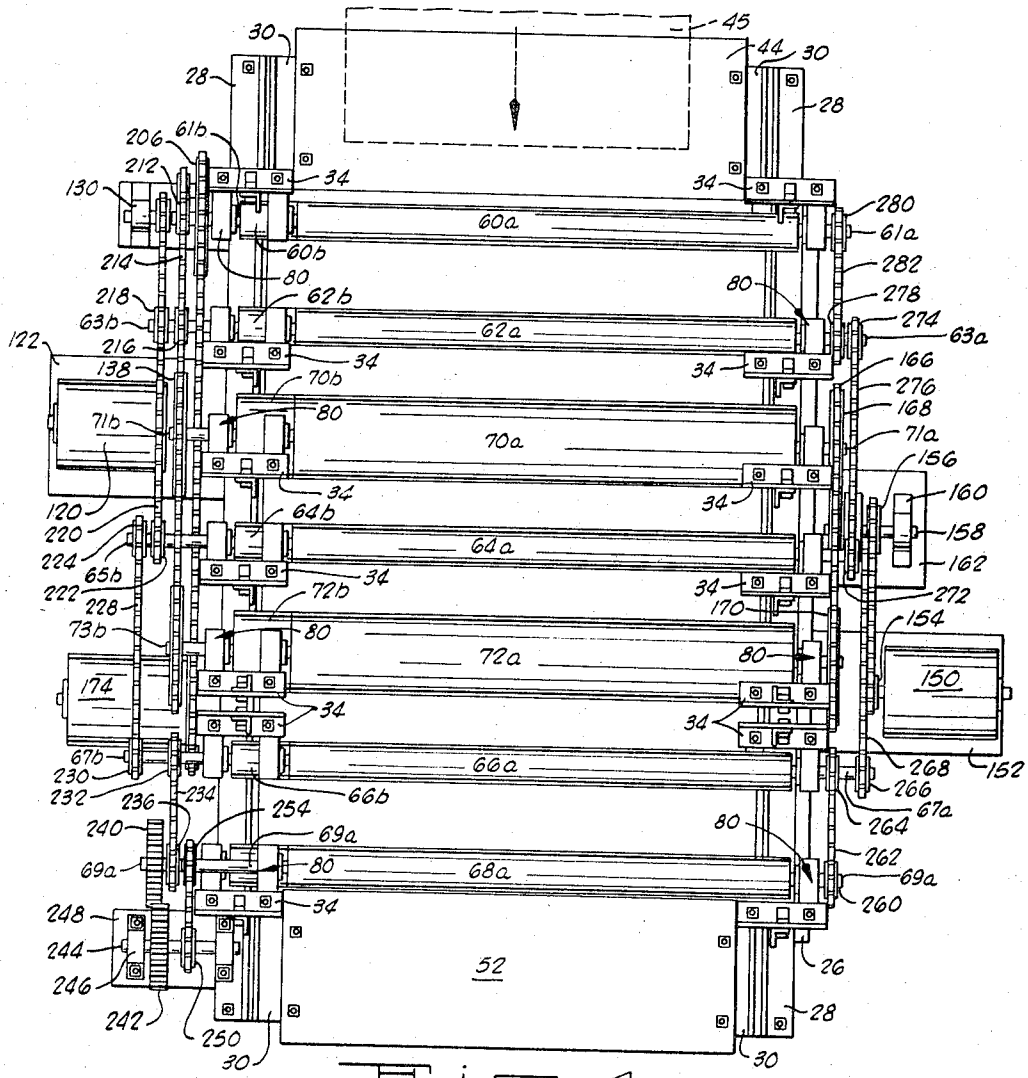

Fig. 4

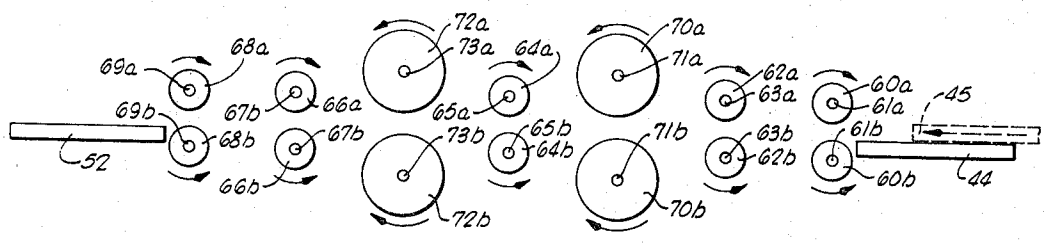

Fig. 6

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3,423,881

SANDING APPARATUS

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Filed June 10, 1965, Ser. No. 462,824
U.S. Cl. 51—87 24 Claims
Int. Cl. B24b 7/00, 9/00

ABSTRACT OF THE DISCLOSURE

An abrading apparatus including a framework, pairs of feed rollers mounted on the framework, pairs of sanding rollers mounted on the framework for receiving a panel from the feed rollers and for abrading the opposite sides of the panel, and chain drive structure for driving the rollers in each pair of feed rollers in opposite directions, and for driving the rollers in each pair of sanding rollers independently of each other and in a direction tending to move toward the feed rollers, a panel passed between, and in contact with, the sanding rollers. For the purpose of adjusting the spacing between the rollers in each pair of rollers, vertically extending support rods are secured to opposite sides of the framework and bearing blocks are slidably mounted on each of said support rods and journal the opposite ends of the rollers. Structure is provided for independently adjusting the vertical position of each of the bearing blocks on its respective support rod.

This invention relates to an abrading or sanding apparatus used to polish by abrasion the surfaces of doors and similar large, flat, wooden or plastic panels. More particularly, but not by way of limitation, the present invention includes a sanding machine for sanding simultaneously the opposed surfaces of a large flat panel, with the machine being adjustable so as to permit panels of varying thicknesses to be passed therethrough, and the opposite sides of such panels quickly and smoothly finished by a sanding operation.

In the finishing of large panels, such as doors, cabinet panels and the like, a completely automatic machine which is capable of simultaneously sanding the opposed surfaces of the panel in an even expeditious manner has not been heretofore developed. In most instances where a fine finish is required, hand sanding is still frequently carried out, and even in automatic machines which accomplish the sanding, on one side of such panels, the machines are not readily adjustable to accommodate panels of differing thicknesses.

The present invention comprises an improved sanding or abrading machine which can be used to automatically feed and sand or abrade the opposed or reverse surfaces of large flat panels of varying thicknesses. Replacement of the sanding surfaces used in the machine can be easily and quickly accomplished by reason of the quick detachable mounting of the sanding rollers therein, and the machine can be accurately and expeditiously adjusted to permit panels of varying thicknesses to be fed therethrough. The machine further can be easily operated to individually sand either of the opposed surfaces of the panel, or both surfaces concurrently.

Broadly described, the sanding apparatus of the present invention comprises at least one pair of opposed feed rollers spaced from each other to permit a panel which is to be sanded to be moved therebetween in contact with both of the feed rollers; a pair of opposed sanding rollers spaced from a common plane containing the axes of rotation of the feed rollers, and spaced from each other to permit a portion of a panel passing between the feed rollers to be simultaneously passed between the sanding rollers in contact with both of the sanding rollers; means

for driving the two rollers in the pair of feed rollers in opposite directions of rotation from each other so as to move the panel toward the sanding rollers; means for independently driving each of the rollers in the pair of sanding rollers in opposite directions of rotation from each other, and in directions such that the sanding rollers, in their rotational movement, tend to move a panel being passed therethrough toward the feed rollers; and means for adjusting the spacing from each other of the rollers in each pair of rollers whereby panels of varying thicknesses may be passed through said sanding apparatus. In a preferred embodiment of the invention, a plurality of pairs of the feed rollers and sanding rollers are employed and are positioned relative to each other to sequentially engage a panel to be sanded as it is moved through the apparatus, thus permitting larger panels to be passed through the apparatus, and also permitting the pairs of sanding rollers to be spaced from each other along the path of movement of the panel to be sanded, and various types of abrading surfaces to be located on the several pairs of sanding rollers so as to accomplish a sequential degree of abrasion on the surfaces being finished, such as proceeding from an initial rough abrasion to a final, very fine, highly polished finish.

In a preferred embodiment of the invention incorporating a novel adjustable bearing structure for use in regulating or adjusting the spacing between the pairs of rollers which have been generally described as being included in the apparatus, the rollers are each mounted upon an elongated shaft with each shaft having each of its ends journaled in a bearing block which is slidably supported on a stationary rod. These rods extend through a suitable draw plate or angle iron structure located at one end thereof, and the draw plate or angle iron structure further carries an adjusting shaft extending parallel to the rod and rigidly secured at one end to the bearing block. The end of the adjusting shaft which passes through the draw plate is peripherally threaded, and a pair of nuts are provided on opposite sides of the draw plate in threaded engagement with the adjusting shaft so that by manipulation of the nuts, the adjusting shaft may be made to move with respect to the draw plate, thus varying the distance between the bearing block and the draw plate and causing the bearing block to move along the length of the stationary rod. The bearing blocks which receive each of the ends of the shafts which support the rollers are similarly mounted for independent adjustment so that the spacing between the rollers can be varied as may be required in order to accommodate panels of varying thicknesses. It should also be pointed out that the adjustability of the bearing blocks and the several rollers which are supported thereby permit the rollers to be aligned as may be desired with a horizontally extending feed table so that a large panel may be moved evenly from the feed table onto the lower roller of the initial pair of feed rollers, and may be supported by the feed rollers without becoming misaligned with respect to the plane of the upper surface of the feed table.

From the foregoing description of the invention, it will have become apparent that it is a major object of the present invention to provide an improved sanding machine which can be utilized to sand one or both of the opposed monoplanar surfaces of a flat panel structure, such as a door or the like.

An additional object of the present invention is to provide a sanding machine incorporating feed rollers and sanding rollers which cooperate in the sanding of doors, cabinet panels and the like, with the spacing between the several sets of rollers being adjustable to facilitate the sanding of doors or panels of varying thicknesses.

An additional object of the present invention is to pro-

vide a sanding apparatus incorporating a plurality of independently driven sanding rollers which can be operated at varying speeds, and which can be utilized to sand or abrade either one or both of the opposed surfaces of a large flat panel.

Another object of the present invention is to provide a sanding machine incorporating a plurality of pairs of feed rollers and sanding rollers, with the sanding rollers being mounted to facilitate quick dismantling of the apparatus so as to permit access to be had to each of the sanding rollers when it is necessary to replace the abrading or sanding material carried thereby.

Another object of the present invention is to provide a sanding machine which is mechanically sturdy and durable in construction, and which is characterized by a long and trouble-free operating life.

In addition to the foregoing described objects and advantages of the invention, additional objects will become apparent as the following detailed description of the invention is read in conjunction with the accompanying drawings which illustrate the invention.

In the drawings:

FIGURE 1 is a side elevation view of one embodiment of the sanding machine of the present invention illustrating a drive system utilized to drive the lower rollers in a plurality of sets of feed rollers utilized in the apparatus, and the drive system utilized to drive the lower rollers in a plurality of sets of sanding rollers utilized in the invention.

FIGURE 2 is a view in elevation of the opposite side of the sanding apparatus from that which is shown in FIGURE 1 and illustrating the drive system which is utilized to drive the upper rollers in the plurality of sets of feed rollers utilized in the apparatus of the invention, and further showing the drive system which is utilized to drive the upper rollers in the pairs of sanding rollers utilized in the invention.

FIGURE 3 is a view in elevation of the sanding apparatus of the invention as it appears when viewed from the end of the apparatus at which doors or other relatively large flat panel structures are introduced to the apparatus.

FIGURE 4 is a sectional view of the sanding apparatus of the invention taken along line 4—4 of FIGURE 1.

FIGURE 5 is a sectional view taken approximately long line 5—5 of FIGURE 3, but showing only the portion of sanding machine adjacent the discharge end thereof where the feed roller drive motor is located.

FIGURE 6 is a diagrammatic illustration of the manner in which the several pairs of feed and sanding rollers utilized in the invention are arranged relative to each other, and further depicting the direction of rotation of these rollers.

FIGURE 7 is a detail view illustrating in elevation the manner in which the rollers utilized in the invention are adjustably mounted in bearing blocks to facilitate a rapid and accurate adjustment of the spacing between the rollers in each pair of rollers.

FIGURE 8 is an end view of the structure shown in FIGURE 7, as this structure appears when it is rotated through 90° from the position which it occupies in FIGURE 7.

In discussing in detail the various structural elements of the sanding apparatus of the invention, and the relationship which these elements bear to each other, the several main sub-combinations or sub-assemblies will be separately described, and then the overall operation of the machine will be discussed.

Framework and superstructure

Referring to the drawings in detail, and particularly to FIGURE 1, the sanding apparatus of the present invention is supported by a framework **10** which includes vertical support members or legs **12** interconnected by a longitudinal brace **14** and a horizontal top supporting member **16**. The legs **12** are also interconnected by a transversely extending brace **17** (see FIGURE 3) and a transverse top supporting member **18**. Supported on the top of the horizontal supporting members **16** and secured thereto by any suitable means, such as by bolts **19** and stanchions **22**, are a plurality of horizontally extending angle irons **26**, with a pair of the horizontal angle irons extending parallel to each other on opposite sides of the framework **10**. The horizontally extending angle irons **26** are each welded to a pair of angle irons **28** and **30** extending over a substantial portion of the length of the angle irons **26**, and oriented with their flanges extending from one leg of the angle irons **26** in opposite directions, as best illustrated in FIGURE 3. For purposes of reference and clarity in the discussion which follows, the angle iron **28** will be referred to as the out-turned rod supporting angle iron, and the angle iron **30** will be referred to as the in-turned feed table supporting angle iron.

Secured at their lower ends to, and extending upwardly from, the out-turned angle irons **28** are a plurality of support rods **32** which are spaced along the length of the out-turned angle iron, as best illustrated in FIGURES 1 and 2, which are views of the sanding machine as it appears when viewed from opposite sides thereof. Each of the support rods **32** has secured to the upper end thereof, an angle iron draw plate **34** which extends at a right angle to the axis of the respective support rod **32** and projects on each side of the axis of the support rod, as best illustrated in FIGURES 3 and 7. The angle iron draw plates **34** are each secured to the top of their respective support rods **32** by a horizontally extending flange **34***a*. Each of the draw plates **34** also includes an upwardly extending flange **34***b* which is welded or bolted to an upright member **36**. The upper ends of the upright members **36** terminate in a common plane and are secured to a longitudinally extending angle iron blower support rail which extends substantially parallel to the horizontal top supporting member **16**, and to the angle irons **26**, **28** and **30**.

A turnbuckle bracing element **40** is connected to each of the ends of each blower support rail **38** and extends downwardly therefrom to the respective out-turned angle iron **28** on the same side of the sanding apparatus as the respective blower support rail **38** is located. The blower support rails **38** preferably each comprises an angle iron having an in-turned horizontally extending flange **42** to which the turnbuckle braces **40** are connected, and which function to support a blower hood (not shown) over the portion of the sanding apparatus in which the sanding is accomplished.

At the end of the sanding apparatus into which a door or panel **45** to be sanded is introduced (the left side in FIGURE 1), a feed table plate **44** is supported in vertically spaced relation to the in-turned feed table supporting angle irons **30** by a plurality of vertically extending bars **46**. The feed table plate **44** is a large board or metal plate of relatively great surface area which functions to support the door or panel **45** immediately prior to its being passed between the sanding rollers by the feed rollers, as hereinafter described. Supported beneath the feed table plate **44** by attachment to the lower surface thereof are a pair of switch boxes **48** and **50** which are controls for driving either the upper sanding rollers, or the lower sanding rollers, or both sets of sanding rollers, for the purpose of sanding either the upper or the lower surface of a door or panel, or both, as hereinafter described in greater detail.

At the discharge end of the framework (the right side in FIGURE 1 and the left side in FIGURE 2), a panel discharge supporting plate **52** is provided in substantially coplanar alignment with the feed table plate **44**. The panel discharge support plate **52** is supported upon the in-turned angle irons **30** and in vertically spaced relation thereto by a plurality of vertically extending bars **54**. The panel discharge support plate **52**, like the feed table plate

44, is a large board or metal plate of large surface area capable of supporting a door discharged from the apparatus.

Roller and bearing structure

Having described the important elements of the framework and superstructure of the sanding machine of the invention, the discussion will next be directed to the manner in which a plurality of pairs of feed rollers and sanding rollers are mounted on the superstructure supported by the framework in adjustable bearings. Referring initially to FIGURE 6 of the drawings, it will be perceived that, in the illustrated embodiment of the invention, the sets of rollers which are provided include five sets of relatively small rollers keyed to shafts for rotation and operated by turning the two rollers in each set of the rollers in opposite directions to each other. These sets of small rollers are designated by reference characters **60***a*, **60***b*; **62***a*, **62***b*; **64***a*, **64***b*; **66***a*, **66***b*; and **68***a*, **68***b*. The postscript, *a*, of the character designation indicates that the roller is an upper roller in the roller pair, and the postscript, *b*, indicates the roller is a lower roller in a roller pair. The arrow adjacent each of the rollers indicates the direction in which it is rotated during operation of the sanding machine. It will be noted that the two rollers in each pair of rollers are aligned with their rotational axes in a common vertical plane.

In addition to the five sets of feed rollers, two sets of sanding rollers designated **70***a*, **70***b*; and **72***a*, **72***b*, respectively, are located on opposite sides of the feed rollers **64***a* and **64***b*. It will be noted by referring to the direction of the arrows adjacent the sanding rollers that their direction of rotation during operation of the sanding machine is opposite that of the smaller feed rollers. It should be pointed out at this point, that though the directions of rotation during operation of the machine for each of the sanding rollers is illustrated in FIGURE 6 by arrows adjacent the rollers, both the rollers in each set of sanding rollers need not necessarily be utilized during the operation of the machine in that the machine permits either the upper or the lower surface of the door or panel **45**, or both of these surfaces, to be sanded simultaneously.

The feed table **44** is schematically illustrated in FIGURE 6 as being positioned to the right of the several pairs of feed and sanding rollers, and the discharge panel support plate **52** is positioned to the left.

The actual positions and appearance of the uppermost rollers in the several pairs of feed and sanding rollers can best be perceived by referring to FIGURE 4 of the drawings. It will be noted in referring to this figure that the rollers occupy the same relative positions as those illustrated schematically in FIGURE 6, and that the uppermost rollers of the several sets or pairs of rollers are spaced horizontally from each other along the superstructure of the machine and over the framework and the main angle irons **26** carried thereby. For convenient reference, the shafts upon which each of the several rollers are mounted for rotation therewith have been designated by the odd numbered reference numeral nearest the number carried by the respective roller, followed by the corresponding postscript of the roller, i.e., the shaft to which the upper sanding roller **70***a* is keyed has been designated as **71***a*, and the shaft to which the upper feed roller **60***a* is keyed has been designated **61***a*.

For the purpose of rotatably journaling the shafts upon which the several feed and sanding rollers are mounted, novel bearing block assemblies are provided for receiving the free ends of each of the shafts. The bearing block assemblies each include a pass through or open bearing block designated generally by reference character **80** and slidably mounted upon the respective support rod **32** (see FIGURE 7). The open bearing block **80** is so termed since the end portion of the shaft which it rotatably receives is permitted to pass all the way through the bearing which journals the shaft, and to project beyond the bearing block.

Each open bearing block **80** includes a support rod engaging portion **82**, and a journal carrying portion **84**. The journal carrying portion **84** is provided with an open bearing or journal **86** mounted centrally in the journal carrying portion **84**, and permitting the end of one of the roller shafts to be extended therethrough, as best illustrated in FIGURE 7. The support rod engaging portion **82** of the open bearing block **80** is provided with a set screw **88** which can be used to fix the position of the support rod engaging portion **82** on its respective support rod **32**, as hereinafter explained. Self-tapping screws **90** are utilized for securing the journal carrying portion **84** to the support rod engaging portion **82** so that the two elements extend at right angles to each other, as will be apparent in referring to FIGURES 7 and 8, and can be quickly and easily detached from each other.

An adjusting shaft **92** is secured to the top of the support rod engaging portion **82** of the open bearing block **80** and extends vertically therefrom and passes through an aperture formed in the horizontally extending flange portion of the angle iron draw plate **34**. The upper end portion of the adjusting shaft **92** is peripherally threaded and a pair of adjusting nuts **94** and **96** are threaded onto the peripherally threaded end portion of the adjusting shaft **92**, and positioned on opposite sides of the horizontally extending flange portion **34***a* of the angle iron draw plate **34**. This construction of the adjusting shaft **92** permits the vertical position of the open bearing block **80** on the support rod **32** to be adjusted so as to regulate and control the spacing between adjacent pairs of rollers, as will be hereinafter explained in greater detail.

Disposed on the opposite side of the sanding machine from that side at which the open bearing block **80** is located, and aligned therewith to receive the opposite end of the shaft which is passed through the open bearing block **80** is a closed bearing block designated generally by reference character **100**. The closed bearing block **100** is constructed substantially identically to the open bearing block **80**, except that the journal or bearing provided in the journal carrying portion thereof is closed so that the end of the shaft which it receives cannot be passed therethrough. Accordingly, all parts and elements of the closed bearing block **100** which correspond identically to parts of the open bearing block **80** have been identified by identical reference numerals. The closed bearing or journal in the journal carrying portion **84** of the closed bearing block **100**, being closed rather than open, has been designated by reference character **102** (see FIGURE 8).

As in the case of the support rod engaging portion **82** utilized in the open bearing block **80**, an adjusting shaft **92** is extended upwardly from the support rod engaging portion **82** of the closed bearing block **100**, and is adjustably positioned relative to the horizontally extending flange **34***a* of its respective angle iron draw plate **34** by a pair of adjusting nuts **94** and **96**. In summary then, the upper roller in each pair of rollers is mounted on the superstructure of the sanding apparatus by extending the ends of the shaft which carries the roller through a pair of bearing blocks which are slidably disposed on the support rods **32** at opposite sides of the sanding machine, and in horizontal alignment with each other. The two bearing blocks **80** and **100** which are used to receive opposite ends of the roller shaft differ in that one of the open bearing block **80** includes a journal carrying portion **84** which permits the end of the shaft to be completely passed therethrough to receive a drive sprocket, as hereinafter described, while the closed bearing block **100** located on the opposite side of the machine, and receiving the other end of the roller shaft, includes a journal carrying portion **84** having a closed journal or bearing to receive the other end of the shaft.

Each lower roller which is paired with one of the upper rollers mounted in the way which has been described immediately above is mounted on a shaft which passes

through an open bearing block **80**, and a closed bearing block **100** as shown in FIGURE 7 of the drawings. The open bearing block **80** and closed bearing block **100** which rotatably receive the ends of the shaft which carry the lower roller are, of course, disposed below the open bearing block **80** and closed bearing block **100** which carry the upper roller on the support rods **32**. It will be noted in referring to FIGURE 7 that the arrangement of the two rollers and the respective bearing blocks is such that the open bearing block **80** of the lower roller is disposed at the opposite side of the sanding machine from the side upon which the open bearing block **80** utilized to support one end of the shaft of the upper roller is located.

Secured to the top of the support rod engaging portion **84** of the closed bearing block **100** which supports one end of the shaft of the lower roller is an adjusting shaft **106**. The upper end of the adjusting shaft **106** is peripherally threaded and passed through an aperture in the horizontally extending flange portion **34***a* of the angle iron draw plate **34**, and carries a pair of adjusting nuts **108** and **110**. Similarly, a vertically extending adjusting shaft **112** is secured to the top of the support rod engaging portion **82** of the open bearing block **80** disposed at the other end of the lower roller and has its upper end adjustably secured to the angle iron draw plate **34** by a pair of adjusting nuts **114** and **116**. It is to be noted at this point that the construction of all of the open bearing blocks **80** is identical, whether such bearing blocks be used to support one end of the shaft upon which an upper roller is mounted, or be used to support an end of the shaft upon which a lower roller is mounted. The same identity of construction is true of all of the closed bearing blocks **100**. It is further reiterated at this point that the support rod engaging portions **82** of each of the open and closed bearing blocks **80** and **100** are secured to the journal carrying portion **84** of the bearing blocks by self tapping screws which permit the journal carrying portion to be quickly and easily detached from the support rod engaging portion. The purpose of this quick detachable arrangement will be hereinafter described in greater detail.

Power transmission system

For the purpose of driving the lower rollers **70***b* and **72***b* in the pair of sanding rollers in rotation, a suitable motor **120** is disposed on a pedestal **122** extending from, and preferably partially or entirely supported by, the framework **10**. The motor **120** is drivingly connected by a chain **124** to a sprocket **126** which is keyed to a shaft **128** for rotation therewith. The shaft **128** is rotatably journaled in a bearing block **130** which is supported by a suitable brace **132** extending outwardly from the framework **10**, as best illustrated in FIGURES 1 and 3. The opposite end of the shaft **128** from that which is journaled in the bearing block **130** is rotatably journaled in a bearing carried by the horizontal top supporting member **16** of the framework.

In addition to the sprocket **126**, the shaft **128** is also keyed to a sprocket **134** which engages a chain **136** which passes upwardly and around a pair of sanding roller sprockets **138** and **140** which are keyed to the projecting ends of the shafts **71***b* and **73***b*, respectively, these shafts being the shafts which carry the lower sanding rollers **70***b* and **72***b*, respectively. It will be noted in referring to FIGURE 4 that the shafts **71***b* and **73***b* carrying the lower sanding rollers **70***b* and **72***b*, respectively, are passed through the open bearing blocks **80** disposed on the left side of the sanding machine as it is viewed in plan in FIGURE 4 of the drawings and as it is seen in elevation of FIGURE 1 of the drawings.

For the purpose of maintaining a desired amount of tension in the chain **136**, an adjustable idler sprocket **142** is positioned for engagement with the chain and is rotatably journaled in a plate **144** which is adjustably mounted for longitudinal movement on a supporting rod **146** extending upwardly from the pedestal **122**. Adjustment of the position of the plate **144** on the supporting rod **146** is achieved by utilizing a pair of adjusting nuts **148** threaded on the end of the adjusting rod **146** and positioned on opposite sides of a flange carried by the plate **144**. It will be apparent from the foregoing description and by reference to FIGURES 1 and 3 of the drawings that the tension in the chain **136** is adjusted by altering the axial position of the plate **144** carrying the sprocket **142** on the supporting rod **146**.

The drive system for driving the upper rollers in each pair of sanding rollers idependently of the lower rollers is mounted to the right side of the framework **10** as it is viewed in plan in FIGURE 4 of the drawings. This side of the sanding apparatus is also illustrated in elevation in FIGURE 2. In referring to these figures, it will be noted that a motor **150** is supported on a pedestal **152** which extends outwardly from, and is partially supported by, a framework **10**. The motor **150** has a shaft extending outwardly therefrom which carries a sprocket **154**. The sprocket **154** engages a chain which extends around a second sprocket **156** mounted on a shaft **158** which is rotatably journaled in a bearing block **160**. The bearing block **160** is supported on a platform **162** extending laterally from the horizontal top supporting member **16** of the framework **10**.

The shaft **158** also is provided with a second sprocket **164** (see FIGURE 3) positioned inboard on the framework **10** from the sprocket **156**. The second sprocket **164** engages a drive chain **166** which extends upwardly around a pair of large sprockets **168**, **170** which are keyed to the shafts **71***a* and **73***a*, respectively, which rotatably support the upper sanding rollers **70***a* and **72***a*, respectively. It will be noted in referring to FIGURES 2 and 7 that the drive chain **166** functions to drive the rollers **70***a* and **72***a* in the same direction (counterclockwise as viewed in FIGURE 2), which direction is counter to the direction of movement of the workpiece **45** through the sanding machine. It will be noted briefly at this point, and discussed in greater detail hereinafter, that the switch boxes **48** and **50** are utilized for controlling the motors **150** and **120**, respectively, so that these motors may be independently energized and either the upper rollers **70***a* and **72***a* in the two sets of sanding rollers driven, or the lower rollers **70***b* and **72***b* driven, or both rollers in each pair of sanding rollers driven simultaneously.

The drive system which is utilized for driving the feed rollers in the desired direction of rotation has portions positioned on both sides of the framework **10** and can best be fully understood by referring to FIGURES 1–4. The motor which is utilized to provide the power for driving the feed rollers is indicated by reference numeral **174** and is shown as resting on the floor or other surface supporting the framework **10**. It should be pointed out, however, that the motor **174** can suitably be positioned on the framework and such mounting constitutes the preferred arrangement where the sanding apparatus is to be transported from one location to another at some time during its operating life.

The motor **174** has a projecting shaft which has keyed thereto a pulley **176** (see FIGURE 3), and the pulley **176** carries an endless belt **178** best illustrated in FIGURE 1. The endless belt **178** is extended around a pulley **180** mounted on a shaft **182** which extends through a journal supported by, and extending upwardly from, the longitudinal brace member **16** of the framework **10**. The shaft **182** also carries a second pulley **184** which is disposed inside the framework **10** as best illustrated in FIGURE 5. An endless belt **186** connects the pulley **184** with a larger pulley **188** keyed to a shaft **190** which is journaled in a bearing block **192** mounted on the longitudinal brace **14** of the framework **10**. The shaft **190** carries a small pulley **194** at its end disposed on the opposite side of the longitudinal brace **14** from the pulley **188**,

and the pulley **194** is interconnected to a pulley **196** by an endless belt **198**.

The pulley **196** is keyed to a shaft **200** which is journaled on the framework **10** and also rotatably carries a sprocket **202**, as shown in FIGURE 1. A chain **204** is extended from the sprocket **202** over a large sprocket **206** which is keyed to the shaft **61***b* which is keyed to and rotatably supports the lower feed roller **60***b* in the initial pair of feed rollers **60***a* and **60***b*. The arrangement of the roller **60***b* and its shaft **61***b* can be best perceived by referring to FIGURES 1 and 4. It will be noted that the shaft **61***b* extends through one of the open bearing blocks **80** and that the sprocket **206** is keyed to the shaft on the opposite side of the open bearing block **80** from the roller **60***b*. Engaging the chain **204** at a point intermediate the sprockets **202** and **206** which it engages is an idler sprocket **208** which is mounted on the framework **10** and is vertically adjustable thereon. Thus, the idler sprocket **208** can be utilized for adjusting the tension in the chain **204**.

The remaining lower feed rollers **62***b*, **64***b*, **66***b*, and **68***b* disposed in the several pairs of feed rollers are driven by chain and sprocket drive linkages interconnecting them with the shaft **61***b* of the initial lower feed roller contacted by the workpiece **45** during its travel through the sanding apparatus. The chain and sprocket arrangement utilized to drive the lower feed rollers is best illustrated in FIGURES 1 and 4. Thus, the shaft **61***b* of the lowermost roller in the initial pair of feed rollers carries, in addition to the sprocket **206**, a sprocket **212** which is interconnected by a chain **214** to a sprocket **216** keyed to the shaft **63***b* on the lowermost roller in the second pair of feed rollers. The shaft **63***b* also carries a sprocket **218** which is connected by a chain **220** to a sprocket **222** keyed to the shaft **65***b* which rotatably supports the feed roller **64***b*. A second sprocket **224** carried by the shaft **65***b* is interconnected by a chain **228** to a sprocket **230** carried by the shaft **67***b* which supports feed roller **66***b*. Finally, an additional sprocket **232** carried by the shaft **67***b* is drivingly connected to a sprocket **236** on shaft **69***b* by a chain **234**. It will be noted that all of the sprockets which have been described as carried by the shafts **61***b*–**69***b* which rotatably support the lower feed rollers **62***b*–**68***b* are of equal size so that the feed rollers are driven at the same rate of speed and the workpiece **45** will be advanced at a substantially constant rate through the sanding apparatus.

In order to use the rotary motion imparted to the lower feed rollers **60***b*–**68***b* in order to drive the upper feed rollers **60***a*–**68***a*, the shaft **69***b* which carries the last lower feed roller **68***b* in the series is provided with a circular gear **240** which is disposed outboard on the shaft from the sprocket **236** and is, of course, keyed to the shaft for rotation therewith. The circular gear **240** meshes with a second circular gear **242** which is keyed to a shaft **244** journaled in a bearing block **246** supported on a platform **248** welded or otherwise suitably secured on the framework **10**. Spaced inwardly from the circular gear **242** and also keyed to the shaft **244** for rotation therewith is a sprocket **250** which drives a chain **252** passing over a sprocket **254** keyed to the shaft **69***a* which supports the upper roller **68***a* in the last pair of feed rollers in the series. This arrangement can best be understood by referring to FIGURES 1 and 4 of the drawings.

By the described arrangement, the upper feed roller **68***a* is caused to rotate in the opposite direction from the lower feed roller **68***b* so that a workpiece **45** moving through the apparatus will be moved by the feed roller pair onto the panel discharge support plate **52**. It will be noted that the manner of supporting the upper feed roller **68***a* in its bearing blocks differs from the manner of support of any of the other rollers utilized in the apparatus in that a pair of open bearing blocks **80** are provided on opposite sides of the framework for receiving the opposite ends of the shaft **69***a* which carries the feed roller **68***a*, rather than one closed bearing block and one open bearing block. The purpose of this arrangement is to permit the upper feed roller **68**a to function as the kinematic chain or transmission instrumentality translating the rotational movement from the lower rollers, as effected by the drive system indicated on the left-hand side of the apparatus as viewed in FIGURE 4, to the drive system utilized for driving the upper rollers as the same appears at the right-hand side of FIGURE 4.

The opposite end of the shaft **69***a* from that which carries the sprocket **254** thus passes through an open bearing block **80** and is provided with a sprocket **260** which is keyed to the shaft for rotation therewith. The sprocket **260** drives a chain **262** which passes around a sprocket **264** keyed to the end of the shaft **67***a* which rotatably supports the upper feed roller **66***a*. A second sprocket **266** which is carried by the shaft **67***a* is drivingly interconnected by a chain **268** to a sprocket **270** carried by the shaft **65***a*. The shaft **65***a* also carries a second sprocket **272** which drives a sprocket **274** carried by the shaft **63***a* through a chain **276**. The shaft **63***a* which carries the sprocket **274** also is keyed to a second sprocket **278** which is drivingly interconnected to a sprocket **280** carried on the shaft **61***a* by a suitable chain **282**. In referring to the side of the machine illustrated in FIGURE 2, it will be noted that the sprockets which are keyed to the shafts **61***a*–**69***a* which carry the upper feed rollers **60***a*–**68***a* are of substantially the same size, and that the manner in which the chains are used to interconnect the sprockets carried by these shafts is such that all of the upper feed rollers are driven in the same direction of rotation.

Operation

In utilizing the sanding apparatus of the invention, a blower hood or other suitable blower or suction apparatus suitable for removing the fine wood dust created in large volumes during the sanding operation is initially mounted above the apparatus and may be conveniently supported on the blower support beams **38** which are carried at the upper ends of the upright members **36**. The lower feed rollers **60***b*–**68***b* are then aligned with each other and with the plane occupied by the top surfaces of the feed table plate **44** and the panel discharge support plate **52**. Adjustment of the vertical position of the several lower feed rollers **60***b*–**68***b* is accomplished by loosening the adjusting nuts **108**, **110**, and **114**, **116** which secure the adjusting shafts **106** and **112**, respectively, in their positions relative to the respective draw plates **34**. Thus, by screwing the adjusting nuts in one direction or the other on the peripherally threaded ends of the adjusting shafts **106** and **112**, these shafts may be moved upwardly or downwardly through their respective apertures in the draw plates **34**, and the positions of the several open blocks **80** and closed blocks **100** on the support rods **32** thus adjusted. It may also be desirable to manipulate the set screws **88** which are passed through the support rod engaging portions **82** of the bearing blocks when the vertical adjustment of the rollers is accomplished, although the set screws **88** are provided primarily for the purpose of firmly securing the feed and sanding rollers in a selected location for long periods of operation. Where adjustments are regularly made in the positions of the several rollers, the set screws **88** may be left in a loosened condition, or may be set up very lightly so as not to provide an unacceptable amount of frictional resistance to adjustment of the position of the rollers by the use of the adjusting shafts, and the respective adjusting nuts screwed on the adjusting shafts.

After the lower feed rollers **60***b*–**68***b* have been adjusted so as to bring their upper peripheral surfaces into alignment along a common tangent which lies in the plane of the feed table plate **44** and the panel discharge support plate **52**, the upper feed rollers **60***a*–**68***a* are then similarly adjusted by use of the adjusting shafts **92** and the adjusting nuts **94**, **96** to space them a distance above the

lower feed rollers **60***b*–**68***b* which will accommodate a workpiece of the thickness of the panel which is to be sanded. The spacing between each of the rollers in the several roller pairs will, of course, be identical and will preferably be such as to provide a relatively firm frictional engagement with the panel as it is passed between the feed rollers so that the panel may be kept moving through the apparatus without slippage.

Simultaneous with, or following, the adjustment of the feed rollers in their vertical positions on the framework, the sanding rollers **70***a*–**70***b* and **72***a*–**72***b* may be similarly adjusted by the use of the adjusting shafts **92** used in conjunction with the bearing blocks which support the uppermost sanding rollers and the adjusting shafts **106**, **112** which are connected to the bearing blocks which support the lower sanding rollers. It is an important feature of this invention, and it should be carefully noted at this point, that each of the individual rollers used in the system, whether it be a feed roller or a sanding roller, can be individually adjusted in its vertical position in a rapid and effective manner, and that the several roller pairs in use are capable of accommodating and receiving panels which vary greatly in thickness and which are of substantially any length.

Once the rollers have been adjusted to the desired positions, the power transmission systems used in the apparatus are energized for driving some or all of the rollers in rotation. In the illustrated embodiment of the invention, all of the feed rollers **60***a*–**68***a* and **60***b*–**68***b* are simultaneously driven in rotation, and the chain and sprocket drive system, which has hereinbefore been described, is effective to drive the upper feed rollers **60***a*–**68***a* in the opposite direction of rotation from the lower feed rollers **60***b*–**68***b* so as to cooperatively move a workpiece **45** through the apparatus. The speed of rotation of the feed rollers is relatively slow so as to permit the workpiece **45** to be thoroughly acted on by the sanding rollers as it passes therethrough. To this end, the system of belts and pulleys illustrated in FIGURE 1, and heretofore described, functions to substantially reduce the output speed of the average or ordinary electric motor **174** so that the feed rollers are rotated at a relatively slow speed. It will be apparent to those skilled in the art that the belt and pulley system employed could be simplified from that which is illustrated if a relatively low speed motor is available for use. It is desirable, however, to use at least one belt and pulley interconnection in the drive system for the feed rollers to allow for some slippage in the eventuality of the workpiece **45** encountering some obstruction in the sanding apparatus and being unable to move under the influence of the rotating feed rollers. The feed rollers can thus be retarded in their rotational movement without stalling out the electric motor **174**, or without the breaking of chains or other unyielding interconnecting driving means.

The reverse direction of rotation which must characterize the upper feed rollers **60***a*–**68***a* with respect to the lower feed rollers **60***b*–**68***b* is accomplished through the medium of the meshing circular gears **240** and **242** and the manner in which these two gears are connected to the shafts **69***b* and **69***a* which carry the lower and upper feed rollers **68***b* and **68***a*, respectively.

In any given sanding or abrading operation, it may be desirable to finish by abrasion either the upper surface of the workpiece **45**, the lower surface thereof, or both the upper and the lower surfaces. To this end, the apparatus of the invention is versatile and permits either the upper sanding rollers **70***a* and **72***a* in each pair of sanding rollers, or the lower sanding rollers **70***b* and **72***b*, or both the upper and lower sanding rollers in both pairs to be operated. For independent operation of the upper sanding rollers **70***a* and **72***a*, the motor **150** is energized, and through the described chain and sprocket linkages, drives the upper rollers **70***a* and **72***a* in rotation on their respective shafts **71***a* and **73***a*. The rollers are driven at the same speed and in the same direction in the illustrated embodiment, although it is desirable in some instances to drive one roller at a greater or lesser speed than the other sanding roller.

As the workpiece **45** is moved through the apparatus by the several feed rollers, it is contacted by the sanding rollers **70***a* and **72***a* which are rotated at a substantially higher speed than the feed rollers. It should be noted that at the time that the workpiece is contacted by the sanding rollers. It is still being biased forwardly through the sanding rollers by the feed rollers, and thus cannot be backed up in the machine by the reverse rotation of the sanding rollers. It is also generally true that the leading edge of the workpiece **45** will be engaged by the intermediate pair of feed rollers **64***a* and **64***b* as it continues to move through the leading pair of sanding rollers **70***a* and **70***b* so that even if the workpiece is out of engagement with the pair of feed rollers **62***a* and **62***b*, it will still be gripped by rotating elements tending to move it toward the discharge end of the apparatus.

If it is desired to operate the lower sanding rollers **70***b* and **72***b* either independently of, or simultaneously with, the upper sanding rollers **70***a* and **72***a*, the motor **120** is energized using the switch **50** and effectively drives the sprockets **138** and **140** carried by the shafts **71***b* and **73***b*, respectively, in rotation at substantially the same speed and in the same direction of rotation. With the described arrangement, it is thus possible to sand or finish either or both the upper and lower surfaces of the workpiece as it is moved through the apparatus.

It should be further pointed out that the types of abrading surfaces which are provided on the several sanding rollers may be varied in any desired manner, and it is possible to provide the sanding rollers **70***a* and **70***b* in the initial pair of sanding rollers with one type of abrading surface, for example, a course abrasive material, and the second pair of sanding rollers **72***a* and **72***b* with a relatively fine abrading material, to thereby provide the most efficient and effective type of sanding operation. On the other hand, the two lower sanding rollers **70***b* and **72***b* may be provided with an entirely different type of abrasive material from the upper rollers **70***a* and **72***a* so that the type of finish provided on the lower surface of the workpiece **45** differs from that which is provided on the upper surface.

As a final aspect of the invention which constitutes an important and useful feature thereof, the several rollers may be quickly and easily removed from the apparatus when it is desired to repair the removed roller, or a roller which is positioned below the removed roller, or where it is desired to remove the abrading or sanding surface on either the upper or lower sanding rollers. Removal of the rollers may be quickly accomplished by simply removing the self-tapping screws **90** which are provided in the bearing blocks **80** and **100** for the purpose of holding the support rod engaging portions **82** thereof to the journal carrying portions **84**. With the self-tapping screws **90** removed, the journal carrying portions can be lifted upwardly on the ends of the respective shafts, and the rollers carried by the shafts can be bodily lifted out of the superstructure of the apparatus to expose the roller carried therebelow, and permit the surface of the lower rollers to be worked on or repaired. Replacement or repair of the removed roller is, of course, equally easily facilitated.

From the foregoing description of the invention, it will have become apparent that the present invention provides a novel, highly useful sanding apparatus which can be used to quickly finish in an effective and aesthetic manner, both the upper and lower surfaces of large flat panels, such as doors and the like. Panels of varying thicknesses can be handled equally well by the apparatus, and the adjustments necessary to the rollers to accommodate panels of differing sizes can be quickly and easily effected. Maintenance of the apparatus is not difficult due to the accessible location of all sprockets and drive chains, and due

to the ease with which the several rollers may be disconnected from their supporting structures and removed completely from the framework and the superstructure carried thereby.

Although a particular embodiment of the invention has been described herein in considerable detail, and several alterations to the illustrated structure have been suggested in the foregoing description, it is reasonable to expect that various departures and modifications can be made in the illustrated structure without departing from the basic principles which underlie the invention. All such modifications and innovations, therefore, which continue to utilize and depend upon the basic and fundamental principles herein enunciated, and upon which this invention is predicated, are deemed to be circumscribed by the spirit and scope of the invention except as the same may be necessarily limited by the appended claims or reasonable equivalents thereof.

I claim:

1. Apparatus for abrading comprising:
a framework;
at least one pair of feed rollers rotatably mounted on said framework and having their rotational axes aligned in a common plane, the feed rollers being spaced from each other to permit a panel to be sanded to be moved therebetween in contact with both of said rollers;
at least one pair of sanding rollers rotatably mounted on said framework and having their rotational axes aligned in a common plane extending parallel to the planes containing the rotational axes of said feed rollers, said sanding rollers being spaced from each other to permit a portion of the panel passing between at least one of the pairs of feed rollers to be simultaneously passed between one of the pairs of sanding rollers and in contact with both of the sanding rollers in said one pair;
means for driving the two rollers in each pair of feed rollers in opposite direction of rotation from each other to move said panel toward said sanding rollers;
means for driving at least one of the rollers in each pair of sanding rollers in rotation in a direction tending to move said panel toward said one pair of feed rollers;
support rods extending vertically from said framework at opposite ends of each of said pairs of rollers;
bearing blocks slidably mounted on each of said support rods and each rotatably journaling one of the rollers at one end thereof; and
means for independently adjusting the vertical position of each of said bearing blocks on its respective support rod.

2. Apparatus for abrading as claimed in claim 1 wherein said apparatus further includes:
a feed table plate supported on said framework and having an upper surface aligned with a plane extending between said roller pairs; and
a panel discharge support plate supported on said framework and positioned on the opposite side of said roller pairs from said feed table plate to receive a panel from said rollers after it has been abraded.

3. Apparatus for abrading as claimed in claim 1 and further characterized as including at least two pairs of feed rollers including pairs positioned on opposite sides of all the pairs of sanding rollers for feeding a panel to be abraded through the pairs of sanding rollers and out of said abrading apparatus after said panel has passed through said sanding rollers.

4. Apparatus for abrading as claimed in claim 3 wherein said apparatus includes five horizontally spaced pairs of feed rollers and two horizontally spaced pairs of sanding rollers, the sequence of occurrence of said roller pairs in a horizontal direction through the apparatus being two adjacent pairs of feed rollers, then a pair of sanding rollers, then a pair of feed rollers, then a pair of sanding rollers, then two adjacent pairs of feed rollers.

5. Apparatus for abrading as claimed in claim 1 and further characterized to include means for driving the other of the rollers in each pair of sanding rollers in rotation independently of said one roller in each pair of sanding rollers.

6. Apparatus for abrading as defined in claim 5 wherein said means for driving at least one of the rollers in each pair of sanding rollers comprises:
a motor;
a shaft driven by said motor;
a sprocket keyed to said shaft for rotation therewith;
a shaft rotatably supporting each of said one rollers in each pair of sanding rollers;
sprockets keyed to each of said roller supporting shafts for rotation therewith; and
a chain drivingly interconnecting said sprockets;
and wherein said means for driving the other of the rollers in each pair of sanding rollers in rotation independently of said one roller in each pair of sanding rollers comprises:
a second motor;
a second shaft driven by said second motor;
a sprocket keyed to said second shaft for rotation therewith;
other roller shafts rotatably supporting each of said other rollers in said sand roller pairs;
sprockets keyed to each of said other roller shafts for rotation therewith; and
a second chain drivingly interconnecting said other roller sprockets and said sprocket keyed to said second shaft.

7. Apparatus for abrading as claimed in claim 1 wherein said means for independently adjusting the vertical position of each of said bearing blocks comprises:
a draw plate secured to each of said support rods in a position above the bearing blocks carried thereby;
an adjusting rod secured to, and extending vertically from, each of said bearing blocks and passing through an aperture in said draw plate; and
retaining means on each of said adjusting rods axially movable on said adjusting rods and detachably engaging the respective draw plates for altering the relative positions of said adjusting rods to the respective draw plates through which they pass.

8. Sanding apparatus for finishing surfaces by abrasion comprising:
a supporting framework;
a plurality of pairs of feed rollers rotatably mounted on said framework and each containing two rollers spaced from each other and adapted to frictionally engage a workpiece to be sanded and to advance said workpiece through said apparatus;
a pair of sanding rollers rotatably mounted in said framework and spaced from each other and from said pairs of feed rollers, said sanding rollers having their peripheral surfaces positioned on two parallel common tangents with the peripheral surfaces of the rollers in said pairs of feed rollers;
drive means for rotating each of the rollers in each pair of feed rollers in opposite directions to move the workpiece engaged by the feed rollers in each pair of feed rollers through the respective feed roller pair;
drive means for independently or simultaneously rotating each of the sanding rollers in said sanding roller pair in opposite directions from each other and in opposite directions from the direction of rotation of at least one feed roller having its periphery positioned on a common tangent with the respective sanding rollers in said sanding roller pair; and
means for independently adjusting the position of the axis of rotation of each of the rollers in each of said pairs of feed rollers and sanding rollers.

9. Sanding apparatus as claimed in claim 8 and further characterized to include shafts rotatably supporting each of said rollers, and wherein said adjusting means comprises:

bearing means receiving the ends of each of said shafts; and

means adjustably supporting each of said bearing means on said framework.

10. Sanding apparatus as claimed in claim **9** wherein said bearing means includes an open bearing block supported on one side of said framework and having an open bearing therein having one end of the respective shaft passed therethrough; and

a closed bearing block supported on the opposite side of said framework from said open bearing block and having a closed bearing therein receiving the opposite end of said respective shaft.

11. Sanding apparatus as claimed in claim **10** wherein said adjustable supporting means comprises:

a vertical support rod extending through each of said open and closed bearing blocks and secured at the lower end to said framework;

a draw plate mounted on each of said vertical support rods at a position above the respective bearing blocks mounted thereon;

adjusting shafts extending through said draw plates to each of said bearing blocks; and

means on said adjusting shafts detachably engaging said draw plates and selectively movable axially on said adjusting shafts.

12. Sanding apparatus as claimed in claim **9** wherein said first mentioned drive means comprises:

sprockets keyed to the shafts of each of said feed rollers;

chains interconnecting the sprockets of said feed rollers for driving the feed rollers in each pair thereof in opposite directions; and

a motor drivingly connected to one of said feed roller shafts.

13. Sanding apparatus as claimed in claim **12** and further characterized to include means drivingly interconnecting said motor with the shaft of said one feed roller, said interconnecting means comprising:

a shaft rotatably mounted on said framework;

a pulley and a sprocket mounted on said shaft for rotation therewith;

a driving sprocket mounted on the shaft of said one feed roller;

endless belt means drivingly interconnecting said motor with said pulley; and

a drive chain drivingly interconnecting the sprocket mounted on the shaft which is rotatably mounted on said framework with said driving sprocket.

14. Sanding apparatus as claimed in claim **13** and further characterized to include chain tensioning means mounted on said framework and cooperating with said drive chain for adjusting the tension therein.

15. Sanding apparatus as claimed in claim **11** wherein the portion of each of said adjusting shafts passing through the respective draw plate is peripherally threaded, and said means engaging said draw plate comprises a pair of adjusting nuts threaded on the peripherally threaded portion of each of said adjusting shafts and positioned on opposite sides of the respective draw plate.

16. Sanding apparatus as claimed in claim **11** and further characterized to include blower hood supporting means mounted on, and extending vertically upwardly from, said draw plates for supporting a blower hood over said framework and rollers.

17. Sanding apparatus as claimed in claim **9** wherein said means for independently or simultaneously rotating each of the sanding rollers in said sanding roller pairs in opposite directions from each other comprises:

a sprocket carried by the shafts rotatably supporting each of said sanding rollers;

a first motor mounted on said framework;

a first chain drivingly interconnecting said first motor with those sprockets carried on the shafts of all of said sanding rollers having their peripheral surfaces positioned on a common tangent extending between the two rollers in each pair of sanding rollers;

a second motor mounted on said framework;

a second chain drivingly interconnecting said second motor with those sprockets carried on the shafts of all of the sanding rollers not driven in rotation by said first motor and said first chain.

18. Sanding apparatus as claimed in claim **10** wherein said open and closed bearing blocks each include a journal carrying portion carrying the respective open or closed bearing; and

a second portion engaging said supporting means and quick detachably secured to said journal carrying portion whereby said rollers may be quickly and easily removed from said framework to permit the surfaces of the rollers to be renewed.

19. A machine for finishing a workpiece by abrasion comprising:

a supporting framework;

a plurality of pairs of feed rollers rotatably mounted on said framework for rotation about horizontal axes and spaced vertically from each other for engaging a workpiece to be advanced through said machine;

at least one pair of horizontally extending sanding rollers rotatably mounted on said framework and having at least one pair of said feed rollers mounted on opposite sides thereof for feeding a workpiece to said sanding rollers, and receiving said workpiece from said sanding rollers;

first driving means mounted on said framework and connected to at least one feed roller in each pair of feed rollers for driving said one feed roller in each pair of feed rollers in a common direction to advance a workpiece through said machine;

second driving means mounted on said framework and connected to one of the sanding rollers in each of the pairs of sanding rollers for driving said one sanding roller in the opposite direction of rotation from the direction of rotation of said one feed roller in each of said pairs of feed rollers;

third drive means mounted on said framework and operable independently of said second drive means for driving the second sanding roller in each pair of sanding rollers in a direction opposite the direction of rotation of said one sanding roller in each pair of sanding rollers;

shafts extending horizontally through, and keyed to, each of said rollers;

vertically adjustable bearing means mounted on said framework and rotatably journaling the opposite ends of said shafts whereby each end of each of said rollers can be independently adjusted in a vertical direction.

20. A machine for sanding flat panels comprising:

a horizontal framework having vertically extending supporting legs interconnected by two horizontal supporting means, said two horizontal supporting means extending parallel to each other on opposite sides of said framework;

a plurality of parallel, vertically extending supporting rods mounted on each of said horizontal supporting means and horizontally spaced therealong;

an open bearing block and a closed bearing block movably supported on each of said vertically extending supporting rods, each of said bearing blocks including a supporting rod engaging portion movably engaging said supporting rod, and a journal carrying portion projecting normal to said supporting rod engaging portion;

means quick detachably connecting said supporting rod engaging portions of said bearing blocks to the journal carrying portions thereof;

a horizontally extending draw plate mounted on each

of said vertically extending supporting rods above said open and closed bearing blocks;

adjusting shafts interconnecting each of said bearing blocks with the respective draw plate located on the supporting rods carrying the respective bearing block;

means for changing the length of the portion of each of said adjusting shafts extending between said draw plates and said bearing blocks;

a pair of parallel, vertically aligned, horizontally extending feed roller shafts having their opposite end portions journaled in the bearing blocks movably supported on two of said supporting rods on opposite sides of said framework from each other, one of said feed roller shafts having an end portion projecting through the open bearing block disposed on one of said two supporting rods, and the other of said feed roller shafts having an end portion projecting through the open bearing block disposed on the other of said two supporting rods;

sprockets keyed to the projecting two end portions of each of said feed roller shafts for rotation therewith, said sprockets being disposed on opposite sides of said framework;

feed rollers mounted on each of said feed roller shafts;

a pair of parallel, vertically aligned, horizontally extending sanding roller shafts having their opposite end portions journaled in the bearing blocks movably supported on two others of said supporting rods on opposite sides of said framework from each other, one of said sanding roller shafts having an end portion projecting through the open bearing block disposed on one of said two other supporting rods, and the other of said sanding roller shafts having an end portion projecting through the open bearing block disposed on the other of said two other supporting rods;

sprockets keyed to the projecting end portions of each of said sanding roller shafts for rotation therewith, said sprockets being disposed on opposite sides of said framework;

sanding rollers mounted on each of said sanding roller shafts;

a first motor;

a speed reducer system interconnecting said first motor with said feed rollers, said speed reducer system including

at least one pulley;

at least one belt interconnecting said pulleys with said motor;

a sprocket;

means drivingly interconnecting said pulleys with said sprocket; and

chain means drivingly interconnecting the sprocket in said speed reducer system with the sprockets on said feed roller shafts for driving said feed rollers in opposite directions from each other;

a second motor;

a chain drivingly interconnecting said second motor with the sprocket keyed to one of said sanding roller shafts;

a third motor; and

a chain drivingly interconnecting said third motor with the sprocket keyed to the other of said sanding roller shafts.

21. A machine as claimed in claim **20** wherein each of said adjusting shafts is extended through an aperture in the respective draw plate, and said means for changing the length of the portion of each of said adjusting shafts extending between said draw plate and said bearing blocks comprises a pair of adjusting nuts threaded on the peripherally threaded portion of said adjusting shafts and positioned on opposite sides of said draw plate.

22. A machine as claimed in claim **20** wherein said means quick detachably connecting said supporting rod engaging portion of said bearing blocks to the journal carrying portion of said bearing blocks comprises a plurality of self-tapping screws extended through the supporting rod engaging portion into the journal carrying portion of each of said bearing blocks whereby the journal carrying portion of each of said bearing blocks can be quick detached from the supporting rod engaging portion thereof to permit the rollers utilized in said machine to be quickly removed and the surfaces thereof restored.

23. A machine as claimed in claim **20** wherein said machine includes a plurality of pairs of sanding rollers keyed to shafts mounted in bearing blocks on said vertically extending supporting rods in substantially the same manner as the sanding rollers described in claim **21.**

24. A machine as claimed in claim **20** and further characterized to include means mounted at the upper ends of said supporting rods and above said draw plates for supporting blower apparatus.

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