June 19, 1934. F. D. ROBBINS 1,963,448

SANDING MACHINE DRUM

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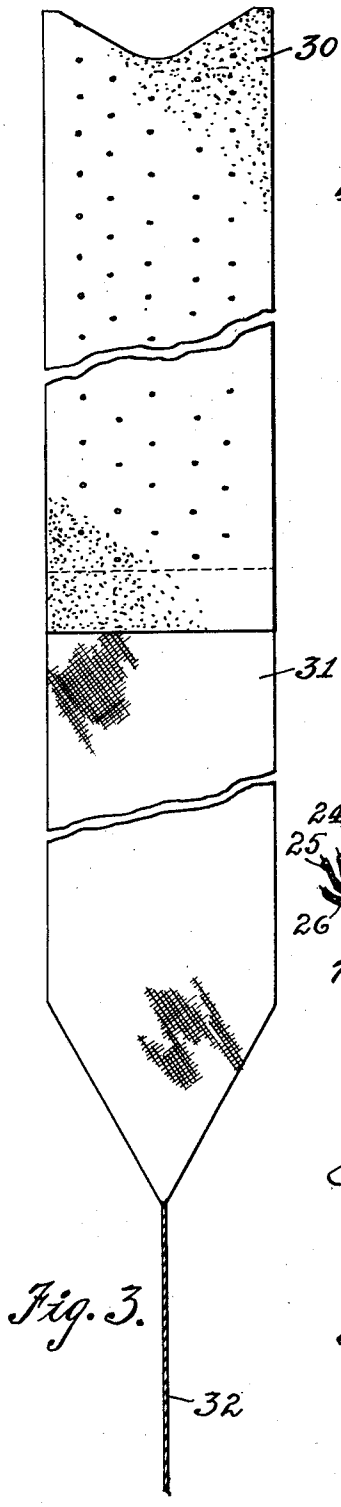
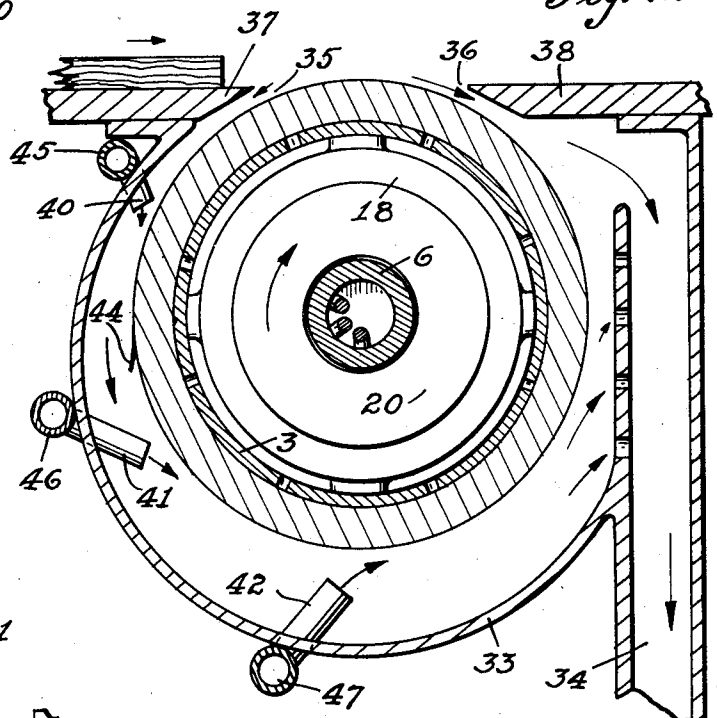


Fig. 3.

Fig. 2.



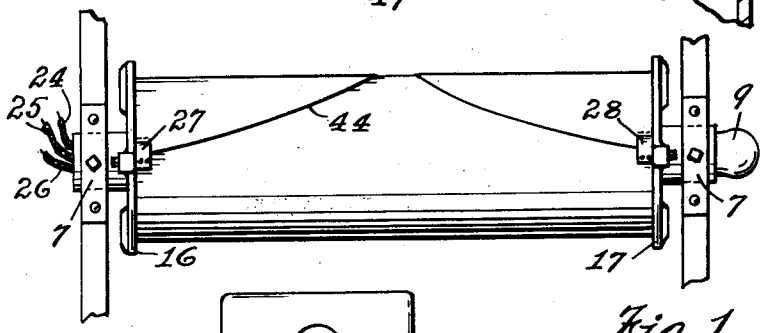


Fig. 1.

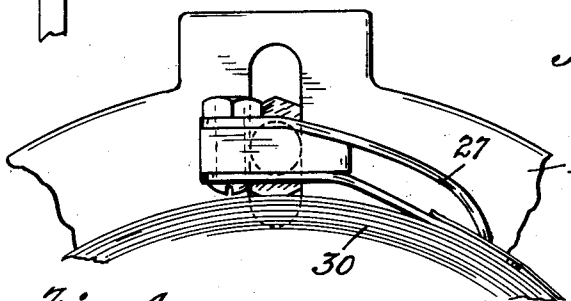


Fig. 4.

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SANDING MACHINE DRUM

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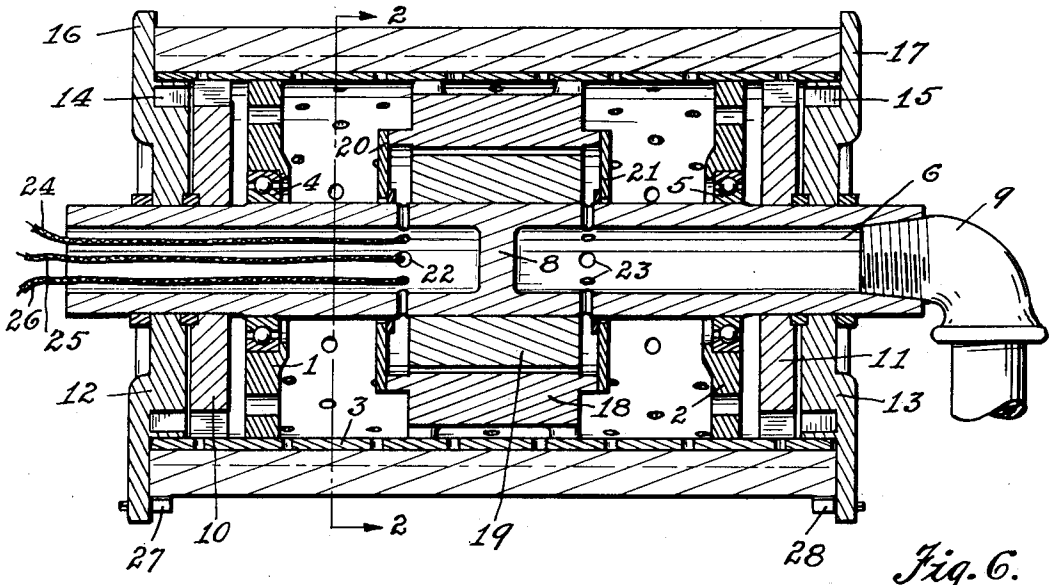

Fig. 6.

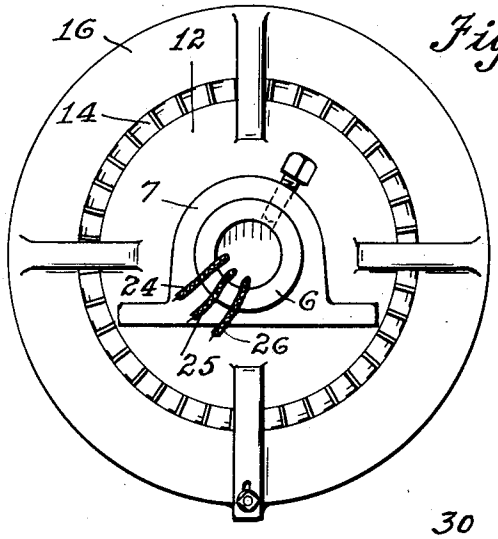

Fig. 8.

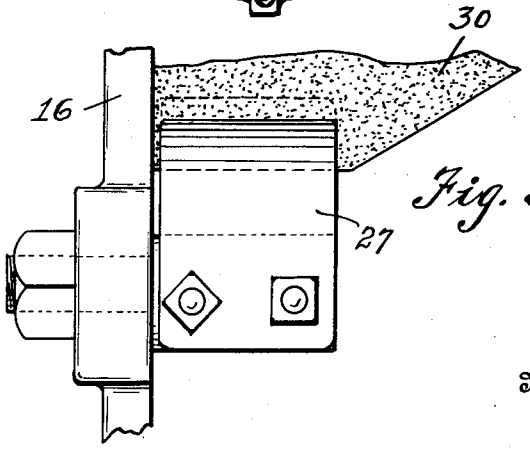

Fig. 5.

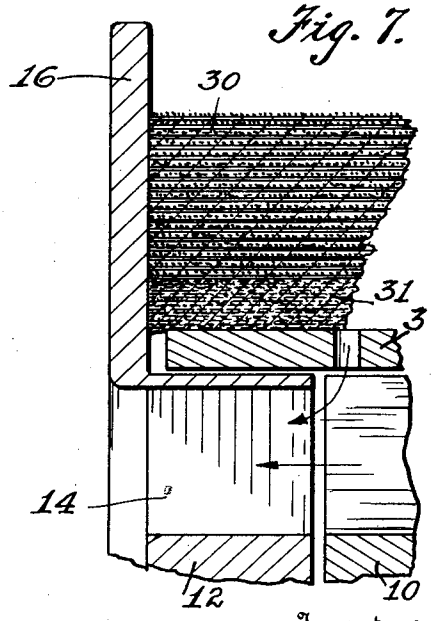

Fig. 7.

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Patented June 19, 1934 1,963,448

UNITED STATES PATENT OFFICE

1,963,448

SANDING MACHINE DRUM

Frank D. Robbins, Portland, Oreg., assignor to Danta Boyd, Long Beach, Calif.

Application January 11, 1932, Serial No. 585,964

6 Claims. (Cl. 51—194)

My invention relates to rotary sanding machine drums designed to carry sand paper stretched tightly thereabout as the abrading element in machines through which woodwork is passed in the polishing or sanding operation, and particularly to means for securing the sand paper thereupon and to a peculiar manner of construction of the drum made possible thereby of special utility.

The principal object of my invention is the provision of means to facilitate the replacement of the sand paper on a drum of the character described.

A second object is the provision of a method and means for using a relatively greater length of sand paper, thereby augmenting the period of operation possible with a single replacement.

A third object of my invention is the provision for a more economical and efficient use of the sandpaper in contact with the work.

A fourth object is the provision of a sanding machine drum of nice balance of such integral construction as will permit of relatively high rotative speeds as enables the use of the abrasive grits at the high contact velocities without serious distortions of form, balance and adjustment.

A fifth object is the provision of means for clearing and cooling the sandpaper to prevent the heating thereof to those temperatures at which the glue, binding the grits to the paper, softens.

A sixth object is the provision of means for driving such a drum directly from a motor contained within the dimensions of the drum thus reducing the total floor area required for the installation of the machine.

Other objects and advantages of my invention will be apparent in the following discourse wherein the significance of the reference characters in the accompanying drawings, details of construction and manner of operation of a typical drum embodying my invention, and the particular advantages thereof are explained.

Figure 1 represents a top view of the entire drum as installed in the journals of an ordinary drum sanding machine.

Figure 2 repreesnts a cross section of the entire drum normal to its axis of rotation taken on the line 2—2 of Figure 6 together with certain auxiliary apparatus and fragmentary portions of an ordinary sanding machine.

Figure 3 represents a length of sandpaper as prepared for attachment to the drum of my invention together with certain auxiliary equipment convenient to employ.

Figure 4 represents a fragment of the drum carrying the paper gripping device of which two of symmetrical design are employed at opposite ends of the drum.

Figure 5 represents a view of the paper gripping device in another view.

Figure 6 represents a view of a longitudinal diametral section of the entire drum and certain auxiliary apparatus.

Figure 7 represents a view of an end fragment of a longitudinal diametral section of the drum showing the disposition of the sandpaper thereupon.

Figure 8 represents an end view of the complete drum illustrating particularly the manner of securing the drum upon the main frame of a machine.

The main body of the drum comprises the two perforated circular members 1 and 2 respectively and the perforated cylindrical member 3 rigidly fitted thereto illustrated in Figure 6. This member, thus composed, is journaled, through the media of the bearings 4 and 5 respectively upon a stationary hollow shaft 6 in turn secured at each end upon the main frame of the sanding machine by some such means as illustrated in Figure 8 at 7, such piece being firmly bolted to the said frame or formed integrally thereupon. This hollow shaft 6 is formed with a central partition 8, shown in Figure 6, two series of perforations 22 and 23 on opposite sides of said partition and further adapted for connection to a blow-pipe 9.

At each end of the drum just externally of the members 1 and 2, bladed stators 10 and 11 are rigidly fixed upon the hollow shaft 6. These stators are formed in detail with a solid central portion adjacent the shaft and bladed peripheries designed to impede the rotation of the air engaged thereby when the drum is in rapid rotation. Exteriorly of these stators 10 and 11 two rotors 12 and 13 are journaled upon the hollow shaft 6 to revolve in the same direction as the drum but independently thereof. These rotors are formed in detail with solid central portions adjacent the shaft 6, bladed portions 14 and 15 apposed to the bladed portions of the stators 10 and 11 and peripheries fashioned to form flanges as 16 and 17. The blades of these rotors are so inclined as to cast air out of the drum when rotated in the same direction as the drum.

The elements of an electric driving motor are shown diagrammatically in Figure 6 comprising a rotor 18 rigidly mounted in the cylindrical member 3 and a stator 19 rigidly mounted upon the hollow shaft 6. Attached to the rotor 18 are two symmetrical annular partitions 20 and 21 adapted to confine certain air currents within the

motor. This motor is served with current through the wires 24, 25, and 26 which extend through suitable of the perforations 22 in the hollow shaft 6.

Two gripping fingers as illustrated in Figures 4 and 5 are fitted to the flange portions of the rotors 14 and 15 as shown at 27 and 28 in Figure 1. These are capable of adjustment radially with respect to the flanges to which they are attached and are provided with gripping fingers between which the end of the sand paper is clamped.

The sand paper may be attached to the drum by winding the same tightly about the cylindrical portion of the drum and disposing the corners of the external end in the gripping fingers 27 and 28. A variant method of preparing the paper for attachment consists in gluing an end of specially perforated sand paper 30 to a length of porous cloth 31 as illustrated in Figure 3 and trimming the ends of the sand paper and the cloth to bifurcated and pointed ends respectively, a string 32 being latterly attached. In this method the string 32 is hitched about the drum and the whole wrapping wound tightly about the drum, the ends being secured in the gripping fingers 27 and 28 as shown in Figure 1. In either method the sand paper constitutes the medium for the transmission of the power from the drum to the rotors 12 and 13 to drive the same against the aggregate resistance cause by friction in the journals thereof and the work of expelling the air from the drum by means of the inclined blades of these rotors.

In Figure 2 is shown at 33 a form of dust hopper well suited for use with the drum of my invention, the direction of the air currents therein as set up by the factory blower system connected through the pipe 34 are indicated by the arrows. The supply of air entering through the apertures 35 and 36 between the drum and the machine tables 37 and 38 is augmented and directed against the drum by means of three or more suitable series of air jets discharging at relatively high pressure from nozzles as 40, 41, and 42 in turn supplied with air under pressure from the manifolds 45, 46, and 47, respectively. These nozzles are disposed in such manner that the air currents issuing therefrom impinge against the drum and serve to deflect those currents induced by the blower system also against the drum and induce therein a definite turbulence to increase the quantity of air actually making contact with the sand paper.

It is to be observed that the direction of flow of the air currents within the dust hopper as illustrated in Figure 2 is opposite to that of the rotation of the drum. This counter movement of the air currents imposes a force tending to wind the sand paper more tightly about the drum and as well provides for such rarification of the air under the end of the sand paper 44 as will prevent the latter from separating from the body of the roll by virtue of the centrifugal force involved.

Four distinct means which may be used in combination or singly, are provided to keep the sand paper tightly wrapped about the drum, namely, the rarification of the air contained within the drum induced by the action of the rotors 14 and 15 in combination with the stators 10 and 11 communicated to the outermost layers of sand paper through the perforations in the drum, through the cloth and through the perforations in the sand paper illustrated in Figure 3; the series of air jets issuing from the nozzles 40, 41, and 42; the gripping means 27 and 28 which resist the rotation of the drum with that force necessary to drive the rotors to which they are attached; and the impedance of the flow of air into the ends of the sand paper pile involved in a separation of the several layers after contact with the work effected by the flanges 16 and 17.

Now it will be apparent from the foregoing that the drum cylinder may be of continuous uniform section of equal strength and mass in every section since other means for retaining the sand paper are provided than clamping devices inset in the cylinder walls. It will be equally apparent that this construction is highly propitious to nice dynamic balancing since the magnitude of all strains due to centrifugal force will be nearly, if not quite equal in every direction. In addition, the stationary shaft of the drum of my invention, corresponding for comparison to the revolving shaft of the ordinary drum, does not contribute the effects of strains therein to produce a whip in the drum as is inherent in the construction employing the revolving shaft.

The constructions are distinguished by these properties:

The drum of my invention is constrained to rotate about that axis which is central of the bearings and which may be removed from the geometrical center of the shaft at the points of attachment thereof to the machine frame by such a separation as represents the strain in that shaft at any moment. Also, the drum of my invention may assume rotation about its own center of gravity or nearly so and the stationary shaft constrained to oscillations or vibrations conforming to this axis, since the shaft is the less ponderous member.

The ordinary drum having a revolving shaft is affected by the strains in the shaft due to gravity as well as working loads since the strains in that shaft must be reversed at each half revolution in the manner well understood to be productive of whipping effects. With such reversals of strains, any set imparted to the shaft is easily disturbed and no permanence of alignment or truth of rotation may be assured.

Since, in the drum of may invention the member providing the structural strength of the drum assembly longitudinally is the drum cylinder, greater lengths of drums of greatly increased capacity may be provided as little or no dependence for truth of rotation is had upon the stationary shaft.

These effects are of incalculable value to the practical mechanic whose duties are to care for such equipment in repair and operation.

It will be further apparent that ventilation of the driving motor may be provided for by means of currents induced through the hollow shaft, motor housing, and hollow shaft in the order named, by means of a suitable blower connection as 9, Figure 6. Or, such a circulation through the motor may be induced by providing suitable perforations in the revolving motor housing when air may be drawn by virtue of centrifugal force through one or both ends of the hollow shaft and exhausted from the motor housing into the drum cylinder from whence it may be expelled by means of the rotors 14 and 15.

Other important effects to be particularly noticed are:

The sand paper is at no time susceptible to buckling since the end of the paper toward which the drum rotates in contact with the work is the free end of the paper and this end may move more or less to compensate for varying degrees of pressure with which the work is engaged and which, by reason of the resilient nature of these

rolls as padded for use, governs the peripheral length of the drum as thus distorted from truth of cylindrical form.

The rarification of the air within the drum and the circulation of air therethrough are highly productive of refrigerating effects invaluable in cooling both the sand paper and driving motor, and as well, when perforated sand paper is used, this condition contributes to the sum of those effects retaining the sand paper in place.

The sanding surface of the roll is renewed, as will be obvious, by disengaging the gripping fingers 27 and 28, tearing off one turn of the paper, or a part of a turn as required, rotating the rotors 14 and 15 to a new position and engaging the gripping fingers.

It will also be easily understood that with the drum of the nice balance contemplated herein, the very slightly spiral form of the roll accruing from the spiral wrapping of the paper will be of negligible effect, and small pieces of paper may be removed at a time so that the surface exposed will have grits of finely graduated degrees of sharpness productive of fine effects in the sanding operation. On the other hand a whole turn of the paper may be removed at a time and the usual effects provided for. But the best use of this device lies in the removal of small pieces at a time to provide a uniform average sharpness of the paper throughout the whole working day.

Having described my invention what I claim is:

1. A sanding machine drum comprising, a stationary shaft, a cylindrical member journaled thereupon, and relatively rotatable means for securing the end of spirally wrapped sand paper thereupon wherein the said securing means is driven in rotation against a resistance by means of power transmitted through the sand paper secured thereby.

2. A sanding machine drum comprising, a stationary hollow shaft formed with a partition medially of its ends and a series of perforations each side of said partition, a perforated cylindrical member journaled upon said shaft, a driving motor the rotor of which is fixed to said cylindrical member and the stator of which is fixed to said shaft medially of said perforations in said shaft, wires extending through said hollow shaft and perforations therein to serve said motor, a pair of symmetrical rotors journaled on said shaft designed to close the ends of said cylinder and expel air therefrom when driven in rotation, a pair of symmetrical gripping fingers mounted on said rotors respectively, and a spiral wrapping of sand paper the end of which is secured by said gripping fingers and which sand paper transmits from the drum the power required to drive said rotors.

3. A sanding machine drum comprising, a stationary hollow shaft formed with a partition medially of its ends and a series of perforations each side of said partition one end of which shaft is open and the other end of which is adapted for connection to a blow pipe, a perforated cylindrical member journaled upon said shaft, a driving motor the rotor of which is fixed to said cylindrical member and the stator of which is fixed to said shaft, wires extending through the open end of said shaft and perforations therein to serve the said motor, a pair of symmetrical rotors journaled on said shaft externally of said cylindrical member journals designed to close the ends of the said cylindrical member and form a flange therefor and to expel air therefrom when driven in rotation, a pair of symmetrical stators journaled on said shaft between the journals of said cylindrical member and said rotors respectively cooperating with said rotors to exhaust air from said cylidrical member, a pair of symmetrical gripping fingers mounted on said rotors respectively adapted for attachment to the end of sand paper spirally wound on said cylindrical member to effect the driving of said rotors and compensate for variations of length of said sand paper due to operating conditions of such a machine.

4. A sanding machine drum comprising, a stationary shaft, a cylindrical member journaled thereupon, two symmetrical gripping fingers each of which is journaled independently upon said stationary shaft at an end of said cylindrical member and adapted to grip the end of sand paper spirally wound about said cylindrical member, and means for imposing a resistance to the rotary motion of said gripping fingers in which the same are impelled by power transmitted through said spirally wound sand paper.

5. A sanding machine drum comprising, a stationary shaft, a cylindrical member journaled upon said shaft, two symmetrical means for gripping sand paper spirally wound about said cylindrical member each of which is independently journaled upon said shaft at an end of said cylindrical member, and a system of nozzles adapted to discharge jets of air against said spirally wound sand paper in a direction opposite to the direction of travel of the drum.

6. A sanding machine drum comprising, a stationary hollow shaft formed with a partition medially of its ends and a series of perforations each side of said partition, a cylindrical member journaled upon said shaft, a driving motor the rotor of which is disposed within and fixed to said cylindrical member and the stator of which is fixed to said shaft medially of said series of perforations, and means to induce a current of air to flow into one end of said hollow shaft, through one series of perforations therein, through the motor, through the remaining perforations in said hollow shaft and thence out through the opposite end of said hollow shaft.

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