July 21, 1953 W. L. BOSTWICK 2,645,871

MACHINE FOR DECORATING SHEET EDGES

Filed April 6, 1950 4 Sheets-Sheet 1

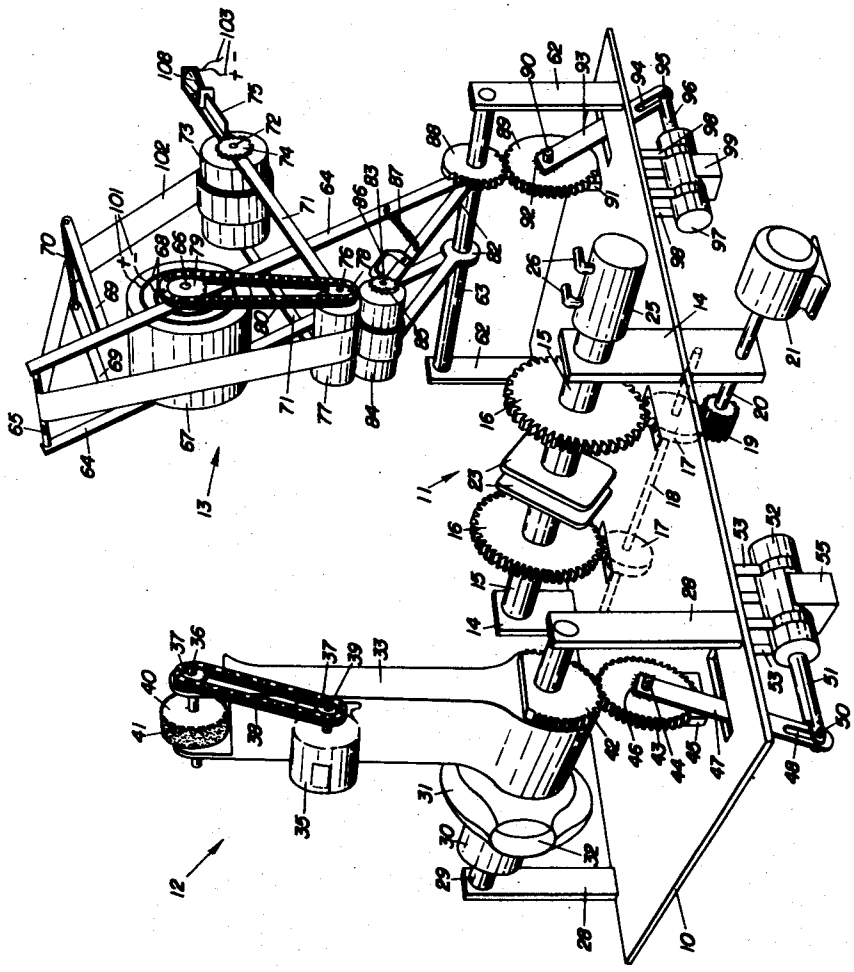


FIG. 1

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MACHINE FOR DECORATING SHEET EDGES

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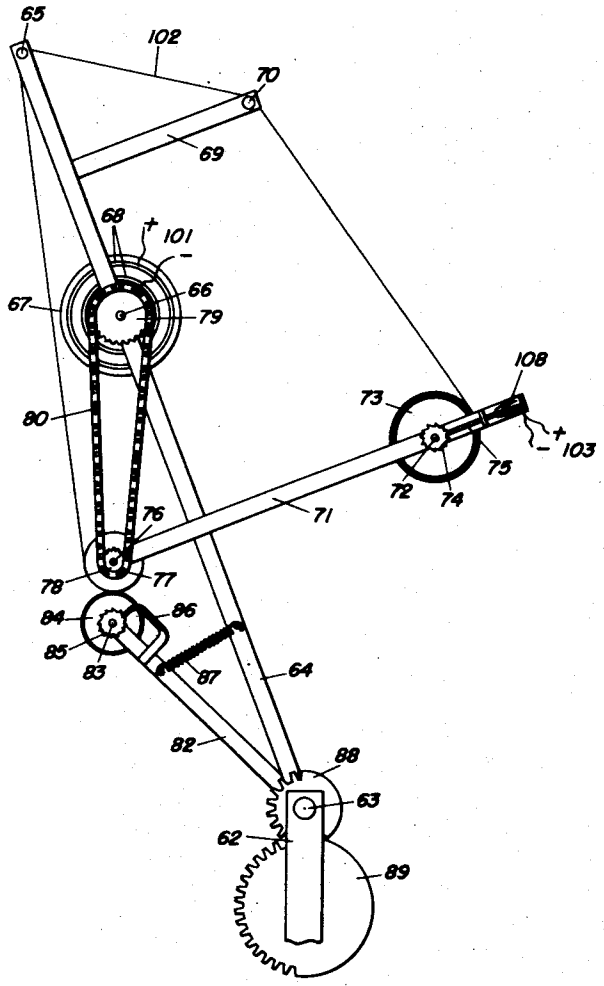


FIG. 2

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FIG. 5

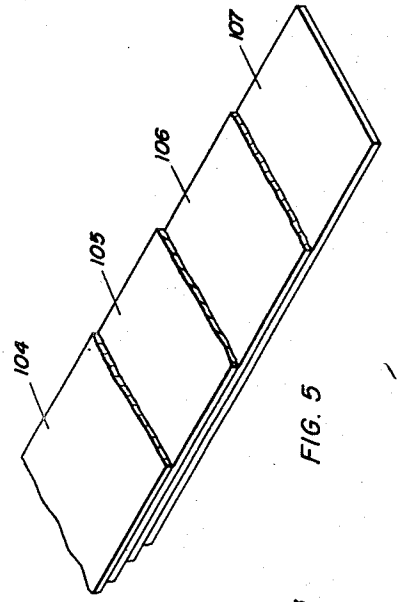
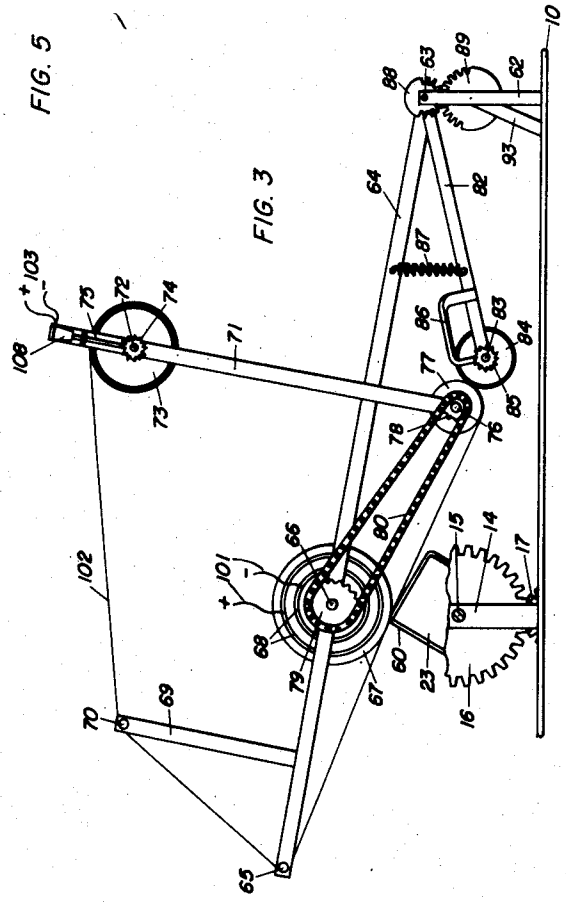


FIG. 3



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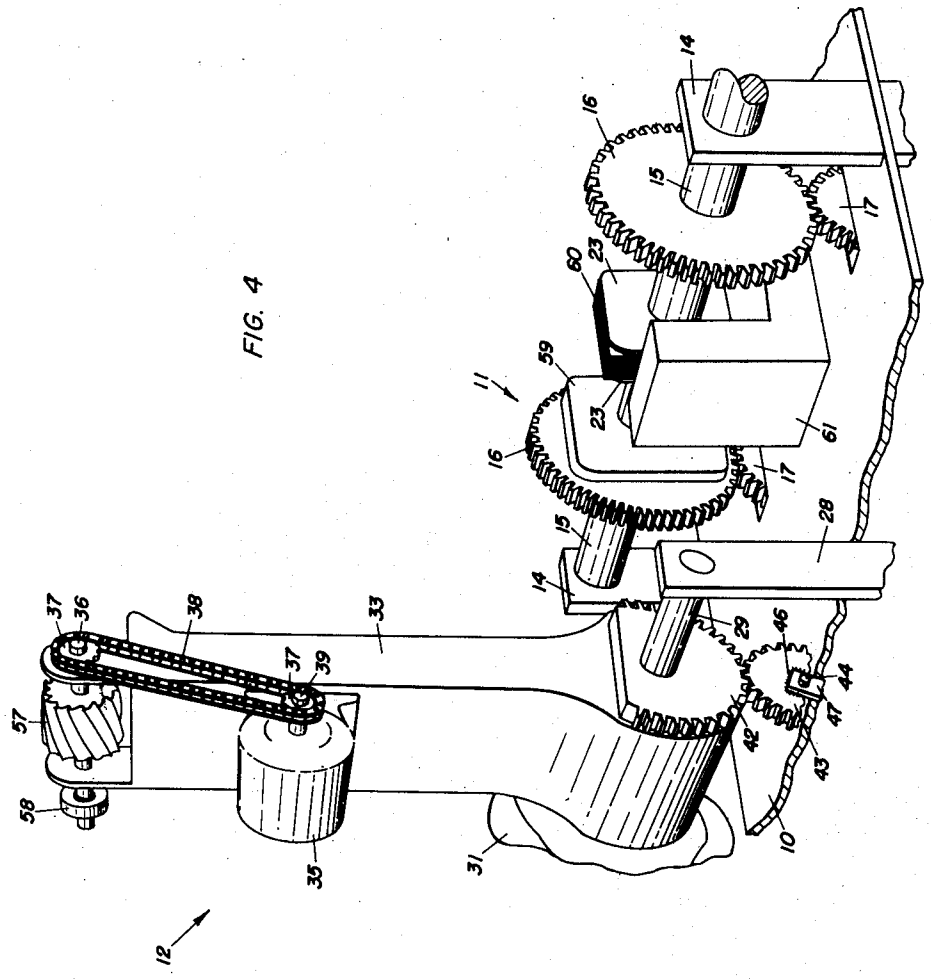
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MACHINE FOR DECORATING SHEET EDGES

Filed April 6, 1950 4 Sheets-Sheet 4

FIG. 4



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Patented July 21, 1953 2,645,871

UNITED STATES PATENT OFFICE

2,645,871

MACHINE FOR DECORATING SHEET EDGES

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Application April 6, 1950, Serial No. 154,370

7 Claims. (Cl. 41—7)

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This invention pertains to edge-gilding or edge decoration and, more particularly, pertains to a machine for and materials for decorating the sheet edges of books, cards, or the like, in such manner that the sheet edges will each present or simulate a metallic surface such, for example, as a surface of gold, silver, aluminum, or the like.

It has been the practice to decorate sheet edges such as those of books, playing cards, or the like, by placing a plurality of book sheets or a plurality of cards in a clamp with the edges of the plurality of such sheets or cards in substantially aligned relation. The edges of the sheets or cards were then sealed to prevent water from penetrating into the cards on later application, and the edges of the clamped sheets or cards were machine-sanded on the major edge surfaces and then hand-sanded at their corners to present a relatively flat surface on each side edge of the pack formed by the clamped sheets or cards and rounded corners joining each side and/or edge. After sanding, any dust or loose particles were removed from the sanded surfaces by the use of a damp cloth or sponge. A paste or filler was then applied to the edge surfaces in such manner as to fill in any cracks and to serve as an adhesive for a metal foil with which the edges were to be decorated. After the paste or filler had dried, it was customary to give the edge surfaces a few light strokes with relatively fine sandpaper to smooth down any irregularities. A size, which is a dilute water soluble adhesive, was then brushed onto the edge surfaces in a bubble-free, thin layer, after which short length unsupported leaves of decorative foil, which had been picked up by the use of the electrostatic charge in a small frame covered with a tightly stretched silk webbing, were applied to the edge surfaces covered with the wet size in such manner that they would overlap. After the size had dried for several hours, the edges were rubbed with a soft cloth to remove excess decorative foil, or any foil which had not adhered to the edge surfaces, and in the latter event patches were applied to defects by using the same size that had been used for applying the original metallic foil leaf and then applying additional metallic foil. When a bright decorative surface was desired, and before the size had completely dried, it was necessary to burnish the decorated surface to produce a lustrous, bright appearance. This operation required the services of a highly skilled workman who could ascertain the proper time at which to carry out the burnishing operation. If the size were too dry and burnishing were attempted, the decorative material would flake off, and if burnishing were attempted when the size were too wet the decorative material would be rubbed off by the

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burnishing tool. After the size used in applying the patches had sufficiently dried, the sheets or cards were separated one from the other by subjecting them to a riffling action, the metallic foil splitting along lines defined by each sheet or card edge in a manner to leave each sheet or card edge covered with the decorative foil so that when the sheets or cards were reassembled a continuous, or simulated continuous, metallic surface would be presented.

From the foregoing it should be apparent that the decoration of the edges of playing cards or book sheets with a metallic foil has been an expensive and time-consuming procedure, and it is one object of this invention to provide a machine and a material which is utilized by said machine, for decorating the edges of book sheets, playing cards, or the like, in a relatively simple and substantially inexpensive manner such as to eliminate the expensive and time-consuming operations heretofore necessary.

It is another object of this invention to provide a machine whereby the edges of book sheets, playing cards, or the like, may be decorated by the use of a carrier-backed decorative foil.

It is still another object of this invention to provide a carrier-backed decorative foil adaptable to the decoration of the edges of book sheets, playing cards, or the like.

It is a further object of this invention to provide a machine, and a material which may be used in said machine, for decorating the edges of book sheets, playing cards, or the like, in a relatively simple and inexpensive manner and which will permit the decoration of at least one entire side edge of a group of book sheets, playing cards, or the like, assembled en masse, all in one operation.

It is a still further object of this invention to provide a machine, and a material which may be used by said machine, for decorating the edges of book sheets, playing cards, or the like, in which a bright, lustrous finish may be obtained on said decorated edges without the necessity of a burnishing operation.

Various other objects and advantageous features of the invention may be had from the following description when taken in conjunction with the accompanying drawings wherein similar characters of reference designate corresponding parts, and wherein:

Fig. 1 is a perspective view of the device;

Fig. 2 is a side elevation view of a part of the device shown in Fig. 1;

Fig. 3 is a side elevation view of the portion of the device shown in Fig. 2, but in a lowered position;

Fig. 4 is a perspective view of a modified por-

tion of another part of the device showing a jig which is used in conjunction with the operation of the device; and

Fig. 5 is a fragmentary perspective view showing a carrier-backed strip of decorative foil, the individual parts being exaggerated in size for purposes of clarity.

Referring to the drawings, and more particularly to Fig. 1, 10 represents a platform or bed plate upon which the greater portion of this device is mounted. The machine, constituting the subject matter of this invention, may be considered as comprising three portions. The sheet or card holding mechanism is indicated generally at 11, while the sheet or card edge preparing mechanism is indicated generally at 12. The part of the machine that is used to apply the decorative material to the sheet or card edges is indicated generally at 13.

The card or sheet edge holding mechanism, indicated generally at 11, comprises a number of parts. 14—14 are supports each of which has one of shafts 15—15 rotatably mounted thereon. Each of these shafts is provided with one of gears 16—16, fixedly secured thereto, and which in turn are actuated by gears 17—17 fixedly secured to shaft 18. Shaft 18 is supported by portions of members 14—14 which extend below platform 10. One of the gears 17—17 may cooperate with another gear 19, fixedly secured to shaft 20 which is connected to an electric motor such as shown at 21. Each of shafts 15—15 are provided with one of two flat sheet or card holders 23—23 which are positioned in parallel disposed planes. Shafts 15—15 are coaxial. Either or both of shafts 15—15 may be slidably mounted in their supports 14—14. Attached to at least one of shafts 15—15 is an air cylinder 25, which may be connected to a source of compressed air (not shown) by means of fittings 26—26. Shaft 18 may be slidably positioned in its supports to enable gears 16—16 and gears 17—17 to be disengaged. Of course, a clutch may be interposed in the gear train between the electric motor 21 and the gear 19.

The motor 21 may be replaced by some other source of power other than an electric motor as has been shown, and other gearing to reduce the speed, or to vary the speed may be interposed in the gear train and is to be considered as coming within the scope of this invention. The electric motor 21 may be mounted on the bed plate 10 or in any convenient manner, as is well-known to those skilled in the art.

Referring now more particularly to Fig. 1 and 4, shaft 29 is rotatably mounted on supports 28—28. Shaft 29 may have associated therewith an electric motor 30, which drives a fan (not shown) located in the vacuum cleaner 31. Vacuum cleaner 31 discharges through opening 32 and through suitable flexible piping (not shown). The suction side of the vacuum cleaner 31 is connected to conduit 33 which may also serve as a support for electric motor 35 and shaft 36, which is rotatably mounted thereon at the upper extremity thereof. Electric motor 35 may be used to drive shaft 36 through sprocket wheels 37—37 and chain 38. One of the sprocket wheels 37—37 is mounted on shaft 39 of the electric motor 35, while the other of the sprocket wheels 37—37 is rigidly secured to shaft 36. Fixedly positioned on shaft 36 is a sanding disc or drum 40 provided with a sanding surface 41.

Rigidly secured to member 33 and fixedly positioned on shaft 29 is a gear member 42, which cooperates with gear 43. Gear 43 is positioned on shaft 44 which is supported by member 45. Rigidly secured to gear 43, as by a welded joint 46, is member 47 which is provided with a slot 48. Positioned in slot 48 is pin 50 which is connected to bifurcated member 51. Member 51 is the piston rod of a piston (not shown) which is located within air cylinder 52. Cylinder 52 is supported by straps 53—53 which are attached to platform 10. Air cylinder 52, as shown, has associated therewith a solenoid operated valve 55, provided with suitable electrical and air connections (not shown). This valve merely permits air to be introduced at either end of the cylinder 52, and is a device well-known to those skilled in the art.

In the particular embodiment of the invention shown in Fig. 4, instead of a sander, there is provided on shaft 36 a milling-head cutter 57. Also provided on shaft 36 is a cam follower 58. Cam follower 58 is adapted to cooperate with cam 59 positioned on gear 16.

Fig. 4 shows a deck of playing cards 60 positioned between playing card holding members 23—23. Jig 61, used initially to align the card edges, is also shown.

Referring now more particularly to Figs. 1, 2, and 3, 62—62 are supports attached to bed plate 10 in which shaft 63 is rotatably mounted.

Rigidly secured to shaft 63 are spaced supporting members 64—64. At the upper extremity of members 64—64 and rotatably mounted on these members is a shaft 65. Shaft 66 is also rotatably mounted on these two members, but spaced somewhat from the top of members 64—64. Mounted on shaft 66 is drum 67, which is provided with two annular concentric spaced slip rings 68—68.

Slip rings 68—68 are connected to heating elements within the drum 67 (not shown). It is preferred that the peripheral portion of drum 67 be made of a material capable of conducting heat from the heating elements to the surface of the drum, and yet be sufficiently resilient to insure continuous contact of a surface to be decorated with a decorative strip when said strip is positioned between said surface and said drum. Such a resilient, heat conducting material is silicone rubber.

Rigidly secured to members 64—64 and extending at approximately right angles thereto are members 69—69. At the outer extremity of members 69—69 is a rotatably mounted shaft 70 similar to shaft 65. Rigidly secured to members 64—64, and positioned at approximately right angles thereto, are members 71—71. Rotatably mounted at one end of these members 71—71 is shaft 72, on which is mounted roller 73. Shaft 72 may be provided with a ratchet wheel 74 and a solenoid 108 which actuates ratchet pawl 75. Rotatably mounted at the other extremities of members 71—71 is shaft 76, on which is positioned roller 77. Shaft 76 is provided with a sprocket 78 and shaft 66 is provided with a sprocket 79. These sprocket wheels are connected by means of sprocket chain 80.

Rotatably mounted on shaft 63 but positioned between members 64—64 are members 82—82, which have shaft 83 rotatably mounted at their upper extremity. Positioned on shaft 83 is roller 84. Shaft 83 may be provided with a ratchet wheel 85 and a ratchet pawl 86. A spring 87, under tension, is fixedly connected to one or both members 64—64 and one or both members 82—82.

Rigidly secured to at least one of members 64—64 and fixedly secured to shaft 63 is gear

88, which cooperates with gear 89. Gear 89 is fixedly attached to shaft 90 which is rotatably mounted in support 91 on bed plate 10. Fixedly secured to shaft 90 and gear 89 as by a welded joint 92 is a member 93 which is provided with a slot 94 at its lower extremity. Positioned within the slot 94 is a pin 95 which is connected to a bifurcated piston rod 96. Piston rod 96 is attached to a piston (not shown) which is positioned in air cylinder 97. Air cylinder 97 is supported by straps 98—98 which are attached to bed plate 10. This air cylinder 97 has associated therewith solenoid operated valve 99, similar to valve 55.

A source of current 101 is supplied to slip rings 68—68, while a source of current 103 is supplied to solenoid 108.

A carrier-backed decorative strip 102 is shown positioned on the device. Shaft 65 and roller 77 are so positioned that strip 102 is out of contact with the surface of roller 67 when the portion of the device indicated generally at 13 is in the raised position. (See Fig. 2)

Referring more particularly to Fig. 5, this same carrier-backed decorative strip is shown therein. 104 represents a carrier-backing such as cellophane or cellulose acetate. 105 represents the release material. Alkali-halide salts such as potassium bromide (KBr), potassium iodide (KI), and others may be used therefor. Waxes also are good release materials. 106 represents the decorative material, such as gold, aluminum, brass, or some other metal. 107 represents a strata of heat activatable adhesive, such as an adhesive of the polyamide type.

While the following description will illustrate the use of this device in the edge decoration of playing cards, it is to be understood that the device is equally adaptable to the edge decoration of book sheets or playing cards. Furthermore, it is to be understood that a plurality of book sheets or playing cards, in excess of the number to be found in a deck of cards or a single book can be accommodated in this machine.

The operation of this device is as follows: Utilizing the jig 61, playing cards are placed between members 23—23. Air is then admitted to the cylinder 25 to cause shaft 15 to slide toward the other shaft 15. The plurality of playing cards will thus be gripped between the members 23—23 and relative motion of the playing cards will be prevented. The jig 61 is then removed, gears 17—17 are meshed with gears 16—16 and the electric motor 21 is started. Obviously, if a clutch is employed between the prime mover and gear 19, the gears 17—17 may remain meshed with gears 16—16 at all times. Actually the speed of rotation of the gears 16—16 and 17—17 is so low that gears 17—17 may be meshed with gears 16—16 while gears 17—17 are being rotated. While the speed of rotation is not critical, excellent edge decoration of playing cards has been achieved by rotation at five revolutions per minute. Thereafter, while the playing cards held between members 23—23 are being rotated, cylinder 52 is actuated by admitting air to the left end thereof. Air admitted to cylinder 52 causes piston rod 51 to move to the right whereby the sanding drum is lowered into contact with the edges of the playing cards.

The electric motor 35 is actuated prior to lowering the sanding device into contact with the card edges. The sandpaper surface 41 of the rotating sanding drum 40 is then brought into contact with the rotating playing card edges held between members 23—23, and the surfaces formed by the edges of the playing card are thereby smoothed and consequently prepared for the decorative material to be adhered thereto.

In the embodiment shown in Fig. 4, instead of a sanding drum there is provided a milling cutter 57. This milling cutter functions in the same manner as does the sanding drum to prepare the surfaces formed by the edges of the playing cards in order that they may have adhered thereto a decorative material. The main purpose of the sanding drum or the milling cutter is to equalize the distance that the playing card edges extend beyond the members 23—23, in order that the card edges will present relatively flat surfaces. In the case of the milling cutter, it is necessary to have a cam and a cam follower as shown in Fig. 4, to prevent damage to members 23—23 and excessive removal of card edges.

In either case, small particles of dust produced by the action of the sander or the milling cutter will be withdrawn through the conduit 33 by the action of the vacuum cleaner 31 connected thereto. When the surfaces have been properly prepared, usually in one revolution of the playing cards, the air cylinder 52 has air introduced to the right end thereof and the air in the other end is released to atmosphere, thereby moving the sanding drum or the milling head cutter to an upright position. It may be desirable to remove any remaining particles of dust from the surfaces of the card edges by hand. This may be accomplished by use of a cloth impregnated with a non-drying varnish, or similar tacky substance.

Thereafter, air is admitted to cylinder 97 and the same action takes place as in cylinder 52 with the result that the portion of the device indicated generally at 13 is lowered until the edges of the playing cards come in contact with the carrier-backed decorative strip 102 as shown in Fig. 3. Simultaneously, the ratchet pawl 75 is disengaged from the ratchet wheel 74, thereby permitting strip 102 to be unwound. The weight of the assembly causes the decorative strip to contact the heated roller 67, which in turn activates the adhesive on the carrier-backed decorative strip, thereby causing the decorative material to adhere to the edges of the playing cards. The rotating playing cards cause the roller 67 to rotate and the strip 102 to unwind. Roller 67 causes the rotation of roller 77 by means of the sprocket chain 80 and sprocket wheels 78 and 79. One complete revolution of the playing cards held between members 23—23 is all that is necessary to transfer the decorative material 106 on the carrier-backed decorative strip 102 to the surfaces of the playing cards. The carrier-backing 104, and any release material associated therewith is wound on roller 84, while the carrier-backed decorative material is unwound from roller 73, which is a feed roller. It is, of course, necessary to have the peripheral speed of roller 67 and roller 77 the same, in order to prevent any undue strain on the carrier-backed decorative strip 102. This is accomplished by the size of sprocket wheels 78 and 79. The spring 87 allows rollers 77 and 84 to be urged toward each other, thereby insuring that the remainder of the carrier-backed decorative strip, which is the carrier backing 104, is tightly wound on roller 84. Thereafter, the portion of the device indicated generally at 13 is raised, and the edge decorated cards may be removed from members 23—23. At the same instant that portion 13 starts to rise, pawl 75 again

contacts ratchet wheel 74, thereby preventing the decorative strip 102 on roller 73 from unwinding.

In order that the decorative material may be readily applied to the prepared surface formed by the sheet edges or card edges contained between members 23—23, the carried-backed decorative strip 102 is so positioned on rollers 73, 77, and 84 that the carrier-backing is on the side toward the heated roller 67. Therefore, at the point of contact of the heater roller 67 and the card edges the carrier-backing will be separated from the adhesive and the decorative material because the adhesive will be activated by the heated roller and a continuous film of decorative material will thereby be adhered to the surface of the edges of the playing cards. The remaining carrier-backing strip with the small amount of release material associated therewith will then be wound on roller 84. It is preferable, but not necessary, to have the surface of the roller 77 formed from a material having a high coefficient of friction, such as rubber, sandpaper, or the like, thereby preventing the formation of a loosely wound roll of the used carrier-backing materials.

It is deemed obvious to one skilled in the art that rollers 73, 77 and 84 need not be positioned on the machine as has been shown. Much larger supply rollers, similar to roller 73, and much larger rewind rollers, similar to rollers 77 and 84, may be positioned with compensating rollers, etc., to insure a steady supply of carrier-backed decorative film at the tangential point of contact of the heated roller 67 and the surface formed by the card edges held between members 23—23.

Furthermore, while air has been employed as the means for raising and lowering the members indicated at 12 and 13 and for urging members 23—23 toward each other, it is readily conceivable that other means may be employed and should be considered as coming within the scope of this invention. For instance, solenoid actuated means or spring actuated means could be used successfully to urge members 23—23 toward each other. Likewise, there are many other types of mechanical or electrical devices that might be employed to effect a raising and a lowering of the members generally indicated at 12 and 13.

Similarly, it should be perfectly obvious to one skilled in the art that the electric motor 35 may be positioned other than on the conduit 33 and with suitable linkage could be used to drive the sander 40 or the milling head cutter 57.

From the foregoing it will be apparent that there has been evolved a new and novel apparatus for decorating sheet edges. This new apparatus results in a faster, cheaper, and much more efficient method of edge-decorating sheet edges of books, cards or the like. By using this new and novel apparatus, a highly polished decorated surface may be formed on the edges of book sheets, playing cards or the like without the need of a further burnishing operation.

While this invention has been described in its preferred embodiment, it is to be understood that the words that have been used are words of description rather than of limitation, and that changes within the purview of the appended claims may be made without departing from the true scope and spirit of the invention.

What is claimed is:

1. A sheet edge decorating device comprising: clamping means having an axis about which it rotates, and adapted to hold a plurality of sheets in side-by-side relation with the respective edges thereof in the same plane whereby to provide a plurality of surfaces made up of sheet edges; means normally urging said clamping means together; means adapted to rotate said clamping means on its axis; a heating roller; means adapted to position a carrier-backed decorative strip, having a heat activated adhesive incorporated therewith, between said surfaces and said heating roller and maintain said strip continuously in contact with said heating roller and said surfaces successively as said clamping means rotates on its axis; said heating roller contacting said decorative strip at the place of its contact with said surfaces as said clamping means rotates; said heating roller being rotated solely by virtue of the rotation of said clamping means and the consequent movement of said decorative strip.

2. The structure set forth in claim 1 in which the means normally urging said clamping means together is a resilient means.

3. The structure set forth in claim 1, in which the means normally urging said clamping means together, is a fluid actuated piston.

4. The structure set forth in claim 1 in which the means normally urging said clamping means together is an air actuated piston.

5. The structure set forth in claim 1, wherein said means adapted to position said carrier-backed decorative strip includes means adapted to maintain said carrier-backed decorative strip under tension.

6. The structure set forth in claim 5, wherein a separate roller is provided to maintain said carrier-backed decorative strip under tension, said separate roller being rotated by said heating roller.

7. A sheet edge decorating device comprising: two clamping jaws having a common axis about which they rotate, and adapted to hold therebetween a plurality of sheets in side-by-side relation with the respective edges thereof in the same plane whereby to provide a plurality of surfaces made up of sheet edges; means adapted to urge said jaws together; means adapted to rotate said jaws on their axis; a heating roller; means adapted to position a carrier-backed decorative strip, having a heat activated adhesive incorporated therewith, between said surfaces and said heating roller, and maintain said strip continuously in contact with said heating roller and said surfaces successively, as said clamping jaws rotate on their axis; said heating roller contacting said decorative strip at the place of its contact with said surfaces as said clamping jaws rotate; said heating roller being rotated solely by virtue of the rotation of said clamping jaws and the consequent movement of said decorative strip.

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