

April 20, 1971

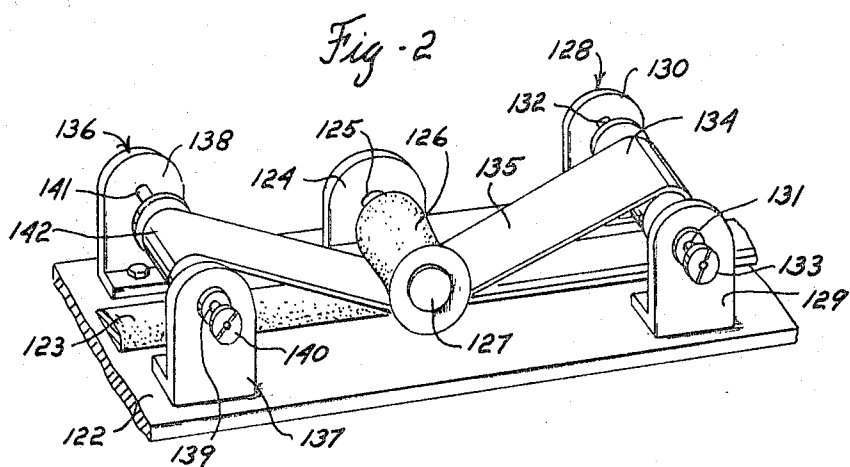
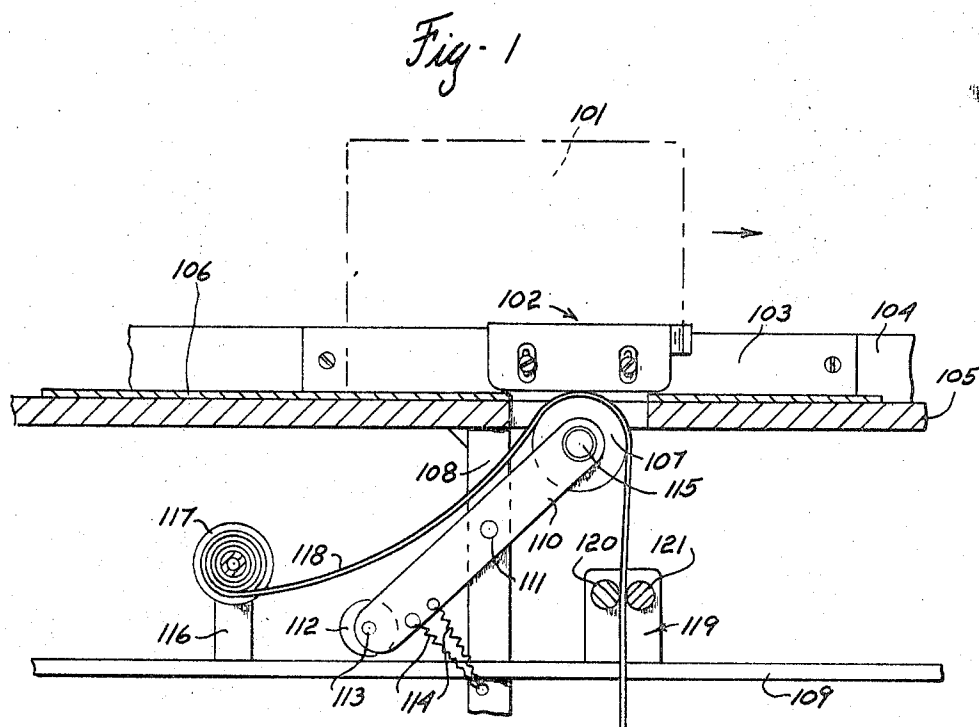
R. T. BILLINGS

3,575,772

GILDING MACHINE

Filed March 3, 1966

4 Sheets-Sheet 1



INVENTOR.

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GILDING MACHINE

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4 Sheets-Sheet 2

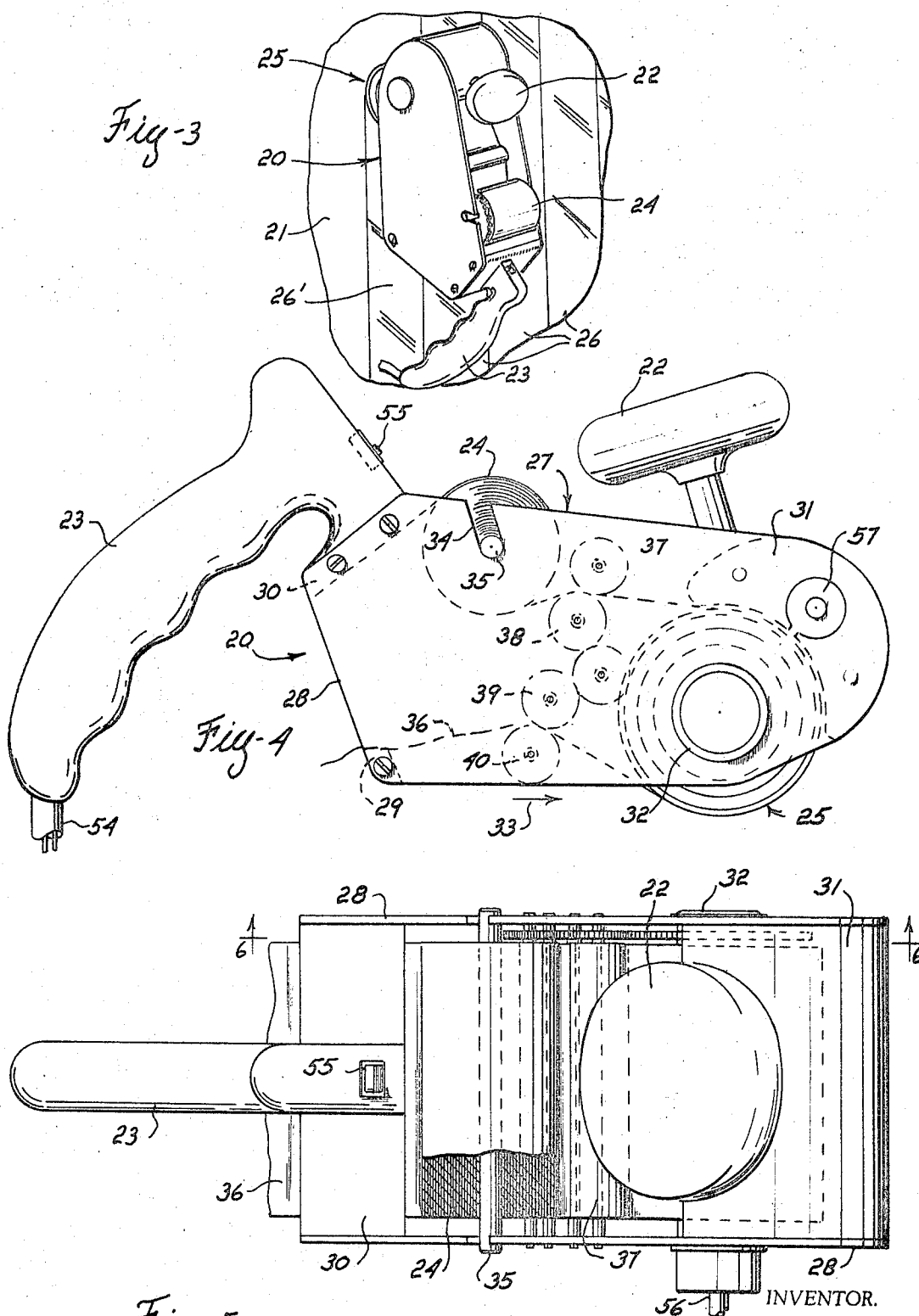


Fig. 5

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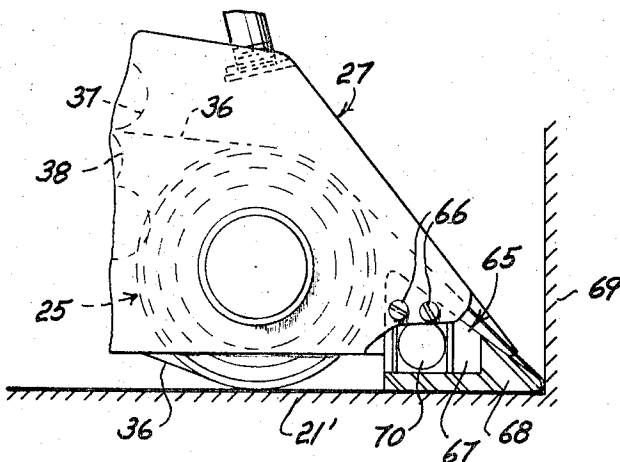
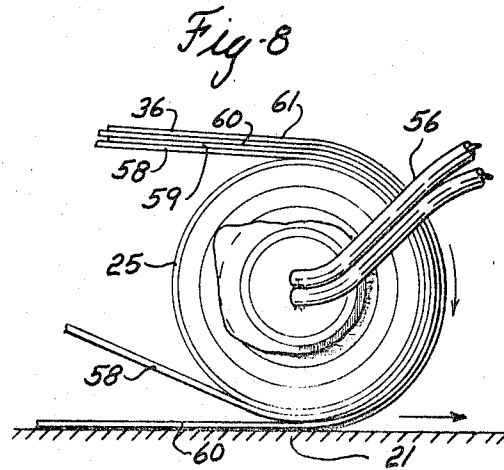
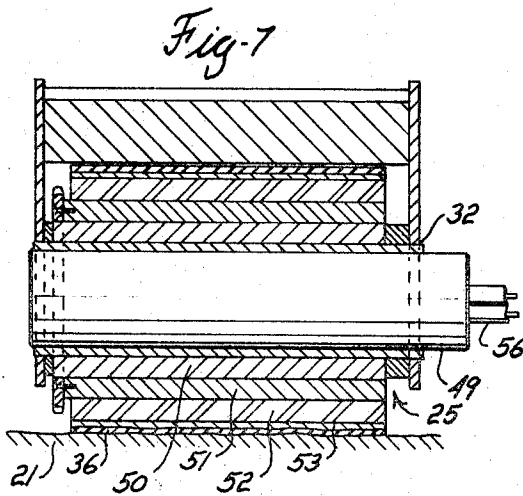
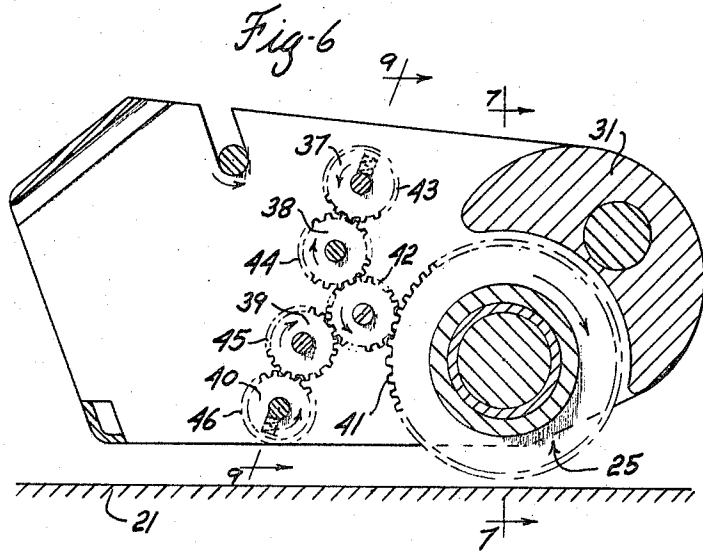
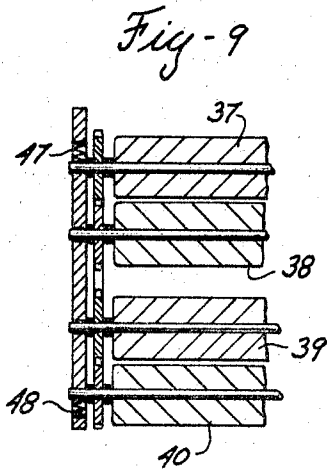
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4 Sheets-Sheet 3



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GILDING MACHINE

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4 Sheets-Sheet 4

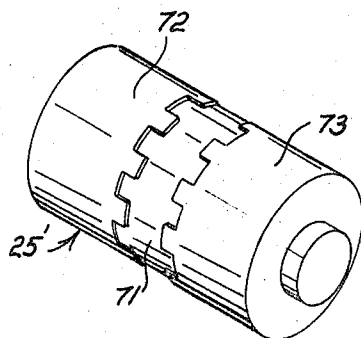


Fig. 11

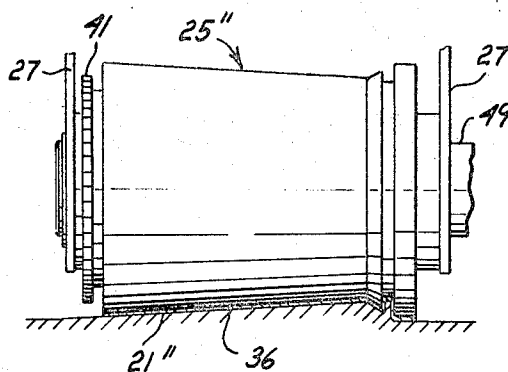


Fig. 12

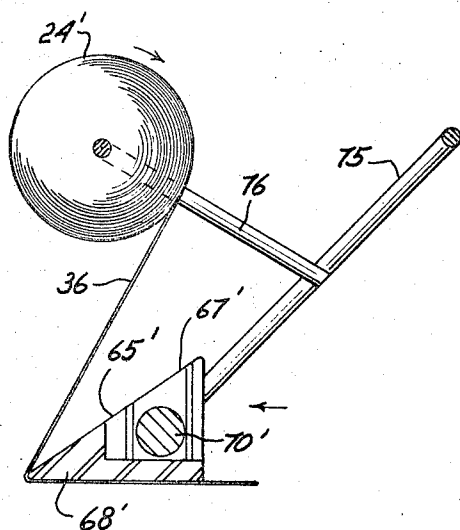


Fig. 13

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3,575,772

GILDING MACHINE

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Continuation-in-part of application Ser. No. 280,035,
May 13, 1963. This application Mar. 3, 1966, Ser.
No. 531,469

Int. Cl. B44c 1/16, 1/24; C23c 17/00

U.S. Cl. 156—540

9 Claims

ABSTRACT OF THE DISCLOSURE

A hand held machine and method of operation for applying a heat releasable coating to the surface of an article from a coating carrying film comprising a frame and an application roller mounted for rotation on said frame and having a heat conducting surface. The roller has a supplying station, a transfer station and a take-away station on the roller. Means are provided for raising the temperature of the heat conducting surface to the coating releasing level and for supplying the coating carrying film to the roller at the supplying station for advancement through the transfer station and take-away station. Take-away means are mounted on the frame for drivingly engaging the film and drawing the film away from the application roller after the heat release and transfer of the coating to the article's surface.

This application is a continuation-in-part of the copending application of Morgan & Billings entitled "Coating Apparatus and Method," Ser. No. 112,065, filed May 23, 1961, now U.S. Pat. No. 3,252,847. This application is also a continuation-in-part of the copending application of Raymond T. Billings entitled "Method and Apparatus for Coating Elongate Work," Ser. No. 280,035, filed May 13, 1963, now U.S. Pat. No. 3,433,698.

This invention relates to a machine for applying gilding to articles, and is especially concerned with a machine for this purpose which is hand held. Machines constructed in accordance with the invention are quite compact and conveniently manipulated, and thus can apply gilding to articles which are much larger than the machine itself. For example, a machine of the invention which is approximately the size of a carpenter's plane can be used to apply gilding to a room wall if desired.

While many of the features of the present invention are especially applicable to a hand held gilding machine, many are applicable to other types of gilding machines, including larger machines arranged for automatic or semi-automatic operation.

The type of gilding with which the machines of the invention are most useful is that which is carried on a heat releasable film. Such heat releasable films have been known for a considerable time in the art of hot stamping titles and decorations on book covers. While such films will be described in more detail later herein it can be pointed out here that they consist generally of a plastic film or sheet to which has been bonded a thin layer of the gilding material, such as, for example, gold foil. The foil is bonded to the film by a heat releasable adhesive agent, such as wax. With such an adhesive, the bond between the carrier film and the gilding material of foil is destroyed when heat is applied to the foil, and the gilding material can thus be separated from the carrier film. On the surface of the gilding material facing away from the carrier film there is an adhesive, commonly called a sizing, by means of which the gilding material can be secured to the surface to which it is to be applied. The sizing is activated to perform its adhesive function by means of heat and pressure. The activation of the sizing

2

is also dependant upon the time during which heat and pressure are applied, sometimes called the "dwell" time. The particular type of sizing employed in a given situation depends on the type of surface to which the gilding is being applied, since different sizings have varying bonding properties to different surfaces.

The application of gilding to articles has presented problems which are overcome by my invention, and which have heretofore retarded the use of gilding. To the extent that gilding has been used at all, it has usually been applied to articles in the form of gold leaf. Efforts to utilize heat releasable films, which have found some use in a hot stamping of titles, etc., on books, have proved generally unsuccessful when the goal is to apply the gilding over relatively large areas. One of the most serious problems arises from the fact that almost any surface to which the gilding is to be applied has minute irregularities thereon which make it difficult to obtain uniform secure adhesion of the gilding to the surface. Another related problem which has been encountered is that of accurately positioning the carrier film on the article to be gilded and securely holding it there prior to and during the application of heat and pressure to release the gilding from the film. Thus, in prior techniques the film has sometimes been placed on the surface of the article to be gilded by hand, after which a separate tool such as a roller or surface plate is moved across the film to apply heat and pressure to effect releasing of the gilding and its adhesion to the surface. However, the hand manipulation of the film often wrinkles or damages the gilding, and the movement of the heat and pressure tool across the surface often causes a "bow wave" to be created in the film adjacent the tool and also shifting and movement of the film on the surface. Another problem encountered involves the difficulty of obtaining uniform application of heat to the film to release the gilding, especially when a heat source external to the pressure tool is employed. The foregoing difficulties, and others, have severely limited the use of gilding for decorative purposes. To the extent that gilding has been used it has been necessary to employ relatively expensive gold leaf in most cases, rather than other gilding materials which are at the same time less expensive and more varied in the decorative effects they produce.

In accordance with the invention there is provided a machine which overcomes the foregoing problems, and others, and which is extremely effective in applying gilding to surfaces. The terms "gilding" and "coating" are used herein in a broad sense to refer to a large class of thin film-like decorative materials. Most of the discussion will refer to gold foil as an example, but it should be understood that foils of other metals, and coatings of other film-like materials can also be applied by use of the invention. Examples include aluminum foils both uncolored and colored by the use of pigments and dyes, plastic foils colored with pigments or dyes, foils of the precious metals, plastic foils carrying patterns such as wood grain colors and patterns, decals and similar materials.

While the embodiments of the invention discussed herein are machines designed for hand-held operation, it should be kept in mind that certain features of the invention can be effectively utilized in other types of machinery.

In constructing and operating a gilding machine in accordance with the invention I make use of a heated resiliently surfaced roller as the key coating applying element. This roller is utilized both for applying heat and pressure to effect release of the gilding from the carrier film and adhesion to the surface, and for positioning the carrier film on the surface in preparation for the

coating application step itself. I also provide feed and removal equipment which cooperates with the heat applying roller to assist in the accurate placement and disposal of the carrier film.

In certain embodiments of my invention there are provided other forms of heat and pressure applying elements for certain special purposes. Furthermore, in accordance with the invention specially configured rollers are provided to obtain desired decorative effects and to shape and apply film to a contoured surface.

It is an object of the present invention to provide a machine for applying decorative films to surfaces which may be much larger than the machine.

It is an object of the invention to provide a machine for applying decorative films to raised or embossed surfaces, that is, to surfaces which project above the main surface of an article in a preselected pattern.

Another object of the invention is the provision of a hand-held gilding machine which can be easily operated by persons with limited skills and which reliably applies coatings to surfaces.

A further object of the invention is the provision of a hand-held gilding machine which is especially adapted to apply gilding in confined spaces, such as the inside corner of a structure.

Still another object of the invention is the provision of a gilding machine having specially configured rollers for obtaining special decorative effects and for gilding non-planar surfaces.

The above objects and purposes together with other objects and purposes may be more readily understood by a consideration of the detailed description which follows, together with the accompanying drawings in which:

FIG. 1 is a partial sectional view of an apparatus embodying certain features of the invention as applied to a machine for gilding the edges of books, this figure being the same as figure 3 of U.S. Pat. No. 3,252,847;

FIG. 2 is a partial top perspective view of an apparatus embodying certain features of the invention, which is especially adapted for coating elongate work, the view being the same as figure 4 of application Ser. No. 280,035, now U.S. Pat. No. 3,433,698;

FIG. 3 is a perspective view of a hand-held gilding machine which is shown applying gilding to a vertical surface, such as a wall or the side of a cabinet;

FIG. 4 is a side elevational view of a hand-held gilding machine of the kind shown in FIG. 3;

FIG. 5 is a plan view of the hand gilding machine of FIG. 4;

FIG. 6 is a fragmentary elevational view taken on the line 6—6 of FIG. 5, with some parts omitted for the sake of simplicity, and showing the construction of carrier film feeding and disposal equipment as well as other features of the invention.

FIG. 7 is a sectional view taken on the line 7—7 of FIG. 6, showing the construction of the resiliently surfaced heat and pressure applying roller;

FIG. 8 is a side elevational view of the roller of FIG. 7 with a much enlarged carrier film being shown mounted on the roller;

FIG. 9 is a fragmentary sectional view taken on the line 9—9 of FIG. 6 showing carrier film feed and disposal equipment;

FIG. 10 is a fragmentary sectional elevational view showing a modification of the machine of FIG. 4 which is specially adapted for applying gilding in confined spaces;

FIG. 11 is an isometric view of a roller, of the general type as shown in the preceding figures, but which has a specially designed surface for obtaining a desired decorative effect in the gilding;

FIG. 12 is a fragmentary elevational view of another roller of the general kind shown in the preceding figures, but which has a specially contoured surface for use in applying gilding to a surface which is contoured; and

FIG. 13 is a sectional elevational view of another embodiment of the invention which is specially useful in the application of gilding in restricted areas.

Attention is first directed to FIG. 1 which shows a portion of the apparatus described more fully in above mentioned application Serial No. 112,065 now U.S. Patent No. 3,252,847. As explained in that application, the apparatus is particularly suited for applying gilding to the edge of books and like articles. As can be seen in FIG. 1, a book 101 is mounted in the apparatus for gilding in an operation in which the book 101 is moved from left to right as FIG. 1 is drawn, that is, in the direction of the arrow on the figure. The book 101 is carried in this movement by means of clamping part 102 which is carried on bar 103 which is in turn carried on side piece 104 of a movable carriage. The carriage is mounted for movement back and forth on a bed or table 105. The bed or table 105 has a surface plate 106 positioned beneath the path of travel for book 101. In the vicinity of coating roller 107 surface plate 106 is apertured so that the roller 107 can effect coating contact with book 101.

The table 105 is also provided with vertical support elements including that marked 108 and a subtable 109. Roller 107 is mounted on lever 110, which lever is pivoted by horizontal pivot 111 on support element 108 at a location spaced vertically between the bed 105 and the subtable 109. The lever extends obliquely and to the right toward the hole in surface plate 106. An adjustable eccentric cam is fixably adjustably carried by the lower end of lever 110 for limiting engagement with subtable 109. The cam 112 is adapted to be adjustably fixed in any desired position of angular rotation about the pivot 113. On the upper end of the lever 110 is carried before mentioned roll 107, which is rotatable about the generally horizontal, laterally extending axis, and has its upper region projecting upwardly through the hole in plate 106 and beyond the upper surface of the bed 105. Suitable resilient means or springs 114 may be connected between the lever 110 and the fixed support element 108 to urge the lever counter-clockwise to its limiting position with the cam 112 engaging the subtable 109. The roll 107 is freely rotatably supported on the lever by a hollow journal in which is received a heating element 115 which may be electrically energized.

Leftward of the lever 110 and in substantial alignment with the roll 107 longitudinally of carriage movement is an upstanding pedestal journal 116, which carries a supply roll or coil 117 of carrier sheet material 118. The sheet or strip 118 extends from the coil 117 rightward over the roll 107 and depends therefrom through a withdrawal mechanism 119. The withdrawal mechanism 119 includes a pair of rolls 120 and 121 arranged to engage the carrier sheet or strip 118 in a manner just sufficient to smoothly distend the latter, but insufficient to draw the carrier sheet over the roll 107 and unwind the coil 117.

The freely rotatable roll 107 is journaled on a hollow bushing which carries heater 115 inside it so that the heater transmits heat through the latter to the roll. The roll may be of silicone type rubber for heat resistance.

The operation of the apparatus shown in FIG. 1 is as follows: Upon rightward movement of the carriage 12 the book 101 contacts the roll 107 depressing the latter out of path of movement of the book by swinging the lever 110 clockwise against the action of resilient means 114. The roll 107 is thus depressed and axially rotated by movement of the book with the carriage. The carrier sheet 118 may be of any suitable flexible material, such as Mylar, and releasably carries on one face a film or coating of any desired material, such as gold. The releasable coated face of carrier sheet 118 is upward as the carrier sheet passes over the roll 107. Hence, the lower edge of book 101 frictionally engages the releasable coated upper surface of carrier sheet 118 to effect movement of the carrier sheet with the book at the tangential

region of contact, and rotation or rolling of the roll 107 along the lower edge of the book. This feeds the carrier sheet 118 just sufficiently to apply a precisely accurate quantity of gold or other coating to the nether edge of the book 101. That is, by the rolling action of roll 107 as effected by rightward horizontal movement of book 101, the carrier sheet 118 is unwound from its supply coil 117; and further, by the pressure of roll 107 toward the book and the application of heat through the roll to the carrier sheet, the coating of the carrier sheet is released from the latter and applied to the book. In order to insure smooth and even application of coating to the book edge, the carrier sheet is maintained smooth at all times by the slight frictional withdrawing action of the withdrawal rolls 120 and 121. As noted hereinbefore, the withdrawal rolls 120 and 121 do not withdraw the carrier sheet 118 in the absence of a book moving tangentially of the roll 107, but during such book movement insure proper separation and release of the carrier sheet from its previously applied coating.

The apparatus of FIG. 2 is especially adapted for coating elongated work, such as parts of a picture frame. It includes a support in the form of a generally horizontal plate 122 across which a workpiece 123 is longitudinally moved for coating purposes. Drive means which are not shown on FIG. 2 are provided for moving the workpiece 123 across the bedplate 122. A coating station is mounted on the bedplate. The coating station may include an upstanding journal bracket or pedestal 124 mounted on the upper side of the bedplate 122 offset rearwardly from the center line thereof so as to be adjacent to the rear side of the bedplate. The pedestal journal 124 may be suitably affixed to the bedplate 122, as by welding or other appropriate means, and may rotatably support a hollow shaft 125 extending generally forwardly from the pedestal normal to the longitudinal axis of the bedplate in an overhanging relation spaced above a laterally medial region of the bedplate. The shaft 125 may be axially rotatable and carry on its forward end a pressure roll 126 of specific configuration for conforming rolling engagement with a workpiece, as at 123, moving longitudinally along the bed 122 between the upper side of the bedplate 122 and the pressure roll. Thus, the pressure roll 126 is mounted for rotation about a generally horizontal axis extending generally normal to and spaced over the bedplate 122. The pressure roll 126, or the outer surface thereof, may advantageously be fabricated of material having suitable heat-transmission and resilient characteristics, such as silicone rubber; and, suitable heating means such as an internal heating means such as an internal heater 127 may be located interiorly of the pressure roll and energized by electricity via conductors passing interiorly of the shaft 125. The pressure roll 126 is thereby adapted to apply pressure and heat to the workpiece or molding 123 beneath the roll, as will appear hereinafter in greater detail.

Located ahead or forward of the pressure roll, there is provided a supply station 128 arranged laterally across the upper side of the bedplate 122. More particularly, the supply station 128 may include a pair of laterally spaced, upstanding journal brackets or pedestals 129 and 130 respectively adjacent to the forward and rearward sides of the bedplate 122. The spaced journal pedestals 129 and 130 may be suitably secured to the bedplate in any desired manner.

Extending through the pedestals 129 and 130, respectively, are pivot elements or threaded pins 131 and 132, such pins being in horizontal, end-to-end spaced alignment with each other generally normal to the longitudinal direction of the bedplate 122. The pins 131 and 132 may be respectively threadably engaged in the brackets or pedestals 129 and 131, being respectively provided with lock-nuts such as 133 retaining the pins in a selected position of adjustment relative to their respective brackets.

Journalled between the adjacent ends of the pins 131

and 132 is a supply spool or roll 134 having coiled thereabout a flexible strip of carrier material 135 provided with a transferable coating, say of gold. The supply spool 134 may be adjusted, removed and replaced by appropriate manipulation of the pins 131 and 132, and in operation is journaled for axial rotation about the aligned axis of the pins.

Rearward or behind the coating behind the coating station 124, there is provided on the bedplate 122 a takeup station 136. The takeup station 136 may include a pair of laterally spaced, facing pedestal brackets or journals 137 and 138, respectively adjacent to the front and rear sides of the bedplate 122 and suitably secured thereto. The forward bracket or pedestal 137 may be provided with a threaded pin 139 extending horizontally in threaded relation through the bracket generally normal to the longitudinal direction of the bedplate 122 and spaced thereabove. A locking nut 140 may be carried by the pin 139 for engagement with the bracket 137 to hold the pin in a selected position of its threaded adjustment relative to the bracket.

In axial alignment with the pin 139, and rotatably carried by the pedestal 138 adjacent to the rear side of the bedplate 122 is a shaft 141. The shaft 141 may project rearward beyond the bedplate 122 and there be provided with a transmission wheel or pulley.

Power drive means, which are not shown, are provided effecting movement of the workpiece across bedplate 122 and for operating takeup spool 142 at a rate sufficient to take up the spent carrier film as it is consumed.

In operation the work 123 is fed along the upper side of the bedplate 122 through the coating station 124, that is work 123 passes through the coating station 124 between the underside of the pressure roll 126 and the bedplate 122; and, simultaneously the web 135 is drawn from the supply 134 to the take-up spool 142 between the upper surface of the work 123 and the underside of the pressure roll 126. It is preferred that the web 135, work 123 and surface of pressure roll 126 all have substantially the same linear velocity to effect transfer of coating material from the underside of the web 135 to the upper surface of the work 123 with a minimum of relative movement or slippage. In this manner pressure may be effected by substantially pure pressure and heat. The particular mechanism of the transfer may be conventional, such as is presently employed in hot stamping of gold.

Thus, it will now be appreciated that the pressure roll 126 is in a rolling relation with respect to the work 123. Also, the specific configuration of the pressure roll is such as to conform to the upper surface of the work and thereby flex the web 135 into conforming engagement with the work. Of course, if full conforming engagement is not desired, say to a coat only a portion of the upper work surface, the roll may be appropriately configured. Thus substantially nonslip engagement of the work with the web 135 is obtained while the web is deflected by the roll into the desired conforming relation with the work.

Attention is next directed to FIG. 3 which shows a hand gilding machine 20 constructed in accordance with the invention. The machine 20 is being held against a wall 21 by the hands of an operator, which hands are omitted in FIG. 3 for the sake of simplicity. The operator holds the machine and moves it against the wall 21 by means of forward handle 22 and back handle 23. The machine carries a supply roll 24 of coating carrying film, which film carries the gilding for application to the wall by means of roller 25. As can be seen from FIG. 3 a number of strips of gilding have been applied to the wall, and a strip of gilding 26' is in the process of being applied.

As can be seen in FIGS. 4 and 5, the gilding machine of this embodiment of the invention has a frame 27 consisting of side plates 28 which are held apart in generally parallel relation by means of spacers 29 and 30 at the back of the frame and by heat sink 31 at the front of

the frame. The rear handle 23 is attached to spacer 30 of the frame, while in the embodiment of FIGS. 2 and 3 the front handle 22 is attached to heat sink 31.

Roller 25 is mounted on the frame by means of hollow shaft 32 which is journaled through side plates 28 of the frame. Thus, the roller 25 will rotate in the frame 27 when the machine is held in contact with the surface and pushed to the right as indicated by the arrow 33 in FIG. 4.

The path of gilding carrying film through the machine can be understood from FIG. 4. On the upper part of frame 27 is a slot 34 which serves as a mounting means for the supply roll 24. A shaft 35 is seated in slot 34 and the supply roll 24 is mounted thereon. The coating carrying film 36 passes from the supply roller through a pair of film feeding rollers 37 and 38 which are mounted for rotation on frame 27 in front of the supply roll 24. After passing through the feeding rolls, the film 36 is led around the outer surface of the coating application roller 25, starting near the top of the roller and proceeding in a clockwise direction, as in FIG. 4, is drawn around to the bottom of the roller 25. From the bottom of the roller, the film 36 is then led through takeaway or disposal rollers 39 and 40 which are mounted for rotation on the frame 27 between the feeding rollers, and behind the application roller 25. The spent film after passing through the take-away rollers is fed out through the back of frame 27.

As can thus be seen in FIGS. 6 and 9, the application roller 25 and the feed rollers 37, 38 and the take-away rollers 39 and 40 are drivably interconnected. The feed roller 25, at one end thereof is provided with a gear 41 which rotates as the application roller 25 rotates. Gear 41 drives a connecting gear 42. The feed rollers 37 and 38 are also provided with gears at one end thereof, the gear for roller 37 being marked 43 and the gear for roller 38 being marked 44 on FIGS. 4 and 7. Gears 43 and 44 are in meshing relationship, and gear 44 meshes with connecting gear 42. In this way a drive train is established between application roller 25 and the feeding rollers 37 and 38. As application roller 25 rotates clockwise, as FIG. 6 is drawn, connecting gear 42 is driven counterclockwise. It drives gear 44 and roller 38 clockwise, and gear 44 drives gear 43 and roller 37 counterclockwise. Thus, a force is created on the portion of the film passing through the nip of feeding rollers 37 and 38 tending to urge the film to the right in FIG. 6 toward the top of application roller 25. The sizes of the application roller and the feed rollers, and the gear train interconnecting them are adjusted so that the circumferential speed of the application roller 25 and the feed rollers 37 and 38 is the same. In this way there will be no tendency for the coating carrying film 36 to stretch or wrinkle in the region between the feeding rollers and the application rollers, and film will be fed to the application roller 25 at the same rate as the application roller applied it against the surface being decorated, which surface is indicated at 21 in FIG. 6.

In some instances it may be desirable to omit the feed rollers 37, 38 and rely on the action of the application roller 25 and the take-away rollers 39 and 40 along to move the film through the unit. In such an arrangement, the feed rollers 37, 38 may be replaced by a simple guide bar in approximately the same position as the rollers. Furthermore, in such an arrangement the supply roller shaft 34 may advantageously be spring biased to yieldingly resist rotation, thereby aiding the uniformity of feed of the film and eliminating any serious tendency to wrinkle during feed.

The take-away or disposal rollers 39 and 40 are also drivably connected to the application roller 25. This is accomplished by means of gear 41 on the application roller 25 and connecting gear 42, which as explained above meshes with gear 41. Take-away roller 39 is provided at one end with gear 45 which meshes with connecting gear 42. Similarly take-away roller 40 is provided with a gear 46 meshing with gear 45. Thus, the drive train between application roller 25 and the take-away rollers 39 and 40

operates through gear 41 meshing with gear 42, gear 42 meshing with gear 45 and gear 45 meshing with gear 46. Upon clockwise rotation of roller 25, the top take-away roller 39 is driven in a clockwise direction and the take-away roller 40 in a counterclockwise direction. Thus a driving force is exerted on the section of the film 36 passing through the nip of the take-away rollers urging the film toward the left as FIG. 6 is drawn. Once again the roller and gear sizes are selected so that the circumferential speeds of the take-away rollers and the application roller is the same. The spent film 36 therefore will be drawn away from the application roller and the surface 21 to which gilding is applied at the same rate as fresh film is applied to the surface for gilding purposes.

As is shown most clearly in FIG. 9, the top feed roller 37, and the bottom take-away roller 40 are spring biased by means of mounting springs 47 and 48 respectively toward the inner rollers 38 and 39. In this way adequate gripping force is applied to the film passing through the nips of the feed and take-away rollers and at the same time threading of the film for loading purposes is facilitated.

The structure of the application roller can be understood from FIGS. 4, 7, and 8. As mentioned above, roller 25 is mounted for rotation on shaft 32. Shaft 32 is hollow and has mounted within it an electrical heating element 49 which preferably does not rotate. Roller 25 further consists of an inner bushing 50, an outer bushing 51 preferably of steel or some other suitable metal, and core 52 of resilient heat conducting material such as silicone rubber, and if desired an outer resilient heat conducting surface 53, which may be of a different material such as another formulation of silicone rubber. At this point it should be noted that instead of relying on internal heater 49 for heating the roller, it is possible to utilize the resilient surface itself as a heating element. In such an arrangement the core of silicone rubber 52 is of a formulation which is electrically non-conducting, while the outer surface 53 of silicone rubber is made from a formulation which conducts electricity. Electrical energy is supplied to the outer surface for heating purposes by means of brushes mounted at the end of the roller in contact with the outer surface 53.

FIG. 7 also illustrates an important advantage provided by the present invention. In FIG. 7 surface 21 to which the gilding is being applied is shown as having a somewhat irregular surface. Substantially all surfaces to which it is desired to apply gilding will have at least minute irregularities and although the irregularities are somewhat exaggerated in FIG. 7, some surfaces have considerable irregularities. The coating carrying film 36 is shown in FIG. 7 in cross-section at 36. As can be seen from that figure, the resiliently surfaced roller 25 accommodates to the slight irregularities in surface 21 and tightly presses film 36 against surface 21 at all points. Therefore, adhesion of the gilding to the surface 21 will be obtained at all points.

Attention is directed once again to FIGS. 4 and 5 where it can be seen that the handles 22 and 23 are shaped so that the machine can be conveniently held by the user. The configuration of the handles is such that the user can hold the machine against the surface being gilded and press it against such surface with considerable force. The user at the same time can easily move the machine toward the right as FIG. 4 is drawn thus rotating roller 25 and applying the gilding to the surface.

An electrical cord 54 is fitted to the bottom of handle 23, and a switch 55 for turning the power on and off is provided at the top of the handle. An electrical line, which is not shown for the sake of simplicity, runs from switch 55 to the heater 49, passing through portions of the frame 27 which are not occupied by other equipment. A short section of the electrical line just mentioned appears at 56 in FIGS. 5, 7, and 8.

The heat sink 31 mentioned earlier is positioned at the front of the frame and has a concave lower surface fitting

fairly closely around roller 25, but spaced therefrom so that the heat sink 31 does not interfere with rotation of the roller. The heat sink has two principal functions; one is to provide a degree of thermal inertia and thus to facilitate heating of the roller 25 by means of heater 49. The heat sink also carries within it an electrical thermostat 57 shown in FIG. 4 which can be conveniently electrically interposed between switch 55 and heater 49 for regulating the temperature on the application roller.

Attention is now directed to FIG. 8 from which an understanding of the mode of operation of the equipment of the invention can be understood. As a user pushes the machine across the surface to be gilded (21) application roller 25 rotates in a clockwise direction. The coating carrying film as a result of this rotation moves around the application roller 25 and into contact with surface 21. In a manner of speaking, the heat releasable film 36 is "laid down" upon the surface by the rotation of roller 25. The structure of film 36 is shown in detail in FIG. 8, as mentioned before on a much enlarged scale. The film 36 consists of a plastic carrying film 58 on one surface of which is a thin layer of heat releasable adhesive 59, such as wax. The next layer of the film is the gilding material itself, which is designated as 60. The gilding material is held on the plastic film 58 by means of the wax 59. On the surface of the gilding material 60 facing away from film 58 is a layer of sizing 61. (It should be noted that in some type of films no separate gilding material is employed. Instead, decorative pigment is mixed with the sizing and it is the mixture of pigment and sizing which is applied to the surface.)

As the film 36 passes around roller 25 toward surface 21 it is heated and the layer of wax or other adhesive 59 melts. Thus, the bond between the carrier film 58 and the gilding 60 is destroyed. In addition as the film heats up the sizing 61 becomes activated or tacky. As the film 36 comes in contact with the surface 21, and is pressed against that surface by the roller 25, the heat and pressure cause the tacky sizing to bond the gilding 60 to the surface 21. At the same time, the bond between the film 58 and the gilding 60 having been dissipated, the film 58 is separated from the gilding 60 and is drawn away from it by the take-away rollers 39 and 40.

With a machine such as that shown in FIGS. 3 through 9, it may be difficult under some circumstances to apply gilding to a surface in a restricted area, such as the portion of the surface near an internal corner. The modification shown in the embodiment of FIG. 10 overcomes such difficulty. The machine in FIG. 10 includes substantially all of the parts shown in the full views of FIGS. 4 and 5, together with additional parts. The shape of the side plates 27 is changed somewhat so that these plates extend forwardly and downwardly further. At the lower forward extremity of the side plates 27 there is mounted a wedge shaped presser block 65. It is held in position on the frame by means of screws 66. The presser block 65 has a metal core 67, and a silicone rubber outer surface 68 which extends at least along the bottom and front of the block 65. When it is desired to apply a film on a surface such as 21' adjacent an internal corner such as that formed by surface 69, the coating carrying film 36 is threaded through the machine in the following manner. It passes from feed rollers 37 and 38 over the top of application roller 25, thence around the front of wedge shaped pusher block 65, backwardly across the bottom of the block and end application roll 25 and finally to the take-away rollers 39 and 40. The machine is then pushed into the internal corner or other restricted space with pressure applied to the surface 21' both through roller 25 and presser block 65. In this way the gilding is transferred to surface 21' even up into the corner region.

It should be noted that pusher block 65 is provided with an internally disposed heating element 70 and that the heat sink used in the machine of FIG. 4 is omitted to make threading easier. It should also be pointed out that

pressure block 65 can be removed from the machine when its use is not required.

In some cases it may be desired to apply the gilding to the surface in a pattern in order to obtain such decorative effects. Such effects may include gilded lettering or other patterns. This can be accomplished in accordance with the invention by embossing the roller 25 or by cutting away portions of its surface. Since the gilding material has very little tensile strength only that portion of the gilding material which is subjected to pressure by the roller when it is urged against the surface will be applied to the surface, and the remaining portion of the gilding carried on film 36 is separated and remains on the film. In FIG. 11 there is shown a roller 25' having a section 71 which is depressed compared to the major portion of the surface of the roller. When such a roller is used in a machine of the kind described hereinabove, only the gilding edges pressed against the surface by the outer sections of the roller 25 marked 72 and 73 will be applied to the surface. There will thus be an ungilded section having a regular shape between the two gilded sections.

On some occasions the surface to be gilded may have a surface which is contoured in one direction. If the profile of the surface to be gilded is uniform along one axis, gilding can readily be applied by a machine of the invention if it is modified by the provision of a resiliently surfaced heat conducting roller having the same profile as the surface. Such a roller is illustrated in FIG. 12. It can be seen from that figure that the contour of surface 21'' is complex and includes several cutouts. The roller 25'' has a surface with cutouts designed to match those of surface 21''. In other respects the machine of FIG. 12 is like that of FIG. 4, and the parts of the machine are given corresponding reference characters. The machine is moved along the surface 21 in the direction in which the surface has a uniform profile; with the roller fitted to the profile. The film 36 is pressed into the profiled surface and the gilding is thereby applied.

The modified embodiment of FIG. 13 provides a gilding machine which may be used alone, or in conjunction with the machine of FIG. 4 to obviate the necessity of modifying that machine in accordance with FIG. 8 each time a restricted area is to be gilded. The machine of FIG. 13 includes a wedge-shaped presser block 65', a handle 75 by means of which pressure can be applied against a surface and an arm 76 holding a supply roll 24'. In operation, the film 36 is fed from the supply roll 24' around an end presser block 65'. The presser block is pushed against and across the surface to be gilded thereby applying the gilding to that surface. The presser block 65' like the one described earlier has a silicone rubber portion 68', a metal core 67' and an internally disposed heater 70'.

I claim:

1. A hand-held machine for applying a heat releasable coating to the surface of an article from a coating carrying film comprising

a frame;

supply means mounted on said frame for delivering coating carrier film;

an application roller rotatably mounted in said frame, said roller having a resilient heat conducting surface thereon for receiving said film from said supply means near the top of said roller and for transferring said coating to the surface of the article at the bottom of said roller;

means mounted within said application roller for raising the temperature of said surface of said application roller to coating releasing level to release said coating from said film at a point intermediate the top and bottom of said roller; and

take-away means mounted on said frame adjacent said application roller for drivingly engaging said film after heat release and transfer of the coating to the

11

surface of the article to draw said film away from said application roller, said take away means including a roller mounted for rotation with said application roller at substantially the same linear speed upon rotation of said application roller for taking away said film.

2. A hand-held machine as set forth in claim 1 wherein said surface of said application roller is electrically conductive and said means for raising the temperature includes means internally of said application roller for passing an electric current through said surface.

3. Apparatus in accordance with claim 1 in which said temperature raising means comprises a heating element mounted internally of said roller, a heat sink mounted on said frame adjacent said application roller, and a thermostat mounted adjacent said heat sink.

4. Apparatus in accordance with claim 1 in which said take-away means comprises a pair of film take-away rollers mounted for rotation on said frame, and in which said machine further comprises a pair of film feeding rollers mounted for rotation on said frame between said supply roll mounting means and said application roller, said feed rollers being adapted to drivingly engage coating carrying film and feed it from said supply roll to said application roller, and drive means interconnected between said application roller, said feeding rollers, and said take-away roller for rotating all of said rollers at substantially the same linear speed upon rotation of said application roller.

5. Apparatus in accordance with claim 1 and further comprising roller mounting means adapted to hold said application roller in rolling area engagement with said article, handle means connected with said roller mounting means for pressing said roller into rolling area engagement with said article, and heating means internally of said roller for heating the surface thereof.

6. A hand-held machine for applying a heat releasable coating to the surface of an article from a coating carrying film comprising: a frame, an application roller mounted for rotation on said frame and having a heat conducting surface projecting partially below said frame for contact with the surface of said article, means for raising the temperature of said heat conducting surface to coating releasing level, supply means mounted on said frame adapted to deliver coating carrying film to said roller, take-away roller mounted for rotation on said frame behind said application roller for drivingly engaging said film after heat release of the coating thereon and transfer of the coating to the surface of said article and drawing said film away from said application roller; and

drive means interconnected between said application roller and said take away roller for rotating said rollers at substantially the same linear speed upon rotation of said application roller.

7. A hand-held machine for applying a heat releasable coating to the surface of an article from a coating carry-

12

ing film comprising: a frame, an application roller mounted for rotation on said frame and having a heat conducting surface means for raising the temperature of said heat conducting surface, a generally wedge shaped presser piece mounted on said frame in front of and substantially parallel to the axis of said roller in contact with said article and adapted to receive coating carrying film from said roller for advancement around said presser piece said presser piece having a heat conducting surface and a heating element for raising the temperature of said heat conducting presser surface to coating releasing level to thereby transfer said coating to the surface of said article, supply means mounted on said frame adapted to deliver coating carrying film to said roller, and take away means mounted on said frame adjacent said application roller for drivingly engaging said film after heat release of the coating thereon and transfer of the coating to the surface of said article and drawing said film away from said presser piece.

8. A hand-held apparatus for applying a heat releasable coating to the surface of an article from a coating supplying a film comprising a frame, a generally wedged shape application element mounted at one end of said frame, said element having a metal core, a heat conducting surface disposed about said metal core and heating means mounted internally of said core for transferring heat to said surface, and supply means mounted on said frame for supplying coating carrying film between the surface of said application element and the surface of said article to thereby supply said coating to said article.

9. A hand-held apparatus for applying a heat releasable coating to the surface of an article from a coating supplying film comprising a frame, a generally wedged shape application element mounted at one end of said frame, said element having a heat conducting surface and heating means mounted internally of said element, and supply means mounted on said frame for supplying coating carrying film between the surface of said application element and the surface of said article to thereby apply said coating to said article.

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HAROLD ANSHER, Primary Examiner

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55 156—233, 579, 583

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,575,772 Dated April 20, 1971

Inventor(s) R. T. Billings

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Col. 4, line 19 insert the word --immediately-- after
the word "positioned".

Col. 7, line 24 "between" should be --below--.

Col. 9, line 44 "rolers" should be --rollers--.

Col. 10, line 10 "mtaerial" should be --material--.

Signed and sealed this 10th day of August 1971.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents