

[54] MACHINE FOR MAKING DEBOSSED  
DISPLAYS AND BLANK THEREFOR[75] Inventors: Charles H. Travis, Martinez; Harry  
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[21] Appl. No.: 347,440

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[51] Int. Cl. .... B41j 1/30

[58] Field of Search .... 197/6.0, 6.3-6.7,  
197/194, 187, 36, 53, 18; 101/111, 20, 27, 3  
R, 26, 28, 29, 30, 32; 346/104

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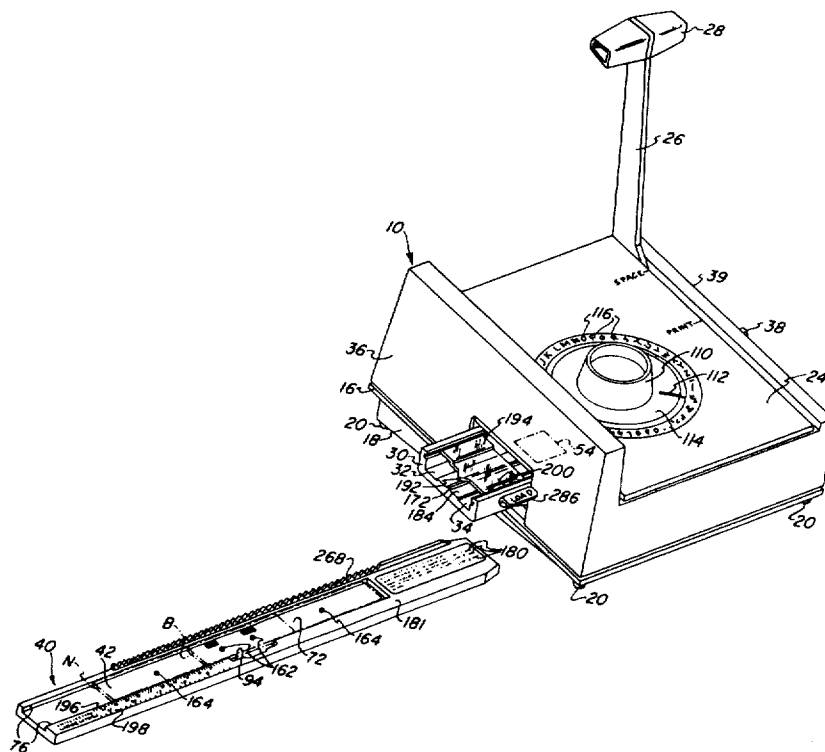
Primary Examiner—E. H. Eickholt

Attorney, Agent, or Firm—Samuelson &amp; Jacob

## [57] ABSTRACT

A machine for impressing a blank of predetermined dimensions with a series of consecutive debossed characters, the machine having debossing means at a debossing station, a guideway leading to the debossing station, a carrier engageable with the guideway for being carried to the debossing station, feed means for advancing the carrier along the guideway and means for receiving and retaining the blank in fixed relationship with the carrier so as to locate consecutive portions of the blank for debossing at the debossing station. A scale and an index enable centering of the series of characters along the blank. The debossing means include a plurality of character punches carried on slugs which can be indexed to place the desired character slug at the debossing station. The character slugs are removable and interchangeable, either as a group or individually. Each punch includes a character with a raised face and side flanks making an angle of about 12° with the direction of impression. The blank is an elongate body of synthetic resin material having registration recesses and relief grooves to minimize distortion from debossing.

17 Claims, 26 Drawing Figures



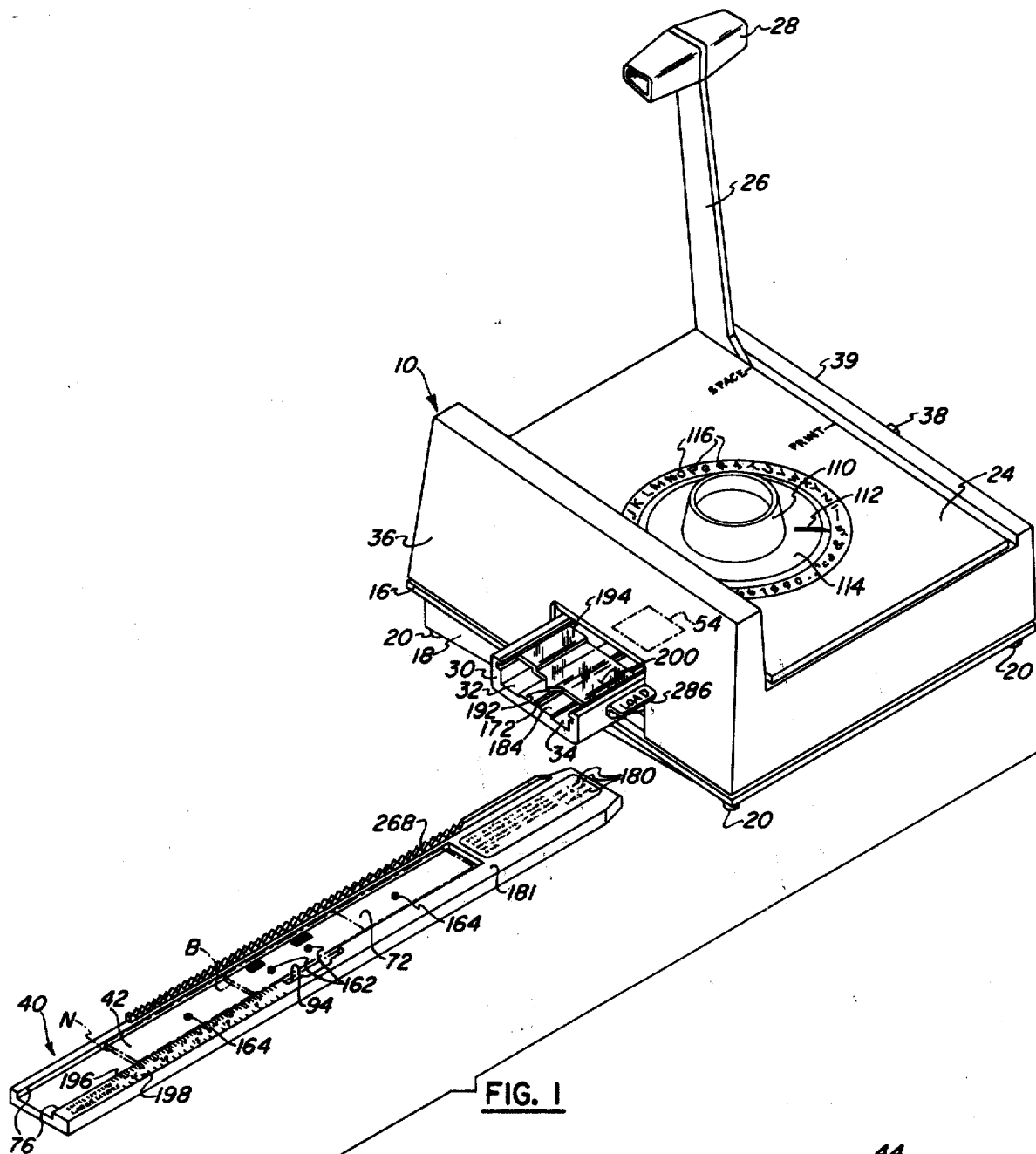


FIG. 1

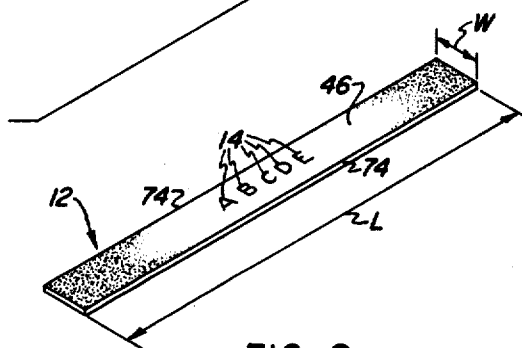


FIG. 2

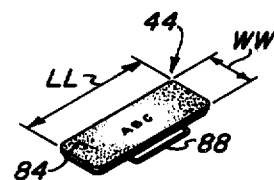


FIG. 3

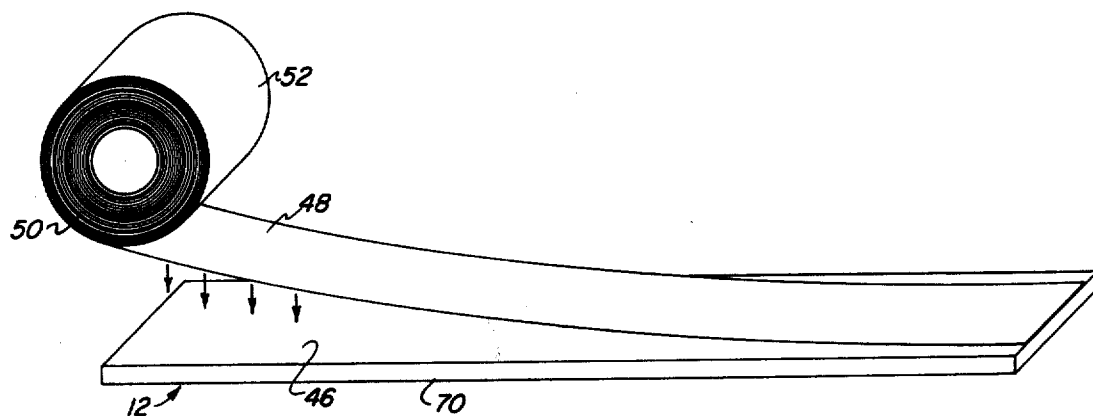


FIG. 4

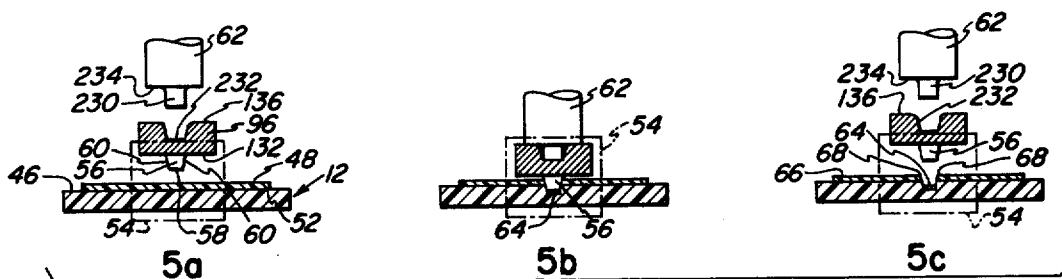


FIG. 5

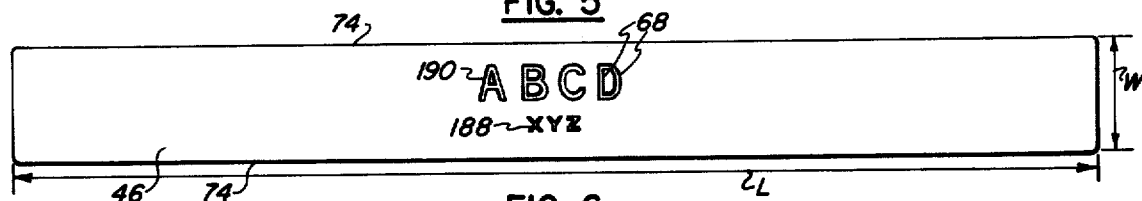


FIG. 6

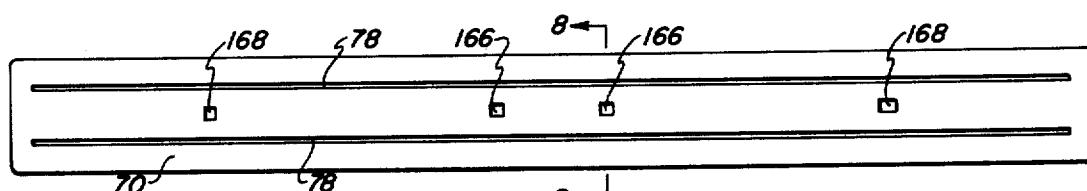


FIG. 7

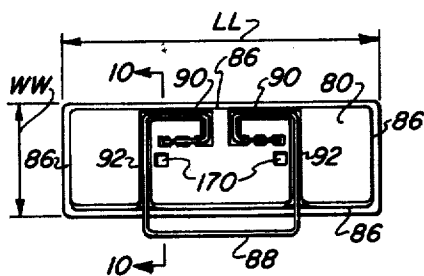


FIG. 9

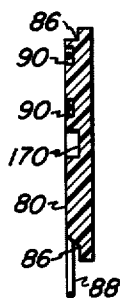


FIG. 10

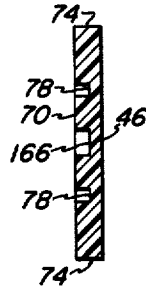


FIG. 8

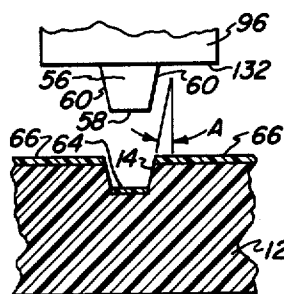
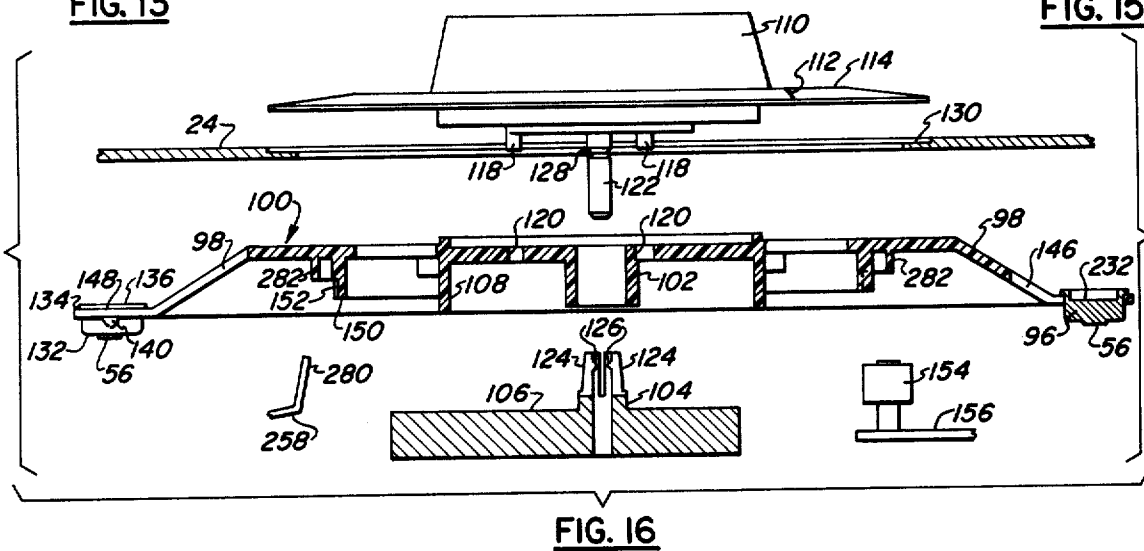
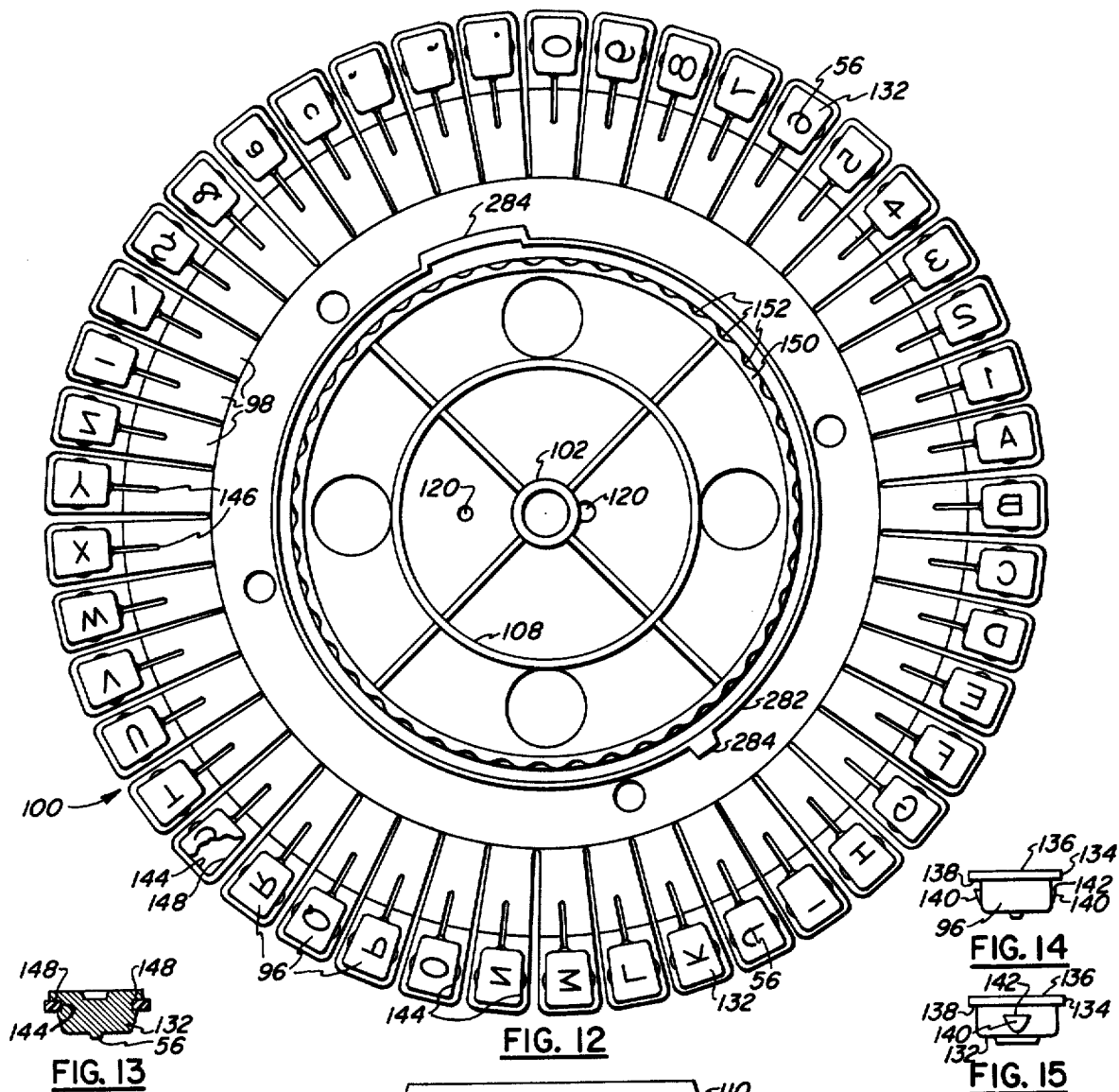
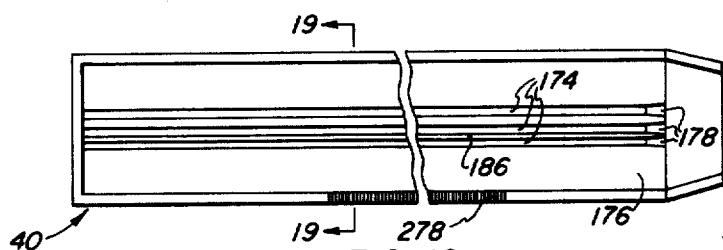
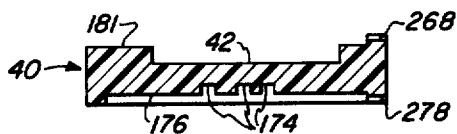


FIG. 11

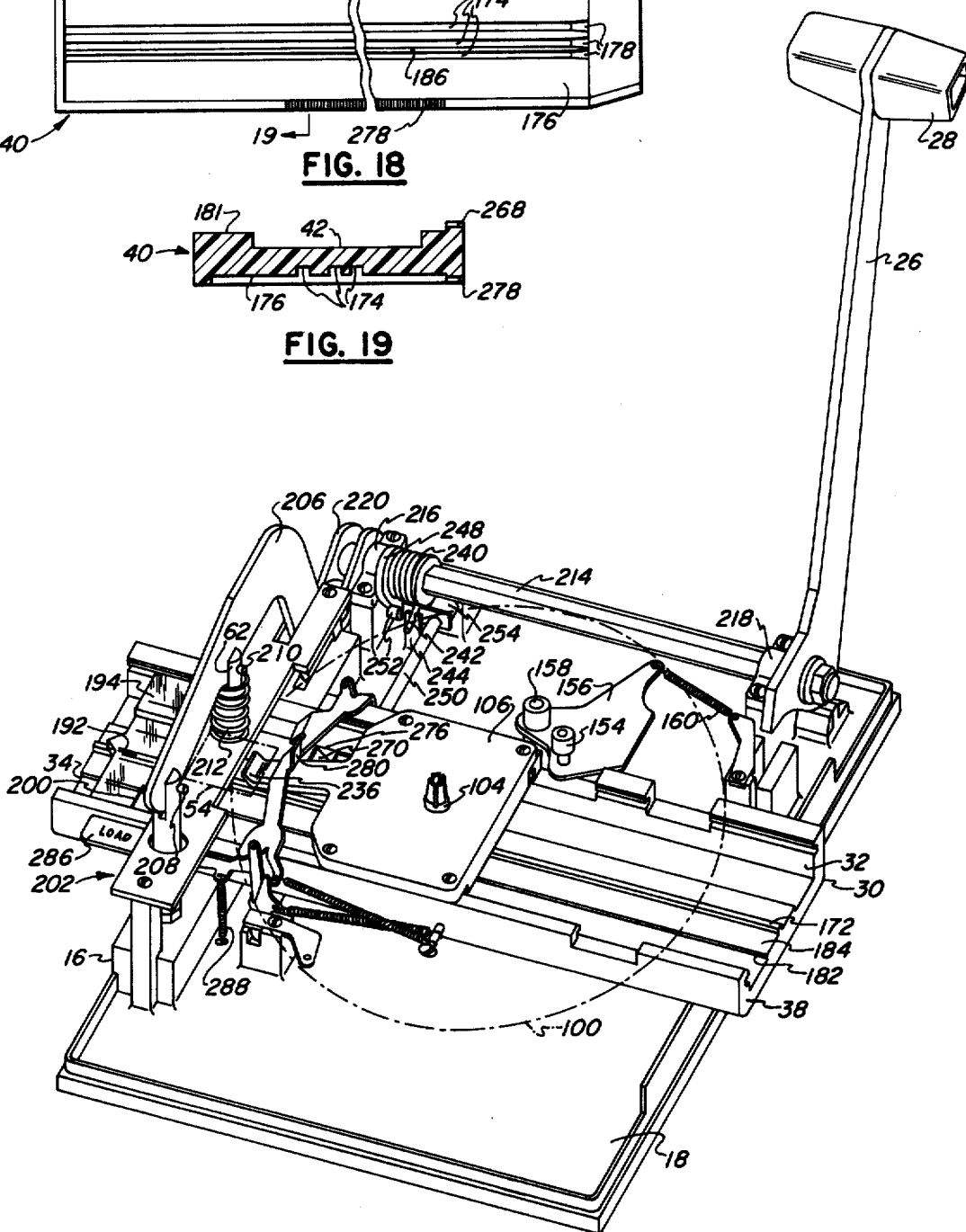




**FIG. 18**



**FIG. 19**



**FIG. 17**



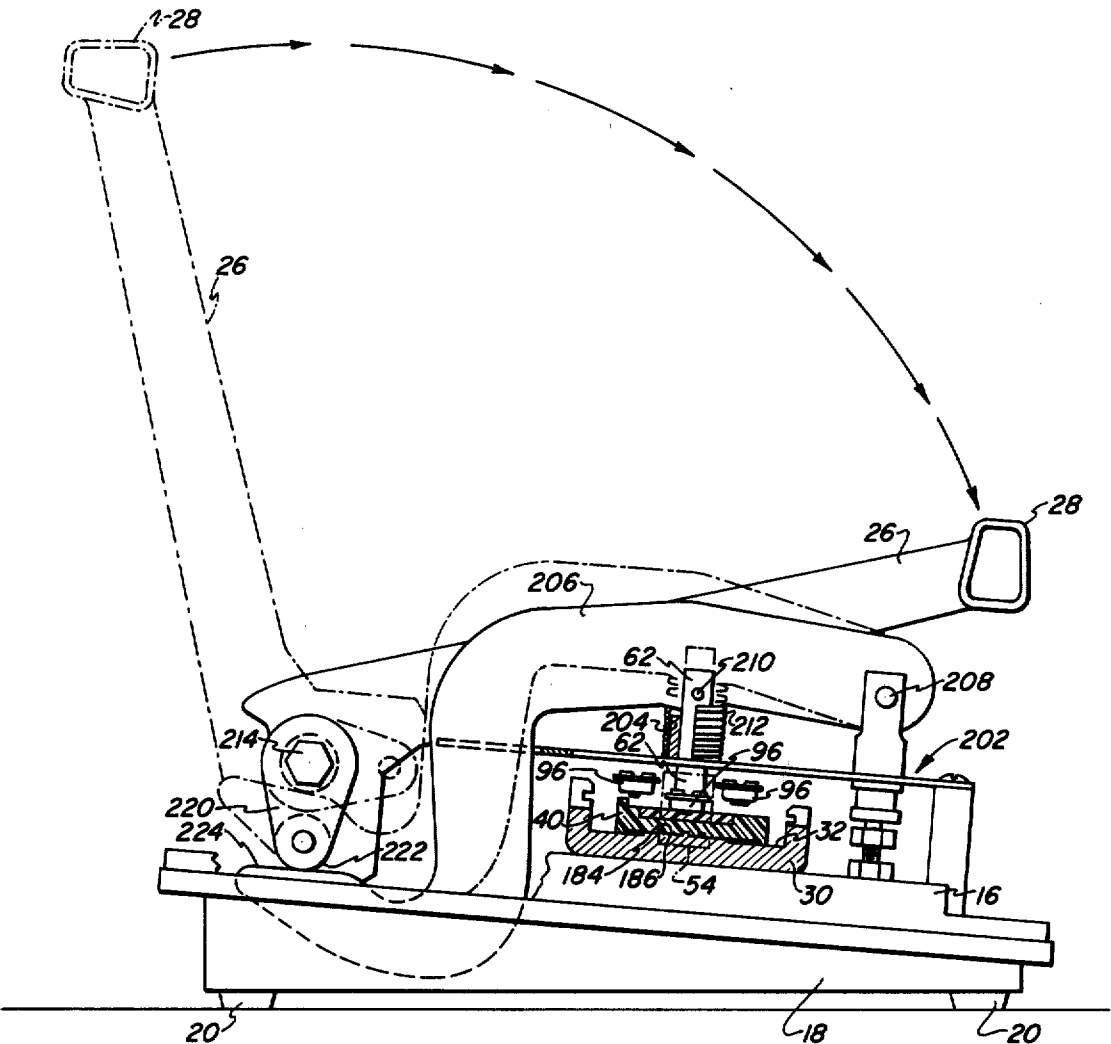


FIG. 22

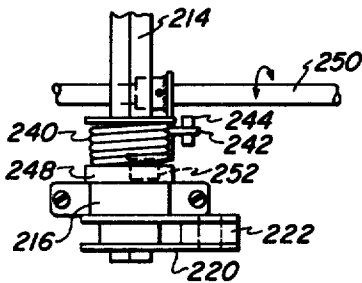


FIG. 23

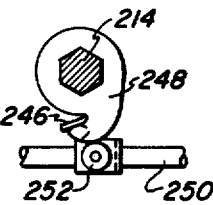


FIG. 24

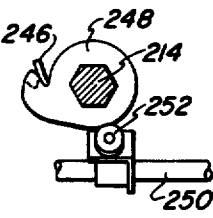


FIG. 25

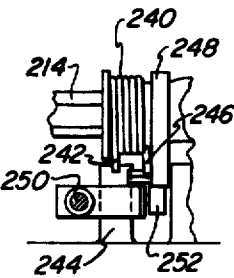


FIG. 26

## MACHINE FOR MAKING DEBOSSSED DISPLAYS AND BLANK THEREFOR

The present invention relates generally to the fabrication of displays and pertains, more specifically, to a machine for impressing a blank with a series of consecutive characters to construct a display, and blanks for use in such a machine.

A wide variety of techniques is currently in use for fabricating displays such as signs, nameplates, identification tags, cards, badges, and like items having a series of consecutive characters made visible against a contrasting background. One technique which has become quite popular is that of embossing indicia on thin plastic strips formed of sheeted thermoplastic synthetic resins which are capable of being cold-formed to establish a contrast color relief enfigurement therein. The ensuing development of simple, low cost tools and machines which can be used to practice that technique has not only led to widespread use of such displays, but has generated an increased demand for similarly simple and low cost tools and machines which can be used for fabricating displays utilizing alternate techniques which produce similarly utilitarian but aesthetically different results. One such alternate technique is that of impressing a blank with a series of characters so that the characters are debossed; that is, the characters themselves are impressed into the surface of the blank so that each character outline is displaced into the blank to provide a contrast with the background, as opposed to embossed characters which are raised from the blank.

It is therefore an object of the invention to provide a compact, simplified, relatively inexpensive machine for fabricating a display by impressing a blank with a series of consecutive characters.

Another object of the invention is to provide a blank for use in the above machine.

Still another object of the invention is to provide a machine of the type described above which is versatile in that blanks of various sizes can be accommodated and can be impressed, or debossed, with characters of different size and style.

A further object of the invention is to provide a compact, portable machine which employs the technique of debossing a series of characters in a blank and which provides for the accurate location of the series, as well as the formation and location of each character with accuracy.

A still further object of the invention is to provide a machine, as described above, which can deboss accurately located characters along more than one line on a blank.

The above objects, as well as still further objects and advantages, are attained by the invention which may be described briefly as a machine for impressing a blank of predetermined dimensions with a series of consecutive debossed characters, the machine comprising a frame, actuator means on the frame, a debossing station on the frame, character debossing means on the frame at the debossing station, a guideway on the frame, a carrier, means for engaging the carrier with the guideway such that at least a portion of the carrier is guided by the guideway along a guidepath juxtaposed with the character debossing means at the debossing station, feed means on the frame for advancing the carrier along the guidepath in predetermined increments of advancement in response to actuation of the actua-

tor means, and means in the carrier for receiving and retaining the blank in such fixed relationship relative to the carrier as to locate consecutive portions of the blank in position for debossing at the debossing station.

The invention will be more fully understood, while still further objects and advantages thereof will become apparent, in the following detailed description of a preferred embodiment illustrated in the accompanying drawing, in which:

FIG. 1 is a perspective view of a machine constructed in accordance with the invention, with the carrier of the machine removed and illustrated separately;

FIG. 2 is a perspective view of a blank used in the machine;

FIG. 3 is a perspective view of an alternate blank used in the machine;

FIG. 4 is a diagrammatic pictorial view illustrating an operation in the technique practiced with the machine;

FIG. 5 is comprised of three diagrammatic pictorial views, labelled 5a, 5b and 5c, illustrating the impressing of a character into the blank;

FIG. 6 is a top plan view illustrating the obverse surface of a blank impressed with characters;

FIG. 7 is a bottom plan view illustrating the reverse surface of the blank;

FIG. 8 is an enlarged, cross-sectional view taken along line 8—8 of FIG. 7;

FIG. 9 is a bottom plan view of the alternate blank of FIG. 3 illustrating the reverse surface thereof;

FIG. 10 is an enlarged, cross-sectional view taken along line 10—10 of FIG. 9;

FIG. 11 is an enlarged, fragmentary view of a portion of FIG. 5;

FIG. 12 is an enlarged, bottom plan view of the character debossing wheel of the machine;

FIG. 13 is a cross-sectional view taken along line 13-13 of FIG. 12;

FIG. 14 is a front elevational view of a character slug of the character debossing wheel;

FIG. 15 is a side elevational view of the character slug;

FIG. 16 is an exploded, partially sectioned diagrammatic view of a portion of the machine;

FIG. 17 is a perspective view of the machine with the cover and character debossing wheel removed;

FIG. 18 is a bottom view of the carrier;

FIG. 19 is a cross-sectional view taken along line 19—19 of FIG. 18;

FIG. 20 is a fragmentary view of a portion of FIG. 17, but with the carrier in place in the machine and with other components deleted for illustrative purposes;

FIG. 21 is an enlarged diagrammatic view of portions of the feed mechanism of the machine;

FIG. 22 is a partially diagrammatic, end elevational view, partially sectioned, illustrating the operation of the machine;

FIG. 23 is a fragmentary plan view of a portion of the feed mechanism of the machine;

FIG. 24 is a cross-sectional view taken along line 24—24 of FIG. 23;

FIG. 25 is a view similar to FIG. 24, but with the components in a different operating position; and

FIG. 26 is an elevational view of the portion of the machine illustrated in FIG. 23.

Referring now to the drawing, and especially to FIGS. 1 through 3 thereof, there is illustrated a machine 10, constructed in accordance with the inven-



tion, for impressing a blank shown in the form of a nameplate 12 with a series of consecutive debossed characters illustrated in the form of letters 14. The machine 10 is of the portable, table-top variety and has a frame 16 which includes a base 18 having depending feet 20 upon which the machine rests. A housing 22 extends upwardly from the base 18 and encloses the major operating components of the machine, the housing 22 carrying a cover 24 attached thereto, but selectively removable therefrom.

Machine 10 is provided with actuator means which include an actuator lever 26 mounted upon the frame 16 and extending upwardly through the housing 22, the actuator lever 26 carrying an actuating handle 28. A guideway 30 is affixed to the frame 16 and includes a channel 32 which provides a guidepath extending across the machine 10 from an inlet end 34 at one side 36 of the machine 10 to an opposite end 38 at the other side 39 of the machine. A carrier 40 may be received within the channel 32 of the guideway 30 to traverse the guidepath. The carrier 40 includes a receptacle 42 for receiving a blank. When the blank is in the form of nameplate 12, the nameplate is placed within the receptacle 42 to take the position illustrated in phantom at N in FIG. 1. An alternate blank, illustrated in FIG. 3 in the form of a badge 44, may be placed within the receptacle of the carrier instead of the nameplate 12 and would assume the position illustrated in phantom at B in FIG. 1.

The technique employed in machine 10 for impressing a blank with a series of consecutive debossed characters is illustrated diagrammatically in FIGS. 4 and 5. In practicing the technique, the blank, here shown in the form of nameplate 12, is first provided with an overlay of a material having an appearance which contrasts with the appearance of the obverse surface 46 of the nameplate 12. Thus, for example, where the obverse surface 46 of nameplate 12 has a particular color, such as black or white, a thin film in the form of a tape 48 of a contrasting color, such as red, is drawn from a roll supply 50 of such tape 48 and adhered to the obverse surface 46 by a pressure-sensitive adhesive carried on the underside 52 of the tape.

The blank nameplate 12, with the contrasting color tape 48 adhered thereto, is placed in the receptacle 42 of the carrier 40 and the carrier is inserted into the channel 32 of the guideway 30 to be advanced in prescribed increments along the guidepath. The carrier 40 and the blank nameplate 12 are then incrementally advanced through a debossing station 54 in the machine such that each portion of the nameplate which is to receive a debossed character is sequentially located within the debossing station 54. At the debossing station, a punch 56 in the form of a selected character having a raised face 58 and side flanks 60 is juxtaposed with the nameplate 12 and is located between the obverse surface 46 thereof and a ram 62, as illustrated in FIG. 5a. As seen in FIG. 5b, the ram 62 is then advanced and drives the punch 56 through the contrast color tape 48 and into the nameplate 12, severing a piece 64 of the tape 48, corresponding in configuration to the configuration of the letter 14 being impressed within the nameplate 12, from the surrounding scrim 66 and embedding the piece 64 of tape 48 in the nameplate 12. Upon retraction of the ram 62, as seen in FIG. 5c, the punch 56 is retracted from the nameplate 12 leaving a debossed character 14 having a color which

contrasts with the remaining background of the obverse surface 46 of the nameplate 12 as a result of the piece 64 of contrasting color tape 48 lying at the bottom of the debossed letter 14. The debossing operation is repeated for as many characters as required. Upon completion of the debossing operations, the scrim 66 is removed by peeling the remaining tape 48 from the obverse surface 46 of the nameplate 12, thus exposing the remaining portion of the obverse surface 46 which serves as a background for the contrast color letters 14, as seen in FIG. 6.

The above technique has been carried out successfully utilizing a blank nameplate 12, or, alternately, a blank badge 44, fabricated of a synthetic resin material of the type capable of being permanently impressed with debossed characters while the material is cold; that is, at room temperature or thereabout. One such material is an injection molded ABS. Preferably, the obverse surface 46 of the blank is textured with a pattern, such as a simulated leather pattern, so that any minor distortions or irregularities along the edges 68 of the debossed letters 14 will be hidden or disguised by the textured surface. Commercially available colored acrylic tapes may be used for tape 48.

Turning now to FIGS. 6, 7 and 8, as well as to FIGS. 1 and 2, the accurate positioning of the series of characters shown as letters 14 on the obverse surface 46 of nameplate 12 requires accurate registration of the nameplate within the carrier 40. Accurate formation of each character with minimal distortion requires that the nameplate be firmly supported within the carrier. Thus, the major portion of the reverse surface 70 of nameplate 12 has a surface configuration complementary to the corresponding surface configuration of the bottom surface 72 of the receptacle 42 of the carrier 40, in this instance, the complementary configuration being flat and planar.

Because the debossed characters are impressed by a punch, there is a tendency for both lateral and longitudinal expansion of the blank which is being impressed, such expansion tending to distort the longitudinal and lateral dimensions of the blank. In view of the relatively great longitudinal length L in comparison to the narrow lateral width W of the nameplate 12, such longitudinal distortion is negligible; however, lateral distortion can become noticeable. Therefore, the longitudinal edges 74 of nameplate 12 are supported and confined by the corresponding longitudinal shoulders 76 in the receptacle 42 of the carrier 40 and any tendency toward lateral distortion is taken up by distortion relief means in the reverse surface 70 of the nameplate blank, such distortion relief means being illustrated in the form of longitudinal grooves 78 running along the length corresponding to the portion of the nameplate 12 which will be debossed. Likewise, as seen in FIGS. 9 and 10, distortion relief means are provided in their reverse surface 80 of the badge 44 to relieve distortion of that blank arising out of the impression of the series of debossed characters 82 in the obverse surface 84 thereof. Such distortion relief means are shown in the form of edge grooves 86. Although the lateral width WW of the badge 44 is the same as the lateral width W of the nameplate 12, the longitudinal length LL of the badge is very much shorter than the longitudinal length L of the nameplate. Therefore, distortion of the longitudinal dimensions of the badge 44, as well as the lateral dimensions thereof, may become noticeable.

Hence, the edge grooves 86 extend around the entire perimeter of the badge 44 to relieve distortion of both the longitudinal and lateral dimensions of the badge.

Badge 44 carries a clip 88 constructed of spring wire and retained within longitudinal and lateral grooves 90 and 92 in the reverse surface 80 so that contiguity between the reverse surface 80 and the bottom surface 72 of the receptacle 42 of the carrier 40 is not disturbed by the presence of the clip 88. A notch 94 in the carrier 40 accommodates the clip 88. The clip is utilized to fix the badge to an article of clothing worn by the person who will wear the badge.

Turning now to FIG. 11, in order to produce aesthetically appealing characters with a compact, portable machine such as machine 10, utilizing the above described technique, each character punch must produce a good, sharp impression while requiring minimal impressing force. At the same time, practically no stripping force, i.e., the force necessary to retract the punch from the impression, should be required. Additionally, separation of the film when piece 64 is cut from tape 48 should be sharp to enhance edge quality around the perimeter of the character. These conditions require choice of the side angle A made between each flank 60 of the character punch 56 and the direction of impression. It has been found that an angle A of as little as 5° produces a good, sharp impression and requires a low impressing force, but necessitates a rather high stripping force. On the other hand, an angle as large as 20°, while requiring practically no stripping force, requires much more impressing force. While the 5° angle produces sharp, well-defined film separation, the 20° angle produces a film separation which is not as sharp and which is lacking in edge quality and general appearance when compared to the 5° angle. It has been determined that although satisfactory results can be obtained when angle A is in the range of about 5° to about 20°, a side angle of about 12° produces an optimum compromise among the above characteristics for a machine such as machine 10.

Referring now to FIGS. 12 through 17, as well as to FIG. 1, machine 10 employs a plurality of character punches 56, any one of which selectively may be located at the debossing station 54 for impressing a chosen character at a prescribed location in the chosen blank. Each character punch 56 is a part of a character slug 96 carried by a flexible portion of a movable member, shown as a resilient finger 98 projecting radially from a character wheel 100. The character wheel 100 is mounted for rotation upon the frame 16 and includes a central hub 102 journaled upon a post 104 projecting from a platform 106 secured to the guideway 30 which, in turn, is affixed to the base 18 of the frame 16. A skirt 108 which is coaxial with the hub 102 rests upon the platform 106 and supports the wheel 100 for rotation such that any one of the character slugs 96 may be located at the debossing station 54.

Selection and location of a particular character slug 96 is accomplished manually by rotating a dial knob 110 until a pointer 112, which is located on a flange 114 integral with the knob 110, points to a corresponding character 116 printed on the cover 24 of machine 10. The knob 110 includes depending projections 118 which are received in complementary apertures 120 in the character wheel 100, the radial location and relative size of each projection 118 assuring that the knob 110 can engage the character wheel 100 in only one

relative radial position, thus assuring correspondence between the character 116 indicated by the dial pointer 112 and the character slug 96 located at the debossing station 54.

When the dial knob 110 is properly located with respect to the character wheel 100, a central shaft 122, affixed to the dial knob 110, is captured within the resilient extensions 124 of the post 104 by the cooperation of detent projections 126 carried by the extensions 124 with a complementary groove 128 in the shaft 122. When the central shaft 122 is thus captured within the post 104, the integral flange 114 overlaps a complementary rim 130 on the cover 24 to aid in retaining the cover in place on the remainder of the housing 22. When it is desirable to impress debossed characters of different size or a different style, the character wheel 100 may be removed and replaced without difficulty by merely pulling the dial knob 110 upwardly relative to the cover 24 to draw the central shaft 122 from the post 104. The cover 24 may then be lifted to expose the character wheel 100 and the character wheel 100 itself may be removed from the machine by merely lifting the wheel from the platform 106. An alternate character wheel (not shown) may then be placed upon the platform 106 and the cover 24 and dial knob 110 may be replaced to again ready the machine for debossing operations to be performed with a different group of character punches.

Each character slug 96 itself may be removed from its corresponding finger 98 and replaced, as desired. Thus, each character slug 96, in addition to having a raised character punch 56 on the working face 132 thereof, includes a flange 134 at the upper face 136 providing first shoulders 138, and a pair of ears 140 on opposite sides of the character slug 96 providing second shoulders 142 confronting the first shoulders 138 and spaced therefrom. Each finger 98 of the character wheel 100 includes an aperture 144 having a configuration complementary to a corresponding character slug 96 carried by that finger, the aperture 144 being resiliently dilatable in a direction transverse to the radial direction by virtue of a radial slit 146 communicating with the aperture. Insertion of a slug 96 within a corresponding aperture 144 is attained by pushing the slug downwardly into the aperture thereby causing resilient dilation of the aperture by the passage of the tapered ears 140 through the aperture 144 and enabling the portions 148 of the resilient fingers 98 of the perimeter of the aperture 144 to become lodged between the confronting shoulders 138 and 142 to capture the slug 96 within the aperture 144, the shoulders 138 and 142 and the portions 148 thus serving as detent means to releasably retain the character slugs 96 within aperture 144.

In order to accurately locate and retain a chosen character slug 96 at the debossing station 54, the character wheel 100 is provided with a detent rim 150 having a plurality of detent recesses 152, one recess 152 for each character slug 96. A detent roller 154 is carried by a crank 156 mounted upon the frame 16 for pivotal movement about a vertical axis at 158 and is resiliently biased toward the detent rim 150 by means of a helical spring 160. The engagement of the detent roller 154 in a complementary detent recess 152 in the detent rim 150 of the character wheel 100 accurately locates a corresponding character slug 96 at the debossing station 54.

Referring now to FIGS. 17 through 21, as well as to FIGS. 1 through 3, and FIGS. 7 through 10, a blank is placed within the receptacle 42 of the carrier 40 and is accurately located relative to the carrier by virtue of at least one pair of upwardly extending projections, integral with the carrier, within a complementary pair of recesses in the reverse surface of the blank. Thus, nameplate 12 has two pairs of recesses 166 and 168 in reverse surface 70 corresponding to the two pairs of complementary projections 162 and 164 assuring that the nameplate 12 is located in only one precise position relative to the carrier 40. Likewise, the badge 44 has one pair of recesses 170 in the reverse surface 80 thereof for engaging the central pair of projections 164 of the carrier to locate the badge precisely relative to the carrier. Each recess of a pair of recesses 166, 168 or 170 is spaced longitudinally in opposite directions equidistant from the midpoint of the length of a blank. In this manner any blank having properly located recesses in the reverse surface thereof, when placed within the receptacle of the carrier, will be located with the center of the blank placed at the same predetermined location in the carrier, regardless of the length of the blank.

The guideway 30 and the carrier 40 are provided with complementary tracking means including a tracking member shown in the form of a longitudinal rib 172 in the guideway channel 32 and tracks illustrated in the form of complementary guide grooves 174 in the underside 176 of the carrier. The longitudinal rib 172 defines a guidepath passing directly through the debossing station 54. The carrier 40 may be located within the guideway 30 in any one of the three alternate, lateral positions by engaging any one of the three guide grooves 174 with the guide rib 172, the insertion of the rib 172 within a groove 174 being facilitated by a flared entrance 178 to each groove. Thus, an operator may choose any one of three lines along which a series of characters will be debossed, the lines being designated, in FIGS. 1 and 20, by marks 180, on the upper surface 181 of the carrier, labelled "line 1," "line 2," and "line 3." The lateral spacing between alternate guide grooves 174 is not made identical so that different lines may be chosen for different size characters. A platform 182 extends along the guideway 30 at either side of the guide rib 172 and provides a firm support for the carrier 40, especially in the vicinity of the debossing station 54. In this manner, complementary surfaces 184 and 186 of the guideway and the carrier establish a rigid anvil for the debossing operation.

In the illustrated embodiment, characters of two different sized may be accommodated and are designated as "small letters" 188 and "large letters" 190. Selection of the desired line upon insertion of the carrier 40 into the guideway 30 is facilitated by the provision of a line indicator 192 carried by a transparent plate 194 affixed to the guideway 30 so as to overlie the carrier 40 and enable the indicator 192 to be aligned with the proper line-designating mark 180 on the carrier 40. Longitudinal centering of the series of characters to be debossed upon the blank is accomplished by locating the carrier 40 in proper longitudinal position relative to the debossing station 54 at the start of the series of debossing operations which will produce the series to be determined by counting the number of characters in the series to be debossed and then, by referring to either a small letter scale 196 or a large letter scale 198,

locating the proper numeral of the scale at an index mark 200 on the transparent indicator plate 194. The increments on the small letter scale 196 and the large letter scale 198 correspond to one-half the longitudinal spacing of the particular consecutive characters to be debossed so that the location of the index mark 200 relative to the debossing station 54 assures that the series will be centered upon the blank.

Referring now to FIGS. 1, 17 and 22, the debossing of each character is accomplished, as explained in connection with FIG. 5, by the downward movement of ram 62 which in turn, depresses the character punch 56 located at the debossing station 54. As best seen in FIGS. 17 and 22, a bridge assembly 202 passes over the debossing station 54 and carries a sleeve 204 within which the ram 62 is guided for accurate reciprocating movement. A ram lever 206 is mounted upon the frame 16 for pivotal movement about a pin 208 affixed to the frame. The ram 62 is affixed to the ram lever 206 at 210 and a helical spring 212 between the bridge assembly 202 and the ram lever 206 resiliently urges the ram lever upwardly to a first or retracted position, as illustrated in full lines in FIG. 17 and in phantom in FIG. 22.

The actuator lever 26 is affixed to one end of a main drive shaft 214 which is itself journaled for rotation upon the base 18 of the frame 16 at 216 and 218. An eccentric 220 is affixed to the other end of the main drive shaft 214 and carries an eccentric roller 222. Upon movement of the actuator lever 26 from a rest position, as illustrated by full lines in FIG. 17 and in phantom in FIG. 22, forward and downward to a depressed position, as illustrated in full lines in FIG. 22, the drive shaft 214 will be rotated causing concomitant rotation of the eccentric 220 and engagement of the eccentric roller 222 with a drive surface 224 of the ram lever 206, thereby depressing the ram lever 206 to a depressed position, illustrated in full lines in FIG. 22, and driving the ram 62 downwardly against the resilient bias of the spring 212 to engage the character slug 96 at the debossing station 54 and effect debossing.

The ram 62 is accurately located relative to the guidepath established by the longitudinal rib 172 in the guideway 30 by virtue of the sleeve 204. In order to align each character slug 96 accurately relative to the ram 62 so as to assure accurate registration of each character debossed into the blank, the ram is provided with a tapered projection 230 extending the direction of movement of the ram 62 and each character slug 96 is provided with a complementary tapered socket 232. Upon downward movement of the ram 62, projection 230 engages the socket 232 and brings the character slug 96 into accurate alignment with the ram. The impressing forces are then transmitted from the ram directly to the character slug, along complementary engaged surfaces 234 and 136, the resilient fingers 98 of the character wheel 100 serving merely to carry the character slugs 96 and transport the slugs into and out of the debossing station 54. Upon retraction of the ram 62, the ram will be disengaged from the character slug 96, at the debossing station 54 and the character slug will return, by virtue of the resilience of the finger 98 in which it is carried, to the plane of the remaining character slugs 96. A hold-down finger 236 (see FIGS. 17 and 20) holds the blank down as the character slug is retracted.

Referring now to FIGS. 17 and 20 through 26, feed means are provided to advance the carrier 40 along the guideway in predetermined increments of advancement in response to actuation of the actuator means. Turning first to FIG. 17, the actuator lever 26 is biased toward the rest position by a main spring 240 coiled around the main drive shaft 214. A first end 242 of the coiled main spring 240 abuts a projection 244 on the base 18 of the frame 16 while the second end 246 of the coiled main spring 240 engages a feed cam 248 affixed to the main drive shaft 214 (see FIGS. 23 through 26). A feed shaft 250 is journaled upon the base 18 of the frame 16 for rocking movement about its own longitudinal axis and carries a follower 252 adjacent one end 254 thereof. The feed shaft 250 passes beneath the guideway 30, as seen in FIGS. 17 and 20, and carries a pair of crank arms 256 extending upwardly, one arm 256 at each side of the guideway. A pawl 258 extends between the crank arms 256 to straddle the guideway 30 and is pivotally mounted at 260 and 262 to the upper end of each crank arm 256. A pawl tooth 264 extends downwardly from the pawl 258 and is biased in a counterclockwise direction, as viewed in FIG. 21, by a helical spring 266 extending between the pawl 258 and the guideway.

When the actuator lever 26 is in the rest position, the feed cam 248 is in the position illustrated in FIG. 24 and the feed pawl 258 is in the rest position illustrated in full lines in FIG. 21. Upon depression of the actuator lever 26 from the rest position toward the fully depressed position, the feed cam 248 is rotated by the main drive shaft 214 to the position illustrated in FIG. 25 enabling the follower 252 to move upwardly and allowing the helical spring 266 to draw the pawl 258 from the rest position to the retracted position shown in phantom in FIG. 21. During movement of the pawl 258 from the rest position to the retracted position the pawl tooth 264 will pass over ratchet teeth 268 which extend along the upper surface 181 of the carrier 40. Movement of the carrier 40 from left to right, as viewed in FIG. 21, during such movement of the pawl tooth 264, is precluded by a latch tooth 270 which is carried by a latch member 272 journaled upon the feed shaft 250 and which is biased in the clockwise direction, as viewed in FIG. 21, by a helical spring 274 to extend through an opening 276 in the guideway 30 and engage complementary rack teeth 278 in the underside 176 of the carrier 40. Upon release of the actuator lever 26, the main spring 240 will rotate the drive shaft 214 in a counter-clockwise direction, as viewed in FIGS. 24 and 25, to return the actuator lever 26 to the rest position and will, at the same time, rotate the feed cam 248 to rock the feed shaft 250 in a counterclockwise direction, as viewed in FIG. 21, thereby advancing the feed pawl 258 from the retracted position to the rest position and, by virtue of the engagement of the pawl tooth 264 with a complementary ratchet tooth 268, accomplishing the advancement of the carrier 40 from right to left, as viewed in FIGS. 20 and 21.

The increment of advancement of the carrier 40 is directly related to the number of ratchet teeth 268 traversed by the pawl tooth 264 during movement of the pawl 258 from the rest position to the retracted position. The increment is accurately measured by providing the pawl 258 with an upwardly extending finger 280 which travels with the pawl 258 and is intercepted by a skirt 282 depending from the character wheel 100.

Abutment of the finger 280 against the skirt 282 stops retraction of the pawl 258 and effectively defines the length of travel of the pawl tooth 264 between the retracted position and the rest position. Thus, each character wheel 100 will have a skirt 282 located in the radial position necessary to provide the increment of advancement required for the size of the character carried by that character wheel 100. In addition, each skirt 282 may carry tabs 284 (see FIG. 12) for varying the spacing among the characters debossed with a single wheel to provide proportional spacing among wider and narrower characters.

Referring now to FIGS. 20 and 21, in order to enable insertion of the carrier 40 into the guideway 30 at the start of the debossing operation, there is provided a load lever 286 which is pivoted upon the guideway 30 and biased in a clockwise direction, as viewed in FIG. 20, by a helical spring 288. Upon movement of the load lever 286 in the downward direction indicated by the arrow in FIG. 20, the end 290 of the lever will engage a tab 292 on the pawl 258 to raise the pawl 258 and the pawl tooth 264 to the position R, illustrated in phantom in FIG. 21. At the same time a second tab 294 on the pawl 258 will engage a finger 296 on the latch member 272 and will pivot the latch member in a counterclockwise direction to move the latch tooth 270 to the position D illustrated in phantom in FIG. 21. Thus, both the pawl tooth 264 and the latch tooth 270 may be moved away from the path of the ratchet teeth 268 and rack teeth 278 to enable insertion of the carrier 40 from left to right as viewed in FIGS. 20 and 21 and to allow proper registration of the carrier relative to the debossing station 54 as described above. Upon completion of the debossing operations, the carrier 40 may be withdrawn from the machine by merely moving the carrier manually from right to left, as viewed in FIGS. 1, 17 and 20, until the carrier is drawn out of the machine. The completed debossed display may then be lifted from the receptacle in the carrier and, after the scrim is removed, put to use.

The above detailed description of a preferred embodiment is provided by way of example only. Various details of design and construction may be modified without departing from the true spirit and scope of the invention as set forth in the appended claims.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A machine for impressing a blank of predetermined dimensions with a series of consecutive, accurately registered debossed characters, the blank having an obverse surface in which the characters are to be debossed and an opposite reverse surface, said machine comprising:

- a frame;
- actuator means on the frame;
- a debossing station on the frame;
- character debossing means on the frame at the debossing station;
- a guideway on the frame;
- a carrier;
- means for engaging the carrier with the guideway such that at least a portion of the carrier is guided by the guideway along a guideway juxtaposed with the character debossing means at the debossing station;

feed means on the frame for advancing the carrier along the guidepath in predetermined increments of advancement in response to actuation of the actuator means;

means in the carrier for receiving and retaining the blank in such fixed relationship to said portion of the carrier as to locate consecutive portions of the blank in position for debossing at the debossing station, said receiving and retaining means including a receptacle in the carrier, said receptacle having a bottom surface complementary to the major portion of the reverse surface of the blank; and

the guideway and the carrier include corresponding surfaces so engaged as to provide a relatively rigid anvil at the debossing station against which the blank, when located in the receptacle and against the bottom surface thereof, rests during debossing.

2. The invention of claim 1 wherein said guidepath extends longitudinally along a fixed line of travel, and said means for engaging the carrier with the guideway includes means enabling engagement of the carrier with the guideway in alternate, laterally spaced relative positions such that alternate, laterally spaced portions of the carrier will coincide with the said guidepath for debossing laterally spaced characters.

3. The invention of claim 2 wherein said fixed line is a straight line and said laterally spaced portions of the carrier lie along straight lines parallel to said fixed line so that the debossed characters will extend along parallel, laterally spaced lines.

4. The invention of claim 2 wherein said enabling means includes laterally spaced alternate tracks on one of said guideway and said carrier and a tracking member on the other of said guideway and said carrier engageable with any of the alternate tracks for providing the alternate laterally spaced positions.

5. The invention of claim 4 wherein said tracks are longitudinal grooves in the carrier and the tracking member is a longitudinal rib in the guideway, complementary to each groove.

6. The invention of claim 5 wherein the tracks extend along straight lines and the rib extends along a straight line passing through the debossing station so that the debossed characters will extend along parallel laterally spaced lines.

7. The invention of claim 1 wherein said guidepath extends longitudinally along a fixed line of travel, said machine further including:

means enabling selection of the longitudinal location of the carrier relative to the guideway; and

means indicating the longitudinal location of the carrier relative to the debossing station to enable selective longitudinal location of the debossed characters upon the blank.

8. The invention of claim 1 wherein the debossing means include:

a member mounted on the frame for selective indexing movement between alternate positions, said member having a plurality of resiliently flexible portions;

a character slug corresponding to each character to be debossed;

means for affixing each character slug to a flexible portion of said member;

said member and each character slug being located relative to the frame such that each character slug

may be located selectively at the debossing station by indexing movement of said member;

a ram mounted upon the frame for reciprocating movement in response to actuation of the actuator means to engage a character slug located at the debossing station and move the character slug against the resilient bias of the corresponding flexible portion; and

said affixing means being selectively releasable for selective removal and replacement of each character slug.

9. The invention of claim 8 wherein said affixing means include:

a resiliently dilatable aperture in each flexible portion, said aperture having a configuration complementary to a portion of a corresponding character slug such that the character slug may be received within the aperture; and

detent means on each character slug juxtaposed with said portion of the character slug for coacting with the flexible portion adjacent the perimeter of said aperture to retain the character slug within the aperture.

10. The invention of claim 9 wherein said detent means includes confronting shoulders spaced apart sufficiently to admit the flexible portion therebetween.

11. The invention of claim 1 wherein the debossing means include:

a member mounted on the frame for selective indexing movement between alternate positions, said member having a plurality of resilient flexible portions;

a character slug corresponding to each character to be debossed;

means for affixing each character slug to a flexible portion;

said member and each character slug being located relative to the frame such that each character slug may be located selectively at the debossing station by indexing movement of the said member;

a ram mounted upon the frame for reciprocating movement in response to actuation of the actuator means to engage a character slug located at the debossing station and move the character slug against the resilient bias of the corresponding flexible portion; and

complementary means on the ram and on each character slug for engagement with one another to align the engaged character slug with the ram for accurate registration of the character slug at the debossing station.

12. The invention of claim 11 wherein said complementary means include a tapered projection extending in the direction of movement of the ram and complementary socket for receiving the projection and aligning the character slug with the ram.

13. The invention of claim 12 wherein the projection is located on the ram and a complementary socket is located in each character slug.

14. A machine for impressing a blank of predetermined dimensions with a series of consecutive debossed characters, said machine comprising:

a frame;

actuator means on the frame;

a debossing station on the frame;

character debossing means on the frame at the debossing station;

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a guideway on the frame;  
a carrier;  
means for engaging the carrier with the guideway  
such that at least a portion of the carrier is guided  
by the guideway along a guidepath juxtaposed with  
the character debossing means at the debossing station,  
said guidepath extending longitudinally along  
a fixed line of travel;  
feed means on the frame for advancing the carrier  
along the guidepath in predetermined increments  
of advancement in response to actuation of the actuator  
means;  
means in the carrier for receiving and retaining the  
blank in such fixed relationship to said portion of  
the carrier as to locate consecutive portions of the  
blank in position for debossing at the debossing station;  
means enabling selection of the longitudinal location  
of the carrier relative to the guideway;  
means indicating the longitudinal location of the carrier  
relative to the debossing station to enable selective  
longitudinal location of the debossed characters upon  
the blank;  
the receiving and retaining means including means  
for locating and fixing the longitudinal center of  
the blank at a predetermined position in the carrier

such that the longitudinal center of the blank will  
be retained at the predetermined position regardless  
of the length of the blank placed in the machine;  
and  
the enabling means including an index for providing  
a visual indication of the location of the center of  
the blank relative to the debossing station and at  
least one scale having numbered increments corresponding  
to one-half the longitudinal spacing of the consecutive  
characters such that location of a numbered increment  
corresponding to the total number of characters in  
the series to be debossed at the index will center  
the series longitudinally upon the blank.  
15. The invention of claim 14 wherein the means for  
locating and fixing the longitudinal center of the blank  
include at least one projection on the carrier engageable  
with a corresponding recess in the blank.  
16. The invention of claim 14 wherein the enabling  
means includes a plurality of scales corresponding to a  
plurality of longitudinal sizes of the consecutive characters.  
17. The invention of claim 14 wherein the scale is on  
the carrier.

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