United States Patent

Austin

[15] **3,666,072**

[45] **May 30, 1972**

[54] ENDLESS BAND EMBOSSING DEVICE

[72] Inventor: **Charles C. Austin,** Nashua, N.H.

[73] Assignee: **Dennison Manufacturing Company,** Farmingham, Mass.

[22] Filed: **May 6, 1970**

[21] Appl. No.: **35,209**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 713,783, Mar. 18, 1968, abandoned.

[52] **U.S. Cl.** **197/6.2,** 101/18

[51] **Int. Cl.** **B41j 1/20**

[58] **Field of Search** 197/6.2, 6.7; 101/18

[56] **References Cited**

UNITED STATES PATENTS

3,277,992	10/1966	Bremer	197/6.7
3,010,387	11/1961	Deutsch	101/111 X
3,280,954	10/1966	Bremer et al.	197/6.7
3,545,587	12/1970	Urbach	197/6.2
1,368,169	2/1921	Arkin et al.	101/18
3,327,623	6/1967	Diegel	101/18
3,263,791	8/1966	Pedersen et al.	101/29 X

FOREIGN PATENTS OR APPLICATIONS

547,391	9/1932	Germany	101/111

Primary Examiner—Edgar S. Burr
Attorney—George E. Kersey

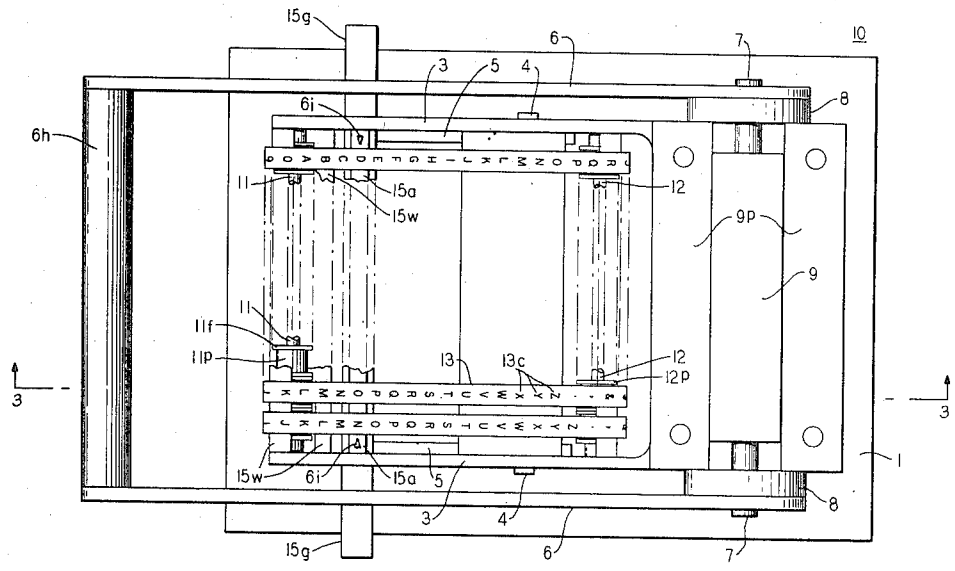
[57] **ABSTRACT**

An embossing device employing a plurality of sets of interlocking embossing bands, there being one set of bands for each of a group of characters that are to be embossed simultaneously on a suitable medium such as a flexible strip or sheet of plastic material.

Each set of embossing bands has two constituent belts with respective raised and recessed complementary characters, which are juxtaposed. The two constituents belts are interlocked over a portion of their length at a plurality of character positions. Consequently, the correct registration of the belts is maintained during the selection of specified characters. This results in distinct and non-disfigured embossments of the flexible material.

In one embodiment, the constituent bands are closed loops which are nested, one inside the other, and traverse the same orbit. In another embodiment, the constituent bands are closed loops which traverse different orbits.

9 Claims, 8 Drawing Figures



Patented May 30, 1972 3,666,072

4 Sheets-Sheet 1

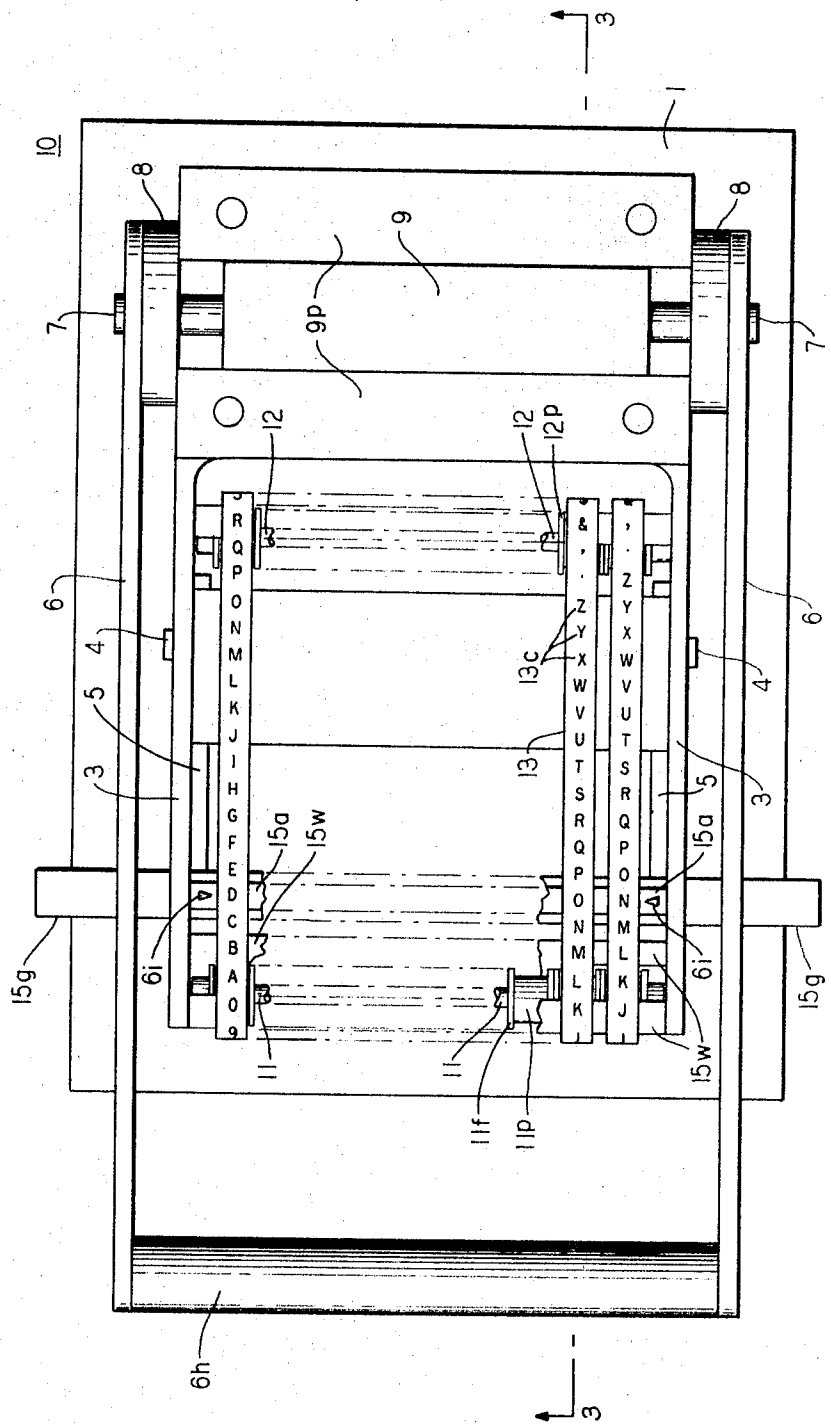


FIG. 1

INVENTOR
CHARLES C. AUSTIN
BY George E. Kersey
ATTORNEY

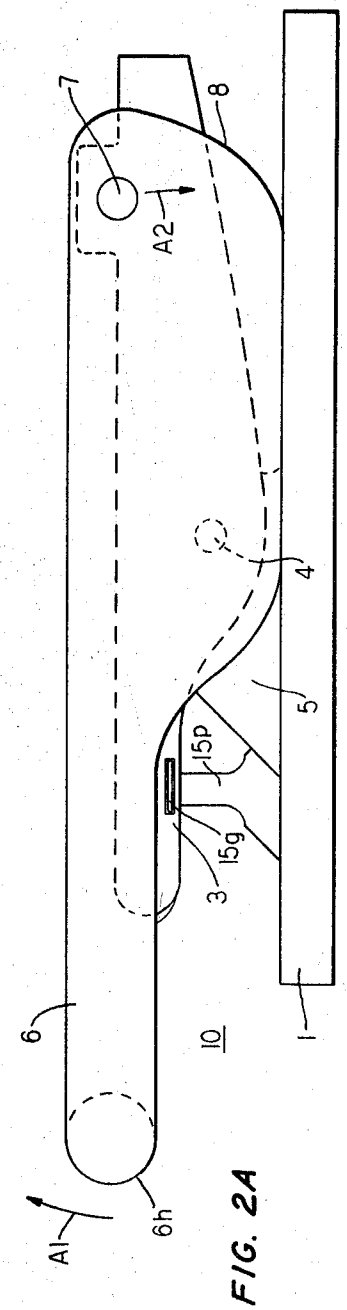


FIG. 2A

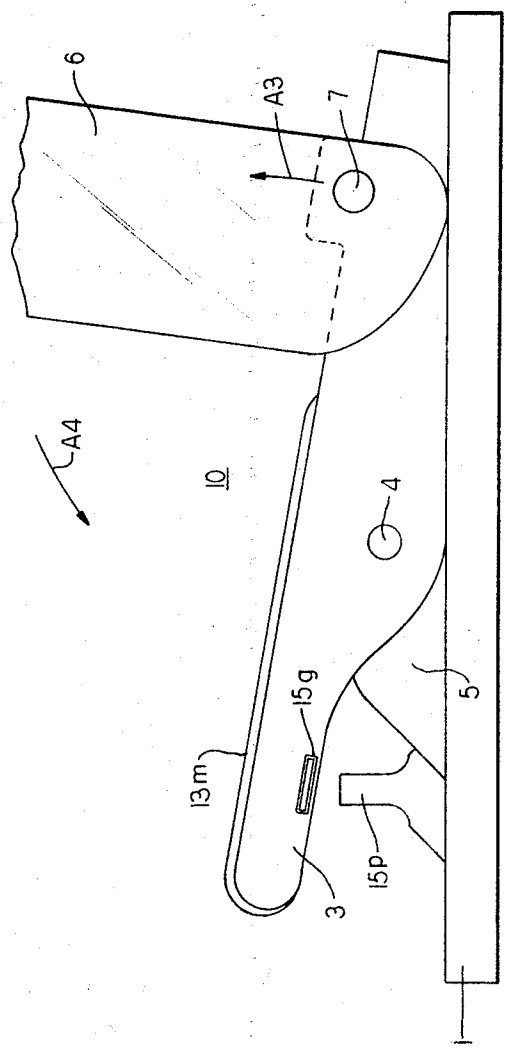


FIG. 2B

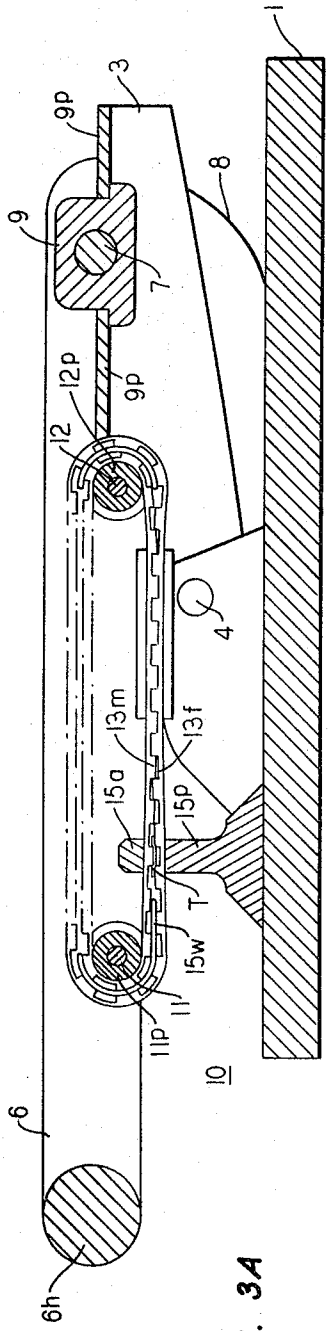

1
3
9p
8
9
7
12p
12
9p
4
13m
13f
15a
15p
T
15w
11
11p
10
6
6h

FIG. 3A

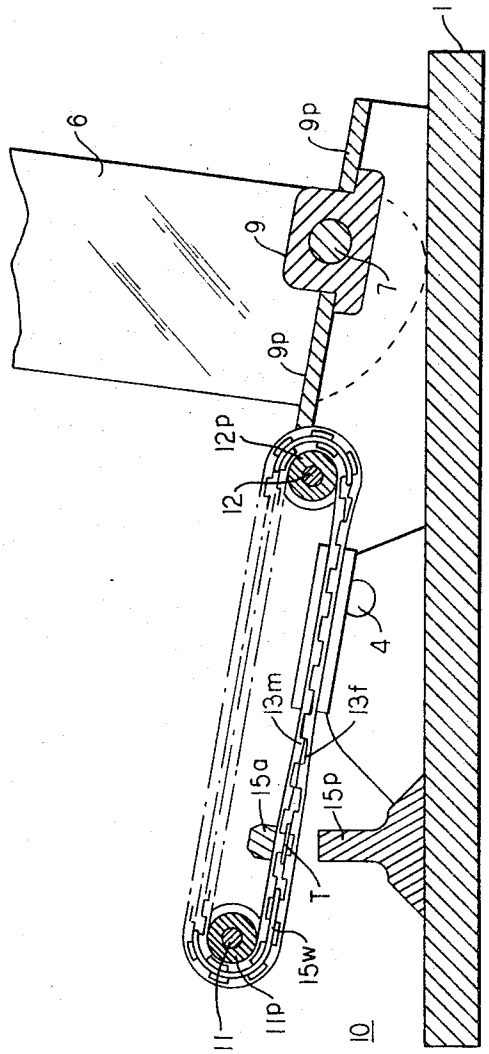

1
6
9p
9
7
9p
12p
12
4
13m
13f
15a
15p
T
15w
11
11p
10

FIG. 3B

FIG. 4A

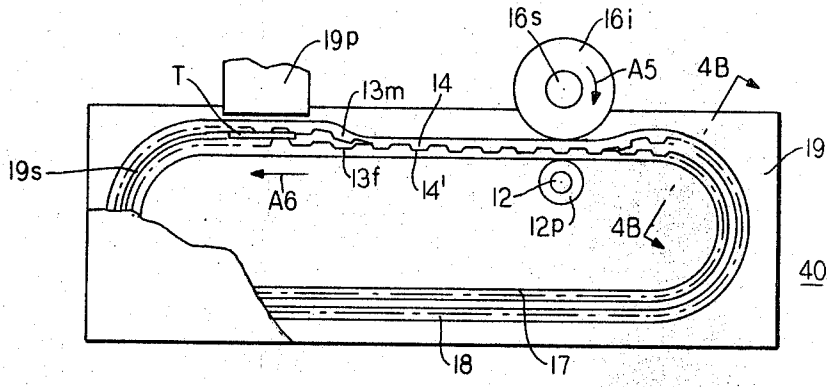


FIG. 4B

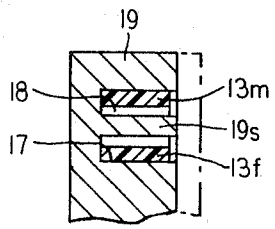
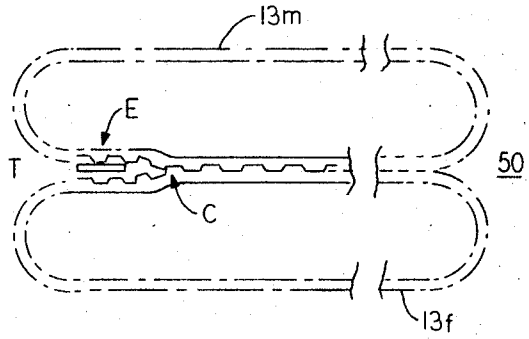


FIG. 5



ENDLESS BAND EMBOSSING DEVICE

BACKGROUND OF THE INVENTION

This invention is a continuation-in-part of application Ser. No. 713,783, filed Mar. 18, 1968, now abandoned.

The invention relates to an embossing device, and more particularly to a device for selectively producing raised characters on strips of flexible plastic tape.

Embossing devices use a punch and die arrangement to produce selected characters on flexible material. Typically, a desired set of punches and dies is provided by the tynes and complementary recesses of a dialable embossing wheel. Such an arrangement produces a single character at a time and has the disadvantage that the number and size of the characters is limited by the size of the embossing wheel.

Another form of punch and die arrangement makes use of a band of raised, punch characters operating with a platen or in conjunction with a band having complementary die characters. In either case the characters produced on the flexible material are often indistinct or disfigured.

A platen arrangement produces indistinct characters because it provides the same counter surface regardless of the punch configuration. A die band results in disfigured characters whenever there is a failure of registration between it and the punch band. Because of their complexity, registration mechanisms are omitted; when present they are cumbersome and a source of difficulty.

Accordingly, it is an object of the invention to facilitate the embossment of flexible materials. A further object is to achieve flexibility with respect to the number and size of characters produced. A still further object is to achieve flexibility in producing distinct and non-disfigured characters.

Another object of the invention is to achieve suitable registration between the punch and die members of an embossing device. A related object is to achieve registration using a simple, easily operated and reliable mechanism. Still another object of the invention is to provide for the multiple, simultaneous embossments of flexible materials.

Other objects of the invention are to provide a device which is simple and economical in construction, which can be set and operated quickly and easily, and which is durable and reliable in use.

SUMMARY OF THE INVENTION

In accomplishing the foregoing and related objects, the invention provides an embossing device with interlocking sets of punch and die members. The punch member is elongated, typically in the form of a movably mounted belt, and bears a plurality of raised indicia for selectively forming characters on embossable materials. The die member is also elongated and bears a plurality of complementary, recessed indicia. The two members are in contact with each other over a plurality of character positions to assure die and punch registration for each character being embossed. At each embossing position, the members are separated to receive the embossable material between them by, for example, a wedge or a channel divider for the respective die and punch members.

In accordance with one aspect of the invention the punch and die members of each set are coaxially mounted bands with juxtaposed raised and recessed characters. In accordance with another aspect the bands have juxtaposed characters, but traverse different orbits.

In accordance with another aspect of the invention the bands of each set are interlocked by their raised and recessed characters at various character positions.

In accordance with still another aspect of the invention, the embossing device includes a plurality of belt sets, an embossing head with means engaging the inner surfaces of the belt sets for guiding them along orbital paths, and an embossing post opposed to the outer surface of the sets at embossing locations on the paths. Each belt set carries a full complement of embossing characters and is movable in a lengthwise direction to permit the selection of any specified

character. At the embossing locations the belts of each set are separated to receive sheet-like material which is compressed by actuator forcing means including a cam. The embossing head, with its guiding means for the belt sets, is pivotally connected to a support upon which the embossing post is mounted. In turn, the actuator is pivotally connected to the embossing head. The cam either forces the embossing head and post apart to receive or release material, or brings the head and post together to emboss material, depending upon whether the actuator is retracted.

In accordance with a further aspect of the invention, the embossing device includes means for guiding the belts of each set along orbital paths with the surfaces of the belts opposing each other in juxtaposition at more than one location along the paths. One of the belt surfaces has raised characters distributed therealong at spaced intervals and the other surface has recesses at corresponding intervals. The belts are forced together at one location to emboss sheet material placed between them. In addition the characters mesh with the recesses at another location along the path to keep the belts in synchronism, and the recesses are shaped like the characters in reverse so that they fit into the recesses.

BRIEF DESCRIPTION OF THE DRAWINGS

Other aspects of the invention will become apparent after considering several illustrative embodiments taken in conjunction with the drawings in which:

FIG. 1 is a plan view of an embossing device in accordance with the invention;

FIG. 2A is a side elevation view of the embossing device of FIG. 1 with its actuator down and its head in embossing position;

FIG. 2B is a side elevation view of the embossing device of FIG. 2A with its actuator elevated and its embossing head raised;

FIG. 3A is a cross-sectional view of the device of FIG. 2A showing a section of tape being embossed;

FIG. 3B is a cross-sectional view of the device of FIG. 2B showing a section of tape after being embossed;

FIG. 4A is an alternative embodiment of an embossing device in accordance with the invention;

FIG. 4B is a partial cross-sectional view of the device of FIG. 4A; and

FIG. 5 is a further embodiment of an embossing device in accordance with the invention.

DESCRIPTION OF THE ILLUSTRATIVE EMBODIMENTS

Turning to the drawings, the embossing device **10** shown in FIGS. **1**, **2A** and **2B** is formed by a base **1** upon which is mounted an embossing head **3** and actuator **6**.

The embossing head **3** is rotatably mounted with respect to the base **1** by pivots **4** in two mounts **5**, which are spaced apart on the base **1** by the width of the frame of the head **3**.

The actuator **6** is rotatably mounted with respect to the embossing head **3** by a pivot **7** which extends through a housing **9**. The latter is held in position at the rear of the embossing head **3** by retaining plates **9*p*** which are attached in conventional fashion. A handle **6*h*** at the front of the actuator **6** controls the embossment of materials such as strips or sheets of plastic tape. At the rear of the actuator **6**, the opposed lateral sides have cam surfaces **8** whose operation is explained below.

In order to accomplish the selective setting of a plurality of characters for simultaneous embossment on a length of material in accordance with the invention, the front portion of the embossing head **3** is an open-ended frame which mounts a plurality of sets **13** of interlocking embossing bands.

Each of the sets **13**, as shown by FIGS. **3A** and **3B**, is formed by an outer band in the form of a belt **13*m*** with male characters and a complementary inner band in the form of a belt **13*f*** with female characters. As indicated in FIG. **1**, the belt sets **13** are mounted on aligned and freely rotatable pulleys **11*p*** and **12*p*** on respective front and rear shafts **11** and **12**. The latter

are journalled in the open-ended frame of the head **3**. In order to prevent slippage of the belt sets **13** each pulley can include, for example, a pair of retaining flanges **11***f*.

When the device **10** is ready to be operated, each set **13** of the belts is positioned with respect to an index marker **6***i* (FIG. 1) in accordance with the characters to be embossed. To facilitate the desired selection, the outer belt of each set is marked with characters **13***c* that correspond to the various embossing positions. Since the belt sets **13** are mounted on freely moving pulleys **11***p* and **12***p*, they are readily advanced manually to the positions desired.

Once the desired settings have been made, and the actuator **6** is appropriately operated as described in detail below, a strip of embossable material such as the tape T of FIGS. **3**A and **3**B is inserted into a guide channel **15***g* (FIGS. **1**, **2**A and **2**B), which is affixed to the embossing head **3**.

Considering the detailed operation of the device **10**, FIG. **2**A shows the actuator **6** in its fully depressed position where embossing takes place. In order to permit the entry of embossable material into the device **10**, the handle **6***h* of the actuator **6** is moved in the direction indicated by the clockwise arrow A1. Because of the cam surface **8**, the pivot **7** then moves in the direction indicated by the second clockwise arrow A2. Consequently the head **3** moves in a clockwise direction about its pivots **4**, causing the head to be raised to the position of FIG. **2**B when the actuator **6** is fully elevated.

In the position of FIG. **2**B, the device **10** is able to receive embossing tape by way of the guide channel **15***g*. When the actuator **6** is depressed, by being moved in the direction indicated by the counter clockwise arrow A4, the base **3** moves about the pivot **4** in the direction indicated by the other counterclockwise arrow A3 into contact with an embossing post **15***p*. As a result, the device **10** returns to the position illustrated by the cross-sectional view of FIG. **3**A, in which a length of tape T becomes embossed with desired characters. Since the head **3** carries a plurality of belt sets **13**, the embossing tape is simultaneously embossed with a plurality of characters in accordance with the number of such sets.

The embossment is achieved by the action of the embossing post **15***p* against the tape T between the male and female belts **13***m* and **13***f*, with respect to an anvil **15***a*. The latter extends between the sides of the embossing head **3** as shown in FIG. **1**, while the post **15***p* is included as an extended member between the mounts **5**.

Also seen in FIGS. **3**A and **3**B, is a separator wedge **15***w* which also extends between the sides of the embossing head **3** and is used to separate the male and female bands **13***m* and **13***f* in advance of the embossing position. This separation is necessary because of the interlock that exists by virtue of the mesh between the raised characters of the male belt **13***m* and the mating recesses of the female belt **13***f*. This interlock maintains synchronism between the two belts during movement and assures that they are in registration at the embossing position to provide the clear, non-disfigured embossments.

A further embodiment **40** of the invention is shown in FIG. **4**A, in which the band sets **13** of FIG. **1** have been incorporated into a housing **19**. FIG. **4**A illustratively shows but a single band set with male and female constituents **13***m* and **13***f*, but as with FIG. **1**, the number of sets corresponds to the number of characters to be simultaneously embossed upon a tape T.

The band set of FIG. **4**A is advanced manually to the embossing position beneath a pressure member **19***p* by manually rotating an indicator wheel **16***i* in a clockwise direction indicated by an arrow A5 in order to advance the belts **13**m and **13**f simultaneously in the direction indicated by an arrow A6. Over the region of the device **40** between the indicator wheel **16***i* and the pressure member **19***p*, the male and female characters **14** and **14'** of the respective belts **13***m* and **13***f* are locked together to achieve desired synchronization.

The indicator wheel **16***i* can be suitably engraved with the characters that correspond to those in embossing position. Beneath the indicator wheel **16***i* is a pulley **12***p* which is mounted on a shaft **12** in conventional fashion and acts with the wheel **16***i* during the advance of the band set.

In place of the wedge member **15***w* used in the embodiment **10** of FIG. **1**, the device **40** of FIG. **4**A employs a separator **19***s* which is integral with the housing **19**, as shown by the partial cross-sectional view of FIG. **4**B. Beyond the embossing and indicator positions the male and female belts **13***m* and **13***f* ride in respective channels **18** and **17**. Because of the latter, the belts **13***m* and **13***f* need not be continuous, in which case the indicator wheel **16***i* is desirably provided with both clockwise and counterclockwise stops (not shown).

A further embodiment **50** of the invention is illustrated in FIG. **5**. The constituent members **13***m* with male characters and **13***f* with female characters are intermeshed beginning at a contact position C in order to achieve the desired registration of the male and female characters at the embossing position E. Both the drive and punch mechanisms used with the members **13***m* and **13***f* can be of conventional design.

While various aspects of the invention have been set forth by the drawings and the specification, it is to be understood that the foregoing detailed description is for illustration only and that various changes in parts, as well as the substitution of equivalent constituents for those shown and described, may be made without departing from the spirit and scope of the invention as set forth in the appended claims.

What is claimed is:

1. An embossing device comprising a first, movably mounted outer band bearing a plurality of indicia for the selective formation of characters on an embossable material at an embossing position,

a second, movably mounted inner band bearing a plurality of complementary character forming indica thereon, said outer band surrounding said inner band and said bands traversing a path which includes a curved section such that the bands tend to lose registration with each other;

means for causing the bands to be enmeshed with each other at least at one position therealong in advance of said embossing position to assure registration of said bands during the movement thereof,

means for separating said bands at said embossing position to permit the entry of said embossable material therebetween, and means for forcing the separated bands together to emboss said embossable material entered therebetween.

2. An embossing device as defined in claim **1** wherein one of said bands has raised characters thereon,

the other of said bands has recessed characters thereon, and said bands are interlocked at a plurality of raised and recessed character positions thereof.

3. An embossing device as defined in claim **2** wherein said first band is a first belt forming a closed loop and said second band is a second belt forming a separate closed loop.

4. An embossing device as defined in claim **3** wherein the exterior of said first belt bears markings which indicate, for any position thereof, the corresponding character at the interior thereof at said embossing position.

5. An embossing device as defined in claim **3** wherein the two belts are movable over different orbits having a common portion including said embossing position and are interlocked with each other over the common portion in advance of said embossing position.

6. An embossing device as defined in claim **1** wherein the separating means comprises a wedge positioned between said bands between said embossing position and the position where said bands are enmeshed with each other.

7. An embossing device as defined in claim **6** wherein said bands move in separate channels and said wedge comprises a separator between said separate channels.

8. An embossing device as defined in claim **1** wherein the forcing means comprises a head carrying the embossing bands and pivotally mounted with respect to an embossing post

and an actuator that is pivotally mounted with respect to said head and having a cam for rotating said head toward said post.

9. An embossing device as defined in claim 1 wherein said bands comprise two endless inner and outer belts which are co-planar with opposed surfaces and are guided along orbital paths,

one of said surfaces having raised characters distributed therealong at spaced intervals and the other of said surfaces having recesses at corresponding intervals,

and said two members are interlocked with each other by characters meshing with said recesses at a plurality of positions along said orbital paths in advance of said embossing position to keep the belts in synchronism.

* * * * *