ABSTRACT: Small, relatively tall, information capsules, having a standard height determined by the system, are provided in the form of stiff sheetlike printing members or plates with embossed printable data thereon. They are prepared by first embossing more than one item of information in spaced locations along a longer plate with the lines of characters running parallel to the length thereof, and then dividing the longer plate into individual printing members between the information items. The procedure is carried out in an automatic embossing machine employing guide tracks for the top and bottom edges of the plates, and makes it possible to handle the work effectively even though the ultimate plate requires a dimension parallel to the lines of characters (i.e., parallel to the machine guide tracks) which would be substantially less than the height dimension, due to which the proportions of such ultimate plate would have been unsuitable for feeding reliably through the tracks of an automatic embossing machine if the plate had been embossed in its final configuration.
METHOD OF EMBOSsing INFORMATION ON PRINTING ELEMENTS

This application is a continuation-in-part of my copending application Ser. No. 542,819 Ed. Apr. 15, 1966.

This invention relates to data gathering, and especially to the making of unit printing members of small size for assembling a bank of information to be imprinted, for example, on a tabulating document to be machine processed. This procedure is described at length in my U.S. Pat. No. 3,413,922.

In order to arrange items of information in compact array on the face of a typewriter or parking mechanism of a flexible, general-purpose imprinter, it is sometimes necessary that these items be embossed on small printing members or tokens having a short dimension running lengthwise of the lines of characters embossed thereon. This is necessary in order to limit as much as possible the area foreclosed to other information by the printing element when in place, while still leaving it of standard dimension in a vertical direction so as to be properly held and positioned by the printing member holding means on the imprinter. In addition, the guide rails between which the tokens travel on automatic embossing machines are of several relatively standard sizes, one of the most conventional being 2½ inches, so that the printing members must have such standard vertical dimension as determined by the system to be properly handled by the automatic embossing machine and the imprinter. (It will be recognized that in this connection ‘’horizontal’’ and ‘’vertical’’ are being used for convenience to designate directions parallel to and normal to the lines of printing characters rather than directions related to the earth’s gravitation).

A problem arises, however, in that printing members of a horizontal dimension short enough to satisfy the compact information requirements of this particular use, are then of smaller dimension horizontally than they are vertically, and hence will not always feed reliably through the embossing machine guides, tending, for example, to tip and bind in the guides.

It is known, of course, that workpieces are sometimes created in strip form and passed through a punch press, embossing machine, or other equipment. The strip may be subdivided into individual pieces either by the work operation or by an operation subsequent thereto. Arrangements of this type are illustrated in U.S. Pat. No. 1,789,831 and in German Pat. No. 873,092. It is notable, however, that these patents do not suggest so moving the strip that the segment to be embossed is shifted parallel to the automatic embossing machine and at the same time parallel to the lines of embossed characters, both of which are critical to the present invention.

Referring to U.S. Pat. No. 1,789,831 which is representative of a certain common type of metal tag making machine, it is well known that these are intended to operate only on quite malleable material which has a very low elastic limit being not only easily embossed at low pressures, but capable of being rather closely coiled so as to take a curved set and readily straightened as an incident to the embossing. Embossed members of this type are sometimes used as printing members in a sense, but this can occur without damage to the type, only by the most careful and judicious limitation of pressure, and they are accordingly not considered printing members in the usual sense.

German Pat. No. 873,092 illustrates a known but seldom used arrangement for providing embossed printing members. It discloses making an embossed insert to be placed in a frame for support during handling and printing. The insert is of light metal foil which would be easily coiled and is not self-sustain- ing but with which very low-level embossing (e.g., such as is achievable on a typewriter) can give several reasonably legible impressions before replacement is required. The manner in which the foil strip of the German patent is arranged requires, in fact, that it be typewriter embossed, for the strip length dimension is normal to the intended direction of the lines of embossing.

Moreover, this principle of strip supply, displayed in the patents referred to, is wholly inapplicable to the situation to which the present invention is addressed. Material which is strong enough to perform satisfactorily, when embossed, as a durable printing plate in the pertinent applications, is stiff and relatively unyielding. It does not lend itself to being coiled tightly because a tight coil of a stiff metal strip could exceed the elastic limit and lend a curl to the strip which would not be corrected during embossing. A tight coil of a stiff plastic strip would bring into operation the cold flow properties of the plastic, and storage in this condition for any significant length of time would impart a curl which would fail to fully restore itself altogether when a segment had been released from the coil. If such a strip were presented uncoiled to the guides of an automatic embossing machine, it would necessarily project for a long distance beyond the entrance side of the machine which would be wholly unacceptable under office circumstances. Even if the stiff strip could be coiled to some extent to present it to the machine, the inside diameter of the coil would necessarily be large, and a strip of any substantial length would still present a coil perhaps several feet in diameter. Such a coil would project from the entrance side of the machine where it would interfere with the freedom of placement of the machine, especially its placement in juxtaposition with electronic equipment designed to provide it with a supply of data from punched cards or other source material which controls the embossing operation. In any event, the relative awkwardness and unattractiveness when used for office use. A fanfold supply is, of course, out of the question since stiff material of the character in view could not be creased and then expected to straighten itself on demand.

From the foregoing it will be understood that there are essential characteristics of stiffness and elastic limit of the material upon which the work is being done which dictate that it be handled in short pieces by magazine stacking, when employed in automatic embossing machines, rather than in long strips or coils. As a practical matter the stiffness of vinyl plastic credit card material of 0.030 inches in thickness may be considered as a usual degree of stiffness and apparent elastic limit in present application, and an apparent elastic limit corresponding to the stiffness and apparent elastic limit of such vinyl credit card material in thicknesses of 0.018 inches or greater is to be understood as having these critical properties needed to make a durable printing member and which dictate piece handling as opposed to strip or coil handling. To put it in other terms, the material is of such stiffness that a cantilever edge of this beam length is self-supporting without significant deflection, and a 3 inch cantilever 1 inch wide is deflected no more than about 0.500 inches when subjected to a distal end load of 6.65 grams, and the elastic limit or apparent elastic limit will also be at least equal to the apparent elastic limit of such 0.018 inch vinyl credit card material. For purposes of this description, material having the foregoing properties may be described as "stiff enough to be capable of durable printing embossment," and when this expression is used the foregoing properties will be understood to obtain.

As a consequence, the printing members of the present invention are handled according to custom in individual pieces of short length, normally not exceeding about 4 or 5 inches and not in excess of three times the standard vertical dimension. This length or major dimension will be referred to hereinafter as being not greatly in excess of said minor (or vertical) dimension, and when such language is used it will be understood that the foregoing relationship is meant. Accordingly the only accepted commercial practice in automatic embossing machines of this type is to present individual pieces for embossing, and to stack them in magazine feeding normal to the feed track, and collecting the embossed pieces in a similar normally projecting receiving stacker at the other side of the machine.

An object of the invention, therefore, is to develop a method whereby small printing members of stiff material,
whose vertical dimensions are greater than their horizontal dimensions, can be produced efficiently and economically on an automatic embossing machine wherein the elements are fed to the embossing station by tracks or guides embracing the printing members at their top and bottom edges extending parallel to the lines of characters embossed thereon.

Another object is to develop an improved printing member compatible with the novel method.

The objects are accomplished by providing a starting printing member whose horizontal length is a multiple of the length of the final unit member or segment desired and which can have units of information embossed at two or three points therealong. This member is horizontally longer than its height and hence will feed smoothly in the embossing machine guides. When the several unit items of information have been embossed thereon, it is fed out of the machine and then cut transversely of its length into two or three information capsules. These each have the desired properties of being short enough horizontally to avoid unnecessary restriction in the amount of information that can be gathered at one time by combining capsules, and having a vertical dimension sufficient to match the standard vertical spread found in the holding means on the imprinter.

In the drawing:
FIG. 1 is a face view of a starting imprinter member before embossing;
FIG. 2 is a section on line 2-2 of FIG. 1;
FIG. 3 is a plan of the guide tracks in an automatic embossing machine showing the printing members therein;
FIG. 4 is a view of the completed imprinter member after severing into individual capsules;
FIG. 5 is a perspective showing an automatic embossing machine and the arrangement of the magazine, track, and receiving stacker thereon; and
FIG. 6 is a plan view of the bed of an imprinter illustrating how the embossed segments prepared in accordance with the invention are to be used.

In FIGS. 1 and 2 the starting printing member is designated 11 and may consist of a flat sheet of embossable material such as sheet metal or preferably stiff plastic. The vertical dimension is selected so as to match both the guides on an automatic embossing machine and the vertically spaced holding means of the corresponding imprinter. This vertical dimension is accordingly a standard figure as determined by the machine measurements pertaining to the system in which the printing element is to be used. In the form shown this vertical dimension is about 2½ inches, and in most cases a measurement of about 2 inches will be found acceptable. In a preferred form the printing member 11 has one or more score marks or lines of weakening such as 13 which divide it into segments and as a result of which the starting member may be readily broken into separate segments by hand when embossure is complete. The form shown in FIG. 1 is provided with a single line of weakening 13 dividing the printing member into two segments 11a and 11b, although additional score lines dividing the member into more than two segments may be used if desired. The final segments thus obtained are required to be quite short in the direction normal to the break (i.e., parallel to the lines of embossed characters). Each one contains a necessary amount of information when embossed, but it is important that it not usurp any more length on the imprinter bed than necessitated by the information which it carries. Accordingly it is important that the final dimension of each segment parallel to the lines of embossing not be over about three-fourths of the standard height (i.e., not over about 1¼ inches in the usual case) and less where the volume of information permits.

FIG. 5 illustrates the manner in which the printing member is to be handled and embossed. In FIG. 5 is shown an automatic embossing machine 30 associated with electronic data equipment 40 for feeding information to the machine 30 to control the embossing operation. The embossing machine 30 includes rail members 15, 17 and 25 spaced apart a standard distance and forming a track, and an embossing carriage 27 cooperating therewith to guide and move the printing members through the embossing operation.

At the right side of the embossing machine 30 and extending in a direction normal to the track 15, 17, 25 is a magazine 32 into which is loaded a stack of unembossed printing members 11. These are fed, one-by-one, into a position between track members 15 and 17, and then each is stepped along the truck until it is grasped by the carriage 27 which manipulates the printing member during its embossment. The printing member is then shifted into a position between the track members 17 and 25 and stepped along until a transfer mechanism 34 finally places the embossed member in a receiving stacker 36 at the left side of the machine and projecting generally normally to the direction of track extension. As more and more printing members 11 have their embossure completed, they accumulate in a stack projecting outwardly from the machine towards the front.

FIG. 3 illustrates on a larger scale the manner in which the printing member is progressed through the embossing area. The members 11 are fed from right to left between the infed rails 15 and 17 of the automatic embossing machine. As each member reaches the embossing position designated 19, the desired information is applied in the form of a separate information unit embossed on each of the segments 11a and 11b. The member is then fed through an auxiliary processing position 21 and then to the outfeed rails 17 and 25 which guide it to the transfer mechanism 34 of FIG. 5, which then places it in the receiving stacker 36.

When the operator wishes to use the information thus embossed, he takes each member 11 in turn and breaks it along its line of weakening 13 to thereby separate the segments 11a and 11b, or if no lines of weakening are provided, the segments may be separated by cutting.

The operator thus has available to him, as the result of an automatic embossing operation, small information capsules embossed so as to print selectable, closely spaced small units of information when properly assembled in an imprinter, but of such configuration that they could not be efficiently and reliably prepared on automatic embossing equipment in accordance with the procedures hereofore known. These capsules are shown in FIG. 4 wherein it will be noted that the lines of information embossed on the segments are parallel to the shorter sides thereof which normally would not be feasible in the usual automatic embossing procedure.

FIG. 6 illustrates the bed of an imprinter 50 on which the printing segments or information capsules are intended to be used. The bed shown comprises settable variable print wheels 52 and means for holding printing segments or information capsules similar to members 11a and 11b. In this case the segments are designated by reference characters 11x, 11y, and 11z since they are shown as containing slightly different information from that shown in FIG. 4, but will be understood to be the same in all other respects. The segments are held against a ledge 54 by spring fingers 56 which are so spaced from the ledge 64 as to receive a printing member of standard height suited to the spacing of the guides on the automatic embossing machine 30 (FIG. 5). When the capsules are assembled as shown in FIG. 6, an impression of the assembled information is taken by placing a carbon interleaved form over the bed in contact with a positioning ledge 58 and stops 60, 60' or 60'". Then a roller platen (not shown) is passed over the form in pressure contact therewith in the customary manner, and the impression of the assembled information is effected.

It will be noted that the segments, 11a and 11b, (or 11x, 11y, 11z) are of a standard height sufficient to match the guides 15, 17, 25 of the embossing machine 30, which is equivalent to saying that they can be properly received in the vertically spaced card-holding members 54, 56 of a corresponding imprinter 50. They are, however, also narrow with respect to this height, not exceeding three-fourths of its value so as not to usurp valuable data gathering space on the bed of the imprinter, and normally will not exceed 1¼ inches in horizontal measurement as pointed out above.

What I claim is:
1. A method of encapsulating information in small units for subsequent use as printing means on an imprinter equipped with means for holding elements of standard vertical dimension as determined by the system in which they are used, by embossing printable information into the printing elements, which comprises:

- providing a supply stack of unused rectangular printing elements of unequal length-width dimension of material which is stiff enough to be capable of durable printing embossment, the lesser of the two dimensions being equal to said standard vertical dimension;
- feeding the elements one by one from an end of said stack and into embossing position in an embossing machine in a direction parallel to the end of the stack and to the longer dimension of the element by means of guides spaced according to said standard vertical dimension and engaging the longer edges and extending rectilinearly in a direction normal to the stack;
- embossing lines of information on each said element parallel to the longer dimension thereof with each item of information confined to a unitary segment of the element selected as if the element were divided by lines normal to its longer dimension, which segments are of a size such that their longer or standard vertical dimensions are normal to the long dimension of the element;

- feeding the embossed element away from embossing position in a direction parallel to its longer dimension by means of guides engaging the longer edges;
- separating the element into information capsules by dividing along vertical lines between said segments;
- placing the capsules thus formed on the bed of an imprinter having element holding devices whose vertical dimensions correspond to said standard vertical dimension; and taking a printing impression of the thus placed capsules.

2. A method as set forth in claim 1 in which the rectangular printing elements are plastic sheets, which method includes the step of predesignating the segments by scoring the sheets normal to their longer dimension to weaken them, and in which the step of separating each element into information capsules is effected by breaking the element along said lines of weakening.