

[54] **APPARATUS FOR FORMING OPPOSED SCORE LINES BETWEEN ROWS OF CHARACTERS ON ONE OR BOTH SIDES OF A THIN METAL PLATE**

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**Related U.S. Application Data**

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[52] U.S. Cl. .... **83/11, 83/8, 83/51, 83/620**

[51] Int. Cl. .... **B26d 3/08**

[58] Field of Search ..... **83/11, 51, 6, 1, 8, 620; 225/96.5, 96, 93, 97**

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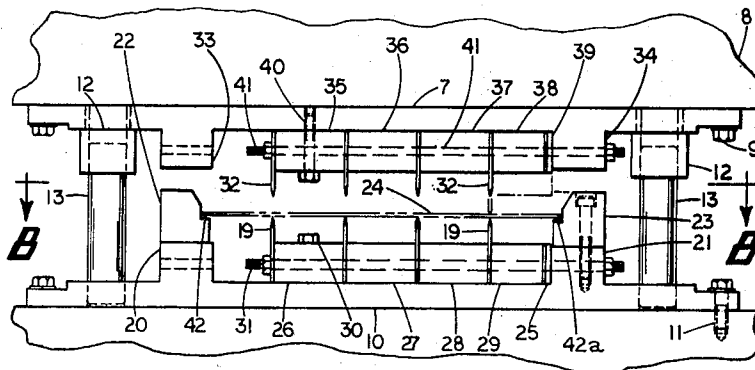
Primary Examiner—Frank T. Yost

[57] **ABSTRACT**

Apparatus for forming oppositely disposed score lines

on a thin metal plate having rows of characters, such as letters, numbers, punctuation marks, and blanks, or a combination of two or more of such characters on one or both sides of the plate. In one form of the apparatus, a reciprocal press is provided having a head plate to which is secured a plurality of spaced downwardly extending blades having converging edge portions and a lower plate is secured to the base of the press and is provided with a plurality of blades, each having tapered upper edge portions for forming score lines in alignment with the upper score lines on the bottom face of the plate. When a thin metal plate rests upon the lower blades and the upper head of the press is moved downwardly it forces the plate on to a pair of spaced abutments and forms score lines between longitudinal or transverse rows of characters upon the upper face of the plate at which time the lower blades form score lines in alignment with the score lines formed on the upper face of the plate which may extend between transverse or longitudinal rows of characters thereon. The score lines may be first formed on both sides of the plate between the transverse rows and then between the longitudinal rows or first between the longitudinal rows and then the transverse rows on one or both sides of the plate. Another modification of the apparatus includes upper and lower shafts having blades thereon by means of which first longitudinal and then transverse score lines may be formed on the opposite sides of the plate between rows on the upper face of the plate or first between transverse rows of characters on one or both sides of the plate and then between longitudinal rows on one or both sides of the plate. Means may also be provided to vary the height of the upper shaft to vary the size of the plate that may be passed between the blades.

**4 Claims, 12 Drawing Figures**



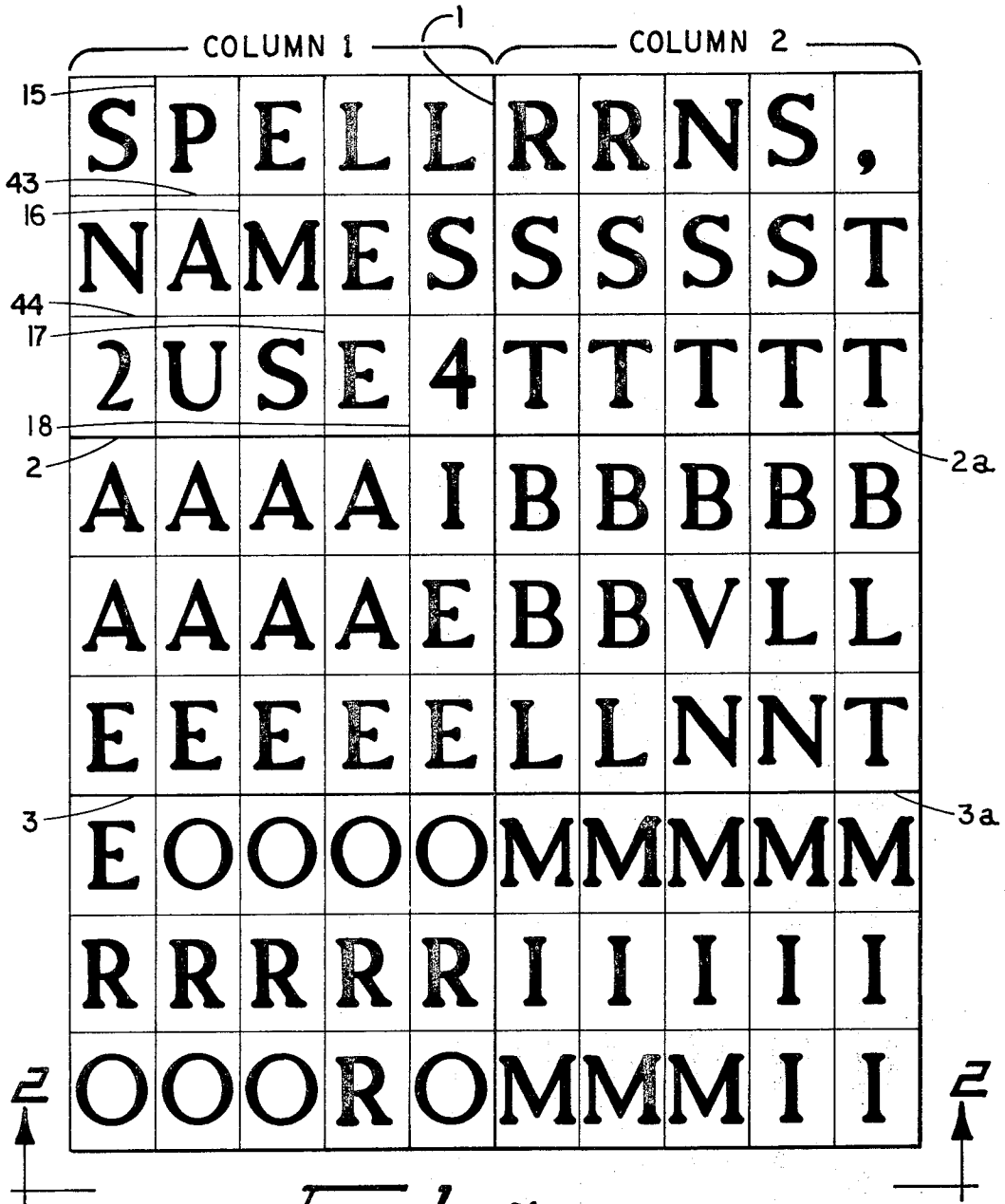


Fig. 1 24

Fig. 2

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COLUMN 3					COLUMN 4				
D	C	Q	X	Z	G	D	C	J	U
Y	P	N	K	H	F	E	C	H	K
J	F	D	X	Z	F	Q	P	H	U
D	C	Y	Z	J	J	V	K	V	H
D	F	G	H	K	P	P	N	V	N
F	C	J	Y	U	V	K	P	L	F
H	K	W	W	W	W	C	J	G	
W	U	G	D	C	V	G	F	D	W
T	G	J	Y	W		.	.	,	,

FIG. 3

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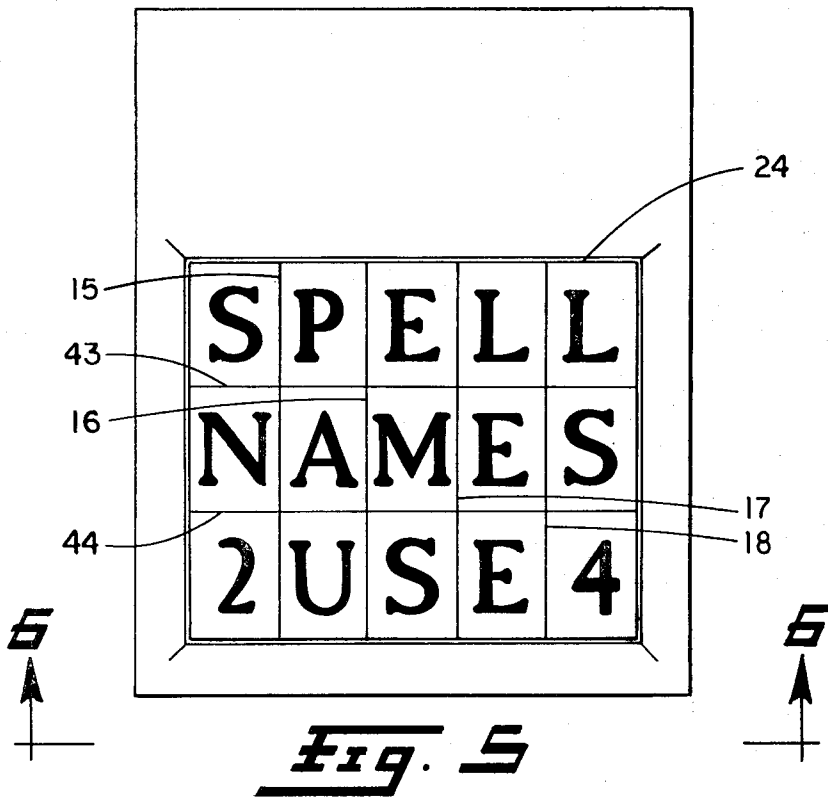
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COLUMN 5					COLUMN 6				
1	2	3	4	5	6	7	8	9	0
1	2	3	4	5	7	8	9	0	6
1	2	3	4	5	8	9	0	6	7
1	2	3	4	5	9	0	6	7	8
1	2	3	4	5	0	6	7	8	9
1	2	3	4	5	8	9	0	6	7
1	2	3	4	5	9	0	6	7	8
1	2	3	4	5	6	7	8	9	0
.	.	.	.	,					

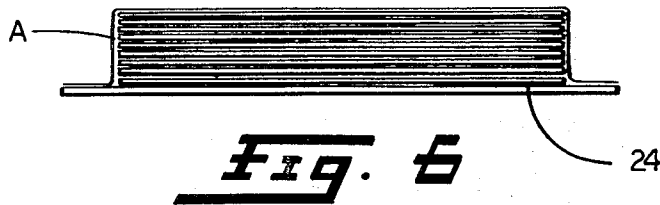
**Fig. 4**

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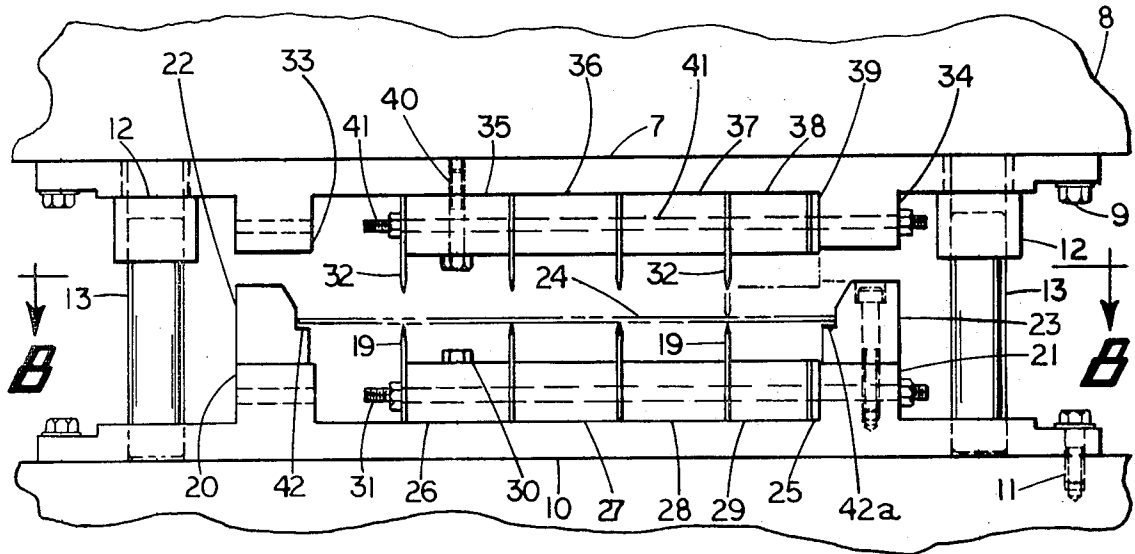


*Fig. 5*

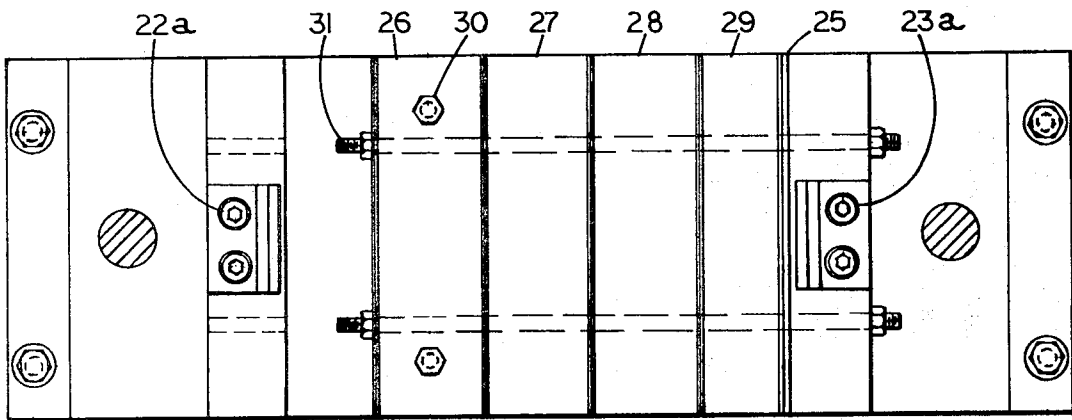


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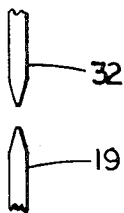
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**Fig. 7**



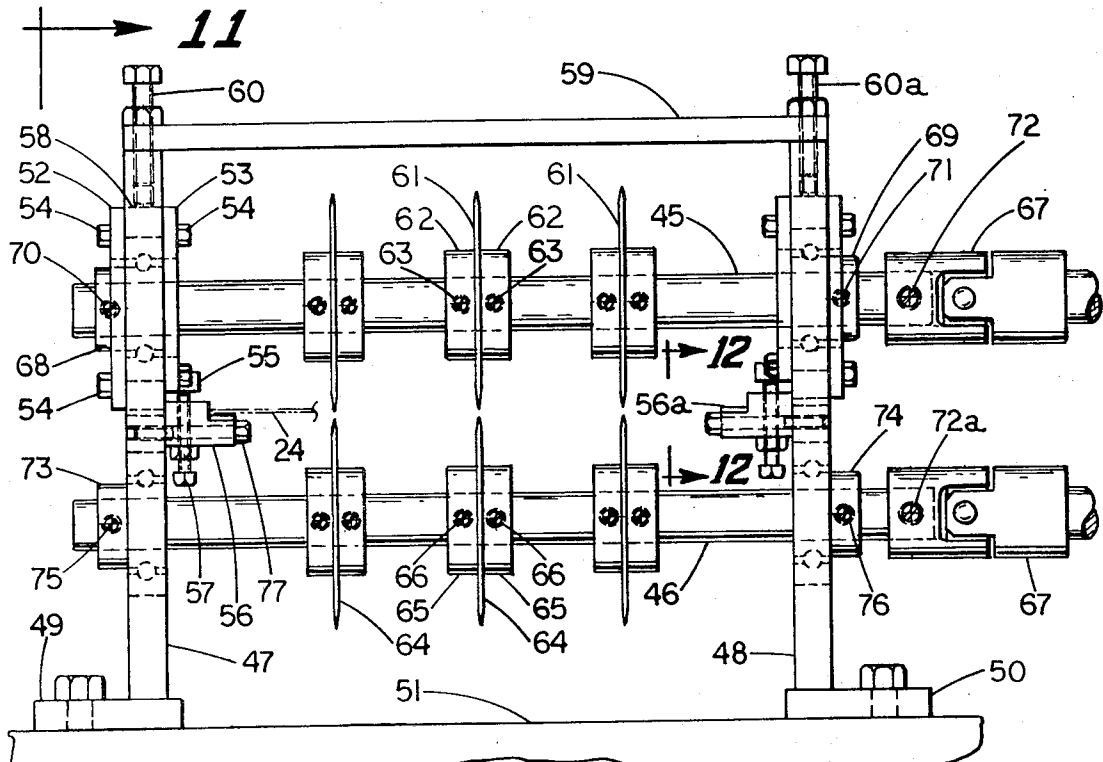
**Fig. 8**



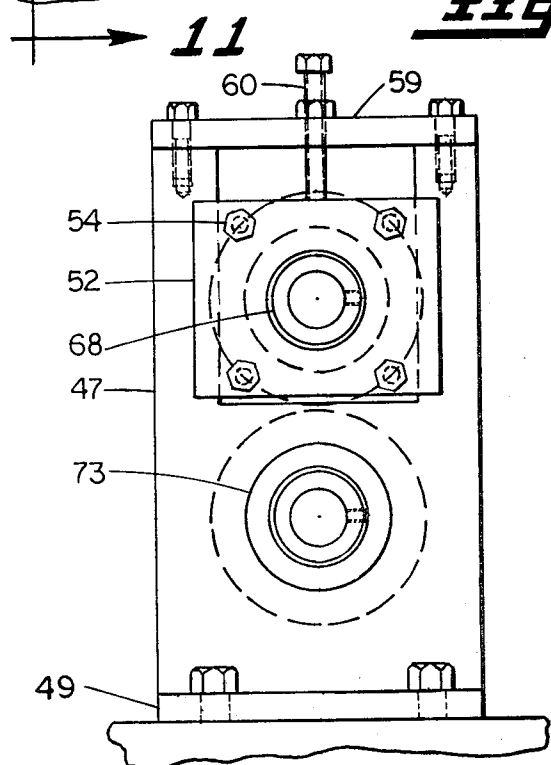
**Fig. 9**

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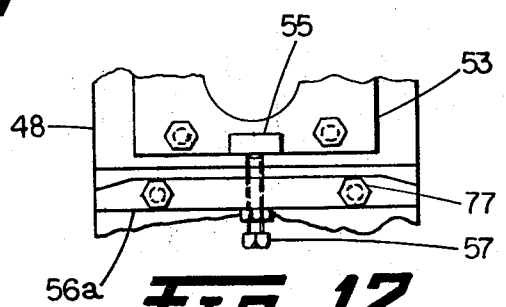
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**Fig. 10**



**Fig. 11**



**Fig. 12**

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## APPARATUS FOR FORMING OPPOSED SCORE LINES BETWEEN ROWS OF CHARACTERS ON ONE OR BOTH SIDES OF A THIN METAL PLATE

The present invention relates to apparatus for use in preparing oppositely disposed score lines between rows of characters, such as letters, numerals, punctuation marks and blanks, or a mixture of two or more of them arranged in horizontal and vertical rows or columns on a thin metal plate from which segments may be snapped off without forming rough edges or burrs and is a division of applicant Ser. No. 870,495 filed in the U.S. Pat. Off. on Oct. 2, 1969 now U.S. Pat. No. 3,626,616.

In providing letters and numerals for preparing signs of any desired type, such as names or names and addresses, it has heretofore been the practice for retail merchants to keep a comparatively large number of letters in stock but because some of the letters of the alphabet are used much more frequently than others, they often become exhausted in which case it has heretofore been necessary for them to order such letters quite frequently. When such letters are ordered individually or in small quantities, however, they are more costly than when supplied in the form of a kit from which the desired letters or numerals may be snapped off without forming rough edges or burrs.

It is an object of the present invention to provide apparatus for forming oppositely disposed indentations or score lines between longitudinal and transverse rows of characters, such as letters, numerals, punctuation marks, blanks, or a combination of two or more of them upon thin metal plates to form a plurality of segments, one or more of which may be easily snapped from a plate without forming rough edges or burrs.

My invention will be better understood by reference to the accompanying drawings in which:

FIG. 1 is a view of one side of a master plate consisting of columns 1 and 2 which may be oppositely scored or from which smaller plates may be cut and oppositely scored in my improved apparatus;

FIG. 2 is an end elevational view of the plate of the plate shown in FIG. 1;

FIG. 3 is the reverse side of the plate shown in FIG. 1 in which column 3 is the reverse side of column 1 and column 4 is the reverse side of column 2;

FIG. 4 is a master plate in which column 5 is the front face of the plate and column 6 may be the rear face of the same plate;

FIG. 5 is a plan view of a letter and number kit, each plate of which has oppositely disposed score lines formed thereon by my improved apparatus;

FIG. 6 is an end elevational view of the kit shown in FIG. 5;

FIG. 7 is a side elevational view with parts broken away of one form of my improved apparatus for indenting or forming oppositely disposed score lines between rows or columns of characters or blanks on a thin metal plate;

FIG. 8 is a sectional plan view on a plane passing through the line 8—8 of FIG. 7 of the apparatus shown in FIG. 7;

FIG. 9 is an enlarged view showing the shape of the end portions of the opposing upper and lower scoring blades shown in FIGS. 7 and 8;

FIG. 10 is a side elevational view of a modified apparatus for forming opposed score lines between longitu-

dinal and transverse rows of characters on a thin metal plate to form a plurality of segments which may be snapped from the plate;

FIG. 11 is an end elevational view of the apparatus shown in FIG. 10 taken on a plane passing through the line 11—11 of FIG. 10; and

FIG. 12 is a detail elevational view taken on a plate passing through the line 12—12 of FIG. 10, looking in the direction of the arrows.

To provide a numbering and lettering kit or packet containing a larger number of those letters which are more frequently utilized in preparing names and signs than other letters, the alphabet may be divided into primary letters, secondary letters, and tertiary letters. It has been found that according to the frequency of their use in signs of various types, such as names, or names and addresses, the letters A, C, E, I, J, N, O, S, and T may be considered primary letters, the letters B, D, F, H, K, L, P, R, W, and V may be considered secondary letters, and the letters G, Q, X, Y, and Z, may be considered tertiary letters. In preparing a kit or packet consisting of thin metal plates, each of which has been divided into segments by oppositely disposed score lines formed between longitudinal and vertical rows, approximately eight to eleven of each of the primary letters, approximately six or seven of each of the secondary letters, and approximately two to five of each of the tertiary letter of the alphabet are formed on one or both sides of the segments of the plate. When characters, such as letters, are provided on both sides of a segment, care must be exercised not to utilize all secondary or tertiary letters on the opposite sides of segments bearing primary letters on one side.

In each packet approximately forty pairs of Kraft strips are also provided having a pressure sensitive adhesive between each pair and in the event it is desired to apply a pressure sensitive adhesive to the back of a letter or numeral, one of the thin Kraft paper strips is removed, the exposed pressure sensitive adhesive, together with the other Kraft strip is applied with the adhesive facing the back of the letter or numeral. The other Kraft backing strip is then removed and the letter or numeral with the pressure sensitive adhesive thereon may be applied to the desired object, such as a mail box, a golf club bag, luggage, boats, counters, trucks, and the like. It will also be understood that instead of printing the letters, numerals, or punctuation marks on both sides of a master plate, they may be applied to only one face of the plate and when oppositely disposed score lines are formed by my improved apparatus between the longitudinal and transverse rows, segments are formed which may be broken off or snapped from the plate and if desired may be arranged in the proper order in U-shaped grooves in a holder or bracket, or when a pressure sensitive adhesive is applied to the rear of a segment bearing a character, such as a number or letter in the manner specified, the letter or number may be applied to any desired object. For instance, the letters or numbers may be applied to a mail box to indicate the name and address of the rural delivery number of the owner. The Kraft strips when used are coated with silicone or wax to enable them to be readily pulled from the pressure sensitive adhesive without removing the adhesive. The pressure sensitive adhesive may be of any well known type which is capable of resisting the temperature to which it is subjected in service or a mixture of a pressure sensitive adhesive and a thermally



setting adhesive may be used. Numerous examples of pressure sensitive adhesives and the mixture of a pressure sensitive adhesive with a thermally setting adhesive are disclosed in U.S. Pat. No. 3,117,902 granted on Jan. 14, 1964.

To provide plates of the desired size having numerals thereon, a third master plate is provided as shown in FIG. 4, the numbers in column 5 being printed, such as by the silk screen process, on the front face of the plate and the numerals in column 6 being printed in a similar manner on the reverse side thereof. It will be noted that in column 5 all of the rows except the last one have the numerals 1, 2, 3, 4 and 5 printed thereon whereas the last row includes four periods and a comma, and in column 6 which is on the reverse side of the plate containing the numerals in column 5, all of the rows of the plate have printed thereon the numerals 0, 6, 7, 8 and 9 with the exception of the last row which consists of five blank segments. The printing of the numbers on the reverse side of the plate as shown in column 6 provides a reserve of the high numbers of the series in the event that a substantial number of certain numerals of the lower group are used. It will of course be understood that instead of printing the numbers shown in column 6 on the reverse side of the plate containing column 5, a separate plate may be provided upon which may be printed the numerals shown in column 6. It will also be noted that the number of each of the numerals to be utilized in the packet including the numerals 2 and 4 in column 1 of FIG. 1 provide nine of each of the numerals 2 and 4 and eight of each of the other numerals.

As shown in FIG. 5, a packet of plates may be provided having printed on one or both sides a plurality of letters or numbers, or a mixture of letters, numbers, and punctuation marks, and including a sufficient number of blanks to enable the formation of names, names and addresses, or other signs. In accordance with my invention, the individual letters and blanks on the plates are scored or indented on opposite sides in such a manner that individual segments upon which is printed letters, numbers, punctuation marks, or which has a blank face, may be easily broken or snapped from the plate without forming rough edges or burrs and while the printing may be formed upon one or both sides of the smaller plates, for economical reasons, master plates may be first prepared which are subsequently divided into smaller plates to prepare the improved packet. As shown in the drawings, one or more master plates are first prepared on which are printed a comparatively large number of letters, numerals, and punctuation marks. The master plate is then subdivided into a plurality of plates of smaller size which may be scored in my improved apparatus and then packaged and secured to a card board to form a letter and numbering kit as shown in FIG. 5 which has a space above the packet for receiving advertising. It is to be understood, however, that if desired, the letters or numerals or mixture thereof, may be printed on one or both sides of smaller plates. As shown in FIG. 1, a master plate is divided into column 1 and column 2, a series of letters being printed on the plate in rows in column 1 with the exception of the third row which has two numbers and in a like manner, column 2 has printed in rows thereon a series of letters with the exception of the first row which contains a comma.

In column 4 of FIG. 3 which is on the reverse side of column 2 shown in FIG. 1, the plate contains all letters except the last row which has one blank face, two periods, and two apostrophes.

Numerals for rural route or house numbers may also be included in the packet which are scored by my improved apparatus so that they may be easily snapped from the plate without forming rough edges or burrs. The plates consisting principally of numerals may be of a size corresponding to the size of the plates having letters thereon. For instance, each plate may contain three rows of numerals, or two rows of numerals and a row of punctuation marks as shown in column 5 of FIG. 4, or as shown in column 6 of FIG. 4, all rows may have printed thereon the numerals 0, 9, 8, 7, and 6 except the last row which contains blanks. If desired, and particularly if column 6 is printed on the reverse side of column 5, the numerals in the vertical rows of column 6 are arranged in staggered relation to each other as shown so that the same numeral in column 6 will not always be arranged on the opposite side of a particular numeral in column 5.

While the plate used in the packet may be of any desired size, and I do not desire to be limited in this respect, to provide a packet of plates that may be conveniently hung on a Peg Board or on a suitable display fixture, the plates are preferably of a size smaller than that shown in FIGS. 1 to 4 and in accordance with my invention the oppositely disposed score lines may be formed upon the smaller size plates so that the individual segments may be snapped from the plate when desired. For convenience in printing, however, the letters, numerals, punctuation marks and blanks are preferably prepared on a comparatively large master plate and are subsequently divided into plates of a convenient size for packaging.

When column 3 is printed on the reverse side of the plate opposite to column 1 as shown in FIG. 1 and column 4 is printed on the reverse side of the plate opposite to column 2 of FIG. 1, the cutting of the master plate along the lines 1, 2, 2a, 3 and 3a will form six conveniently sized plates having principally letters thereon but one of which has two numerals thereon, a second of which has a comma thereon, and a third of which has a blank, two periods, and two apostrophes thereon, and the remaining three plates being formed entirely of rows of letters. The blanks and punctuation marks, however, may be arranged in any one or more of the rows on the plates.

When the numerals in column 6 are arranged on the reverse side of those printed in column 5, the cutting of the master plate into three smaller plates provides plates of the desired size to fit into the packet shown in FIG. 5. As shown in FIG. 4, however, the numerals in column 6 are printed on the master plate on the same side as columns 5 in which case, the master plate may be first cut along the line 6 to divide it into columns 5 and 6 and column 5 may be cut along the lines 4 and 5 column 6 may be cut along the lines 4a and 5a to form six smaller sized plates, all of which are of the desired size to fit within the packet.

The number of letters, numerals, blanks, and punctuation marks, may of course be widely varied although it evidently should contain in the packet more of the primary letters of the alphabet than secondary letters and more of the secondary letters than tertiary letters. As shown in the drawings, a packet made from the

plates will have 172 letters, 82 numerals, six periods, two commas, five blanks, and two apostrophes from which a comparatively large number of signs may be made.

As shown in FIG. 5, the packet of plates may be protected by a transparent polymeric resin A sold under the trade name Surlyn which is tough and resistant to solvents. Surlyn D which is a copolymer of ethylene with a small amount of sodium methacrylate or methacrylic acid, and copolymers of vinylidene chloride and vinyl chloride which is sold under the trade mark Saran may also be used.

After plates of the desired size having longitudinal and transverse rows of letters, numerals, punctuation marks, and blanks or mixtures thereof on one or both sides of the plates have been prepared or after master plates are first prepared having such longitudinal and transverse rows of letters, numerals, punctuation marks and blanks, or a mixture thereof, on one or both sides as shown in FIGS. 1 to 4 of the drawing which plates are then cut to the desired size for convenient packaging, I provide apparatus for scoring or providing indentations on the opposite sides between the transverse and longitudinally extending rows on one or both sides of each plate, and while various apparatus embodying the essential features of the invention may be used for this purpose, as illustrated in FIGS. 7 and 8, a portion of a motor driven press is shown having an upper head plate 7 secured to the movable part 8 of a press by suitable means, such as screws 9, and a lower base plate 10 which is secured to the lower portion of the press by screws 11.

The upper portion of the press is reciprocated by a motor having the usual fly wheel associated therewith to move the upper head downwardly toward and upwardly away from the base plate 10, the upper head plate having oppositely spaced bushings 12 which are secured by suitable means, such as welding or a press fit in the upper head plate 7 to receive spaced guide posts which are secured to the lower base of the press in a similar manner.

In accordance with the present invention, apparatus is provided for first scoring or forming indentations simultaneously on the opposite sides between the longitudinal or transverse rows of letters, numerals, punctuation marks, blanks, or mixtures thereof, formed on the plates. As illustrated in FIGS. 7 and 8, means are shown for forming four transverse score lines 15, 16, 17 and 18 on the opposite sides of each plate as shown in the first column of FIG. 1. For this purpose spaced blades 19 are secured to the base plate in any suitable manner. The base plate also has two upwardly extending supports 20 and 21 upon which rests blocks 22 and 23, respectively, which form abutments for the opposite end portions of a metal plate which is designated by the numeral 24.

The lower blades 19 have converging upper end portions as shown in FIG. 9 and are maintained in spaced relation from support 21 by a shim 25 and from each other by metal blocks 26, 27, 28 and 29. For securing the spacers to the bed plate and to hold them in compact relation with each other, a pair of screws 30 extend through spacer 26 which terminates within the base plate and a pair of bolts 31 extend through the support 21, and aligned apertures in the blades and spacers to hold them in their assembled position.

The upper blades 32 are secured to the head of the press in a somewhat similar manner. As shown, the head of the press is provided with downwardly extending supports 33 and 34 and the blades are maintained in spaced relation by metal blocks 35, 36, 37 and 38. Block 38 in turn is maintained in spaced relation to the support 34 by a shim 39. As shown, block 35 is secured to the head of the press by screws 40 and by bolts 41, only one of which is shown. The bolts 41 extend through aligned apertures in the blades, the metal blocks 35, 36, 37, 38 and shim 39, and the support 34.

As illustrated in the drawings, the plate to be scored may be placed in position to rest upon the upper edges of the blades 19 and is slightly tapered at its end portions which terminate a slight distance above the abutments 42 and 42a on the blocks 22 and 23 which blocks are secured to supports 20 and 21 by screws 22a and 23a.

Each of the upper blades has an upper flat edge and a downwardly extending free end portion having converging faces and which is arranged in opposed relation to one of the upper edge portions of a lower blade and as the head of the press descends, the upper blades strike the thin metal plate and score or indent the upper surface of the plate between transverse rows of letters, numerals, punctuation marks, and blanks, or mixtures of two or more of them, and forces the plate downward against abutments 42 and 42a at which time the lower blades simultaneously score the opposite side of the plate when the opposite side of the plate is blank, or between rows of letters, numerals, punctuation marks and blanks, or mixtures of two or more of them when rows of such characters are printed upon the lower face of the plate.

The press is so set that when the opposite ends of the plate rest upon the abutments 42 and 42a, the head of the press begins to rise before either the upper or lower blades severs the plate. The plate is thus scored or indented on opposite sides but sufficient metal still extends between the oppositely disposed score lines to provide an integral plate.

To score the plate longitudinally as shown in FIG. 1, a pair of upper blades 32 and a pair of lower blades 19 are provided to score or indent the lines 43 and 44 on the opposite sides of the thin metal plates. In such case, two upper and two lower blades may be removed from the press or a separate press may be provided having only two upper blades 32 and two lower blades 19 when the plates being scored are of the size shown in FIG. 5. To remove two of the upper blades and two of the lower aligned blades, the nuts on the right hand end of rods 41 and 31 may be removed and blocks of the desired size may be provided to space the blades the desired distance apart. In either case, it will of course be understood that each of the plates is divided into segments bordered on all sides by oppositely disposed upper and lower score lines and each segment bears one or more blank faces or one or more characters and may be snapped from the plate without forming rough edges or burrs.

It will of course be apparent that by providing a large number of blades, a larger number of score lines may be formed between the transverse or longitudinally extending rows during a single downward movement of the press. It will also be understood that instead of forming oppositely disposed score lines between the

transverse rows of the plate first, they may be formed between the longitudinal rows first and then between the transverse rows. In either case, the blade is divided into square or rectangular shaped segments bordered on all sides by upper and lower aligned score lines, each of which segments bears a blank face or a character on one or both sides of the plate, any one or more of which segments may be snapped from the plate without forming rough edges or burrs.

In my improved apparatus, the depth of penetration of the score lines on opposite sides of each segment should be such that a sufficient amount of metal remains intermediate the score lines to hold the segments together. The metal between the score lines, however, must be capable of being easily broken by a slight pressure to enable each segment to be snapped off without leaving rough edges or burrs when it is desired to separate letters, numerals, punctuation marks or blanks from a plate. Generally stated when the metal is approximately 0.016 of an inch thick, the thickness of the metal between the score lines may range from approximately 0.0001 to 0.0002 of an inch. When the metal is thinner, the score lines on the opposite sides of the plate may be as small as 0.001 of an inch.

For preparing score lines or indentations on the upper and lower sides between transverse or longitudinal rows of letters, numerals, punctuation marks or blanks, or between rows of a mixture of two or more of them, another form of my invention is shown in FIGS. 10 to 12. As shown, the apparatus includes an upper driving shaft 45 and a lower shaft 46, which may be a driving or a driven shaft. The opposite ends of each of the shafts are rotatably mounted in ball bearings in or associated with frames 47 and 48, respectively. To provide a stable structure, each of the frames has a lower outwardly extending flange 49 and 50, respectively, which may be secured to a base plate 51 by suitable fastening means, such as screws or bolts.

In the apparatus shown in FIGS. 10 to 12, inclusive, the upper shaft is adjustable upwardly and away from and downwardly toward the lower shaft to permit plates of varying thickness to be passed between the upper and lower blades and for regulating the depth of the score lines or indentations between rows of letters, numerals, punctuation marks, or blanks, or a combination of two or more of them on the upper side of the plate and the depth of the score lines on the reverse side of the plate or between rows of letters, numbers, punctuation marks, or blanks, or a combination of two or more of them on the reverse side of the plate. For this purpose, the upper portion of each of the frames is provided with a central opening into which a rectangularly-shaped bearing block 58 fits with its opposite sides slidably engaging the opposite sides of the opening in the frame. Each of the bearing blocks is provided with a central circular opening for receiving the opposite end portions of the upper shaft and a circular recess which forms the outer race of the bearing balls of the upper shaft.

To enable the upper shaft to be raised, retaining plates 52 and 53 are arranged on opposite sides of each of the upper portions of each frame through which fastening means, such as bolts 54, extends which bolts also extend through apertures in the bearing blocks 58. Also extending inwardly from each inner retaining plate is a lug 55 and from each frame guides 56 and 56a are secured which serve to direct metal plates into the appa-

ratus and for varying the height of shaft 45, screws 57 which may be finely threaded to provide precision in the distance that the upper shaft may be raised or lowered, pass through the inner portion of guides 56 and 56a to vary the distance of the upper shaft from the lower shaft. It will of course be understood that the bearing blocks 58 while preventing sidewise movement of the upper shaft permits vertical movement thereof and that there is a slight clearance between the bearing blocks 58 and the retaining plates 52 and 53 in each of the frames to permit upward movement of the shaft when screws 60 and 60a which pass through frame 59 are released. To permit downward movement of the upper shaft, screws 57 may be released at which time the upper shaft may be lowered to position it at the desired distance from the lower shaft. At this time the lower screws 57 are again tightened and the upper screws 60 and 60a are threaded downwardly to maintain the upper shaft in the desired position.

For cutting transverse score lines in the plate, the upper shaft is provided with a series of spaced blades 61, each of which has an outer edge portion provided with converging faces and each of which blades is held in place on the upper shaft by collars 62 secured to shaft 45 by suitable means, such as screws 63. In a like manner, the lower shaft 46 is provided with a corresponding number of spaced circular blades 64, each of which has an outer edge portion provided with converging faces and each of which lower blades is held in position on the shaft 46 by collars 65 affixed to the shaft by suitable means, such as screws 66. As shown, each of the lower blades is arranged in vertical alignment with one of the upper blades.

The shafts 45 and 46 may be connected to a prime mover, such as a motor, not shown, by a universal joint 67 which permits the height of the upper shaft to be varied or if desired the upper shaft may be connected through a universal joint to the prime mover and the lower shaft may be driven by the work as the plate is forced between the shafts. Shaft 45 may be connected to the inner race of the upper ball bearings by suitable fastening means, such as screws 70 and 71 and the upper portion of the universal joint by fastening means, such as screw 72. In a like manner, shaft 46 is connected to the inner race of the lower ball bearings by set screws 75 and 76, respectively, and to the lower portion of the universal joint by a screw 72a and to vary the spacing of the blades on each of the shafts from each other to vary the size of the segments, set screws 63 and 66 passing through each of the upper and lower collars, respectively, may be loosened or removed and the blades may be reset in aligned upper and lower relation at the desired distance from each other.

To remove one of the plates on each shaft, such as when preparing longitudinal lines 43 and 44 as shown in FIG. 1, screws 70 and 71 passing through the inner races of the ball bearings for the upper shaft may be loosened and screw 72 connected to the universal joint 67 may be removed and the shaft moved to the left as shown in FIG. 10 at a sufficient distance to permit the removal of one of the blades at which time the shaft may be returned to its original position.

One of the blades may be removed from the lower shaft in a similar manner. As shown, shaft 46 may be connected to and driven by the prime mover or it may be driven through the plate being scored when the upper shaft is rotated. To remove one of the blades

from the lower shaft, set screws 75 and 76 which pass through the inner races of the bearing associated with shaft 46 may be loosened and the screw 72a associated with the universal joint or an outlet shaft, may be removed and the shaft moved to the left at which time one of the blades may be removed. The lower shaft may then be returned to its original position at which time the set screws 75, 76 and 72a may be tightened. The remaining upper and lower blades on the upper and lower shafts may then be reset in aligned relation to provide opposed longitudinal score lines or indentations in the upper and lower sides of the plates which score lines may be between rows of letters, numerals, punctuation marks, and blanks, or two or more of them on one or both sides of the plate.

In my improved apparatus as shown in FIGS. 10 to 12, the plate to be scored or indented is passed or driven over guides 56 and 56a which are firmly held in place by screws 77 secured to each frame and as shafts 45 and 46 are rotated in opposite directions, the blades score or indent the plate to provide oppositely disposed upper and lower score lines or indentations between segments having a blank thereon or on which a letter, numeral or punctuation mark, may be printed on one or both sides which score lines are of sufficient depth to enable the segments to be easily snapped or broken off without forming rough edges or burrs.

What is claimed is:

1. Apparatus for forming upper and lower opposed score lines between first parallel rows of characters formed of letters, numerals, punctuation marks, or a mixture of one or more of such characters and one or more blank faces, and then forming opposed score lines between second parallel rows of similar characters or a mixture of one or more of such characters and one or more blank faces extending in a direction normal to the first parallel rows on a thin rectangular plate of substantially uniform thickness, said apparatus including a plurality of spaced upper blades, each having a lower free edge portion, and spaced lower blades, each extending in a direction between the first parallel rows of characters on said plate and each of which lower blades has an upper unbroken edge portion which extends toward the downwardly extending edge portion of an upper blade with the upper portion of each of the lower blades being arranged in opposed relation to the edge portion of an upper blade throughout its entire length, said apparatus having means for causing a first downward movement of at least the upper blades to cause the downwardly extending edges of the upper and the lower blades to penetrate opposite sides of the thin plate between the first parallel rows of characters and to form opposed upper and lower score lines between second parallel rows of characters or a mixture of one or more of such characters and one or more blank faces extending in a direction normal to the first parallel rows during a second downward movement of at least the upper blades of the apparatus when the plate is again inserted between the blades with the second parallel rows of characters or a mixture of one or more of such characters and one or more blank faces extending normal to the first parallel rows, the apparatus being in the form of a press having a base plate, an upper reciprocable head, a plate secured to said head, means for securing spaced upper blades, each having a downwardly extending edge portion, to the head plate, means for securing lower blades to the base plate, each of which has

an upper edge portion in alignment with a downwardly extending edge portion of an upper blade, a pair of spaced blocks connected to the opposite ends of the base plate, each of which has an abutment thereon arranged a short distance below the upper edges of the lower blades, and said press being so set that during first downward movement of the upper blades, they engage the thin plate resting upon the upper edges of the lower blades and move it downwardly to form score lines in the lower face of thin plate and then forces to the opposite ends of said plate into engagement with said abutments at which time the edges of the upper blades are forced into the upper face of said plate to form score lines therein which are arranged in opposed relation to the score lines formed upon the lower face of said plate between rows of characters or a mixture of one or more of such characters and one or more blank faces extending in the first direction, and said upper and lower blades being so settable relative to each other that portions of the plate remaining between each of the upper and lower score lines on each downward movement of the upper blade has sufficient strength to hold the segments of the plate so formed between said score lines intact but in which the score lines bordering each segments have sufficient depth that segments of the plate formed by the movement of at least the upper blades between longitudinal and vertical rows of characters or one or more of such characters and one or more blank faces may be snapped from the plate without forming rough edges or burrs.

2. Apparatus for forming upper and lower opposed score lines between first parallel rows of characters formed of letters, numerals, punctuation marks, or a mixture of one or more of such characters and one or more blank faces, and then forming opposed score lines between second parallel rows of similar characters or a mixture of one or more of such characters and one or more blank faces extending in a direction normal to the first parallel rows on a thin rectangular plate of substantially uniform thickness, said apparatus including a plurality of spaced upper blades, each having a lower free edge portion, and spaced lower blades, each extending in a direction between the first parallel rows of characters on said plate and each of which lower blades has an upper unbroken edge portion which extends toward the downwardly extending edge portion of an upper blade with the upper portion of each of the lower blades being arranged in opposed relation to the edge portion of an upper blade throughout its entire length, said apparatus having means for causing a first downward movement of at least the upper blades to cause the downwardly extending edges of the upper and the lower blades to penetrate opposite sides of the thin plate between the first parallel rows of characters and to form opposed upper and lower score lines between second parallel rows of characters or a mixture of one or more of such characters and one or more blank faces extending in a direction normal to the first parallel rows during a second downward movement of at least the upper blades of the apparatus when the plate is again inserted between the blades with the second parallel rows of characters or a mixture of one or more of such characters and one or more blank faces extending normal to the first parallel rows, the apparatus being in the form of a press having a base portion and an upper reciprocating head, a plate secured to said head, means for securing upper blades of like length in spaced rela-

tion to each other to said head plate, means for secur-  
ing blades or like length in spaced relation to each  
other and to the lower base plate, each of which lower  
blades is in vertical alignment with an upper blade, a  
pair of spaced blocks secured to the lower plate, each  
of which has an abutment thereon which terminates a  
short distance below the upper edges of the lower  
blades and said press being so set that during its down-  
ward movement the upper blades force the thin plate  
downwardly to cause the upper edges of the lower  
blades to form score lines in the lower face of the thin  
plate between parallel rows of one or more characters  
or a mixture of one or more characters and one or more  
blank faces extending in one direction on said plate and  
as the upper blades force said thin plate into engage-  
ment with said abutments, the lower edges of the upper  
blades form score lines in the upper face of the thin  
plate in opposed relation to the lower score lines and  
said upper and lower blades being so settable relative  
to each other that portions of the plate remaining be-  
tween each of the upper and lower score lines on each  
downward movement of the upper blade has sufficient  
strength to hold the segments of the plate so formed be-  
tween said score lines intact but in which the score lines  
bordering each segments have sufficient depth that seg-  
ments of the plate formed by the movement of at least  
the upper blades between longitudinal and vertical  
rows of characters or one or more of such characters

and one or more blank faces may be snapped from the  
plate without forming rough edges or burrs.

3. Apparatus as defined in claim 2 in which the num-  
ber of upper and lower blades in the press may be var-  
ied and the thin plate is provided with second rows of  
characters or second rows of one or more characters  
and one or more blank spaces extending in a direction  
normal to the first rows or like characters or a mixture  
of one or more of such characters and one or more  
blank faces so that when the plate is again inserted be-  
tween the blades of the press in a direction perpendicu-  
lar to its first insertion, rectangular segments may be  
formed during a second reciprocation of the press con-  
taining characters or blank faces, any one of which may  
be snapped from the plate without forming rough edges  
or burrs.

4. Apparatus as defined in claim 2 in which the thin  
plate has parallel and vertical rows of characters on  
both sides and the number of the upper and lower  
blades may be varied so that after score lines are  
formed between first parallel rows of characters on  
both sides of the plate, the plate may be inserted be-  
tween the blades to provide second parallel rows of  
score lines extending normal to the first rows to provide  
rectangular segments having characters or blank faces  
thereon, any one of which may be snapped from the  
plate without forming rough edges or burrs.

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