

[54] **TAPE EMBOSSING TOOL**

[75] Inventor: **Curt A. Poulton**, St. Paul, Minn.

[73] Assignee: **Minnesota Mining and Manufacturing Company**, St. Paul, Minn.

[22] Filed: **Oct. 12, 1973**

[21] Appl. No.: **406,110**

[52] U.S. Cl. **197/6.7; 101/18**

[51] Int. Cl. **B47j 1/30**

[58] Field of Search **197/6.2, 6.6, 6.7; 101/18**

[56] **References Cited**

UNITED STATES PATENTS

3,263,790	8/1966	Bremer et al.	197/6.7
3,263,791	8/1966	Pedersen et al.	197/6.7
3,280,954	10/1966	Bremer et al.	197/6.7
3,372,787	3/1968	Humphrey et al.	197/6.7
3,389,772	6/1968	Sjogren et al.	197/6.7

Primary Examiner—Edgar S. Burr

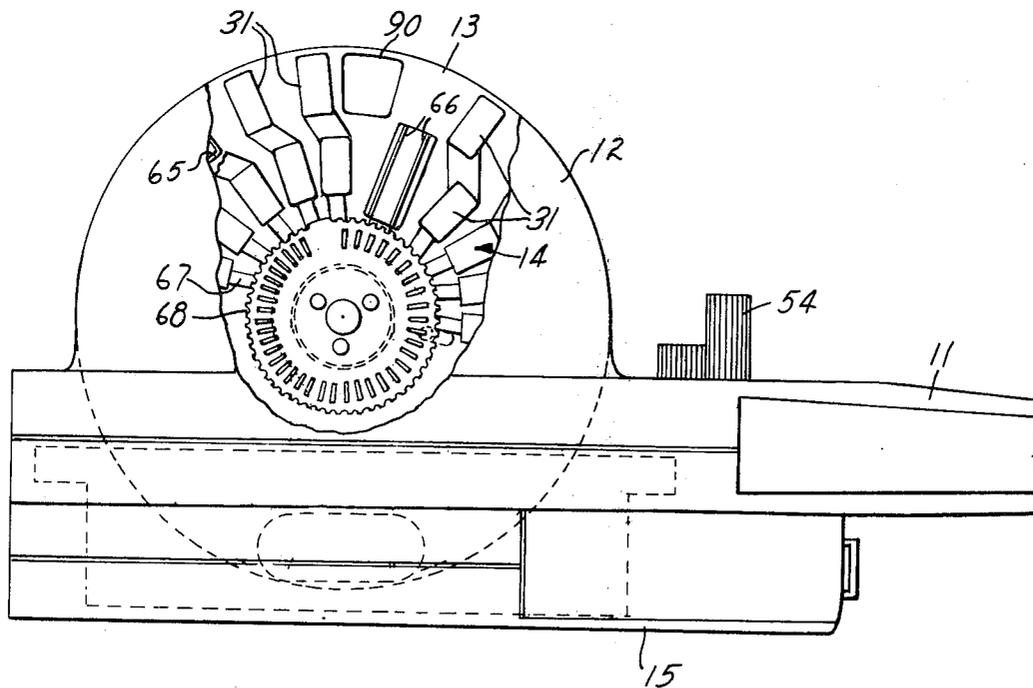
Assistant Examiner—Paul T. Sewell

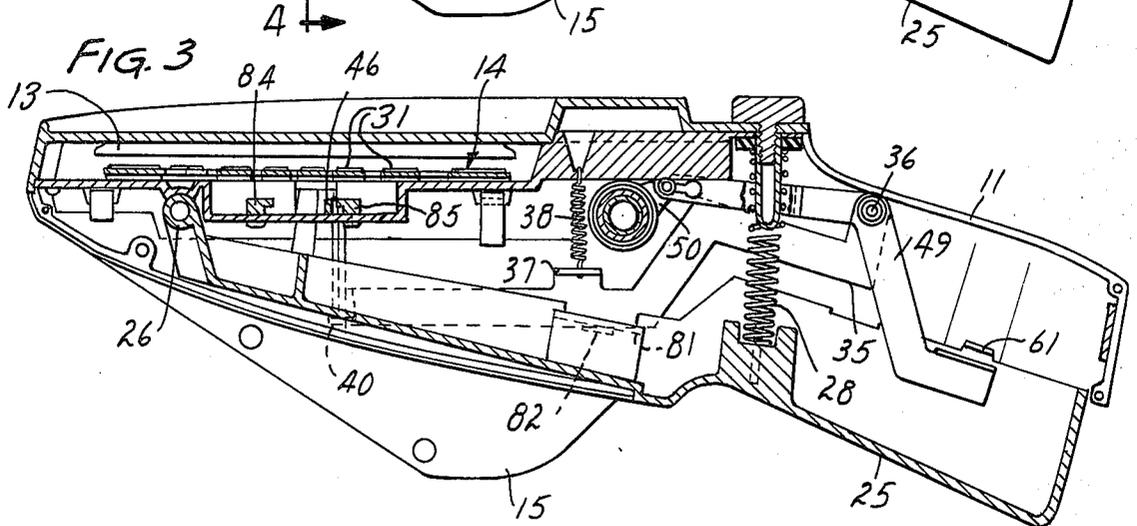
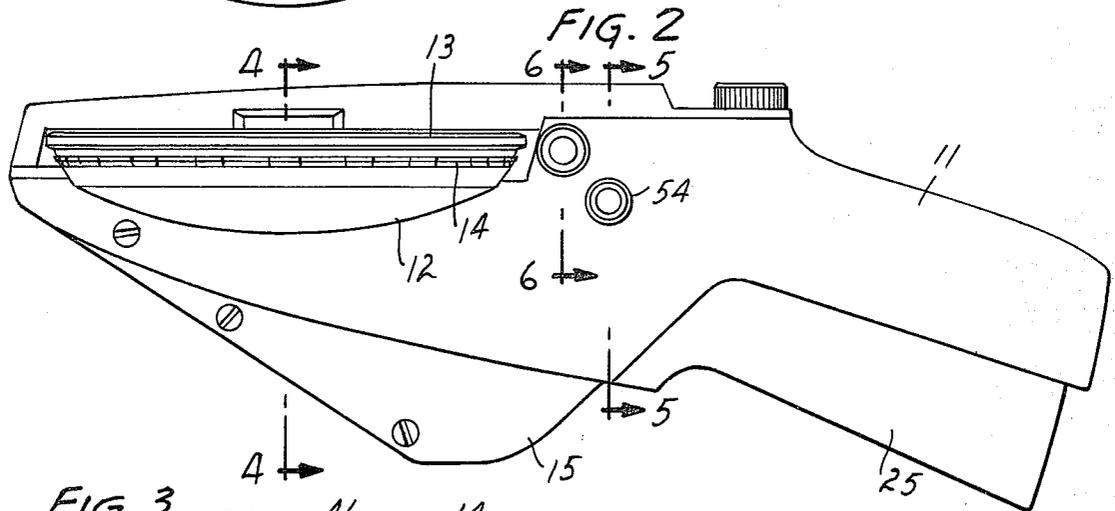
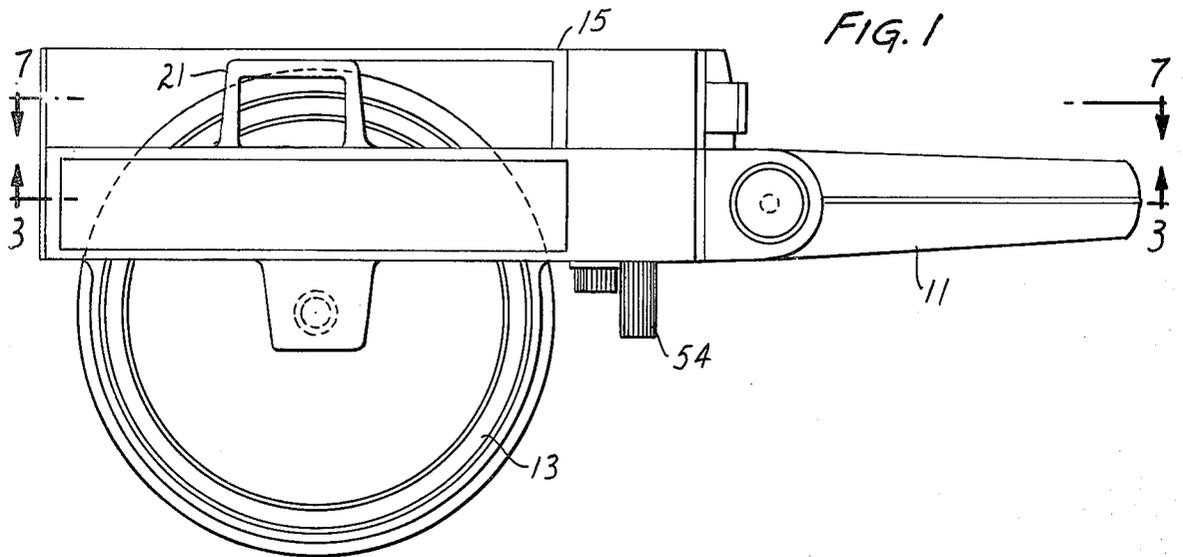
Attorney, Agent, or Firm—Alexander, Sell, Steldt & Delahunt

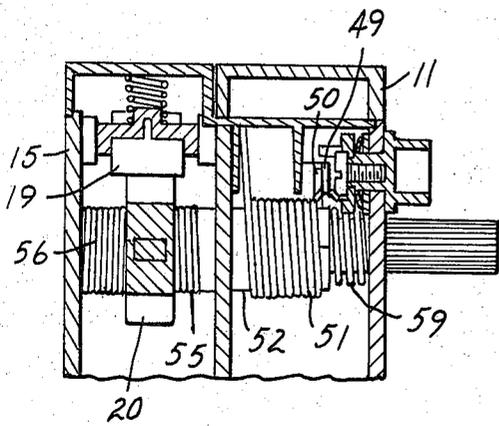
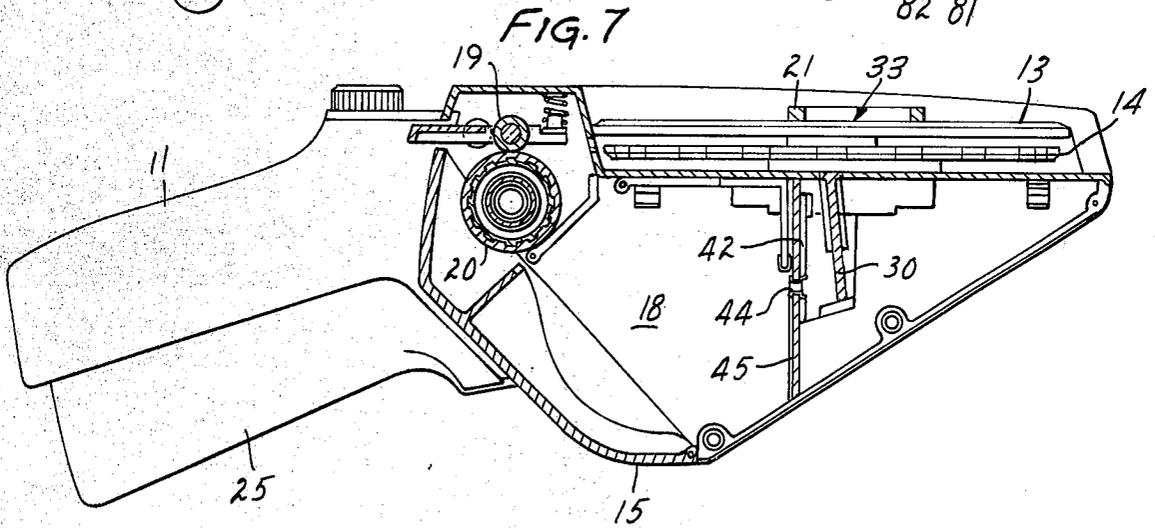
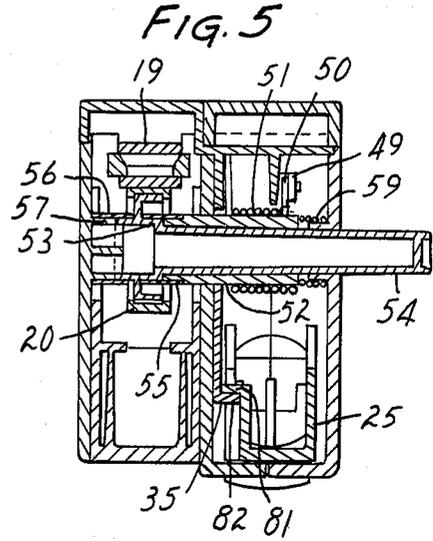
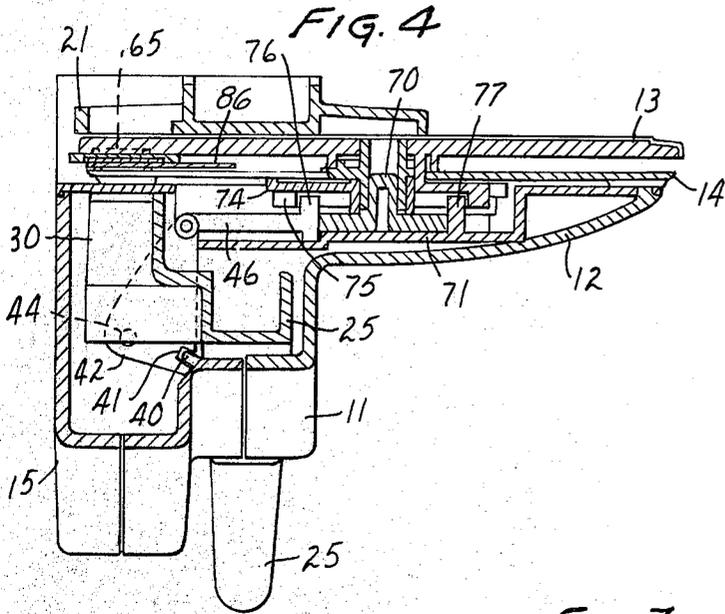
[57] **ABSTRACT**

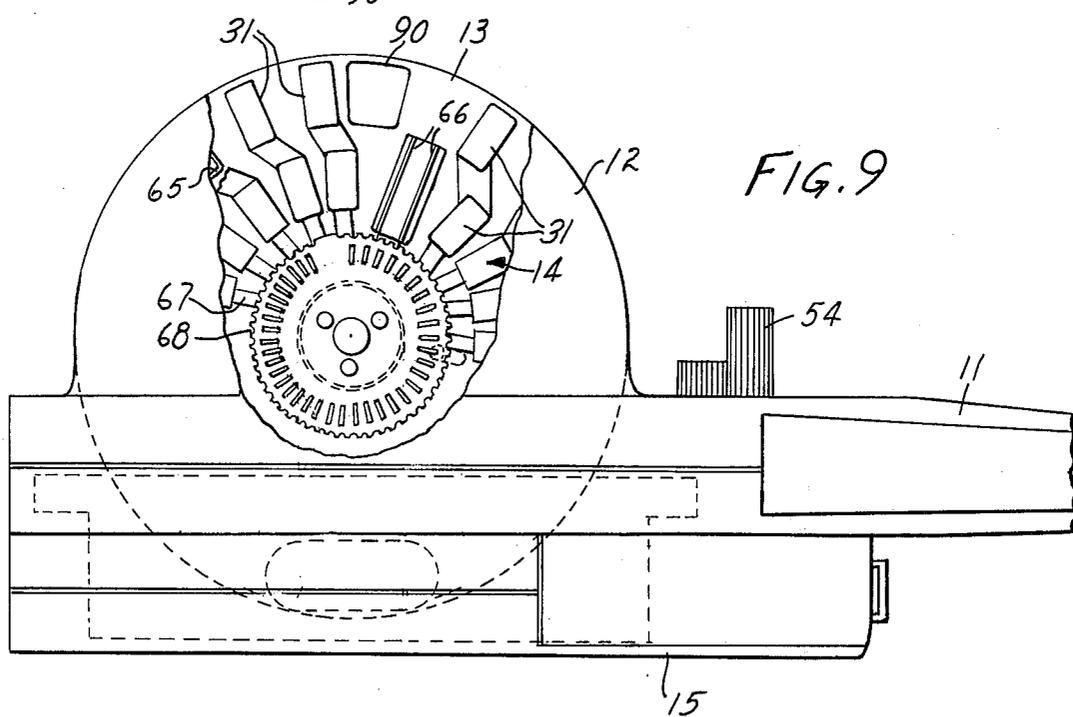
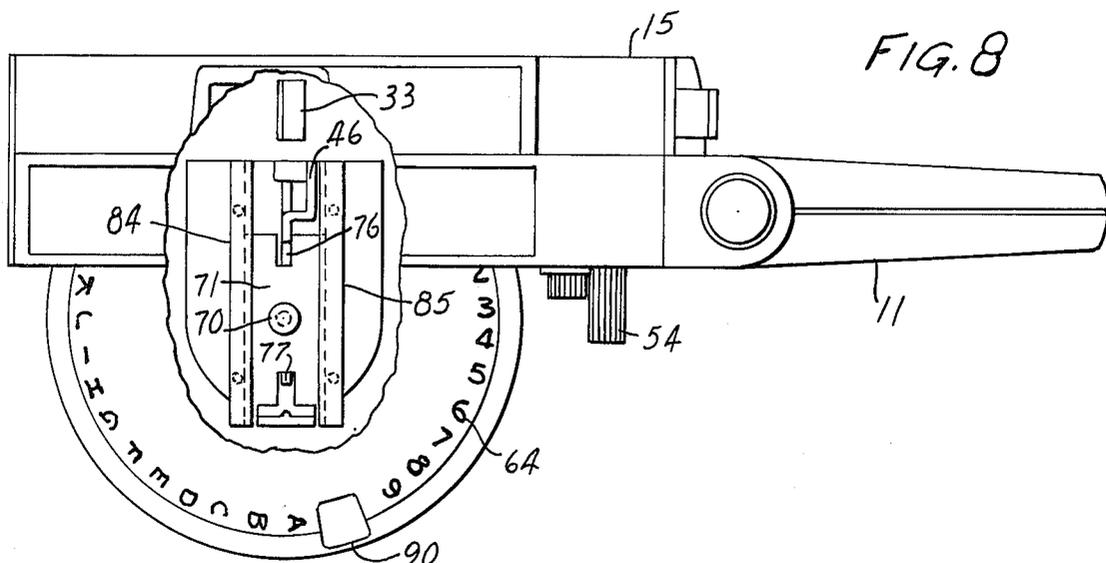
A hand-holdable and manually operable tape embossing tool for use with wide embossing tape. The tool has a small die disk for embossing one-half inch indicia on tapes up to 3/4 of an inch as mating die elements on opposed die disks in two radially spaced arrays around the die disks are moved together at the embossing station. The disks are shiftable radially in a direction normal to the direction of movement of the tape and the die members extend to be right reading radially. When the character selected to be embossed on a length of tape is to be made by corresponding die elements disposed on the radially inner array of the two arrays thereof on the die disks the disks are shifted and the shifting is automatic.

3 Claims, 9 Drawing Figures









TAPE EMBOSSEING TOOL

FIELD OF THE INVENTION

This invention relates to an improvement in manually operated embossing tools which are used to emboss characters onto an embossable strip material referred to generically hereinafter as embossing tape. Characters selected may include all alpha-numeric characters as well as other additional symbols. In one aspect this invention relates to an improved embossing tool for use in embossing large symbols of $\frac{1}{2}$ inch on a strip of embossing tape.

BACKGROUND OF THE INVENTION

The prior art on embossing tools is extensive as many improvements in these tools have been made as a result of the acceptance of a pressure-sensitive adhesive label from a polyvinyl material which is capable of permanent cold flow deformation upon embossment and color change in the embossed areas. As the dsire for type sizes above 14 or 18 points has come about, the size of the tool for embossing the strip material has also increased. As the size of the tool has increased it has become a desk or table machine and no longer a portable hand-held and manually operable and convenient device, easy to store, handle and use. Further, it is known from U.S. Pat. Nos. 3,263,791 and 3,280,954 that the number of characters or symbols on a die may be increased without increasing the size of the die by placing the dies in concentric positions about the die disk. This has been done previously however only where a female die and a resilient deformable plug are used in combination. Also this has previously been done only where the die disk has shifted in the direction of movement of the tape through the machine and the indicia, characters or symbols, have been positioned on a tangential position on the disk.

It is therefore an object of the present invention to provide an improved hand-held embossing tool which allows the use of very large characters on a wheel which is not proportionately increased in size over other hand-held machines having the desired characters. The embossing tool constructed in accordance with the present invention uses opposed mating die members in two radially spaced positions.

The embossing tool constructed according to the present invention has an advantage over other embossing tools in that it permits a radially oriented cut-off knife to be disposed on the embossing die disk without increasing the overall diameter of the wheel. Such radially oriented knives are necessary when the tape path is tangential to the embossing die disks.

SUMMARY OF THE INVENTION

The embossing tool of the present invention comprises a body member which is formed with a portion defining a handle, a portion for supporting the radially shiftable die disks, a portion defining the embossing station, and a portion defining a supply storage area for the embossable strip material. An actuating lever is pivotally mounted in the body portion to afford the embossing of the strip material by opposed die elements. The opposed die disks are formed with cooperating die elements positioned about the disk in true radially spaced concentric areas. The die disks are rotatable to permit selection of a desired character to be embossed on the strip material and the die disks are supported to

shift along a radial path normal to the path of the embossing tape which is parallel to the handle of the tool. Lever means are provided to shift the die disks radially and transversely of the body in the event that the characters selected are positioned on the radially inner array of die elements. After each embossing operation which causes the die disks to shift, the dies return to their initial position on the body member. Associated with the lever means is a clutch to advance the strip material from the supply through the embossing station after each operation of the embossing tool. The body is formed with a tape storage cavity and a tape path extending parallel to and to one side of the center line of the portion of the body member defining the handle.

DESCRIPTION OF THE DRAWINGS

The above and further features of the present invention will be more fully described in relation to the embodiment illustrated in the accompanying drawing wherein:

FIG. 1 is a plan view of an embossing tool constructed according to the present invention;

FIG. 2 is an elevational view of the embossing tool;

FIG. 3 is a sectional view taken along the lines 3—3 of FIG. 1;

FIG. 4 is a vertical sectional view taken along the lines 4—4 of FIG. 2;

FIG. 5 is a vertical sectional view taken along the lines 5—5 of FIG. 2;

FIG. 6 is a longitudinal sectional view taken along the lines 6—6 of FIG. 2;

FIG. 7 is a vertical sectional view taken along the line 7—7 of FIG. 1;

FIG. 8 is a plan view of the embossing tool with portions removed to show the shifting mechanism; and

FIG. 9 is a bottom view of the embossing tool of FIG. 1 with portions broken away to show the structure of the die disks.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The embossing tool illustrated in the drawings is adapted to emboss characters on embossing tape comprising thin plastic strips formed of thermoplastic resins which resins are capable of being cold-formed to establish a contrast color relief graphic symbol therein.

The embossing tool is adapted to be hand-held while performing the embossing step as the operator grips the handle. The body is formed of molded or cast pieces suitably secured together and comprises a portion defining a handle 11 extending longitudinally to the tool. Extending to one side of the body member is a portion 12 for supporting a pair of opposed die disks 13 and 14. Positioned on the other side of the body in opposed relation to the support portion 12 for the die disks is a portion 15 for storing a supply of the embossing tape within a chamber 18 and defining a tape path which leads from the supply chamber past a set of tape advance rollers 19 and 20 to the embossing station outlined by a portion 21 of the body member.

Pivotally mounted within the body are lever means which afford the movement of opposed die elements on the embossing die disks 13 toward each other to form the embossed character on the tape. The lever means also provide for advancing the embossing tape along the path upon completion of the embossing operation and for moving the embossing dies along a path normal

to the tape path to position certain ones of the die elements at the embossing station. The lever means comprise a lever 25 extending longitudinally of the body member and forming part of the handle for the tool. The lever 25 is pivoted about a pivot 26 forwardly in the tool and is moved from a position outwardly of the body member portion 11 to a position inwardly of the handle against the bias of a spring 28. The lever 25 is generally channel shaped in section and has a laterally projecting arm 30 which is T-shaped in vertical and horizontal section to provide strength and is movable with the lever upwardly upon movement of the lever into the handle portion 11. The top of the arm 30 forms a plunger on the reciprocating actuating member which engages a movable die element 31 on the die disk 14 and forces it axially toward the cooperating die element on the other die disk 13 at the embossing station defined generally by the reference numeral 33 in FIG. 7.

A second lever 35 is pivotally mounted on a pin 36 within the body member 11 in the handle portion thereof and extends longitudinally of the body member adjacent the lever 25. This lever 35 has a flange 37 extending transversely thereof to which a spring 38 is attached and which spring is sufficiently strong to lift the lever 35 about its pivot 36 upon operation of the lever 25. The forward end of the lever 35 or the portion thereof to the left as seen in FIG. 3, has a cam finger 40 formed thereon, which finger 40 is engaged in a notch 41 on a bell crank 42, see FIG. 4, causing the bell crank 42 to rotate about its pivot pin 44 upon operation of the lever. The pivot 44 is supported in a wall 45 forming one wall of the tape chamber 18. The bell crank 42 is connected to a reciprocating link 46 positioned transversely of the tool body member to afford movement of the die disks 13 and 14 automatically as required to perform an embossing operation. This movement will be described hereinafter with relation to the support for the die disks.

A third lever 49 is mounted pivotally on the pin 36 intermediate its ends to actuate the feed means for the strip material to advance the same along the feed path. The lever 49 is connected to a crank arm 50 which upon clockwise displacement as seen in FIG. 3, and its return, will afford the counterclockwise rotation of the feed roll 20 mounted within the body member.

The feed means is actuated in response to the actuation of the lever 25 so that the tape is advanced automatically after each embossing operation to advance the tape and afford the desired spacing between the embossed characters. The feed means comprises the feed wheel 20 having a periphery to afford a gripping action against the tape to advance the same between the feed wheel 20 and the idler pressure roll 19. The crank arm 50 is integral with a drum 52 (FIGS. 5 and 6) and drives the feed wheel 20 through a conventional spring clutch. The arm 50 is driven clockwise by a torsion spring 51 secured between the body portion and the arm 50 which drives the arm 50 upon inward movement of the trigger. The drum 52 has an external diameter equal to the external diameter of the arbor portion 53 of the feed wheel 20 which feed wheel is mounted on a shaft 54 coaxially with the drum 52 for rotation relative to the drum. A first helical clutch spring 55 couples the drum 52 and the arbor 53 and has an internal diameter small enough so that the convolutions of the spring 55 will grip the drum and the arbor portion during counterclockwise displacement of the crank

arm 50 to rotate the feed roll in a counterclockwise direction and advance the embossing tape accordingly. The convolutions of the clutch spring 55 are so oriented that upon rotation of the drum in the clockwise direction the grip of the clutch spring is relaxed so that the clutch mechanism is deactivated and will not cause the wheel to rotate and back up the strip material during movement of lever 25 to afford the embossing operation. A second helical clutch spring 56 couples the arbor 53 with a cylindrical boss 57 projecting from the body of the tool. The convolutions of the second clutch spring 56 are oriented opposite to those of the first clutch spring 55 so that the path of the helix followed by the second clutch spring advance toward the left as seen in FIG. 5 as the helix is followed in a counterclockwise direction. Thus the second spring 56 will tend to contract and grip the arbor and the juxtaposed boss tightly upon any attempt to rotate the feed roll in a clockwise direction as seen in FIG. 3. The spring 56 will be relaxed and allow counterclockwise rotation however of the drum. The arm 50 is driven counterclockwise to drive roller 20 during return movement of lever 25. The arm 50 is operated as the lever 25 engages a flange 61 on the lever 49 to move the lever 49 clockwise as the lever 25 is returned to its normal position by compression spring 28. A stack spring 59 is positioned between the body portion 11 and the drum 52 to hold the clutch members in position axially.

The die disks 13 and 14 for the embossing tool illustrated comprise a first solid disk 13 which is the selector wheel and carries on its upper surface indicia 64 indicating the characters which may be formed by the die elements thereof. The undersurface of the disk 13 is formed with the female die elements 65 representing each of the characters. The die elements 65 on this disk are arranged in two concentric circular arrays which are spaced radially with respect to the die disk 13. The dies are formed so the indicia is right reading when viewed radially. The dies 65 are spaced circumferentially within these areas. A set of cut-off knives 66 are disposed across the area of the inner concentric area permitting the knives to cover the width of the tape in the tape path to sever the same. The second die disk 14 of the set carries the male die or punch of each die set. As shown, this die disk 14 is divided into a plurality of radially outwardly extending resilient fingers 67 supported by an inner hub 68 and movably supporting the die elements 31. Each of the fingers carries a punch of two die sets in radially spaced relation corresponding to the spaced relation of the die elements 65 on the upper disk 13. The die disks are keyed together to rotate as a unit upon rotation of the upper die disk 13, and are rotatably mounted on a stub shaft 70, extending upwardly from a slidable guide plate 71.

The support for the die disks further includes a wheel 74 positioned concentric with the axis of the die disks and beneath the lower die disk 14. Wheel 74 is rotatable with disks 13 and 14 and is formed with circumferentially spaced axially extending teeth 75 about its outer peripheral edge. The teeth 75 are positioned to be engaged by or to permit passage therebetween of the upstanding lug 76 on the link 46 and the stop 77 formed on the body member. The teeth 75 are positioned to correspond with the radially inner set of die elements, such that selection of one of these characters will position a tooth 75 in radial alignment with the lug 76 and a space between two teeth 75 opposite the top

77. Subsequent operation of the lever 25 will then cause the lever 35 to rotate the bell crank 42 and lug 76 on link 46 will engage the aligned tooth 75 and pull the disks 13 and 14 via wheel 74 and guide plate 71 in a direction normal to the tape. The bell crank 42 will draw the disks a distance sufficient to align the annular area occupied by the radially inner array of die elements and a specific set of said die elements with the embossing station.

Continued movement of the lever 25 into the handle portion 11 causes the arm 30 on the lever 25 to force the now aligned plunger on the disk 14 into engagement with the tape to force the tape into the die 65 on the disk 13 forming an embossed character in the tape. The spring 28 returns the lever 25 to its original position against the bias of springs 38 and 51 after the embossing is completed. A flange 81 on the lever 25 engages a flange 82 on the lever 35, returning the lever 35 to its normal position and the cam finger 40 thereof to a position returning the belt crank 42 by rotating it clockwise as seen in FIG. 4. Movement of the belt crank 42 clockwise thus causes the lug 76 to engage the guide plate 71, forcing it back along its path between two guide rails 84 and 85 to its original position with the stub shaft 70 centered relative to the body portion 12 supporting the die disks 13 and 14.

A guide plate 86 is positioned along the path of the embossing tape between the die disks 13 and 14. This guide plate 86 extends parallel to the main body portion and handle 11 and along the upper surface of the portion 15 for storing the supply of the embossing tape. This guide plate 86 has a relief at the embossing station to permit engagement of the opposed die elements against the embossing tape and is preferably formed as described in a copending application Ser. No. 406,111 filed Oct. 12, 1973 by M. C. Faust and J. W. Seabold, attorney docket No. 28,524, and assigned to the assignee of this application.

If the selected indicia is to be formed by a pair of die elements on the radially outer set or array of elements on the die disks the link 46 with the lug 76 is permitted to pass between two of the teeth 75 and no movement of the die disks will occur. The lug 76, between two teeth 75, forms a stop to prevent rotation of the die disks during embossing and the stop 77 is aligned with a tooth 75 to prevent the lateral shifting movement of dies due to friction.

An opening 90 in the disk 13 may be located over the tape path defined by the guide plate to view the last character embossed onto the tape.

Having thus described the present invention with reference to a preferred embodiment, what is claimed is:

1. An embossing tool for embossing a series of characters along a length of embossable strip material, said tool comprising

- a body having a handle,
- means for defining an embossing station and a support portion on said body,
- lever means movable relative to said body and into said handle for applying an embossing force at said embossing station,
- means defining a path for strip material on said body parallel to said handle and through said embossing station,

opposed rotatable die disks joined together for concurrent rotation and having a plurality of axially opposed die elements, said die elements on said die disks being formed in two radially spaced circular arrays concentric with the axis of said die disks,

support means for supporting said die disks for movement in a radial direction normal to said path of said strip material to permit the selective placement of a pair of die elements from either the radially inner array or the radially outer array of die elements at said embossing station on opposite sides of the path of said strip material, said support means comprising a guide plate supported on said support portion for sliding movement and means for rotatably supporting said die disks on said guide plate, and

reciprocating link means movable normal to said lever means and engageable with the support means supporting the die disks for sliding the axis of the die disks toward and away from the path upon actuation of said lever means.

2. An embossing tool according to claim 1 wherein said link means comprises a link coupled to said lever means and movable toward the path of said strip material upon each operation of said lever means for applying an embossing force.

3. An embossing tool according to claim 2 wherein said support means includes a wheel secured to said die disks and having teeth circumferentially spaced and extending axially therefrom, said teeth being spaced to permit said link to pass therebetween when the pair of die elements selected is in the outer array or to be engaged by said link to afford said shifting of said die disks toward said path when the pair of die elements selected is on the inner array.

* * * * *

50

55

60

65