CUTTER FOR EXCISING SHAPES FROM SHEET MATERIAL

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ABSTRACT OF THE DISCLOSURE

A cutter for excising shapes from sheet material wherein in the parts of the male die engaging the female die are sharp, generally acurate, and have at least one sharp point for initial penetration of the material to be cut.

This invention relates generally to cutters and, particularly, to improved dies for cutters. It relates to improved dies and the copending application Ser. No. 424,231, filed Jan. 8, 1965 which matured Nov. 15, 1966, as Patent No. 3,284,899.

It is among the objects of this invention to provide dies for a cutter, which will cut shapes from sheet material, that will not tear the sheet material, will remain continuously sharp, and which are relatively inexpensive.

These objects and advantages, as well as other objects and advantages, may be attained by the device shown for purposes of illustration in the drawings in which:

FIGURE 1 is a perspective view of a cutter with complementary dies in place;
FIGURE 2 is a side elevational view thereof, with walls partially exploded away to show the dies;
FIGURE 3 is a perspective view of the back of the male die;
FIGURE 4 is a perspective view of the back of the female die; and
FIGURE 5 is a perspective view of the front of the male die.

A cutter made of inexpensive plastic material can be provided with complementary dies, for cutting shapes from sheet material. The dies must always be set in precise registration. It has been found that the cutting edges of these dies, after very little wear, lose their capacity to make sharply cut figures and soon commence to tear the sheet material. The torn areas soon become greater and greater, and the cut areas become of lesser extent. Shapes excised become irregular, and rough. It has been found that if the male die is provided with accurate, sharp edges which intersect with each other in sharp, pointed enlargements, and the edges defining the shape of a figure to be excised from sheet material (such as paper), the figure will have neat, clean cut contours.

Referring now to the drawings in detail, there is provided a pair of levers 11, 12 intersecting with each other and pivotally connected on a pin 13 in such a manner that the handles 14, 15 on the levers 11, 12, when compressed, cause the opposite jaws 16, 17 to move toward each other. The jaws have undercut channels 18, 19 for receiving a pair of complementary dies 20, 21.

It has been found exceedingly difficult to provide dies which will cut a clean-cut design from a sheet of material, such as paper. The present dies will perform this function. Each of the dies 20, 21 is provided with a small end-enlargement 22, 23, defining a handle for easy manipulation of the dies and insertion in the channels, 18, 19. The outer faces of the dies are provided with dimples 24, which engage with small bosses 25, which are locating means for positioning the dies and holding them at the end of the channels 18 and 19. The bosses 25 are hemispherical domes corresponding in size and shape with the dimples 24. The angular disposition of the jaws 16, 17 are such that the male die 21 does not enter the female die 20 in general parallelism with it, but enters angularly disposed; that is to say, one end of the male die 21 enters the female die 20 before the other, as may be concluded from FIGURE 2. The female die 20 is characterized by having an aperture which flares away from the surface at which the male die 21 enters. The male die is provided with an outer surface, which is generally flat, and has a raised area 26, which defines a shape to be cut and corresponds to the aperture in the female die. It has been found that the male die 21 must be provided with sharp marginal edges 8 in precise conformity with the edges 9 of the female die 20. These marginal edges 8 must be arcuate and not straight, and they define the outer edge of a concavity. The arcuate marginal edges 8 intersect with each other in sharp points 29. Unless the marginal edges 8 are arcuate, the cutting action of the male die is ragged and the sheet is torn. Thus, the edges extending between the sharp points 29, 29 may not be straight, but must be smoothly curved, and define a continuous arcuate edge, extending between the points 29, 29. With this construction, the cutting action of the sharp marginal edges of the dies is continuous and shearing, without any tearing of the sheet. A figure is completely severed along the sharp marginal edges 28, and discharged from the sheet with smooth, precise edges showing no sign of tearing. It thus appears that the arcuate character of the marginal edges of the male die are critical to the achievement of a precise cut.

Since the entry of the male die into the female die is a matter of extreme precision, materials which are relatively soft, compressible, yielding or readily subject to deformation upon the application pressure, will not function properly in the making of dies to be used in the present cutter. Thus, a relatively hard and dense material must be used, so that the sharply defined edges 28 of the male die 21 may engage with the edges 9 of the female die 20, with great precision, and will not be quickly abraded, or roughened by repeated contact. It has been found that the material known in the trade as medium-impact styrene is ideally suited for this purpose. Such plastics as polypropylene and polyethylene, and acetics are generally found to be too soft to have the hard glass-like texture required to perform the precise shearing function of the applicant's die. The cost factor dictates the use of plastic materials of this kind for the dies, although a hard metal would, undoubtedly, perform the same function in a satisfactory fashion. While the cutter has been conceived primarily as an inexpensive toy, it may also serve commercial purposes.

The foregoing description is merely intended to illustrate an embodiment of the invention. The component parts have been shown and described. They each may have substitutes which may perform a substantially similar function; such substitutes may be known as proper substitutes for the said components and may have actually been known or invented before the present invention; these substitutes are contemplated as being within the scope of the appended claims, although they are not specifically catalogued herein.

What is claimed:

1. A cutter for excising shapes from sheet material comprising:
   (a) a pair of levers movably connected together;
   (b) jaws on the levers movable toward each other;
   (c) a male die and a female die each engaged with one of the jaws;
   (d) a raised area on the male die;
   (e) the female die having an aperture in registration with the raised area;
3. A cutter comprising
(a) a pair of levers movably connected together;
(b) jaws on the levers movable toward each other;
(c) marginal edges of the raised area on the male die being sharp and generally arcuate, and intersecting with each other in at least one sharp point;
(d) a raised area on the male die;
(e) a female die having an aperture in registration with the raised area;
(f) marginal edges of the raised area on the male die being sharp and generally arcuate, and intersecting with each other in at least one sharp point;
(g) the marginal edges defining the outer limits of a concavity in the raised area;
(h) the marginal edges defining the outer limits of a concavity in the raised area;
(i) the marginal edges and the deepest portion of the cavity merging in a smooth curve.

2. A cutter for excising shapes from sheet material comprising
(a) a pair of levers movably connected together;
(b) jaws on the levers movable toward each other;
(c) a male die and a female die each engaged with one of the jaws;
(d) a raised area on the male die;
(e) a female die having an aperture in registration with the raised area;
(f) marginal edges of the raised area on the male die being sharp and generally arcuate, and intersecting with each other in at least one sharp point;
(g) marginal edges of the aperture in the female die being sharp and fitting closely with the marginal edges on the male die;
(h) the marginal edges on the male die defining the outer limits of a concavity in the raised area.

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