SCROLL CUTTING MACHINE

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By his Attorney

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This invention relates to scroll-cutting machines in which the cutting is done by a rapidly reciprocating punch in conjunction with a die, the sheet material to be cut being moved under the punch along lines corresponding to the desired design; and provides improvements therein.

The present invention provides improvements whereby the operation of cutting out slots in a sheet, corresponding to separated letters of a word, for example, may be easily, reliably and quickly shifted from one part to another of the sheet being cut.

The invention further provides improved means for rapidly replacing worn or broken punches, the punches in this type of machine being unusually susceptzile to wear and breakage, owing to the small diameter of the punch, the rapidity of its reciprocation, and a number of other conditions.

The invention further provides improvements whereby the machine is simplified and its effectiveness for carrying out its intended purpose enhanced.

One embodiment of my invention is illustrated in the accompanying drawings, wherein:

Figure 1 is a top plan view thereof; and
Figure 2 a side elevation;
Figure 3 is a view in side elevation on an enlarged scale, and with parts in section, the view being similar to Fig. 2, but showing only a part of the construction there shown;
Figure 4 is a view in side elevation showing in detail the eccentric mounting of the crankshaft in a rotatable sleeve.
Figure 5 is a cross-section on the line 5—5, Fig. 3.

Referring to said drawings, numeral 10 (Fig. 3) designates a punch, carried by a plunger 12, reciprocated in convenient manner, as by a shaft 14 (Fig. 4) having an eccentric pin or crank 16 thereon. A pitmanrod 17 connects the plunger 12 and crankpin 16. The plunger 12 is conveniently supported at the outer end of an overhanging frame 18, providing a deep throat admitting of the machine handling sheets of considerable width, and unlimited length.

Beneath the punch 10 is mounted a die 20 (Fig. 3) and the machine is preferably provided with a broad table 22, providing a table surface of considerable area, at front and back, and on each side of the punch 10.

The sheet material, designated by X, may be held by hand and moved under the punch, or it may be held in a holder, preferably one of universal movement, 24.

The holder 24 conveniently comprises a bar 26 extending crosswise of the table 22 and sliding on a rail 28, rollers 30 being preferably provided for easing the movement of the bar 26 on said rail. The rail 28 preferably extends across the table 22, and is supported at its ends by rails 34, 35 perpendicular to the rail 28. The rail 28 may be provided with rollers 36, 38 for easing the movement thereon of the rails 34, 35. Clamps 38 (Fig. 1) may be provided for fastening the sheet X to the rod 26. For equalizing the movement of the opposite ends of the rail 28, chains 37 are attached to each end of said rail 28 (through suitable brackets, for example, as shown) and these chains pass over sprockets 37a, 37b at each side of the machine, said sprockets (or at least two of them, one on each side) being fixed on a shaft, or shaft 37c running across the machine.

The rod 26 is conveniently provided with an arm 40 having a stylus 41 at its end. The stylus 41 may be used for following the lines of a design, or the edges of a template or pattern, as indicated in Fig. 1. The movement of the rod 26 along the rail 28 and the movement of the rail 28 on rails 34, 35 at right angles, provides a universal movement for the holder 24 and sheet X carried thereby; consequently the stylus 41 may follow a line of any shape, and the sheet X will be moved in a corresponding line or path beneath the punch 10.

Means are provided for shifting the cutting by the punch 10 from one part of the sheet X to another, as from one part in which the cutting of a slot or opening corresponding to a letter of the alphabet has been completed, to an adjacent part of the sheet where it is desired to cut out a slot or opening corresponding to another letter of the alphabet. This means conveniently comprises a rotat-
able sleeve 44 (Figs. 3 and 4) mounted in the frame 18, and having an eccentric bearing 46 therein for the shaft 14, carrying the crank 16 which reciprocates the plunger which carries the punch 10. An electric motor 50, mounted on the frame 18, as shown in Fig. 1, is preferably provided for continuously driving the shaft 14, and thereby the punch 10, said motor driving the shaft 14 conveniently through a belt 52 passing over pulleys on the motor shaft and crankshaft 14 respectively. A flywheel 53 is preferably mounted on shaft 14 for giving it a considerable amount of inertia for driving the punch.

By shifting the sleeve 44 so that the center-line of shaft 14 is in the position indicated by the upper dot-and-dash line, Fig. 4, the punch 10 is lifted out of cutting position, and by shifting the sleeve 44 so that the center-line of shaft 14 is in the position indicated by the lower dot-and-dash line, the punch is moved into cutting position, it being thus possible by the simple rotation of the sleeve 44 through a short angle to cause the punch 10 to cut or to cease cutting, without any interruption in the reciprocation of said punch, and, while the punch is lifted out of cutting position the sheet X may be shifted from one cutting position to a separated cutting position.

For quickly and easily shifting the position of sleeve 4, it is conveniently provided with an arm 55, fastened thereto. Preferably the arm 55 is actuated by a spring 58, or the like, in such manner as to normally move the sleeve 44 so as to carry the center-line position of shaft 14 up to a position where the punch 10 is out of cutting position, said spring 58 being conveniently connected to the upper end of said arm 55. Means, as a treadle operated means 60, is preferably provided for rotating said sleeve 44 to bring the center-line position of shaft 14 down to a position where the punch 10 is in cutting position, the treadle for this purpose being conveniently connected by a cord 62 with the lower end of said arm 55.

For safely and reliably shifting said sleeve 44 to bring the punch 10 into cutting position the stop 65 is provided on said frame 18 in the path of said arm 55. The stop 65 is preferably an adjustable one. When the treadle 60 is pressed, the arm 55 is brought against the stop 65, which is set to so limit the rotation of the sleeve 44 (and limit thereby the lowering of the center-line of shaft 14) that the lower limit of the stroke of plunger 12 and punch 10 is fixed at a precise point. This preciseness is important, as it is found with rapidly reciprocating punches of small diameter, that the optimum arrangement is for the punch to just pass through the sheet being punched, without entering the die; otherwise there is more rapid and unequal wear of the punch, and greater liability to breakage.

Means are provided for quickly and easily replacing a broken or worn punch 10. This means comprises a guide 70 for the plunger 12 which is quickly removable, the plunger 12 and pitman rod 17 being preferably arranged so as to be removed from the machine without disturbing any other part. Means 72 are provided for quick-detachably fastening the guide 70 to the frame 18. These means conveniently comprise a hinged strap 74 and a hinged bolt 76 carrying a clamping nut 78 adapted to press and hold the strap 74 against said guide 70. The frame 18 is conveniently provided with an depression having a very accurately formed bearing surface 80, so that the replacement of the guide after removals may be effected with uniformity of position of said sleeve. The bearing surface 80 is conveniently a block having two faces on a mitre with the bisector passing through the center-line of the plunger 12. The guide 70 is conveniently round and centrally bored, and the portions embraced by the strap 74 and bearing against the mitre-faces are preferably very accurately formed.

The punch 10 is preferably held in a spring collet 85, which is attached by threads 88 in a tapered bore in the plunger 12, the collet 85 being readily removed and attached by turning it at its outer end. A threaded plug 90 in the collet 85 provides for accurately positioning the punch therein.

To replace a worn punch 10, it may be simply and quickly done by removing the strap 74 by loosening the nut 78 (the motor being stopped) and swinging said strap to one side. The entire assembly consisting of guide 70, plunger 19 and pitman-rod 17 may then be removed with one pull, the pitman-rod 17 sliding off of the free end of the crankpin 16, laid on a table or bench, the collet 88 removed, the broken or worn punch 10 removed and replaced. By accurately positioning the new punch 10 in the collet 85 by means of the adjustable plug 90, the parts may be replaced, by simply shipping the pitman-rod over crank-pin 16, closing strap 74 around guide 70, and fastening nut 78, no further adjustment of any part being ordinarily necessary.

The machine may be provided with a stripper-plate 95 for the punch 10. This stripper plate 95 is conveniently attached to the guide 70, as indicated at 96. Said stripper plate may be raised and lowered with reference to a sheet X (as in removing and replacing a sheet Y) by sliding the guide 70 up or down in the strap 74, the nut 78 being slackened to facilitate the vertical movement of said guide 70. The portion of said guide 70 embraced by said strap 74 may be conveniently formed of reduced diameter, as shown at 98, the shoulders between said portions of different diameter.
Operation.—In starting, a sheet \( X \) is placed between the punch 10 and die 20, the stripper-plate 95 being raised if necessary by loosening the nut 78 and sliding the guide 70 carrying said stripper-plate, slightly upward. The sheet \( X \) is preferably attached to the holder 24 by the clamps 38, and by moving the stylus 41 over the outline of the letters or other design to be cut out of the sheet, the said holder, by reason of its universal movability, moves the sheet \( X \) under the punch in a manner corresponding to the movement of the stylus over the pattern or outline, and thereby the punch acts to cut out figures or slots corresponding to the pattern.

After the sheet \( X \) is initially placed between the punch 10 and die 20, the motor 50 driving the die is started and allowed to continuously run, the punch being brought into and out of cutting operation by pressure and release of the treadle 60, as hereinafter described. By releasing the treadle, the plunger 12 carrying the punch may continue to reciprocate without cutting the sheet, and in the released position of the treadle the sheet may be thereby shifted from one position to another under the punch, and allow separated slots to be readily cut into the sheet.

The punch 10, when it is broken or becomes dull, may be readily replaced by releasing nut 78, swinging out strap 74, and lifting out with one pull the assembly consisting of the guide 70, pitman-rod 17, plunger 12, collet 85 and punch 10 carried thereby. The replacement of the plunger has already been hereinbefore fully described.

The inventive idea may receive various other embodiments than that herein specifically illustrated and described.

What is claimed is:

1. A machine of the character described comprising a frame, a crank pin journaled therein, a pitman connected to said crank pin and adapted to be disconnected by sliding same axially of the pin, a plunger reciprocated by said pitman, a tubular guide for said plunger, means for detachably fastening the guide to said frame, and a punch removably carried by said plunger.

2. A machine according to claim 1, in which said guide fastening means comprises a part in said frame having a depression with an accurately formed face thereon, and means for clamping said guide within said depression.

3. A machine according to claim 1, in which said guide fastening means comprises a part of said frame having mitre-faces thereon, and means for clamping said guide against said mitre-faces, said guide being round.

4. In a machine of the character described, the combination with a guide, a reciprocating plunger mounted in said guide, said plunger having a threaded tapered bore in its end, a collet secured within said bore, a punch mounted in the collet and a threaded plug in the collet for accurately positioning the punch therein.

In testimony whereof I have hereunto affixed my signature on this 31st day of July, 1928.

ROY E. HALLINGS.