April 13, 1943. J. D. KLOPFENSTEIN 2,316,650

STEEL RULE SLOT CUTTING MEANS

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Fig. 2.

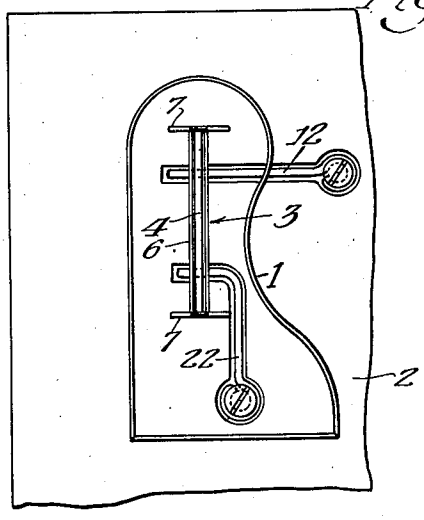


Fig. 1.

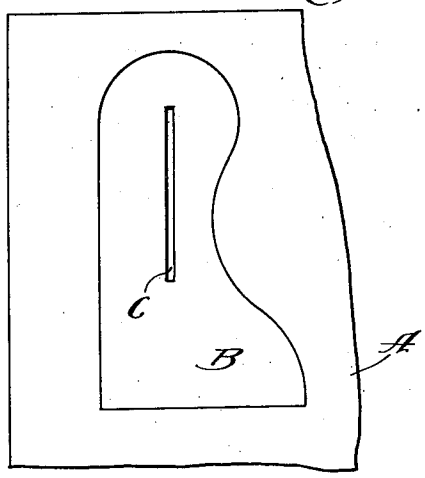


Fig. 3.

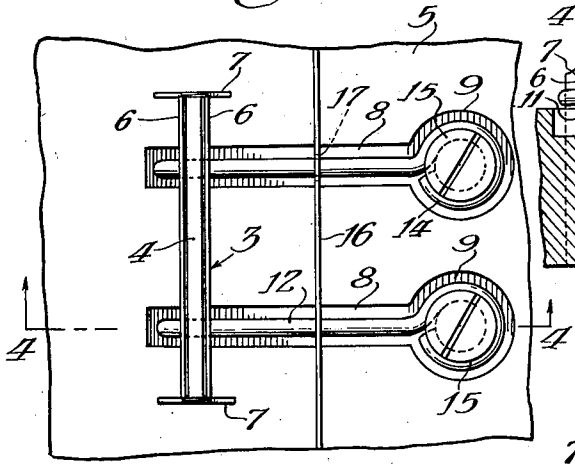


Fig. 4.

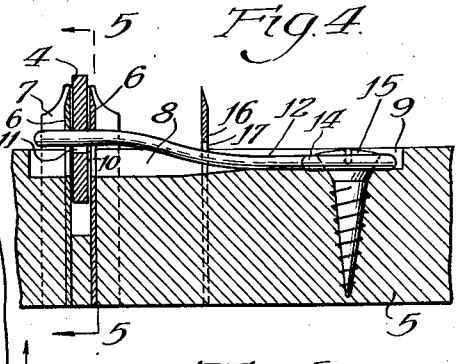


Fig. 5.

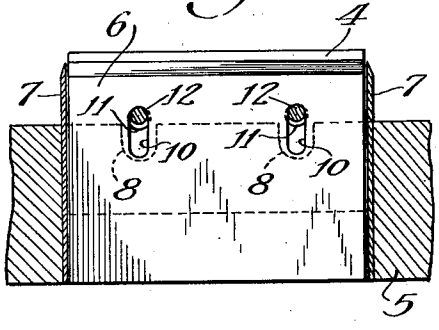


Fig. 6.

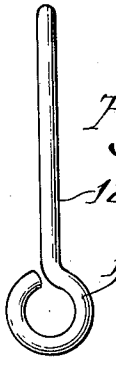
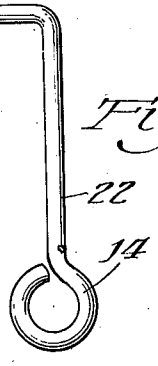


Fig. 7.



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Fig. 10.

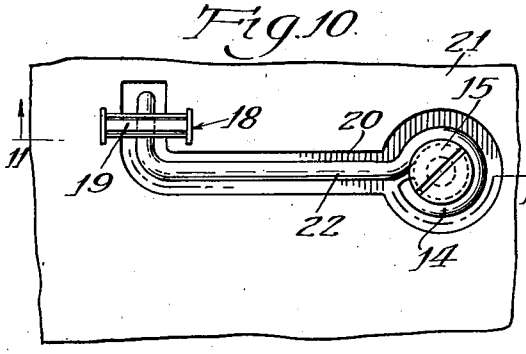


Fig. 11.

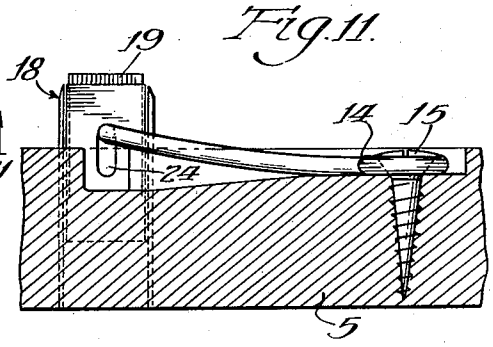


Fig. 12.

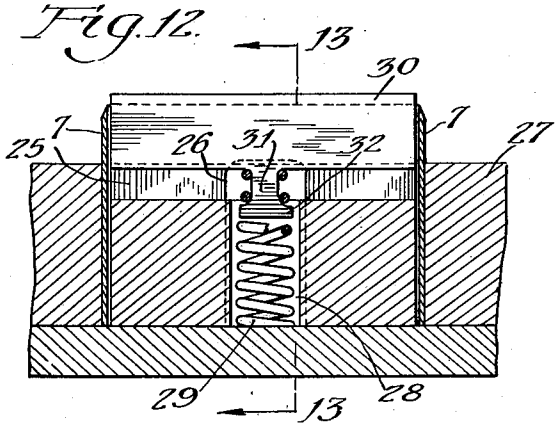


Fig. 13.

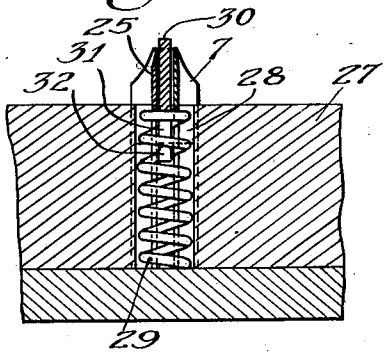


Fig. 14.

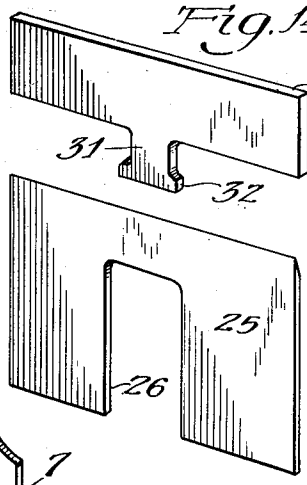


Fig. 15.

Fig. 16.

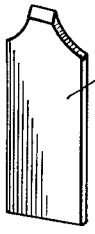
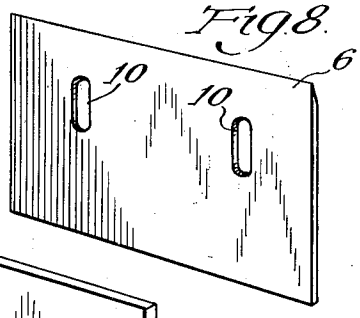


Fig. 8.



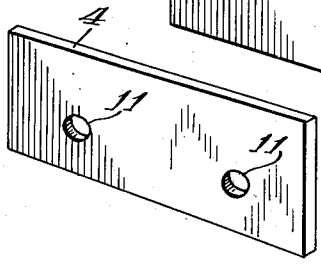


Fig. 9.

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Patented Apr. 13, 1943

2,316,650

UNITED STATES PATENT OFFICE

2,316,650

STEEL RULE SLOT CUTTING MEANS

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Application September 11, 1942, Serial No. 458,046

8 Claims. (Cl. 164—33)

It is common practice to sever pieces of any desired sizes and shapes from cardboard sheets or panels by the so called steel rule die cutting process. When it is necessary to provide a piece with narrow slots, as for example, where an assembly is to be made by inserting an ear or tongue on one piece with a slot in another, considerable difficulty is encountered due to clogging of the slot cutting dies by the material which they cut out.

The object of the present invention is to overcome the above difficulty and make it possible to cut narrow slots cleanly and leave the severed material within the same so that it will be carried away just as though it were still a part of the original board or sheet.

In order to cut out a little strip and still leave it in its original position in the board or panel, it is necessary to employ means to act on the strip in a manner effectively to force it out of the little die that severs it from the body member. Because of the narrowness of the slots under consideration the usual stripping means adapted to act on the large pieces or cut-outs cannot be employed. The most satisfactory stripping device for my purpose is a wide flat bar set on edge and slidable up and down in the space bounded by the slot-cutting rules. However, because of the thinness of such a bar, the application of effective spring pressure to hold it up presented a problem the solution of which may be regarded as being an object of the present invention.

The various features of novelty whereby my invention is characterized will hereinafter be pointed out with particularity in the claims; but, for a full understanding of my invention and of its objects and advantages, reference may be had to the following detailed description taken in connection with the accompanying drawings, wherein:

Figure 1 is a plan view of a fragment of a cardboard panel including a cut out piece containing a narrow slot; Fig. 2 is a plan view of fragment of a die block containing the steel rules required to effect the cutting indicated in Fig. 1; Fig. 3 is a plan view of a fragment of a die assembly showing on an enlarged scale the die for cutting a narrow slot, a fragment of one of the rules for cutting out the piece which is to contain the slot, and a spring means for the stripper bar in the slot-cutting device; Fig. 4 is a section on line 4—4 of Fig. 3; Fig. 5 is a section on line 5—5 of Fig. 4; Fig. 6 is an elevational view, on a larger scale, of one of the springs in Fig. 3–5; Fig. 7 is a view similar to Fig. 6, showing another form of spring; Figs. 8 and 9 are perspective views of one of the long rules and of the stripper bar in Figs. 3–5; Fig. 10 is a view similar to Fig. 3 illustrating a way of using the spring shown in Fig. 7; Fig. 11 is a section on line 11—11 of Figure 10; Fig. 12 is a vertical, longitudinal section through a modified form of slot-cutting die; Fig. 13 is a section on line 13—13 of Fig. 12; Figs. 14 and 15 are, respectively, perspective views of the stripper bar and one of the long rules of Figs. 12 and 13; and Fig. 16 is a perspective view of one of the short rules that cut the ends of the slots in any of the several forms of dies illustrated.

In Fig. 1 of the drawings there is shown a fragment of a cardboard panel A in which there remains a large cut out piece B in which there is a narrow slot wherein remains the little cut out strip C. The piece B, along with other pieces, not shown, are easily pushed out of the board or sheet by the user. The little strip C is waste material and may or may not be removed by the manufacturer. The board of Fig. 1 may be the result of a die cutting process in which a rule or combination of rules 1, as in Fig. 2 forming the outline of the piece B, are fixed in any usual way in a base 2 which may be a piece of thick plywood. The slot is cut by a die 3 formed of the usual rules.

The present invention has to do only with the means for cutting the slot. In Fig. 2 there is shown a construction in which there is a stripper bar 4 within the space bounded by the slot-cutting rules, one of the springs being straight and the other being L-shaped. These springs will be described in connection with other views in the drawings.

Thus, in Figs. 3–5, there is a slot-cutting die 3 mounted on a base 5, similar to the base 2. It will be seen that this die consists of two parallel long rules 6, 6 and two short end rules 7, 7, all extending entirely through the base and rising a considerable distance above the latter. This is common construction. It will be seen that there are two shallow recesses in the top of the base, each being in the nature of a groove 8 positioned at right angles to the long rules 6 and lying mainly on one side of the rule assembly, although extending a short distance past the other side. Each groove is enlarged at the end most remote from the die, as indicated at 9. The rules 6 have long vertical slots 10 intercepting the grooves, and the stripper plate has holes 11 registering with the slots 10. Lying in each groove is a strong spring wire 12 provided at one end with an eye 14 that lies in the enlarged end of the groove; the free

end of the wire extending through the slots 10 and the hole 11. The wire may be secured in place by a screw 15 passing through the eye.

The parts are so proportioned that the free ends of the wires normally engage with the upper bounding edges of the slots 10 which therefore serve as stops to limit the upward movement of the stripper bar. When the stripper bar is pressed down the free ends of the springs are also moved downwardly into the grooves above which they normally project, but are ready to push the bar up again as soon as the pressure is released. By permitting the stripper bar to rise above the rules it is made certain that the little cardboard element cut out by the slot-cutting die will be raised well above the die when the press is opened, thereby preventing such element from remaining in or clogging the die.

Not only am I able to use long, sturdy spring wires in association with the stripper bar, but the presence of another rule, having the function of rule 1, does not matter. Thus, in Figs. 3 and 4 there is shown such a rule 16 crossing both of the wires 12. This rule is slotted, as indicated at 17, in the regions of the grooves, the wires passing freely through these slots. Therefore this rule does not interfere in any way with the operation of the springs.

In Figs. 10 and 11 there is illustrated a construction in which the main part of the spring lies parallel to long rules of the slot-cutting die 18. The slot to be cut is short so that a single spring suffices to operate the stripper bar 19. The groove 20 in the top of the base 21 is L-shaped, the long arm lying beside and parallel to and the short arm across the die. An L-shaped spring 22 lies in the groove, the short arm passing through slots 24 in the rules and through a hole in the stripper bar. The far end of the spring is fastened to the base by a screw 15 passing through an eye 14 on the spring, as in the case of the other form of spring.

It will be seen that in Figure 2 a condition is indicated in which both forms of wire springs are employed, room being available within the bordering cutter 1 for one of the L-shaped springs, whereas the other spring is preferably one of the straight type; this latter spring passing through the rule 1 in the same way that the spring 12 in Figs. 3 and 4 passes through the rule 16.

When it is desired to use a coiled spring, this can be done in the manner illustrated in Figs. 12–16. Here the long rules of the slot-cutting die have wide deep notches 26 extending up from their lower edges, while the base 27 has a large bore 28 symmetrically disposed with respect to these notches. A coiled spring 29 is located in this bore, projecting laterally from both sides of the die and engaged with the bottom edge of the stripper bar 30. The bar may have a lug 31 projecting downwardly therefrom into the spring. The spring cannot be lifted out of the die because the rules 25 hold it down and, therefore, by providing the lug 31 with a head 32, to be screwed into or be otherwise interlocked with the spring, the spring is caused to serve as a means to hold the bar in the die, as do the springs in the other forms.

While I have illustrated and described with particularity only a single preferred form of my invention, with slight modifications I do not desire to be limited to the exact structural details thus illustrated and described; but intend to cover all forms and arrangements which come within the definitions of my invention constituting the appended claims.

I claim:

1. In a slot-cutting die, rules defining the shape of the slot to be produced, a stripper bar slidable up and down in the space bounded by the rules, at least one of the rules having an opening through the same, and a spring lying partly in said opening and acting on said bar in a direction yieldingly to force it up until it projects somewhat above the upper edges of the rules.

2. In a slot-cutting die, a base, rules fixed in and projecting above the base in positions to define the shape of the slot to be produced, a stripper bar slidable up and down in the space bounded by the rules, at least one of the rules containing an opening therethrough well below the cutting edge, and a spring mounted on the base and extending through said opening into engagement with said bar yieldingly to hold the bar raised.

3. In a slot-cutting die, a base, rules fixed to and projecting above the base in positions to define the shape of the slot to be produced, a stripper bar slidable up and down in the space bounded by the rules, at least one of said rules having a vertically-elongated opening therethrough well below the upper edge, the base having a shallow groove of considerable length in the top in registration with said opening; and a spring wire lying at least partly in said groove, extending at one end through said opening into engagement with the bar yieldingly to hold the bar up, and secured at the other end to the base.

4. In a slot-cutting die, a base, rules fixed to and projecting above the base in positions to define the shape of the slot to be produced, a stripper bar slidable up and down in the space bounded by the rules, at least one of said rules having a vertically-elongated opening therethrough well below the upper edge, the base having a shallow groove of considerable length in the top at right angles to the bar and in registration with said opening; and a spring wire lying at least partly in said groove, extending at one end through said opening into engagement with the bar yieldingly to hold the bar up, and secured at the other end to the base.

5. In a slot-cutting die, a base, rules fixed to and projecting above the base in positions to define the shape of the slot to be produced, a stripper bar slidable up and down in the space bounded by the rules, the bar and at least one of the rules having registering openings therein in the vicinity of the top of the base, there being a groove in the top of the base in registration with said openings, and a spring wire in and extending along said groove with one end passing through the opening in the bar, and means securing the other end of the wire to the base.

6. In a slot-cutting die, a base, rules fixed to and projecting above the base in positions to define the shape of the slot to be produced, a stripper bar slidable up and down in the space bounded by the rules, the bar and at least one of the rules having registering openings therein in the vicinity of the top of the base, there being in the top a shallow L-shaped groove the short arm of which is transverse to the plane of the bar and registers with said openings while the long arm parallels said plane, and L-shaped spring wire in the groove with its short arm extending through said openings, and means for detachably securing the free end of the long arm of the wire to the base.

7. In a slot-cutting die, a base, rules fixed to and projecting above the base and defining the shape of the slot to be produced, a stripper bar slidable up and down in the space bounded by the rules, the rules having therein opposed slots below the bar, a compression spring beneath the bar and extending laterally into both of said slots for yieldingly supporting the bar, and a lug on the bar projecting down into the spring.

8. In a die for cutting out a part of predetermined shape from a piece of cardboard or other blank and forming therein a narrow slot, comprising a base, a rule device rising from the base and adapted to make in said blank a cut along the line of an edge of said part, slot-forming rules near the aforesaid rule, a stripper bar slidable up and down in the space bounded by the slot-forming rules, the first mentioned rule and the nearest one of the other ruler containing registering openings in the vicinity of the top of the base, and a spring wire secured to said base outside of the first rule and extending through said openings into engagement with said bar yieldingly to hold the latter raised.

JESSE D. KLOPFENSTEIN.