Oct. 19, 1926. 1,603,265

O. S. BEYER

METHOD AND APPARATUS FOR CUTTING SHEETS

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Fig. 1.

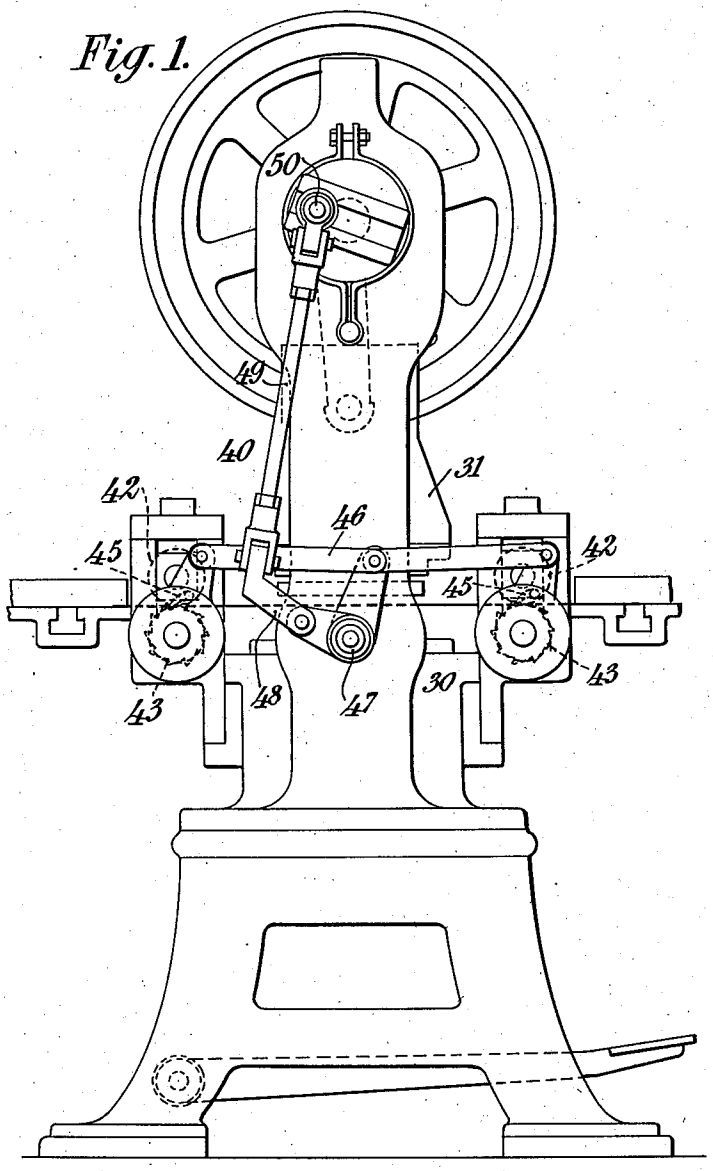
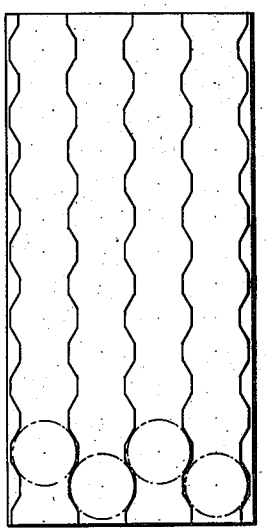


Fig. 5.



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Fig. 3.

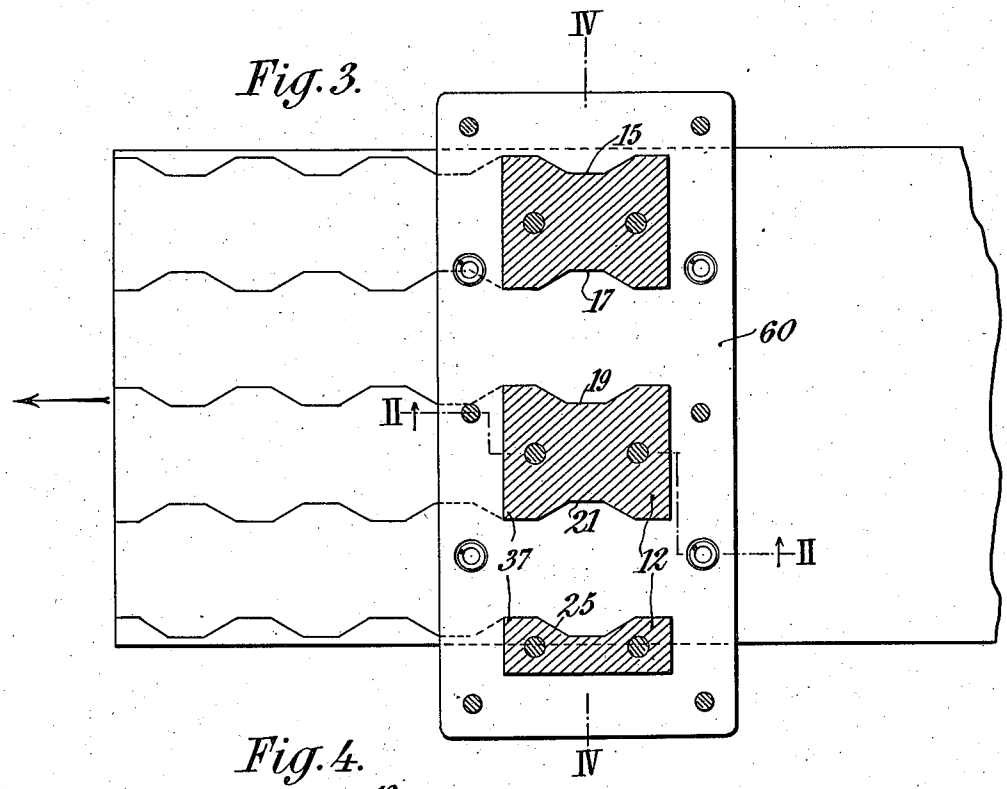


Fig. 4.

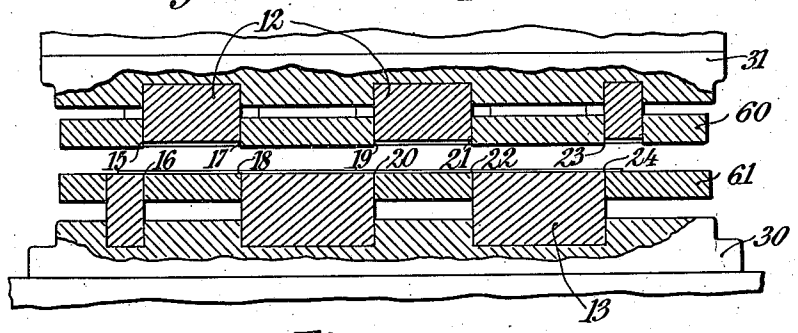
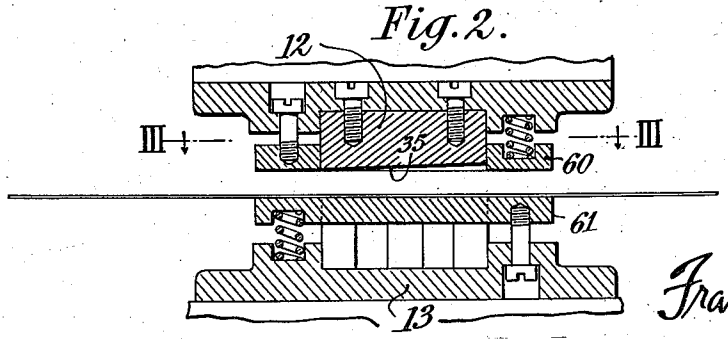


Fig. 2.



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UNITED STATES PATENT OFFICE.

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METHOD AND APPARATUS FOR CUTTING SHEETS.

Application filed March 21, 1925. Serial No. 17,421.

This invention relates to zig-zag cutters and to a method of cutting sheets, and aims to provide improvements therein.

The invention provides a method of cutting scalloped strips from sheets of metal in such manner to obtain from the sheet the maximum of useful blanks, and the minimum of scrap. The invention further provides a method which is rapid and which may be carried out by machines of relatively simple construction, and which are durable and reliable in action.

The invention further provides an apparatus having the above indicated characteristics and advantages.

An embodiment of the apparatus is illustrated in the accompanying drawings in which:—

Figure 1 is a side elevation of a machine in the form of a reciprocating press for cutting.

Fig. 2 is an enlarged vertical sectional view, on the line II—II, Fig. 3.

Fig. 3 is a horizontal sectional view on the line III—III, Fig. 2.

Fig. 4 is a vertical sectional view on the line IV—IV, Fig. 3.

Fig. 5 is a view of a sheet cut into strips such as is done by the present method and apparatus.

Referring to said drawings, the cutter comprises a pair of coacting cutting dies 12, 13, and preferably a plurality of such cutting dies comprising a plurality of cutting edges 15—24, (Fig. 4) and constituting a socalled gang cutter.

The dies 12, 13 are mounted on stamping means whereby they are reciprocated toward and from one another for cutting, and for this purpose the one may be mounted on the bed 30 and the other on the reciprocating plunger 31 of a crank (or eccentric) power press (Fig. 1). The press has a usual feeding means for intermittently feeding the blank endwise, the feeding movements alternating with the cutting strokes.

The cutting edges of the dies 12, 13, etc. are longer than the feed movement, so that the successive cuts overlap and form a continuous cut. The dies are preferably arranged to make a progressive cut at each reciprocation, and to cut less than the full length of the cutting edges 15, 16, etc. thereof and thereby in a simple manner to avoid indentation by the corners of the dies of the surface of the sheet of metal. To this end the cutting edges 15, 16, etc. are conveniently relatively inclined, as by forming the face of the die at an incline to the plane along which the sheet of metal is passed between the dies, as indicated at 35, Fig. 2. As the dies 12, 13 come together, the cutting edges 15, 16, etc. will first cross at the lowermost point of the inclined face 35 and thereafter the point of crossing will progress toward the highest point of the inclined face 35 until the limit of approach of the dies 12, 13 is reached. The cutting of a sheet of metal (or other material) interposed between the cutters, will therefore be progressive along the edges 15, 16, etc. of the dies, so that there will be simultaneous progressive cutting of an interposed sheet. The stroke of the plunger 31 and consequently the approach of the dies 12, 13 is preferably so limited that the edges 15, 16, etc. do not cross throughout their entire length at the limit of the approaching movement of the dies, and consequently the sheet will be cut less than the full length of the edges 15, 16, etc. of the dies. Consequently the sheet will not be dented by the corners 37 of the dies (Fig. 3). The inclination of the face 35 is preferably slight, as thereby the cut strip is not pressed downward by the movable die to any considerable extent out of the plane of the sheet or to such an extent as to receive a permanent bend or set. Also, by such slight inclination, less movement of the dies apart is required to bring them to a position where the edges do not cross and thereby a less stroke of the plunger 31 is required. The plunger 31 may thereby be given a very short stroke, and hence may be reciprocated at high speed and the machine thereby enabled to work rapidly.

The present apparatus and method have been particularly devised for the cutting of sheets into strips with scalloped of zig-zag edges, which strips are in turn cut into round blanks or into blanks of a similar nature where the blanks may be "nested" on the sheet from which they are to be cut, that is, where the wider portions of one strip including two or more blanks may coincide with the narrower portions of the other strip. Such a cutting of a sheet and the relative position of the blanks is illustrated in Fig. 5.

For cutting such strips, the cutters or cut-

ting dies 12, 13 are provided with zig-zag edges as shown most clearly in Fig. 3. The cutting edges 15—24 are of less length than the sheet, and the sheet is cut from end to end by a succession of cuts by the cutters, and as heretofore explained the edges 15, 16, etc. are preferably somewhat longer than the cut to be made, and the upper and lower coacting cutting edges do not cross at one end thereof and thereby do not cut entirely the length thereof.

The cutting edges 15—24 have each the length of a symmetrical part of the zig-zag line, and hence make symmetrical cuts at each successive cut. The contours of the successive cutters are similar but opposite, each as compared with the next, as will be seen from looking at the edges 15 and 17, 17 and 19, etc., Fig. 3.

After each cut the sheet is fed forward the necessary distance to enable the cutters to repeat the previous cut, and suitable means 40 for this purpose are preferably provided. For example, the sheet may be fed between a pair of rollers 42, 43, which are intermittently rotated, as by means of a pawl 45, and suitable linkage 46, 47, 48, 49 with an eccentric or crank pin 50. These feed rolls 42, 43 are preferably provided on each side of the cutters, as shown in Fig. 1.

The zig-zag cuts are made lengthwise of the sheets, as shown in Fig. 5, as this results in strips containing the maximum of blanks, and the minimum of scrap. This will be apparent from the fact that at each end one-half blank is lost at the end of each alternate row, as will be seen in Fig. 5, and consequently the greater the number of rows the greater the number of half-blanks.

Stripper plates 60, 61 may be provided for pressing the strips out from between the dies as the dies move apart.

The method and the mode of procedure in carrying out said method will be apparent from the foregoing description.

The apparatus may receive other embodiments than that herein specifically illustrated and described.

What I claim is:

1. The method of cutting a metal sheet into scalloped strips extending longitudinally of the sheet, which comprises feeding the sheet lengthwise intermittently, and by intervening simultaneous shearing cuts forming the opposite sides of the reversed scallops of one lateral series, the successive cuts coinciding to cut the continuous strips.

2. The method of cutting metal sheets into scalloped strips, comprising dividing by intermittently and progressively shearing said sheet for a part of its length along a zig-zag line, and feeding said sheet lengthwise of the strips being cut during intermissions to the cutting operations to provide as a result of a succession of the cuts a complete cut and thereby a cut scalloped strip.

3. The method of cutting metal sheets into scalloped strips, comprising dividing by intermittently shearing said sheet for a part of its length along a zig-zag line, and feeding said sheet lengthwise of the strips being cut during intermissions to the cutting operations to provide as a result of a succession of the cuts a complete cut and thereby a cut scalloped strip, and limiting the displacement of said strip by the cutting dies to an amount less than will cause distortion.

4. The method of cutting metal sheets into scalloped strips, comprising dividing by intermittently shearing said sheet for a part of its length along a plurality of zig-zag lines by a succession of simultaneous cuts, and feeding said sheet lengthwise of the strips being cut during intermissions to the cutting operations to provide as a result of a succession of the cuts a plurality of complete cuts and thereby a plurality of cut scalloped strips.

5. The method of cutting metal sheets into scalloped strips, comprising dividing by progressively and intermittently shearing said sheet for a part of its length along a plurality of zig-zag lines by a succession of simultaneous cuts, and feeding said sheet lengthwise of the strips being cut during intermissions to the cutting operations to provide as a result of a succession of the cuts a plurality of complete cuts and thereby a plurality of cut scalloped strips.

6. The method of cutting metal sheets into scalloped strips, comprising dividing by intermittently shearing said sheet for a part of its length along a plurality of longitudinally extended zig-zag lines, for a succession of simultaneous cuts, and feeding said sheet during intermissions to the cutting operations to provide as a result of a succession of the cuts a plurality of complete cuts and thereby a plurality of cut scalloped strips, said sheet being fed lengthwise.

7. The method of claim 1, further characterized in that each of the successive cuts is longer than the feed, so that the cuts overlap to form continuous cuts.

8. The method of claim 1, further characterized in that each of the successive cuts is longer than the feed and the cuts are made of varying depths to form partial cuts at one end which are completed by the overlapping of the next successive cuts.

9. A machine for cutting a metal sheet into scalloped strips extending longitudinally of the sheet, comprising opposed shearing dies having cutting edges adapted each to cut one side of one scallop, and arranged to simultaneously cut the reversed sides of the scallops of one lateral series, and alternately-acting stamping and feeding means, the lat-

ter adapted for feeding the sheet endwise after each cutting stroke.

10. A cutter for dividing metal sheets, comprising a reciprocating zig-zag cutter adapted to make a plurality of cuts part way of the length of a sheet, and means for intermittently feeding said sheet lengthwise to said cutter, whereby to provide as a result of a succession of said cuts a plurality of complete cuts and thereby a cut scalloped strip, said cutter comprising parts adapted to cross progressively lengthwise thereof and to thereby progressively cut.

11. A cutter for dividing metal sheets, comprising a reciprocating zig-zag cutter adapted to make a cut part way of the length of a sheet, and means for intermittently feeding said sheet lengthwise to said cutter, whereby to provide as a result of a succession of said cuts a complete cut and thereby a cut scalloped strip, said cutter comprising a pair of cutting edges having an inclined relation to each other, whereby said edges cross progressively lengthwise thereof and have a progressive shearing action.

12. A cutter for dividing metal sheets, comprising a reciprocating zig-zag cutter adapted to make a cut part way of the length of a sheet, and means for intermittently feeding said sheet lengthwise to said cutter, whereby to provide as a result of a succession of said cuts a complete cut and thereby a cut scalloped strip, said cutter comprising a pair of cutting edges having an inclined relation to each other, whereby said edges cross progressively lengthwise thereof and have a progressive shearing action, said inclination of said cutting edge being slight so that the metal will not be set or strained when carried beyond the meeting points of the edges in the act of cutting.

13. A cutter for dividing metal sheets, comprising a plurality of reciprocating zig-zag cutters adapted to make simultaneous cuts part way of the length of a sheet, and means for intermittently feeding said sheet lengthwise to said cutters, whereby to provide as a result of a succession of said cuts a plurality of complete cuts, and thereby a plurality of cut scalloped strips, said cutters comprising a pair of cutting dies and a reciprocating plunger carrying one of said pair of dies.

14. A cutter for dividing metal sheets, comprising a plurality of reciprocating zig-zag cutters adapted to make simultaneous cuts part way of the length of a sheet, and means for intermittently feeding said sheet lengthwise to said cutters, whereby to provide as a result of a succession of said cuts a plurality of complete cuts, and thereby a plurality of cut scalloped strips, said cutters comprising a pair of cutting dies and a reciprocating plunger carrying one of said pair of dies, the edges of said pair of dies having an inclined relation one to another, whereby said edges cross progressively lengthwise thereof and have a progressive shearing action.

15. A cutter for dividing metal sheets, comprising a reciprocating zig-zag cutter adapted to make a cut part way of the length of a sheet, and means for intermittently feeding said sheet lengthwise to said cutter, whereby to provide as a result of a succession of said cuts a complete cut and thereby a cut scalloped strip, said cutter comprising inclined cutting edges adapted to cross progressively lengthwise thereof and to thereby progressively shear the sheet, and means for limiting the reciprocating movement of said cutting parts to an extent that when moved together a shearing cut less than the complete length of the cutters is made.

16. A cutter for dividing metal sheets, comprising a plurality of reciprocating zig-zag cutters adapted to make simultaneous cuts part way of the length of a sheet, and means for intermittently feeding said sheet lengthwise to said cutters, whereby to provide as a result of a succession of said cuts, a plurality of complete cuts, and thereby a plurality of cut scalloped strips, said cutters comprising a pair of cutting dies and a reciprocating plunger carrying one of said pair of dies, the edges of said pair of dies having an inclined relation one to another, whereby said edges cross progressively lengthwise thereof and have a progressive shearing action, and means for limiting the reciprocating movement of said plunger to an extent that when the cutters are moved together a shearing cut less than the complete length of the cutters is made.

17. A machine according to claim 9, further characterized in that the shearing dies have cutting edges longer than the feed strokes.

18. A machine according to claim 9, further characterized in that the shearing edges of the dies are relatively inclined to cut progressively from end to end.

19. A machine according to claim 9, further characterized in that the shearing edges of the dies are relatively inclined to cut progressively from end to end and to cut only partly through at the advancing ends, the cut being completed at the next succeeding stroke.

In witness whereof, I have hereunto signed my name.

OTTO S. BEYER.