Jan. 29, 1952 M. J. CELOVSKY 2,583,682

APPARATUS FOR CUTTING FLANGED SLOTS IN RADIATOR SECTIONS

Filed April 18, 1950

Fig. 1

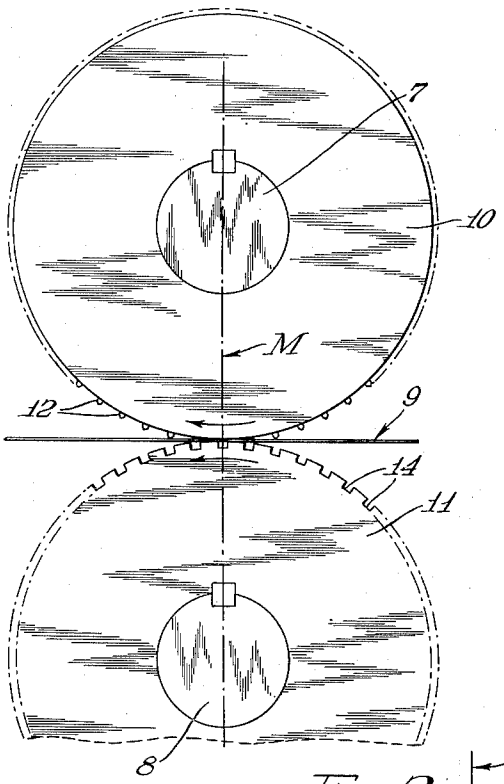


Fig. 4

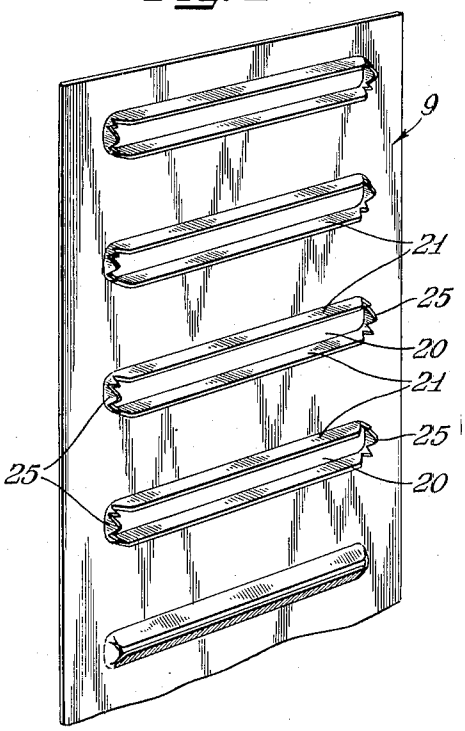


Fig. 2

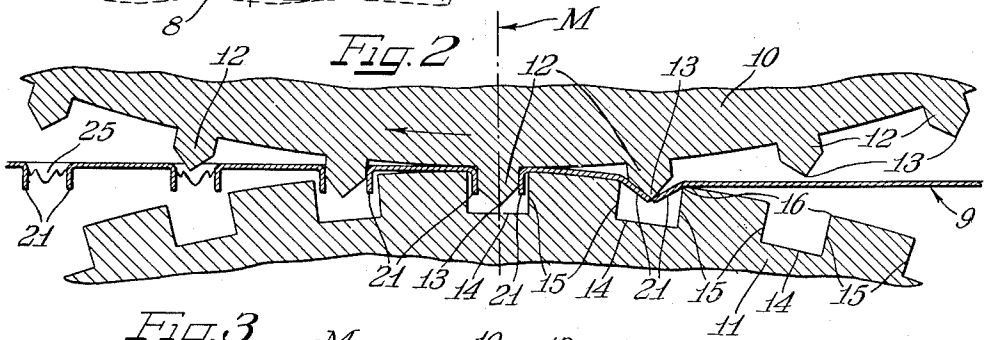
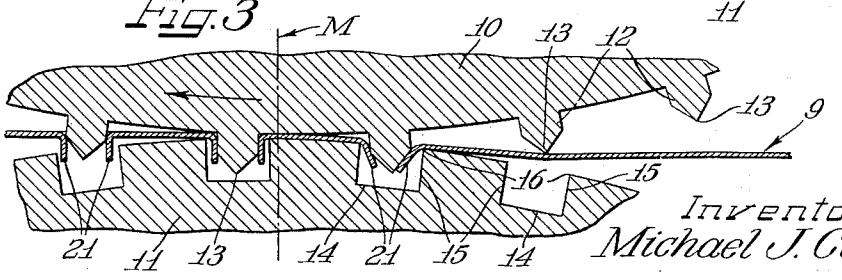


Fig. 3



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APPARATUS FOR CUTTING FLANGED SLOTS IN RADIATOR SECTIONS

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1 Claim. (Cl. 164—99)

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This invention relates to cold metal working, and more particularly, to the forming of spaced flanged slots or apertures in a continuously advancing strip of metal.

At the present time in the automotive industry, it is common practice to form in dies spaced flanged slots in a strip of metal such as a copper strip for use as a section of an automobile radiator. Such flanged slots usually correspond generally in shape to the cross-sectional contour of tubes adapted to be inserted therein in the fabrication of an automobile radiator; the flanges being designed to tightly embrace the outer surface of the tubes for holding the tubes in spaced slotted sections.

Now the method of forming these strips in dies has proven to be quite expensive both from the standpoint of the cost of the dies and their maintenance as well as from the standpoint of the labor involved in feeding a press and in handling the formed strips leaving the press.

Others have attempted to form flanged slots or apertures in metal strips by the use of meshing rolls, one set of meshing rolls being used for slitting and another set being employed for thereafter forming the burrs on each slot into flanges. Such attempts, however, have not proven commercially successful for the reason that the operation involved separate sets of rolls, thereby adding to the cost and in addition required that the operation of each set be perfectly timed with that of the other set.

An object of this invention is to provide a simplified and inexpensive way of completely forming spaced flanged slots or apertures in a metallic strip by the use of a single set of meshing rolls.

Another object of this invention is to provide a new method of roll forming spaced slots or apertures in a metal strip whereby each slot is formed by first slitting the material in advance of the medial plane of the rolls and, as the strip advances toward the medial plane of the rolls progressively forming the side edges thereof so that they are completely formed into flanges at substantially right angles to the plane of the strip by the time the slot straddles such medial plane.

Yet another object of this invention is to provide rolls with meshing projections and depressions of such construction that by the use of a single set of such rolls the strip may not only be slit at spaced intervals but the side edges of the slits may also be formed progressively into side flanges at right angles to the plane of the strip.

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In accordance with the general features of this invention, there is provided a method of and meshing rolls for forming spaced flanged slots or apertures in a metal strip whereby in the use of the same the strip is directed toward and between the meshing rolls, is engaged between the rolls to shear a slot in the strip and upon continued advance of the strip after slitting toward the vertical medial plane of the rolls, the side edges of the slot are progressively depressed until the slot straddles the medial plane of the rolls, at which time such side edges are completely formed into flanges at right angles to the plane of the strip.

Other objects and features of this invention will more fully appear from the following detailed description taken in connection with the accompanying drawing which illustrates a single embodiment thereof, and in which:

Figure 1 is a fragmentary side view of a pair of meshing rolls with a strip therebetween and embodying the features of this invention;

Figure 2 is a fragmentary enlarged side view of meshing portions of the rolls with the strip therebetween shown in section;

Figure 3 is a view similar to Figure 2 showing an intermediate stage in the depressing of the side edges of the slot and showing a tooth or projection about to perforate a slot; and

Figure 4 is a perspective view of a metal radiator section formed with flanged slot, in accordance with the features of this invention, for receiving radiator tubes (not shown).

As shown on the drawing:

Reference characters 10 and 11 designate generally meshing rotatable metal rolls splined to shafts 7 and 8, respectively, for rotating the same. Any suitable mechanism (not shown) may be employed for rotating the rolls.

Positioned between the rolls is a metal strip 9 which may be made from any suitable metallic sheet, such, for example, as copper. This strip is adapted to advance from right to left as shown by the arrows in Figures 1, 2 and 3; the latter two figures being enlargements of portions of Figure 1 showing different stages in the formation of the flanged slots.

The upper roll 10 has spaced projections or teeth 12 on its periphery with a pitch at least twice their width; the spaces between them corresponding to the spaces between the ultimate slots desired in the strip 9. In Figure 4, I have shown the finished product from which the spaces between the slots 20, to be hereinafter described, are clearly shown.

Each of the projections 12 has a rectangular root or shank and wedge shaped terminal portion with a square cutting edge is pointed at 13 and each is adapted to progressively enter a corresponding depression 14 in the lower toothed roll 11. That is to say, the lower roll 11 has a plurality of square shouldered teeth on its periphery which alternate with and define the depressions 14. Each depression is generally of a rectangular shape and includes substantially parallel sides 15 as well as a forming edge 16 which, upon engagement with the strip, is adapted to support the same for perforation as the corresponding tooth or projection 12 advances into the depression, as shown in Figures 2 and 3.

The perforating of the strip takes place at substantially one tooth pitch in advance of the vertical medial plane of the meshing rolls which plane is designated generally by the reference character M in Figures 1 and 2 when the strip is bridged over a corresponding depression. As the perforation 20 is formed, the side edges or burrs 21 are progressively depressed by the radial leading and trailing faces of the tooth in engagement therewith downwardly into the corresponding depression 14. These faces of each tooth extend to a height substantially half the width of said teeth to minimize wiping of the burrs upon withdrawal of the teeth.

With the continued advance of the strip toward the medial plane, the tooth or projection 13 continues to enter the depression, gradually slitting apart the burrs or edges 21—21 until the slot straddles the medial plane M (Figure 2), at which time these edges are completely formed into spaced flanges at right angles to the plane of the strip 9, the walls of the depression being relieved from the tooth by at least the thickness of the metal strip.

Now it will be noted from Figures 2 and 3 that upon the complete forming of the flanges 21 of one slot by perforation the tooth immediate to the rear of the medial plane perforates the metal for the forming of the next slot in the exact spaced relation, desired, from the first or previously formed one. Then the operation of forming the flanges on the succeeding slot is progressively effected as the tooth at the medial plane moves thereafter to the left.

In addition, it is also contemplated that each tooth will form the ends of each slot 20 into end flanges 25—25, as shown in Figure 4, so that a tube inserted in a particular slot will be frictionally engaged on all of its sides by flanges. This enables the tube to be frictionally bound tightly to the strip upon insertion in the slot 20. From Figure 1, it is clear that the teeth 12 and the depressions 14 extend transversely across the

rolls. The teeth 12 are of a length corresponding to the length of the desired slot and so that the ends of each tooth will straighten the end flanges 25 of each slot 20 shown in Figure 4.

From the foregoing it will be perceived that with a single set of meshing rolls, I am enabled not only to slit a sheet, but in addition to form completely the side edges of each slit into flanges at right angles to the plane of the strip or sheet.

It will be understood that modifications and variations may be effected without departing from the scope of the novel concepts of the present invention.

I claim as my invention:

In an apparatus for cutting flanged slots in metal strip for radiator sections, a pair of meshed rolls spaced apart to grip a metal strip at their medial plane, one of said rolls having axially elongated teeth circumferentially aligned with a pitch at least twice their width, each of said teeth having a substantially rectangular root portion with leading and trailing surfaces thereof lying in radial planes and a wedge-shaped terminal portion with faces thereof converging at a right angle from said root surfaces to a central axially extending square cutting edge, said root surfaces having height substantially half the width of said teeth, the other of said rolls having axially elongated rectangular depressions spaced circumferentially to register centrally with said teeth upon rotation of said rolls, the walls of said depressions being relieved from said teeth during rotation of said rolls by at least the thickness of the metal strip, the diameter of said rolls being great enough relative to the height and spacing of said teeth that said teeth will successively first linearly perforate the metal strip a tooth pitch in advance of the medial plane when the strip is bridged over a corresponding depression, said teeth and depressions cooperating to cut substantially rectangular slots in the metal strip with end flanges and side flanges coextensive with the respective edges of said slots and set at right angles to the strip.

MICHAEL J. CELOVSKY.

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