July 4, 1939. E. PENKALA 2,164,836

PRODUCTION OF PROFILED SECTIONS FROM SHEET METAL BY ROLLING

Filed June 19, 1937 3 Sheets-Sheet 1

Fig. 1.

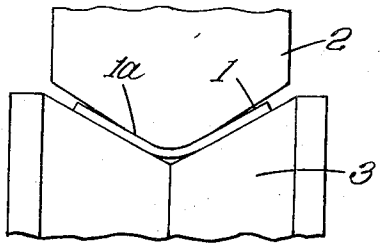
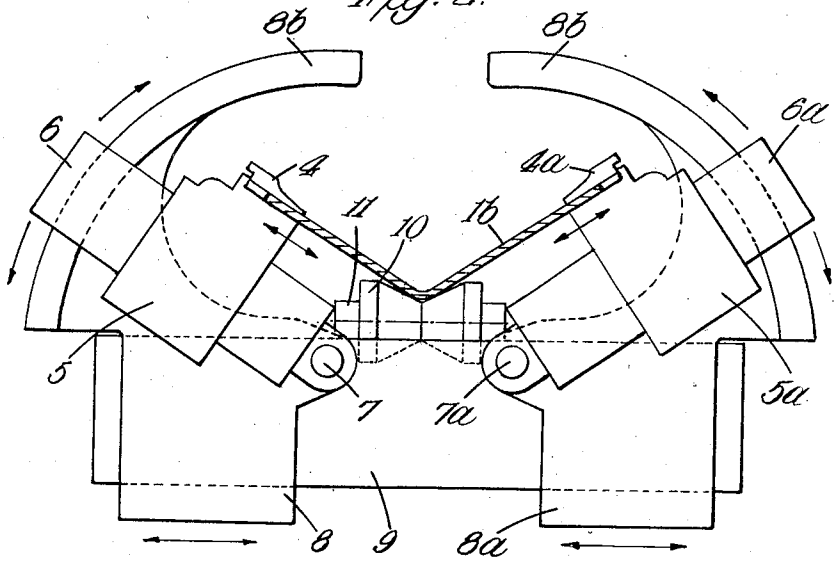


Fig. 2.



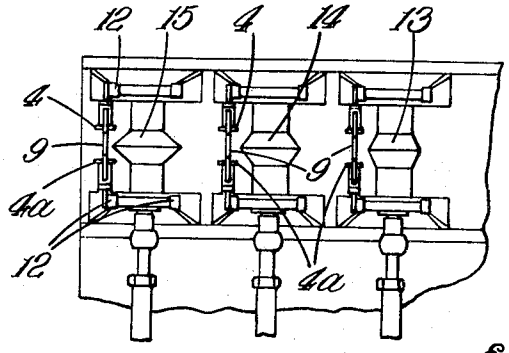


Fig. 5.

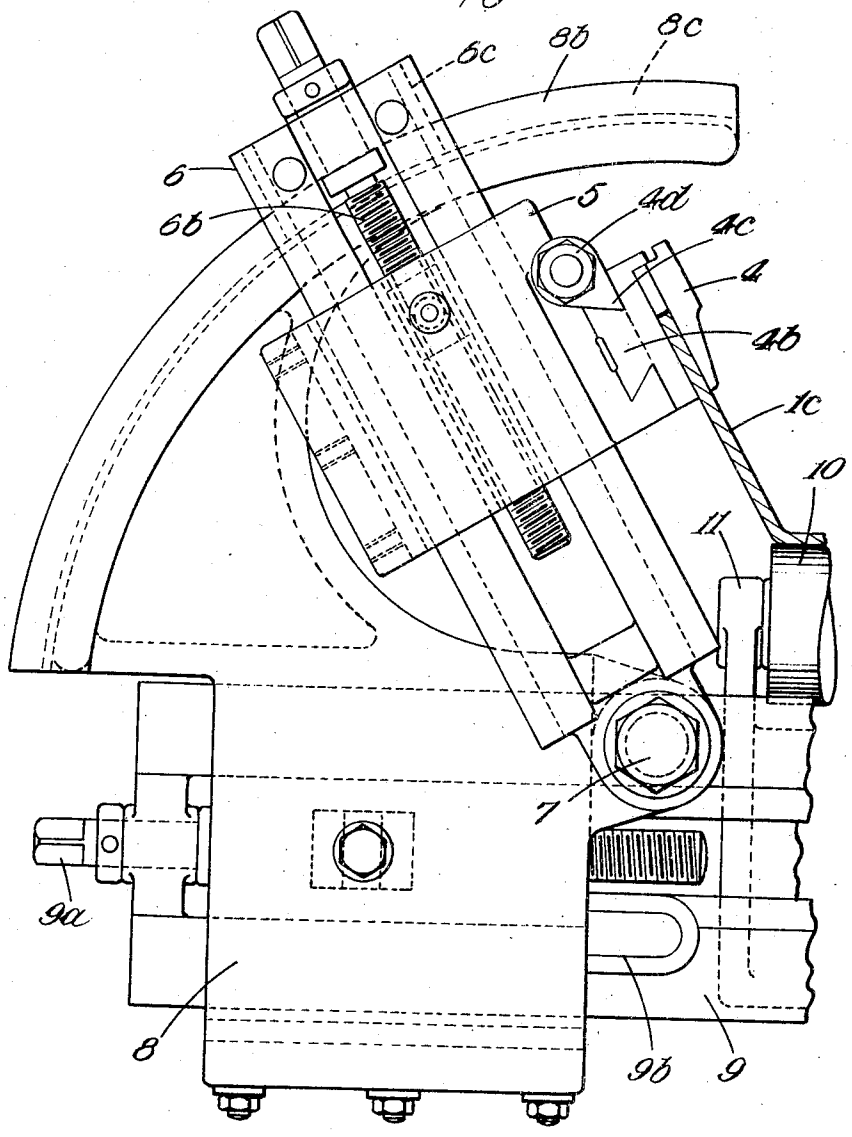
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PRODUCTION OF PROFILED SECTIONS FROM SHEET METAL BY ROLLING

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Fig. 3.



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PRODUCTION OF PROFILED SECTIONS FROM SHEET METAL BY ROLLING

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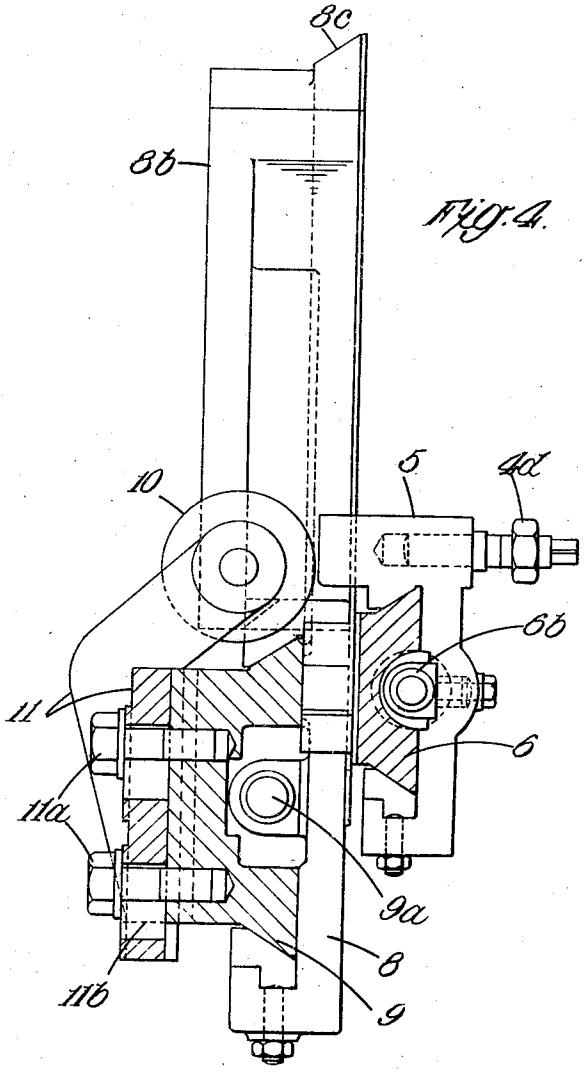


Fig. 4.

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Patented July 4, 1939

2,164,836

UNITED STATES PATENT OFFICE

2,164,836

PRODUCTION OF PROFILED SECTIONS FROM SHEET METAL BY ROLLING

Emil Penkala, London, England, assignor to Metal Trim Limited, London, England, a British company

Application June 19, 1937, Serial No. 149,218
In Great Britain January 26, 1937

9 Claims. (Cl. 153—28)

This invention relates to the production of profiled sections from sheet metal by rolling, especially cold rolling.

In the production of profiled sections of L, U, or other shapes as heretofore practised, the co-operating rollers in each pass are designed not only to form the material but also to position and guide the material by engaging the edges or marginal or other parts thereof. Thus, for every change in dimension of the same section, different rollers had to be utilised to ensure the accurate positioning of the strip material in relation to the profiled parts of the rollers.

The present invention has for its object to enable L, U and other sections in a wide range of dimensions to be produced with the minimum number of passes and by the use of a relatively small number of stock profile rollers.

According to the present invention, rollers for use in producing profiled sections are shaped so as to perform only the bending and forming of the material, and the positioning and guiding of the material in relation to the rollers is effected by guides adapted to engage the edges or marginal or other parts of the strip material or of the partly or completely formed section.

The invention also includes the provision, in a machine comprising pairs of profile rollers acting in series on strip material, of guides arranged between any two or more or all successive pairs of rollers whereby the material is guided from pass to pass and positioned in relation to the forming rollers.

The guides advantageously are mounted on carrier members adjustable angularly about axes parallel with and preferably adjacent to the approximate virtual axis along which the material travels and also adjustable towards and away from the said axes to engage the edges or marginal parts of the material or of the partly or completely formed section. Preferably also the adjustable members are carried by mountings adjustable horizontally on a base member to vary the position of the said axes. Alternatively, or in addition, the base member may be fixed to the pedestals or the like carrying the profiling rollers or may be otherwise mounted so as to be adjustable vertically.

By the provision of such adjustments the guides may be readily positioned for use in the production of any desired section. For example, in the case of an L section, the profiled parts of the final rollers would each have faces disposed at 90° with respect to one another. In the known methods the profiled parts of one of the rollers would be flanked by shoulders or the like so that the co-operating rollers provide between them an aperture corresponding exactly to the L section, this being necessary to avoid possibility of deviation of the material in relation to the rollers. In accordance with the present invention, the same profile rollers may be used with L sections of different thicknesses and of differing dimensions of the limbs which may be equal or unequal, it being only necessary to adjust the guides to suit the particular dimensions of the section. Thus, the carrier members of the guides at the outlet side of the final rollers would be set at 45° with respect to the horizontal and would be adjusted to bring the guides up to the edge of the particular L section being produced. Obviously at different stages of the formation the angular disposition of the guide carrier members would be varied, the vertical adjustment enabling accurate registration of the guides with the material of the section to be secured.

Thus it will be understood that by the use of the same guides strip materials of different widths and thicknesses and sections of different dimensions may be accommodated.

The invention also includes apparatus for the production of profiled sections by rolling from sheet metal comprising the combination of profiling rollers shaped so as to perform only the bending and forming of the material, and guides arranged intermediate pairs of the profiling rollers to position the material in relation thereto.

The invention also includes in or for a machine for rolling profiled sections from sheet metal, means for guiding the material from one pass to another and for positioning the material in relation to the profiling rollers, comprising guides mounted so as to be capable of adjustment to engage and locate the profiled section in relation to the profiling rollers. Advantageously, each guide is mounted on a member carried by a second member angularly adjustable about a pivot disposed substantially parallel with the longitudinal axis of the machine, the first-mentioned member being adjustable on the second-mentioned member towards and away from the said pivot which is carried by a mounting adjustable horizontally on a base member adapted to be fixed parallel to the profiling rollers. A roller adapted to support the base of the profiled section may be mounted in a bracket or the like adjustable vertically in relation to the base member.

The invention is hereinafter described by way

of example with reference to the accompanying diagrammatic drawings, in which:

Figure 1 is an end elevation illustrating the manner in which profiled sections of different dimensions may be produced by the use of the same series of profiling rollers;

Figure 2 is a cross-sectional view illustrating the manner in which a profiled section having, if desired, unequal limbs may be positioned in relation to the profiling rollers by the use of adjustable guides engaging the edges or marginal portions of the material;

Figure 3 is a part sectional view similar to Figure 2, but showing in more detail a preferred construction of the adjustable guide mounting;

Figure 4 is a central longitudinal section corresponding to Figure 3, but with the angularly adjustable parts shown in the horizontal position; and

Figure 5 is a fragmentary plan view illustrating the manner in which the guiding means according to the invention is associated with the profiling rollers, in the application of the invention, for example, to apparatus according to my copending application Serial No. 149,216, filed June 19, 1937.

As hereinbefore mentioned, the profiling rollers as heretofore employed are adapted not only to bend or to form the material, but also to position the same, for which purpose one of each pair of rollers is usually formed with shoulders or like abutments adapted to engage the edges of the material. Thus, the rollers for producing a profiled section 1 (Figure 1) could not be utilized for producing a similar section of smaller dimensions such as the section 1*a*.

In accordance with the present invention, pairs of guides 4, 4*a* are arranged in relation to profiling rollers 13, 14, 15 as shown in Figure 5, so as to guide and position the material in relation to the profiling rollers which, having only to perform the single function of bending or forming the material, may be a simple profile, such as shown for example in Figure 1, without the usual positioning shoulders or abutments. Thus, as will be appreciated from Figure 1 of the accompanying drawings, the same pair of rollers 2, 3 may be employed for rolling profiled sections of the same shape but of different dimensions and having, if desired, limbs of unequal length, as shown at 1*b* in Figure 2. In a similar manner U and other sections of different dimensions may be rolled by the use of a single set of profiling rollers.

In carrying the invention into effect according to a preferred embodiment, which is especially applicable for use in the rolling apparatus according to the said copending application guides 4, 4*a*, which conveniently are adjustable to suit various thicknesses of material, are mounted on carrier members 5, 5*a* which in turn are mounted on members 6, 6*a* which are adjustable angularly about pivots 7, 7*a* the axes of which are disposed parallel with the approximate virtual axis along which the material travels during the profiling operation. The pivots 7, 7*a* preferably are carried by mountings 8, 8*a* adjustable horizontally on a base member 9, the members 8, 8*a* having arcuate portions 8*b* with which the outer ends of the members 6, 6*a* engage to ensure sufficient rigidity.

As shown more especially in Figure 5, the base member 9 is fixed to the front or rear face of the pedestals 12 or the like by which the profiling rollers are supported, for example by the provision of bolts engaging vertically disposed T slots in the pedestals 12 so that the base member 9 is adjustable vertically.

It will be understood that the angular adjustment of the member 6 about the pivot 7 enables the guide 4 to be adjusted to coincide with the angle of the section, while the adjustment of the member 5 on the member 6 towards and away from the pivot 7 enables the guide 4 to be brought into proper engagement with the edge of the material. The adjustment of the members 8, 8*a* on the base member 9 enables the guides to be set closer together or further apart, as for instance, for rolling a U section, and the vertical adjustment of the base member 9 in relation to the pedestals 12 or the like provides further latitude in the range of adjustment of the guides 4, 4*a*.

By the various adjustments thus provided, profiled sections in various stages of formation and of varying shapes and dimensions may be effectively positioned in relation to the profiling rollers without the necessity of providing any shoulders or like positioning means on the latter.

As illustrated more especially in Figures 3 and 4, the guide 4 may be mounted on a slide 4*b* which may be locked in position by means of a wedge action clamp 4*c* operated by a screw and nut device 4*d* in order to facilitate quick assembly and interchangeability. The adjustment of the member 5 on the member 6 preferably is effected by means of a screw 6*b* and likewise the adjustment of the member 8 on the base member 9 is effected by a screw 9*a*. In order to ensure adequate rigidity of the guides, the outer end of the member 6 is fitted with a block 6*c* having an arcuate undercut face adapted to engage a correspondingly inclined face 8*c* on the arcuate portion 8*b* of the member 8.

In Figure 3 the guide 4 is shown engaging one limb of a channel section 1*c*. More particularly in the case of channel and like sections, it may be necessary to provide for guiding and supporting the base of the section, and for this purpose a roller 10 may be mounted in a bracket 11 fixed to the base member 9 by means of bolts 11*a* extending through slots 11*b* in the bracket 11 so as to provide for vertical adjustment of the roller 10.

It will be understood that the invention is not limited to the particular embodiment hereinbefore described. Obviously, the construction, arrangement and mounting of the guides may be modified in various ways and, if desired, the guides may be fitted with anti-friction rollers.

The invention is applicable for the production of profiled sections according to my co-pending applications Serial Numbers 149,217 and 149,220, both filed June 19, 1937, and may be used in conjunction with the construction of rollers according to the co-pending application Serial No. 149,219, filed June 19, 1937.

What I claim and desire to secure by Letters Patent is:

1. A machine of the class described, comprising at least two relatively closely spaced pairs of profiling rolls designed to act in series on a strip of material to change the cross-sectional shape thereof, at least one guide member arranged between said pairs of rolls and provided with substantially parallel faces that engage and embrace the marginal portions of the strip edge and thus cause accurate movement and delivery of the strip, and means for adjustably supporting said guide member, said means comprising a swinging element having a pivot substantially parallel with and adjacent the approximate vir-

tual axis along which the strip travels, and a carrier element adjustable longitudinally of said swinging element, said guide member being wholly disposed on said carrier element.

2. In the machine defined in claim 1, a supporting member carrying said pivot and adjustable linearly along a line substantially perpendicular to said virtual axis.

3. A machine of the class described, comprising at least two pairs of profiling rolls designed to act in series on a strip of material to change the cross-sectional shape thereof, at least one guide member arranged between said pairs of rolls in immediate proximity to each solely to cause accurate movement and delivery of the strip, said guide member having means for receiving and engaging an edge of the strip and means for adjustably supporting said guide member, said supporting means comprising a swinging element having a pivot substantially parallel with and adjacent the approximate virtual axis along which the strip travels, means adapting said guide member for carriage by said swinging element, and a supporting member carrying said pivot and adjustable linearly along a line substantially perpendicular to said virtual axis.

4. A machine of the class described, comprising at least two pairs of profiling rolls designed to act in series on a strip of material to change the cross-sectional shape thereof, at least one guide member arranged between said pairs of rolls in immediate proximity to each and formed to engage an edge of the strip and cause accurate movement and delivery of said strip, and means for adjustably supporting said guide member, said means comprising an element mounted to extend laterally away from the general path of linear strip travel, a carrier for said guide member adjustable longitudinally of said element, and means for adjusting said element substantially perpendicularly with respect to said general path of strip travel.

5. A machine of the class described, comprising at least two pairs of profiling rolls designed to act in series on a strip of material, at least one guide member arranged between said pairs of rolls to cause accurate movement and delivery of the strip, and means for adjustably supporting said guide member, said means comprising a swinging element having a pivot substantially parallel with and adjacent the approximate virtual axis along which the strip travels, a carrier element for the guide member adjustable longitudinally of said swinging element, a shiftable mounting for said pivot, and means for adjusting said mounting in two directions—linearly along a line substantially perpendicular to said virtual axis, and linearly along a second line substantially perpendicular to the first mentioned line.

6. A machine of the class described, comprising at least two pairs of rolls designed to act in series on a strip of material; at least one guide member arranged between said pairs of rolls to cause accurate movement and delivery of the strip; and means adjustably supporting said guide member; said means comprising a swinging member having a pivot substantially parallel with the path of strip travel between the pairs of rolls, a shiftable mounting for said pivot, and means for adjusting said mounting in two directions relative to the profiling rolls—linearly along a line substantially normal to said path and linearly along a second line substantially normal to the first mentioned line.

7. A machine of the class described, comprising at least two pairs of profiling rolls designed to act in series on a strip of material to change the cross-sectional shape thereof, a guide unit arranged between said pairs and designed to permit relatively free travel of the strip without substantially changing the cross-sectional shape thereof, and means adjustably supporting said guide unit, said means comprising an elongated element slidably carrying said guide unit, and a support providing a pivot for one end of said elongated element on an axis adjacent and substantially parallel to the path of strip travel, said support having an arcuately-shaped rigid extension substantially centered at said pivot and designed to provide a reenforcing guideway for the other end of said elongated element.

8. In a strip profiling machine of the class described, wherein the strip material passes through rolls or the like, strip guiding mechanism comprising a pair of divergent elements each having a pivot at one end on an axis parallel to and adjacent the path of strip travel and extending laterally outwardly beyond said path, means mounted for longitudinal adjustment on each of said elements and designed to engage and embrace a corresponding edge of the strip material, means for adjusting and holding said pivoted elements to various positions, and a reenforcing guide member mounted adjacent said pivotal axes substantially in the path of travel of an intermediate portion of the strip.

9. In the combination set forth in claim 8, means adjustably supporting said reenforcing guide member, and adjustable means carrying the pivots for said divergent elements.

EMIL PENKALA.

CERTIFICATE OF CORRECTION.

Patent No. 2,164,836. July 4, 1939.

EMIL PENKALA.

It is hereby certified that the above numbered patent was erroneously issued to "Metal Trim Limited" as assignee of the entire interest therein, whereas said patent should have been issued to --Emil Penkala, of London, England, assignor of one-half interest to Metal Trim Limited, of London, England, a British company--, as shown by the record of assignments in this office; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 9th day of October, A. D. 1945.

Leslie Frazer

(Seal) First Assistant Commissioner of Patents.