

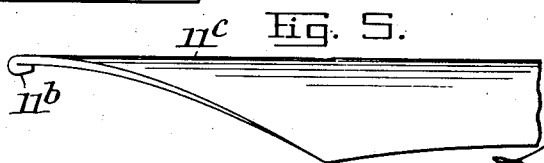
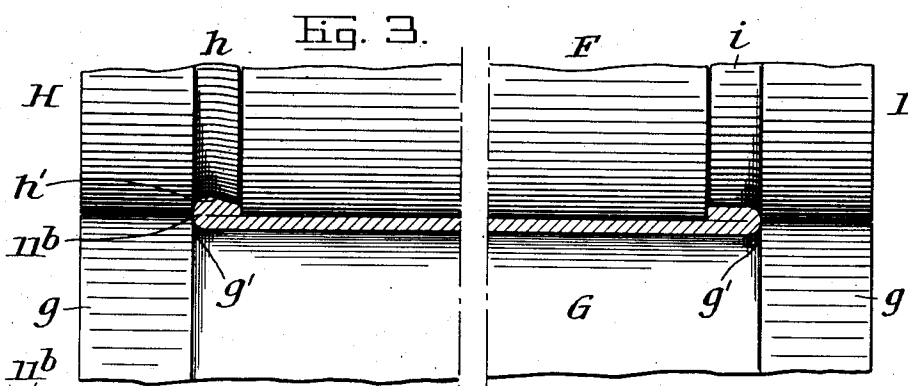
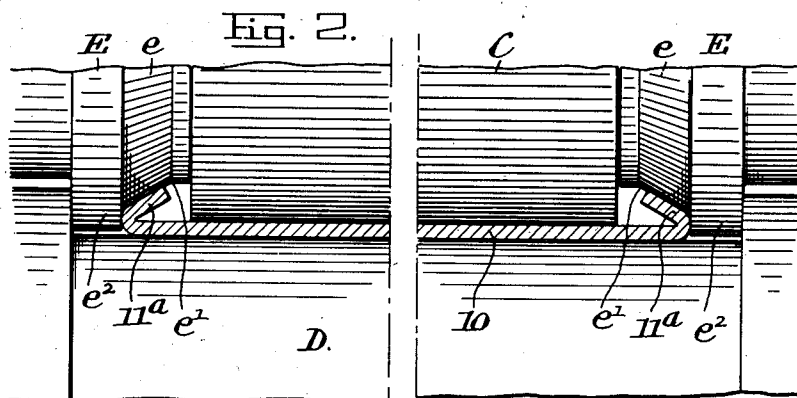
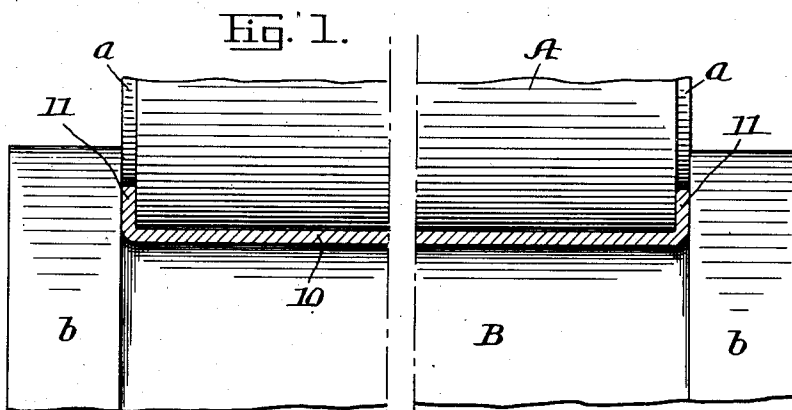
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MANUFACTURE OF METAL STOCK

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2,159,002

MANUFACTURE OF METAL STOCK

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6 Claims. (Cl. 113—32)

My invention relates to the manufacture of specially shaped sheet or strip metal stock available for many uses in the arts.

In carrying out my invention, I may operate upon various metals; metals of the ferrous type, alloys of various kinds, as well as precious and semi-precious metals, such as gold and silver. In particular, I have operated upon thin strip metal of the type familiarly known as "stainless steel", whose composition is more or less well known, preferring to employ that form of stainless steel which contains a small percentage of molybdenum.

The particular object of my invention is to provide thin strip metal, usually in relatively narrow widths, with a turned, folded, or curled edge (or a plurality of turned, folded, or curled edges) subsequently displaced edge-wise of the same so as to produce, lengthwise of such strip—which may be of any convenient length—a narrow thickened edge wherein the displaced metal has been stressed beyond its elastic limit and is closely folded against and held in intimate and permanent contact with the main body of the metal strip operated upon and, in addition, has been so acted upon during a combined drawing and roll-forging operation as to be reduced in its width or transverse dimension and increased in thickness for a special purpose hereinafter described.

A further object of my invention is to effect the production of roll-forged, and/or curled and subsequently thickened edge portions at both sides of a strip of metal; such narrow thickened edge portions being closely folded against the body of the strip, reduced in width and increased in thickness and produced simultaneously and by a series of successive steps.

And a still further object of my invention is to effect the production of relatively wider strips of metal with narrow thickened edge portions reduced in width and increased in thickness at each longitudinal margin, simultaneously produced in a series of steps.

The features of my present invention are more fully pointed out hereinafter; reference being had to the accompanying drawing, more or less diagrammatic in character, in which:

Figure 1 is a fragmentary view of means which may be employed in carrying out the first step of the method which forms part of my invention.

Fig. 2 is a fragmentary view of the same character as Fig. 1, illustrating means which may be employed in carrying out the second step of the method which forms part of my invention.

Fig. 3 is a fragmentary view of the same char-

acter as Figs. 1 and 2, illustrating means which may be employed in carrying out the final step of the method which forms part of my invention.

Fig. 4 is a fragmentary view on a slightly larger scale of the final form of the folded and compressed edge portion of the metal strip following the operations carried out by means such as illustrated in Figs. 1, 2 and 3 and

Fig. 5 is a side elevation of the writing tip end of a pen or pen point made from my improved metal stock.

My present invention comprises improvements in the metal stock and the manner or method of preparing the same set forth in the patent of Ralph F. Gibbs, No. 2,038,278, dated April 21, 1936.

The behavior of metal undergoing roll-forging, or combined roll-forging and drawing, operations is a matter peculiar to the character of metal operated upon, and the manner of passing it through the rolls and/or dies. In carrying out my invention, I deform or upset the edge of a thin strip of metal, having a thickness ranging from approximately .008" to approximately .015", to produce at such edge a narrow, thickened portion greater than double the thickness of the thin strip metal operated upon. This folding or doubling and thickening of the edge is carried out in a series of separate steps, although it is conceivable that it may be carried through as a continuous operation in a succession of stages. In practice, in preparing this stock, both edges of the strip of metal operated upon will be turned inasmuch as such operation will insure an equal strain or tension upon the metal and produce at one edge—which may be either edge—the formation desired. The form of the opposite edge is not so important since, under most circumstances such part of the metal strip may be considered waste.

The manner of operating upon the edge of the thin metal strip is in the nature of a combined roll-forging and drawing operation. The thin metal strip is passed between rolls having the function of dies; such rolls being constructed and arranged to impart to the edge (or edges) of the thin metal strip the desired conformation as the latter is drawn between the same. In carrying out this operation, the metal strip may be engaged by traction means, common in the art, and is drawn between the rolls simultaneously with the rotation of the latter; the combined operation producing the desired conformation at the edges of the thin metal strip operated upon whereby one or both of such edges may be em-

ployed as the writing tip end of a pen made therefrom.

While many metals are available for use in carrying out my invention and in the production of the final product, I have successfully employed that particular form of ferrous metal known as "stainless steel"; and in particular have used the form of stainless steel containing a small quantity of molybdenum. This metal is hard, tough, sufficiently ductile, and admirably adapted for many uses in the arts. The thickened edge portion has a particular purpose or function which will be pointed out hereinafter.

In carrying out the first step of that part of my present invention which constitutes the method or process for the formation of a thickened edge at the side of the thin metal pen stock, I may employ means in the form of a roll assembly such as that indicated in Fig. 1, which comprises a pair of rolls A and B, between which a strip of thin metal pen stock, indicated at 10, is passed; the roll A having annular grooves at each end or side face into which the edges of the strip 10 will be turned or crowded, and the roll B having flanges b between which the roll A may fit. As these rolls move together to effect the bending of the metal strip, it will be understood of course that there will be the necessary clearance to permit such action. The annular grooves a at the side or end faces of the roll A are of such dimensions plus the necessary clearance as to provide a space that equals the thickness of the thin metal strip of pen stock operated upon so that, when these rolls are in operative relation with respect to the interposed strip of thin metal and traction is applied to the latter, the edges of such metal will be turned into the recesses formed by the annular grooves a at the bite of the rolls. The result of this operation is to bend or stress the metal beyond its elastic limit and raise the edges of the metal strip in the form of flanges 11, which may be and preferably are of the same dimensions, and extend at substantially right angles to the central portion of the thin metal stock, as clearly illustrated in Fig. 1.

The second step in the production of the thickened edge portion of the thin sheet metal pen stock consists in passing the flanged strip shown in Fig. 1, between a plurality of rolls assembled in the manner and substantially of the character illustrated in Fig. 2, comprising top and bottom rolls C and D, and end rolls E, also disposed above the sheet operated upon and rotating on the same axis as the rolls C. The rolls E have annularly recessed portions e, with beveled faces e', which engage the flanged edge portions 11 of the strip of thin metal pen stock and bend them over at an angle that may approximate 30°, or more, toward the central portion of such strip of metal, as clearly indicated at 11^a. In the operation of this set of rolls, the flanges e² of the rolls E serve to maintain the strip in proper position to insure that the folding or bending over of the flanges 11 of the strip 10 to the position indicated at 11^a will be properly accomplished.

The strip of thin metal pen stock is now ready to have the folded or curled edge 11^a compressed against the body of the strip and into intimate and permanent contact therewith and so compressed and/or crowded laterally and outwardly thereof as to reduce the original width of such folded or bent over edge portion (or portions) and increase its thickness with respect to the main body of the thin metal pen stock with which it is in close and intimately permanent contact.

For this step in the improved method or process of operation, I may employ a roll assembly of the character illustrated in Fig. 3; with rolls such as illustrated at F, G, H and I. In this arrangement, the rolls F and G engage the central portion of the strip of thin metal pen stock, while the rolls H and I engage the respective turned edges of the same. The roll G is of such size and shape as to receive the strip in the shape developed by the roll assembly shown in Fig. 2; the end flanges g being rounded at their junction with the main portion of the roll as indicated at g', and engaging the rounded shoulders of the edges of the strip adjacent to the bent or turned over portions of the same. The roll H is provided with a groove h, with a concaved surface h', at one side or end of its operative face, which groove is of a shape and size or extent as to crowd the metal of the turned edge or flange 11^a laterally and outwardly and into the space thus provided by the groove h; the effect of which operation is to thicken such turned portion with respect to the main body of the thin metal pen stock. The roll I at the opposite side of the strip has an annular recess i, which will finally fold down and accommodate the opposite turned edge of the strip but without crowding the same to effect thickening thereof. It will be understood, however, that the roll I may be shaped like the roll H, if it be desired to reshape and increase the thickness of both turned edges of the strip. In this set of rolls, the rolls G and H have their end flanges in such relation as to maintain the metal strip in proper position laterally with respect to the rolls and insure that one turned edge will be not only compressed into intimate and permanent contact with the main body of the metal strip, but will also be crowded into the groove h of the roll H so as to increase its thickness, as indicated at 11^b, Fig. 3.

A fragmentary end view of the thin strip of pen metal stock after it has passed the rolls F, G, H and I, and has its turned edge thickened, is illustrated in Fig. 4 on a slightly larger scale; such view indicating by dotted lines the original thickness of the turned edge of the metal before it has been operated upon by the rolls F, G, H and I. In this condition of the thickened edge, the turned over and compressed portion thereof has been permanently stressed beyond the elastic limit of the metal and has been materially increased in thickness, to form the writing tip end of pens or pen points made from blanks cut from such special stock.

While the metal stock with a thick edge produced in the manner illustrated in the drawing and set forth in the foregoing description is applicable for many uses in the arts, it has particular advantages in the manufacture of pens and/or pen points, and in Fig. 5 I have shown at 11^c the nib portion of a pen point made from such metal; the turned over, closely folded and thicker edge portion 11^b of the thin metal strip constituting the writing tip end of such nib portion. This pen or pen point may be made in accordance with the method set forth in my Patent No. 2,037,699, dated April 21, 1936.

With stock of the character produced in accordance with the method of manufacture illustrated and described with respect to Figs. 1, 2, and 3, pens or pen points blanked therefrom will face in one direction; the thickened edge portion of the stock forming the writing tip point of the pen. In the use of double width stock in which both edges will be thickened in the man-

ner described, the pens or pen points may be blanked in either direction; either thickened edge of the thin metal stock serving as the thickened portion at the writing tip point of the pen and/or pen point.

The improved method forming the subject of my invention has been applied to the production of thickened edges upon a strip of stainless steel, a material particularly available for the manufacture of pens with a thickened portion at the writing tip end of the same; such, for instance, as described in my prior patent before referred to. It will be understood, however, that I do not wish to be limited to the use of stainless steel in carrying out the method forming the subject of my invention, and that such method, in all of its details, may be employed in forming thickened edges upon strips of various types of metals, whether or not available for use in the manufacturing of writing pens.

In view of the nature of many metals that may be operated upon in carrying out the method or process forming part of my invention, it is quite essential that the strip of thin metal pen stock be guided in exact parallelism to the respective sets of rolls for turning, curling, or folding, and finally deforming the turned-over or flanged edge or edges to the desired thickened condition. In the operation upon metals of a ferrous nature—stainless steel, for instance—it may be necessary or desirable to subject the strip to an annealing effect or operation between the rolling steps. The compressing and thickening of the turned edge of a stainless steel strip in the final rolling or roll forging or such other operation producing the same will have the effect of hardening such thickened portion and improving its wearing qualities when employed in the manufacture of pens or pen points wherein such thickened portion becomes the writing tip end of the same.

It will be understood that the shapes of the rolls may be changed and that, if desired, a rolling operation may intervene between the rolling operation effected by the roll assembly illustrated in Fig. 2, and the roll assembly illustrated in Fig. 3, that will flatten the turned edge or edges before the deforming operation to thicken one or both of the same.

While I have described with some particularity one method or process of forming a thickened edge or edges upon a thin metal strip of suitable metal—stainless steel, for instance—it will be understood that I do not wish to be limited to the exact details thereof, and that modifications may be made in such method or process within the scope of the appended claims, without departing from my invention.

I claim:

1. In the manufacture of metal stock for forming pen points and the like, the steps of first bending an edge portion of a strip of thin metal to form a flange overlying the main body of the strip and finally drawing and roll-forging said flange into intimate and permanent contact with the main body of the strip and simultaneously contracting its width and increasing its thickness with respect to the main body of the stock whereby a thickened edge of narrow width is obtained.

2. In the manufacture of metal stock for forming pen points and the like, the steps of first bending an edge portion of a strip of thin alloy steel to form a flange overlying the main body of the strip, and finally drawing and roll-forging said flange into intimate and permanent contact with the main body of the strip and simultaneously contracting its width and increasing its thickness with respect to the main body of the stock whereby a thickened edge of narrow width is obtained.

3. In the manufacture of metal stock for forming pen points and the like, the steps of first bending an edge portion of a strip of thin stainless steel to form a flange overlying the main body of the strip, and finally drawing and roll-forging said flange into intimate and permanent contact with the main body of the strip and simultaneously contracting its width and increasing its thickness with respect to the main body of the stock whereby a thickened edge of narrow width is obtained.

4. Metal stock for forming pen points and the like, consisting of a strip of thin metal having one edge turned over and drawn and substantially roll-forged down against the body of the strip in intimate and permanent contact therewith, forming an enlarged edge of narrow width with the turned over portion of such edge materially thicker than the body of the strip.

5. Metal stock for forming pen points and the like, consisting of a strip of thin alloy steel having one edge turned over and drawn and substantially roll-forged down against the body of the strip in intimate and permanent contact therewith, forming an enlarged edge of narrow width with the turned over portion of such edge materially thicker than the body of the strip.

6. Metal stock for forming pen points and the like, consisting of a strip of stainless steel having one edge turned over and drawn and substantially roll-forged down against the body of the strip in intimate and permanent contact therewith, forming an enlarged edge of narrow width with the turned over portion of such edge materially thicker than the body of the strip.

LEON HEHL ASHMORE.