Feb. 5, 1952 B. MILLER 2,584,470

METHOD OF MAKING KNIFE BLADES

Filed Oct. 13, 1950

Fig. 1.

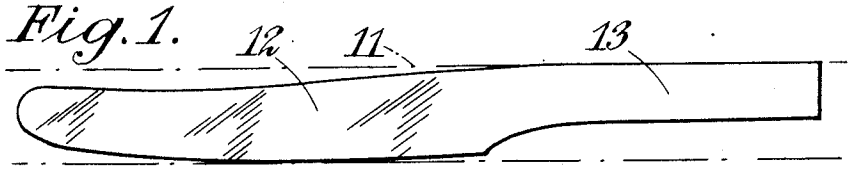


Fig. 2.

Fig. 3.

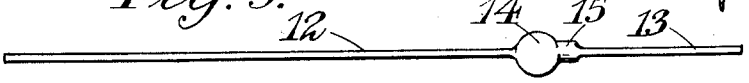


Fig. 4.

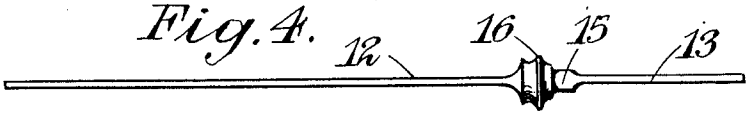


Fig. 5.

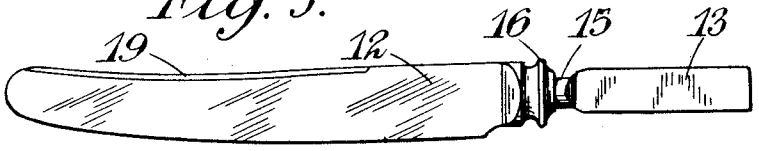


Fig. 6.

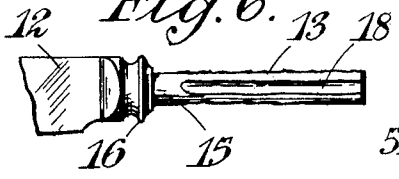


Fig. 7.

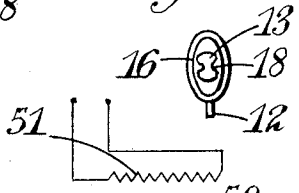
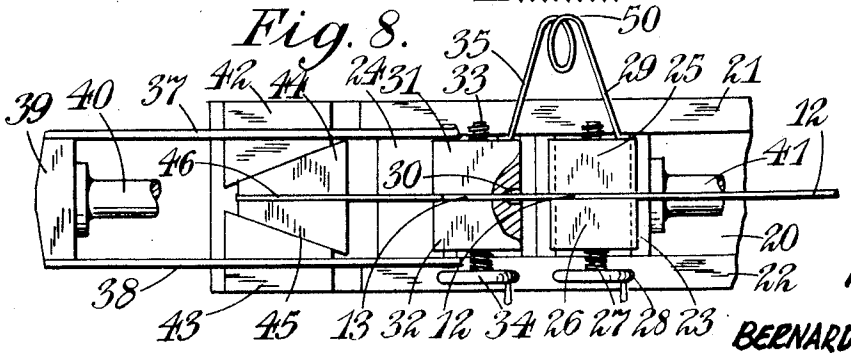


Fig. 8.



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METHOD OF MAKING KNIFE BLADES

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6 Claims. (Cl. 76—104)

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This invention relates to the manufacture of table and like knives with solid forged bolsters.

In the manufacture of such table and like knives it is usual for the blade, bolster and tang to be forged by drawing down the blade and tang from stock of a section large enough to afford the bolster between them. This provides a black forging with an irregular outline to the blade, from which the proper shape is produced by cutting away excess metal in a die. Afterwards the blade is hardened and then with the bolster, ground and polished. These operations require much work and result in a substantial loss of metal as scrap removed by the die and as metal ground off.

It has been proposed, instead of drawing down the metal, to use black rolled strip metal and form the bolster by an upsetting operation, but the forging has still required subsequent operations of hardening, grinding and polishing.

In the process according to the present invention the order of operations is substantially reversed, with material economy in metal and labour and increased rate of ouput.

According to the present invention, bright hardened stock is taken of a section substantially that of the finished blade, and is first punched out to the outline of the blade with an allowance for tang and bolster, the bolster is then upset by an electrical upsetting process and is formed between dies, and the blade is then completed by glazing and polishing the bolster.

By electrically upsetting the bolster the temper and surface of the blade is not interfered with; therefore no subsequent hardening operation is necessary and the finishing operations are substantially reduced to that on the bolster, little or no work on the blade itself being required, except sharpening the edge.

Preferably the vice jaws which grip the tang portion of the work in the electrical upsetting operation are shaped to upset a short root portion of the tang into a thickened or rounded shape and if desired in a subsequent operation the remainder of the tang can be heated and thickened by edgewise pressure on the part of the stock which is left.

If this is done the finished blade has all the features of a blade forged in the black in the way hitherto usual, without any of the prolonged grinding necessary to bring a hammered or rolled blade to a fine flat finish and without the loss of metal consequent upon such grinding.

Bright finished hardened tapered-section stock such as is required for the initial material according to this invention can be produced with great uniformity of quality and correct temper of the finished blade so that variations of temper in the knives are automatically obviated, no straightening operations, such as are commonly required after hardening, are called for and the product is a superior article of cutlery.

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One example of a specific form of the process according to the present invention will now be described with reference to the accompanying drawing, in which:

Figure 1 shows the form of blanks punched from the strip of hardened and polished stock according to the present invention,

Figure 2 is a cross-section of the stock,

Figure 3 shows the blank viewed edgewise after upsetting a bolster section therein,

Figure 4 is a similar view with the bolster die-shaped to its final form,

Figure 5 shows the parts in a state shown in Figure 4, but with the blade viewed flatwise,

Figure 6 shows the tang after it has been compressed edgewise to thicken it,

Figure 7 is an end-view of a tang as shown in Figure 6,

Figure 8 is a diagrammatic plan of the upsetting apparatus.

Referring to Figure 1, a strip 11 is taken of hardened, tempered and polished stainless steel. This strip is commercially producible in long lengths and is of tapered section as seen in Figure 2, the back being thicker than the opposite edge. The dimensions of the strip are such as to afford a blank, when punched therefrom, which is of the right thickness for the completed knife-blade, and which needs only sharpening along the thin edge, without any material removal of the metal from the polished surfaces. As shown a blank 12 is punched from said strip in the form of a knife-blade with a tank portion 13 extending from it. The tang portion is wider than that eventually required for the tang, and somewhat longer. The blank is punched so that as much as possible of the edge of the blade extends along the thin edge of the strip and so that the back of the blade where it is nearest to the tang touches the thicker edge of the strip. The tang itself is punched as far as possible from the thicker portion of the strip. Although the strip is hardened and tempered, it is possible to punch blanks therefrom as the temper is not so hard as that which can be imparted to punches and dies, and the operation of punching a knife blank from such strip is known in itself.

The first operation upon the blank 12 after

punching is to upset a bulge in the blank as shown at 14, Figure 3, at the junction between the blade and the tang. This is done in the manner hereinafter explained in connection with Figure 8 of the drawing. The upset portion 14 is such as to contain the correct amount of metal for the bolster eventually required, and also comprises an embryo end portion 15 of the tang. The bulk of the tang, however, is left of the thickness of the original stock from which it was punched. The bolster 14 is formed by pressure between dies to the shape shown at 16, Figure 3 or to any other desired shape which may be called for by the fashion chosen for the knife. This is effected either hot, while the piece is still hot from the upsetting operation, or in a subsequent operation as may be found desirable.

The above operations leave the tang portion 13 still flat, but joined to the bolster 16 by a partially-upset circular portion 15. Any flash which may be produced in the die operation on the bolster 16 is trimmed away, and the tang portion 13, which is left broader than the circular upset portion 15, is next pressed edgewise between dies so as to reduce it to the dimensions of the portion 15, in the plane of the blade 12, and to thicken it laterally as shown in Figures 6 and 7. The dies employed for this purpose have roughened or serrated surfaces which give the tang the necessary gripping quality when it comes to be inserted in the knife handle. The effect of edgewise pressure on the flat tang is that the metal is mushroomed over along each edge, leaving a certain amount of hollow space as shown at 17, Figures 6 and 7. Such hollow further assists the grip of the tang in the handle, but the hollow does not persist right up to the bolster 16 on account of the metal having been electrically upset into a round form close to the bolster. It may be desirable to heat the tang before pressing it edgewise, at least sufficiently to draw the temper of the metal, and if necessary to a forging heat. As shown in Figure 5, the back of the blade is bevelled as indicated at 19, and when the slight degree of oxidation which occurs close to the bolster has been removed by glazing and polishing and the edge has been sharpened, the blade is ready for insertion in the handle in known manner.

Referring to Figure 8, the electrical upsetting apparatus comprises a bed 20 having longitudinal guideways 21, 22 in which operate two sliders 23 and 24. The slider 23 carries two transversely movable vice jaws 25, 26, which are operated toward one another by a right-hand left-hand screw 27, and hand-wheel 28. These vice jaws are made of bronze, and are electrically connected by flexible lead 29 to one terminal of the low voltage secondary winding 50 of a step-down electrical transformer having a primary winding 51. The vice jaws 25, 26 are shaped to fit the blade portion 12 of the knife-blank. The slide 24 carries vice jaws 31, 32, which are adapted to be forced towards one another to grip tang 13, by right- and left-hand screw 33 operated by an end-wheel 34. The vice jaws 31, 32 are connected by flexible lead 35 to the other terminal of the secondary winding 50 of the transformer hereinbefore referred to. The jaws 31, 32 are insulated from the jaws 25, 26 in manner known per se and are recessed as shown at 30 to afford space on each side of the knife blank for the metal of the blank to flow, when softened, and to form a portion 15 of the tang as indicated in Figures 3 to 7. The slider 24 is connected by connecting-rods 37, 38 to a cross-head 39, and the cross-head

is engaged by a ram 40. The ram 40 is operated by hydraulic cylinder not shown in the drawing so as to move the cross-head 39 to the left as shown in the figure, when suitable pressure is applied in the cylinder, and thus to carry with it the slide 24 and the vice jaws 31, 32. The slide 23 is operated upon by a ram 41, which may be either yieldingly pressed by spring means, or hydraulically operated, or otherwise, as desired, to move the vice jaws 25, 26, to the left as shown in the figure.

Behind the slider 24, considered in the direction of the length of the machine there is a wedge-shaped structure consisting of two upstanding blacks 42, 43, between which are two wedge vice jaws 44, 45, adapted to grip the end of a push rod 46 firmly and to sustain it against pressure exerted on the tang 13.

In operation a knife-blank 12 is gripped firmly between the movable vice jaws 25, 26 and also gripped at the tang end between the intermediate vice jaws 31, 32. The intermediate vice jaws 31, 32 are so adjusted as not to grip the tang so firmly as to prevent them sliding along it. Current being now applied, the portion of the blank between the jaws 25, 26 on the one end, and the jaws 31, 32 at the other, becomes heated by the passage of the electric current to forging temperature, and the pressure applied by the ram 41 compresses the metal, forming an upset portion between the two pairs of jaws. As the upsetting operation proceeds, the intermediate vice jaws 31, 32 are caused to slide along the knife blank to the left sufficiently to expose fresh metal to the electric current and to the upsetting operation until an upset is produced similar to that shown in Figure 3. By suitable regulation of the current, the upsetting operation is carried out at a temperature which is maintained within forging temperature of the steel, and, surprisingly, it is found that although the steel is forged in the bolster portion, the remainder of the blade where it is gripped by the vice jaws 31, 32 does not have its temper drawn, but remains bright and polished and of good temper suitable for a knife blank.

It will be seen, therefore, that by the present invention, starting from hardened, tempered and polished stock, a bolster is forged in one piece with the knife-blade without altering the temper of the blade, and without demanding those extensive grinding and polishing operations upon forged metal which are commonly regarded as essential in the production of a solid forged blade.

The resultant saving in the metal employed as compared with the usual process for blade-forging the whole blade, followed by grinding, polishing, hardening and tempering, is very considerable, and the blades according to the present invention are not only of the highest quality, but are more easily mass-produced with absolute uniformity, both of temper, sharpness and design, than has been possible in the manufacture of cutlery hitherto.

I claim:

1. A process for the production of solid forged knife blades, wherein bright hardened stock of a section substantially that of the finished blades is used, comprising punching out the outline of a blade and integral tang from the stock, upsetting a bolster by heating the portion between the blade and tang and applying pressure to the blade axially thereof to bulge outwardly the heated portion and pressing the bulged portion between dies to shape the bulged portion into a complete bolster.

2. A process for the production of solid forged knife blades, wherein bright hardened stock of a section substantially that of the finished blades is used, comprising punching out the outline of a blade and integral tang from the stock, upsetting a bolster by electrically heating the portion between the blade and tang and applying pressure to the blade axially thereof to bulge outwardly the heated portion and pressing the bulged portion between dies to shape the bulged portion into a complete bolster.

3. A process as claimed in claim 2, including the step, simultaneous with the upsetting of the bolster, of upsetting a short root portion of the tang.

4. A process as claimed in claim 2, including the subsequent step of compressing the tang transversely of its axis to thicken it.

5. A process for the production of solid forged knife blades, wherein bright hardened stock of a section substantially that of the finished blades is used, comprising punching out the outline of a blade and integral tang from the stock, upsetting a bloster by electrically heating the portion between the blade and tang and applying pressure to the blade axially thereof to bulge outwardly the heated portion, placing the bulged

portion between dies to shape the bolster, and subsequently polishing the bolster.

6. A process for the production of solid forged knife blades, wherein bright hardened stock of a section substantially that of the finished blades is used, comprising punching out the outline of a blade and integral tang from the stock, upsetting a bolster by electrically heating the portion between the blade and tang and applying pressure to the blade axially thereof to bulge outwardly the heated portion and pressing the bulged portion between the dies to shape the bulged portion into a complete bolster, cutting off the flash around the bolster and polishing the bolster.

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