(No Model.) 4 Sheets—Sheet 1.

T. SHAW.

PROCESS OF MAKING KNIFE BLADES.

No. 489,719. Patented Jan. 10, 1893.

Fig. 1.

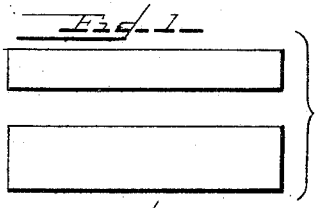


Fig. 2.

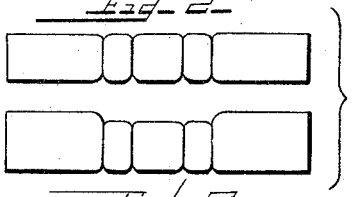


Fig. 3.

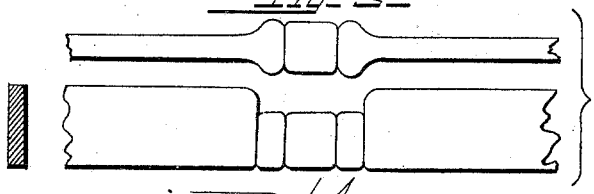


Fig. 4.

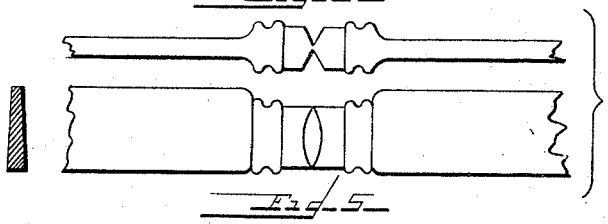


Fig. 5.

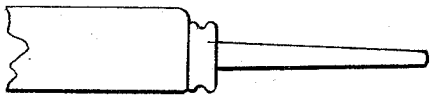


Fig. 6.

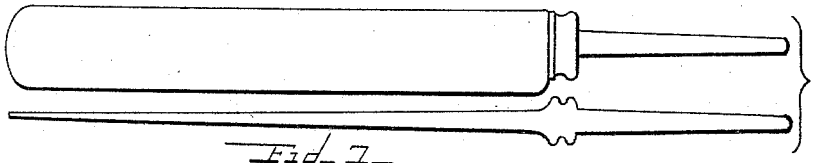
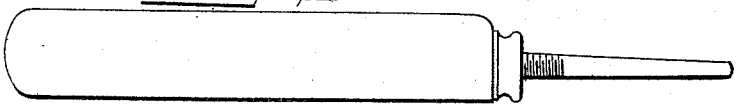


Fig. 7.



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T. SHAW.

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No. 489,719. Patented Jan. 10, 1893.

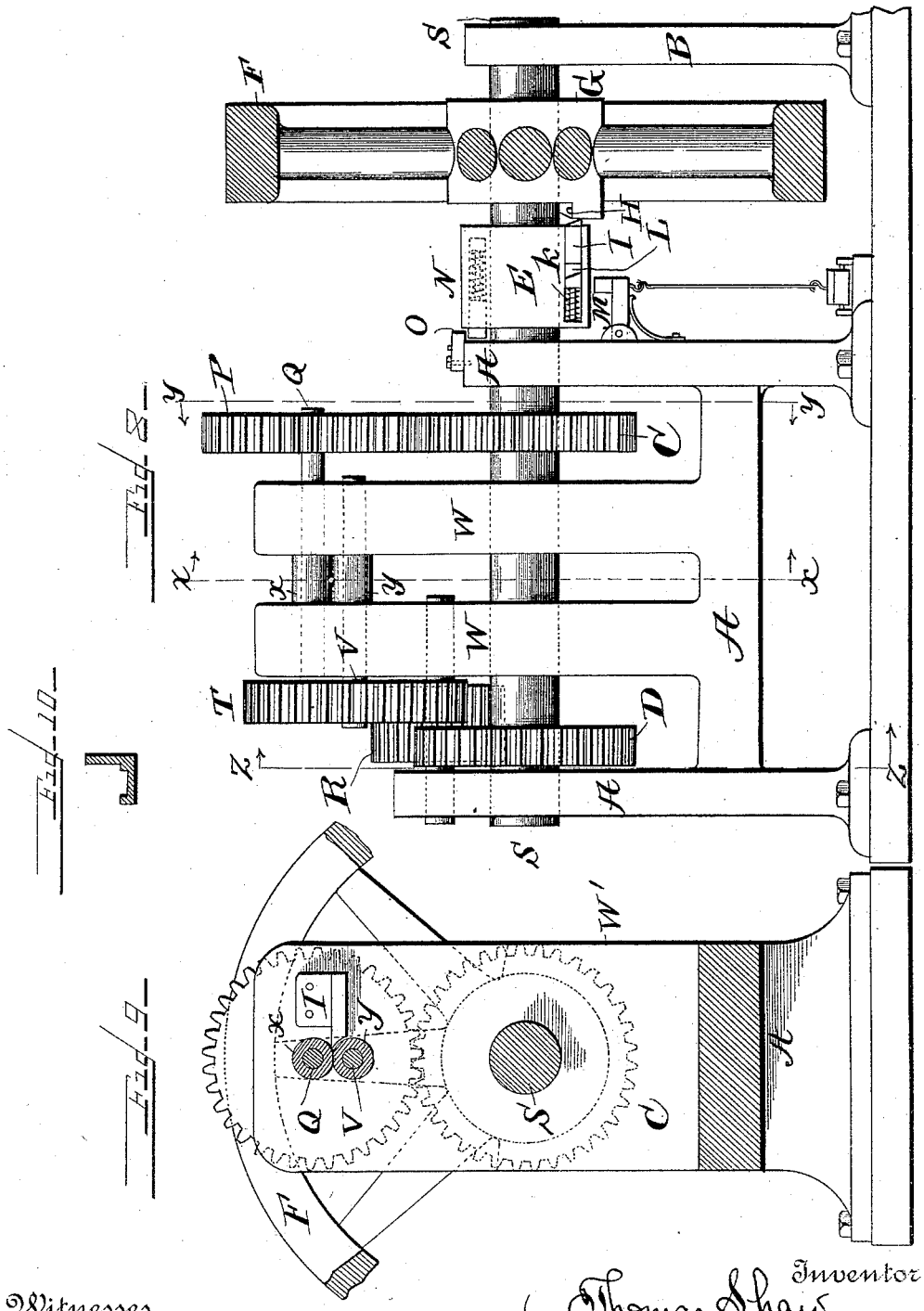

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Fig. 12

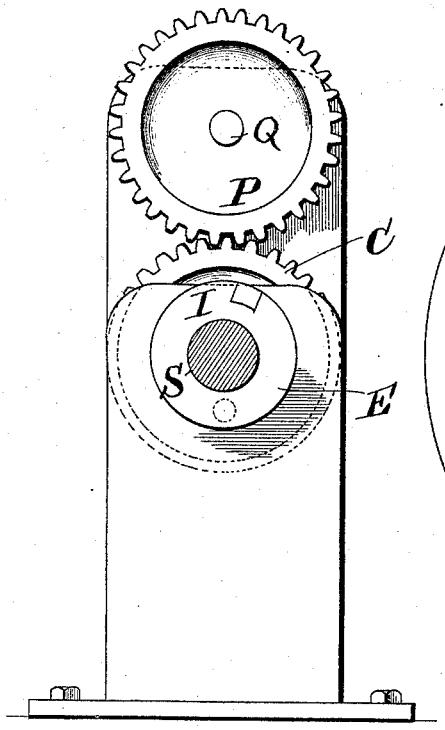


Fig. 11

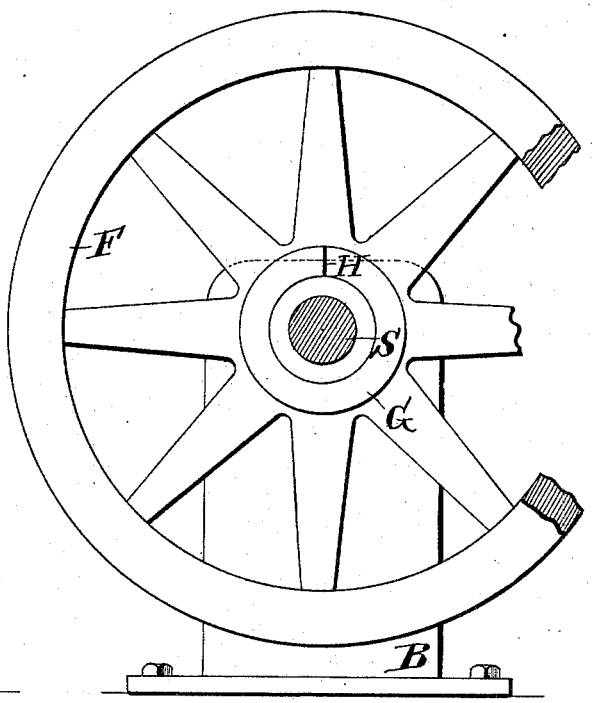
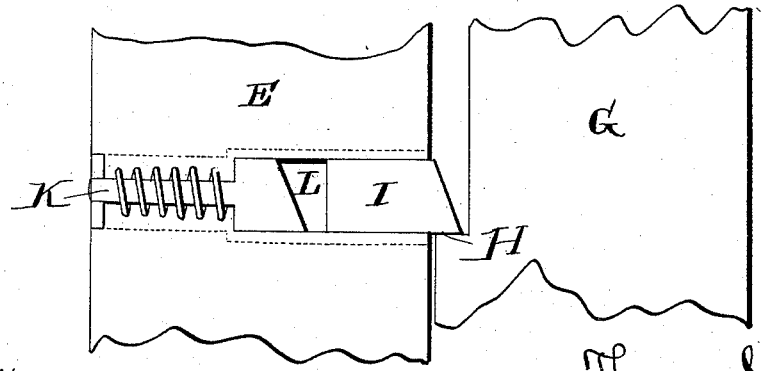


Fig. 12a



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(No Model.) 4 Sheets—Sheet 4.

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PROCESS OF MAKING KNIFE BLADES.

No. 489,719. Patented Jan. 10, 1893.

Fig. 13.

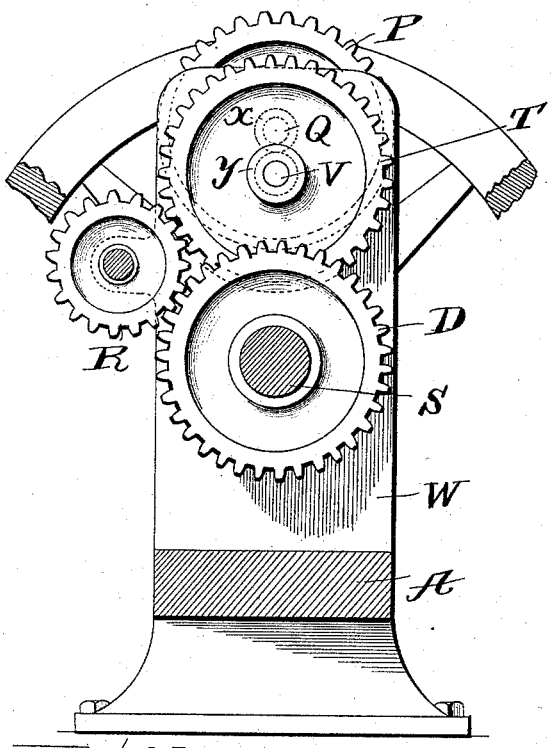


Fig. 14.

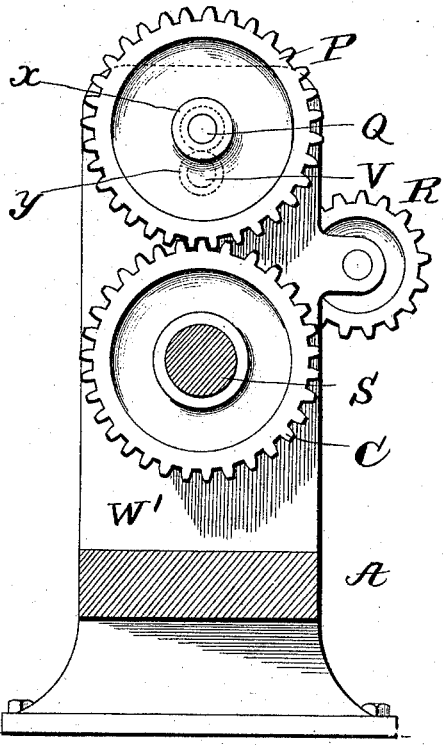


Fig. 15.

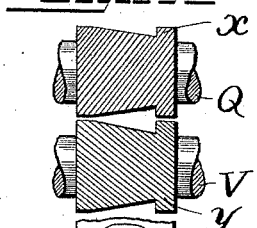
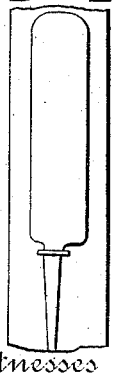


Fig. 16.



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UNITED STATES PATENT OFFICE.

THOMAS SHAW, OF NEWARK, NEW JERSEY.

PROCESS OF MAKING KNIFE-BLADES.

SPECIFICATION forming part of Letters Patent No. 489,719, dated January 10, 1893.

Original application filed July 22, 1891, Serial No. 400,363. Divided and this application filed May 6, 1892. Serial No. 432,103.

(No model.)

To all whom it may concern:

Be it known that I, THOMAS SHAW, of the city of Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in the Process of Making Knife-Blades; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This my invention is an improvement in the process of making knife blades and consists in the novel features hereinafter described.

In the accompanying drawings I have illustrated the various steps of my improved process and the machinery for carrying one step of the same into effect, and my said invention is fully disclosed in the following description and claims.

Referring to said drawings, Figure 1 is a view of a blank from which the blades are made. Fig. 2 is a view of the blank with the bolsters partially formed. Fig. 3, views of the blank with the bolsters and blade portions partially formed. Fig. 4, views of the blank with the blade portions beveled and the blank cut nearly in two. Fig. 5, a view of the blank for one blade, with the tang drawn ready to be rolled. Fig. 6, views of the blade after it has been rolled. Fig. 7, view of the blade after it has been trimmed. Fig. 8 is a front view of the machine in which the blades are rolled. Fig. 9 is a section through the rolls of the machine. Fig. 10 is a section of the feed guide. Fig. 11 is a section through the shaft S, showing the face of the cam on the fly-wheel. Fig. 12 is a section through the shaft S, showing the hub E. Fig. 12ª is an enlarged view of the bolt H and hubs E and G. Fig. 13 is an end view of the machine, showing the gear wheels which connect the rolls together. Fig. 14 is a sectional view, showing the gear wheels C, P. Fig. 15 is a longitudinal section of the rolls X, Y. Fig. 16 is a view of the face of one of the rolls straightened out.

I will now proceed to describe the manner in which I carry out the process which constitutes this, my invention. I take a blank of steel or other suitable metal, preferably of such size as will make two blanks, or blanks for two knife blades, shown in Fig. 1, and subject it when red hot to a stamp, which brings it into the form shown in Fig. 2, wherein the bolsters for the knife blades are partially formed. It is then heated and subjected to a drop forge, which brings it into the form shown in Fig. 3, having the bolsters partially formed and the blade portions widened. The blank is then again heated and stamped, and brought into the form shown in Fig. 4, in which the blade portions are beveled and the blank is cut nearly in two at the center, so that it may be readily broken apart into two blanks, or blanks for two blades. The end of the blank is now heated and the tang is drawn out, as shown in Fig. 5. This is preferably done under a steam hammer. The blank is now ready for the rolling process, as I usually carry on the process, although it is manifest that the blank might have been brought to the shape shown in Fig. 5 by other process, or process with other steps than those described and shown in the preceding figures. The blank shown in Fig. 5 is now heated in a furnace, so as to bring it to a red heat, and it is then placed in the rolling mill, shown more particularly in Fig. 8, between the rolls X and Y, with the tang and bolster end forward. The rolls are so cut that they are provided with dies, or are die rolls, having sufficient space in them to receive the tang and bolster. The tang and bolster fit into the dies made in the rolls, while the space between the rolls where the blade portion of the blank comes is much closer than the thickness of the blank and the dies are the counterpart of the finished blade. The die rolls are made to revolve, and the blade portion of the blank is rolled out to the exact form and shape of the die rolls, giving as the result of this step a finished blade, shown in Fig. 6. In order to carry on this rolling process, it is necessary to have a rolling mill capable of starting from a state of rest, so that the roller dies may be at a state of rest when the blank is introduced between them, and the roller dies may be made to revolve rapidly so as to pass the blank through them while it is still hot without danger of its cooling off in passing between them.

I will now proceed to describe the machine

by which I carry out this step of my process. The main frame A, of the machine is provided with boxes for the shaft S, in which it runs. The shaft S is also supported by the pillar B, so that it runs in five boxes. Rigidly attached to the shaft S are the cog-wheels C and D, being equal in size and number of teeth with one another. Rigidly attached to the shaft is the hub E, while the fly-wheel F, runs free on the shaft, that is, it is journaled on the shaft. This fly-wheel F has considerable weight, so as to give it great momentum, and the power is applied by a belt going around it so as to drive it in the direction desired. On the side or end of the hub G of the wheel F is arranged the cam or projection H shown more clearly in Fig. 11. The face of this cam or projection recedes from the point marked H in Fig. 11 all the way around the face of the hub, so as to make a single notch or projection at the point H. In the hub E, which is attached to the shaft S, is the bolt I shown in Figs. 8 and 12ª. This bolt I works in a dovetail channel or groove provided for it, and is projected toward the hub G of the wheel F by a spring pressing it out from the hub E. It is manifest that when the bolt I is projected out beyond the face of the hub E and the wheel F is revolving in the direction shown by the arrow, the cam H or projection on the end of the hub G will engage with the bolt I and cause the shaft S to revolve with the wheel F. The bolt I works in the groove in the hub E and projects beyond the circumference of the hub E, and has cut in that part which projects beyond the circumferential face of the hub E, a groove or wedge-shaped passage L.

The brake M is attached to the frame of the machine and is impelled by a spring into contact with the circumferential face of the hub E. This brake M has on it a wedge faced lug, in such a position that it will come in contact with or be forced into the tapered slot L and the wedge-like action of the two faces will draw the bolt back and away from contact with the cam H on the hub of the wheel F, and at the same time check the revolution of the hub E, and consequently of the shaft S. A treadle arrangement is shown in the drawings, Fig. 8, by which this brake or stop M may be withdrawn from contact with the bolt I. Many modifications of the arrangement for so withdrawing the brake will be suggested. It is unnecessary that any form should be suggested. The normal position of the brake M is in contact with the bolt I, holding it out of contact with the revolving wheel F, and holding the rolls and necessary gear wheels in a state of rest. To operate the rolls, the brake M is withdrawn when the bolt I is thrown into contact with the cam H, and the rolls X, Y, are thereby made to revolve. To prevent back lash, I have provided a spring catch N in the hub E. This catch is projected by a spring from the end of the hub, and comes in contact with the main frame A of the machine, where a ratchet O is provided for it to work against, so that the hub E cannot spring back away from the brake M when it is stopped by coming in contact with the brake. As the point of stoppage of the hub E is always the same it is manifest that only one ratchet or catch is necessary for the catch N to take against. By the arrangement of the wheel F provided with a cam H on its hub, and the bolt I, brake M and catch N on the hub E rigidly attached to the shaft S, the shaft S may be given one rapid and complete revolution and brought again to a state of rest always in the same position.

I will now proceed to describe the gearing by which the rolls X and Y are driven by the shaft S. The wheel C on the shaft S meshes with the wheel P, which is of the same size and number of teeth and which is on the shaft Q. This shaft Q has on it the die roll X. The wheel D is also on the shaft S and meshes with the idler R, which in turn meshes with the wheel T, the wheels T and D being of the same size and having the same number of teeth. The wheel T is on the shaft V, which carries the other of the die rolls Y. By this arrangement of gear, the two die rolls X, Y are made to revolve together once for each revolution of the shaft S. The die rolls X, Y, are held in the frames W, W′, and may be removed and adjusted as desired, but this forms no part of this my invention. On the side of the frame W′, as shown in Fig. 9, is arranged the guide *l*, adjustably attached to the frame. It is made with a slide or chute to accommodate the blade of the blank to be rolled, and is so placed that the blank fed from it will be tangent to the two die rolls X, Y, at their point of contact. This enables me to get much better results, as the blade is not bent in passing through the die rolls. The two sides on the guide keep the blade true and straight in its course to the rolls. The die rolls draw the blade out to its proper length, bevel it, and taper it, all in one operation. The blade thus rolled is then subjected to planishing dies and a steel hammer, which straightens and trues it and finishes the bolster.

I arrange the trademark stamp for the blades in one of the planishing dies, so that it is impressed in the blade at the planishing, thus giving a uniform depth of stamp to the trademark. This forms the subject matter of another application filed by me, July 22, 1891, and given Serial No. 400,364. The knife blade is now ready for grinding, tempering and polishing. The grinding I prefer to accomplish on emery wheels, but do not wish to confine myself to that means.

Heretofore, and before this my invention, great difficulty has been experienced in making good knife blades. If the blade was hammered it had to be welded to the bolster, which is difficult, expensive, requires skilled labor and leaves a weak point at the welding. If the blade and bolster are made from one

piece, the blade is drawn to its form by forging and stamping, producing metal of uneven density, of a form requiring a great deal of trimming, making much scrap and consequent waste. Forged blades, being of uneven density frequently crack in hardening. Some makers of table cutlery to lessen the loss in cracked blades, weld iron bolsters on the steel blade. While others who forge blades out of one piece of steel, are compelled to harden in oil to partially overcome the loss in cracked blades. Blades made by the process herein described are so even in density that they may be hardened in water or oil without the risk of cracking the blade. This my invention, differs from all previous processes in that the blade portion of the blank, is beveled on both sides before being introduced into the rolls, so that as the blade portion is rolled out the metal is crowded lengthwise of the blade only and is not crowded sidewise as well, as is the case where the blank is not first beveled. Where the blank is not beveled before it is placed in the rolls, the crowding of the metal laterally in giving the proper bevel to the blade tends to make the blade curl, or crack when finished, whereas by my process, the crowding of the metal is only in a direction longitudinally of the blade and the tendency of the blades to crack or curl is obviated.

The mechanism herein shown and described for imparting intermittent motion to the die rolls, and positively stopping the same at the end of a single complete rotation forms the subject matter of another application for Letters Patent of the United States filed by me July 22, 1891 and given Serial No. 400,363, of which this, my present application is a division and said mechanism is therefore not specifically claimed herein.

Having now described my process and the mechanism used in carrying it out, I claim as new and desire to secure by Letters Patent,—

1. The herein described process of making knife blades, consisting in forming the bolster in the knife blade blank beveling the blade portion and heating the same, introducing the hot blank between die rolls provided with recessed portions for the bolster and for the blade and rolling out the blade lengthwise giving it the proper form, taper and bevel by one operation, substantially as described.

2. The herein described process of making knife blades, consisting of subjecting the blank to the operation of dies to form the bolster and a portion of metal at either side for the tang and blade respectively, drawing out the tang, beveling the blade portion, then heating the blank and introducing it between die rolls when said rolls are stationary or in a state of rest, then starting the rolls and rolling out the blade lengthwise and giving it the proper form, taper and bevel by passing once between the rolls, substantially as described.

3. The herein described process of making knife blades, consisting in subjecting a blank to the operation of successive dies to form the bolster of two blades, with portions of metal at either side of each bolster for the tang and blade respectively beveling the blade portion and indicating the point of separation, then separating the two blanks, then treating each blank by drawing out the tang, heating the beveled blade portion and subjecting it to the action of die rolls, rolling out the blade lengthwise and giving it the proper form, taper and bevel by one operation, substantially as described.

4. The herein described process of making knife blades consisting of forming the bolster in the knife blade blank and beveling the blade portion, heating the blade portion and subjecting it to the action of die rolls, rolling out the blade lengthwise and giving it the proper form, taper and bevel by one operation, then subjecting the blade to planishing dies, then grinding and tempering the same, substantially as described.

In testimony whereof I have hereunto affixed my signature in the presence of two witnesses.

THOS. SHAW.

Witnesses:
G. G. FRELINGHUYSEN,
JOSEPH J. SULLIVAN.