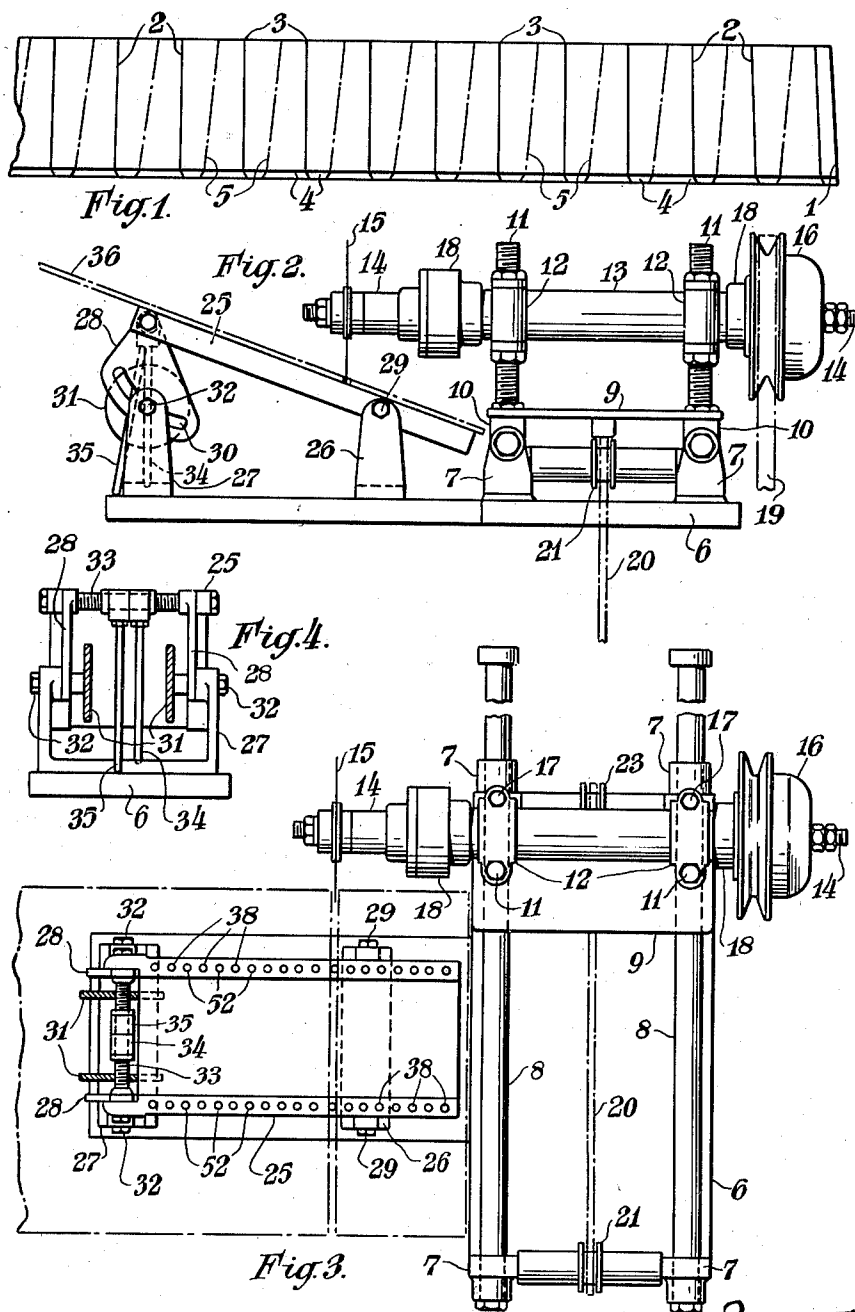


May 10, 1938.

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METHOD OF AND APPARATUS FOR MANUFACTURING
LINKS FOR V-BELTING FROM SHEET MATERIAL
Filed Oct. 14, 1936

2,117,057

3 Sheets-Sheet 1



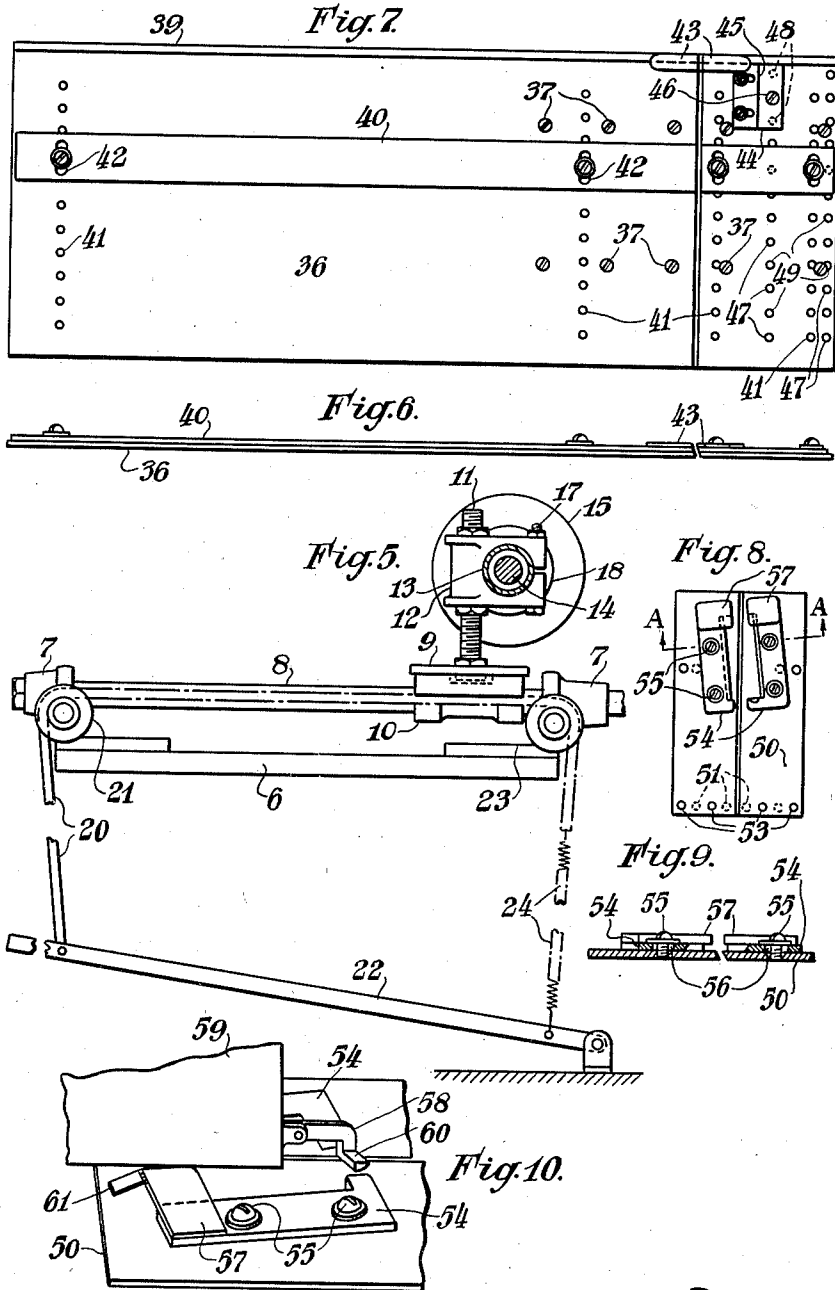
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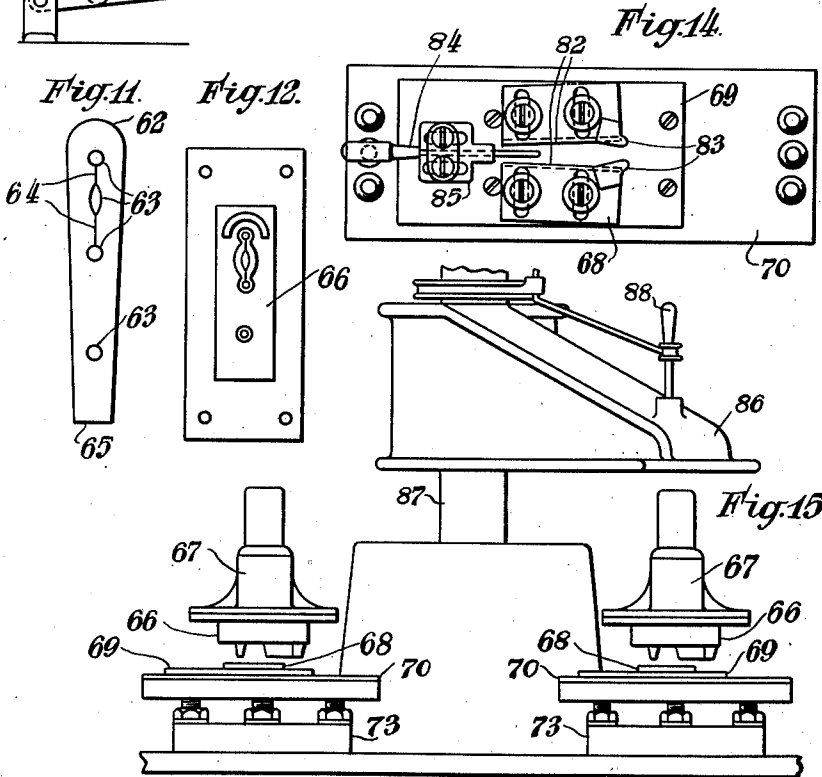
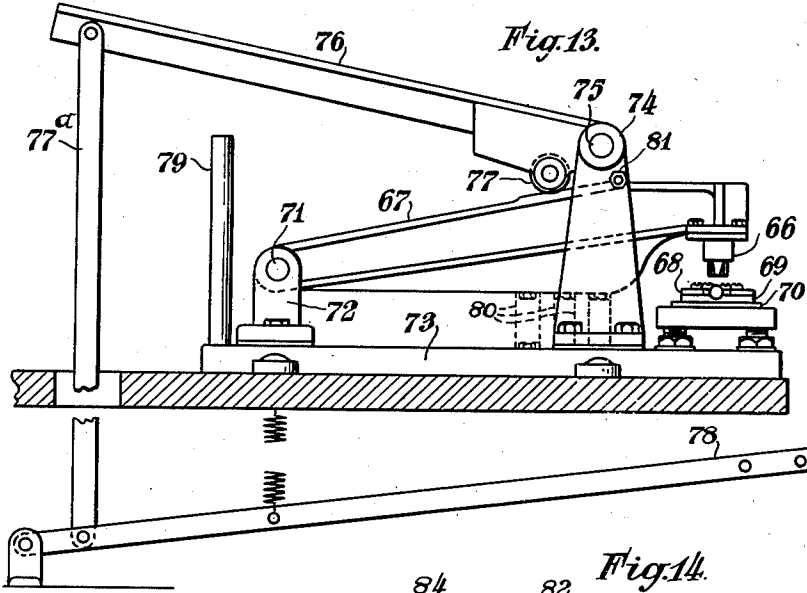
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,117,057

METHOD OF AND APPARATUS FOR MANUFACTURING LINKS FOR V-BELTING FROM SHEET MATERIAL

Percival Thomas Evans, Coventry, England

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16 Claims. (Cl. 164—66)

This invention relates to the manufacture of links for V-belting from sheet material. V-belting of the type to which this invention particularly relates comprises a number of superimposed links secured together by fastening means and with the edges of the links chamfered before or after their assemblage.

This invention is particularly applicable to the manufacture of links for V-belting of the type described and illustrated in the complete specification of British Patent No. 340,065.

A known method of manufacture is to cut the sheet material into strips and then punch out the links with a die. To obtain a minimum of waste it has been customary to cut the links at right angles to the length of the strip and (when the link is wider at one end than the other) to reverse the die (from end to end) after each link is punched. The difficulty with this method is that a certain space (with resultant waste of material) must be left between each cut so as to obtain a correct formation of each link, also this gauging of each subsequent cut requires skill on the part of the cutter if the amount of waste is to be kept to a minimum. Additionally, as the links have straight cut edges, to provide the required chamfered edge on a V-belt the links are usually assembled and mounted on pulleys so that the edges of the belt may be ground or cut to the required finish.

The above method is expensive in both the amount of waste material and the labour required and the object of this invention is to provide an improved method of, and apparatus for, the formation of the links.

Referring now to the accompanying drawings in which several embodiments of the invention are shown by way of example only:—

Fig. 1 is a perspective view of a strip of material showing the required cuts for the formation of blank links;

Figs. 2 and 3 are respectively a front elevation and a plan view of the apparatus for cutting the material;

Fig. 4 is a side elevation of adjusting means for the cutting table;

Fig. 5 is a side elevation showing the means for operating the knife supporting carriage;

Figs. 6 and 7 are respectively a front elevation and a plan view of the material feed plate;

Fig. 8 is a plan view of the carrier for pieces of material to be cut into blank links;

Fig. 9 is a sectional elevation on line A.A. of Fig. 8;

Fig. 10 is a perspective view of a device for removing cut pieces from the carrier;

Fig. 11 is an enlarged plan view of a link after the shaping operation has taken place;

Fig. 12 is a plan view of a die punch;

Fig. 13 is a side elevation of punching apparatus for shaping blank links;

Fig. 14 is a plan view of a holder for blank links to be punched;

Fig. 15 is a front elevation of a construction including two punching devices and a common mechanical operating means;

In carrying this invention into practice the sheet material is first cut into strips 1, as shown in Fig. 1, of approximately the same width as the length of a link it is desired to form. Each strip 1 is then cut transversely across at equal (or unequal if desired) distances apart with each cut 2 angularly disposed with respect to the flat surfaces of the strip. Each end of the strip is similarly cut so that a plurality of pieces 3 are formed with their longitudinal edges chamfered. The cutting means may be set at an angle to the surface of the strip or the strip arranged in an inclined position and adjusting means furnished to enable the angle of the cut to be varied at will.

To provide the required V-formation of the chamfered edges of each link being formed the above pieces 3 are cut to the width of two blank links 4 when the pieces 3 are reversed, that is, turned over or end to end, and divided longitudinally in two by the cut 5 which may be made by the same cutting means or by similarly disposed cutting means.

As the blank links shown taper from end to end, one of the cutting means, or one of the cutting operations, is adapted to form the cut 5 in the strip 1 transversely at an angle (other than a right angle) to its edge. Alternatively the pieces 3 are divided separately by a longitudinal cut 5 running at an angle (other than a right angle) to the end of the piece. In this manner adjacent blank links 4 are located head to tail.

The apparatus for cutting the strips 1 and pieces 3 may assume a variety of forms of which one is shown in Figs. 2 to 9. A bed plate 6 is furnished with bearings 7 for a pair of slidable spindles 8 carrying a knife supporting carriage in the form of a plate 9, brackets 10, upright screw-threaded bolts 11 and bearings 12. The brackets 10 secure the plate 9 to the spindles so as to move therewith and the bolts 11 allow the bearings 12 to be adjusted vertically.

In the bearings 12 is mounted the sleeve 13 enclosing the knife spindle 14 furnished with a cir-

cular knife 15 at one end and a grooved belt pulley 16 at the opposite end. The sleeve 13 is capable of axial movement in the bearings 12 for affording lateral adjustment for the knife 15 and is locked in position by the set screws 17. Housings 18 are carried by the sleeve 13 for enclosing ball and/or roller bearings for the shaft 14.

The knife is rotated by a belt 19 or like flexible driving element from any suitable source of power and is drawn in a forward direction by means of a chain 20 anchored to the underside of the plate 9 and passed round the sleeved pulley 21 to the foot lever 22. The rear end of the chain 20 is passed round the sleeved pulley 23 and attached to a return spring 24 which is anchored to the foot lever 22 so as to return both the movable carriage and the foot lever 22 to their normal positions.

An inclined cutting table 25 is mounted on the bed plate 6 through the medium of the brackets 26, 27 and quadrants 28. The cutting table 25 is movable about the screws 29, and such movement is allowed for by the slots 30 in the quadrants 28. When adjusted, the table is secured by the lock nuts 31 on the screws 32. For predetermined angles of adjustment, the table 25 is furnished with a transverse screwed spindle 33 carrying rods 34, 35 of different lengths which may be located in turn in a vertical position. The ends of the rods 34, 35 enter shallow recesses in the bracket 27 for location purposes. Any number of angle setting rods may be employed as desired.

Strips 1 to be cut are fed over a feed plate 36 (Fig. 7) secured on the cutting table 25 by screws 37 entering the screw threaded holes 38 of which a plurality are provided for adjustment purposes. The plate 36 is divided for the passage of the knife 15 and furnished with a fixed guide 39 and an adjustable guide 40. The guide fixing screws are movable initially into any of the holes 41 and the slots 42 allow a limited secondary adjustment. Retaining pieces 43 project over the plate 36 for holding down the strip 1 during the cutting operation and an end stop 44 (provided with an adjustable stop piece 45) determines the width of the pieces being cut. The end stop is secured by a screw 46 entering one of the holes 47 and pins 48 adapted to enter holes 49 serve to locate the stop.

Pieces 3, after being cut from the strip, are located in a carrier of the type shown in Figs. 8 and 9. The divided (or grooved) carrier plate 50 is located in position on a table 25 by entering the pins 51 in the holes 52 and secured by passing screws through the holes 53 in the plate 50 into the holes 38. The pieces 3 are located between the members 54 whose inner edges are respectively undercut and inclined to receive the chamfered edges of a piece 3. Screws 55 secure the members 54 to the plate 50 and slots 56 allow the members to be adjusted. Overhanging pieces 57 hold a piece 3 flat in the carrier during the cutting operation.

For this second cutting operation the pieces to be divided may be located in carrier means capable of holding two pieces so that immediately a piece has been cut the carrier may be moved so that such divided piece passes away from the cutting means and the other piece takes its place. In this manner one portion of the carrier may be emptied or refilled whilst a piece is being cut to form two links. A carrier of this type is constructed by extending the plate 50 laterally to receive a second set of members 54, forming the

divisions for the passage of the knife only part way through the plate (or providing a bridge piece), and securing the plate 50 slidably to the cutting table 25 by screws passed through slots in the plate.

Fig. 10 shows a device for removing blank links automatically from the above carrier and comprises a member 58 pivoted to the guard 59 covering the knife 15. The free end of the member 58 is shaped to form a link engaging element 60 which extends laterally on each side of the division in the plate 50 and normally rides over the surface of the plate. As the knife advances for the cutting operation the element 60 rides up the incline 61 over the pieces 57 and the piece 3 located in the carrier until it falls down in front of the piece. When the knife recedes the element engages the pair of blank links and draws them out of the carrier. To allow free passage of a link and the element 60, the incline 61 is hinged for the passage thereunder of the said parts.

Each chamfered blank link 4 is finally shaped and/or punched by a die or other means to the shape shown in Fig. 11 ready for assembly.

For example, the head of each link 4 is rounded at 62 and holes 63 and slits 64 formed in the link for the reception of studs, rivets, tubes and loose members or other fastening means employed for securing the links in superimposed layers to the required length of V-beltting. Also the tail 65 of each link is preferably chamfered by hand or other means to provide a substantially smooth under surface for the belting.

The links may be shaped by the punching apparatus shown in Figs. 12 to 14 which includes a die 66 carried by a pivoted arm 67 and a link holder 68 mounted on a copper or like plate 69 secured to the fixing plate 70. The pivot 71 of the arm 67 is carried by the bracket 72 mounted on the bed plate 73 and the arm passes between the uprights of the bracket 74 supporting the pivot 75 of the operating lever 76. A roller 77 impinges on the arm 67 so that its front end is depressed when the lever 76 is drawn downwardly by the link 77^a and foot lever 78. A stop 79 limits the downward movement of the lever 76 and springs 80 raise the arm 67 to its normal position against the stop 81. The link holder comprises a pair of adjustable members provided with undercut edges 82 for receiving the chamfered edges of a blank link 4, and overhanging pieces 83 retain the head of the link down. A link when punched is ejected by the pin 84 which is slidably mounted in the bracket 85 and may, if desired, be spring controlled. The link holder may be of double formation and slidably mounted in a similar manner to the aforesaid double carrier means.

In Figure 15 a modified construction is shown wherein a punching apparatus is mounted side by side with a second punching apparatus and both are adapted to be operated by a common mechanical operating means. The operating means shown comprises a buffer arm 86, slidably mounted on a vertical standard 87, and controlled by the handle 88, which is connected to a clutch (not shown) mounted on the machine. The machine is of the type known in the shoe trade as a "Clicking machine." With this arrangement the buffer arm may be swung alternately over each punching apparatus for punching purposes.

It will readily be understood the apparatus for cutting and punching the links may be modified in a variety of ways without departing from the

scope of the invention. For example, the cutter element may comprise a band or reciprocating knife or guillotine and may cut in both directions of its travel. In a modification the material may be moved with respect to the knife. Also to obtain the desired angular cut the knife may be set at an adjustable angle. Further, one or more knives may be employed so as to make several cuts at one operation and each link may be completely chamfered in one operation by a pair of associated knives adapted to form alternate cuts in a strip at the same but reverse angles.

What I claim is:—

1. The method of manufacturing links for V-belted from sheet material comprising cutting the sheet material into strips and cutting the strips transversely at intervals so that alternate cuts are at a desired angle to the surface of a strip and the remaining cuts are at a similar but reverse angle whereby the resultant pieces are chamfered on each longitudinal side and shaped substantially ready for assembly.

2. The method of manufacturing links for V-belted from sheet material comprising cutting the material into strips, cutting the strips transversely into pieces so that the longitudinal edges of each piece are chamfered in one direction, and subsequently dividing each piece with a cut at an angle (other than a right angle) to both the surface and the end of the piece so as to form a pair of blank tapered links located head to tail and chamfered on both longitudinal edges.

3. The method of manufacturing links for V-belted from sheet material, comprising feeding strips of material over an inclined plate between guide members to an adjustable end stop, advancing a cutter element and cutting off pieces from the strip, each piece having both its longitudinal edges chamfered in one direction and each of a width equal to two blank links, and finally turning each piece and locating it in a carrier for cutting in two by the cutter element with an inclined cut.

4. Apparatus for manufacturing links for V-belted from sheet material which is first cut into strips, said apparatus including a rotary knife, a driven spindle for said knife, a carriage for supporting said spindle, said carriage being capable of movement to allow the said knife to be brought into contact with a strip of the material for cutting it transversely into pieces and the pieces into links, and means for presenting the said strips and pieces at an inclination to the axis of the said knife to provide chamfered edges to each piece and each link; said means comprising a cutting table extending to opposite sides of the path of travel of said rotary knife, means supporting said table for adjustment of the inclination of the table to the plane of the knife, and guide means detachably secured to said table for holding the sheet material in predetermined relation to the path of said knife.

5. The invention as claimed in claim 4, wherein the guide means secured to said inclined member includes a detachable plate over which strips of material are passed to the cutting position, and said plate is furnished with guide members for the strips, at least one of said guide members being adjustable.

6. The invention as claimed in claim 4, wherein the guide means secured to said inclined member includes a carrier element for the reception of pieces of material to be cut into links, and the element is shaped to afford clearance for the knife when cutting a piece of material.

7. The invention as claimed in claim 4, wherein said guide means comprises carrier means for detachable connection to said inclined member, and a pair of members adjustably secured to said carrier means, said adjustable members having opposed edges inclined in opposite directions to receive the chamfered edges of pieces of material.

8. Apparatus for manufacturing links for V-belted from sheet material, said apparatus including a rotary knife, a driven spindle for said knife, a movable carriage for supporting said spindle, means for moving said carriage for enabling the knife to perform its cutting operation, an inclined member for the reception of material to be cut, and guide means detachably connected to said inclined member at opposite sides of the path of movement of said knife for positioning the material to be cut.

9. The invention as claimed in claim 8, wherein the inclined member is provided with adjusting means for changing the angularity of said member at will.

10. Apparatus as claimed in claim 8, in combination with means supporting said inclined member for angular adjustment, means for clamping said inclined member in desired adjustment, and a plurality of spacer members of different lengths for setting the angular adjustment of the inclined member.

11. In cutting apparatus, the combination with a base, a rotary cutting knife, and means supporting said knife for movement transversely of said base, of a member for supporting material to be cut by said knife, means supporting said table for angular adjustment with respect to said base, means for securing said table in the desired position of adjustment, and a plurality of rods of different lengths adapted alternatively to be positioned between said base and said table to set said table to a desired predetermined adjustment.

12. Apparatus for manufacturing links for V-belted from sheet material, said apparatus comprising a rotary knife, a driven spindle for said knife, a movable knife carriage having upright supports, brackets mounted adjustably on said supports, a sleeve supporting the knife spindle and adjustably held by said brackets, said brackets and supports providing means for adjusting said knife in more than one direction, means guiding said carriage for movement to carry the knife into contact with the material for a cutting operation, and means for presenting said material at an inclination to the axis of said knife to provide chamfered edges to each piece cut from the material, said last means comprising a cutting table extending to opposite sides of the path of travel of said rotary knife, means supporting said table for adjustment of the inclination of the table to the plane of the knife, and guide means detachably secured to said table for holding the sheet material in predetermined relation to the path of said knife.

13. Apparatus for manufacturing links for V-belted from sheet material, said apparatus comprising a bed plate, a pivoted arm mounted on said bed plate, a die punch secured to the free end of said arm, means for turning the arm about its pivot for depressing the said punch, said turning means including a pivoted lever engaging said pivoted arm adjacent the free end of said arm, a holder mounted on said bed plate below said punch, said holder being shaped to receive blank links having chamfered edges, and means associated with said holder for ejecting links therefrom.

14. The invention as claimed in claim 13, wherein means including a foot lever is provided for operating the said pivoted lever.

5 15. Apparatus for manufacturing links for V-belt
from sheet material, said apparatus comprising a bed plate, a pair of arms each pivoted to said bed plate, a die punch at the free end of each pivoted arm, a holder on the bed plate beneath each die punch for receiving blank links
10 having chamfered edges, and a mechanically operated buffer arm supported on a standard for swinging movement with reference to said bed plate into position above the free end of either of said pivoted arms.

15 16. Apparatus for severing blanks of sheet ma-

terial by a cut inclined to the surface and to the ends of the blanks, said apparatus comprising a support for the blank, guide means for positioning the blank on the support, a rotary knife, means supporting the knife for reciprocating
5 movement over said support to divide the blank into two sections, and ejector means movable with said knife-supporting means to eject the divided blank from said guide means; said ejector means including a pivotally mounted arm carried
10 by said knife-supporting means, and a hinged strip on said guide means for raising said pivotally mounted arm above the blank as the knife moves on its cutting stroke.

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