C. B. HOWARD.

METHOD OF CUTTING SHEET MATERIAL.

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1,340,225. Patented May 18, 1920.

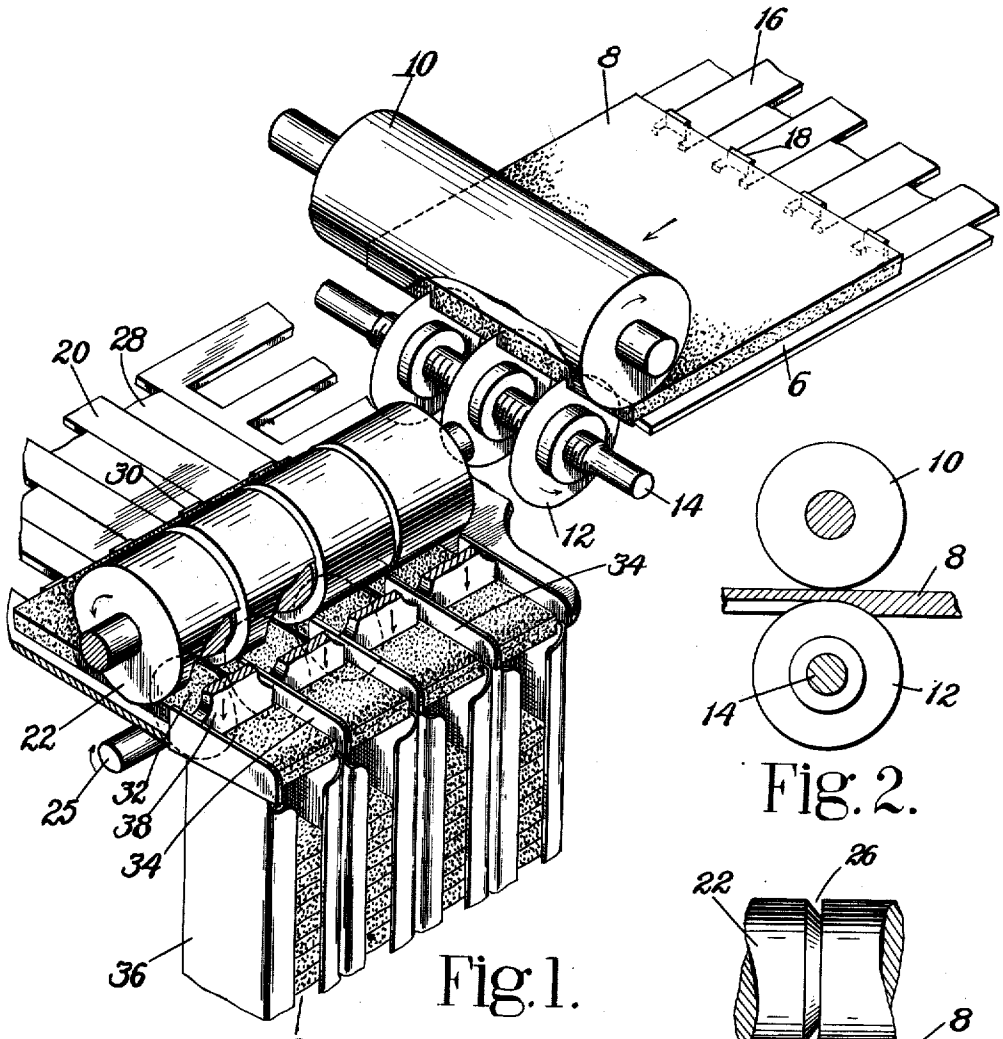

Fig. 1.

Fig. 2.

Fig. 3.

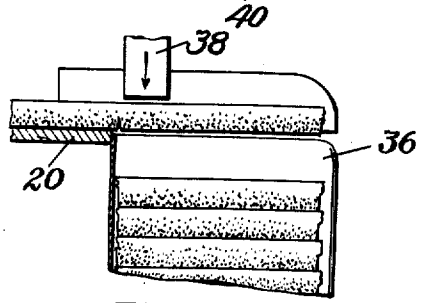

Fig. 4.

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METHOD OF CUTTING SHEET MATERIAL.

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To all whom it may concern:

Be it known that I, CHARLES B. HOWARD, a citizen of the United States, residing at Lynn, in the county of Essex and State of Massachusetts, have invented certain Improvements in Methods of Cutting Sheet Material, of which the following description, in connection with the accompanying drawings, is a specification, like reference characters on the drawings indicating like parts in the several figures.

This invention relates to methods of cutting sheet material and more particularly to methods of cutting blanks from such material by the use of cutters designed to operate either simultaneously or in sequence upon the material.

A well-known method of cutting sheet material into blanks involves the slitting of each sheet into strips, of a width substantially equal to one dimension of the desired blank, previous to any blank forming operation, the disadvantage of the method lying in the necessity of handling the material corresponding to each sheet as many times at least as there are strips in the sheet. In accordance with another method commonly practised, sheet material is cut into strips simultaneously with the progressive production of blanks from successive strip areas in each sheet. In other words, the blank forming devices and the slitting devices for separating strips from the sheet operate simultaneously and hence the sheet must be presented to the devices a plurality of times and each time it is so presented it is reduced in width by the width of the strip that is cut off and reduced to blanks, the operation being repeated so long as there remains material of a width to have blanks of the desired dimensions cut therefrom. While this method has distinct advantages over that first described, it requires in practice considerable manipulation of the material.

It is an object of the invention to produce a method of cutting stock which will greatly reduce manipulation of the stock and the practice of which will generally be more satisfactory and economical than methods heretofore employed.

In one aspect the invention contemplates cutting sheet material preliminarily to determine one dimension of each of the desired blanks and in such manner that the sheet remains substantially intact for the purposes of positioning it relatively to another instrumentality which is utilized in performing another step of the process, and subsequently completing the formation of the blanks by separating them along the lines of incisions made in the preliminary cutting operation.

In another aspect the invention provides for cutting sheet material along lines angularly related to each other, the cuts along certain of the lines extending entirely through the material and along other lines only part way through the thickness of the sheet, and subsequently completing the formation of the blanks by separating them along the lines of incisions which penetrate only part way through the material.

In still another aspect the invention contemplates scoring sheet material and subsequently stripping the scored material into strips extending across the scoring lines, and simultaneously breaking off blanks from the strips along the scoring lines and depositing the blanks in stacked relation.

A marked advantage of the method resides in the fact that the operations may be carried out rapidly since the partly severed pieces produced by the first cutting operation may be shifted, and then repositioned and fed to other blank forming instrumentalities all as one piece of material, whereby the production of blanks is increased over certain other methods without any corresponding disadvantages.

Other objects and advantages will be apparent from the following detailed description.

In the drawings:—

Figure 1 is a perspective view of mechanism by which the method of my invention may be practised;

Fig. 2 is a sectional view of the cutting mechanism and is illustrative of the first step of the method;

Fig. 3 is a detail view showing the operation of cutting the material into pieces; and

Fig. 4 is a detail view illustrating one method of completing the severance of the blanks from the strips.

The mechanism shown in the drawings is illustrative merely of one type of mechanism which may be utilized in practising the herein described method of cutting blanks from sheet material. While the improved method of cutting blanks may have wide

application in various arts, it is here related more particularly to processes involved in the manufacture of heel lifts. As illustrated, the machine comprises a work support 6 upon which sheets of material 8 are successively placed for the operation of a cutting mechanism which preferably consists of a roller or cylinder 10 for engaging the sheet on one surface thereof and maintaining it in position for the operation of circular cutters 12, the latter being mounted upon a shaft 14 arranged parallel to the axis of the cylinder 10. Upon reference to Figs. 1 and 2, it will be observed that the cutters 12 are so arranged as to cut only part way through the material, thus leaving the strips or pieces partially joined together so that the sheet is still intact for the purpose of positioning it with respect to other instrumentalities for subsequent operations. According to the showing in Fig. 2, the material is scored or cut a little more than half way through. Obviously, however, the depth of cut may be varied considerably so that with some kinds of material, the incisions will be almost through to the other surface of the sheet. For the purpose of feeding the sheet to the cutters 12, there are provided in the construction shown reciprocable members 16 slidable in guideways in the support 6 and having sheet engaging fingers 18 which contact with the rear edge of the sheet and push the same completely through the plane of cutting operations. While this cutting operation is preferably performed by circular cutters run continuously, it is obviously perfectly feasible to perform this operation by means of cutters differently mounted and operated, as, for instance, by cutters carried by a cross-head and reciprocated to effect at one stroke a cutting of the sheet with the same result as that disclosed, that is, with the incisions extending only part way through the material.

The next step in the method consists in stripping the sheet which has already been operated upon as described and, by this, is meant the cutting of the sheet into strips. In performing this operation the sheet is positioned upon a support 20 for the operation of a cutting mechanism which, in the illustrative construction, comprises a cylinder 22 and cutters 24 arranged on a shaft 25 to coöperate with the cylinder. Inasmuch as the operation is to result in the complete severance of the sheet into strips, the cutters are so positioned as to cut completely through the material as will be clear from an inspection of Fig. 3 of the drawings. Preferably, therefore, the cylinder 22 is provided with grooves 26 for the reception of the cutting edges of the disk members. Means is provided for feeding the sheet material to the cutting mechanism, the said means consisting of the reciprocable slides 28 operating in guideways in the support 20 and having feed fingers 30 similar to those provided on the feeding slides 16. For convenience and efficiency in operation the feed table 20 will be so located with respect to the first cutting mechanism that a sheet operated upon by said mechanism may be passed directly to the second feed table 20 in position to be engaged by the feed fingers 30. A sheet thus positioned has the incisions on its lower surface located parallel to the cylinder 22 and thus substantially at a right angle to the cutting edge of each cutter 24. It is within the scope of the invention, however, to position the sheet so that the line of cut by the second cutting mechanism will intersect the first incisions by a selected angle other than a right angle should it be desired to change the shape of the blanks from that which will be obtained by a right angled cut. Again it will be observed that the cuts which divide the sheet into strips may be made by a mechanism quite different from that illustrated as, for instance, by knives mounted on a cross head which is reciprocable toward and from a cutting bed to effect at a single operation the cutting of the sheet into strips. Moreover, the cuts which sever the sheet into strips and the cuts which make incisions only part way through the material may both be performed simultaneously by knives mounted on a cross head and extending in sets so arranged as to cut completely through along certain lines and only partially through the material along other lines. Clearly, such a mechanism would require more power in operation and a much heavier framework in its construction than the relatively light and simple cutting mechanisms illustrated in the drawings.

While the cylinder 10 and the cutters 12 of the first cutting mechanism may operate continuously to cut the sheet which is moved without interruption by the feeding slides 16, the sheet on the work supporting table 20 is fed preferably intermittently, that is, by regularly recurring steps of a length corresponding to one dimension of the desired blank in order that the blank severing mechanism may act upon the strips as they appear at one edge of the table 20. In the illustrative construction, the strips 32 as they pass from beneath the cylinder 22 are separated from each other slightly by means of guiding plates 34 so arranged as to provide guideways for the forward ends of the strips so that the latter are positioned over magazines 36 and beneath plungers 38. These plungers are preferably carried on a cross head (not shown) which reciprocates in timed relation with the feeding of the strips so that in the intervals of feed, the plungers descend to break the blanks from the strips. Preferably, the plungers are so arranged as

to engage the blanks along a line parallel with and adjacent to the edge of the table or support 20 so that upon reciprocation of the plungers the blanks will be easily broken from the strips, it being clear that the feeding movement of the sheet on the table is so arranged as to bring the incision in the strips slightly beyond the supporting edge of the table. As the blanks are severed from the strips they are at the same time deposited in magazines positioned for their reception. Conveniently, these magazines have an open faced portion or slot 40 so that the blanks may be readily withdrawn therefrom and placed in other magazines in connection with machines designed to operate in a special manner upon the blanks. Otherwise the magazines 36 may be so constructed as to be readily removed from their location beneath the plungers 38 when they have been filled with blanks so that empty magazines may be substituted therefor.

According to a common method of cutting sheet material into blanks, the sheets are first stripped, that is reduced to a number of strips which must each be handled separately in presenting them to a blank forming machine. In carrying out this method there is obviously the disadvantage of handling four or five strips in place of the single sheet from which they originated and, furthermore, each strip is passed separately into the machine for forming blanks therefrom. If it be attempted to position all of the strips for simultaneous operation by a blank forming machine, the said strips must be located against a gage but this operation of positioning the strips is not without difficulty since the strips may vary in thickness and thus not all be engaged at the same time by the feeding means or by the blank forming mechanism. It will be clear, therefore, that there are distinct advantages in applicant's method wherein all of the strips are presented at one time and as a single sheet to the blank forming mechanism, thus obviating the disadvantages which have been pointed out as well as insuring the very minimum of manipulation on the part of the operator.

Having described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. That improvement in methods of cutting sheet material into blanks which comprises cutting a sheet of material by cuts extending only part way through the material and by cuts extending through the material angularly to the first mentioned cuts so as to divide said sheet into pieces or strips, and subsequently separating blanks from said strips along the lines of incisions made by those cuts which penetrate only part way through the sheet material.

2. That improvement in methods of cutting blanks from sheet material which comprises partially severing pieces from a sheet by cuts which extend only part way through the material, cutting the said sheet in directions extending angularly to the first cuts in such manner as to sever the sheet into pieces, and then dividing the pieces into blanks along the lines of the cuts of the first mentioned cutting or severing operation.

3. That improvement in methods of cutting blanks from sheet material which comprises scoring a sheet of material along lines extending parallel to one axis of the sheet, stripping said sheet along lines substantially at right angles to the first mentioned lines in such manner as to sever the sheet into strips, and then breaking blanks from said strips along the lines made by the scoring operation.

4. That improvement in methods of cutting sheet material into blanks which comprises cutting a sheet along a line substantially parallel to one axis of the sheet, the cut extending only part way through the material, positioning the sheet with respect to a cutting instrumentality so as to cut along a line at an angle to the first mentioned line of cut, performing a cutting operation on the sheet thus positioned to sever the sheet into pieces, and then dividing each piece into blanks as determined by the cuts made on the first cutting operation.

5. That improvement in methods of cutting blanks from sheet material which consists in making lines of incisions in a sheet of material with the incisions extending only part way through the sheet material, stripping said sheet into strips, and then breaking blanks from said strips along the lines of incisions made by the first mentioned cutting operation and simultaneously depositing the blanks in stacks.

6. That improvement in methods of cutting sheet material into blanks which comprises cutting a sheet of material along lines parallel to one axis of the sheet with the cuts extending only part way through the material, positioning the sheet so that the lines of operation of the cutters will be angularly related to said axis, cutting the said sheet along lines angularly related to the first mentioned lines of cut by cuts which divide the sheet into pieces, and then dividing the pieces into blanks as indicated by the first mentioned cuts.

In testimony whereof I have signed my name to this specification.

CHARLES B. HOWARD,