

[54] **CROSS-ROLLING MACHINE HAVING WORKPIECE BLANK SUPPORT**

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[51] Int. Cl.**B21h 9/00**

[58] Field of Search72/71, 102, 107, 72/108, 204, 250, 252

[56] **References Cited**

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Primary Examiner—Lowell A. Larson
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[57] **ABSTRACT**

A cross-rolling machine comprises a pair of spaced apart rollers having outwardly extending wedge-shaped blades or dies on the periphery which engage a workpiece positioned between the rollers to form the workpiece. The rollers carry cutters at the ends of the dies which engage the workpiece to separate from the workpiece blank and the workpiece falls into a receiving notch defined in the periphery of the rolls at the ends of the dies. Each roller is provided with an arcuate insert or additional support piece which extends over the complete notch area at the workpiece feeding end and it provides a support for the workpiece blank after the workpiece has been severed therefrom.

5 Claims, 13 Drawing Figures

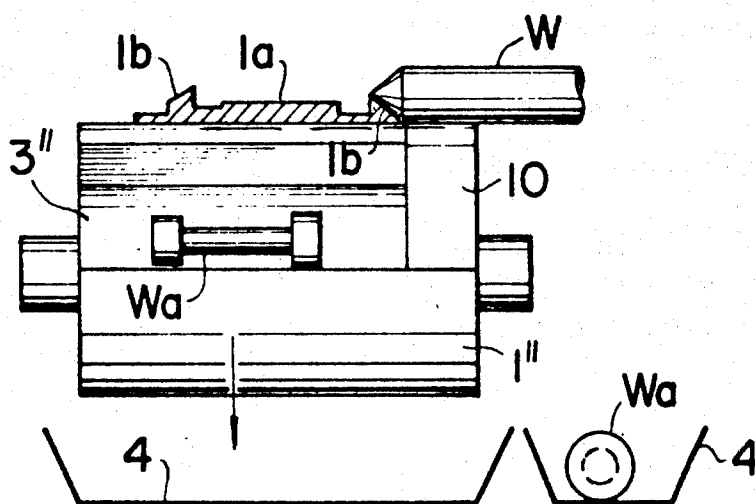


FIG. 1
PRIOR ART

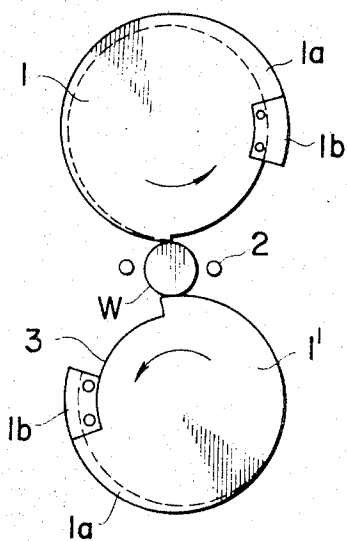


FIG. 2
PRIOR ART

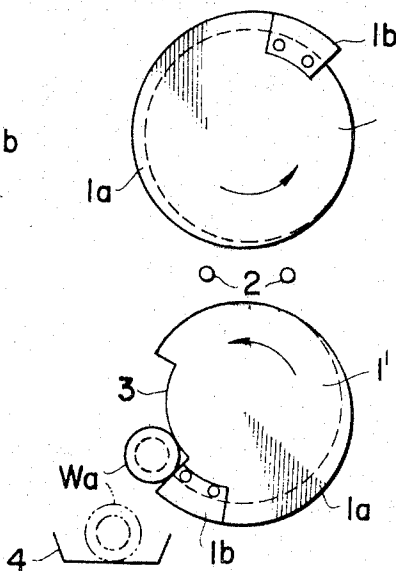


FIG. 3a

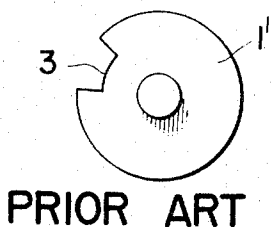


FIG. 3 PRIOR ART

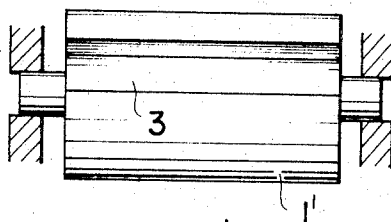
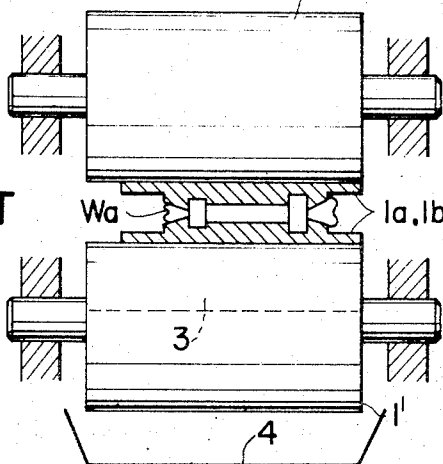


FIG. 4
PRIOR ART



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FIG. 5 PRIOR ART

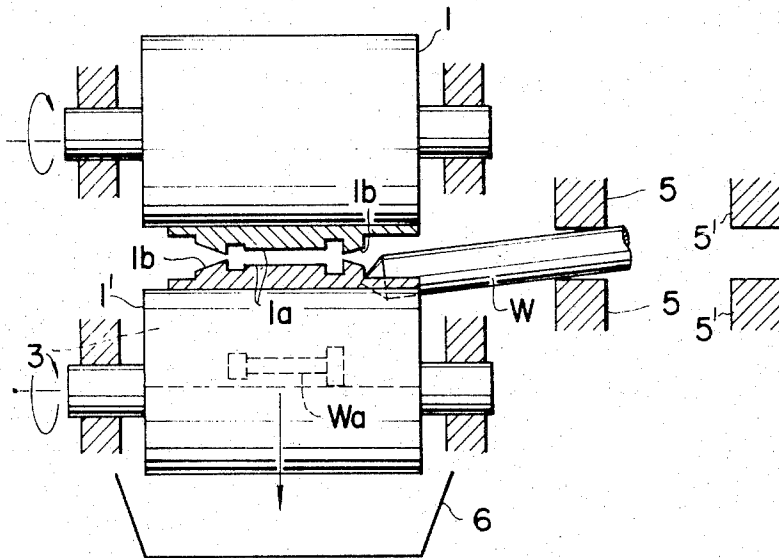
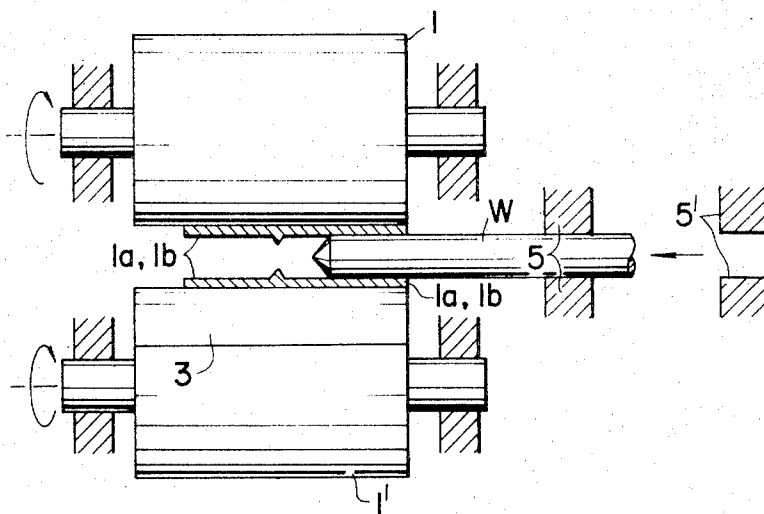


FIG. 6 PRIOR ART



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FIG. 7

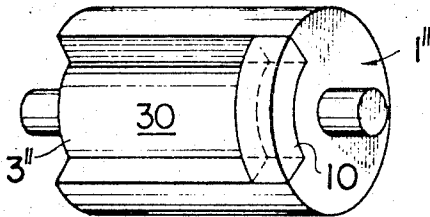


FIG. 7a

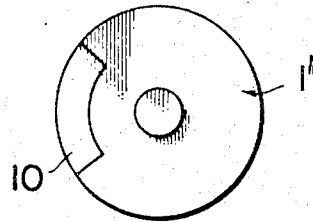


FIG. 8

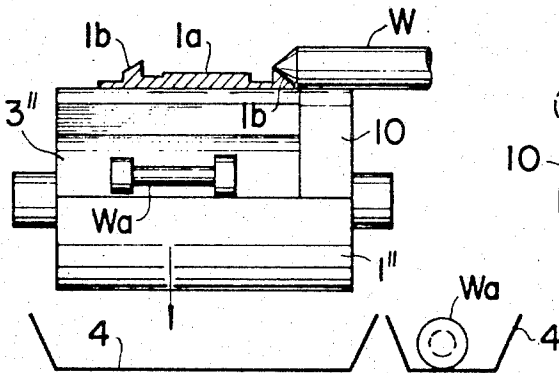


FIG. 8a

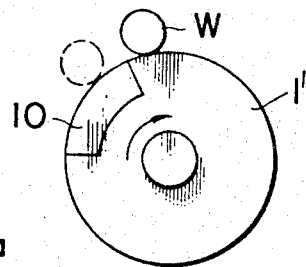


FIG. 9

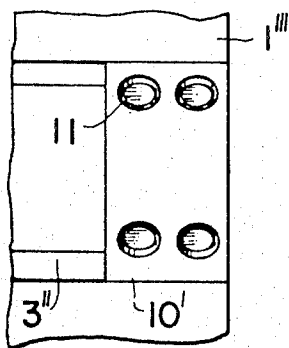
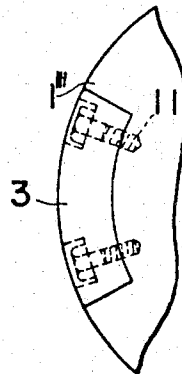


FIG. 9a



CROSS-ROLLING MACHINE HAVING WORKPIECE BLANK SUPPORT

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates in general to the construction of forming roll machines and, in particular, to a new and useful cross-rolling machine, comprising two opposed rollers having outwardly extending die formations for forming a workpiece positioned therebetween and with cut off means, and a receiving slot for the finished workpiece and with an arcuate support piece extending in the receiving slot area and providing a support for the workpiece billet which remains after the workpiece has been cut away therefrom.

2. Description of the Prior Art

Prior to the present invention, it was known to form a workpiece between two opposed crossed rolling rolls which have outwardly extending wedge-shaped dies which act on the workpiece to form it into a desired shape. With the known construction, means are provided on each side of the workpiece to ensure that it doesn't feed out laterally from between the rolls during the formation, and when the workpiece has been formed, it is severed from the remaining part of the blank and dropped into a receiving notch defined on a portion of the periphery of the lower roll and then delivered into a receiving station or receiving chute. With the known construction, it is necessary to provide a lateral support for the remaining workpiece billet which has been cut away from the workpiece which has been formed in order that it does not fall away from its operating position between the two operating rolls. This is particularly true when the remaining billet is reduced to a size in which the lateral support therefor is only partially effective because it cannot grip along a sufficient length of a remaining workpiece billet.

SUMMARY OF THE INVENTION

In accordance with the present invention, there is provided a cross-rolling machine which includes opposed rollers between which the workpiece billet is fed, each of which includes an operating die to form the workpiece. With the inventive construction, the receiving notch for the finished workpiece is bounded on the workpiece feeding side by an arcuate support for workpiece which extends over the complete arcuate area of the receiving notch adjacent the end of the operating cutters of the dies and in a position to engage with the remaining workpiece blank after the formed workpiece has been severed therefrom. The construction provides an adequate support for the blank so that it may be fed even when the blank length is reduced to a very small amount at which it may be only engaged by one lateral support rather than two.

Accordingly, there is an object of the invention to provide an improved cross-rolling machine having means for supporting the workpiece billet after the workpiece has been cut away therefrom.

A further object of the invention is to provide a cross-rolling machine which is simple in design, rugged in construction and economical to manufacture.

The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this disclosure. For a better understanding of the invention, its operat-

ing advantages and specific objects attained by its uses, reference should be had to the accompanying drawing and descriptive matter in which there is illustrated a preferred embodiment of the invention.

BRIEF DESCRIPTION OF THE DRAWING

In the drawing:

FIG. 1 is a schematic end elevational view of a cross-rolling machine of the prior art;

FIG. 2 is a view similar to FIG. 1 of another prior art device;

FIG. 3 is a partial side elevational and partial sectional view of a conventional prior art lower roller of a cross-rolling machine;

FIG. 3a is an end elevational view of the roller shown in FIG. 3;

FIG. 4 is a partial elevational partial sectional view of a prior art cross-rolling machine in which only a single article is formed from a single workpiece blank;

FIG. 5 is a view similar to FIG. 4 in which a plurality of articles are formed from a single blank of a prior art construction;

FIG. 6 is a view similar to FIG. 4 in which a workpiece has been reset for engagement prior to the formation of another workpiece of the prior art construction;

FIG. 7 is a front side perspective view of a lower roller of a cross-rolling machine constructed in accordance with the invention;

FIG. 7a is an elevational view of the roller shown in FIG. 7;

FIG. 8 is a front elevational view partly in section showing positioning of the workpiece after it has been severed in the workpiece blank;

FIG. 8a is an end elevational view of the part as shown in FIG. 8;

FIG. 9 is a partial side elevational view of a roller having a support with a workpiece constructed in accordance with the invention; and

FIG. 9a is a partial end elevational view of the roller shown in FIG. 9.

DETAILED DESCRIPTION OF THE PRIOR ART SHOWN IN FIGS. 1 TO 6

As shown in FIGS. 1 and 2, a conventional cross-rolling machine comprises an upper and lower roll 1 and 1' which are arranged for rotation about horizontal axes which are arranged in a single vertical plane. The peripheries of the rolls are in spaced opposition to receive a billet or workpiece W therebetween. Each roll 1 and 1' includes a wedge-shaped outer portion in the form of a blade or die 1a which are correspondingly arranged in respective positions of the associated rolls 1 and 1'. During the rotation of the rolls 1 and 1', in the direction of the arrows indicated, a red hot workpiece or blank W is squeezed and formed into the desired shape by means of the dies 1a. When the rolls rotate to move the workpiece beyond the ends of the dies 1a, the workpiece is engaged by cutter surfaces 1b, which sever the article Wa which is formed from the remaining portion of the billet. The finished article or product Wa, which is obtained each time the rolls make one rotation, falls into a receiving recess or notch 3, which is formed as an indentation into the cylinders 1 and 1'. During the forming operation, the workpiece W is prevented from moving out laterally by positioning ele-

ments or stops 2 arranged on each side thereof. After the article passes beyond the cutters 1b, it moves into the notch 3 and the further rotation of the roller is effective to bring it over a receiving tray or chute 4 into which it is dumped.

In the prior art construction, as shown particularly from FIGS. 3 and 3a, the receiving notch 3 extends along the width of the lower roll 1'.

As shown in FIG. 4, the prior art construction is effective insofar as the receiving notch 3 is concerned, only when a single piece material is used as a blank and a single product is formed therefrom. A produce Wa formed by the dies 1a and of each roll 1 and 1' will feed into the notch 3 when the rolls 1 and 1' rotate.

When a long billet W is used, as shown in FIG. 5, the article Wa drops into the receiving notch 3 and then into the chute 4, but the remaining portion of the blank which is supported by the laterally spaced support members 5 and 5' is not adequately held since it is engaged by only one of the supports 5 when the length is reduced so that end falls out of alignment for feeding between the rollers 1 and 1', as shown in FIG. 5. If the cutters 1b are worn, both the product Wa and the blank W may be dropped into the notch 3 and be kept therein, thus causing damage to the machine.

A further disadvantage is that if the workpiece W is to be accurately fed between the rollers 1 and 1', it must be reengaged as shown in FIG. 6 which requires a stopping of the machine and a manual repositioning of the workpiece blank W.

GENERAL DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIGS. 7 to 9 in particular, the invention embodied therein, comprises a cross-roll forming machine which includes an upper cross-roll 1 similar to the prior art, and a lower cross roll 1', which has a receiving notch 3'' defined within the periphery of the roll surface and having an arcuate bottom wall 30. The end of the receiving groove or notch 3'' is closed by a support member 10, which in the embodiment shown in FIG. 7, comprises an arcuate piece completely filling the notch 3'' adjacent the workpiece end thereof.

As shown in FIG. 8, when a workpiece blank W has been cut away from an article Wa which is formed by the cutter parts 1b of the dies 1a, the remaining blank W is still supported by the arcuate surface 10 so that it will not become misaligned or fall off even when it is reduced to a small amount as in the prior art constructions. The blank holder 10 may be formed as a continuation of the surface of the lower roll 1' as shown in FIGS. 7 and 8 or the holder may comprise a separate support member 10' which fills the workpiece end of the notch 3'' for a lower roll 1''' as shown in FIGS. 9

and 9a. In this case, the support 10' is held in place by bolts 11 which extend into the roll 1'''.

While a specific embodiment of the invention has been shown and described in detail to illustrate the application of the principles of the invention, it will be understood that the invention may be embodied otherwise without departing from such principles.

What is claimed is:

1. A cross-rolling machine for forming articles from a workpiece blank which is adapted to be fed to the machine from one side thereof, comprising first and second spaced apart vertically aligned forming rolls each having circumferentially extending cooperative dies and cutting means for forming at least a portion of a workpiece billet positioned therebetween into an article, means rotatively supporting said rolls one above the other for rotation about substantially horizontal axes, means for feeding a workpiece billet between said first and second rolls to present at least a portion thereof for operation thereon by said roll dies and said cutting means, the lower one of said rolls having a finished article receiving notch defined in the surface thereof and extending around a portion of the periphery alongside the circumferential end of said cutting means in a position to receive the article as it is cut away from the workpiece blank, and a support surface on said lower one of said rolls in addition to and laterally of said dies and cutting means and defining a circumferentially extending surface alongside said dies and said cutting means and the article receiving notch and upon which the workpiece blank is supported after the article is cut away from the blank.

2. A cross-rolling machine for forming articles from a workpiece blank, according to claim 1, wherein said support comprises a surface extending around the periphery of said lower one of said rolls adjacent the end thereof to which the workpiece blank is fed and providing a support for this end of the workpiece blank.

3. A cross-rolling machine for forming articles from a workpiece blank, according to claim 1, wherein said support comprises a marginal strip of said lower one of said rolls closing the end of the notch at the end adjacent the feed of said workpiece blank and providing a support for the end of the workpiece blank.

4. A cross-rolling machine for forming articles from a workpiece blank, according to claim 1, wherein said support comprises a separate support member positioned to close the workpiece receiving notch at the end thereof at which the workpiece is fed to said first and second rolls.

5. A cross-rolling machine for forming articles from a workpiece blank, according to claim 4, including bolt means holding said member to said lower one of said rolls.

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