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Koss et al.

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[54] **APPARATUS FOR PREVENTING STRIP ACCUMULATION**

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[52] **U.S. Cl.** **225/94**, 83/106, 83/610

[51] **Int. Cl.** **B23d 17/06**

[58] **Field of Search** 83/105, 106, 163, 356.2, 83/610, 611; 225/94

[56] **References Cited**

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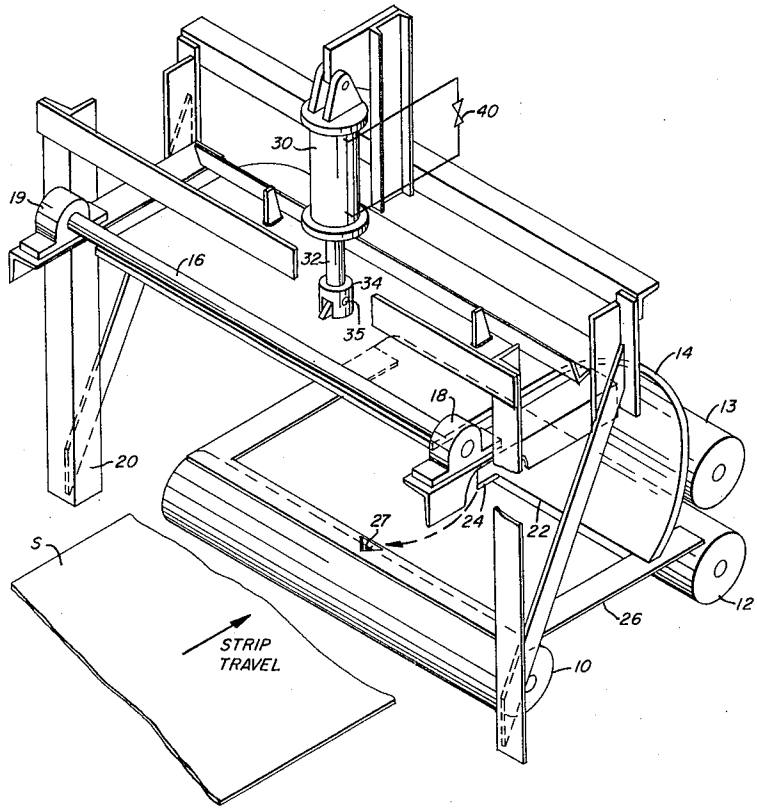
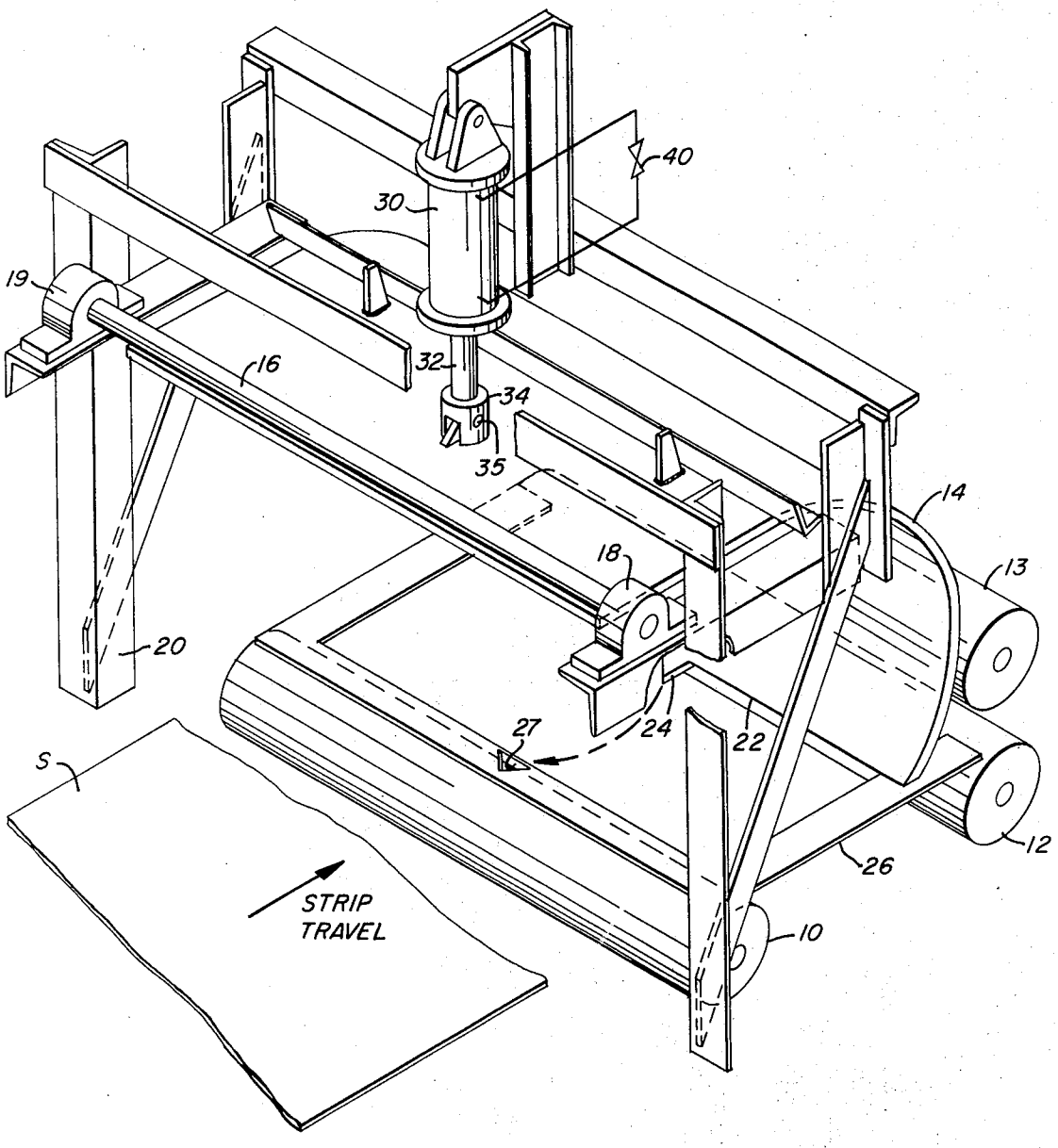
[57] **ABSTRACT**

Apparatus for preventing accumulation of strip between stands of a multistand hot or cold reduction mill when a strip breaks includes a curved knife blade of greater width than the strip, means for maintaining the knife in a stand-by position above the path of the strip, and means for moving the knife into contact with the strip to cut and reverse the direction of travel of the strip. The method consists of detecting the strip break, actuating a cutting means, cutting the strip and reversing the direction of strip travel.

6 Claims, 1 Drawing Figure

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APPARATUS FOR PREVENTING STRIP ACCUMULATION

This invention relates primarily to an apparatus to be used in combination with a multistand high speed reduction mill for cutting moving strip and preventing its entry into the first stand of the mill. Hot strip mills normally consist of a roughing mill followed by from three to six finishing stands. When six stands are used, the speed of the product leaving the last stand of the mill is often in excess of 2,000 feet per minute. A cold reduction mill usually has about the same number of stands as a hot reduction mill. The product leaving the last stand of a cold mill can be traveling in excess of 7,000 feet per minute. Normally whenever a strip breaks or a cobble occurs between stands, there is a long deceleration period during which the strip continues to be fed into the reduction mill by all stands preceding the strip break or cobble. This causes the stip to pile up between the mill stands which not only can cause damage to the equipment, but also is extremely time consuming to remove. Occasionally, a broken strip will wrap around the work roll and wreck the mill. Rolls must then be changed resulting in further downtime before the mill can resume production.

The primary object of our invention is to provide an apparatus in combination with a high speed strip mill that will prevent strip from entering the first stand of a multistand mill when a break or cobble occurs in the mill.

It is also an object of our invention to provide an apparatus for use in combination with a high speed strip mill that will prevent accumulation of strip near the entry side of any roll stand of a multistand mill including the first stand.

It is another object of our invention to provide an apparatus that is simple and economical to use and easy to maintain.

Another object of our invention is to provide an apparatus for use in combination with a high speed strip mill that will sever the strip being fed into the mill momentarily upon the occurrence of a break or cobble.

A further object of our invention is to provide a method of preventing strip entry into a high speed strip mill on occurrence of a strip break or cobble.

We have invented a strip severing apparatus which is positioned before the first stand of a multistand strip mill above the path of travel of the strip. The apparatus includes a curved blade which drops downwardly against the strip to thereby cut the strip and change its direction of travel back upon itself.

Our invention is better understood by reference to the following detailed description and the appended drawing in which:

The single FIGURE is an isometric view of the preferred embodiment of our invented strip cutting apparatus.

Considering now the invention in some detail, and referring to the illustrated form thereof in the drawing, our strip cutting apparatus is mounted between a feed roll **10** and the first stand of a multistand reduction mill, the stand being represented by work rolls **12** and **13.** A blade **14** is pivotally mounted on a shaft **16** which is journaled in a pair of bearings **18** and **19** mounted on frame **20.** The knife blade **14,** which may be curved as shown in the drawing, has a horizontal cutting edge **22** and a wedge-shaped central piercing protrusion **24** near the center of its lower edge. A strip guide **26,**

which may be a plate, is mounted between the feed roll **10** and bottom work roll **12.** The guide has a hole **27** therein to receive piercing protrusion **24.** A double acting air cylinder **30** is mounted atop the frame **20** and anchored thereto. Piston rod **32** extending from the air cylinder is fastened to knife blade **14** by a clevis **34** and pin **35.** The pneumatic cylinder is actuated by means of a solenoid-operated pneumatic valve **40.**

In operation, the knife blade **14** is held in the ready or stand-by position above the path of strip S by air cylinder **30** which holds piston rod **32** in the retracted position. In the event of a strip break or cobble at the entry side of any of the reducing stands in the mill, valve **40** is actuated to cause the piston rod to extend. This may be accomplished manually or a strip detector may be used to automatically actuate the pneumatic cylinder. This causes the knife blade **14** to pivot about its shaft **16,** moving its lead edge **22** downwardly at a rapid rate, forcing the wedge-shaped central piercing protrusion **24** into and through the center of the moving strip S and into hole **27** in strip guide **26,** shearing the strip outwardly from its center. The strip follows the curvature of the knife blade and moves back over itself into an area in front of the reducing mill, that is, to the left of feed roll **10** as shown in the drawing. This area is easily accessible for cleanup and is not subject to damage from strip pile up because there is little or no operating equipment in this area.

It has been found that the knife blade **14** does not always rupture the strip unless the wedge-shaped protrusion **24** is present. This imparts a tearing action to the strip which is completed as the cutting edge **22** of the knife hits the strip across its full width.

Although a highly detailed embodiment of the invention has been shown and described above, it is obvious that many modifications can be made without departing from the spirit of the invention. For example, the knife blade could be straight and could drop vertically. The function of the curved portion of the blade could be performed by a curved guide between the blade and the first work roll stand which would be contacted by the strip after being cut, and thereupon change the direction of strip travel back upon itself because of the curvature of the guide. The knife blade could be pivoted at one side of the frame **20** in such a manner that it would contact one edge of the strip first. The knife could be held in a stand-by position by an electromagnet. In this case, the power would be switched off to drop the blade into the cutting position.

It is readily apparent from the foregoing that we have invented a strip cutting device which will rapidly cut a moving strip and change its direction of travel to prevent it from piling up near the entry side of work rolls in a multistand reducing mill whenever the strip breaks or a cobble occurs.

We claim:

1. Apparatus for cutting and reversing the direction of travel of a traveling strip comprising a knife having a cutting edge and an arcuate portion, the width of said knife being greater than that of said strip, means for maintaining said knife in a standby position above the path of travel of said strip, and means for moving said knife edge into contact with said strip to cut said strip, whereby said arcuate portion of said knife acts as guide means for reversing the direction of travel of said strip.

2. Apparatus according to claim 1 further comprising a wedge-shaped protrusion extending downwardly from the lower edge of said knife.

3. Apparatus according to claim 1 wherein said first named means is a pneumatic cylinder having a piston, the associated piston rod of which is attached to said knife, said piston being in the retracted position.

4. Apparatus according to claim 1 wherein said second named means is a pneumatic cylinder connected to said knife.

5. Apparatus according to claim 1 wherein the blade of said knife is arcuate to provide said guide means.

6. Apparatus according to claim 1 further comprising a frame, said knife being journaled for rotation upon said frame.

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