Aug. 8, 1967 H. KOPP 3,334,838

APPARATUS FOR FEEDING WOUND MATERIAL TO A PROCESSING MACHINE

Filed Aug. 26, 1965 2 Sheets-Sheet 1

Fig. 2

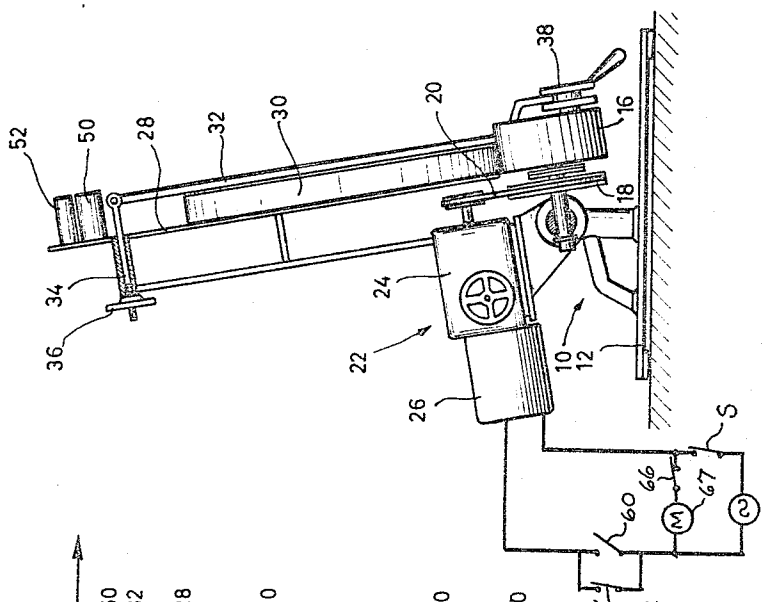
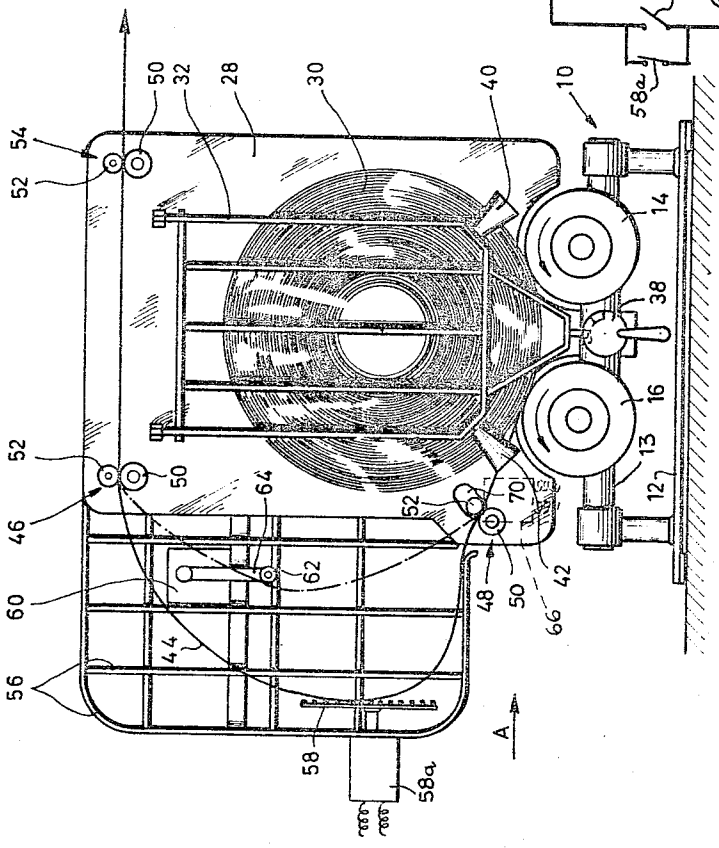


Fig. 1



Inventor:
Heinz Kopp
By:
Lawrence C. Laubscher
ATTORNEY

Aug. 8, 1967 H. KOPP 3,334,838

APPARATUS FOR FEEDING WOUND MATERIAL TO A PROCESSING MACHINE

Filed Aug. 26, 1965 2 Sheets-Sheet 2

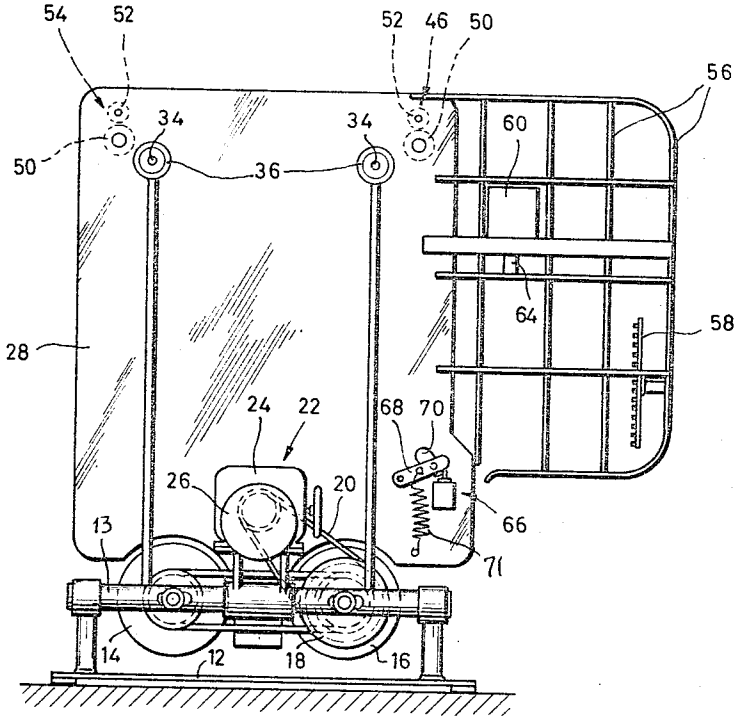


Fig. 3

Inventor:
Heinz Kopp
By:
Lawrence E. Laubscher
ATTORNEY

United States Patent Office

3,334,838

Patented Aug. 8, 1967

1

3,334,838

APPARATUS FOR FEEDING WOUND MATERIAL TO A PROCESSING MACHINE

Heinz Kopp, Niefern, Pforzheim, Germany, assignor to Kopp & Odenwald, Niefern, Pforzheim, Germany, a German firm

Filed Aug. 26, 1965, Ser. No. 482,789
Claims priority, application Germany, Sept. 5, 1964, K 48,951
3 Claims. (Cl. 242—78.7)

This invention relates generally to improved apparatus for feeding strip mtaerial, particularly a metal band, from a wound supply roll thereof to a processing machine.

In the feeding of strip material to high speed processing machines, such as rapid operating eccentric presses or bending machines, the proper rate of supply of the material relative to the operating rate of the processing machine is of particular importance. For example, in order that the proper tension be maintained on the strip material for accurate clamping or gripping by the working means of the processing machine, care must be exercised over the control of the feed rate, particularly in the case of relatively thin strip materials where the danger of breakage of the material is always great.

In the strip feeding apparatus of the prior art, it has been proposed to supply material from a reel arranged for rotation on a bed, which reel is driven by electric drive means at a given speed relative to the processing machine. Switch means are provided for interrupting the drive means of the reel when a predetermined length of the material is unwound from the reel. In some cases the switch control means may be operated by a loop formed in the band or strip material during the feeding thereof from the reel to the processing machine. The installation of the band material in such known arrangements is very complicated and difficult, since each time the material must first be wound on a reel prior to use in the supply apparatus. Furthermore, the use of the known apparatus is limited solely to relatively strong, resilient strip material, which material has a sufficiently great resistance or strength to control the switching device. As far as relatively thin materials are concerned, the control of the switching means to interrupt the drive apparatus is normally so complex as to render the known apparatus impractical for actual use.

The primary object of the present invention is to provide an improved apparatus for feeding band material (specifically, a metal strip) from a wound roll thereof to a processing machine, such as a high speed press or strip bending machine, said apparatus being characterized by the provision of drive means for driving a reel-less supply roll peripherally supported for rotation on a frame, and separate switching means operable by the material supplied from the roll for energizing and de-energizing the drive means to regulate the linear speed of travel and tension of the strip material. The apparatus is specifically designed for use with any type of strip material, including extremely thin or relatively thick material. According to the invention, the various drawbacks inherent in the known apparatus are avoided by conducting the strip in an arched configuration from the roll in such a manner that the curved strip portion engages first contact element means to de-energize the supply roll drive means when the feed rate exceeds the demand rate of the processing machine. As a consequence of the invention the use of complex de-energizing switch means for the drive arrangement is avoided, and the apparatus is suitable for control by thin foil bands of material.

2

In this connection, it is, of course, possible to so form the contact element that the drive means is again switched on as soon as the band material is displaced from the contact element. However, in such an arrangement, the electrical control device is necessarily undesirably large and costly. In accordance with a more specific object of the invention, this is avoided by providing a second switch means spaced from the contact element means on the opposite side of the arched portion of the strip. By this construction, the contact element means serves solely to de-energize the drive means, and the second switch means serves solely to subsequently energize the drive means, whereby in the simplest manner an extremely functional control is obtained. In this manner, the supply roll is maintained stationary both as long as the curved strip portion engages the contact element, and until the slack is removed from the strip material to cause subsequent engagement with the second switch operator, whereupon the drive means in re-energized.

Other objects and advantages of the invention will become apparent from a study of the following specification when considered in the light of the accompanying drawing, in which:

FIGURE 1 is a front elevational view of the strip feeding apparatus of the present invention;

FIG. 2 is a left hand end view of the apparatus of FIGURE 1; and

FIGURE 3 is a rear elevational view of the apparatus of FIGURE 1.

Referring now to the drawing, the strip feeding apparatus of the present invention includes a base **10** having a stationary base plate **12** upon which are mounted trunnion means that support for pivotal movement a horizontal shaft **13**. Rotatably supported by parallel spindles carried by the horizontal shaft **13** are a pair of parallel horizontally-spaced drive rollers **14**, **16** that are adapted to be driven in the same direction (as shown by the arrows in FIGURE 1) by drive means **22** including an electric motor **26**, variable speed transmission **24**, endless belt **20**, and a pair of pulleys **18** connected with the drive rollers, respectively. As shown in FIGURES 2 and 3, the drive means **22** is carried by the horizontal base shaft adjacent, rearwardly of, and slightly above, the drive rollers **14** and **16**.

Also carried by the horizontal shaft **13** of the base **10** is a support plate **28** which laterally supports a roll of wound strip material (for example, a metal band) that is peripherally supported by the spaced drive rollers **14**, **16**. The roll **30** is also laterally retained in position by a holder frame **32** parallel with and spaced from the plate **28**. At its upper end, the frame **32** is pivotally connected with threaded rods **34** which are longitudinally adjustable relative to the plate **28** by adjusting nuts **36**. At its lower end, the frame **32** is releasably connected with the horizontal base shaft by locking means **38**. The horizontal base shaft is normally pivoted to a position in which the plate **28**, frame **30**, drive means **22** and drive rollers **14**, **16** carried as a unit thereby are slightly inclined rearwardly as shown in FIGURE 2. Frustoconical guide rollers **40**, **42** rotatably carried by the lower portion of the holder frame **32** laterally support the lower portion

of the roll **30** from which the strip material **44** is removed.

The strip **44** is guided by successively arranged conducting or guide means **48, 46, 54** that are carried by the plate **28**. Each of these conducting means comprises a pair of rollers **50, 52** between which the strip **44** is conducted as it is fed to an electrically driven processing machine, not shown, having a given continuous rate of operation. By appropriate control of the variable transmission means **24**, the rate of feed of the strip material is normally adjusted to substantially equal (and possibly slightly exceed) the operation of the processing machine.

Rigidly secured to the plate **28** is a carrier frame formed of rod elements **56**, which carrier frame supports element means **58** arranged between the conducting means **46, 48** and having a relatively large surface parallel with the axis of supply roll **30**. The contact element means **58** is adapted to open normally closed switch means **58***a* (FIGURE 2) that control the energization of the electric motor **26**. As shown in FIGURE 1, when the variable transmission means **24** is adjusted to cause drive rollers **14, 16** to supply strip **44** at a faster rate than the rate of operation of the processing machine, an arched portion or loop is formed between guide means **46, 48** which arched portion eventually engages the vertical surface of the contact element means **58**, thereby operating the same to open the aforementioned switch means and de-energize the drive motor **26**.

Mounted on the carrier frame on the opposite side of the arched portion of the strip **44** in spaced relation to the contact element means **58** is an additional normally-open switch means **60** operable to energize the drive motor **26**. The switch means **60** includes a roller **62** carried by pivotal lever **64** for engagement by the strip **44** when in the position shown by the phantom line in FIGURE 1.

According to a further feature of the invention, the plate **28** carries on its rear surface safety or protective switch means **66** including normally-closed contacts for energizing the drive motor **67** of the aforementioned processing machine, not shown. These safety switch means include a pivotally mounted lever **68** carrying the roller **52** of the first or lower conducting means **48**, said roller extending through the arcuate slot **70** contained in the plate **28**. If desired, spring means **71** may be provided for biasing the lever **68** of FIGURE 3 in the clockwise direction. As long as the strip **44** is fed with a predetermined tension between the rollers **50, 52** of conducting means **48**, the safety switch means **66** remains closed to energize the processing machine. If the strip tension should increase above a desired value (as might result from failure of operation of switch means **60**), the safety switch means **66** is operated to de-energize the drive motor **67** of the processing machine, thereby avoiding undesirable waste of the processed material.

Operation

Upon closing of the start switch S, motors **26** and **27** are energized to drive the rollers **14, 16** and the various means of the processing machine, respectively. By adjustment of the variable transmission means **24**, the drive rollers **14, 16** are driven at a slightly increased peripheral speed relative to the rate of operation of the processing machine, whereby an arcuate portion is formed in strip **44** between conducting means **46** and **48** as shown in FIGURE 1. When this arcuate portion engages contact element means **58**, switch **58***a* is opened to de-energize drive motor **26**, whereby the supply of strip material **44** is momentarily interrupted. Since the processing machine is still withdrawing strip material from the conducting means **46** and **54**, the arcuate portion assumes the position shown in phantom in FIGURE 1, whereby roller **62** is engaged by the strip and pivots lever **64** to close the contacts of switch means **60**. The drive motor **26** is thereby re-energized to supply material from roll **30**, whereupon the arcuate portion is again formed between conducting means **46** and **48** as previously described.

If for any unforeseen reason, the operation of switch means **60** should fail, the roller **52** of conducting means **48** will be displaced in slot **70** by the increased tension of the strip material to operate switch means **66** to de-energize motor **67** of the processing apparatus.

Although in the illustrated embodiment, the various switch means have been indicated as having normally open and closed positions, it is apparent, of course, that many other connections and arrangements are possible in accordance with the invention. It will be apparent, therefore, to those skilled in the art that various other modifications and improvements may be made in the apparatus described without deviating from the invention set forth in the following claims.

What is claimed is:

1. Apparatus for supplying strip material from a roll to high speed strip processing means including first drive motor means, comprising

support means including a frame for rotatably supporting the roll;

second drive motor means for rotating the roll to unwind the strip therefrom;

means for guiding the unwound strip into an arched configuration, comprising first and second guide roller means arranged at each end of the strip arch, respectively, each of said guide roller means including a pair of cooperating rollers between which the strip is fed;

first switch means for de-energizing said second drive motor means when the height of the arched strip exceeds a given first value, said first switch means including stationary contact element means connected with said frame for tangential engagement by the outer surface of the strip arched portion; and

second switch means for energizing the second drive motor means when the height of the arched strip is less than a given second value, said second switch means including a switch housing rigidly connected with said frame, and a pivotally mounted switch operating lever arranged for actuation by the inner surface of the arched portion of said strip to operate said second switch means and thereby energize the second drive motor means.

2. Apparatus for supplying strip material from a roll to high speed strip processing means including first drive motor means, comprising

second drive motor means for rotating the roll to unwind the strip therefrom;

means for guiding the strip into an arched configuration, said guide means comprising first and second guide roller means arranged at each end of the strip arch, respectively, each of said guide roller means including a pair of cooperating rollers between which the strip is fed;

first switch means for de-energizing the second drive motor means when the height of the arched strip exceeds a given first value, said first switch means including contact element means arranged for tangential engagement by the outer surface of the strip arched portion;

second switch means for energizing the second drive motor means when the height of the arched strip is less than a given second value, said second switch means including a pivotally mounted switch operator arranged for engagement by the inner surface of the arched portion;

and safety switch means associated with one of said first and second guide roller means for de-energizing said first drive motor means when strip tension exceeds a given value.

3. Apparatus as defined in claim **2** wherein said first guide roller means are arranged adjacent said second

drive motor means, wherein said safety switch means is associated with said first guide roller means, and further wherein the rollers of said first guide means are mounted relative to each other as a function of increase in tension of the strip material above a given value.

References Cited

UNITED STATES PATENTS

2,207,663	7/1940	Glasner	242—78.7
2,345,656	4/1944	Calleson et al.	242—78.7 X

2,757,880	8/1956	De La Motte	242—78.7
2,877,961	3/1959	Groll	242—78.7

FOREIGN PATENTS

744,063	2/1956	Great Britain.

STANLEY N. GILREATH, *Primary Examiner.*

N. L. MINTZ, *Assistant Examiner.*