Dec. 6, 1966 C. M. WIIG 3,289,448

BACK-UP MEANS FOR STRAIGHTENING ROLLS

Filed Jan. 31, 1964 2 Sheets-Sheet 1

Fig. 1.

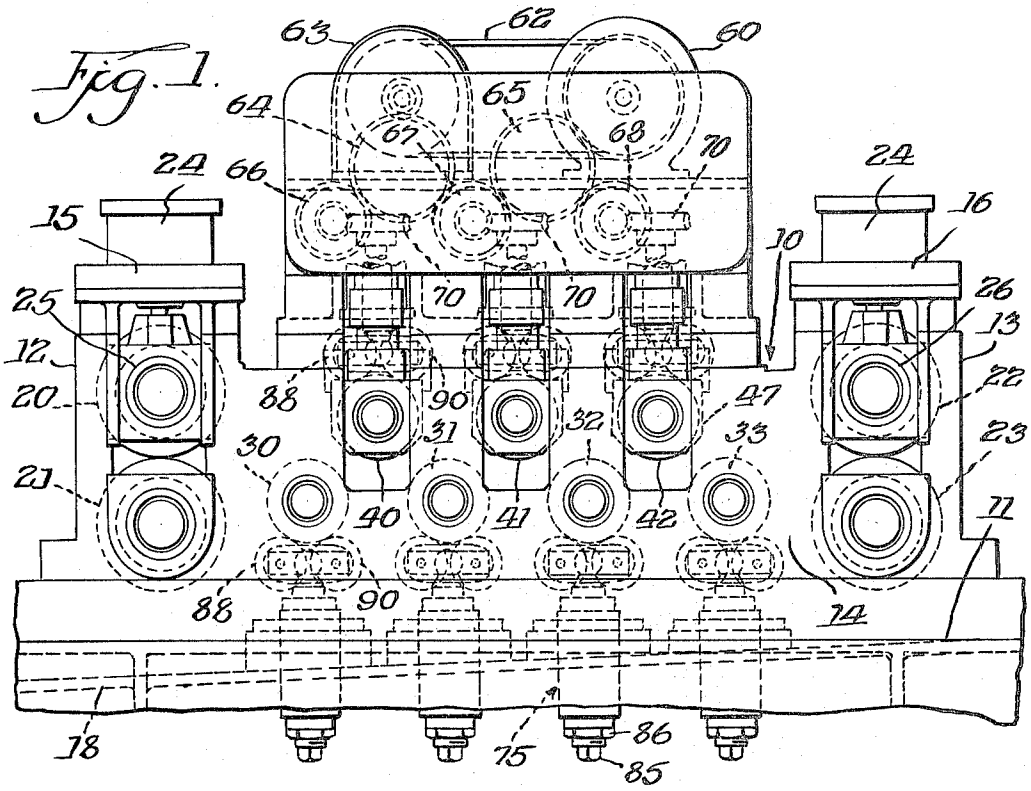


Fig. 3.

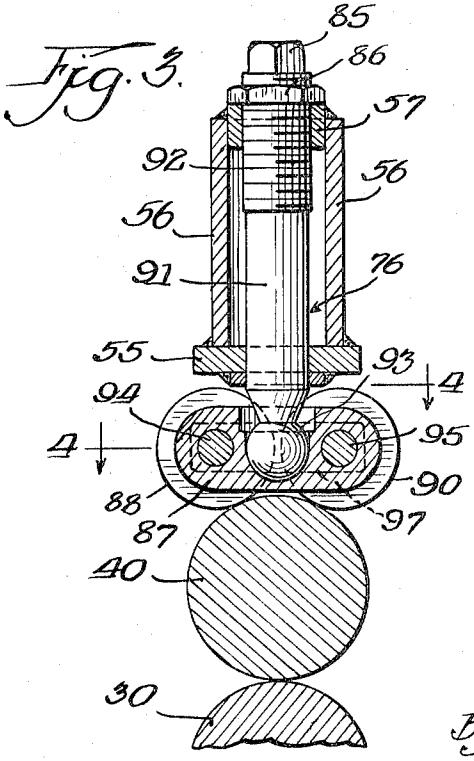
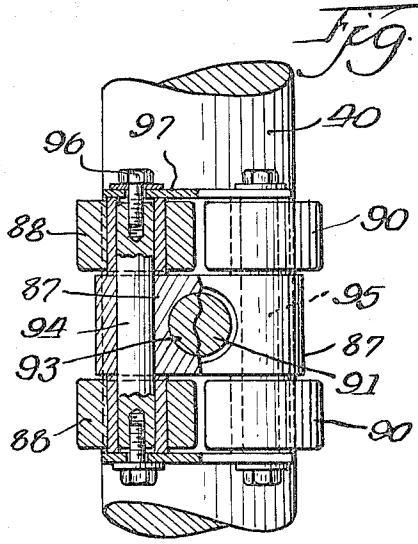


Fig. 4.



Inventor.
Chester M. Wiig.
By Byron Hume Irons & Clement
Attys.

Dec. 6, 1966 C. M. WIIG 3,289,448

BACK-UP MEANS FOR STRAIGHTENING ROLLS

Filed Jan. 31, 1964 2 Sheets-Sheet 2

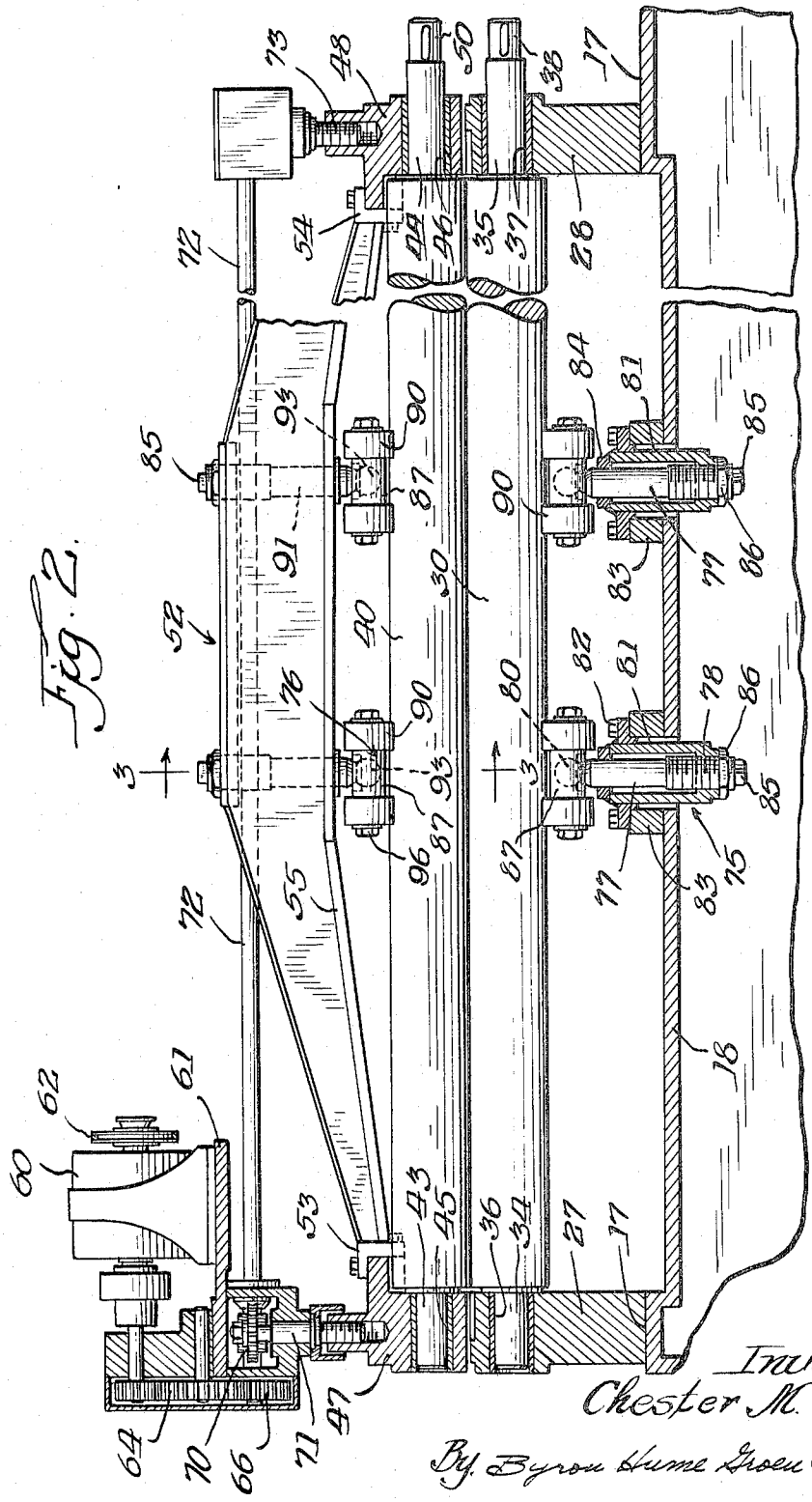


Fig. 2.

Inventor.
Chester M. Wiig.
By Byron Hume Groen & Clement
Attys.

United States Patent Office

3,289,448

Patented Dec. 6, 1966

1

3,289,448

BACK-UP MEANS FOR STRAIGHTENING ROLLS

Chester M. Wiig, Chicago, Ill., assignor to F. J. Littell Machine Company, Chicago, Ill., a corporation of Illinois

Filed Jan. 31, 1964, Ser. No. 341,546
3 Claims. (Cl. 72—163)

The invention relates to straightening and feeding machines for metal strip material and has reference in particular to novel mechanism for backing the feed rolls to prevent bending and deflection of the rolls during operation under pressure.

Metal working machines such as punch presses, die cutting machines, and the like, are operated in conjunction with feeding and straightening mechanism which conditions the metal strip material and feeds the same to the reciprocating plunger of the press for cutting, punching and similar operations. The strip material is unwound from a coil of such stock and the intermittent rotation of the feed rolls results in the feeding of measured lengths of said material which has been straightened and otherwise conditioned for subsequent operations. The pressures on the rolls for straighttning the strip material are considerable, even for relatively thin strip material. However, as thickness of the strip increases the pressures become enoromous, and as the width of the strip increases the rolls are more apt to bend and deflect due to their greater length. Generally, said pressures are more than sufficient to cause the straightening rolls to bend or deflect centrally thereof, which, of course, is highly objectionable since such bending adds to the wear and deterioration of the journal bearings in addition to limiting the efficiency of the entire mechanism.

An object of the invention is to provide improved straightening and feeding mechanism which will incorporate means for backing up the rolls in order that they may better resist the heavy pressures to which the rolls are subjected when operating on relatively thick strip material.

Another object of the invention is to provide feeding mechanism for feeding metal and other material in continuous strip form to punch presses and the like which will incorporate novel and improved means for backing the straightening rolls of the mechanism to prevent bending and deflection under pressure, and which will automatically center itself when contacting its roll so as to eliminate all binding stresses such as would otherwise result.

Another object is to provide straightening and feeding mechanism such as described which will employ one or more backing means for each of the straightening rolls, which will be spaced along the length of the roll in order to reinforce the same against bending pressures and which will have such contact with its respective straightening roll as not to interfere with its driving means or with the free rotation of the roll.

With these and various other objects in view the invention may consist of certain novel features of construction and operation, as will be more fully described and particularly pointed out in the specification, drawings and claims appended thereto.

In the drawings which illustrate an embodiment of the device and wherein like reference characters are used to designate like parts—

2

FIGURE 1 is a side elevational view of feeding and straightening mechanism, the same incorporating the improved means of the invention for backing up the straightening rolls of the said mechanism;

FIGURE 2 is a transverse sectional view taken through the mechanism of FIGURE 1 and showing a pair of straightening rolls with the backing means of the invention applied thereto;

FIGURE 3 is a sectional view on an enlarged scale showing the detail certain improved features in the construction of the backing means for the straightening rolls; and

FIGURE 4 is a sectional view taken substantially along line 4—4 of FIGURE 3.

Referring to the drawings and in particular to FIGURES 1 and 2, the straightening and feeding rolls of the mechanism selected for illustrating the present invention are suitably journalled within a frame 10 having the usual base 11, front and rear walls 12 and 13, side walls 14 and top supporting wall portions 15 and 16. The base 11 provides the bottom portions 17 and the bottom wall 18 as best shown in FIGURE 2. Adjacent the front and rear walls 12 and 13, respectively, the frame 10 provides suitable structure for journalling the front feeding rolls 20 and 21, and for journalling the rear feeding rolls 22 and 23. The said front and rear feeding rolls and straightening rolls to be presently described are operatively connected by conventional gearing and all of the rolls are driven simultaneously so that they rotate in unison. Reference is made to the patent to Miller 2,315,446, granted March 30, 1943, for a full disclosure of journalled feeding and straightening rolls with connecting gearing, and drive means for rotating the rolls for intermittent feeding operations.

The strip material from a coil of said material or from any other source of supply will enter the mechanism between the rear feeding rolls 22 and 23. The said rolls will feed and propel the strip material in a longitudinal direction through the frame 10 and into the bite of the front feeding rolls 20 and 21. The bite of said front feeding rolls and also that of the rear feeding rolls on the material can be adjusted by conventional means located and journalled within the housing members 24. The said members are supported by the top wall portions 15 and 16, respectively, and each said means is operatively connected with the journalling structure for the upper feeding rolls, namely 20 and 22. It will be understood that the lower feed rolls 21 and 23 rotate only, and they do not move bodily in a vertical direction as do the upper rolls. The said movement of the upper rolls is possible, since their journal bearings 25 and 26, respectively, are carried by bearing blocks which are mounted for movement in a vertical direction toward and from their coacting lower roll, whereby the feeding rolls at the entrance and exit end of the mechanism are conveniently adjustable for the purposes mentioned.

The frame supports 27 and 28, FIGURE 2, journal four lower straightening rolls identified by the numerals 30, 31, 32 and 33, FIGURE 1. Each of the rolls have stud shafts such as 34 and 35 extending from respective ends and said bearings 36 and 37 receive the stud shafts, respectively for journalling the rolls. The said lower straightening rolls do not move bodily in a vertical direction but rotate only, for which purpose the rolls are

operatively connected by gearing, not shown, and which may be fixed in the conventional manner to reduced extensions 38 provided by the stud shafts 35. The three upper straightening rolls 40, 41 and 42 are each located above and in alignment with the space between each pair of lower straightening rolls 30 to 33, inclusive. Each of the upper rolls have stud shafts 43 and 44 projecting from respective ends thereof and which are received by the bearings 45 and 46. The bearings are carried by movable bearing blocks 47 and 48 which are mounted in the frame supports 27 and 28 so as to have vertical movement for effecting a straightening action on the metal strip material as it passes between the upper and lower rolls. The reduced portions 50 on the stud shafts 44 receive gears, not shown, which operatively connect the three upper rolls with each other and with the four lower rolls so that all the rolls rotate together.

Each pair of bearing blocks 47 and 48 are structurally connected by a metal bridge 52 which is bolted at 53 to the block 47 and at 54 to the block 48. The bridges are similar in construction as shown in FIGURE 3, the same including a bottom plate 55, side plates 56, and a pair of internally threaded ring members 57.

The bodily movement of the three upper straightening rolls 40, 41 and 42 is produced by power means in the form of an electric motor 60 supported on the fixed platform 61 forming part of the frame structure. The endless belt 62 connects the motor with the speed reducer 63 which drives the intermediate gears 64 and 65, which in turn drive the gears 66, 67 and 68. Each last mentioned gear has a geared relation with a worm gear 70, FIGURE 2, which is fixed to a threaded rod 71. The said rod at its threaded end is secured to the frame support 47. The said gears 66, 67 and 68 are each fixed to a transverse shaft 72 which drives in a similar manner the rod 73 having threaded relation with frame support 48. The drive from the electric motor 60 is thus complete to each of the frame supports, and said supports are accordingly elevated or lowered in unison and to a like extent by operation of the said power means. When heavy stock is passing through the machine, the upper rolls can be lowered for effecting the desired deformation of the said stock material for straightening the same. For relatively thin stock, the reverse bending deformation need not be so great and in such cases the upper rollers can be elevated to the required extent.

The straightening action performed by the rolls subjects them to enormous pressures and which progressively increase as the width and thickness of the strip material increases. These pressures are generally high enough to produce a bending of the rolls in a transverse direction with the greatest bending and deflection occurring substantially at the center of the length of the rolls. In order to counter any such bending, while at the same time permitting free and unrestricted rotation of the rolls, the invention provides backing up means of the character as shown in detail in FIGURES 3 and 4. The backing-up means for the lower rolls is indicated in its entirety by numeral 75 and the backing up means for the upper rolls is similarly indicated by numeral 76.

Referring to FIGURE 2 which shows the units 75 in detail, it will be seen that each unit includes a trunnion rod 77 threaded at its base as at 78 and having a ball shaped formation 80 at its upper end. An adapter 81 is suitably bolted at 82 to the spacing ring 83 which is either welded to the bottom wall 18 or secured thereby by means of said bolts. Each trunnion rod 77 has threaded relation at its base with the interiorly threaded end of the adapter, whereas the upper end of the trunnion rod is guided by the top plate 34. Adjustment of the trunnion rod 77 can thus be effected by rotating the rod by using a tool on the squared end 85. When once adjusted the trunnion rod can be locked in position by the lock nut 86. The ball formation 80 as regards each unit supports a carriage consisting of a block 87 and two pairs of rollers 88 and 90, FIGURE 4. The structural details of the carriage will be described in connection with the units 76 for the upper rolls, it being understood, however, that a pair of rollers are disposed on respective sides of a lower straightening roll and by means of the ball formation each carriage is supported in a manner to permit universal pivotal adjustment. As a result of the supporting relation which the carriage has on its ball formation, all four rollers will bear against the periphery of their respective straightening roll to provide the desired pressure in a direction countering any deflection which might otherwise take place.

The backing up units 76 likewise include a trunnion rod 91, FIGURE 3, which is threaded at 92 and which has a ball formation 93 at its opposite end. The trunnion rod at 92 is threaded in a ring member 57 and the rod is suitably guided at its opposite end by the wall 55 of a bridge structure such as 52. The ball formation 93 supports for universal pivotal movement a carriage which includes a block 87 and two pairs of rollers 88 and 90. The ball formation has supporting contact with the block on its transverse and longitudinal centers and the rollers 88 are journalled on one side of the center by the pin 94. The rollers 90 are journalled on the opposite side of the center by the pin 95. The washer and lock nut combination 96 secures the retaining plate 97 to the pins 94 and 95, and thus the rollers are held and retained on their respective pins which journal the rollers for free rotation.

Each of the backing up units, namely 75 and 76, can be adjusted in a vertical direction and thus the extent to which the unit backs up its straightening roll can be varied to suit conditions. Also, the necessary requirement that the carriage have freedom of movement in a horizontal plane is met by the ball and socket joint between the fulcrum rod and the carriage block. Each fulcrum rod terminates in a ball shaped formation such as 80 and 93, and the same is mounted in a ball shaped socket located centrally in the carriage block. The rollers 88 and 90 are carried by the block and thus the pressures exerted by the rollers are substantially equalized with each roller assuming its proportionate share.

The invention is not to be limited to or by details of construction of the particular embodiment thereof illustrated by the drawings as various other forms of the device will, of course, be apparent to those skilled in the art without departing from the spirit of the invention or the scope of the claims.

What is claimed is:

1. In a feeding and straightening machine for metal strip material, in combination, a pair of feeding rolls operating to engage the material therebetween and to feed the material when the rolls are rotated in a feeding direction, a plurality of straightening rolls located in associated relation with the said feeding rolls, gearing connecting the rolls whereby the feeding and straightening rolls rotate in unison, and backing-up means for each of said straightening rolls, each said backing-up means including a plurality of rollers having contact with the periphery of a straightening roll approximately mid-way of the length of the roll, supporting means including a carriage block providing journalling means for the rollers, and a fulcrum rod having a ball and socket connection with the carriage block.

2. In a feeding and straightening machine for strip material, a pair of feeding rolls operating to engage the material therebetween and to feed the material when the rolls are rotated in a feeding direction, a plurality of straightening rolls located in associated relation with the feeding rolls, and means for backing-up each of said straightening rolls whereby to prevent bending and deflection of the roll due to the pressures to which the roll is subjected during operation, said backing-up means including at least one unit providing a plurality of rollers

having contact with one of said straightening rolls on respective sides of its longitudinal center line, a carriage block providing journalling means for the rollers, a fulcrum rod having a ball and socket connection with the carriage block, and means providing for adjustment of the fulcrum rod towards and from its particular straightening roll.

3. A feeding and straightening machine for strip material as defined by claim 2, wherein certain of said straightening rolls comprise upper rolls and wherein the remainder comprise lower rolls, and additionally including frame structure providing bearing elements for journalling the said rolls, said frame structure also providing supporting means with which the fulcrum rods of the back-up units respectively have threaded relation for adjustment purposes.

References Cited by the Examiner

UNITED STATES PATENTS

1,911,321 5/1933 Long ---------- 72—163

CHARLES W. LANHAM, *Primary Examiner.*

R. D. GREFE, *Assistant Examiner.*