Sept 17, 1957 W. L. SIEGERIST 2,806,508

BAR STRAIGHTENING MACHINE

Filed Dec. 18, 1953 2 Sheets-Sheet 1

FIG. 1.

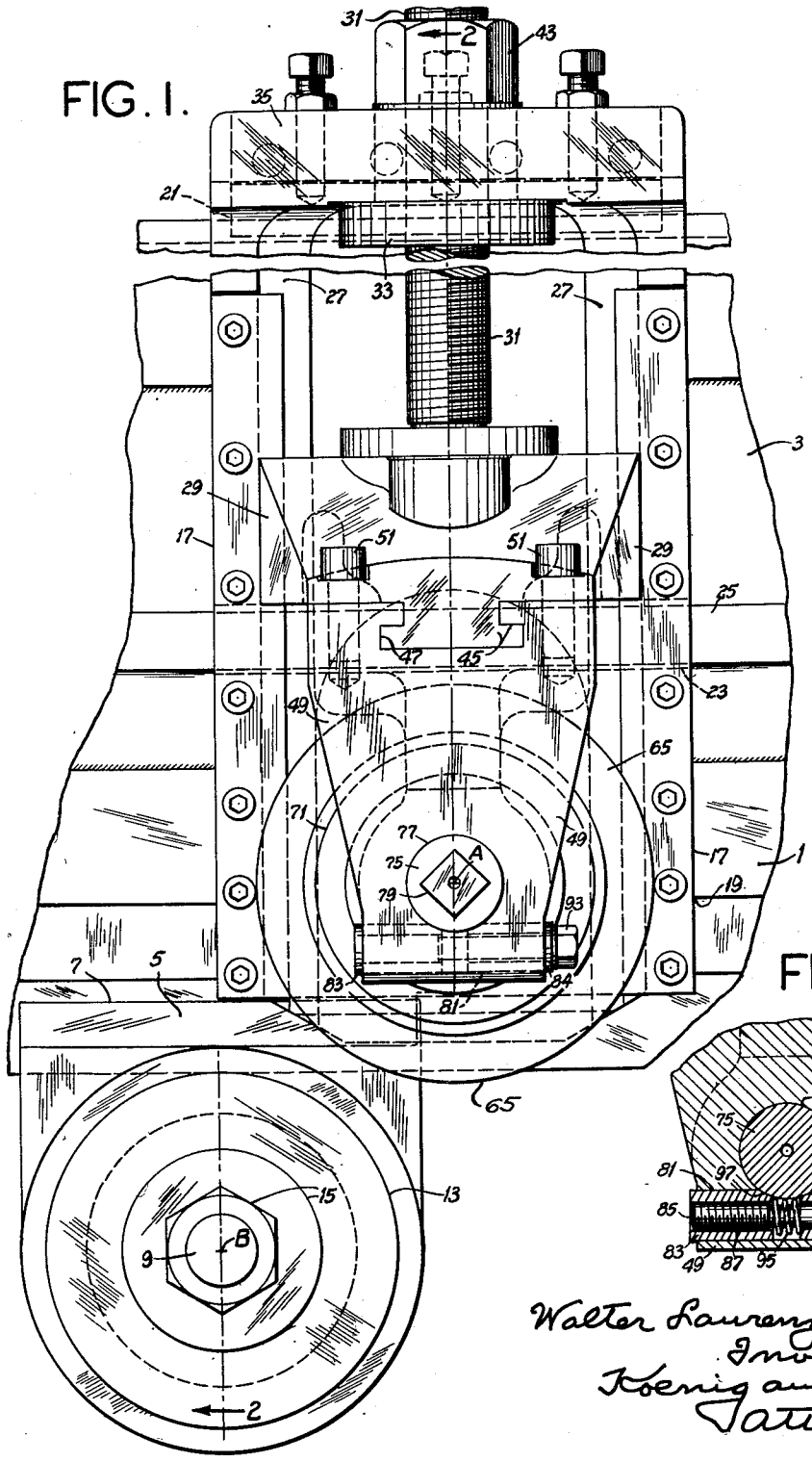


FIG. 3.

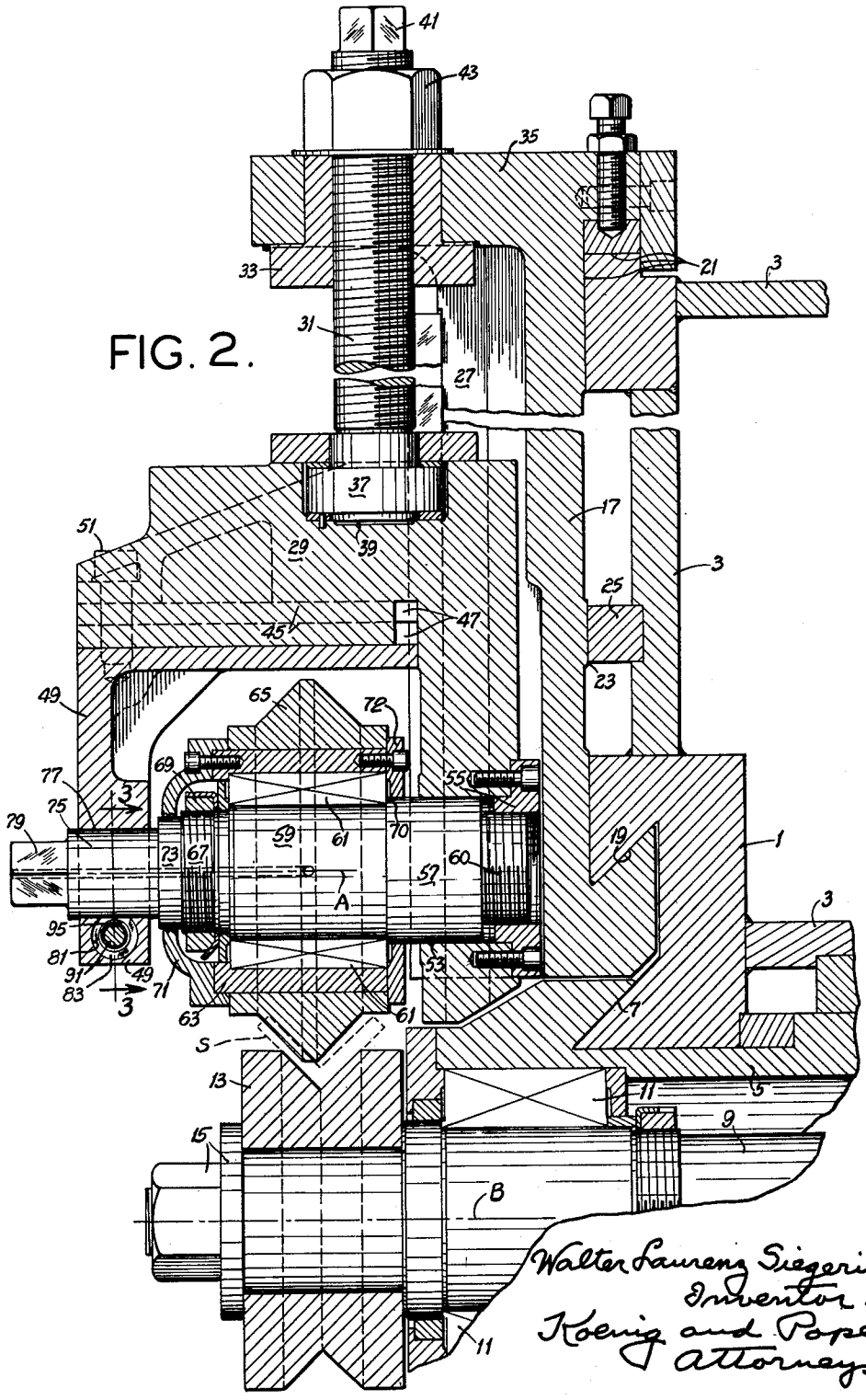
Walter Laurenz Siegerist,
Inventor.
Koenig and Pope,
Attorneys.

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FIG. 2.



Walter Laurenz Siegerist,
Inventor.
Koenig and Pope,
Attorneys.

United States Patent Office 2,806,508 Patented Sept. 17, 1957

2,806,508

BAR STRAIGHTENING MACHINE

Walter Laurenz Siegerist, Affton, Mo., assignor, by mesne assignments, to Blaw-Knox Company, Pittsburgh, Pa., a corporation of Delaware

Application December 18, 1953, Serial No. 398,941

7 Claims. (Cl. 153—104)

This invention relates to bar straightening machines, and more particularly to machines of this class having relatively adjustable power and idler rolls.

The invention is an improvement upon that set forth in my United States patent application Serial No. 329,224, filed January 2, 1953, for Straightening Machine, eventuated as Patent 2,720,242 dated October 11, 1955.

Among the several objects of the invention may be noted the provision of means for axially adjusting a roll on one linearly movable carriage with respect to a power roll on another linearly moving carriage, the carriages being arranged to pass one another, whereby the rolls are capable of effecting straightening actions on a workpiece in two planes, one of which is parallel to the rotary planes of the rolls and the other perpendicular thereto; the provision of such apparatus wherein the rolls may function also as pinch rolls; the provision of adjusting means of the class described in which an axially adjustable roll shaft may be maintained stationary and held accurately in position between periods of adjustment; the provision of adjusting means of this class which supports the roll shaft on two sides of the supported roll so as to provide properly balanced forces; and the provision of means of the class described which is simple in construction, having easily renewable vital parts and which is convenient of access for making adjustments and replacements. Other objects and features will be in part apparent and in part pointed out hereinafter.

The invention accordingly comprises the elements and combinations of elements, features of construction, and arrangements of parts which will be exemplified in the structures hereinafter described, and the scope of which will be indicated in the following claims.

In the accompanying drawings, in which one of various possible embodiments of the invention is illustrated,

Fig. 1 is a fragmentary side elevation of straightening apparatus embodying the invention;

Fig. 2 is a cross section taken on line 2—2 of Fig. 1; and,

Fig. 3 is an enlarged detail cross section taken on line 3—3 of Fig. 2.

Corresponding reference characters indicate corresponding parts throughout the several views of the drawings.

Referring now more particularly to the drawings, numeral 1 indicates a corner guide member of a longitudinal supporting frame 3. A first carriage 5 is dovetailed to the guide member 1, as shown at 7, and carries a power-driven roll shaft 9 on bearings 11. A typical roll on shaft 9 is shown at 13, held in place by a suitable fastening means 15. Further description of the guide 1, frame 3, carriage 5, shaft 9, roll 13 and power drive for the latter will not be necessary herein, being known and to be found in said application.

A second carriage is indicated at 17, dovetailed at 19 to the guide member 1 and having a sliding keyed or splined connection with the upper part of the frame 3, as indicated at 31. A land 23 on the carriage 17 slides on a backing strip 25 of the frame 3.

Located in the carriage 17 is a vertical guide 27 and a vertically movable subcarriage 29. This subcarriage is controlled in its movements by a screw 31, threaded through a bushing 33 located in an overhanging portion 35 extending from the carriage 17. The bushing is fixed in the portion 35. The screw 31 has an affixed head 37 which is rotary within a socket 39 in the subcarriage 29. The head 37 is not axially movable within the socket. Thus by threading the screw 31 through the bushing 33, the vertical position of the subcarriage 29 may be controlled. A polygonal portion 41 is provided on the screw 31 for receiving an adjusting tool. A releasable lock nut 43 serves to hold the screw 31, and hence the subcarriage 29, in any adjusted position.

The subcarriage 29 includes a T guide 45, engageable by a T slot 47 of a removable outboard bearing member 49, held in place by the studs 51.

The subcarriage 29 is provided with a circular inboard bearing opening 53. This bearing receives and snugly fits the rear shouldered part 57 of a roll shaft 59 and also a replaceable threaded bushing 55. Extending from the shoulder 57 is a threaded stub 60 which is threaded into said bushing 55. An antifriction bearing 61 of any suitable type (indicated by crossed lines) supports a sleeve assembly 63 affixed to a straightening roll 65. The latter may have any appropriate surface shape, the shape shown being for operating upon a workpiece of angle section such as suggested by the dotted lines S in Fig. 2. The roll shaft 59 includes a reduced threaded portion 67 and a holding nut 69 which holds the inner race means of the bearing 61 against shoulder 70. The outer race means of the bearing is held in the sleeve assembly 63. The sleeve assembly 63 carries a sealing portion 71 cooperating with a reduced shoulder 73 on the shaft 59; also a sealing portion 72 cooperating with shoulder 57.

At 75 is shown another reduced shoulder of the shaft which snugly fits and extends through a circular opening 77 of the outboard bearing member 49. A polygonal extension 79 serves to receive an adjusting tool. It will be noted that the polygon of the member 79 lies within the circle of the shoulder 75, so that the outboard bearing support 49 may be removed. Intersecting the opening 77 is a transverse hole 81, adapted to receive two cylindric circular clamping plugs 83 and 84. Plug 83 carries a threaded opening 85 for the reception of the threaded end 87 of a bolt 89. An unthreaded portion 91 of the bolt passes through an unthreaded opening passing through the plug 84. The bolt carries a head 93. A compression spring 95 tends to bias apart the plugs 83 and 84 when not held together by the bolt 89. When the bolt is threaded into plug 83 by use of a wrench on head 93, both plugs are forced together, so that endwise circular notches 97 therein engage the sides of the shoulder 75 of shaft 59. This anchors the shoulder in the outboard support 49 by a vertical reaction which keeps the axis of the roll shaft 59 in a vertical plane.

From the above it will be clear that normally the roll shaft 59 is stationary and, when locked by the plugs 83 and 84, is accurately positioned and supported in the openings 53 and 77 by the shoulders 57 and 75. By loosening the bolt 89 and turning the shaft 59, the threads 60 may be operated in the threaded bushing 55 to provide for axial movement of the shoulder 75. When a desired adjustment has been made, the bolt 89 is tightened, so as to bring together the plugs 83 and 84 against the action of spring 95 to contact and key shoulder 75. As will be apparent from Fig. 2, the distance between the inboard and outboard bearing portions around shoulders 57 and 75 is greater than the axial length of the idler roll assembly 61, 63, 65, 67, 71, 72 and 73, thus providing the space required for making the desired axial adjustments.

In Fig. 2 an adjustment of the roll 65 has been shown laterally with respect to roll 13. It will be understood from said application that roll 13 is a power roll, and that rolls 13 and 65 may be relatively spaced with respect to the length of the guide 1. Thus in such positions they serve to straighten vertical bends in workpieces such as S. The lateral adjustment indicated serves to carry out horizontal bend or camber in S. It will be understood also that the power roll 13 may be placed directly under the idler roll 65, so that the two of them function as pinch rolls, in which event the central planes of the rolls 13 and 65 would be brought into coplanar alignment.

It will be understood that the pair of rolls 13 and 65 described is exemplary of additional pairs that may be used in connection with the frame 3 and guides 7, 19 and 21. Several rolls 13 may be employed, as well as serveral rolls 65, as will be clear to those skilled in the art and from the abovementioned application.

Among the advantages of the invention are the following:

The combined relative adjustments of the rolls 13 and 65 along the guide 1 with the relative lateral adjustments parallel to the center line of shaft 59 provide great versatility in straightening operations. Thus vertical bends and lateral camber may be dealt with simultaneously. Moreover, when the central planes of the rolls are coplanar and their axes relatively vertical, they have the stated pinch-roll functions. While functioning as pinch rolls, the relative lateral adjustments between rolls allow for equal or unequal distribution of the pinching effect on a given section. For example, in the case of the angle section shown, one leg may be pinched more than the other. Conversely, the lateral adjustment is used to align the rolls to compensate for wear or inaccuracies in machining of the roll profiles. Thus the invention provides a compact means external to the main frame 3 of the machine for providing convenient lateral adjustment of the rolls even while the machine is in motion and operating on a bar.

The supporting surfaces of the roll shaft 59 (at 57 and 75) are circular and not threaded, which results in the ability more accurately to support and align roll 65, and since at these points there are snug (though rotary) fits, the threads 60 form no supporting functions and act only to adjust the axial position of the shaft 59. Moreover, the adjusting means 79 is simple and conveniently located for access. The removability of the outboard bearing 49 from the subcarriage 29 provides convenient means for removing and replacing a roll 65 or for replacing a roll shaft 59.

Another advantage of the invention is that the control member 79 and head 93 are close to one another, so that manipulations may be carried on at one location at the lower end of the outboard support 49.

It will be understood that shapes other than that shown for workpiece S may be worked by providing appropriate roll contours such as for example I, channels, box or other sections.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As various changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. In a bar straightening machine having longitudinal guide means for carriages carrying power and idler roll assemblies whose planes of rotation are parallel; a transversely adjustable subcarriage on the carriage for the idler roll assembly, a normally stationary roll shaft for said idler roll assembly having circular inboard and outboard bearings on the subcarriage, the distance between said inboard and outboard bearings being greater than the axial length of said idler roll assembly, means adapted to prevent axial movement of said idler roll assembly relative to said roll shaft, means adapted for threading the roll shaft to the subcarriage and adapted upon rotation of the roll shaft to adjust it axially, means for locking the roll shaft to the outboard bearing between adjustments, and means at the end of the roll shaft adjacent the outboard bearing for turning the shaft for adjustments.

2. A bar straightening machine made according to claim 1, wherein said outboard bearing is removable from said subcarriage.

3. In a bar straightening machine having longitudinal guide means for carriages carrying power and idler roll assemblies whose planes of rotation are parallel; a transversely adjustable subcarriage on the carriage for the idler roll assembly, a normally stationary roll shaft for said idler roll assembly, circular inboard and outboard bearings for the shaft on the subcarriage, the distance between said inboard and outboard bearings being greater than the axial length of said idler roll assembly, means adapted to prevent axial movement of said idler roll assembly relative to the roll shaft, removable coaxial means adjacent said circular inboard bearing adapted for threading the roll shaft to the subcarriage and adapted upon rotation of the roll shaft to adjust it axially, means for locking the roll shaft to the outboard bearing between adjustments, and means at the end of the roll shaft accessible beyond the outboard bearing for turning the shaft during adjustments.

4. In a bar straightening machine having longitudinal guide means for carriages carrying power and idler roll assemblies whose planes of rotation are parallel and the axes of which are adapted to pass one another; a transversely adjustable subcarriage on the carriage for the idler roll assembly, a normally stationary roll shaft for said idler roll assembly, circular inboard and outboard bearings for the shaft on the subcarriage, the distance between said inboard and outboard bearings being greater than the axial length of said idler roll assembly, means adapted to prevent axial movement of said idler roll assembly relative to the roll shaft, a removable threaded bushing coaxial with the roll shaft and located in the subcarriage at the inboard bearing, a coaxial threaded extension on the roll shaft adjacent said inboard bearing, adapted upon rotation of the roll shaft to adjust it axially by threading in said bushing, means for locking the roll shaft to the outboard bearing between adjustments, and means at the end of the roll shaft accessible beyond the outboard bearing for turning the shaft during adjustments, said adjustments being adapted to be made while the machine is in motion and operating upon a bar.

5. A bar straightening machine mdae according to claim 4, wherein said outboard bearing is removable from said subcarriage.

6. In a bar straightening machine, a carriage, a roll shaft, a roll assembly on said shaft, said carriage having an inboard support containing a circular supporting hole for a first cylindric supporting part of the roll shaft on one side of said roll assembly, a nonsupporting extension from said supporting part of the shaft, said extension being in threaded connection with respect to the carriage, an outboard bearing support on said carriage and located on the other side of the roll assembly, said outboard support having a circular supporting hole for a second cylindric supporting part of the roll shaft, the distance between said inboard and outboard bearing supports being greater than the axial length of said roll assembly, means adapted to prevent axial movement of said roll assembly relative to said roll shaft, control means extending from said second cylindric part of the roll shaft for turning it to operate said threaded connection, and releasable means for locking said second cylindric portion of the shaft to said support.

7. A bar straightening machine made according to claim 6, wherein said outboard bearing support is removable from the carriage, said control means being smaller

than the supporting hole in the outboard bearing and adapted to permit removal of said outboard bearing support for changing rolls or supporting shafts.

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