

July 21, 1953

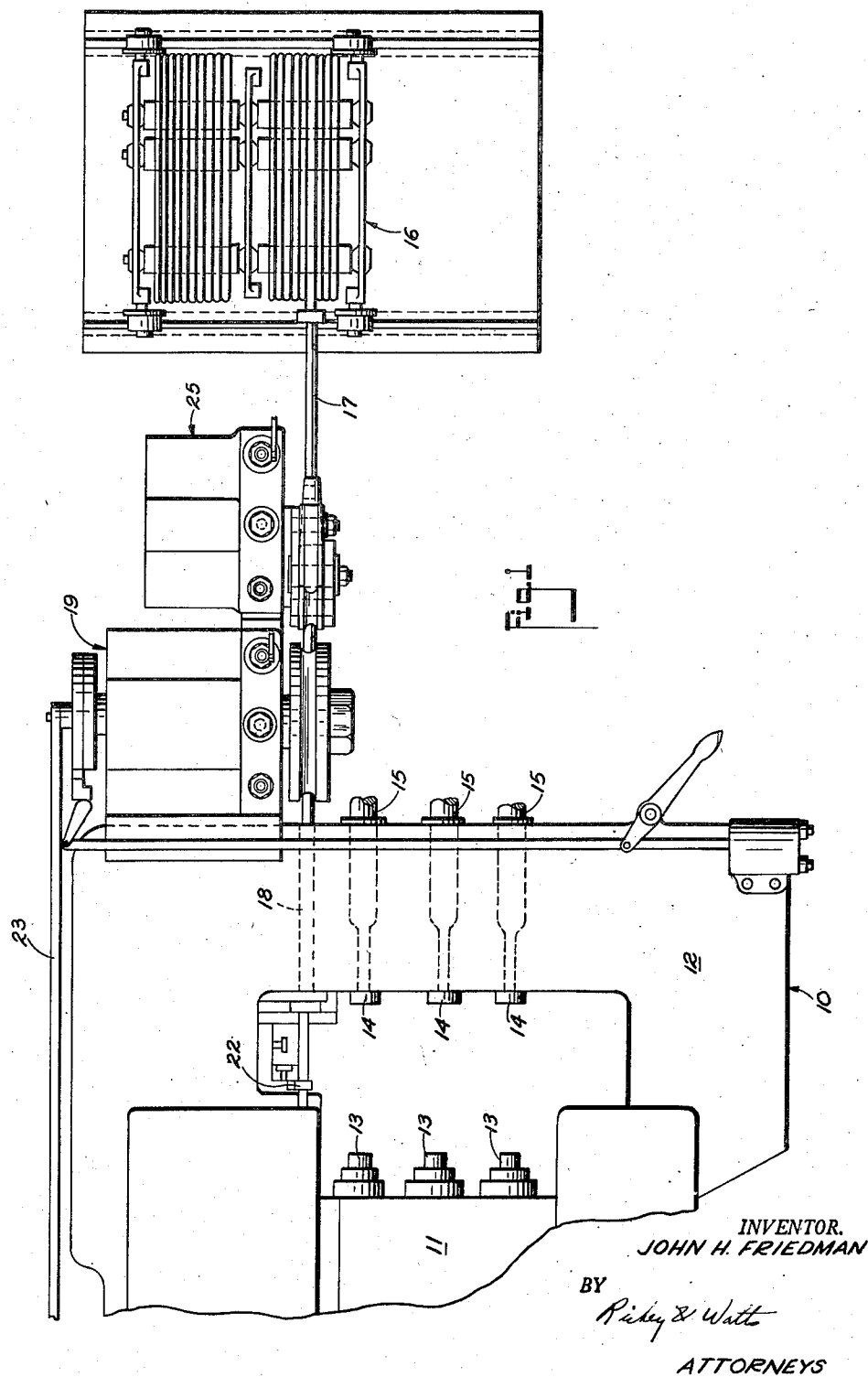
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2,646,102

STOCK STRAIGHTENER FOR COLD HEADER DEVICES

Filed March 15, 1949

5 Sheets-Sheet 1.



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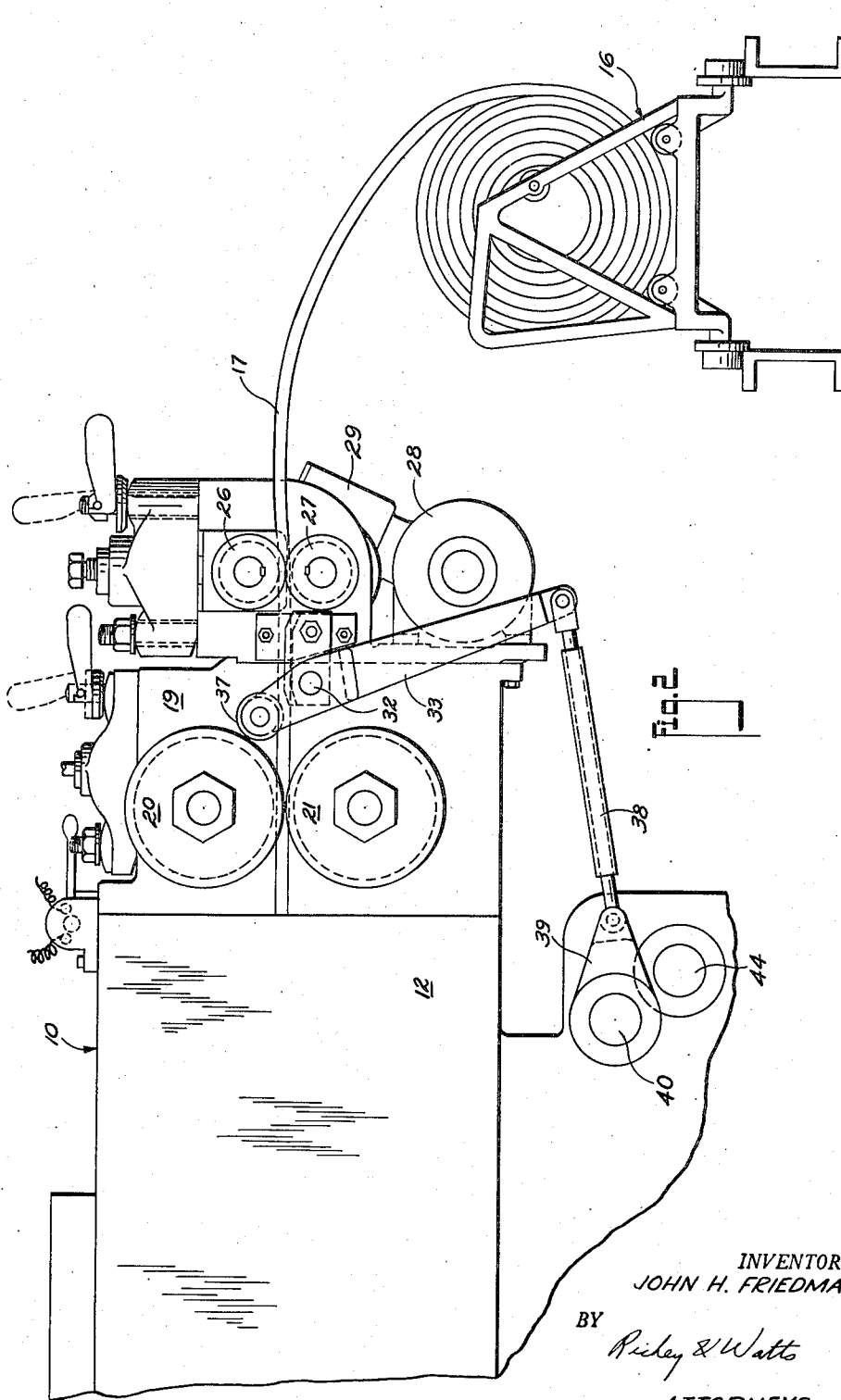
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STOCK STRAIGHTENER FOR COLD HEADER DEVICES

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5 Sheets-Sheet 2



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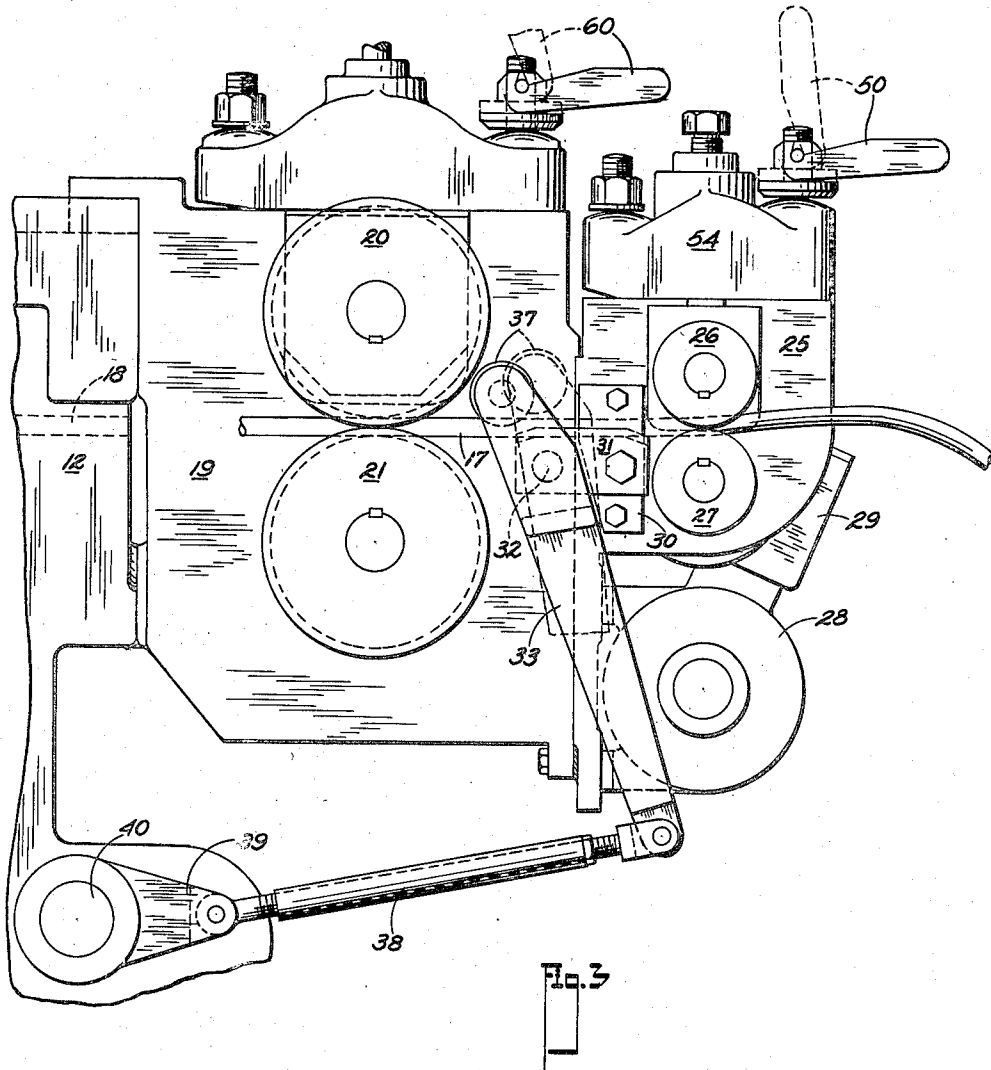
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STOCK STRAIGHTENER FOR COLD HEADER DEVICES

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5 Sheets-Sheet 3



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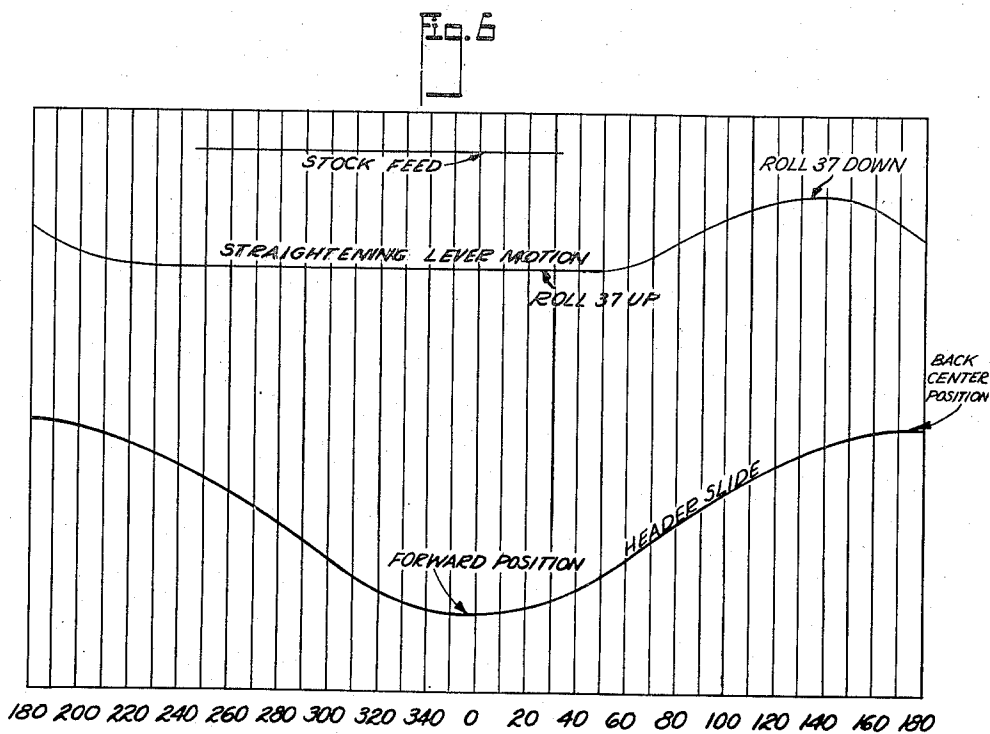
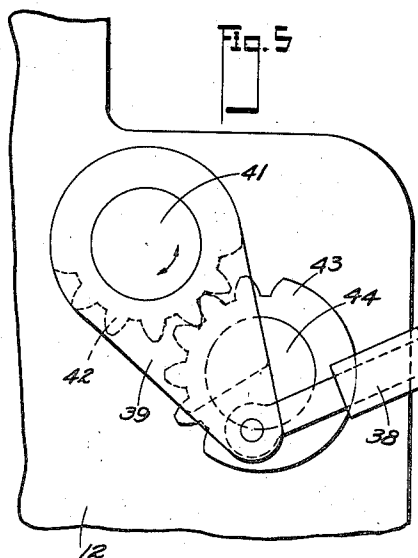
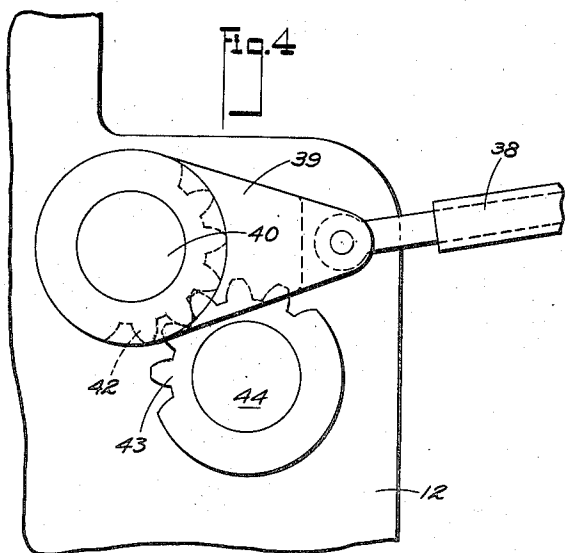
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STOCK STRAIGHTENER FOR COLD HEADER DEVICES

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5 Sheets-Sheet 4



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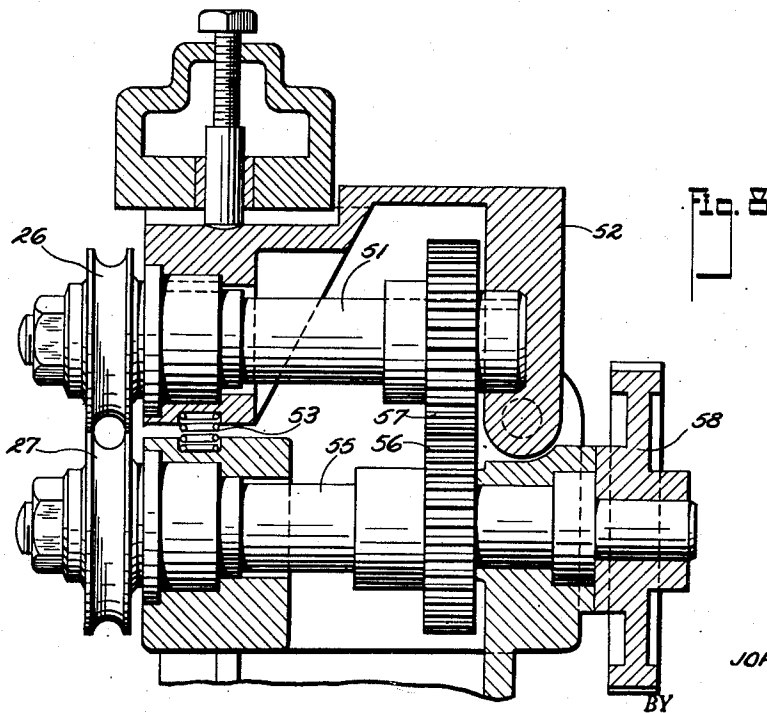
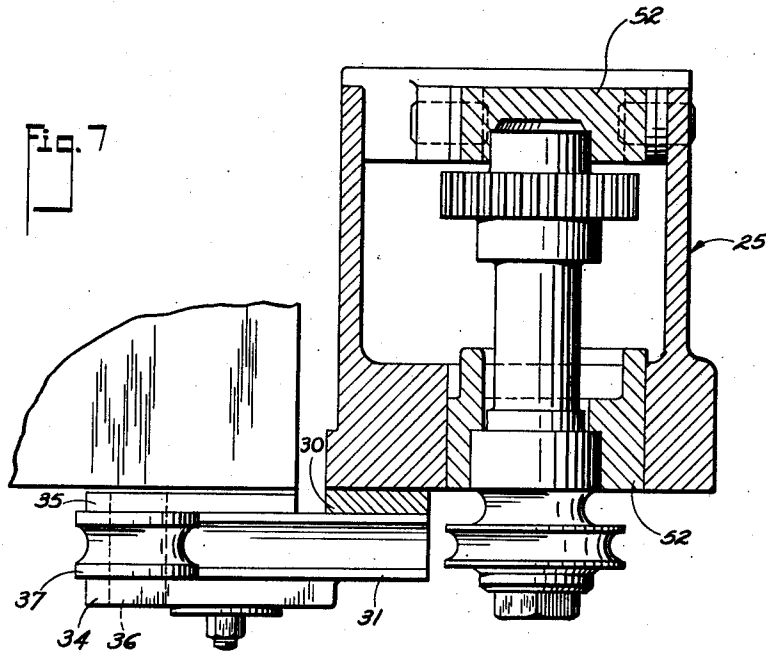
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STOCK STRAIGHTENER FOR COLD HEADER DEVICES

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5 Sheets-Sheet 5



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2,646,102

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Application March 15, 1949, Serial No. 81,514

3 Claims. (Cl. 153—39)

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This invention relates to wire or rod straightening and handling apparatus particularly adapted for use in connection with cold headers for similar machines which utilize coiled lengths of wire or rod stock such as, for instance, the apparatus covered by my U. S. Patent 2,219,811, issued October 29, 1940.

Cold headers and similar machines are commonly provided with feed rolls or other feed mechanism designed to feed the stock into machines by steps or as by required by the particular machine, the stock ordinarily being fed from reels or coils containing relatively long lengths.

The feeding of the stock step by step into the machine is timed with respect to the cycle of operations carried out by the cold header. Reference in this connection is made to the U. S. Letters Patent to W. L. Clouse, 2,139,936, issued December 13, 1938, showing the important relation between the feeding of the stock into the machine with respect to the movements of the header slide, carriage, cut-off and knock-out movement. Numerous expedients have been proposed to eliminate the bend or curve imparted to the stock due to the coiling thereof prior to the introduction of such stock between the feed rolls used to advance the stock into the cold header. Such prior art expedients have included a plurality of offset rolls through which the stock is pulled by the feed rolls so that a length of stock is straightened by the straightening rolls at the same time a length in advance thereof is being moved by the feed rolls.

It will be understood by those skilled in the art that it is desirable to relieve the feed rolls of the high loads that would be imposed thereon by the pulling of the stock through the straightening rolls so as to minimize the gouging, scoring or marring of the rod stock that is characteristic of a high gripping pressure across the feed rolls. It will also be understood that where the straightening roll movement is coincident with the feed roll movement the power requirements for the straightening movement occur at a time when the header slide of the machine is approaching the bed frame dies.

According to the instant invention, I have provided an apparatus which will straighten successive portions of the stock being fed into the machine by the feed rolls at a time when the feed rolls are stationary and wherein the straightening load is carried by the cold header at a time when the header slide is moving to its back center position. It is, accordingly, an object of my invention to provide a mechanism to be attached to or combined with a cold header or similar ma-

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chine operating upon wire or rod stock which will straighten the stock going into the cold header feed rolls in an intermittent manner out of phase with the intermittent motion of the feed rolls so as to relieve the feed rolls and the drive mechanism therefor of any straightening load.

It is a further object of my invention to provide a mechanism according to the preceding object wherein a length of unstraightened wire rearwardly of the feed rolls is supported at each end thereof and a straightening member moved in a direction transverse to the direction of feed is brought into engagement with the supported length of stock so as to bring the axis thereof into alignment with the axis of the stock forwardly of the feed rolls.

It is a further object of my invention to provide a mechanism according to the preceding objects wherein the feed rolls engage one end of the supported length of stock and the other end of said length of stock is engaged by the starting rolls during the straightening of that length.

It is a further object of my invention to provide a mechanism according to the preceding object wherein the wire straightening load is transmitted to the straightening mechanism from a part of the cold header that moves when the header slide recedes from the bed frame dies and that is idle or dwells when the header slide is approaching the bed frame dies so that the drive means for the cold header takes the straightening load at a time out of phase with the movement of the feed rolls.

Other objects and advantages relating to simplicity of design, economies in manufacture and convenience in use will appear from the following description and the appended drawings wherein:

Fig. 1 is a plan view of a cold header and stock feed arrangement embodying my invention;

Fig. 2 is a side elevation of the apparatus shown in Fig. 1;

Fig. 3 is an enlarged elevation showing in detail the feeding and straightening apparatus of my invention;

Fig. 4 is an elevation with parts broken away showing the transmission of the cold header cam shaft drive to the straightening apparatus at one end of the straightening stock;

Fig. 5 is a view similar to Fig. 4 showing the drive at the other end of the straightening stock;

Fig. 6 is a diagram showing the relation between the stock straightening motion and the movement of cooperating cold header parts;

Fig. 7 is a sectional view with parts in plan

showing the relation between the moving straightening lever and a fixed straightening anvil; and

Fig. 8 is a sectional view in elevation of a feeding and supporting unit embodying my invention.

Referring to the drawings, I have illustrated my invention in the environment of a cold header indicated as at 10, wherein a reciprocating header slide 11 moves horizontally in the bed frame 12 to effect a working of metal blanks between the cooperating header slide and bed frame dies 13 and 14 respectively. It will be understood that the cold header includes a transfer mechanism, not shown, arranged to transfer the blanks from one set of cooperating dies to the next adjacent set and that the knock-outs 15 are reciprocated to eject the worked blanks from the bed frame dies 14.

The rod or wire stock from which the work pieces or blanks are cut is carried by the reel mechanism indicated at 16 and the stock 17 is fed in through the bed frame 12 as at 18 by the feed mechanisms indicated in its entirety as at 19. The feed rolls 20 and 21 are turned in timed relation with respect to the header slide movement as shown in Fig. 6 so as to advance a length of stock into the cold header against an adjustable stop 22 and such advanced length is thereafter cut off and sequentially transferred step by step through the die stations 13—14. The connecting rod 23 transmits the movement of the crank shaft of the cold header to the feed mechanism 19. The stock starting unit is indicated in its entirety as at 25 and includes a pair of rolls 26 and 27 arranged to be driven by the motor 28 through gear reduction 29 so that when the free end of the stock 17 from the gear is gripping between the cooperating rolls 26—27 and the motor 28 energized, the stock will be advanced into position between the feed rolls 20—21. The feed roll unit 19 is detachably supported on the bed frame and the starting unit 25 is in turn supported as a unit on the feed roll mechanism 19 so that the axis of the stock passing through the opening 18 in the bed frame is in alignment with the axis of the stock gripped between the feed rolls 20—21 and the rolls 26—27.

The straightening mechanism mounted on unit 25 includes an anvil bracket 30 to support the anvil 31 mounted thereon extending beneath the stock 17 disposed between the two pairs of rolls 20—21 and 26—27. The anvil 31 is preferably grooved as best shown in Fig. 7 and is preferably supported in space slightly below the horizontal plane between the two sets of rolls so as to compensate for any "spring back" in the stock after the stock between the two sets of rolls has been subjected to a straightening action. It will be understood by those skilled in the art that the vertical adjustment of the anvil 31 will vary somewhat depending upon the size of the stock being handled and the spring back characteristics of the particular stock for the length being straightened. The anvil 31 is provided with a transverse pin 32 upon which is fulcrumed a straightening lever 33. The upper end of the lever 33 is bifurcated to provide arms 34 and 35 (Fig. 7), which arms are apertured to carry the pin 36 which rotatably supports the straightening roll 37. The lever 33 is arranged to move the straightening roll 38 from the full line position, as shown in Fig. 3, to the dotted line position shown in Fig. 3.

The timing of the motion of the lever 33, with respect to the timed rotation of the feed rolls

20—21, is such that the straightening roll 37 moves to its dotted line position as shown in Fig. 3 while the feed rolls are advancing stock into the cold header. The unstraightened stock which is thus advanced in through the space between the two pairs of rolls is characterized by a convex curvature resulting from the curvature imparted to the stock on the reel. Thus, the unstraightened stock supported in the space between roll 21 and roll 27 is bowed upward slightly so as to be out of contact with the anvil and above a straight line between the points of support provided by rolls 21 and 27. When, however, after the feed rolls have completed their stock advance motion the straightening roll 27 is moved to the full line position of Fig. 3 and the stock is thereby straightened. The first increment of straightening is obtained by bringing the entire length of stock supported between rolls 21 and 27 into a horizontal plane and the second or final phase of the straightening is accomplished by downward movement of the roll 37 on a shorter length of stock, namely, that stock in the space between the free end of the anvil 31 and the roll 21.

The limit positions of the straightening roll 37, with respect to the plane of the straightened stock, may be varied by means of the adjustable connecting rod 38 extending between the lower end of the lever 33 and the rock lever 39 fixed to shaft 40 carried by the cold header. It will be understood that adjustments of the rod 38 and vertical adjustments of the straightening anvil 31 will be made for different diameters of stock and stock having different spring back characteristics.

The rocking motion characterizing lever 39 is transmitted to the rock shaft 40 by means of a gear 42 fixed to the shaft 40 in mesh with a gear 43 fixed to the cam shaft 44 extending transversely of the bed frame of the cold header. It will be found by reference to the phase diagram of Fig. 6 and to the patent to Clouse, 2,139,936, above referred to, that the cam shaft 44 is turned at a time when the header slide is receding from the bed frame dies so that the knock-outs actuated by said cam shaft eject the blanks during this phase of header slide movement. This arrangement provides that a straightening lever motion is synchronized with the cam shaft motion and downward motion of roll 37 is thus out of phase with the movement of the stock feed rolls 20—21. There are numerous advantages to this arrangement. It eliminates the need for an auxiliary power unit to drive the stock straightening device. It utilizes the power available in the main power unit for the header slide at a time when the header slide is not required to effect a working in the cooperating dies 13—14. It straightens the curved stock coming from the reel at a time when there is no motion of the stock in the direction of its length and eliminates the problem of attempting to straighten stock and advance the stock at the same time. It reduces the gripping pressure across the feed roll dies and thus reduces the danger of scoring or marking the stock fed into the cold header. It solves the problem of straightening small diameter stock heretofore generally pulled along with reciprocating grip dies that mar the stock.

To start the stock into the cold header the free end of the stock is brought from the reel and placed between the rolls 26 and 27 with said rolls in a "release" position with the release lever 50

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swung upwardly to its dotted line position as shown in Fig. 3. The upper roll 26 is fixed to a shaft 51 mounted in a pivoted yoke 52 in the main casting of the unit 25, as best shown in Figs. 7 and 8. A spring 53 is arranged between the main casting and the pivoted yoke 52 so as to move the yoke and the roll 26 carried thereby away from the lower roll 27 upon the release of the head 54 which encompasses the yoke on the side of the unit adjacent the rolls. The roll 27 is fixed to a shaft 55 carried by the main casting and gears 56-57 carried by the shafts 55 and 51 respectively transmit the turning movement of the lower shaft 55 to the upper shaft 51. A worm gear 58 fixed to the lower shaft 55 is driven by the worm of the reduction gearing 29 and the motor 28.

The feed roll mechanism 19 is provided with a release lever 60 and the rolls are geared to each other so as to turn together substantially as described in connection with the rolls 26 and 27. The drive for the rolls 20 and 21, however, comes from the main shaft of the cold header through the connecting rod 23 and is accordingly an intermittent drive as distinguished from the drive for the unit 25. The lever 60 is also moved to its release position, as shown in Fig. 3, when a new roll of stock is to be started into the cold header.

Upon swinging the manually operated lever 59 to the full line position, the free end of the stock between the rolls 26 and 27 is securely gripped and a starting of the motor 28 advances the free end of the stock into the space between the straightening roll 37 and the anvil 31 and thence in between the rolls 20 and 21 which are at this time released. It will be understood that during the advance of the stock by means of the motor 28, the straightening roll 37 is in its dotted line position. As soon as the free end of the stock has been moved forwardly in between the feed rolls 20 and 21, the lever 60 of the feed mechanism 19 may be swung to its full line position to effect a gripping of the stock between the feed rolls. The motor 28 is thereafter stopped and the cold header motor is started. Thereafter the operation of the cold header effects the step by step advancing of the stock by the feed rolls and the straightening of the stock supported between the feed rolls and the rolls 26 and 27, as heretofore described.

Although I have shown and described one embodiment of my invention in considerable detail, it will be appreciated that those skilled in the art may effect numerous modifications therein without departing from the scope of the invention as defined in the following claims.

What is claimed is:

1. A stock straightener for a header having a pair of intermittently operated feed rolls, said straightener including stock guiding means arranged substantially in axial alinement with the pass of said feed rolls, an anvil positioned between said feed rolls and said guiding means on one side of the line of feed of the stock, said anvil including a surface closely adjacent to the line

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of feed of the stock and a surface merging therewith and extending away from such line of feed, a movable straightener element disposed on the other side of the line of feed of the stock and means for moving said movable straightener element to press the stock being fed against the said surfaces of said anvil while said feed rolls are idle.

2. A stock straightener for a header having a pair of intermittently operated feed rolls, said straightener including guide roll means arranged substantially in axial alinement with the pass of said feed rolls, an anvil positioned between said feed rolls and said guide roll means on one side of the line of feed of the stock, said anvil including a surface closely adjacent to the line of feed of the stock and a surface merging therewith and extending away from such line of feed, a movable straightener element disposed on the other side of the line of feed of the stock and means for moving said movable straightener element to press the stock being fed against the said surfaces of said anvil while said feed rolls are idle.

3. A stock straightener for a header having a pair of intermittently operated feed rolls, said straightener including stock guiding means arranged substantially in axial alinement with the pass of said feed rolls, an anvil positioned between said feed rolls and said guiding means on one side of the line of feed of the stock, said anvil including a surface closely adjacent to the line of feed of the stock and a surface merging therewith and extending away from such line of feed, a straightener roll disposed on the other side of the line of feed of the stock, means mounting said straightener roll for pivotal movement in a plane containing said line of feed, and means moving said straightener roll when said feed rolls are idle to press the stock being fed against the second portion of said anvil.

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References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
62,669	Nelson	Mar. 5, 1867
283,535	Tittle	Aug. 21, 1883
358,116	Gustin	Feb. 22, 1887
536,237	Standford	Mar. 26, 1895
611,695	Lundy	Oct. 4, 1898
1,161,864	Johnson	Nov. 30, 1915
1,314,877	Langford	Sept. 2, 1919
1,479,877	Sleeper	Jan. 8, 1924
1,594,439	Williams	Aug. 3, 1926
2,139,936	Clouse	Dec. 13, 1938
2,219,811	Friedman	Oct. 29, 1940
2,393,702	Naegeli	Jan. 29, 1946

FOREIGN PATENTS

Number	Country	Date
18,144	Great Britain	of 1911
323,981	Germany	Aug. 17, 1920
239,402	Great Britain	Sept. 10, 1925
704,781	France	Feb. 24, 1931