Oct. 23, 1945. W. A. ZAHUTNIK 2,387,380

DEVICE FOR BENDING COIL CONVOLUTIONS

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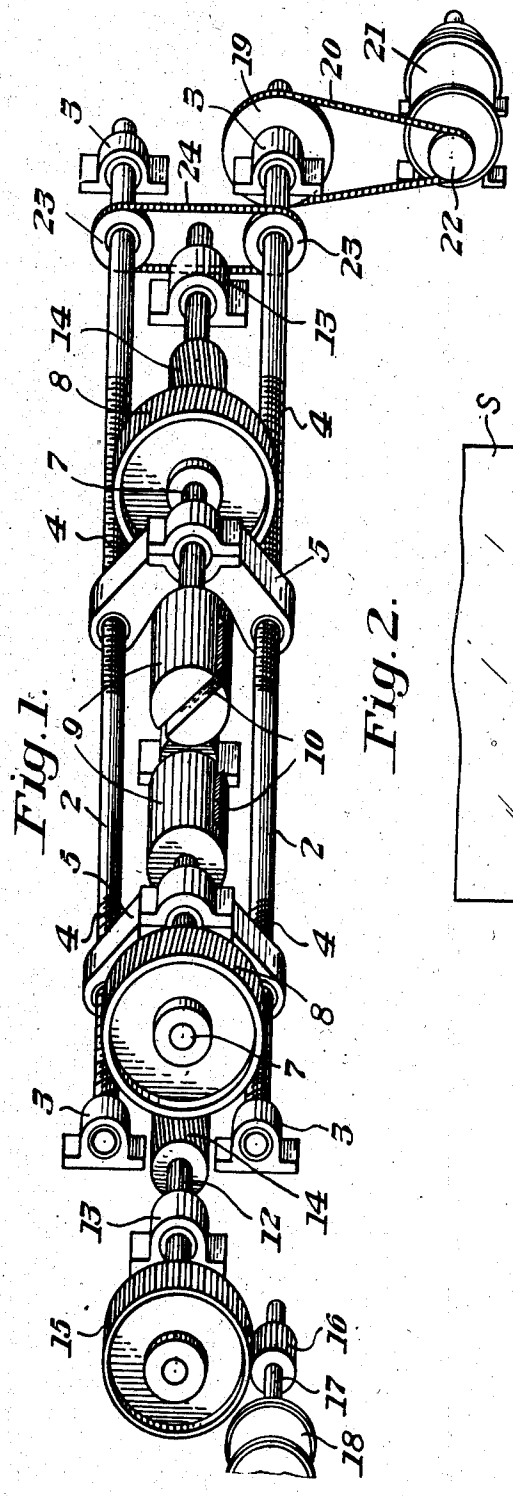


Fig. 1.

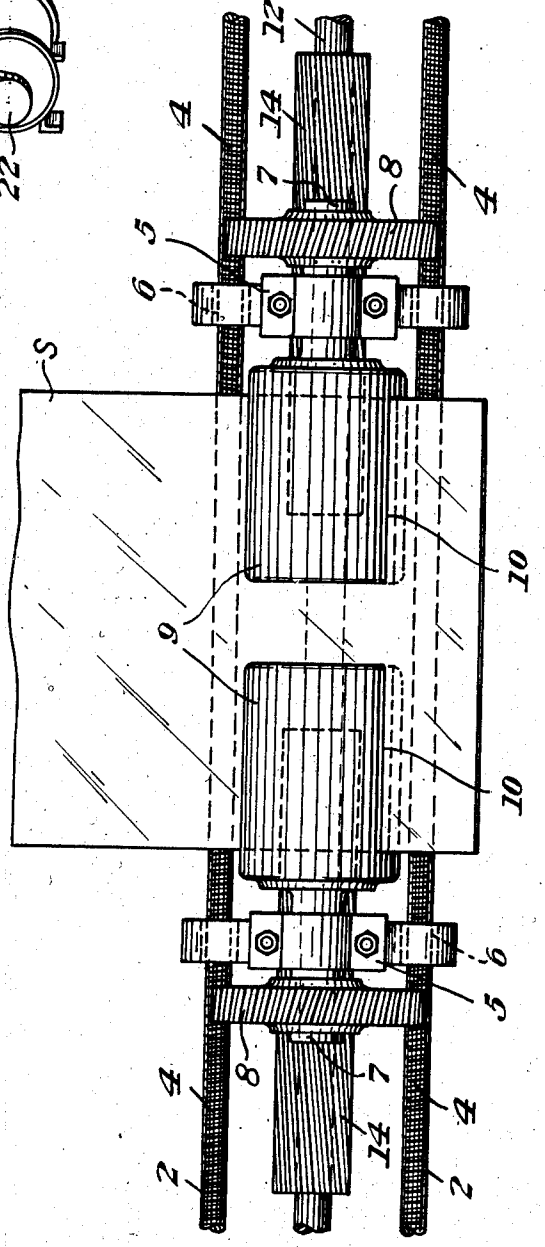


Fig. 2.

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Fig. 3.

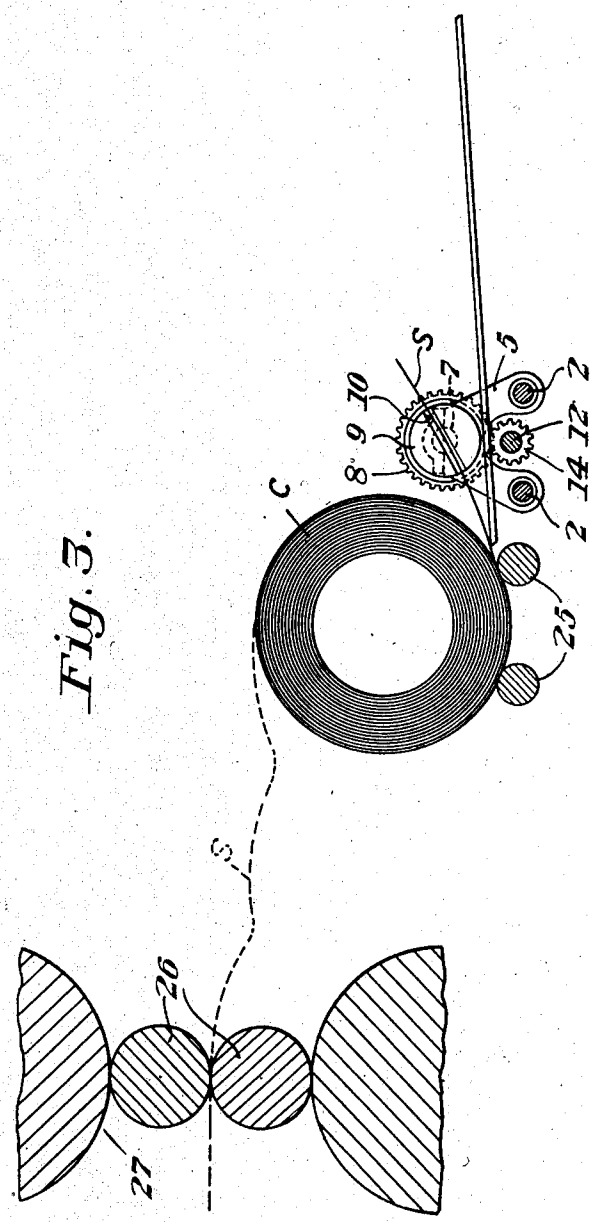


Fig. 5.

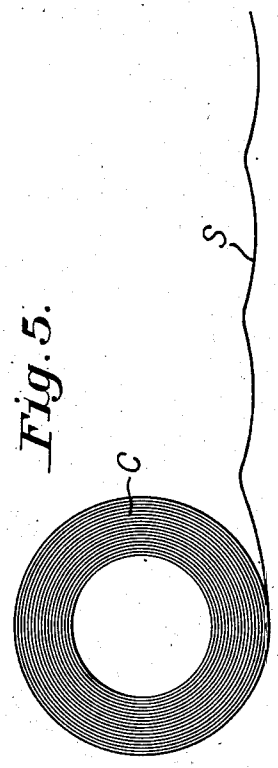
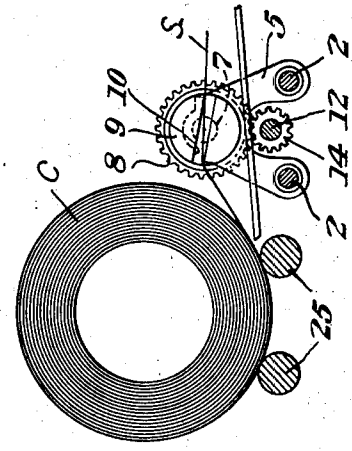


Fig. 4.



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Fig. 6.

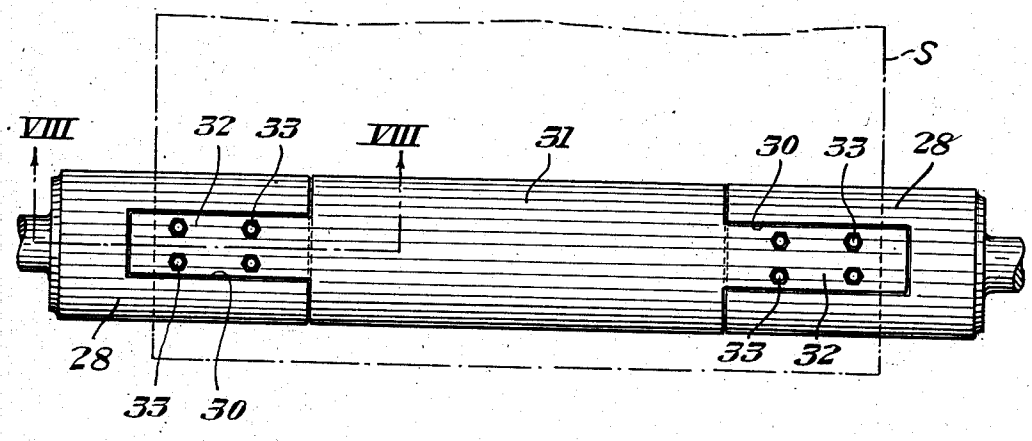


Fig. 7.

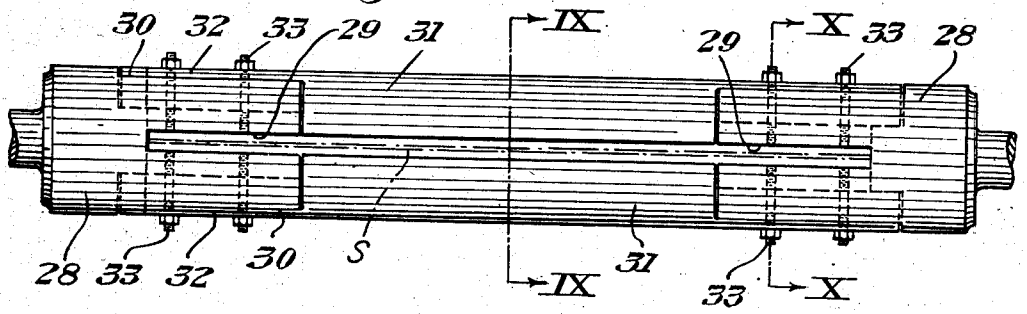


Fig. 8.

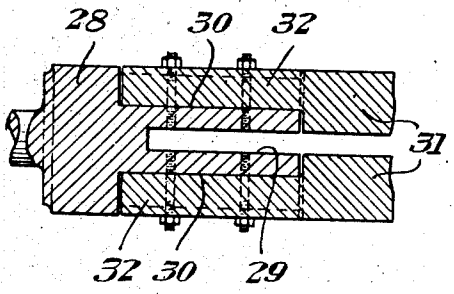


Fig. 9.

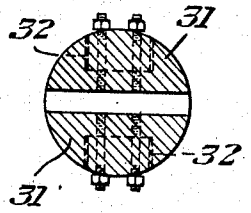
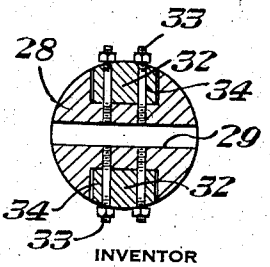


Fig. 10.



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Patented Oct. 23, 1945 2,387,380

UNITED STATES PATENT OFFICE

2,387,380

DEVICE FOR BENDING COIL CONVOLUTIONS

Walter A. Zahutnik, Gary, Ind., assignor to Carnegie-Illinois Steel Corporation, a corporation of New Jersey

Application July 15, 1943, Serial No. 494,844

2 Claims. (Cl. 153—32)

This invention relates to a device for bending the convolutions of coiled material and, particularly, to an improved device for straightening or bending the outer convolutions of a coil of continuous metallic strip material.

In the steel industry semi-processed metallic continuous strip is usually coiled and then transferred from one processing step to the next succeeding step, such as to cold rolling mills, levellers, etc. Upon the coiling of the strip, the metal, particularly heavy gage metal, the convolutions of the coil tend to acquire a permanent set. Accordingly, when the outer convolutions of a coil are forced or peeled back from the remainder of the coil in order to thread the leading edge of the strip into and between the rolls of the rolling mill or other processing units, great difficulty is encountered due to this permanent set in the convolutions.

Heretofore, the leading edge and outer convolution of a coil were straightened so as to facilitate the feeding or threading of the leading edge of the strip into the rolling mill or other processing unit by stripping or peeling back the outer convolution or wrap of the coil and bending it back over a timber disposed on the floor in front of the mill. One or more workmen would then jump up and down on the coil set in the convolution so as to remove the same so as to straighten the end of the strip. It will be seen that such a practice was not only dangerous to the workmen, as oftentimes they slipped on the greasy strip and fell, but was tedious and oftentimes ineffective. Also, such a practice consumed considerable time and oftentimes delayed production.

Accordingly, it is the general object of the present invention to provide an improved device or apparatus for removing the coil set from the convolutions of metallic strip material which is simple and inexpensive in its construction, and, at the same time, efficient, safe and effective in its use thereby eliminating the above mentioned disadvantages.

It is another object of the invention to provide an improved device or apparatus for removing the coil set from the convolutions of metallic strip material which may be used on various widths of strip, and, at the same time, a device which is portable so that it can be easily and conveniently incorporated with any processing unit.

It is a further object of this invention to provide an improved device for removing the coil set from the outer convolutions of a coil of metallic strip material by bending the strip in a direction opposite that from the set in the convolution so as to bend or corrugate the same at spaced intervals from the leading edge of the strip thereby tending to straighten the same.

Various other objects and advantages of this invention will be more apparent in the course of the following specification and will be particularly pointed out in the appended claims.

In the accompanying drawings there is shown, for the purpose of illustration, one embodiment and a modification thereof which my invention may assume in practice.

In these drawings:

Figure 1 is a schematic view of the improved strip bending device of my invention;

Figure 2 is a plan view of the central portion of my improved device showing the position the strip assumes therein while being bent;

Figure 3 is a vertical sectional view through substantially the center of my device showing how it may be positioned with respect to a rolling mill;

Figure 4 is a sectional view similar to Figure 3 showing the strip being bent by the device of my invention;

Figure 5 is an end elevational view of a coil of strip material showing how the leading end of the strip is bent by the device of the present invention;

Figure 6 is a plan view showing a modified strip gripping means in accordance with my invention;

Figure 7 is a front elevational view of Figure 6;

Figure 8 is a sectional view taken on line VIII—VIII of Figure 6;

Figure 9 is a sectional view taken on line IX—IX of Figure 7; and

Figure 10 is a sectional view taken on line X—X of Figure 7.

Referring more particularly to Figures 1 through 4 of the drawings, the improved device of my invention comprises a pair of spaced apart shafts **2** with the end of each of these shafts suitably journaled in bearings **3**, which are suitably attached to a base or frame (not shown). Adjacent each end of each of the shafts **2**, there are arranged thereon threaded portions **4** which are disposed directly opposite each other. There is provided a pair of yoke-like crosshead members **5** with the arm portions thereof having an interiorly threaded hole **6** arranged in each end thereof which cooperate with the threaded portions **4** of the shafts **2** for a purpose hereinafter to be described. In the upper end of each of the crossheads **5**, there is suitably journaled in bearings carried thereby, a stud shaft **7**, and on the

outer end of each of the shafts 7, there is securely arranged a gear 8. On the inner end of each of the shafts 7, there is securely arranged a chuck-like member 9 with each having a slot 10 arranged transversely thereof and extending through the axis thereof.

Below the shafts 7 and centrally of the shafts 2, there is arranged another shaft 12 which is suitably journaled in bearings 13, which are also attached to the base or frame with which the device is to be used. Intermediate the length of the shaft 12, there is securely arranged thereon two relatively wide pinion gears 14 with one arranged directly opposite each of the gears 8 on the shaft 7 with which they respectively mesh.

On one end of the shaft 12, there is arranged, preferably, a gear 15 which meshes with a pinion gear 16 mounted on the shaft 17 of a motor 18. At the opposite end of the shaft 12, there is arranged on one of the shafts 2 preferably, a sprocket wheel 19 having a chain 20 arranged thereover so as to be driven by a reversible motor 21 having a sprocket 22 arranged on the shaft thereof, over and around which the chain 20 is also disposed. Also adjacent that end of the shafts 2, there is arranged on each of them, in opposed relation, a sprocket 23 over and around which there is disposed a chain 24.

The improved device of my invention functions in the following manner. The coil C of metallic strip material which is adapted to be rolled, is positioned in the coil holding box and disposed on the driven blocker rolls 25 thereof, as shown in Figures 3 and 4 of the drawings. The leading end of the strip S is then peeled or moved from its position around the coil so as to be positioned between the slotted chucks 9 of the device of my invention with the extreme leading edge of the strip positioned at a point a short distance beyond the chucks 9. The motor 21 is then energized and it will be seen that both of the screws or shafts 2 will then be rotated through the action of the sprocket 19, the chains 20 and 24, and the sprockets 23. Upon rotation of the shafts 2, it will be seen that each of the crossheads 5 will be moved either away or toward each other, due to the cooperation of the threaded portions 4 with the interiorly threaded holes 6 of the crossheads. In order to obtain such a result, it will be understood that the threaded portions 4 at one end of both of the shafts 2 are righthanded and those on the other end are lefthanded. In the present instance, the motor 21, being reversible, is energized so that the crossheads 5 are moved toward each other. When the crossheads move toward each other and toward the edges of the strip S positioned therebetween, it will be understood that the chucks 9 are positioned angularly so that the opposed edges of the strip pass into the slots 10 thereof, as shown in Figure 2 of the drawings. After the crossheads have been moved sufficiently toward each other so that the edges of the strip S fit well into the slots 10 of the chucks 9, and so as to abut the bottom of the slots, the motor 21 is deenergized and the shafts 2 arrested from further rotative movement. It will be understood that each of the chucks 9 are sufficiently long and the slots 10 therein sufficiently deep so that the chucks will straddle the greater portion of the strip in a transverse direction, so that any bending action thereby on the strip S will be effective throughout the width thereof instead of merely along the edges of the strip which might happen if the chucks had a relatively shallow slot arranged therein. In such an event, a shallow slot would merely crimp the edges of the strip, particularly of light gage stock, and would not effectively bend the same through the width thereof.

After the strip S has been positioned between the chucks 9 and properly arranged in the slots 10 therein, as shown in Figures 2 and 3 of the drawings, the shaft 12 is set in motion so as to rotate both of the shafts 7 and the chucks 9 carried thereby, in a direction opposite to that of the coil set in the convolution of the strip through the action of gears 14 and 8 and the chucks 9 will grip the edges of the strip, as shown in Figure 4. It will be understood that the pinion gears 14 are of sufficient width so that the gears 8 carried by the shaft 7 will mesh at all times therewith throughout the travel of the crossheads 5 along the shafts 2. The shaft 12 is preferably rotated by means of the motor 18 through the action of gears 15 and 16, but it will be understood that this shaft is merely rotated enough to bend the strip so as to provide a corrugation therein. In other words, all that is needed to bend the strip is a more or less kicking action which may be provided by rotating the shaft 12, manually, or by means of a pneumatic cylinder.

After the strip has been bent transversely of the same at a point near the leading edge thereof, if it is again desired to bend or corrugate the strip at another point therealong, the motor 18 is deenergized and the strip S is pulled through the slots 10 of the chucks 9 so that the chucks 9 are positioned at the edges of the strip where it is desired to corrugate or bend the strip transversely of the same at a spaced distance from the first corrugation or bend formed therein. Each succeeding bend or corrugation in the strip is performed in a like manner so as to provide the leading edge of the strip with a series of spaced apart corrugations thereby tending to straighten the same, as shown in Figure 5 of the drawings.

After the strip has been sufficiently bent and the desired number of corrugations formed therein and the desired length of strip has been straightened, the motor 21 is energized so as to travel in a reverse direction from its initial operation so that the shafts 2 rotate in the opposite direction. Upon such rotation, it will be seen that the crossheads 5 move away from each other and, consequently, the chucks 9 also move away from each other and eventually disengage from the opposed edges of the strip. It will then be seen that the leading end of the strip can be easily and conveniently threaded between the rolls 26 of the rolling mill 27 for further processing, as shown in the broken lines of Figure 3 of the drawings.

In Figures 6 through 10 of the drawings, there is shown a slight modification of the device of my invention. In this construction there is likewise provided a pair of opposed chuck-like rotatable members 28 similar to chucks 9 and which are mounted in a similar manner. Each of the chuck-like members 28 has a transverse slot 29 extending through the axis thereof. There is arranged in the outer periphery of each of the chuck-like members 28 at diametrically opposed points, preferably, a pair of keyway-like slots 30 which extend longitudinally of the chuck-like members parallel to the axis thereof. Between each of the chuck-like members 28, there is disposed a pair of transversely extending members 31 with each having a key-like end 32 arranged

on each end thereof which fits into the keyway-like slot **30** of the chuck-like members **28** with one disposed on each side of the chuck-like members in opposed relation with each other. The transverse members **31** are held in engagement with the chuck-like members **28**, preferably, by means of studs or cap screws **33** which are disposed through holes **34** arranged through the key-like ends **32** on each end of the transverse members **31**. By providing such construction, it will be seen that there is a continuous slot arranged from the inner end of one chuck-like member **28** and extending between the transverse members **31** and into the opposite chuck-like member **28**, as shown in Figure 7 of the drawings. In such a construction, the strip is either threaded through the slots **29** of the chuck-like members **28** and between the transverse members **31** or the strip may be first positioned in the slots of the chuck-like members and then one or both of the transverse members **31** afterwards assembled in position on the chuck-like members so as to be disposed to either side of the strip S. One of the advantages of the modified construction is that the strip is grasped throughout the entire width thereof so as to insure bending or corrugating the strip across the full width thereof, and so as to prevent displacement of the opposed edges of the strip from the slots in the chuck-like members. It will be understood that this modified construction functions together with the other parts of my improved device in substantially the same manner as the preferred construction to bend or corrugate the strip.

As a result of my invention, it will be seen that there is provided a device for removing the coil set from convolutions which can be made portable so that it can be quickly and conveniently incorporated and used with existing strip processing equipment. It will also be seen that my improved device effectively bends or corrugates the strip tending to straighten the same in a minimum length of time with the elimination of any danger to the operator or other workmen.

While I have shown and described one embodiment of my invention and a modification thereof, it will be understood that these embodiments are merely for the purpose of illustration and description and that various other forms may be devised within the scope of my invention, as defined in the appended claims.

I claim:

1. A device for removing the coil set from the convolutions of a coil of metallic strip, comprising two spaced parallel rods having opposed screw-threaded portions at both ends thereof, a pair of crossheads having screw-threaded openings therethrough mounted on said spaced rods one at each end thereof, in engagement with said threaded portions and adapted to be moved inwardly or outwardly by rotating said rods, a shaft rotatably mounted in each of said crossheads, chuck members having slots therein at the inner ends thereof mounted on the inner end of each of said shafts, a ring gear mounted on the outer end of each of said shafts, a shaft having a pair of spaced elongated gears thereon in engagement with said first mentioned gears, means for rotating said rods to move said chucks inwardly to engage the opposite sides of strip material and means for rotating said last mentioned shaft to partially rotate said chuck members in a direction opposite that from the set in the coil convolution so as to bend or corrugate the strip thereby tending to straighten the same.

2. A device for removing the coil set from the convolutions of a coil of metallic strip, comprising two spaced parallel rods having opposed screw-threaded portions at both ends thereof, a pair of substantially V-shaped crossheads having screw-threaded openings therethrough mounted on said spaced rods one at each end thereof, in engagement with said threaded portions and adapted to be moved inwardly or outwardly by rotating said rods, a shaft rotatably mounted in each of said crossheads, chuck members having slots therein at the inner ends thereof mounted on the inner end of each of said shafts, a ring gear mounted on the outer end of each of said shafts, a shaft having a pair of spaced elongated gears thereon in engagement with said first mentioned gears, means for rotating said rods to move said chucks inwardly to engage the opposite sides of strip material and means for rotating said last mentioned shaft to partially rotate said chuck members in a direction opposite that from the set in the coil convolution so as to bend or corrugate the strip thereby tending to straighten the same.

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