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PATENTED JUNE 19, 1906.

W. F. CONKLIN.

METHOD OF FINISHING AND STRAIGHTENING FLAT METAL STRAPS.

APPLICATION FILED AUG 14, 1905.

3 SHEETS—SHEET 1.

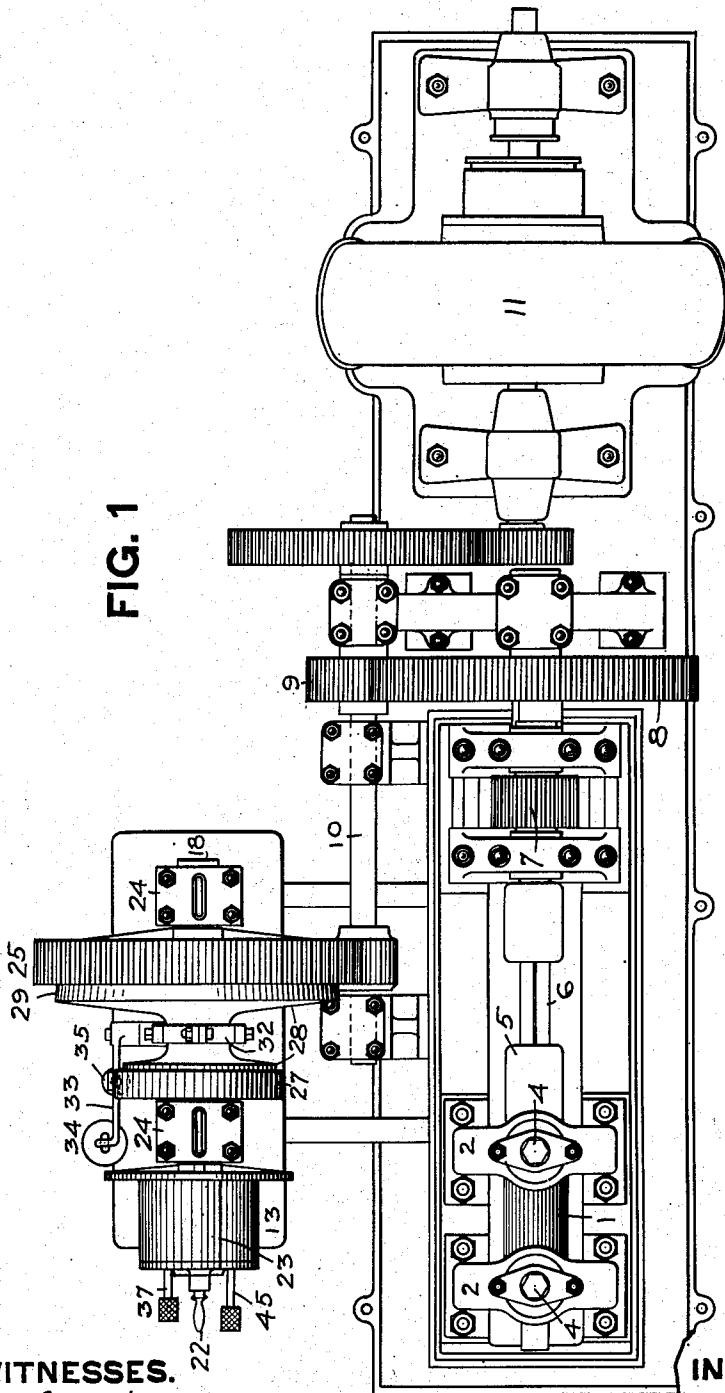


FIG. 1

WITNESSES.

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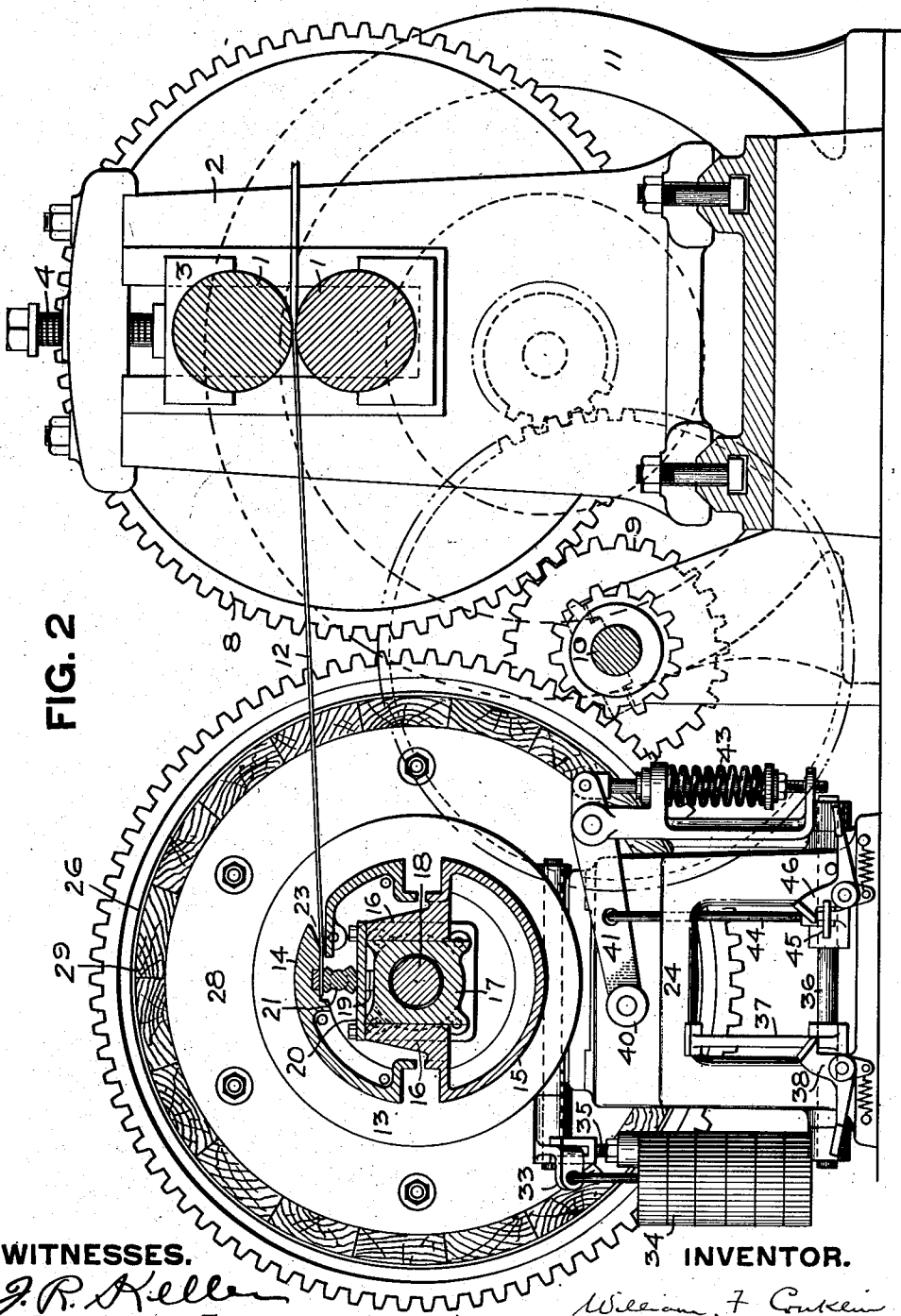
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3 SHEETS—SHEET 2.

FIG. 2



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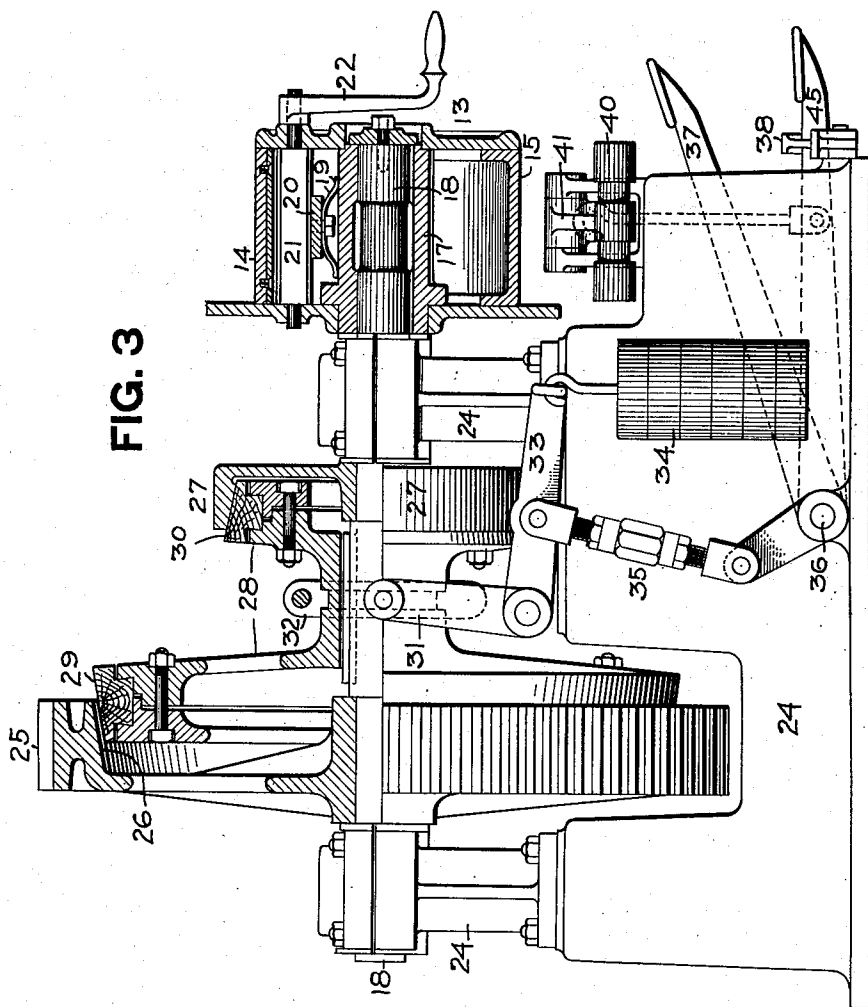
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

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METHOD OF FINISHING AND STRAIGHTENING FLAT METAL STRAPS.

No. 823,766.

Specification of Letters Patent.

Patented June 19, 1906.

Application filed August 14, 1905. Serial No. 274,081.

To all whom it may concern:

Be it known that I, WILLIAM F. CONKLIN, a resident of Leechburg, in the county of Armstrong and State of Pennsylvania, have invented a new and useful Improvement in Methods of Finishing and Straightening Flat Metal Strips; and I do hereby declare the following to be a full, clear, and exact description thereof.

This invention relates to a method of finishing and straightening metal in the form of flat strips; and the object is to provide a method whereby the straightening may be done simultaneously and progressively with the finishing.

In the manufacture of metal strips or bands, and especially those which are to be used for purposes requiring the metal to have an accurate gage and smooth face, it is the practice to finish by passing the same cold through rolls which reduce it to gage and finish the surface of the same. With all products of this character which can be strictly termed "strips" or "bands"—that is, which are so narrow that they cannot be termed "sheets"—one difficulty in finishing is due to the curvatures, kinks, or waves imparted to the strip by the finishing-rolls. This is due either to the fact that the strip as it comes from the hot mill is thicker on one edge than on the other or that the finishing-rolls cannot be held accurately adjusted. Frequently one journal-bearing will be lower than the other, thus reducing the strip more at one edge than the other, which results in curving the strip sidewise—that is, in the direction of the edge of the strip—or it frequently happens that the bearings of the rolls have a slight rocking movement, thus giving the strips a waved form. After giving the finishing reduction to such strips it is necessary to straighten the same. Heretofore this has been done either by attaching the two ends of the strip to suitable mechanism whereby it can be stretched or by passing the strip under tension over a drum or series of drums, or when the strips are very narrow by passing them through what is known as a "wire-straightener." These strips generally are several hundred feet in length, so that the first manner of straightening the same requires a very long mill-floor and all manners necessitate comparatively expensive ma-

chinery and a considerable amount of labor and time.

My method has for its object to overcome these objections to former methods of straightening metal strips or bands; and it consists, generally stated, in stretching the strip or band simultaneously and progressively with the finishing thereof, this being accomplished by winding the same on a smooth-faced cylindrical drum which is driven at a somewhat-higher rate of speed than the reducing-rolls, so as to put that portion of the strip or band between the drum and the rolls for its entire width and length under sufficient tension to straighten the same uniformly. The invention also consists in other features, such as driving the reel yieldingly, so as not to put undue strain on the strip or band.

In the accompanying drawings I have illustrated machinery suitable for carrying out my method. Figure 1 is a diagrammatic plan view of such machinery. Fig. 2 is a side elevation of the same, showing portions thereof in section; and Fig. 3 is an end view of the drum and its driving mechanism, showing the parts thereof in vertical section.

The reducing-rolls are shown at 1, these being mounted in suitable housings 2 and adjusted therein by means of the bearings 3 and screws 4. These rolls will be provided with suitable faces for finishing the strip or band and will be driven in any suitable way, the drawings showing coupling members 5, connecting the necks of the rolls with shaft-sections 6, which are connected by the pinions 7, and one thereof being provided with a gear 8, meshing with a pinion 9 on the power-driven shaft 10. The latter may be driven by any suitable means, the drawings showing an electric motor 11 geared thereto.

The strip or band being finished is shown at 12. After being reduced by the rolls 1 it will be coiled under sufficient tension to stretch the same sufficiently to remove any bends, curves, or waves that may be formed therein due to the action of the rolls 1. This coiling preferably will be done upon a suitable reel or drum. In the drawings I have illustrated an expansible drum 13, provided with a smooth outer face and preferably formed in sections, so that it can be collapsed to permit the withdrawal of the coil therefrom. This

drum may be of various constructions and provided with any suitable means for connecting the end of the strip thereto. As shown, the body thereof is formed in two sections 14 and 15, the former of which is rigid or stationary with reference to the heads of the drum, while the latter is movable with reference thereto, being provided with guide-arms 16, fitting over a hub portion 17, secured to the shaft 18. A spring 19, located between the hub member 17 and a cross-bar 20, carried by the section 15, serves to collapse the reel, while a cam 21, mounted in the drum-heads and bearing against the inner face of the stationary section 14 and the cross member 20, serves to expand said reel. This cam is provided with a suitable handle or crank 22 outside of the reel for turning the same. The section 14 is provided with a slot 23 to permit the end of the strip to pass into the same, and the latter is gripped by means of the cam 21, as clearly shown in Fig. 3. This reel or drum may be driven by any suitable mechanism. Preferably, however, it will be yieldingly driven, so as to prevent placing undue strain on the strip. A suitable friction-clutch is the best manner of securing this result. As shown in the drawings, the shaft 18 is mounted in a suitable frame or housing 24, and mounted loosely thereupon is a wheel 25, which may be driven from any suitable source of power, such as from the power-driven shaft 10. This wheel is provided with a clutch-face 26. Fixed to the frame 24 is a stationary clutch member 27. Splined to the shaft 18 between the wheel 25 and clutch member 27 is the sliding clutch member 28, this having a face 29, adapted to cooperate with the face 26 on the wheel 25 and with another face 30, adapted to cooperate with the stationary clutch member 27. The clutch 28 can be moved on the shaft 18 to engage the same with either the wheel 25 or stationary clutch member 27. For this purpose I have illustrated a forked lever 31 engaging a yoke 32 on said clutch member. The lever 31 is provided with an arm 33, carrying a weight 34, which acts to hold the clutch normally in engagement with the stationary clutch member 27, thus holding the reel or drum stationary. In order to rotate the drum, I provide adjustable toggle-links 35, one of which is connected to the lever-arm 33 and the other of which is fixed to a rock-shaft 36, mounted in the base of the frame 24. Secured to this rock-shaft is a suitable lever or treadle 37, by means of which the toggle-links can be straightened so as to throw the clutch-face 29 into engagement with the clutch-face on the wheel 25, thus driving the drum with said wheel. A suitable spring-latch 38 is provided for locking the treadle in position to hold the clutch member 28 in engagement with the wheel 25. As soon as the latch 38 is released from the lever 37 the weight 34

will throw the clutch member 28 into engagement with the stationary clutch member 27, thus quickly stopping the drum.

It is desirable to apply compressive force to the strip while being wound on the drum 13. For this purpose I have illustrated a roller 40 mounted on the end of a lever 41, which has connected thereto a spring 43, which acts to hold the roller tightly against the drum 13. To withdraw said roller, a link or rod 44 is connected to the lever 41 and to a treadle 45. A spring-actuated latch 46 is provided for locking this treadle so as to hold the roller 40 out of contact with the drum. The drum will also be provided with suitable means for holding it in proper position to receive the end of the strip and also with means for tying or clamping the coil before removal from the reel; but as these are not necessary elements of my method I have neither described nor illustrated the same.

In carrying out my invention by the apparatus described the strip or band in a cold state is fed to the rolls 1 and the end thereof then connected to the drum 13. The latter is rotated at a speed somewhat greater than the feed of the rolls 1, so that that portion of the strip between the reel and the rolls is stretched sufficiently tight to reduce any curvatures, bends, or waves in the strip. This stretching and reeling continues progressively during the reducing of the strip, so that by the time the strip is finished by the rolls 1 it will also be straightened and coiled on the reel. During the winding of the strip the roller 40 compresses the successive layers firmly one upon the other, so that the strip will be entirely free from any kinks or waves, but will merely have a gradual and uniform curvature due to its winding. Said roller also prevents the strip from springing and uncoiling when the end thereof leaves the rolls 1. Should the resistance of the material in the rolls be such as to reduce the feed thereof, the friction driving mechanism for the drum will permit the latter to yield or slow down, so that the strip will not be subjected to undue strains.

By the method described the strips are straightened simultaneously with the reduction and finishing thereof, thus doing away entirely with the complicated mechanisms heretofore necessary and also greatly reducing the time and labor incident to the straightening thereof.

What I claim is—

1. The method of finishing and straightening flat metal strips, which consists in giving to the same a finishing reduction, and coiling or winding the finished strip at such a rate of speed as to stretch the portion between the coil and the finishing device.

2. The method of finishing and straightening flat metal strips, which consists in giving the same, while cold, a finishing compression, and simultaneously therewith coiling or wind-

ing the finished strip at such a rate of speed as to stretch the portion between the coil and the finishing device.

3. The method of finishing and straightening flat metal strips, which consists in giving to the same a finishing reduction, and coiling or winding the finished strip with a yielding pull at such a rate of speed as to stretch the portion between the coil and the finishing device.

4. The method of finishing and straightening metal strips, which consists in passing the same through finishing-rolls and coiling or winding the finished strip or band at such a

rate of speed as to stretch the portion between the coil and the rolls.

5. The method of finishing and straightening metal strips, which consists in rolling the same while cold to finish the same, and simultaneously therewith winding or coiling the finished portion at such a rate of speed as to stretch the same and with a yielding pull.

In testimony whereof I, the said WILLIAM F. CONKLIN, have hereunto set my hand.

WM. F. CONKLIN.

Witnesses:

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ROBERT C. TOTTEN.