

June 8, 1937.

E. T. LORIG

2,083,518

METHOD OF PREPARING METAL STRIP

Filed June 8, 1934

3 Sheets-Sheet 1

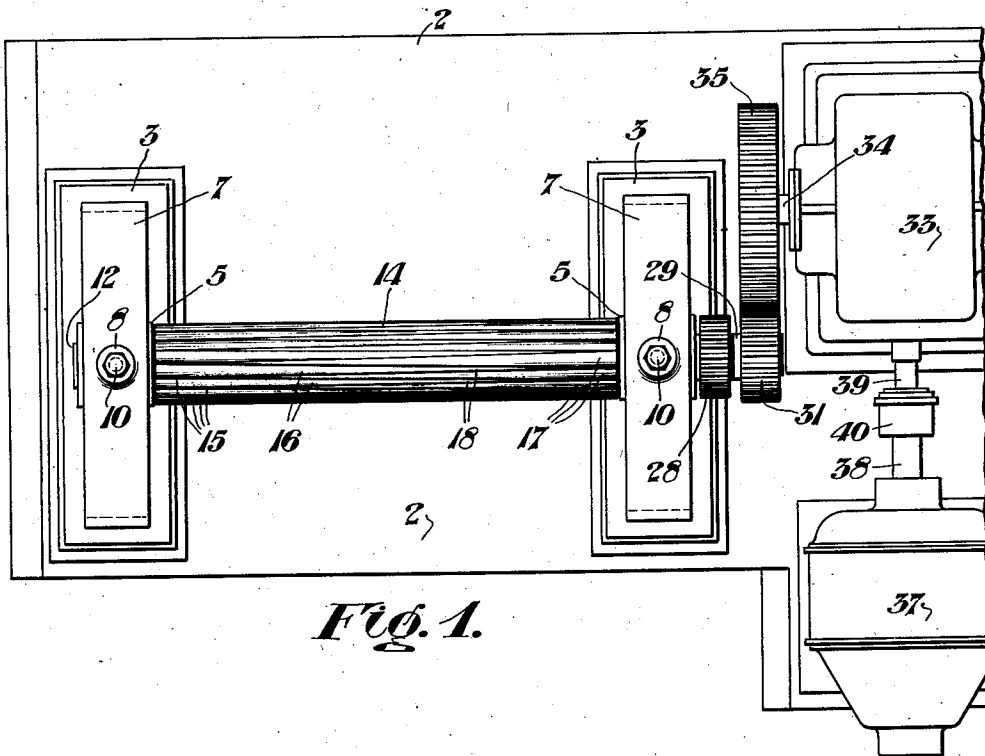


Fig. 1.

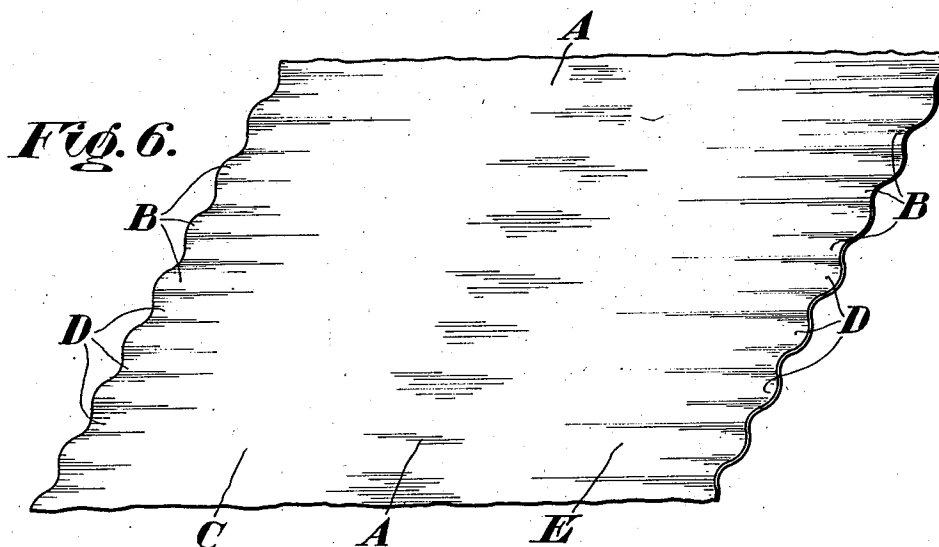


Fig. 6.

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3 Sheets-Sheet 3

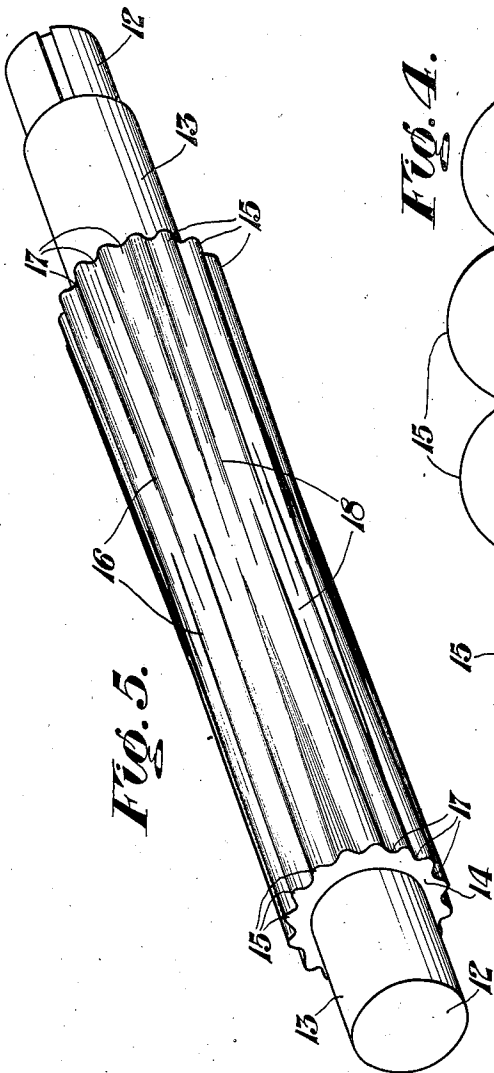
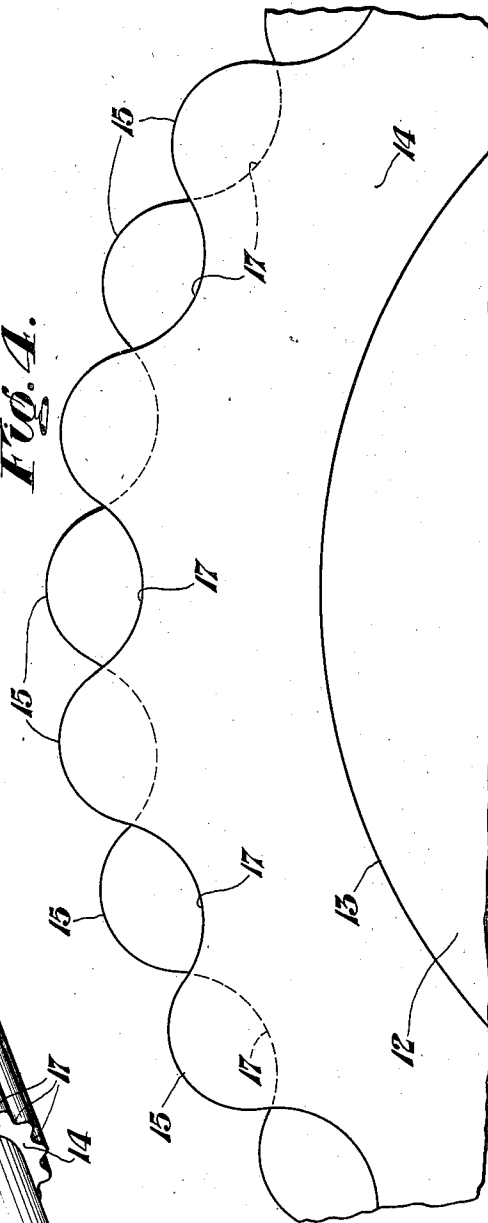


Fig. 4.



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UNITED STATES PATENT OFFICE

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METHOD OF PREPARING METAL STRIP

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4 Claims. (Cl. 153—7)

This invention relates to an improved method of preparing metal strip prior to immersing the same in a liquid, such as a pickling solution, although not limited thereto.

ing stains, unpickled areas, and surface defects, as previously mentioned.

A further object is the provision of a novel method of preparing metal strip in such manner as to permit its being coiled and efficiently pickled in existing types of small pickling vats, such as are now being used for pickling sheet metal in short lengths.

These and still further objects will be apparent after referring to the drawings, in which:

Figure 1 is a plan of the apparatus of the invention.

Figure 2 is an elevation of the apparatus of Figure 1.

Figure 3 is an end elevation.

Figure 4 is an enlarged fragmentary elevation of a detail.

Figure 5 is an enlarged perspective of one of the novel corrugated rolls of the invention.

Figure 6 is a perspective view of the article obtained by the use of the novel apparatus.

Referring more particularly to the drawings, the numeral 2 designates a bed on which the apparatus of the invention is mounted. Roll housings 3 are disposed upon the bed 2 and provided with the usual bearing apertures 4. An upper and lower bearing assembly 5 and 6, respectively, is disposed in each of the bearing apertures 4. A top plate 7 is mounted on top of each side of each housing 3, and each plate provided with a cage 8 in which there is disposed a spring 9. An adjusting screw 10 is screw-threaded in each of the cages 8 for adjustably compressing the spring 9 to maintain the bearing assemblies 5 and 6 in the proper resilient relationship. A roll 12 having necks 13 is provided with an enlarged central body portion 14 which is corrugated in such manner as to provide protuberances 15 which taper, as at 16, toward its center. Between the various protuberances 15 there are indentations 17 which taper inwardly toward the center of the roll, as at 18. The various protuberances and indentations 15 and 17, respectively, are alternately opposed on each of the edges of the body 14 of the roll 12, which has its necks 13 journaled in the upper bearing assemblies 5.

A roll 20 is provided with necks 21 which are antifrictionally journaled in the lower bearing assemblies 6 in the bearing apertures 4 of the housings 3. The roll 20 is provided with an enlarged central body portion 22 having protuberances 23 on its surface which are identical with the protuberances 15 on the body portion 14 of the roll 12. These protuberances 23 taper in-

It has been the practice in the past to remove hot mill scale, and other impurities, from long lengths of metal strip by continuously pickling the same prior to subsequent processing operations, such as cold reducing. One way of accomplishing this was by coiling the strip as it comes from the hot mill, transferring it to a remote part of the mill, uncoiling it, and slowly running it as a single length through an extremely long shallow tank filled with pickling acid.

The pickled strip was then run slowly through an extremely long rinsing tank, after which it was dried and recoiled. Such a procedure necessitates not only a high initial equipment cost, but the apparatus necessarily occupies a large area of floor space. Coils of metal strip of this type often weigh several tons and are from one to nine hundred feet in length, the width being considerably above thirty inches.

Their transportation is necessarily a troublesome matter, and the cost of pickling, rinsing, drying and recoiling the same is very great. It has been proposed to pickle small coils of strip, which weigh only a few hundred pounds, by inserting "spacer pins" between the convolutions thereof and to immerse them as a unit into the pickling acid. This method has however, not met with much success, due to the fact that the "spacer pins" often dropped out, thus permitting adjacent convolutions of the metal strip to make contact, causing pickle stains or "black spots". In addition, these "spacer pins" often dropped between the convolutions further toward the middle of the coil and affected the surface of the metal by marks and dents. Even if these "spacer pins" were attached in such manner as not to drop between the convolutions of the coiled strip, they leave stains or marks where they make contact with the metal, due to the fact that they must be of considerable length in order to be of any value.

One object of the present invention is the provision of a novel method of preparing metal strip in such manner as to permit its uniform and economical pickling, thus doing away with expensive pickling equipment which occupies large areas of floor space.

Another object is the provision of a novel method of the class described which entirely eliminates the use of "spacer pins", thus avoid-

wardly toward the center of the body 22, as shown at 24. An indentation between each of the protuberances 23 tapers toward the center of the body 22, as shown at 25. The protuberances 23 and indentations 25 on the edges of the body 22 are alternately opposed with respect to each other.

A gear 28 is secured to one of the necks 13 of the upper roll 12 while the adjacent neck 21 of the lower roll 20 is provided with an extension 29 to which there is secured a gear 30. The gears 28 and 30 are secured to the necks 13 and 21, respectively, in such manner as to provide for the interlocking of their various protuberances 15 and indentations 15 and 23, and 17 and 25, of the rolls 12 and 20 respectively. A gear 31 is also secured to the extension 29 on the neck 21 of the roll 20. A gear reduction unit 33 is mounted on the bed 2 adjacent the gear 31 and 20 is provided with a driven shaft 34 to which there is secured a gear 35 which is in mesh therewith. A motor 37 is mounted on the bed 2 and provided with the usual drive shaft 38 which is in alignment with the driving shaft 39 of the gear reduction unit 33, and is connected thereto as by means of a coupling 40.

The strip to be prepared, which is indicated at A, is passed between the bodies 14 and 22 of the rolls 12 and 20, respectively, and is corrugated in such manner as to provide protuberances B which taper toward the center thereof as shown at C, while alternately disposed on either edge of the strip A indentations D are formed which taper inwardly as at E. These protuberances and indentations D and E, respectively, permit the strip A when coiled to have its various convolutions assembled in such manner as to permit only the contact of the indentations D at both of its side edges, thus permitting free circulation of the pickling acid in which the coil is to be immersed.

Due to the very small points of contact between its various convolutions, the coiled strip A may be efficiently and economically pickled in existing types of small pickling vats, which are both inexpensive and occupy but small areas of floor space in the mill.

While I have shown and described one specific

embodiment of my invention, it will be understood that I do not wish to be limited exactly thereto, since various modifications may be made without departing from the scope of my invention, as defined in the following claims.

I claim:

1. The method of preparing a metal strip for subsequent immersion in liquids which includes corrugating substantial lengths of the same, thereby producing raised sections at the extreme edges thereof, coiling said strip, and maintaining only the raised sections at the extreme edges of adjacent convolutions in contact therebetween.

2. The method of preparing a metal strip for subsequent immersion in liquids which includes corrugating substantial lengths of the same, thereby producing alternate and opposite protuberances and depressions, the protuberances on one side of said strip gradually approaching the depressions on the other side thereof at substantially the center of said strip, coiling said corrugated strip and maintaining only the protuberances of adjacent convolutions in contact.

3. The method of preparing a metal strip for subsequent immersion in liquids which includes corrugating a substantial length of the same, thereby producing raised sections at the extreme edges thereof, said corrugated metal strip being undeformed except for said corrugations in a plane transverse to its longitudinal axis, and coiling said strip with only the raised sections at the extreme edges of its adjacent convolutions in contact therebetween.

4. The method of preparing a metal strip for subsequent immersion in liquids which includes corrugating a substantial length of the same, thereby producing alternate and opposite protuberances and depressions, the protuberances on one side of said strip gradually approaching the depressions on the other side thereof at substantially the center of said strip, said corrugated metal strip being undeformed except for said corrugations in a plane transverse to its longitudinal axis, and coiling said strip with only the protuberances of its adjacent convolutions in contact.

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