June 8, 1937. E. T. LORIG 2,083,517

METHOD OF TREATING COILED MATERIAL

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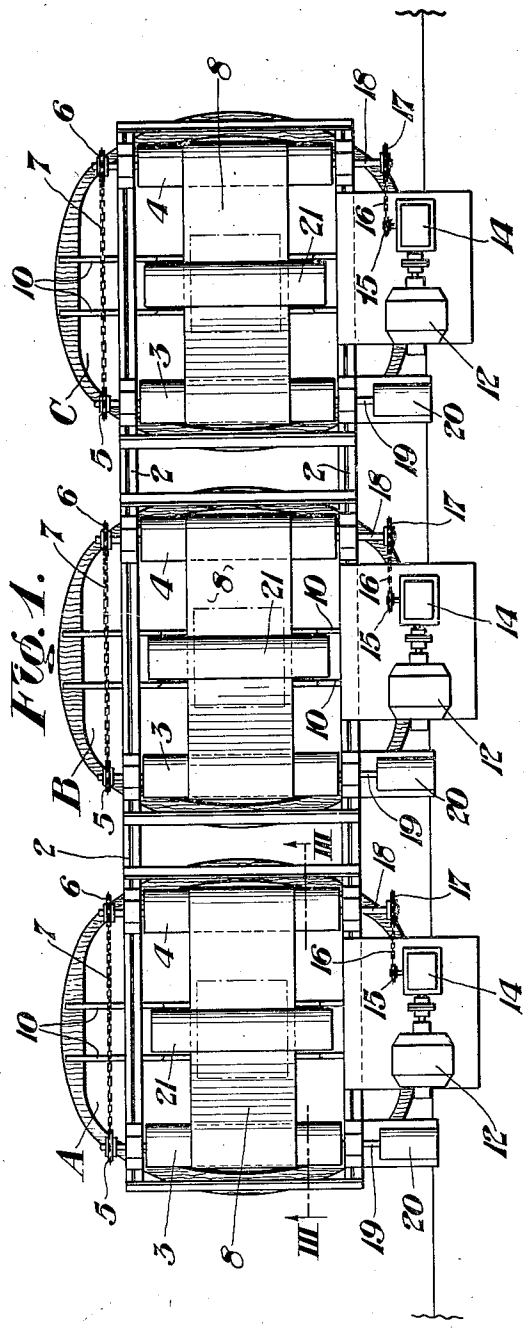


Fig. 1.

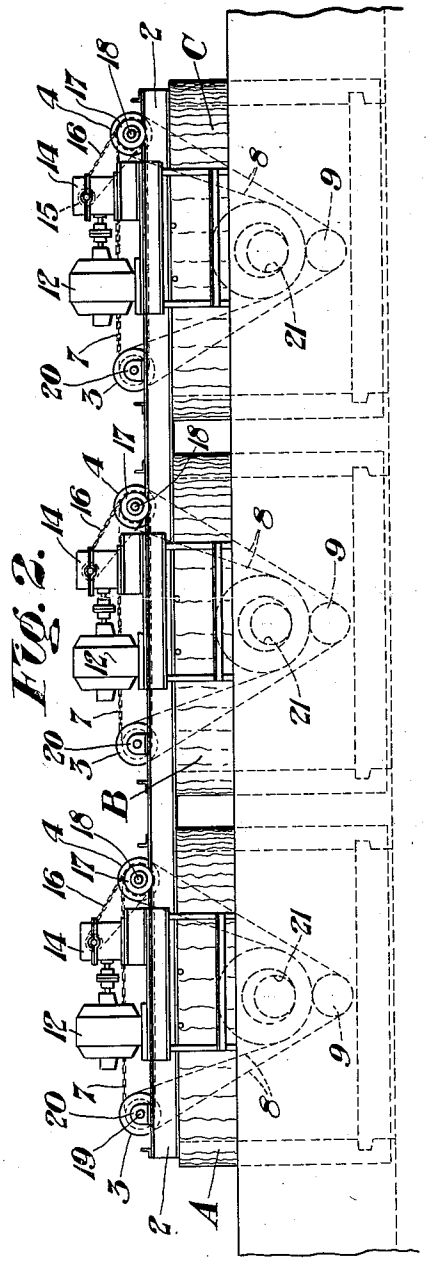


Fig. 2.

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Fig. 3.

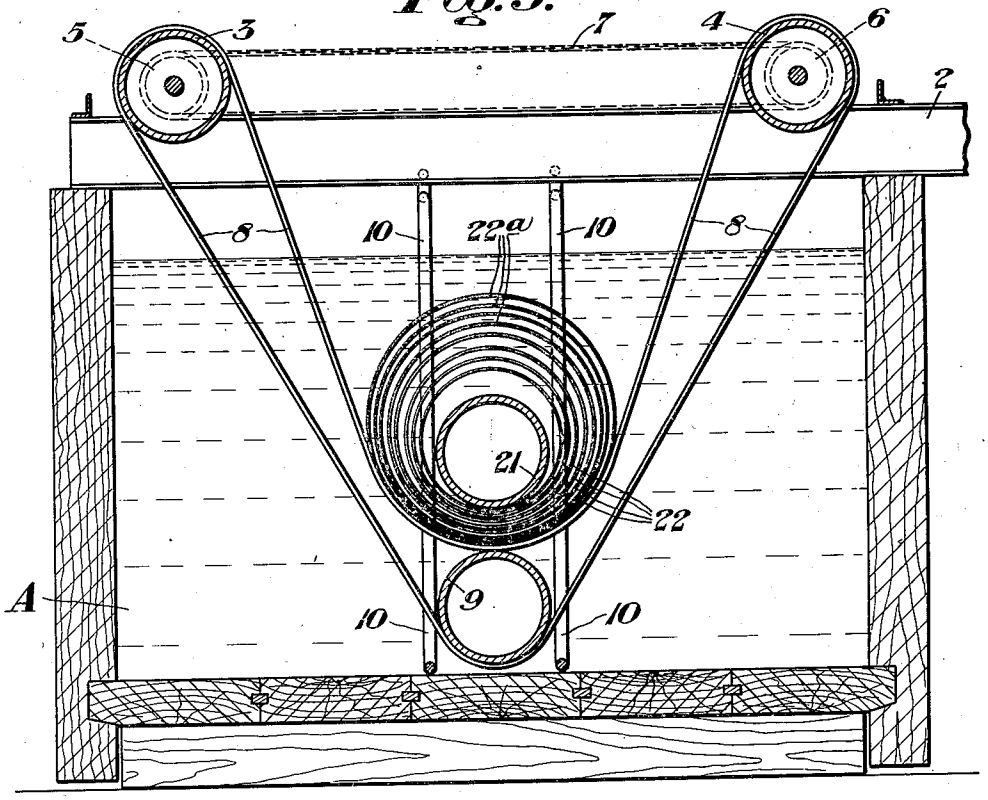
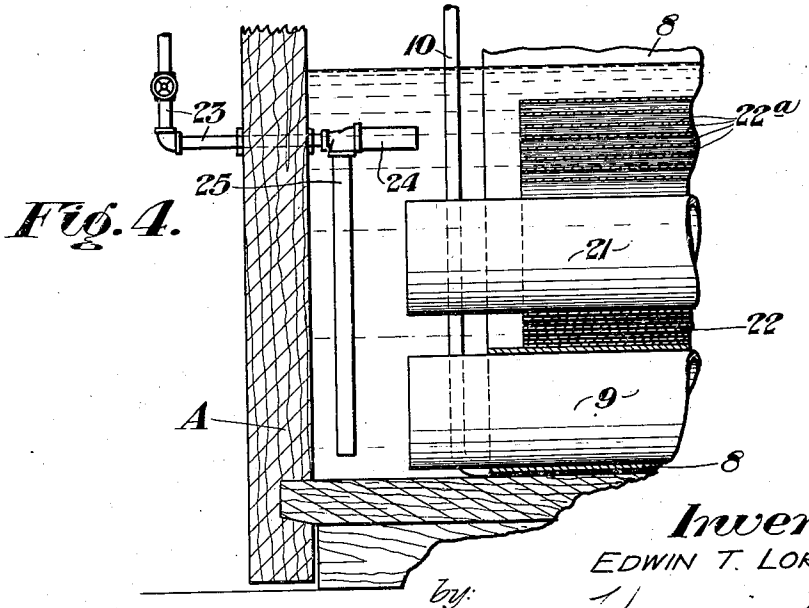


Fig. 4.



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METHOD OF TREATING COILED MATERIAL

Edwin T. Lorig, Gary, Ind., assignor to American Sheet and Tin Plate Company, a corporation of New Jersey

Application February 19, 1934, Serial No. 712,088

1 Claim. (Cl. 148—8)

This invention relates to a method of treating coiled material, and more particularly to the pickling, washing and oiling of coiled metal strip, although not limited thereto.

In the manufacture of coiled metallic strip, for numerous commercial purposes, billets are greatly reduced by first rolling in a strip mill until it has acquired a very substantial length, usually over several hundred feet. The long strip material is then coiled and conveyed to a plurality of greatly elongated vats wherein they are unrolled and made to travel through pickling, washing and oiling solutions.

The step of pickling being a very important one, and therefore not to be dispensed with, considerable trouble must be taken and a great deal of time consumed in the handling incident to the uncoiling, treating and recoiling of the material prior to its introduction to subsequent processing apparatus; for instance, a cold reduction unit, wherein it acquires a finished surface.

One object of the present invention is the provision of a novel method of pickling, washing and oiling coiled material in such manner as to obviate the necessity of uncoiling it.

Another object is to provide a novel method and apparatus of the class described which provides for pickling coiled material without the necessity of uncoiling it and immersing it in the usual greatly elongated and remotely situated vats, and the incidental troublesome transportation thereto and therefrom.

These and 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 a side elevation thereof.

Figure 3 is a sectional view on the line III—III of Fig. 1.

Figure 4 is a fragmentary sectional view of a modified form of the invention.

Referring more particularly to the drawings, the letters A, B, and C designate vats containing pickling, washing and oiling solutions, respectively.

A pair of continuous rails 2 are made to extend across upper and open ends of the vats A, B, and C and in spaced relationship.

Each of the vats A, B, and C is provided with a pair of rolls 3 and 4 which are journaled transversely of the rails 2. The rolls 3 and 4 are each provided on their ends with a sprocket 5 and 6, respectively, which are connected together by means of a chain 7. An endless belt 8 is passed around each of the rolls 3 and 4 and made to extend down into the vats A, B, and C. A roll 9 is disposed between each of the endless belts 8 in contact with its inner surfaces and held against lateral movement by means of guides 10 on either side of the vats.

In practice, the rolls 9 maintain the belt 8 relatively taut, but out of contact with the bottoms of the vats.

A motor 12 is mounted on the upper end of each of the vats A, B, and C and drives a gear reduction unit 14, having a driven sprocket 15, and a chain 16 which drives a sprocket 17 on an extension 18 on the roll 4.

The roll 3 is similarly extended, as at 19, and provided with any of the well known types of limit and reversing switches generally indicated at 20 for reversing the direction of rotation of the shaft of the motor 12.

A hollow mandrel, or pipe 21, having coiled thereon numerous relatively loose convolutions of strip material, as at 22, is lowered into the vat A with its ends disposed intermediate the guides 10 until the lower convolutions of the coiled material are in contact with the upper and outer surface of the endless belt 8.

Due to the loose winding of the strip material 22 on the mandrel, or pipe 21, and the fact that it rests against the upper surface of the endless belt 8, which in turn rests on the roll 9, the upper, or remote, convolutions of the coiled strip material will expand, or "open" in such manner as to become out of contact with the next adjacent convolutions, as represented in the drawings at 22^a. Thus, the upper convolutions of the coil are radially and progressively separated by virtue of its lower portion being held in close confinement on the major portion of the lower half of its periphery by the endless belt 8.

In operation, a suitable overhead conveying means is utilized to bring the mandrel 21 and coiled strip 22, over the pickling vat A.

The mandrel 21 is lowered with its ends between the guides 10 until the coil rests upon the upper portion of the endless belt 8, which permits of the coil being completely submerged in the pickling solution. The motor 12 is operated in such manner as to rotate the roll 4 which will, in turn, cause movement of the endless belt 8 and the consequent rotation of the coil 22. This will cause successive portions of its surfaces to be exposed to the pickling solution. This operation is continued until the shaft 19 on the roll 3 causes the limit switch 20 to stop, and the commencement of the reverse direction of rotation of the shaft of the motor 12. The operation is

then continued until the coil is completely pickled.

After pickling, the overhead conveyer mentioned is utilized to remove the mandrel 21 and its coil to the adjacent washing and oiling vats B and C, respectively, where the same type of apparatus causes the coil to rotate in the manner described with the consequent complete treatment of the entire surfaces of the strip by the various liquids.

After the coil is thoroughly oiled in the vat C, it is removed in a condition to be subsequently processed to a finished surface.

Referring to Figure 4 of the drawings, there is disclosed a modified form of the invention for assisting the complete circulation of the liquids of the various vats through the areas between the convolutions of the coils. In practicing this form of the invention, a suitable pressure medium, such as compressed air, is introduced through a pipe 23 to a discharge nozzle 24 which is disposed beneath the surface of the liquid in the vat and closely adjacent the upper and separated edges of the coils in such manner as to be in alinement therewith. A tube 25 is connected to the nozzle 24 to supply it with liquid.

While I have disclosed several specific embodiments of my invention, it will be understood that I do not wish to be limited thereto, since various modifications may be developed by those skilled in the art without departing from the scope of my invention, as defined in the appended claim.

I claim:

The method of treating a loose coil of metal with a liquid which includes the steps of immersing the coil entirely in a body of treating liquid, applying directly opposed confining mechanical pressures from the interior and exterior of said coil to confine a relatively small area of the convolutions of said coil between said pressures, positively rotating said coil to continually bring successive areas between said confining pressures while permitting the convolutions of the areas moving from between said confining pressures to expand and separate one from the other due to the inherent resiliency of the coiled metal, whereby the treating liquid is forced to wash over the surfaces of the convolutions of coiled metal by the movement of the convolutions of the coiled metal toward and away from each other.

EDWIN T. LORIG.