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METHOD OF AND APPARATUS FOR TREATING METAL.

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1,412,979. Patented Apr. 18, 1922.

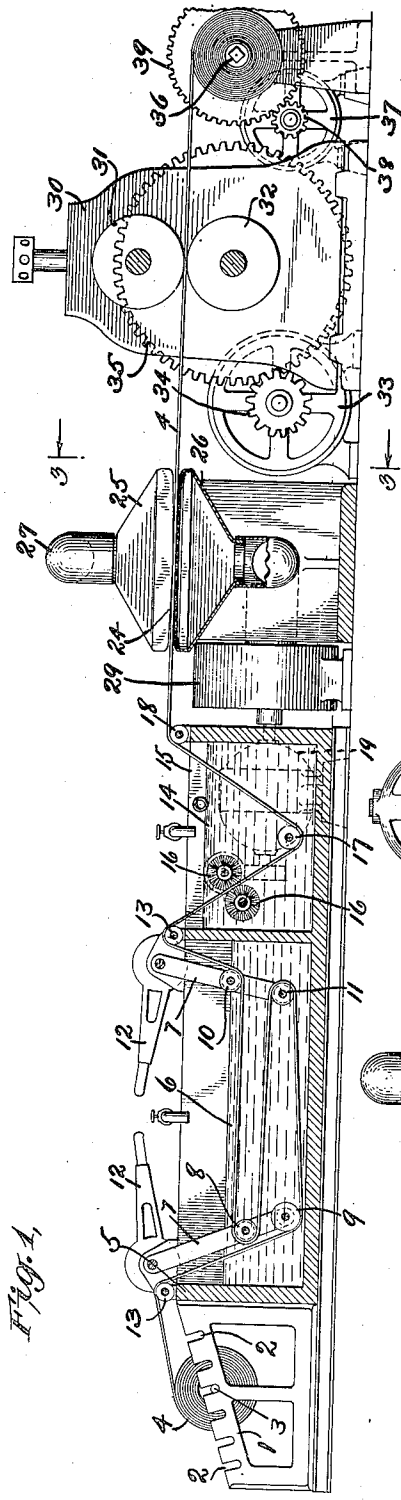


Fig. 1.

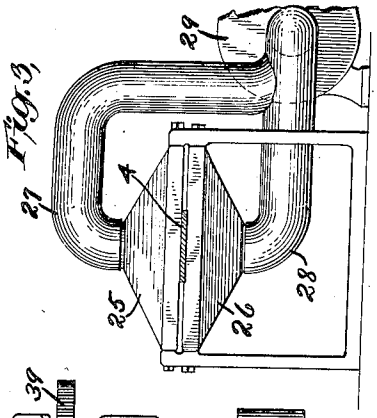


Fig. 3.

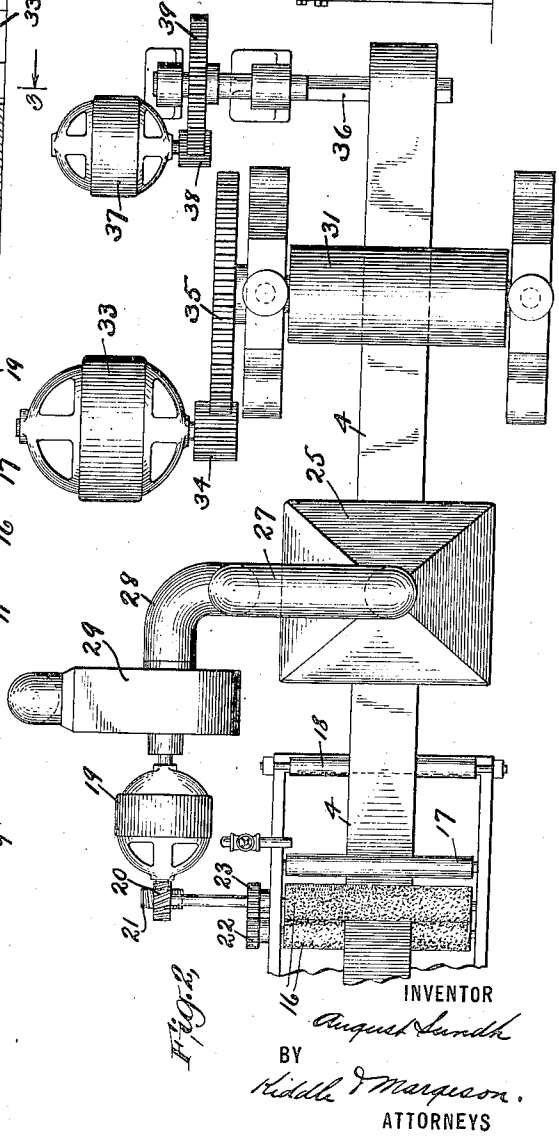


Fig. 2.

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METHOD OF AND APPARATUS FOR TREATING METAL.

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To all whom it may concern:

Be it known that I, AUGUST SUNDH, a citizen of the United States, and a resident of Hastings-upon-Hudson, Westchester County, State of New York, have invented certain new and useful Improvements in Methods of and Apparatus for Treating Metal, of which the following is a specification.

This invention relates to an improved method of and apparatus for treating metal strips more specifically, although the apparatus is adapted for treating strips of other material as well as for treating metal in forms other than strips.

In general, I have provided an apparatus wherein a metal strip, for example, may be passed through a pickling tank wherein the strip is subjected to the action of a pickle to loosen the scale thereon which has accumulated upon the strip during the annealing operation, the strip then passing through a washing unit wherein it is subjected to the combined action of water and scrubbing brushes, the strip being then passed through a device wherein and whereby the strip is subjected to the action of a vacuum to remove the moisture which has accumulated upon the strip, the strip finally passing through a rolling mill if desired to reduce it to the proper thickness, and thereafter being rolled up into a coil or roll.

By the use of my improved apparatus metal strips particularly may be cleaned very rapidly and thoroughly and without necessitating handling of the strip by hand. In addition means have been provided whereby the metal which may be in the pickling tank may be removed therefrom should it be desired to stop the operation of the machine for any length of time, without necessitating the use of hooks or without it being necessary for the workman to handle the strip by hand.

Another object of my invention is to provide an apparatus wherein the strip of metal or other material is wound up upon a winding drum which is driven by an electric motor of the series type in order that the increased load upon the motor as the virtual diameter of the coil of strip upon the winding drum increases, may cause the drum to automatically slow down so as to maintain the tension on the strip of metal or other material being operated upon to remain practically constant.

In the drawings accompanying this application,—

Fig. 1 shows my improved apparatus in sectional elevation;

Fig. 2 is a plan view of the apparatus for washing the strip, the apparatus for subjecting the strip to a vacuum, the mill for reducing the thickness of the strip and the winding drum; and

Fig. 3 is an elevation taken at the line 3—3 of Fig. 1;

Referring to the drawings in detail, 1 designates a supporting frame provided with slots 2 for receiving a mandrel or mandrels 3 upon which the metal 4 being treated is coiled. 5 designates a pickling tank containing pickle 6 for loosening the scale and dirt upon the strip or strips 4. Supported at each end of the pickling tank 5 are arms 7, a pair at each end, which arms support rollers 8, 9, 10 and 11 about which the strip 4 passes as it traverses the tank. The levers 12 are adapted to raise the arms 7 and the rollers carried thereby as well as the strip traversing the pickling tank at any time out of the pickle if it be desired to shut the machine down for any reason whatsoever. At each end of the pickling tank I provide rollers 13 over which the strip 4 passes in travelling to the tank and in passing out of the tank. Adjacent the end of the pickling tank I provide a washing tank 15 containing water 14 and a pair of scrubbing brushes 16 between which the strip 4 passes in going through the machine. Below the level of the water 14, I provide a roll or rolls 17 about which the strip passes. The discharge end of this washing tank carries a roller 18 about which the strip passes as it moves forward to the next step in the operation of the machine. The brushes 16 just mentioned are driven by an electric motor 19 operatively connected thereto by a worm and worm wheel 20 and 21, the brushes being geared to each other by gears 22 and 23.

The strip 4 after passing from the washing tank is passed through a vacuum clean-

ing device 24 comprising upper and lower vacuum elements 25 and 26. The vacuum cleaning device is connected by pipes 27 and 28 to an exhauster 29 which is driven by the motor 19 already referred to and it will be apparent that as the strip 4 passes between the upper and lower elements 25 and 26 of the vacuum cleaning device the water and moisture carried by the strip will be removed therefrom by the action of the vacuum so that as the strip emerges from the vacuum cleaning device it will be thoroughly dried. The strip then passes to a rolling mill designated 30 comprising upper and lower rolls 31 and 32 respectively. This mill is driven by a motor through a gear train 34 and 35.

The strip after passing through the rolling mill 30 and being reduced to the desired thickness is wound upon a winding drum or block 36 driven by a series wound motor 37 connected to the drum or block 36 by a gear train comprising the gears 38 and 39.

In operation a coil of metal 4 is placed upon the supporting frame 1 and the machine threaded, the strip passing from the coil upon the frame 1 over the roller 13 at the left-hand end of the pickling tank of Fig. 1 downwardly under the rollers 9 and 11 around the roller 11 and back through the pickle in the pickling tank to and around the roller 8, back through the pickle again and around the roller 10. The strip is then led upwardly around the roller 13 at the right hand end of the pickling tank as viewed in Fig. 1 and into the washing tank 15. It will be understood, of course, that the brushes 16 at this time are being rotated by the motor 19 and the strip is led between the brushes which are submerged in the water 14, downwardly around the roller 17 adjacent the bottom of the washing tank and then upwardly around the roller 18 at the discharge end of the tank. The strip, it will be seen, in passing through the pickling tank is caused by the rollers 8, 9, 10 and 11 to traverse the pickle several times in order that the scale and dirt upon the strip may be thoroughly loosened and that when the strip passes into the washing tank and is subjected to the action of the brushes 16 and the water 14 therein, the strip will be thoroughly cleaned.

When the strip passes from the washing unit into the vacuum cleaning device 24 between the elements 25 and 26 thereof, it is subjected to the action of the vacuum created by the exhauster 29 so as to remove all moisture from the strip resulting in the strip passing to the rolling mill 30 in a thoroughly dried condition. The strip leaving the rolling mill is wound upon the drum or block 36 and as the virtual diameter of the strip from this drum increases the drum will be automatically slowed down due to the fact that the motor 37 is of the series wound type, so that the tension on the strip, no matter what the virtual diameter of the roll of metal upon the drum 36, will remain practically constant.

What is claimed is:

1. The method of treating metal which consists in pickling and washing the same, drying, rolling, and finally winding in a coil.

2. The method of treating metal which consists in pickling and washing the same, then subjecting the metal to a vacuum to dry the same, thereafter passing the dried metal through a mill to reduce the thickness of the metal, and finally winding the metal in a coil.

3. In an apparatus for treating metal, the combination of pickling and washing means for receiving the metal to clean the same, a vacuum apparatus for receiving the metal after the same has been cleaned to remove moisture from the metal, and a drum or block for winding the dried metal in a coil.

4. In an apparatus for treating metal, the combination of means for pickling and washing metal, a vacuum apparatus for drying the metal, a rolling mill for receiving the dried metal and for reducing the thickness of the same, and a drum for winding the metal in a coil as it comes from the rolling mill.

5. In an apparatus for treating metal, the combination of means for pickling and washing the metal, a vacuum apparatus for drying the metal, a rolling mill for receiving the metal from the vacuum apparatus and for reducing the metal, a winding drum for receiving the metal from the rolling mill and for coiling it up, and a series wound motor for driving said winding drum.

6. In an apparatus for treating metal, the combination of means for cleaning metal, means for drying the metal, said last-named means being in position to receive the metal as it comes from the cleaning means, a rolling mill for receiving the metal from the drying means, a drum for receiving the metal from the rolling mill and winding it into a coil, and means for driving said winding drum, said last-named means being automatically operable to maintain the tension on the metal as it comes from the rolling mill practically constant.

7. In an apparatus for treating metal, the combination of means for cleaning and drying the metal, a winding drum for winding the metal after being so treated into a coil, and means for driving said drum, said means being automatically operable to maintain the tension on the metal practically constant.

8. In an apparatus for treating metal, the combination of means for cleaning and drying metal, means for winding the metal into a coil, and a series wound motor for driving

said last-named means, said motor operating automatically to maintain the tension on the metal practically constant.

9. The method of treating a metal strip which method consists in cleaning the strip and thereafter passing the same through a vacuum apparatus to dry the strip.

10. In an apparatus for treating metal, the combination of brushes for scrubbing the metal, a vacuum apparatus for receiving the metal after it has been operated upon by said brushes, said vacuum apparatus comprising an exhauster and a motor for driving said exhauster and said brushes.

11. In an apparatus for treating metal strips, the combination of means for cleaning the strips, and a plurality of means adapted to receive the strips after the same have been cleaned and to subject the entire strip to the action of a vacuum to dry the same.

12. In an apparatus for treating metal strips, the combination of means for cleaning the strip comprising a tank for washing liquid through which the strip is drawn and a pair of brushes in said tank between which the strip is drawn, a vacuum apparatus through which the strip is drawn after it has been cleaned and washed, said vacuum apparatus subjecting both sides of the strip to a vacuum to dry the same, an exhauster operatively connected to said vacuum apparatus and a motor for driving said exhauster and brushes.

This specification signed this 3rd day of November, 1920.

AUGUST SUNDH.