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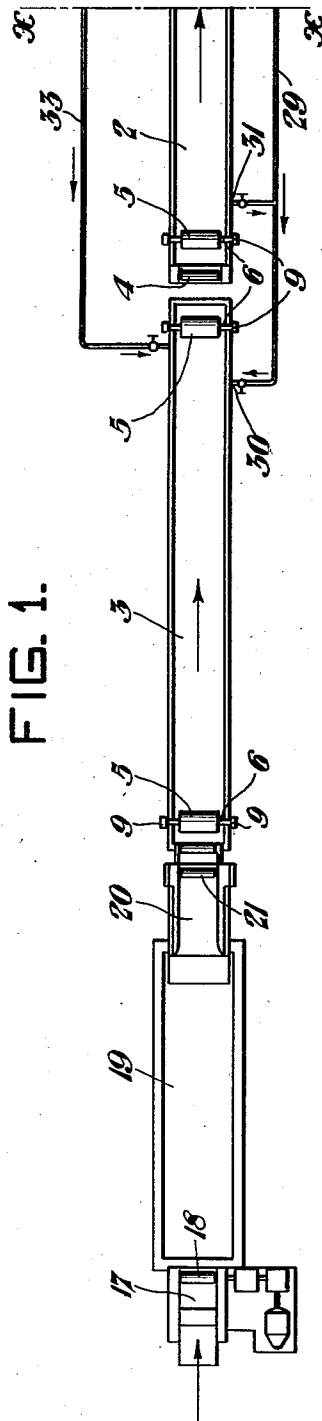
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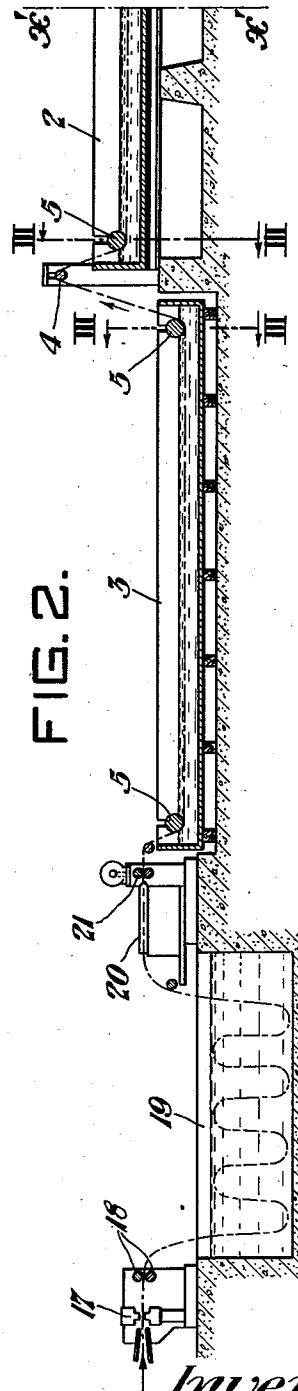
CONTINUOUS STRIP PICKLING METHOD AND APPARATUS

Filed Jan. 15, 1938

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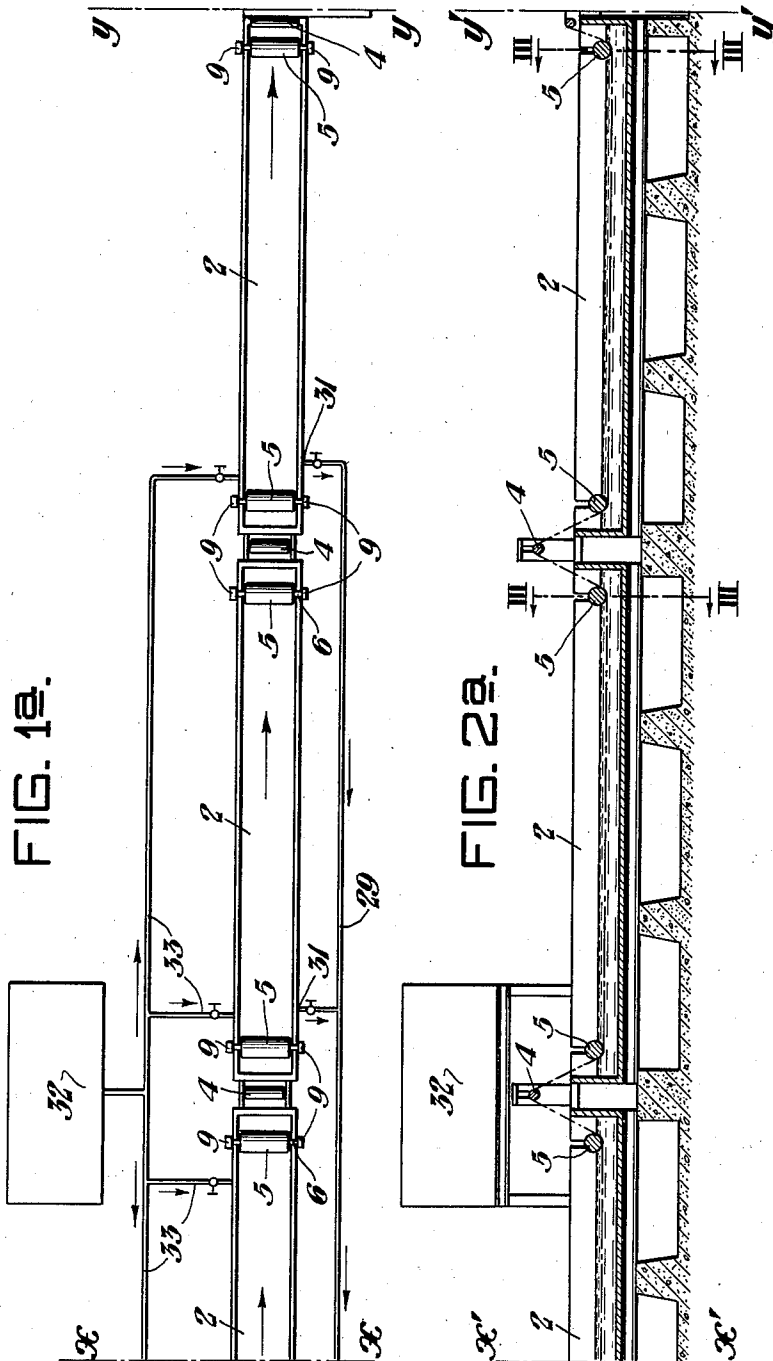
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CONTINUOUS STRIP PICKLING METHOD AND APPARATUS

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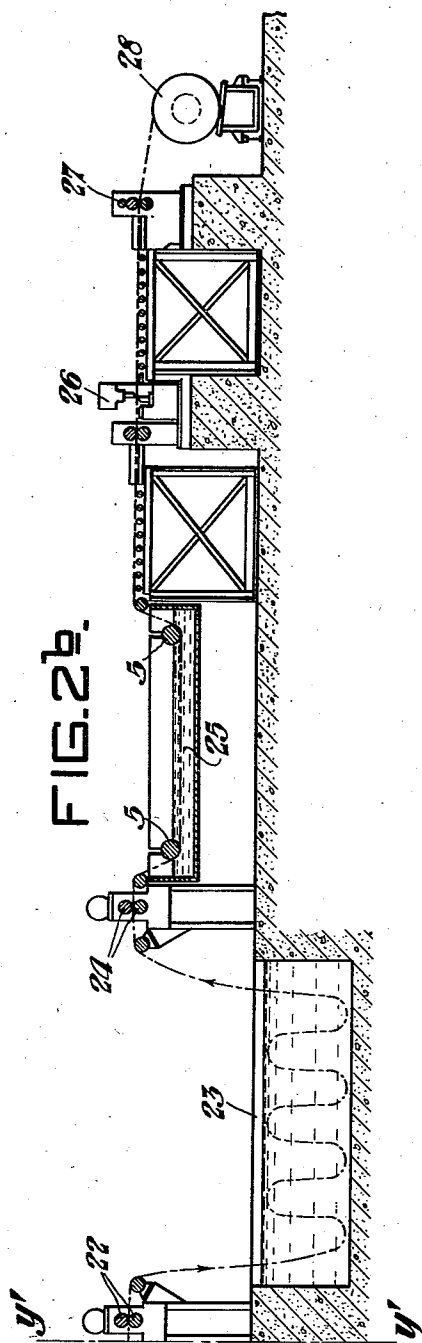
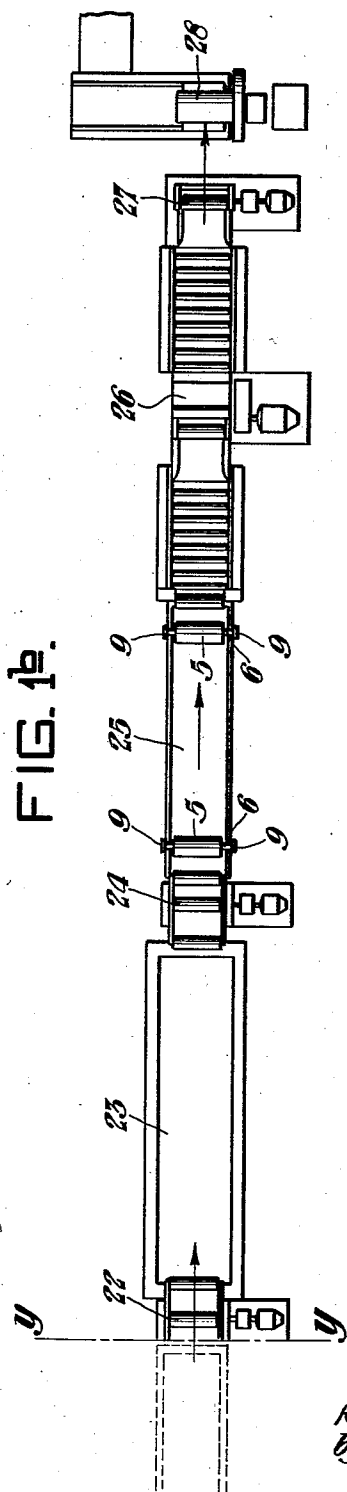
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CONTINUOUS STRIP PICKLING METHOD AND APPARATUS

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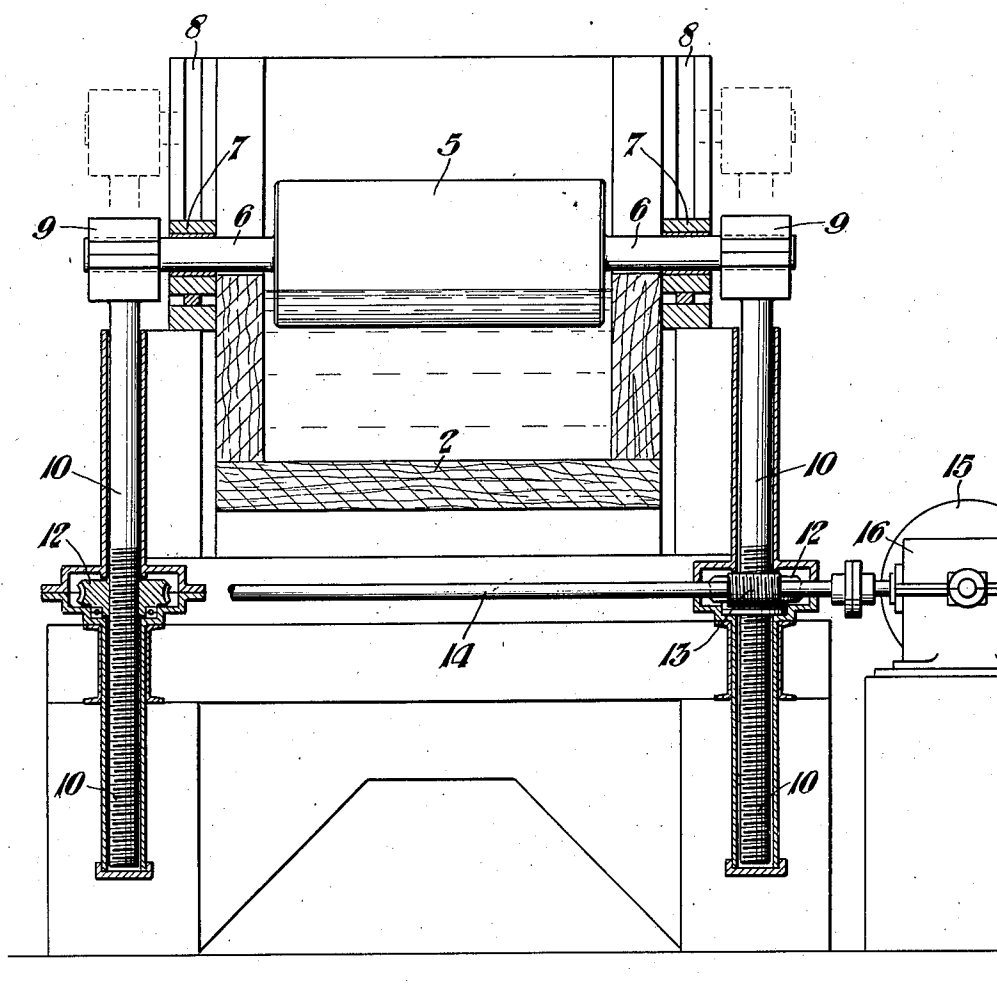
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CONTINUOUS STRIP PICKLING METHOD AND APPARATUS

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4 Sheets-Sheet 4

FIG. 3.



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UNITED STATES PATENT OFFICE

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CONTINUOUS STRIP PICKLING METHOD
AND APPARATUS

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Application January 15, 1938, Serial No. 185,209

5 Claims. (Cl. 148—8)

This invention relates to a method and apparatus for pickling continuous strip metal and, more particularly, to an improved method of recharging the pickling tanks with pickling solutions.

5 In pickling strip metal, it is usually the practice to provide a series of pickling tanks arranged in end-to-end relationship, each having a pickling solution therein of the proper acid concentration through which the strip metal is adapted to pass. 10 After these pickling solutions have been used for a while they become greatly reduced in their acid concentration and have to be replaced with fresh pickling solutions of the proper acid concentration. Heretofore, it has been the usual 15 practice to empty the used pickling solutions from each of the tanks, recharge the tanks with fresh water and acid to the proper acid concentration and heat the solution, usually by means of steam, to the desired temperature. This 20 method of recharging the tanks with a fresh solution and heating the same not only took an unreasonable amount of time, but the pickling of the strip would have to be suspended during the recharging which, of course, greatly reduced the 25 rate of pickling.

It is an object of this invention to provide a method of recharging each of the tanks used for pickling continuous strip metal with fresh pickling solutions without suspending pickling 30 operations.

It is another object of the invention to provide an apparatus for pickling continuous strip metal whereby the pickling solutions in each of the tanks can be easily and quickly changed and 35 replaced with pickling solutions of the proper acid concentration.

It is a further object of this invention to provide pickling tanks for pickling continuous strip metal which will keep the metal completely immersed in the solutions therein as it passes continuously therethrough. 40

Various other objects and advantages of my invention will more fully appear during the course of the following specification, and will be 45 particularly pointed out in the appended claims.

In the accompanying drawings I have shown, for the purpose of illustration, one embodiment which my invention may assume in practice.

In the drawings:

50 Figures 1, 1^a and 1^b together constitute a plan of the improved apparatus of my invention for pickling continuous strip metal;

Figures 2, 2^a and 2^b together constitute a side elevation of the same; and, 55

Figure 3 is a sectional view taken on the lines III—III of Figures 2 and 2^a.

There is shown in the drawings three pickling tanks 2 arranged substantially on the same level for holding suitable pickling solutions and a 5 fourth tank 3 arranged preferably at a lower level. These tanks are consecutively arranged in line in end-to-end relationship and have a guide or direction roll 4 positioned between each of them over which the strip is adapted to pass 10 as it moves from one tank to the other.

There is rotatably mounted in each of the tanks adjacent each end thereof adjustable hold-down rollers 5. These rollers are adapted to keep 15 the strip of metal immersed in the pickling solutions in the respective tanks as the strip passes therethrough. The shafts 6 of these rollers are rotatably mounted in bearing-like guide members 7 which are, in turn, movably mounted in suitable guideways 8 in the sides of the tanks. 20 The outer ends of the shafts of these rollers are mounted in bearing members 9 which are connected to the top end of each of the screws 10 arranged along the side of the tanks. There is disposed on each of the screws 10 a gear 12 which 25 is adapted to be driven by suitable worm-gears 13 mounted on drive shafts 14 which, in turn, are driven by a motor 15 through a transmission 16. These screws are adapted to raise and lower the rollers in the tanks through the above described mechanism. With such an arrangement these rollers can be adjusted relative to the height of the pickling solution in the tanks so as to keep the metal strip completely immersed in the pickling solutions as it passes therethrough, and 35 substantially the full length of the tank can be utilized for pickling. Also, with such an arrangement these rollers can be raised, if desired, a considerable distance above the solution to permit the strip to be brought out of the solution which is an advantage when pickling operations are to be suspended for any length of time.

At the entering end of the line of tanks there is preferably arranged a stitcher 17, stitcher pinch-rolls 18, a wet looper-pit 19, strip-guides 20, and a pair of power-driven pinch-rolls 21. At the delivering end of the line of tanks there is arranged preferably a pair of power-driven pinch-rolls 22, a wet looper-pit 23, another pair of power-driven pinch-rolls 24, a hot water strip 50 rinsing tank 25, a stitch-shear 26, an oiling unit 27 and a strip coiler 28.

The pinch-rolls 22 at the delivery end of the line of tanks pull the strip through the tanks, and the pinch-rolls 21 at the entering end of the 55

line of tanks produce a drag on the strip so as to keep the strip taut as it passes through each of the tanks. The wet looper-pit 23 at the delivering end takes the place of the conventional cold water rinse tank. Such a pit eliminates the stopping of the strip in the pickling tank and allows the continuous pickling of the strip while the stitch is being sheared from the strip.

There is arranged along one side of the line of tanks a drain line 29 which is connected to the used pickling solution tank 3 at 30 and to each of the tanks 2 at 31. This drain line 29 is preferably arranged so that it slopes from the tanks 2 toward the tanks 3. Preferably along the other side of the tanks there is arranged an elevated auxiliary water tank 32 which is connected to each of the tanks by means of a pipe line 33. This tank is used for preheating the water before it enters the pickling tanks. There is not shown any means for heating the water in the tank, but any suitable means may be employed.

When the acid concentration of the pickling solutions in the pickling tanks 2 is materially reduced and unfit for any appreciable amount of further use, the solution in each of these tanks is successively conveyed through the drain line 29 into the dump tank 3 and a fresh pickling solution made up successively in each of the tanks after they are emptied. With this arrangement the required number of pickling tanks, in this case three, would be available for use at all times, thus permitting continuous operation of the line without material loss in production, while a fresh pickling solution was being made successively in each of the tanks 2. The location of the dump tank 3 at a lower elevation than the other three and the drain line at a slope is advantageous in that it permits the used pickling solutions to flow from the tanks by gravity, thereby eliminating the need of pumps for handling the hot pickling solutions.

The auxiliary hot water tank is, of course, provided for heating the water prior to the dumping of a tank. With hot water available, a tank can be dumped and a fresh pickling solution mixed within a very short time.

While I have shown and described an embodiment of my invention, it will be understood that this embodiment is 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. Apparatus for pickling a continuous strip of metal including a plurality of pickling tanks through which the strip is adapted to pass, one of said tanks being positioned lower than the others, independently controlled means for conveying the waste pickling solution from each of said tanks to the lower positioned tank, a container for preheating the water, and means for

conveying said heated water from said container into each of said tanks to mix fresh pickling solutions therein.

2. Apparatus for pickling a continuous strip of metal including a number of pickling tanks having a pickling solution therein of the proper acid concentration for properly pickling said strip, an extra tank having a used pickling solution therein, means for moving the strip through all of said tanks, means for draining the used pickling solution from said last-mentioned tank, and independently controlled means for conveying the pickling solutions from each of said tanks when it is unfit for further use into said extra tank.

3. The method of changing the pickling solutions in a plurality of consecutively arranged pickling tanks for pickling continuous strip metal, each of said pickling tanks having a pickling solution therein of the proper acid concentration for properly pickling the strip as it continuously passes therethrough and an extra tank through which the strip also passes during the pickling thereof comprising emptying the used pickling solutions from each of the tanks, one at a time, into said extra tank, and recharging each of said pickling tanks successively with the pickling solution of the proper acid concentration while the strip is passing through each of the tanks and being pickled.

4. The method of changing the pickling solution in a plurality of consecutively arranged pickling tanks for pickling continuous strip metal with at least one of the tanks being positioned at a lower level than the others, comprising emptying the used pickling solution from each of said other tanks successively and independently into said lower tank by means of gravity and recharging each of the tanks successively within a fresh pickling solution of the proper acid concentration while the strip is being continuously pickled and moving therethrough.

5. The method of changing the pickling solution in a plurality of consecutively arranged pickling tanks for pickling continuous strip metal with at least one of the tanks being positioned at a lower level than the others, each of said higher positioned pickling tanks having initially disposed therein a pickling solution of the proper acid concentration for properly pickling the strip as it continuously passes therethrough comprising emptying the used pickling solution after it has fallen below the required acid concentration from each of said higher positioned tanks successively into said lower positioned pickling tank by means of gravity and recharging each of said higher positioned pickling tanks successively with a pickling solution of the proper acid concentration while the strip is passing continuously through all of the tanks and being pickled.

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