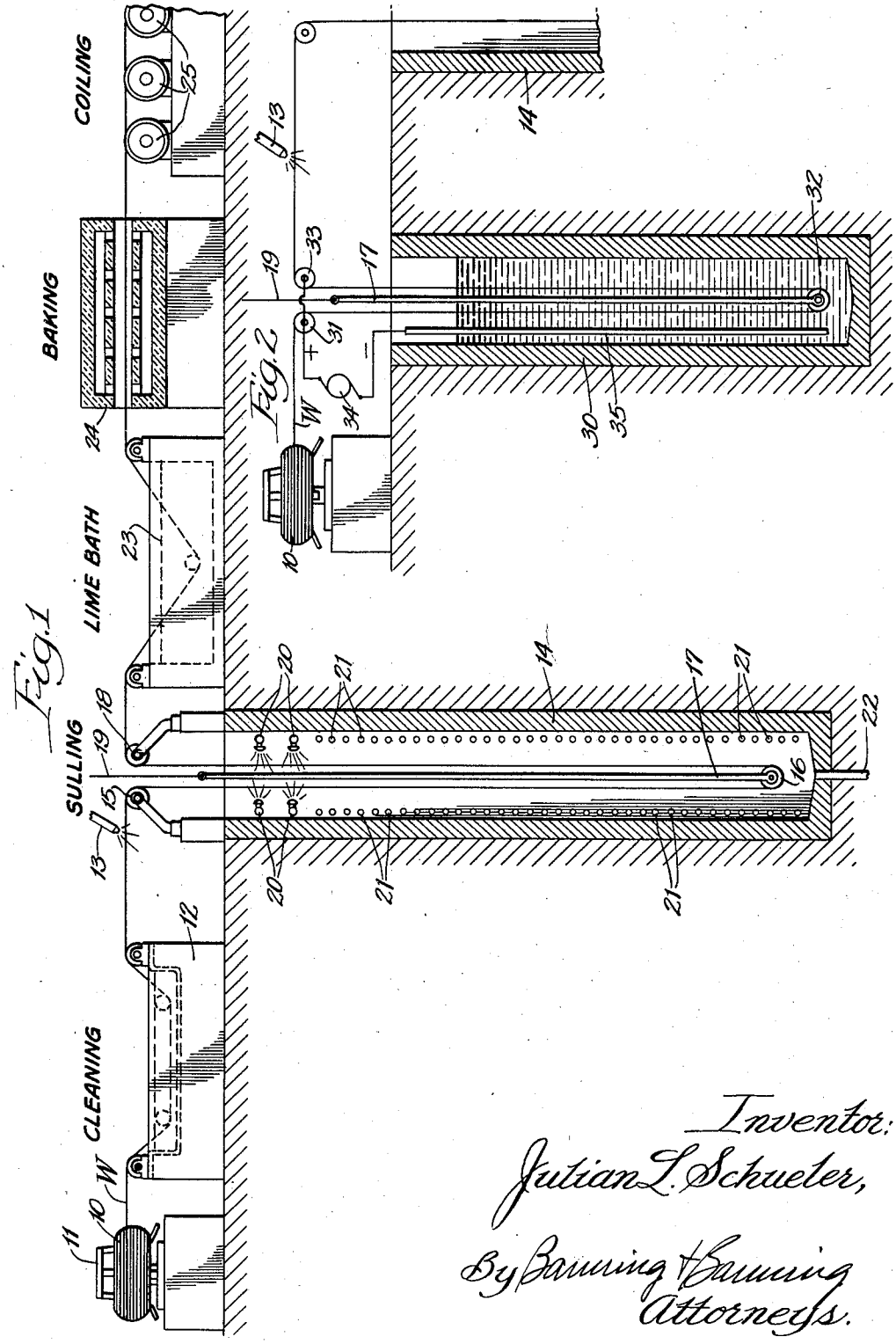
June 4, 1940. J. L. SCHUELER 2,203,063

METHOD OF TREATING AND COILING WIRE

Filed April 18, 1938



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Patented June 4, 1940 2,203,063

UNITED STATES PATENT OFFICE

2,203,063

METHOD OF TREATING AND COILING WIRE

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Application April 18, 1938, Serial No. 202,715

3 Claims. (Cl. 148—7)

An object of this invention is to provide an improved method of cleaning or pickling iron or steel rods or wire for the removal of scale acquired during a hot rolling process, and for sulling and/or lime coating the same, and for coiling the rods or wire thus treated, all as a continuous process applied to a strand, or preferably many parallel strands, of the wire running continuously through the apparatus. The word "wire" as used in the specification and claims is intended for convenience to include both rods and wire of all shapes and sizes which are subject to the processes disclosed therein.

Another object is the provision of means for varying the amount of pickling, sulling, liming or the like, applied to each wire individually while it travels at a uniform speed through the baths and other treating apparatus. It will be understood that while only a single strand of wire is shown, this process adapts itself advantageously to the use of a number of parallel strands of wire, each being drawn independently of the others through the various baths, or other treating apparatus.

These objects, as well as others which will hereinafter appear, are accomplished by this invention which is fully described in the following specification and shown in the accompanying drawing, in which—

Figure 1 is a diagrammatic view, partly in vertical section, showing my apparatus for cleaning, sulling, liming, baking and coiling rods or wires; and

Fig. 2 is a vertical section of a modified form of cleaning or pickling tank.

In Fig. 1 is shown one form of the apparatus in which a coil of rod 10 as received from a rod mill is placed on a reel 11 from which it is unreeled as a rod or wire W. It is then passed through a tank 12 containing a suitable cleaning liquid such as dilute sulphuric acid which removes the scale (iron oxide) acquired by the rod during the process of hot rolling in the rod mill. This acid while partly dissolving the scale removes it principally by the formation of hydrogen gas between the scale and the rod, thus operating to dislodge the scale mechanically. As the rod or wire leaves the cleaning tank, it is thoroughly washed by a spray or the like 13.

The tank 12 may contain any other suitable cleaning liquid such as a molten salt bath or it may be replaced by a mechanical etching system using grit, sand or other abrasive material applied to the wire with force as by means of an air blast or by centrifugal means.

If a sull coating is desired, the wire then passes to a sulling well 14 where a coat of "sull" i. e. iron rust is applied to act as a lubricant for later wire drawing operations. The thickness of this sull coat may vary from a slight green to a very dark brown depending on the use to which the wire is to be put. The sulling well which is preferably relatively deep and narrow is provided with a sheave 15 located near the top over which the wire passes, thence down to pass under a sheave 16 journaled at the bottom of a frame 17 and up over a sheave 18, thus completing a loop. The frame is suspended as by a rope 19 attached to a hoist or the like (not shown) by means of which the frame may be raised and lowered in the well at will to increase or decrease the length of wire exposed to the sulling action. Nozzles 20 serve to spray water or steam on the wire, and the well may be heated by steam pipes 21 thereby maintaining an atmosphere where sulling takes place rapidly. Any water collecting in the well passes out through the drain 22. It will be understood that sulling may be omitted for certain forms of continuous wire drawing machines.

As the wire leaves the sulling well, it may pass into a lime bath 23 where the wire acquires a coating of lime which acts as a lubricant to improve the drawing qualities of the wire and thence passes through a baking oven 24 which is highly heated by any well known means so as to bake the lime on the wire, preferably in a matter of seconds. Sal soda and other chemicals in solution may be substituted for the lime for certain purposes, and baking may sometimes be dispensed with.

After coating, the wire passes to one of the coiling machines 25 where it is again coiled for shipping or storage preliminary to drawing into wire of smaller gauges, the pull of the coiling machines providing a power for drawing the wire through the apparatus. As an alternative procedure, the wire in the form of coils, as received from the mill, may undergo an initial cleaning in the usual manner, if desired, by sulling while still in coils, the wire being then uncoiled for liming and baking treatment in strands preliminary to drawing operations.

After one coil is unwound from the reel 11, another coil is mounted thereon, and the forward end of the new coil is attached to the rear end of the coil that is just unwound, preferably by welding, so that the process is continuous.

All the apparatus shown and described is intended primarily for use with a number of paral-

lel strands of wire, each running continuously and independently through the apparatus. Thus adjacent strands may be of different size or composition and may be running at very different speeds.

In Fig. 2 is shown a modified form of cleaning tank **30** which, like the sulling well, is relatively deep and narrow to permit the wire W to pass over a pulley **31** and thence down and under a pulley **32** and up over a pulley **33** to complete a loop. An electric generator **34** or other source of direct current is connected on its positive pole to the sheaves **31**, **33**, so as to make the loop of wire the anode of a cell while an electrode **35** of any suitable metal serves as a cathode and is connected to the negative pole of the generator **34**. The anode and cathode are located in a suitable electrolyte such as dilute sulphuric acid. As current of low voltage and heavy amperage passes through the electrolyte, hydrogen is formed between the wire and its oxide scale which causes the latter to raise and drop off. By this use of electric current the scale is removed much more rapidly and efficiently than where the pickling is done without the use of current.

As a modification of this cleaning process, tin, lead or other suitable metal may be plated on the treated wire which then passes into a bath similar to that of Fig. 2 where the process is reversed and the plating material removed, the scale being removed at the same time. All cleaning steps using an electrolyte or pickling bath are preferably followed by washing with clean water preliminary to travel of the wire into the sulling chamber.

The wires may also receive an initial heat treatment in which case they can be handled as strands by being passed through a heat treating furnace or the like, then allowed to cool preliminary to annealing; or quenched, if the wires are to be heat treated for tempering or hardening; the process, as to its remaining steps prior to wire drawing, being thereafter continued, i. e., through the steps of cleaning, liming and baking, with, or without, sulling. The heat treating furnace may be of any conventional type, depending on whether the wire is processed wire, patented wire, spring wire or the like.

I claim:

1. The continuous methed of successively treating portions of a strand of iron or steel wire comprising removing scale from the wire, causing a portion of said wire to travel in a loop while sulling the wire to produce a rust coating thereon, coating the wire with lime, and baking the lime, the wire traveling continuously.

2. The continuous method of successively treating portions of a plurality of strands of iron and steel wire comprising passing each strand through a tank containing a cleaning liquid to remove scale, washing the wire to remove the cleaning liquid, causing a portion of said wire strands to travel in elongated loops while sulling the wire to produce a rust coating thereon, varying the lengths of the wire strands traveling in loops to control the amount of rust coating thereon for drawing, coating the wire with lime, and baking the lime, each strand traveling continuously and independently of the others.

3. The continuous method of successively treating portions of a plurality of strands of iron and steel wire comprising passing each strand through a tank containing a cleaning liquid, passing an electric current through the wire as an anode in the cleaning liquid to remove scale, washing the wire to remove the cleaning liquid, causing a portion of each wire to travel in an elongated loop while sulling the wire to produce a rust coating thereon, adjusting the length of wire in said loops to control the amount of sull coating thereon for drawing, coating the wire with lime, and baking the lime, each strand traveling continuously and independently of the others.

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