

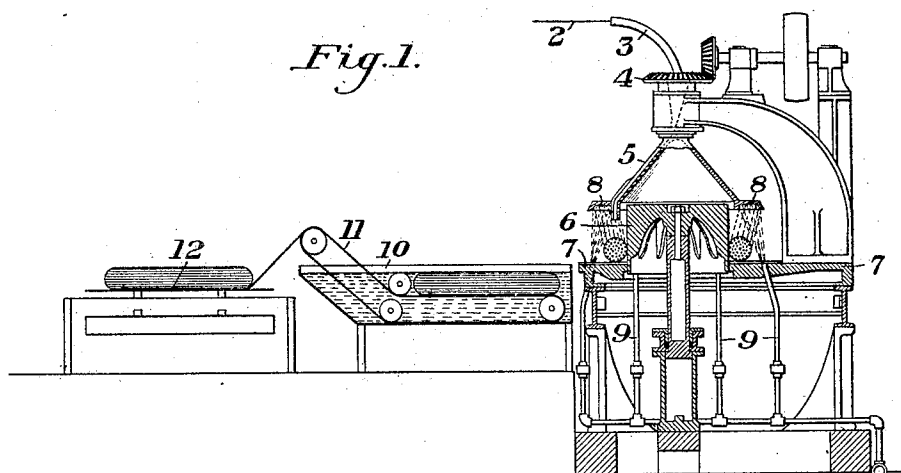
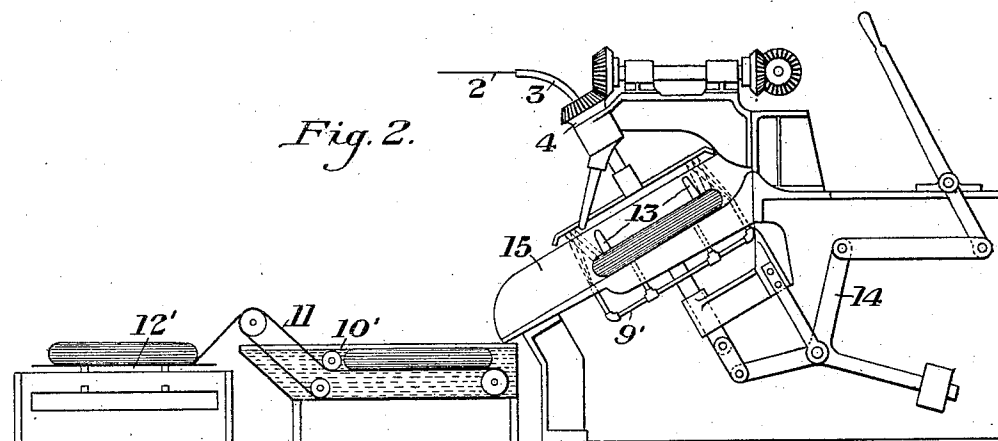
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F. H. DANIELS.

PROCESS OF AND APPARATUS FOR COOLING WIRE RODS.

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WITNESSES

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FRED H. DANIELS, OF WORCESTER, MASSACHUSETTS.

PROCESS OF AND APPARATUS FOR COOLING WIRE RODS.

No. 895,973.

Specification of Letters Patent.

Patented Aug. 11, 1908.

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To all whom it may concern:

Be it known that I, FRED H. DANIELS, of Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Improvement in the Process of and Apparatus for Cooling Wire Rods, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a sectional elevation of one form of apparatus embodying my invention, and Fig. 2 is a side elevation, also partly diagrammatic, of another form of the apparatus.

The object of my invention is to provide a method and apparatus for cooling iron or steel rods after they have been rolled in a rolling mill, by which oxidation is prevented and the cooling process is stopped in time to prevent hardening to an undue extent, which hardening takes place at a fixed temperature, depending upon the amount of carbon which is present in the metal. I accomplish this object by immediately submerging the coil, while still red hot, or near it, in water, which excludes the air and at the same time quickly cools the coil. In a predetermined time, the coil is removed from the water bath, care being taken that it does not remain therein long enough to become so thoroughly cooled as to render the metal brittle. If it is left in the water the proper length of time and is removed at a very low red heat, scaling is prevented, the waste from the scale is saved and the metal is not hardened. A coil so treated also cleans with very much less acid. I may also subject the metal while it is being coiled to an air-excluding atmosphere.

Various forms of coiling apparatus may be employed in carrying out my invention, the particular construction of the coiling reels being immaterial so long as means are provided for preventing oxidation of the metal while in the hot state.

Referring to the form of apparatus shown in Fig. 1, the wire rod is coiled on the horizontal reel, being guided through pipe 3, over deflector 5 and coil formed on stationary plate 7. When the air excluding atmosphere is used, the coil as it is formed, is being sprayed by water projected upwards through pipes 9 striking reflector 8. The water thus partly forms steam and partly vapor without air coming in contact with the hot rod. The

coil is then at once transferred to the water tank 10, when it is at once immersed and partially cooled, yet without hardening, but enough to admit its being taken up without danger of oxidizing in the air. This method of cooling the rod admits of a wide range of adjustment to suit various qualities of steel; *e. g.*, very soft steel rods may be quickly removed from the reel to the water tank and immediately quenched in the said tank; while hard steel rods may be left longer on the reel to cool off more slowly, and then finally quenched in water. In other cases the coil may be removed from the reel without being put in water, or the coil may be treated in the water tank alone without spraying the coil while on the reel.

The form of apparatus shown in Fig. 2 is similar to that shown in Fig. 1, except that the coiling reel and table are in an inclined plane, so that when the centering studs 13 are withdrawn by means of the counter-weighted lever mechanism 14, the coil will slide by gravity down the inclined chute 15 into the tank 10'. From this tank it is lifted by a conveyer 11', and carried to a conveyer 12' in the same manner as in the form of apparatus first described.

I do not limit myself to the production of an air-excluding atmosphere of steam and vapor by means of the jets of water directed against a reflecting surface in the manner above described, since the same result may be obtained by the direct use of steam or other gaseous fluid, or by atomizing the water in the neighborhood of the coil in various ways. The water may also be brought into contact with the metal before the water enters the reel, the principal and novel feature being the water tank into which the coil may be immersed immediately after reeling.

Various other changes may be made in the apparatus and in the manner of using the same, without departing from my invention, since

What I claim is:

1. The herein described method of treating metal rods, which consists in coiling them and then immediately submerging them in a cooling bath while still hot, and removing them from said bath before they have fully cooled; substantially as described.

2. The herein described method of cooling metal rods after rolling, which consists in coiling them in an air-excluding atmosphere, whereby they are gradually cooled without

oxidation, and then further partially cooling them by immersing them in water and removing them from the water before they have fully cooled; substantially as described.

5 3. The herein described method of cooling wire rods after rolling which consists in coiling them in an air-excluding atmosphere of steam and water vapor, then immediately submerging the coil in a water bath, and re-
10 moving the coil from the bath before it has fully cooled; substantially as described.

4. In apparatus for cooling metal rods after rolling, a coiling apparatus, a water atomizing device adjacent thereto, and a cooling
15 tank; substantially as described.

5. In apparatus for cooling metal rods after rolling, the combination of a coiling apparatus, a cooling tank arranged to receive the coils immediately after they are released
20 from the reel, and a conveyer or the like for removing the coils from the tank; substantially as described.

6. In apparatus for cooling metal rods after rolling, a coiling apparatus, means for
25 producing an air-excluding atmosphere about the rods as they are being coiled, a cooling tank adjacent to the cooling apparatus and designed to receive the coils immediately after they are removed from the reel, and
30 means for removing the coils from the cooling tank after being partially cooled; substantially as described.

7. In apparatus for treating metal rods, a coiling device, a cooling tank adjacent to the coiling device and designed to receive the
35 coils immediately after they are removed from the coiling device, and a conveyer for removing the coils from said tank before they have had time to fully cool; substantially as described.

8. In apparatus for cooling metal rods after rolling, a coiling apparatus, and means
40 for directing water vapor or spray upon the coil to thereby form an air-excluding and cooling atmosphere therefor; substantially as described.

9. In apparatus for treating metal rods after cooling, a coiling device open to the air, means for producing an air-excluding atmosphere about the rods as they are being coiled,
50 a cooling tank arranged to receive the coils as soon as they are removed from the coiling device, and a conveyer, said tank and conveyer being so constructed and arranged that the coils can be removed from the tank be-
55 fore they have fully cooled; substantially as described.

In testimony whereof, I have hereunto set my hand.

FRED H. DANIELS.

Witnesses:

M. F. SHEEHAN,
WM. A. BACON