June 19, 1934. R. B. ZUBER 1,963,539

WATER PROTECTION DEVICE

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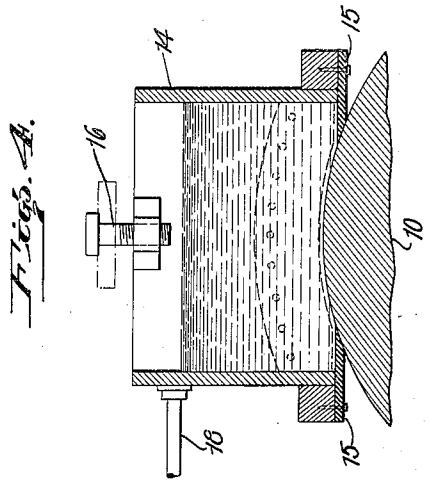


Fig. 4.

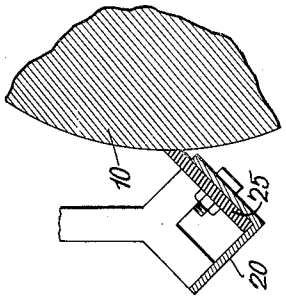


Fig. 5.

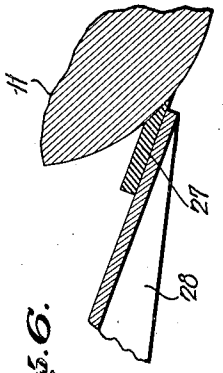


Fig. 6.

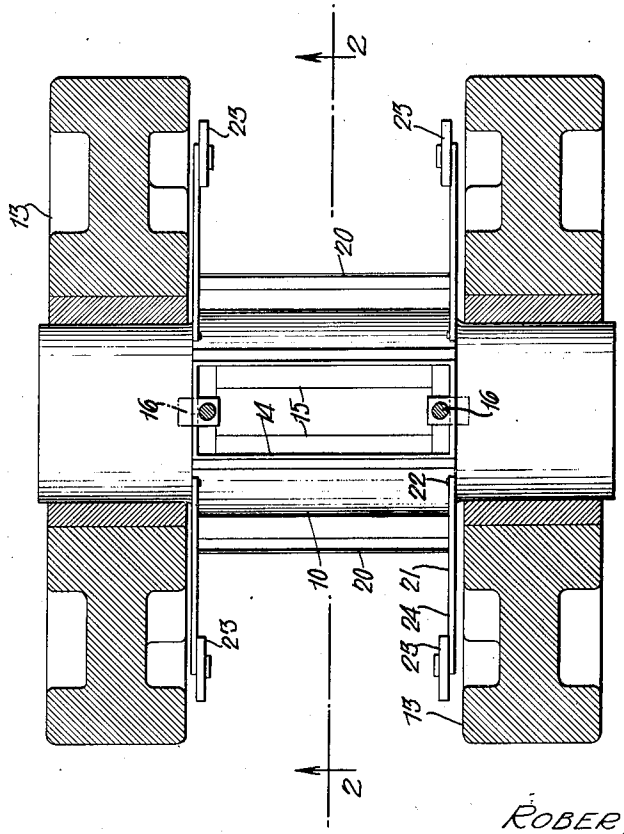


Fig. 1.

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Fig. 3.

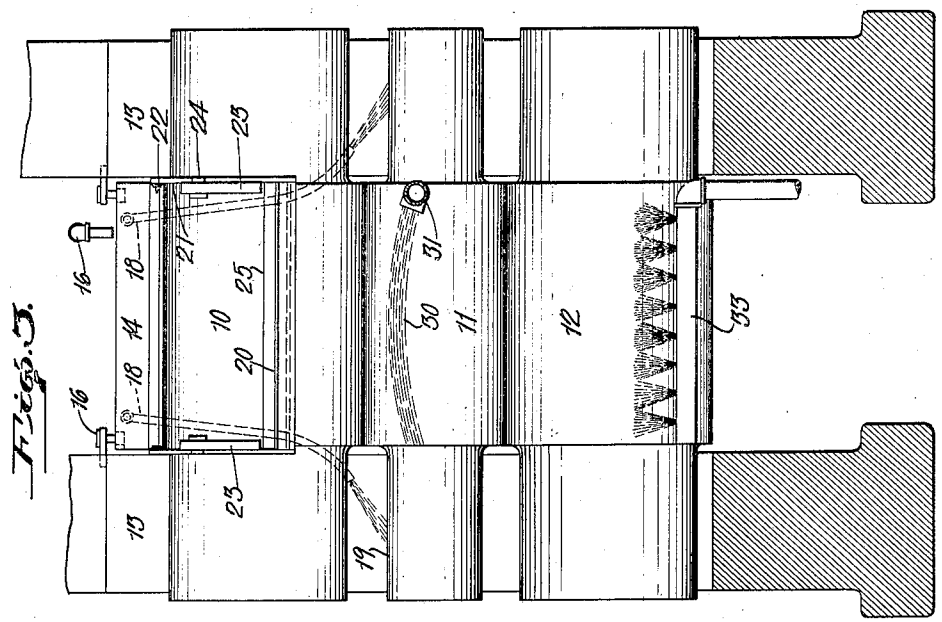
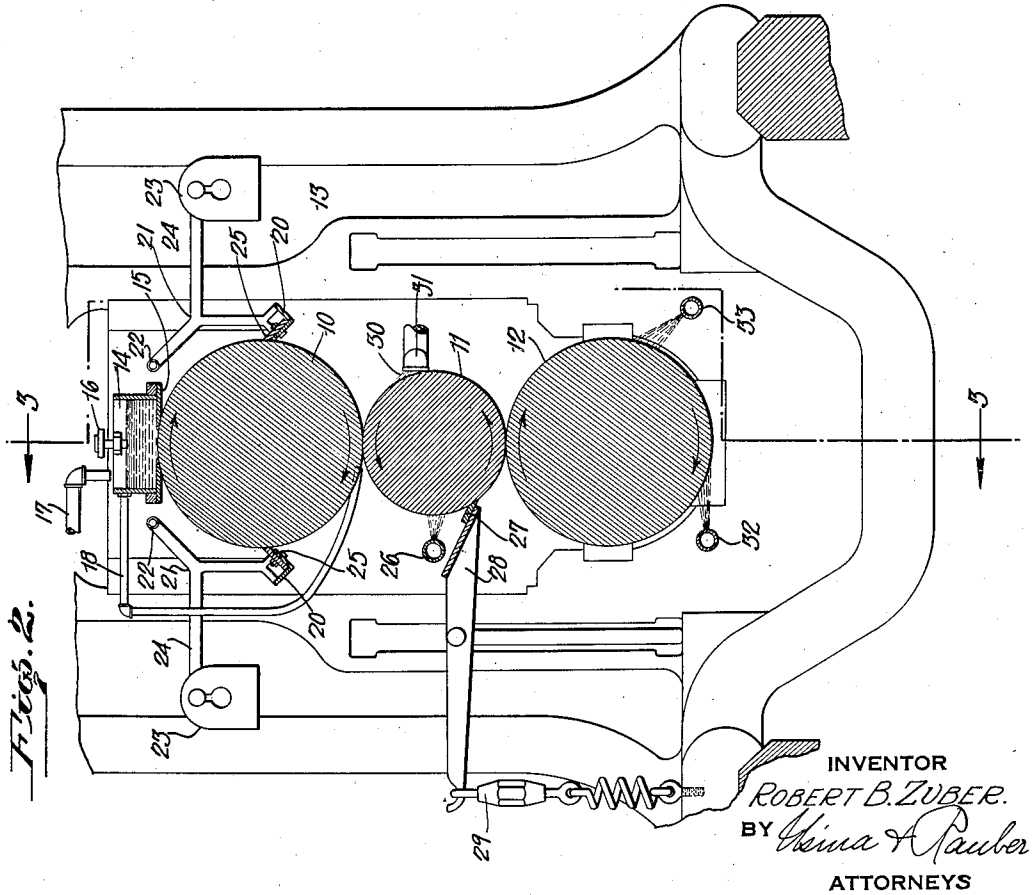


Fig. 2.



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Patented June 19, 1934 1,963,539

UNITED STATES PATENT OFFICE

1,963,539

WATER PROTECTION DEVICE

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Application October 25, 1932, Serial No. 639,521

2 Claims. (Cl. 80—41)

My invention relates to water cooling means for the rolls of rolling mills and to devices for protecting the hot metal being rolled from contact with the cooling water. In order to maintain the rolls used for rolling hot steel at a constant shape and to prevent contraction and expansion, it is necessary to flood the surfaces of the rolls with cooling water and thus to take up the heat given up to the rolls by the hot metal.

In the cooling arrangements heretofore used, no means have been provided for preventing the cooling water on the rolls above the hot metal from dropping or flowing down onto the metal and chilling it, thus rendering the metal harder to roll and slowing down the production of the mill.

Objects of my invention are to provide a cooling apparatus for the rolls of a rolling mill in which the dripping of water onto the hot metal being rolled will be substantially prevented; and to provide means whereby water flowing or dropping downwardly over the surface of a roll will be intercepted and withdrawn before it can reach the hot metal.

The various features of the invention are illustrated in the accompanying drawings, in which—

Fig. 1 is a plan view of a rolling mill, part of the supporting frame extending above the rolls being shown in section.

Figs. 2 and 3 are vertical sectional and side views taken on the lines 2—2 and 3—3 of Figs. 1 and 2, respectively.

Fig. 4 is a vertical section on a larger scale of the upper roll on line 2—2 of Fig. 1.

Figs. 5 and 6 are detail sectional views of water intercepting devices.

In my present invention water is applied to the upper and intermediate rolls of a rolling mill either by means of troughs, or other devices, that bring a body of water into contact with the surface of the roll, or by spraying jets of water against the surface of the roll. This water may be permitted to flow down the surface of the roll, preferably in thin films, so as to increase the cooling effect. The down-flowing water is however, intercepted before it reaches that part of the roll that is being brought into contact with the metal to be rolled and is removed from the surface of the roll except for a thin film of adhering moisture which rapidly evaporates before being brought into contact with the hot metal.

The intercepting devices comprise wearing strips or scrapers resiliently pressed against the surface of the roll to scrape off the water and permit it to flow into receivers from which it is conveyed out of further contact with the rolling apparatus.

Referring more particularly to the accompanying drawings, the invention is illustrated as applied to a three-high mill having an upper roll 10, an intermediate roll 11, and a lower roll 12 supported in suitable framework 13. The upper roll 10 is cooled by means of a water trough 14 having an open bottom which rests on the upper surface of the roll 10 and which is provided with a sealing strip or plate 15 of rubber or other resilient flexible material which is pressed by the weight of water in the trough 14 against the surface of the roll sufficiently to prevent excessive escape of water from the trough. The trough 14 is secured to the framework of the mill by means of pins 16, one at each end. A constant supply of water is maintained in the trough 14 from a supply pipe 17. The level of water in the trough 14 is maintained constant by means of overflow pipes 18 which convey the overflow water to the bearings 19 of the middle or intermediate roll 11. At each side of the roll 10, preferably on about a level with the center of the roll, are water receivers or strippers each consisting of a trough 20 carried on a lever 21 suspended from a pivot 22 above and somewhat inwardly of the rolls 10 so that the troughs 20 tend to swing into contact with the surface of the roll.

A weight 23 carried on a horizontal projecting arm 24 of the lever 21 serves additionally to press the troughs 20 against the surface of the roll.

Each trough 20 is provided with a wearing strip or scraper 25 of ebonite, or other suitable material, which bears against the surface of the roll 10 as the troughs 20 are pressed against the rolls by the weights 23. The water flowing down the surface of the roll 10 is, therefore, intercepted by the wearing strips or scrapers 25 and conveyed into the troughs 20, from whence it flows sidewise past the ends of the rolls and is permitted to fall downwardly. In this way all water, except a thin wetting film which immediately evaporates, is prevented from passing downwardly into contact with, or from dropping onto, the hot metal that passes between the rolls 10 and 11.

The roll 11 is cooled by means of jets of water projected against the surface of the roll from a horizontal pipe 26 having a number of jet openings. The water thus projected onto the roll

11 tends to flow downwardly but is intercepted by a stripper or scraper 27 of ebonite, or other suitable material, carried on the end of a lever 28, the outer end of which is actuated by a resilient means such as a spring 29 to press the scraper or stripper 27 into contact with the roll 11. The roll 11 may also be cooled by means of a jet of cooling water 30 projected from a nozzle 31 horizontally across the surface of the roll on the side that is moving upwardly.

The action of the jet is such as to carry any water not immediately evaporated horizontally past the edge of the roll and thus prevent an excessive quantity from flowing downwardly. The lower roll 12 may be cooled by jets of cooling water from horizontal pipes 32 and 33 projected against the lower part of the roll. As the hot metal only comes into contact with the upper part of the roll and the amount of water that is carried upwardly of the jet 32 is negligible, no intercepting devices are necessary on this roll.

Through the above invention the surfaces of the rolls are adequately cooled by an abundant supply of water so that heating and distortion are prevented while, at the same time, contact of this water with the hot steel or other metal being rolled is substantially prevented. The improved protecting devices, therefore, permit the steel being cooled to hold its temperature longer, making it possible to obtain more passes through the rolls with a single heating than have heretofore been possible. The capacities of the mills are thereby raised and, moreover, the rolls and bearings are subjected to less wear than with the cooling devices heretofore used.

What I claim is:

1. A rolling mill comprising a vertical series of rolls, an open bottom trough on the topmost roll having the bottom closed by the upper surface of said roll, water intercepting means below said trough, said intercepting means comprising a contact strip, means to press said strip against the surface of said roll, and a water receiving trough to receive water removed from said roll by said strip.

2. A rolling mill comprising a vertical series of rolls, an open bottom trough on the topmost roll having the bottom closed by the upper surface of said roll, water intercepting means below said trough, said intercepting means comprising a contact strip, means to press said strip against the surface of said roll, a water receiving trough to receive water removed from said roll by said strip, means for spraying water against the surface of a roll below said topmost roll, and means below said spray for removing excess water from the surface of said roll.

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