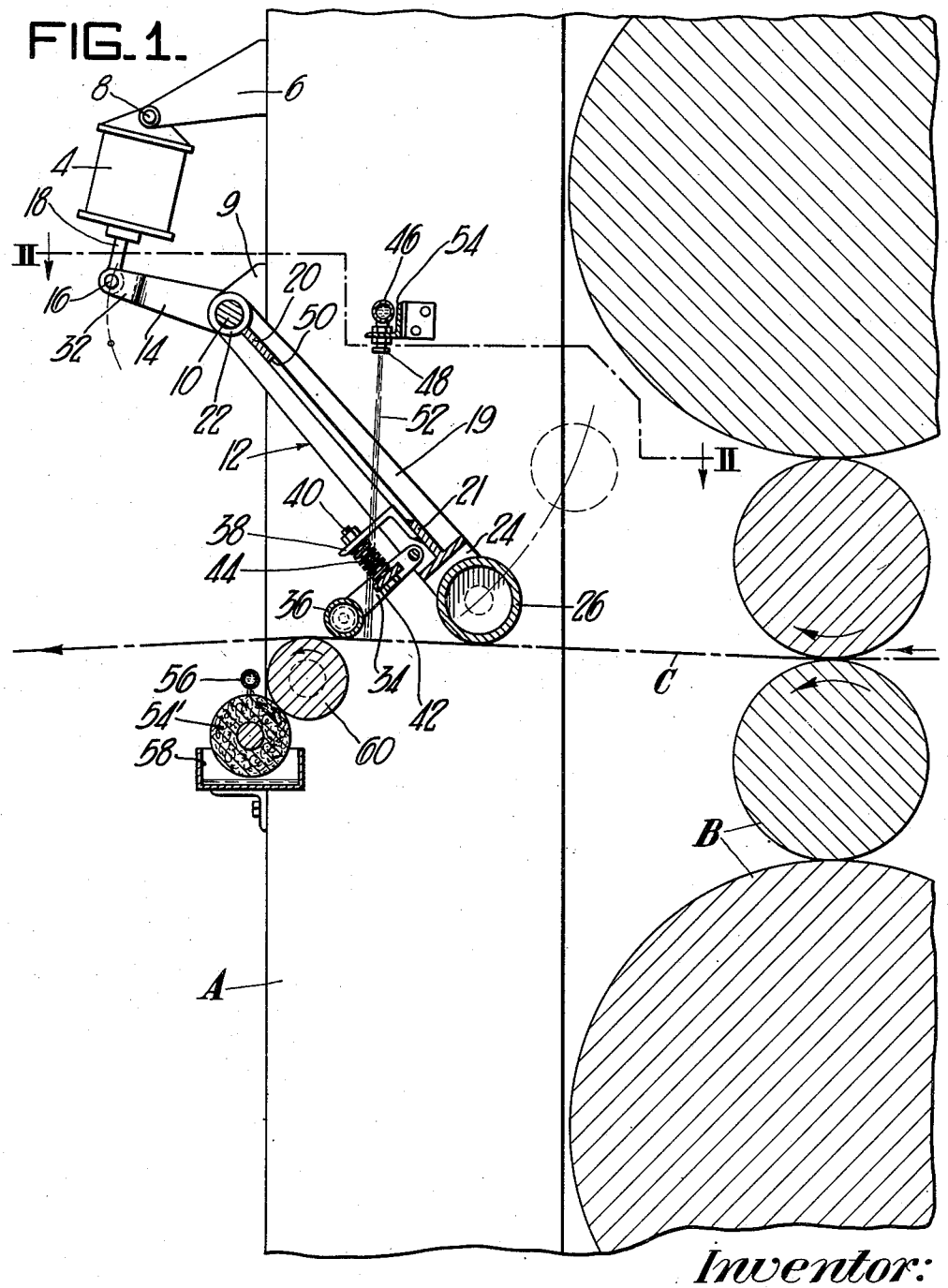
May 29, 1951 E. R. BACKUS 2,555,021

APPARATUS FOR LUBRICATING METALLIC STRIPS

Filed Nov. 13, 1945 2 Sheets-Sheet 1

FIG. 1.



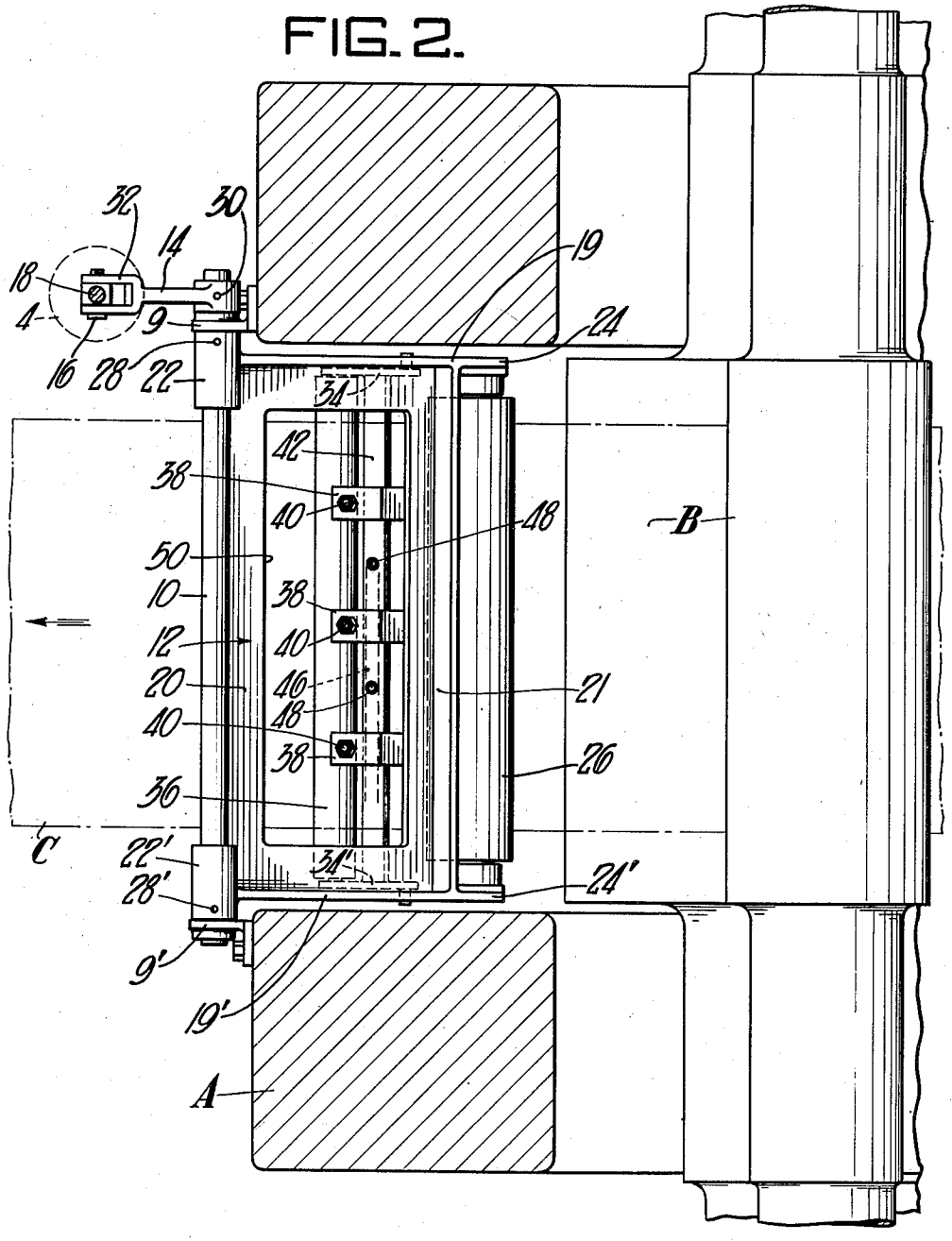
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APPARATUS FOR LUBRICATING METALLIC STRIPS

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FIG. 2.



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APPARATUS FOR LUBRICATING METALLIC STRIPS

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1 Claim. (Cl. 91—29)

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This invention relates to the rolling of metal strip and in particular to apparatus for continuously applying lubricant to the strip during the cold-rolling thereof.

It is known to be desirable for various reasons to lubricate metal strip, e. g., strip steel, during the cold-rolling thereof. It is also desirable to cool the rolls of the cold-rolling mill as by flushing their surfaces with a coolant liquid.

It has been customary heretofore to apply lubricant to the strip as it is uncoiled prior to its entry into the mill, the lubricant being sprayed or permitted to drip onto the upper surface of the strip.

This method of applying lubricating medium to the strip usually results in an uneven coating. This is not serious in the early stages of the reduction because of the heavy drafts effected by the first few stands of the mill. The lubricant adhering to the strip is sufficient together with the coolant liquid applied to the rolls of each stand, to lubricate the strip thoroughly and prevent overheating thereof and excessive wear on the rolls.

The coolant liquid supplied to the upper rolls, however, descends onto the strip and tends to wash off the lubricant originally applied thereto and it becomes necessary, therefore, to apply additional lubricant to the strip in the later stages of reduction in order to produce satisfactory cold-rolled material. In order to turn out a good product, lubricant must be applied evenly over the entire extent of both upper and lower surfaces of the strip as it traverses the last stand or two of the mill since non-uniform application of the lubricant tends to cause the strip to finish off-gauge or with an imperfect surface.

I have invented a novel apparatus for applying a uniform film of lubricant to the strip just prior to its entry into the finishing stand or stands of the mill, usually the last two stands. In a preferred embodiment of the invention, I provide means engaging the upper surface of the strip to remove any roll-cooling liquid standing thereon. A squeegee roll may be employed for this purpose. I also provide a lubricant-supply pipe having nozzles directing jets onto the strip beyond the liquid-removing means, and a spreader roll engaging the strip beyond the points of impingence of said jets. The squeegee and spreader rolls are preferably journaled in a frame extending between the housings of one of the mill stands, such as the next to the last, and pivoted thereto so that the rolls bear on the strip by gravity. A lubricant-absorbing roll extending between the

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housings receives lubricant from a second supply pipe and engages a strip-supporting roll which serves as a ductor to apply a film of lubricant to the lower surface of the strip.

The invention may be readily understood from the following detailed description which refers to the accompanying drawings showing a preferred embodiment. In the drawings,

Figure 1 is a vertical central section through a four-high cooling mill having the invention installed therein, the mill being shown diagrammatically; and

Figure 2 is a horizontal section taken on the line II—II of Figure 1 showing parts in plan.

Referring more particularly to the drawings, housings A with rolls B journaled therein form one stand of a mill for cold-rolling strip. The mill rolls are provided with means (not shown) for flushing their forward surfaces with an oil-water emulsion, as described above.

The apparatus of my invention may conveniently be installed on the exit side of the stand of rolls B which in practice is preferably the third stand of a four-stand mill. This apparatus includes an air cylinder 4 which is pivoted by a pin 8 on a bracket 6 bolted or otherwise suitably secured to the housing A.

Oppositely disposed brackets 9, 9' on the roll housings provide bearings for a shaft 10, upon which is mounted a roll-supporting frame 12. The frame is movable angularly with the shaft in the brackets 9, 9' by means of a crank arm 14 mounted on the end of the shaft proximate to the cylinder 4, connected by a pivot pin 16 to a piston rod 18 operating in the cylinder. The arm 14 is secured to the shaft by a pin 30 and has a fork 32 at its end to receive piston rod 18.

The frame 12 includes side members 19 and 19', and upper and lower transverse members 20 and 21, respectively. The frame 12 also includes hub portions 22 and 22' at each end thereof through which shaft 10 extends. The frame 12 is secured rigidly to shaft 10 by means of tapered steel pins, indicated at 28, 28', driven into holes in the hub portions 22, 22'.

Side members 19 and 19' extend beyond the lower member 21 of the frame 12, thereby defining lugs 24, 24' in which is journaled a steel squeegee roll 26. The roll 26 rides on the strip C and, because of its weight exerts a slight downward pressure thereon, whereby it serves to remove any cooling emulsion carried by the strip as it enters the finishing pass of the mill. The roll acts as a progressive wiping means.

Pivotally mounted on the side members 19 and

19' of the frame 12, are lever arms 34, 34', in which is journaled a steel distributor roll 36. Clip angles 38, welded to the lower transverse member 21 of the frame 12, receive bolts 40 which pass through a connecting bar 42 extending between the arms 34 and 34'. In order to maintain good contact between the distributor roll 36 and the strip C, a compression spring 44 is placed around each of the bolts 40, with the ends of each spring bearing respectively on its clip angle 38 and the connecting bar 42.

Lubricant is applied to the strip in advance of the distributor roll 36 by one or more spray pipes 46 having nozzles 48 spaced therealong, as required, which receive lubricant from a suitable header, not shown. These nozzles are so positioned as to direct jets of lubricant downwardly through the central opening 50 of the frame 12, and onto the top surface of the strip C immediately in advance of the distributor roll 36, as indicated at 52. The lubricant-supply line 46 is mounted on an angle 54 secured to the housings A of roll stand B. The specific lubricant employed is immaterial, palm oil being the usual one. In order to improve the distributing action of roll 36, a shallow helical groove is machined into the surface of the roll extending completely across the roll face.

In order to assure a good finish on both surfaces of the strip, it is desirable to apply the lubricant to the bottom thereof as well as the top. For this purpose, an absorbent roll 54' is journaled between the housings to receive lubricant dripping from a lubricant-supply line 56. The absorbent material of the roll may be cloth, or any other suitable material. The roll 54' is mounted in a trough 58 in which excess lubricant collects. The roll 54' engages a steel tensiometer roll 60 which acts as a ductor, picking up lubricant from the saturated surface of roll 54' and applying it to the underside of strip C. It will be understood that the rolls 54' and 60 extend the full width of the mill.

The above-described apparatus fulfills the objectives of the invention. The squeegee roll 26 effectively removes substantially all of the roll-cooling emulsion remaining on the strip. The jets of lubricant from nozzles 48 impinge on the resulting substantially water-free upper surface of the strip beyond the roll and a lubricant film is evenly distributed across the surface of the strip by the spreader roll 36.

When required, the entire apparatus can be swung upwardly about the shaft 10 as an axis by means of compressed air applied to the cylinder 4. This operation which may be controlled by a manual valve facilitates threading the mill or removing broken strip.

The roll 60 applies lubricant to the bottom of the strip, and the latter is thus provided with a uniform coating of lubricant on both sides prior to its entry into the succeeding mill stand.

Although the preferred embodiment of the invention is that herein described, it will be apparent that the invention is not limited to its adaptation to a rolling mill but is readily adaptable to processing lines, other than rolling mills, where it is necessary to apply a lubricant to water-free surfaces and to apply a protective lubricant on finished products.

I claim:

Apparatus for lubricating a traveling metal strip, said apparatus comprising a rectangular frame pivoted at one end on a horizontal axis above and transverse to the path of the strip and lying in a plane inclined downwardly in a direction opposed to the travel of the oncoming strip, a wiping roll journaled adjacent the lower end of the frame and bearing on the strip under the combined weight of the frame and roll, thereby effecting removal of any liquid present on the strip, a pair of lever arms pivoted to the frame adjacent said roll and extending downwardly therefrom, a spreader roll journalled in said arms engaging a transverse line on the strip after it has passed said wiping roll, a bridging bar extending between said lever arms, bracket means secured to said frame and overhanging said bar, spring means compressed between said bar and said bracket means, and means for discharging lubricant onto the strip between said rolls.

EARL R. BACKUS.

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