April 7, 1953 R. S. WATTERSON, JR 2,633,822

STRIP STOCK OILER

Filed Oct. 11, 1950 2 SHEETS—SHEET 1

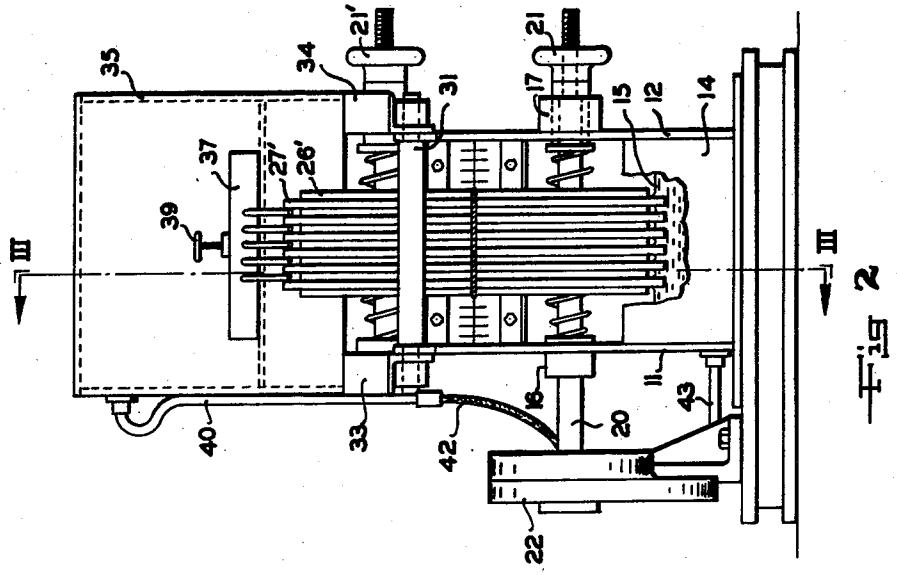


Fig. 2

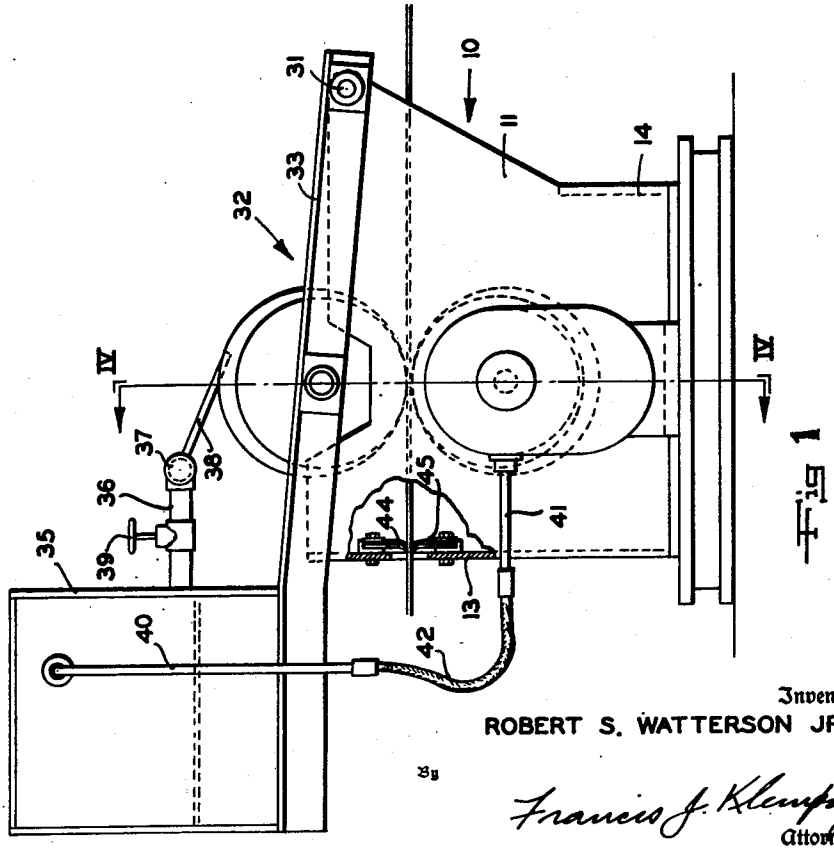


Fig. 1

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STRIP STOCK OILER

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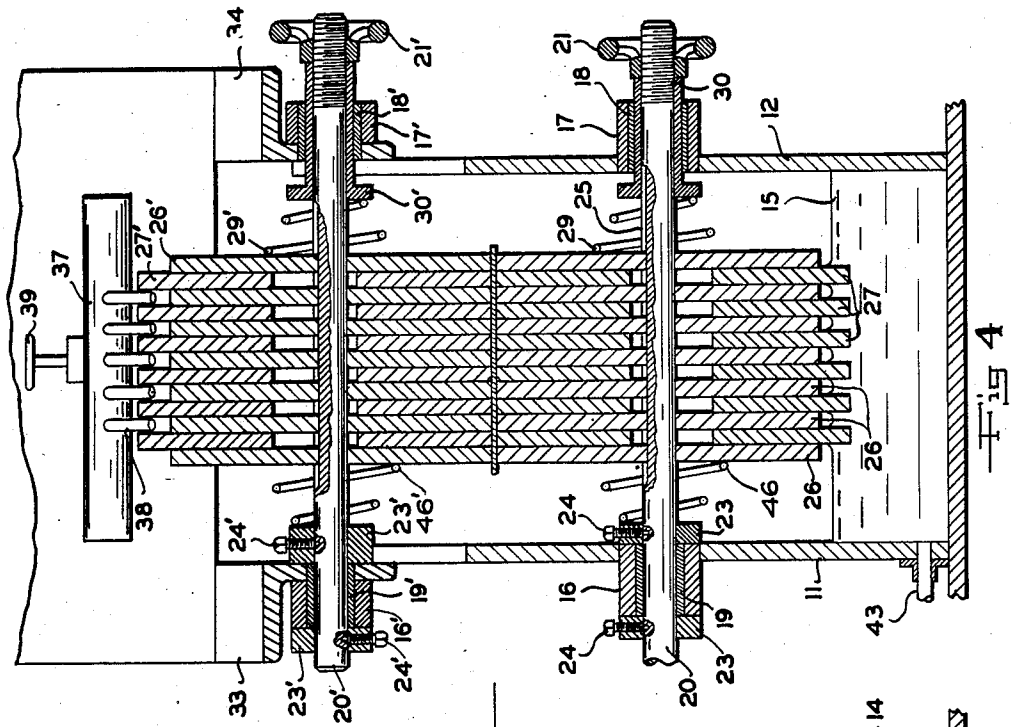


Fig. 4

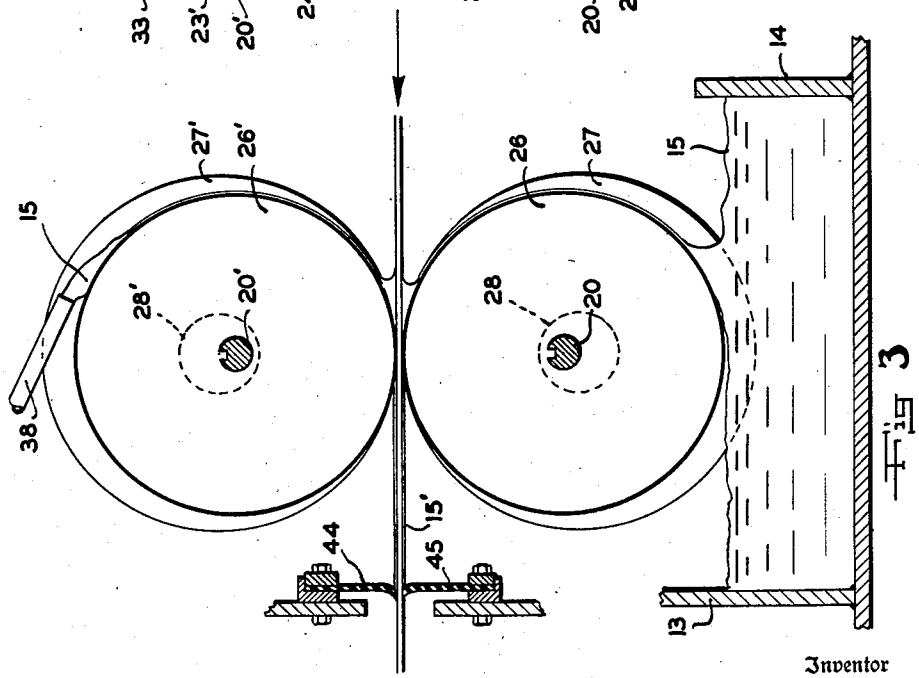


Fig. 3

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STRIP STOCK OILER

Robert S. Watterson, Jr., Salem, Ohio

Application October 11, 1950, Serial No. 189,568

7 Claims. (Cl. 118—227)

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This invention relates to apparatus for processing metal strip and the like and more particularly to an improved and novel device for applying a film of oil to continuous strip stock.

It is common practice in ferrous metal working industries to subject hot rolled metal to a pickling process to remove any scale or oxide formations which occur as the result of the rolling operations. As is well known to those familiar with the art, pickling consists of dipping the metal in hot acid which attacks and removes the scale or oxide formations. As the metal emerges from the pickling bath, however, it is void of any protective film and has numerous pits on its surface. In this condition it is quite susceptible to further oxidation upon contact with air and it is therefore necessary to immediately give the emerging stock a protective coating of oil or similar preservative in order to prepare it for storage or shipment.

Since hot rolled strip or sheet stock is often somewhat wavy due to uneven contraction during cooling, and since it is imperative to apply an even continuous protective film to the stock, it has been necessary, in most prior devices, to utilize a pair of soft and pliable rolls between which the stock is passed. The protective film is, of course, applied to the stock by the rolls which, due to their suppleness, easily follow the irregularities of the stock and apply an even film thereto.

The type of roll which is now in common use for this purpose is constructed of a large number of discs of velvet, canton flannel, or similar material. These discs are positioned axially on a shaft which serves as an axle and are tightly compressed by means of retaining washers and nuts placed at each end. This type of roll, while being operative to effectively apply the desired protective film, has very poor wearing qualities and frequent replacement is therefore necessary. It is accordingly the primary object of this invention to provide a sheet or strip oiler, of the character described which, while being operative to effectively apply a protective coating in the manner desired, is so constructed that replacement of parts is rarely, if ever, necessary.

A further object of this invention is the provision of apparatus of the character described, wherein adjustment is automatically made for the various thicknesses of material to be processed.

Another object of the invention is the provision of means whereby the pressure exerted by the applicator rolls may be varied as desired.

Other objects and advantages of the invention will become apparent upon full consideration of the following specification and accompanying detailed drawings wherein there is disclosed a certain preferred embodiment of my invention.

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In the drawing:

Figure 1 is a side elevation of a strip stock oiler constructed according to the principles of my invention, with parts broken away to show internal details;

Figure 2 is a front elevation of the oiler of Figure 1 with parts broken away to show further internal details;

Figure 3 is a fragmentary sectional view taken substantially along line III—III of Figure 2 showing the principles of operation of my invention; and

Figure 4 is a fragmentary sectional view taken substantially along line IV—IV of Figure 1 showing details of its construction.

Referring to the drawings, the reference numeral 10 denotes the base of my machine. The two side members 11 and 12 thereof are held in spaced relation by end members 13 and 14 and are secured thereto preferably by welding. As shown, the front end member 14 extends only a short distance upward and serves principally as a means of enclosing a rectangular reservoir in which is contained oil 15 or similar preservative to be applied to the stock.

As is clearly shown in Figure 4 journals 16 and 17 are positioned in the side members 11 and 12 and are adapted to retain bearings 18 and 19 which rotatably support a shaft 20. The shaft 20, the ends of which extend beyond the sides 11 and 12, is threaded at one end to engage a hand wheel 21 and is keyed at the other end to engage and drive a rotary pump 22, the purpose of which will be later described. To retain the shaft 20 in the proper axial position I have provided a pair of collars 23 which are secured to the shaft 20 by set screws 24 and which bear against the ends of the journal 16 to thereby prevent any axial movement of the shaft. A keyway 25 is provided in the shaft 20 to engage an alternate series of discs 26 of bronze or similar material. Interspaced with the keyed discs 26 is a series of slightly larger discs 27 of similar material. According to the principles of the invention the large discs 27 are provided with a central aperture 28 which is considerably larger than the shaft 20. It should be apparent, then, that the large discs 27 have considerable freedom of transverse movement.

For yieldingly retaining the discs 26 and 27 in axial position I have provided a pair of conical coil springs 46 and 29, one of which is positioned at each end of the series of discs to act thereupon to yieldingly compress the discs into a compact roll. Acting upon the outer end of spring 29 is a flanged sleeve 30 which is positioned between the shaft 20 and its supporting bearing 18, and is keyed to the shaft to allow only axial movement with respect thereto. The outer end of the sleeve 30 abuts against the inner shoulder of the hand wheel 21 which functions to posi-

tion the sleeve 30 axially as desired, to thereby provide means of adjusting the force exerted by the springs upon the discs 26 and 27.

Pivotally fulcrumed by the shaft 31 which is secured in the upper forward section of the side members 11 and 12 is the upper frame section 32 of my apparatus. As is shown most clearly in Figures 1 and 2 the upper frame section 32 comprises a pair of angle members 33 and 34 which are journaled at their front end on the fulcrum shaft 31 and are free to rotate thereabout. At points directly above the shaft 20 I have provided journals 16' and 17' in the depending leg portions of angle members 33 and 34. Rotatably supported by the journals 16' and 17' is a disc assembly similar to that supported in the lower journals 16 and 17. Further description of the upper disc assembly will not be given since reference may be made to corresponding elements of the lower assembly by referring to the primed reference numerals of the upper assembly to corresponding numerals of the lower assembly.

Secured to the extended back ends of the angle members 33 and 34 is a tank 35 which is adapted to contain oil or other preservative fluids. The extended positioning of the tank 35 provides means of exerting considerable force between the rolls since the points of support are the fulcrumed shaft 31 and the line of contact between the disc assemblies. A short conduit 36 extends from the front of the tank 35 and terminates in a distributing head 37. Extending downwardly and outwardly from the distributing head 37 is a plurality of conduit sections 38 which are spaced axially along the distributing head so that the open ends of the conduits are positioned in the interstices formed between discs 26' and 27'. A regulating valve 39 is provided in the main conduit 36 to permit regulation of fluid flow therethrough. Fluid is supplied to the reservoir tank 35 by means of conduits 40 and 41 which are connected to the tank 35 and pump 22 respectively and which are interconnected by a length of flexible tubing 42. The pump 22 is supplied with fluid through conduit 43 which connects the lower reservoir formed by the base members 11, 12, 13 and 14. It should be observed that rotation of the lower shaft 20 actuates the pump 22 to force the fluid 15 from the lower reservoir, into the tank 35 and onto the upper disc assembly.

In the operation of my apparatus the strip stock to be oiled is fed between the rolls or disc assemblies and into a coiling machine, for example. As the stock is drawn through the oiler, the discs are rotated by contact therewith. As the lower disc assembly rotates through the lower reservoir, the fluid 15 contained therein adheres to the discs in the manner shown in Figure 3, whereupon it is carried upwardly and deposited upon the under surface of the stock, as is shown at 15'. As explained, rotation of the lower shaft 20 actuates the pump 22 to deliver oil to the upper disc assembly through conduit 38. This oil is, of course, fed into the interstices formed between the pairs of large discs 27' and is carried downwardly by rotation of the assembly.

It should be particularly noted that as the disc assemblies are rotated, the eccentric larger discs 27 and 27' are constantly forced apart so that, in effect, their centers of rotation coincide with their geometric centers; provided that the stock is flat. If, however, as is often the case, the stock is somewhat wavy, the eccentric discs will tend to follow its contours since, as may be observed from Figure 3, it is the stock which forces the discs 27 and 27' apart. It should further be noted that the interstices which carry the fluid to the stock diminish in depth until, at the stock, they cease to exist. This action insures the spreading of the fluid evenly over the entire surface of the stock.

It is, however, undesirable to apply an excess of oil to the stock since it is merely wasteful and offers no additional protection. To prevent this I have provided wipers 44 and 45 of resilient material such as rubber or leather. The wipers 44 and 45 are secured near the stock exit of the apparatus by suitable clamps and are adapted to bear against the entire surface of the stock to thereby remove any excess fluid as the stock emerges from the apparatus.

It should be understood that the force exerted on the stock by the rolls is exerted in part by the smaller concentric rolls 26 and 26' and in part by the larger eccentric rolls 27 and 27'. The force exerted by each may be varied to best suit the particular application by adjustment of the hand wheels 21 and 21' to cause more or less compression between the discs. The total force exerted may be varied if desired by placing additional weight on the tank 35. This would not be necessary unless the stock was extremely irregular so no special provision has been made for this adjustment.

From the preceding description is should be apparent that I have provided improved apparatus which is operative to apply an even film of oil to strip stock and the like, and which has wearing qualities far beyond those of the existing prior devices. My device will readily accommodate stock of various sizes and thicknesses without requiring any adjustment therefor. My apparatus may be manufactured economically from standard parts and materials and requires only elementary machining operations. According to my principles the rate of application of the oil is dependent upon the speed of the stock passing through the apparatus. The quality of the applied film therefore remains essentially constant regardless of variations in the speed of the stock such as might occur when using the apparatus in conjunction with a coiling machine, for example.

It should be understood that the embodiment of the invention herein described should be considered as illustrative only since numerous changes may be made in the specific structure without departing from the spirit or scope of the invention.

While I have specifically described my invention as being a strip stock oiler, it should be understood that the invention is equally applicable to other coating operations as, for example, in the application of paints to strip material generally. Reference should therefore be had to the appended claims in determining the scope of the invention.

I claim:

1. Apparatus of the character described comprising in combination a base having a reservoir adapted to retain a fluid; an upper frame section pivotally secured at one end to said base; a pair of horizontally disposed roll assemblies, one of which is journaled in said base and the other of which is journaled in said upper frame section, each of said assemblies comprising an elongated shaft, a multiplicity of small discs adapted to be slidably retained on said shaft in concentricity therewith, a multiplicity of larger discs interspaced with said small discs and adapted to be loosely retained on said shaft, said larger discs having a central axial aperture with a diameter

at least equal to the diameter of said shaft plus the difference between the diameters of said large and small discs; a fluid retaining reservoir tank positioned on said upper frame section; means including a pump connected to one of said shafts to transfer fluid from said base reservoir to said reservoir tank; means to conduct fluid from said reservoir tank to the top of said upper roll assembly; and means to conduct fluid from said base reservoir to the bottom of said lower roll assembly.

2. In apparatus for oiling strip stock and the like the combination of a base; an upper frame section pivotally secured at one end to said base; a pair of roll assemblies, one of which is journaled in said base, the other of which is journaled in said upper frame section; each of said roll assemblies comprising a shaft, a multiplicity of small diameter discs adapted to be slidably retained on said shaft, a multiplicity of large diameter discs interspaced with said small diameter discs and adapted to be loosely retained on said shaft, said large diameter discs being provided with a centrally disposed axial bore adapted to permit sufficient freedom of transverse movement to allow the periphery of said large diameter discs to be in tangency with the periphery of said small diameter discs at any point therealong; means to apply resilient pressure between said discs; said upper frame section being adapted to support a weight at its free end whereby a predetermined pressure may be maintained between said roll assemblies; a fluid retaining reservoir positioned in said base and adapted to maintain fluid in contact with at least the bottom of said base-journaled roll assembly; and means including a pump actuated by rotation of one of said shafts to supply fluid to said frame-section-journaled roll assembly.

3. In apparatus for applying oil or the like to lonigtudinally moving strip stock the combination of a pair of roll assemblies; a base member journaling one of said roll assemblies; a second member movable with respect to said base member adapted to journal the other of said roll assemblies in spaced parallel relation to said first mentioned roll assembly; each of said roll assemblies comprising a shaft, a set of discs slidably retained on said shaft in concentricity therewith, and a second set of discs of larger diameter than said first set interspaced therewith and having a large axial bore therein whereby said large diameter discs are adapted to move transversely with respect to said shaft a distance at least equal to the difference in the diameters of said discs; means to apply axial pressure upon said discs; and means to supply fluid to the periphery of said roll assemblies.

4. In apparatus for applying oil or the like to longitudinally moving strip stock the combination of a base member; a roll assembly journaled in said base member, said roll assembly comprising a shaft, a plurality of discs slidably mounted on said shaft in concentricity therewith, a plurality of larger diameter discs retained on said shaft interspaced with said first mentioned discs, said larger diameter discs having a large axial bore therein of diameter at least equal to the diameter of said shaft plus the difference in the diameters of said first mentioned and said larger diameter discs whereby the latter are adapted to have transverse movement with respect to the former; yieldable means positioned adjacent at least one axial end of said roll assembly adapted to apply compressive force to the discs thereof;

means to supply fluid to the outer periphery of said roll assembly; means positioned in spaced parallel relation to said roll assembly adapted to yieldably apply pressure to strip stock passing between said roll assembly and said last mentioned means.

5. In apparatus for applying oil or the like to longitudinally moving strip stock the combination of a base member; a horizontally disposed roll assembly journaled in said base member, said roll assembly comprising a shaft, a plurality of discs slidably mounted on said shaft in concentricity therewith, and a plurality of larger diameter discs retained on said shaft and interspaced with said first mentioned discs, said larger diameter discs having a large axial bore therein whereby said larger diameter discs have freedom of transverse movement with respect to said shaft at least equal to the difference in the diameters of said larger diameter and said first mentioned discs; means to apply compressive axial pressure to said discs; and means to supply fluid to the peripheries of said discs; the arrangement being such that strip stock passing over said roll assembly will cause the same to rotate.

6. Apparatus for spreading an even coating of oil or other fluid on the lower surface of longitudinally moving horizontally disposed strip stock comprising a base member; a roll assembly journaled in said base member, said roll assembly comprising a shaft, a plurality of discs slidably mounted on said shaft in concentricity therewith, and a plurality of larger diameter discs retained on said shaft and interspaced with said first mentioned discs, said larger diameter discs having a large axial bore therein whereby said larger diameter discs have freedom of transverse movement with respect to said shaft at least equal to the difference in the diameters of said larger diameter and said first mentioned discs; means to apply compressive axial pressure to said discs; and means acting on the upper surface of said strip stock to retain the same in pressure contact with said roll assembly.

7. Apparatus for oiling strip stock and the like comprising in combination a pair of opposed roll assemblies, each including a shaft, a set of discs adapted to be retained upon said shaft in concentricity therewith, a second set of discs of larger diameter than said first mentioned set of discs interspaced therewith and having an axial bore therein at least equal to the diameter of said shaft plus the difference in the diameters of said discs whereby said larger diametered discs are adapted to have transverse movement with respect to said shaft at least equal to the difference in diameter between said sets of discs; a base adapted to rotatably retain one of said roll assemblies; an upper frame section pivotally secured to said base and adapted to rotatably retain the other of said roll assemblies; means to apply variable axial pressure to said discs; and means to supply the peripheries of said roll assemblies with fluid.

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