March 19, 1935. L. S. DAHL ET AL 1,994,691

APPARATUS FOR CLEANING METAL WORKING ROLLS

Filed Oct. 19, 1933 2 Sheets-Sheet 1

Fig. 1.

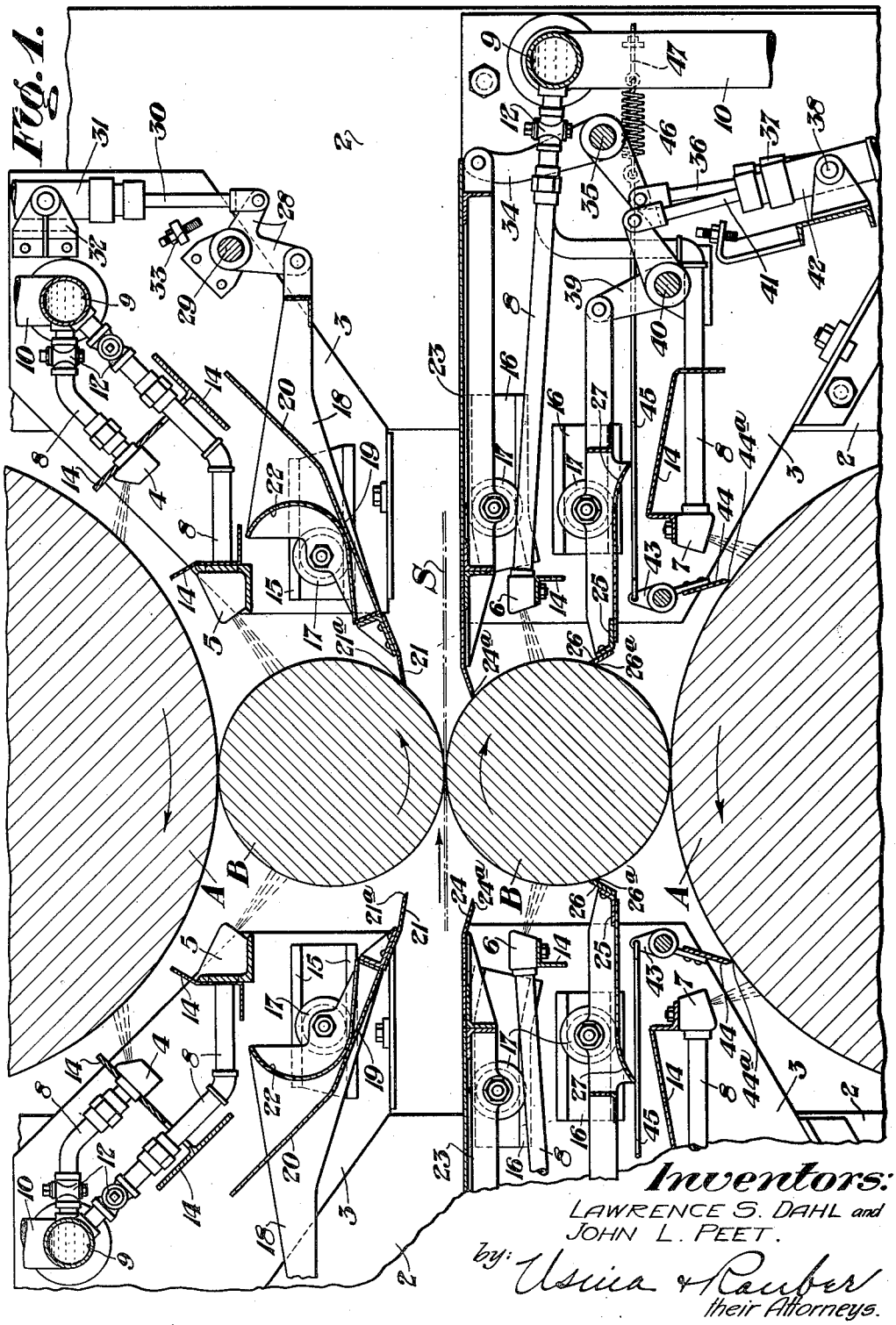

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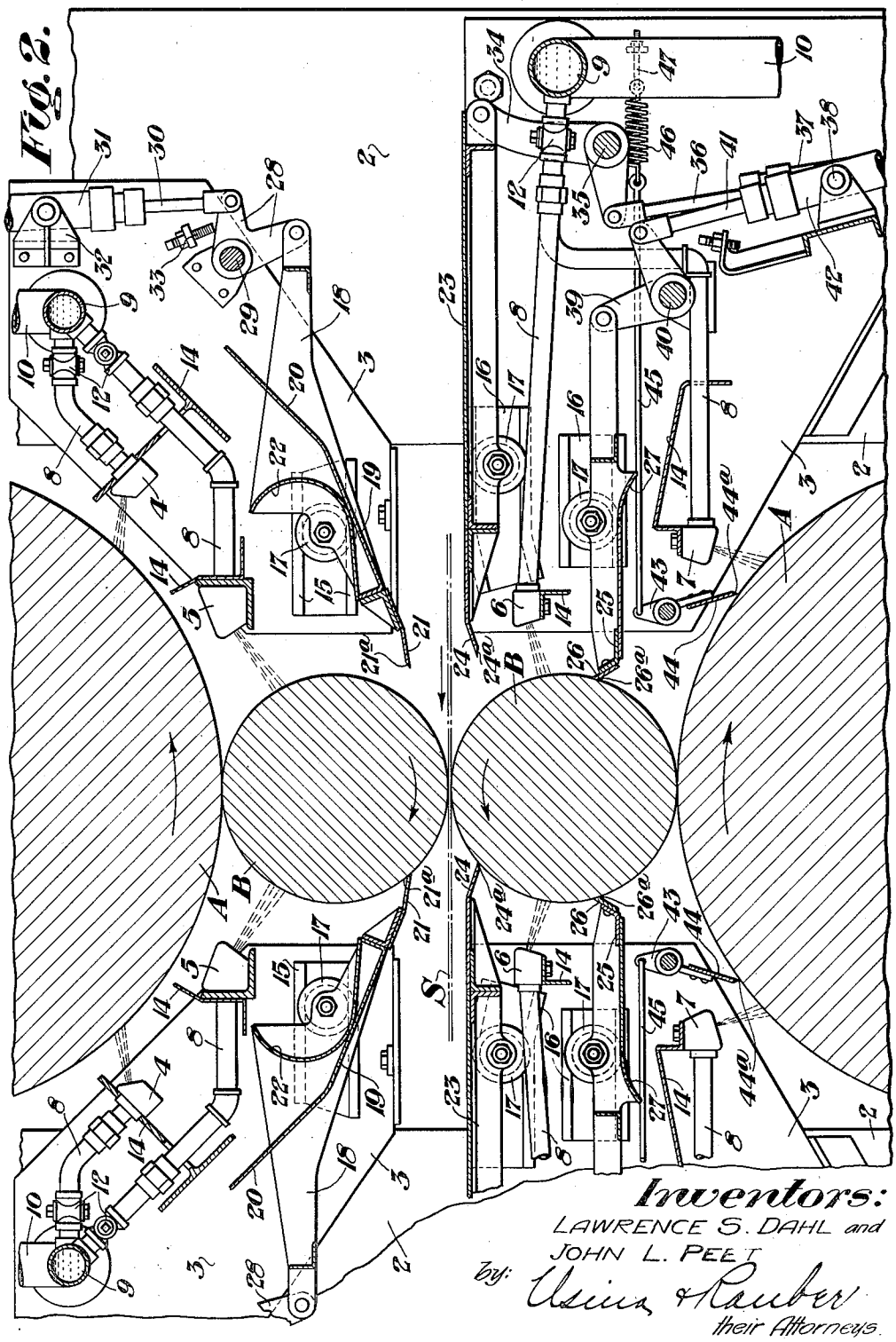
Fig. 2.



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APPARATUS FOR CLEANING METAL WORKING ROLLS

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Application October 19, 1933, Serial No. 694,316

4 Claims. (Cl. 80—1)

This invention relates to an apparatus for cleaning metal working rolls, and particularly those used in the cold rolling of sheets, tin plate or continuous strip material, although not limited thereto.

In the manufacture of cold reduced continuous strip material for a subsequent processing into commercial sheets, plates and the like, billets are first rolled on a "hot strip mill", wherein a workpiece of slight thickness and very substantial length is obtained. The strip material is then usually processed in a 4-high cold rolling mill wherein its reduction is transposed into much greater length without any appreciable change in its width. In order to acquire the desired finely finished surface in an operation of this sort, the severe strain imparted to the material caused numerous slivers to break away from its surfaces and collect on the bodies of the metal working rolls. In addition, carbonized oil from the surfaces of the material likewise collects on the surfaces of the metal working rolls. These conditions not only cause these slivers and impurities to be worked into the surface of the material but, in addition, they cause the surfaces of the metal working rolls to become pitted, giving rise to many difficulties.

In two co-pending applications of Edwin T. Lorig entitled "Method and apparatus for maintaining contant the temperature of metal working rolls", both filed November 13, 1933, and bearing Serial Nos. 697,862 and 697,863 there is disclosed novel means for spraying a liquid coolant on the surfaces of metal working rolls, the latter further showing an improved construction for use on mills intended to process materials of a width greatly exceeding commercial dimensions; such as for instance 84 inches in lieu of the conventional 48 inches. By the use of these devices, highly desirable results are obtained but the liquid coolant must be removed from the surfaces of the metal working rolls from the side which the strip material is emerging, otherwise it will drop onto the strip and occasion considerable difficulty in subsequent operations; such as, for example, annealing.

In our co-pending application entitled "Method and apparatus for cleaning the surfaces of metal working rolls", filed October 19, 1933, Serial No. 694,315, means are disclosed for cleaning metal working rolls of carbonized oil deposits, metal slivers, and superfluous quantities of liquid coolant.

The present invention seeks an improved construction of the class described which is particularly adapted for use on mills processing materials of a width considerably greater than conventional dimensions, and provides a highly efficient combination of mechanical movements for effecting its operation.

One object of the present invention is to provide a novel method and apparatus for cleaning the surfaces of metal working rolls of all impurities, and superfluous quantities of liquid coolant, and includes novel means for maintaining the cleaning elements a considerable distance from the face of the strip being processed, whether in operation or otherwise.

Another object is to provide a novel method and apparatus for bringing the cleaning devices into and out of contact with the metal working rolls in a highly efficient manner, and necessitating but few moving parts.

A further object is to provide a novel device of the class described which will be very cheap and easy to manufacture and install, and one which will prove very durable in service and require no adjustments.

These and further objects will be apparent after referring to the drawings, in which:

Figure 1 is a sectional elevation of the device of the invention, as used in connection with a conventional type of 4-high mill.

Figure 2 is a view similar to Figure 1 of the devices in another stage of operation.

Referring more particularly to the drawings, the letters A indicate a pair of large backing-up rolls while the letters B represent smaller metal working rolls disposed therebetween, which, when taken as a unit, comprise a conventional type of 4-high cold reducing continuous strip mill.

A vertical frame 2 is secured to either end of the 4-high mill and on either side thereof, and serve to carry end plates 3, each pair of which supports a spray manifold 4 adapted to operate on the lower side of the upper backing-up roll A, a spray manifold 5 functioning similarly against the upper side of the upper metal working roll B, a spray manifold 6 having its spray orifices directed against the upper side of the lower metal working roll B, and a spray manifold 7 functioning against the upper side of the bottom backing-up roll A. Each of the manifolds 4, 5, 6 and 7 between each pair of end plates 3 on either side of the mill is provided with a supply pipe 8, distributing pipe 9 and conduit 10, which is connected to a suitable reservoir containing a liquid coolant, valves 12 being disposed in each of the supply pipes 8 for enabling the selective opera-

tion of one to the exclusion of all others, if desired.

A series of baffles 14 are associated with the various manifolds 4, 5, 6 and 7 for enabling the efficient handling of surplus quantities of coolant after it has been spent upon the bodies of the various rolls.

Each of the end plates 3 is provided with an upper track 15 adjacent the mid-portion of the upper metal working roll B, while two pairs of similar trackways 16 are disposed below the center line of the mill, one being adjacent the upper portion of the lower metal working roll B and the other adjacent the lower portion thereof. A roller 17 is disposed in each of the upper guideways 15 on the end plates 3 on either side of the mill, and supports a tilting frame 18 extending from side to side of the mill. A plate 19 is secured to each of the frames 18 and provided with a rearwardly projecting extension 20 to cooperate with the baffles 14 for enabling the proper handling of superfluous liquid coolant, while the forward end of each of the plates 19 is provided with a scraper blade 21 having a hollow ground edge, as at 21a.

A curved plate 22 is extended across the upper face of each of the plates 19 for enabling the collection of a "back-log" of coolant from the supply manifolds 5, and serving, in addition, to deflect spent coolant from the manifolds 4 onto the extensions 20.

A pair of rollers 17 is disposed in the guideways 16 adjacent the upper portion of the lower metal working roll B, and on each side thereof, and each supports an elongated table 23 having a scraper blade 24 on one of their ends with a hollow ground edge 24a for contact therewith.

The pairs of rollers 17 in the trackways 16 adjacent the lower portion of the lower metal working roll B each support a lower table 25 on either side thereof having a scraper blade 26, with a hollow ground edge 26a for contact with this portion of the lower metal working roll. A curved plate 27 is connected to each of the lower tables 25 for enabling the distribution, or handling, of superfluous quantities of liquid coolant from the manifolds 6.

The rearward ends of each of the frames 18 are connected to bell-crank levers 28, which are pivoted, as at 29, on the end plates 3, the other ends of the bell-crank levers being connected to piston-rods 30 of fluid cylinders 31, which are likewise connected to the end plates 3 on either side of the mill.

An adjustable stop 33 is secured to each of the end plates 3 for limiting the movement of the bell-crank levers 28.

The rearward ends of the elongated tables 23, adjacent the upper portion of the lower metal working roll B on either side of the mill, are connected to bell-crank levers 34 which are pivoted, as at 35, on the end plates 3, the other end of the bell-crank levers each being connected to a piston-rod 36, which is associated with a fluid cylinder 37 that is connected to an end plate 3, as at 38.

The rearward end of each of the lower tables 25 adjacent the lower portion of the lower metal working roll B is connected to a bell-crank lever 39, which is pivoted between the end plates 3, as at 40. The bell-crank levers 39 are each connected at their other end to a piston-rod 40 associated with a fluid cylinder 42 which is likewise connected between the end plates 3, as at 38.

A pivoted lever 43 is mounted between the end plates 3 adjacent the upper portion of the lower metal working roll A on either side of the mill, and each support a scraper blade 44 having a hollow ground edge 44a. A shaft 45 is connected to the other end of each of the pivoted levers 43, and to one end of a spring 46, which is suitably secured to the adjacent conduit 10, as shown at 47.

In operation, the fluid cylinders 31, 37 and 42 will be energized to operate the bell-crank levers 28, 34 and 39, to enable the contact of the blades 21, 24 and 26 against the metal working rolls B—B on the right-hand side of the mill when the strip is being rolled in the direction indicated by the arrow in Figure 1.

The blades 21, 24, 26 and 44 will contact with the lower portion of the upper metal working roll B; the upper portion of the lower metal working roll B; the lower portion of the lower metal working roll B; and the upper portion of the lower backing-up roll A, respectively, and the baffles 14 for the spray devices 4, 5, 6 and 7 and the plates 20, 22 and 27 will serve to remove superfluous spent coolant to remote portions of the mill, from whence it can be conveyed to a suitable cleaning and storage device to be returned through the conduits 10 for subsequent usage.

The operation being the same on both sides of the mill, when the direction of rolling is changed from that shown in Figure 1, the fluid cylinders 31, 37 and 42 on the right-hand side of the mill are exhausted, and their counterparts on the opposite side of the mill operated to reverse the position of the various elements accordingly, as shown in Figure 2.

Due to the rocking action of the bell-crank levers 28, 34 and 39 and the fact that the rollers 17 move in the trackways 15 and 16, respectively, the positions of the blades 21, 24 and 26 deviate but slightly from their horizontal movement into and out of operating position, with the result that they are remotely situated with respect to the strip A at all stages of operation. In practice, the scraper blades 44 are held in contact with the lower backing-up roll A at all times, regardless of the direction of rolling.

While we have shown and described one specific embodiment of our invention, it will be understood that we do not wish to be limited exactly thereto, since various modifications may be made without departing from the scope of our invention, as defined in the following claims.

We claim:

1. Apparatus for cleaning the surfaces of metal working rolls comprising a pair of trackways adjacent each of said metal working rolls and on either side thereof, a wheeled carriage adapted to move on each pair of said trackways, a scraper blade on the end of each of said carriages and adapted to contact with said metal working rolls relatively adjacent their line of pass, a leverage system for withdrawing each of said carriages, and means for actuating each of said leverage systems.

2. Apparatus for cleaning the surfaces of metal working rolls comprising a pair of trackways adjacent each of said metal working rolls and on either side thereof, a wheeled carriage adapted to move on each pair of said trackways, a scraper blade on the end of each of said carriages and adapted to contact with said metal working rolls relatively adjacent their line of pass, a leverage system for withdrawing each of said carriages and means for actuating each of said leverage

systems, the contact edge of each of said scraper blades being hollow-ground.

3. Apparatus for cleaning the rolls of a 4-high cold reduction mill comprising a wheeled carriage adjacent each of the metal working rolls of said mill and on either side thereof, a scraper blade on each of said carriages adapted to contact with the surfaces of said metal working rolls relatively adjacent their line of pass, a second wheeled carriage adjacent the lower portion of the lower metal working roll and on either side thereof, a scraper blade on said last named carriages adapted to contact with the lower portion of said lower metal working roll, a scraper blade for both sides of the lower backing-up roll of said mill, and means for selectively moving all of said scraper blades into and out of operative position.

4. Apparatus for cleaning the rolls of a 4-high cold reduction mill comprising a wheeled carriage adjacent each of the metal working rolls of said mill and on either side thereof, a scraper blade on each of said carriages adapted to contact with the surfaces of said metal working rolls relatively adjacent their line of pass, a second wheeled carriage adjacent the lower portion of the lower metal working roll and on either side thereof, a scraper blade on said last named carriage adapted to contact with the lower portion of said lower metal working roll, a scraper blade for both sides of the lower backing-up roll of said mill, and means for selectively moving all of said scraper blades into and out of operative position, and baffle devices associated with each of said scraper blades for enabling the flow of superfluous roll lubricant to remote portions of the mill.

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