April 7, 1942. F. J. WOOD 2,279,217

CONTINUOUS STRIP PICKLING AND CLEANING DEVICE

Filed May 25, 1939 2 Sheets-Sheet 1

Fig. 1

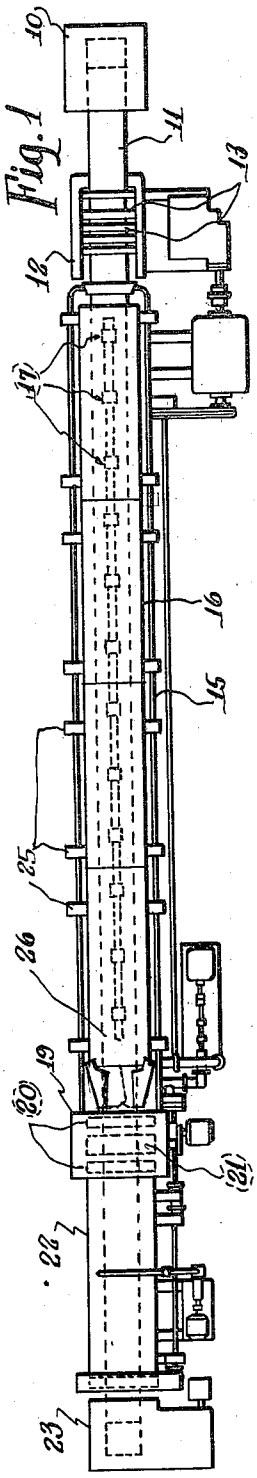


Fig. 2

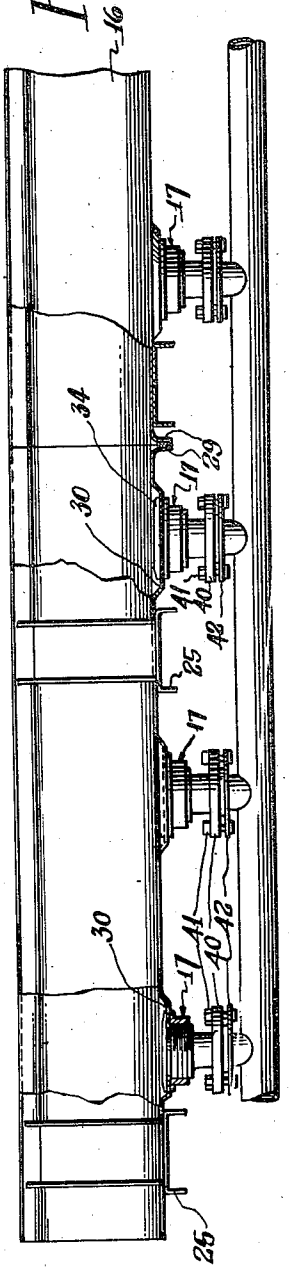
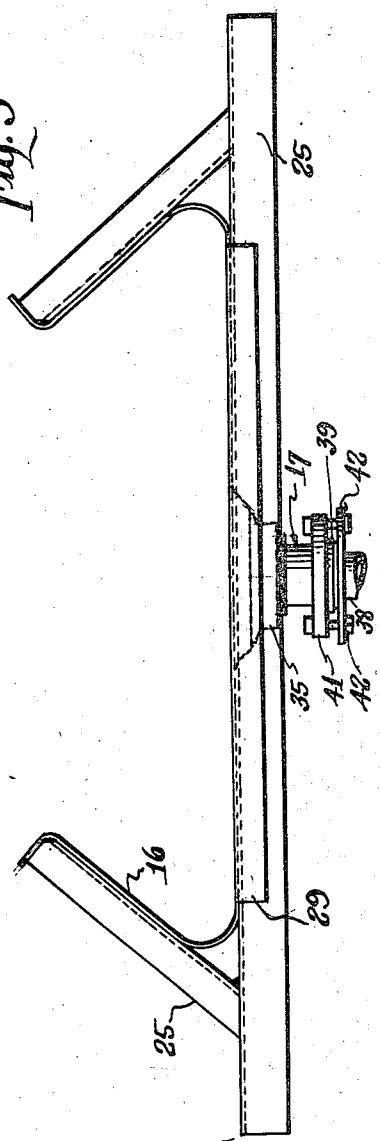


Fig. 3



Inventor
Frank J. Wood
Clarence F. Poole
Attorney

April 7, 1942. F. J. WOOD 2,279,217

CONTINUOUS STRIP PICKLING AND CLEANING DEVICE

Filed May 25, 1939 2 Sheets-Sheet 2

Fig. 4

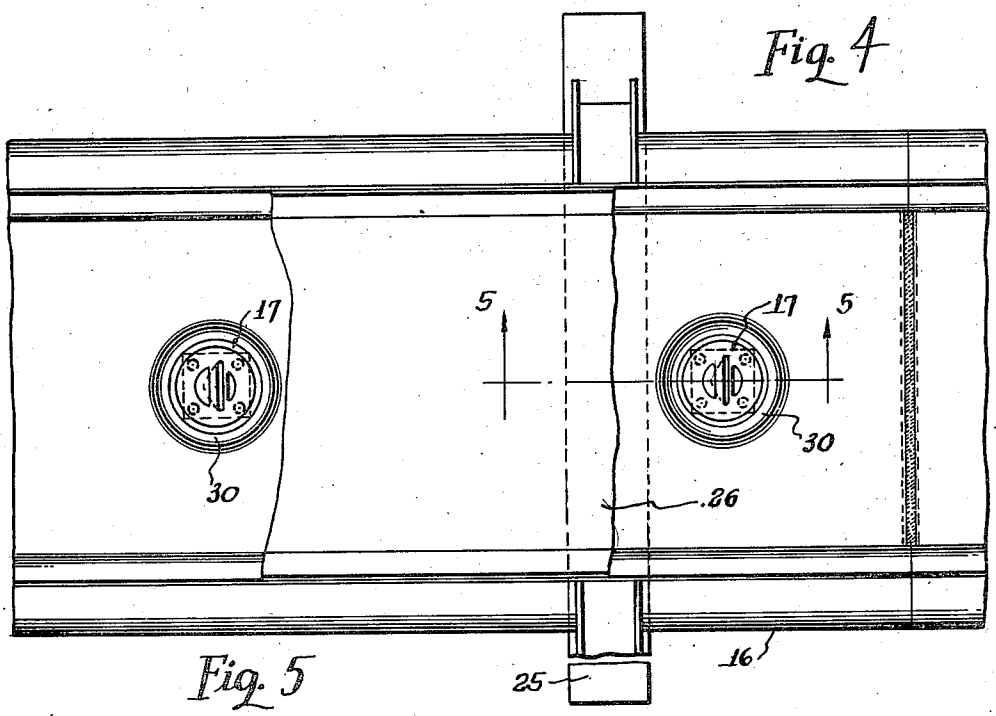


Fig. 5

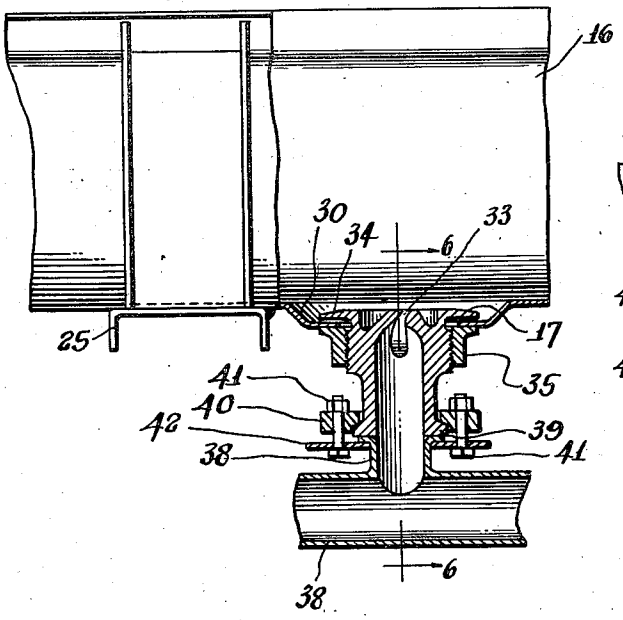
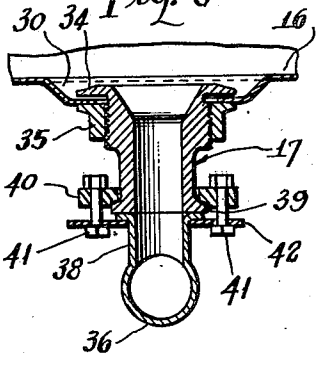


Fig. 6



Inventor
Frank J. Wood
Clarence T. Pole
Attorney

Patented Apr. 7, 1942 2,279,217

UNITED STATES PATENT OFFICE

2,279,217

CONTINUOUS STRIP PICKLING AND CLEANING DEVICE

Frank J. Wood, Riverside, Ill., assignor to Goodman Manufacturing Company, Chicago, Ill., a corporation of Illinois

Application May 25, 1939, Serial No. 275,705

3 Claims. (Cl. 266—7)

This invention relates to improvements in continuous strip pickling and cleaning devices, and more particularly relates to improvements in the pickling trough and acid spray for pickling the strip metal.

In pickling and cleaning devices for continuous strips of metal, where the metal is sprayed with pickling fluid as it passes through the pickling trough, the metal is frequently scratched while passing through the pickling trough. This is caused by engagement of the underside of the metal with the spraying nozzles and the welds at the joints between the trough sections. Another difficulty which has been encountered is that pickling troughs have usually been made of an acid resisting steel, to prevent their attack by the pickling fluid, and when they are welded together or when the nozzles are secured to the trough by welding, the heat of welding changes the structure of the steel around the weld and renders the joints and areas around the nozzle less resistant to attack by the pickling fluid.

The principal objects of my invention are to remedy these difficulties by providing a novel form of pickling trough having the spraying nozzles recessed below the bottom of the trough and secured thereto by means other than welding, and having all projecting joints which might scratch the metal disposed beneath the normal bottom of the trough.

Other objects of my invention will appear from time to time as the following specification proceeds, and with reference to the accompanying drawings wherein:

Figure 1 is a diagrammatic plan view of a continuous strip pickling and cleaning apparatus having a pickling trough constructed in accordance with my invention as a part thereof;

Figure 2 is an enlarged detail view in side elevation of a part of a pickling trough constructed in accordance with my invention, with certain parts broken away and certain other parts shown in longitudinal section;

Figure 3 is an enlarged end view of the trough;

Figure 4 is a plan view of the trough drawn to substantially the same scale as Figure 2, with parts of the cover therefor broken away;

Figure 5 is an enlarged fragmentary longitudinal sectional view taken substantially along line 5—5 of Figure 4; and

Figure 6 is a transverse sectional view taken substantially along line 6—6 of Figure 5.

In the drawings, the continuous strip pickling and cleaning device embodying my invention includes a coil supporting box 10 disposed at the entering end of the apparatus and forming a support for a coil of strip metal 11, permitting it to be unwound and passed through the cleaning apparatus. A leveler 12 is provided in advance of said coil supporting box and consists of a plurality of power driven leveling rolls 13, 13 engaging opposite sides of the metal, for leveling and breaking the scale on the metal, before the cleaning operation, in a manner well known to those skilled in the art. A pickling bath is provided in advance of said leveler and, as herein shown, includes a pickling and cleaning tank 15 having a pickling trough 16 disposed thereabove and extending therealong. Said pickling trough is provided with a plurality of nozzles 17, 17 spaced therealong for spraying the metal with pickling fluid as it passes through said trough. Said nozzles and pickling trough will herein be more clearly described as this specification proceeds. A squeegee and brushing stand 19, including squeegee rolls 20, 20 and brushing rolls 21, 21 disposed therebetween, is disposed in advance of said cleaning trough for removing the loosened scale and other foreign matter, which has been attacked by the pickling solution, from the metal, by scrubbing with water. From said cleaning and brushing stand, the metal may pass through a drier 22 to a coiler 23 which recoils the metal and aids in pulling it through the system. Said coil supporting box, leveler, squeegee and brushing stand, drier and coiler are only shown in an illustrative form since they form no part of the present invention except in so far as the apparatus of the present invention may be a part of an entire pickling system.

Referring now in particular to the details of the pickling trough 16, said trough is mounted above the pickling and cleaning tank 15 on supporting frame members 25, 25, extending across and herein shown as being mounted on the upper edges of said pickling and cleaning tank. The sides of said trough are inclined upwardly and inwardly from the bottom to form a restricted open top of smaller area than the bottom, to reduce the tendency of the pickling fluid to splash out of the trough, and to permit the sides of the trough to form a guide for the wider strips of metal. A cover 26 closes the top of said trough.

The pickling trough 16 is preferably constructed of an acid resisting sheet material such as stainless steel, and in view of its length, which is usually around 60 feet, is of a sectional construction with the sections thereof welded together. For strength, these welds usually project above the bottom of the trough and form an

upwardly projecting surface which scratches the underside of the metal as it passes therethrough, and which also weakens the metal at the weld and renders it subject to attack by the pickling fluid. In the form of trough shown, the bottom of the trough at the junction point between the trough sections is bent downwardly with a smooth curve at the bend thereof, to form a depending flange 29 (see Figure 2). These flanges of adjacent sections are then placed in abutting relation with respect to each other, and may either be bolted or welded together. In welding, the entire weld is disposed beneath the bottom of the trough to provide a smooth path along the bottom of the trough to prevent scratching of the metal. Also, since the weld is beneath the bottom of the trough, a greater part of the heat in the metal during welding is in the depending flanges 29, 29, which reduces the liability of the heat of the weld to change the structure of the trough at the point where it is in engagement with the pickling fluid. The abutting edges of the trough, along the sides thereof, may be welded together by line welding to form a fluid-tight joint between the trough sections. It should herein be noted that the line weld of the sides is relatively small, and this welding does not heat the ends of the trough sufficiently to noticeably change the structure of the steel. Likewise, these welds being on the sides of the trough cannot scratch the metal.

Referring now to the novel manner in which the nozzles 17, 17 are mounted in the bottom of the pickling trough 16, the bottom of said pickling trough is provided with a plurality of depressed or dished in portions 30, 30 which are apertured to receive the nozzles 17, 17 and recess the top surfaces of said nozzles beneath the normal bottom of said trough (see Figures 2, 5 and 6).

Each nozzle 17 is provided with an opening 33, formed to spread the pickling fluid and direct it to engage the metal in the direction said metal travels through the system, or in an opposite direction, if desired, by changing the position of said nozzle with respect to said trough. Said nozzle is likewise provided with a flanged upper portion 34, which is engaged with the top of the dished in portion 30 by a flanged collar 35 engaging the underside of said dished in portion. Said collar is threaded on said nozzle and engages the underside of the depressed portion 30 of said trough. Said nozzle may be directed in any desired direction by loosening the collar 35 and turning said nozzle about a vertical axis, so as to spray fluid on the bottom of the metal in the direction of travel of the metal through the pickling trough, or in an opposite direction, if desired.

Pickling fluid is conducted to the nozzles 17, 17 by means of a pipe 36 extending along the bottom of said tank and having flanged branches 38, 38 adapted to be engaged with the bottom of lower flanged portions 39, 39 of said nozzles. A retaining collar 40 engages the top of said lower flanged portions, and suitable nuts and bolts 41, 41, extending through said collar and a collar 42 abutting the underside of the flange of the flanged branch 38, are adapted to securely engage said branches with said nozzles (see Figures 5 and 6).

It may be seen from the foregoing that a new and improved construction of pickling trough and spraying nozzle therefor has been provided, which eliminates all nozzles projecting upwardly from the bottom of the trough into the path of the metal and also eliminates all upwardly projecting joints connecting the trough sections together, and thus reduces the liability of the metal to scratch on the bottom of the trough. It may likewise be seen that welds between the nozzles and bottom of the trough have been eliminated, and that the nozzles are so mounted in the trough as to be readily adjustable to spray in any desired direction.

While I have herein shown and described one form in which my invention may be embodied, it will be understood that the construction thereof and the arrangement of the various parts may be altered without departing from the spirit and scope thereof. Furthermore, I do not wish to be construed as limiting myself to the specific embodiment illustrated, excepting as it may be limited in the appended claims.

I claim as my invention:

1. In a continuous strip pickling and cleaning device, a pickling trough having a relatively flat bottom surface along which a strip of metal is adapted to pass, said bottom surface having a depressed portion formed therein, and a spraying nozzle mounted in said depressed portion out of the path of travel of the metal through said trough and opening into said pickling trough for spraying the underside of the metal with pickling fluid as it passes therethrough, said nozzle having a depending portion extending through the bottom of said depressed portion, and means engaging said nozzle and the under side of said trough for holding said nozzle in said depressed portion thereof so its top surface is wholly beneath the bottom portion of said trough which defines the upper margin of said depressed portion.

2. In a continuous strip pickling and cleaning device, a pickling trough through which a strip of metal is adapted to pass, said trough being formed from an acid resisting metal and being provided with a plurality of depressed apertured portions longitudinally spaced along its bottom, a spraying nozzle mounted in each of said depressed portions and opening into said trough, the upper extremities of said nozzles being disposed beneath the path of travel of the metal through said trough and wholly beneath the bottom portions of said trough which define the upper margins of said depressed portions, and each of said nozzles having a portion engaging the upper side of said depressed portion and having a body depending therefrom and extending through the opening defined by said apertured portion, and means engaging said body portion of said nozzle and the underside of said depressed portion, for holding the portion of said nozzle engaging the upper side of said depressed portion in engagement with said depressed portion and securing said nozzle to said depressed portion in such a manner as to permit said nozzle to be adjustably moved about a vertical axis so said nozzle may be adjusted to spray fluid into said trough in various desired directions.

3. In a continuous strip pickling and cleaning device, a pickling trough through which a strip of metal is adapted to pass, said trough being formed from an acid resisting metal and being provided with a plurality of depressed apertured portions longitudinally spaced along its bottom, a spraying nozzle mounted in each of said depressed portions and opening into said trough, the upper extremities of said nozzles being disposed beneath the path of travel of the metal

through said trough and wholly beneath the bottom portions of said trough which define the upper margins of said depressed portions, and each of said nozzles having a portion engaging the upper side of said depressed portion and having a body depending therefrom and extending through the opening defined by said apertured portion, and a collar threaded on said body and adapted to engage the underside of said depressed portion for holding the portion of said nozzle engaging the upper side of said depressed portion in engagement with said depressed portion, for securing said nozzle to said depressed portion in such a manner as to permit said nozzle to be adjustably moved about a vertical axis so said nozzle may be adjusted to spray fluid into said trough in various desired directions.

FRANK J. WOOD.