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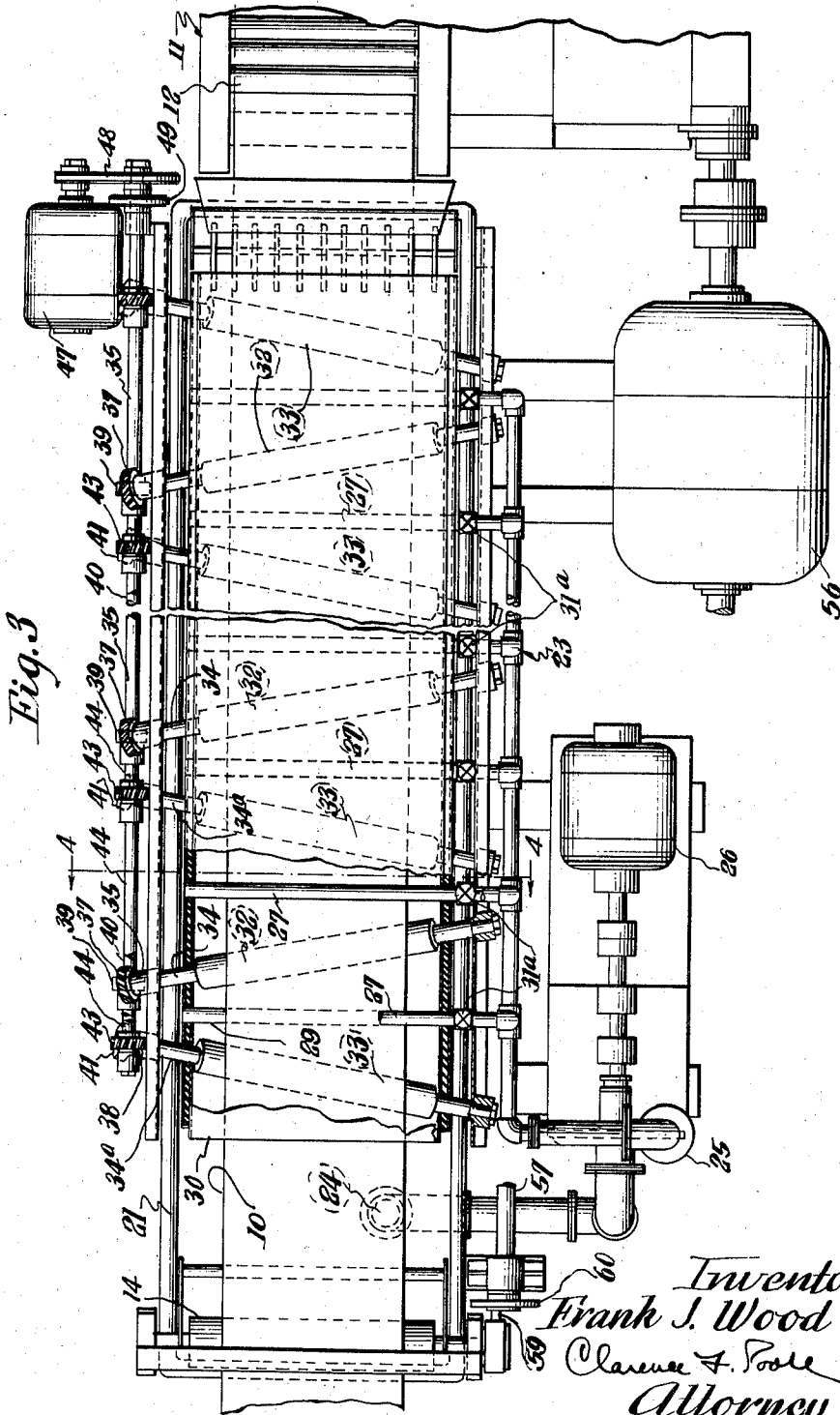
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PICKLING AND CLEANING DEVICE FOR STRIPS OF SHEET METAL

Filed May 13, 1937

3 Sheets-Sheet 2



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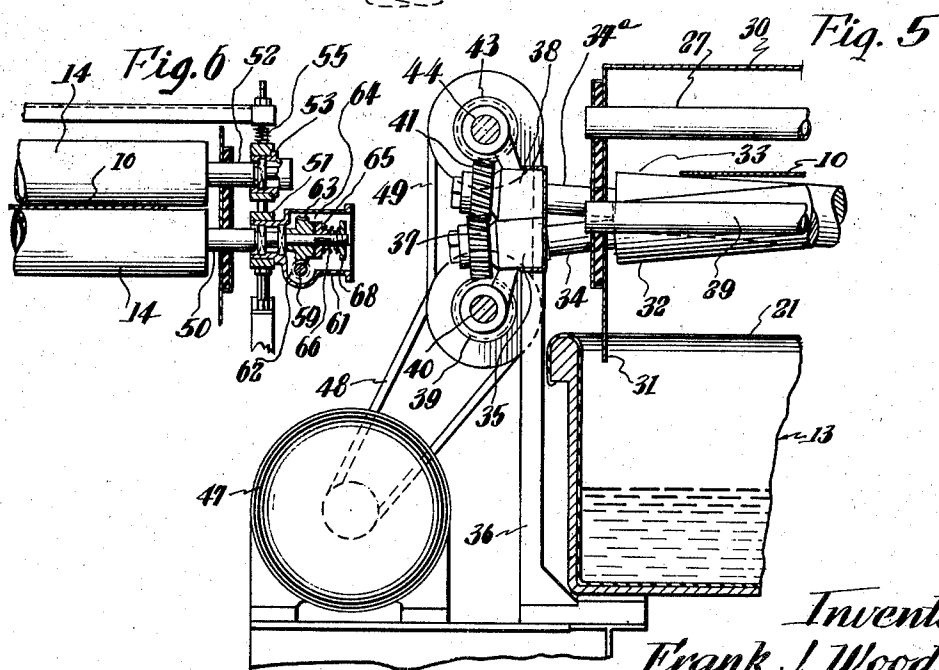
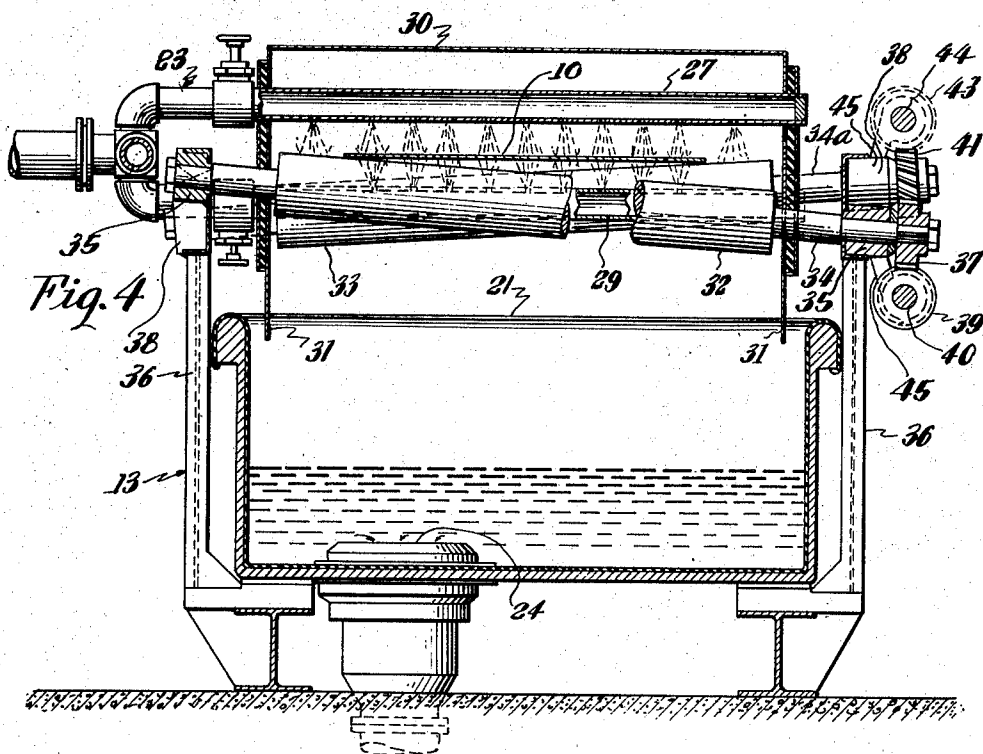
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3 Sheets-Sheet 3



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PICKLING AND CLEANING DEVICE FOR STRIPS OF SHEET METAL

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2 Claims. (Cl. 266—3)

This invention relates to improvements in pickling and cleaning devices for strips of sheet metal and more particularly relates to a conveying and centering means for the metal as it passes through the pickling bath.

Heretofore, pickling devices and continuous cleaners for strips of sheet metal have usually consisted of a leveler, an acid bath or pickling tank, squeegee and cleaner rolls, and a drier. The metal is usually uncoiled as it passes through the system and coiled up at the end of the system, the coiling mechanism forming a means for conveying the metal through the system. When one coil is completely uncoiled, its free end is usually attached to the free end of the next succeeding coil by stitching. With such a system the tendency is for the metal to sag and rub against the bottom and sides of the acid tank or rest upon submerged rollers which may be provided to guide the metal through the tank. Also the metal must be stopped after each coil has been unwound to attach the next succeeding strip to it. This gives an extra pickling time to that part in the tank which is not in motion and thus produces over pickling of certain parts of the metal. Irregularity in pickling of the entire strip of metal also occurs where the entire under surface of the metal is supported on rollers or where the metal rests on the bottom of the tank by its own weight. A further disadvantage is that the pull of the squeegee rollers serves to convey the material through the acid bath and this causes breakage of the metal at its stitched joints and causes waves or irregularities in thin strips of metal.

My invention has as its objects to remedy these difficulties by providing a new and improved pickling and cleaning device arranged so as to support the metal on its edges only as it passes through the pickling tank and to uniformly spray the metal with a controlled spraying means on both sides with pickling acid, instead of submerging it in a bath of pickling acid and relying upon the stitched pieces to follow through without breaking the joints.

Another object of my invention is to so arrange the means for supporting the metal that it may also form a conveying means for moving the metal along the pickling tank and center it in relation to the tank.

Another object of my invention is to so arrange the spraying and conveying means that the edges of the metal only are engaged by the conveying means to permit the entire surface of the metal to be uniformly sprayed.

Still another object of my invention is to so

arrange the squeegee rolls that they may maintain sufficient tension on the metal as it passes through the bath to prevent its sagging and buckling, but which tension will not exceed a certain predetermined value.

Other objects of my invention will appear from time to time as the accompanying specification proceeds.

My invention may be more clearly understood with reference to the accompanying drawings wherein:

Figure 1 is a diagrammatic top plan view of a pickling and cleaning device constructed in accordance with my invention;

Figure 2 is a diagrammatic side elevation of the device shown in Figure 1;

Figure 3 is an enlarged detail plan view of the pickling bath with parts of the mechanism and tank broken away and in section, to more clearly illustrate certain details thereof;

Figure 4 is an enlarged transverse sectional view of the pickling bath taken substantially along lines 4—4 of Figure 3;

Figure 5 is an enlarged fragmentary transverse sectional view of the pickling bath illustrating certain details of my invention which are not shown in Figure 4; and

Figure 6 is an enlarged detail transverse fragmentary sectional view of the forward squeegee rolls.

Like reference characters refer to like parts throughout the various figures.

In the drawings the embodiment of my invention illustrated includes generally a coil of strip metal 10 supported so that it may be unwound upon the application of tension to its free end. Said metal is trained through a leveler 11 which consists of a plurality of power driven leveling rolls 12, 12. From thence it is trained through a pickling bath generally indicated by reference character 13 and which will hereinafter be more clearly described as this specification proceeds. Power driven squeegee rolls 14, 14 are provided at the opposite end of said pickling tank to squeeze the acid from said metal. Succeeding said squeegee rolls is a plurality of rotatable brushes 15, 15 for brushing the upper and lower sides of the metal. Another pair of squeegee rolls 16, 16 is provided on the opposite side of said brushes from said first-mentioned rolls. Said strip metal then passes through a drier 17 and through another pair of squeegee rolls 18, 18 to a coiler 19.

Referring now particularly to the pickling bath 13 and several of the novel features of my invention, said pickling bath includes generally a longi-

itudinally extending tank 21 having spraying devices 23, 23 disposed thereabove and adapted to spray the upper and lower sides of the strip metal with a suitable pickling acid. Said tank is herein shown as being lined with acid-resisting rubber and serves as a receptacle to catch the pickling acid, and is provided with an outlet 24 leading to a pump 25 which supplies pickling acid to said spraying devices so that it may be used over again. Said pump is of an ordinary construction driven by a motor 26 so will not herein be shown or described in detail.

The spraying devices 23, 23 consist of a plurality of parallel spaced pipes 27 arranged along said tank in transverse relation with respect thereto and disposed above the metal with openings in the underside thereof to spray directly on the top surface of the metal, and a plurality of similar pipes 29, 29 disposed beneath said first-mentioned pipes and having openings on the upper side thereof to spray the underside of the metal. Said pipes are closed at their free ends and are mounted between the sides of a cover section 30 which extends along the top of the tank 21 and has downwardly extending sides 31, 31 terminating beneath the upper side of the tank 21 to catch the sprayed material and direct it into said tank. Suitable valves, generally indicated by reference character 31a are provided to control operation of said spraying devices when desired, and thus stop the pickling action when adjacent ends of the metal are being stitched together, to prevent overpickling of a portion of the metal.

Referring now particularly to the supporting and conveying means for the metal, a plurality of parallel spaced rolls 32, 32 is provided which extend transversely of the tank 21 at suitable intervals therealong and which are arranged in skewed relationship with respect to the sides of said tank in both horizontal and vertical planes. A plurality of parallel spaced rolls 33, 33 is also provided. These rolls are disposed between the rolls 32, 32 and are arranged in skewed relationship with respect to the sides of the tank and with respect to the rolls 32, 32 in both horizontal and vertical planes but in opposite directions than said first-mentioned rolls. Thus the rolls 32, 32 are inclined in one direction in a vertical plane and extend towards one end of the tank, while the rolls 33, 33 are inclined in an opposite direction in a vertical plane and extend towards the opposite end of the tank so that adjacent rolls form in effect a trough support for the sheet material. The tendency is for one roll to move the sheet material thereon toward one side of the tank while the next adjacent roll tends to move it towards the opposite side of the tank. Thus each set of rolls 32 and 33 tend to center the material with respect to the tank as they convey it therealong. It should also be noted that with the trough-like formation of adjacent rolls, the edges only of the sheet metal rest on said rolls so that the major portion thereof is suspended above said rolls and may receive a bath from the underside thereof.

The rolls 32, 32 are herein shown as being mounted on shafts 34, 34 which are mounted in bearing members 35, 35 adjacent their ends. These bearing members are in turn mounted in the upper sides of upstanding side frame members 36, 36 extending upwardly along opposite sides of the tank 21. In a like manner the rolls 33, 33 are mounted on shafts 34a, 34a which are mounted in bearing members 38, 38, which bear-

ing members are mounted in the side frame members 36, 36. Spiral gears 37, 37 are keyed to the outer ends of the shafts 34, 34 and are meshed with spiral gears 39, 39 on a longitudinally extending shaft 40. Likewise spiral gears 41, 41 are keyed to the outer ends of the shafts 34a, 34a, and are meshed with spiral gears 43, 43 on a longitudinally extending shaft 44. Said longitudinally extending shafts are mounted in parallel spaced relation with respect to each other in brackets 45, 45 extending laterally and upwardly and downwardly from the upper end of one side frame member 36.

The shafts 40 and 44 are driven from a motor 47 which is of an ordinary electric type and which drives the shaft 40 by means of a suitable drive connection herein shown as being a V-belt drive and generally indicated by reference character 48. The shafts 40 and 44 are connected together by a suitable drive connection which is herein shown as being a V-belt drive generally indicated by reference character 49.

It will thus be apparent that when the strip of sheet metal is trained onto the rolls 32 and 33 that said metal will be supported at its edges on said rolls and that rotation of said rolls will tend to move it along said tank, and that the skewed relationship of said rolls with respect to each other in a horizontal plane will center the metal with respect to said tank.

Referring now in particular to the details of the squeegee rolls 14, 14 and another of the novel features of my invention, said squeegee rolls are disposed at the leaving end of the tank 21 and partially overhang said end of said tank. The lower squeegee roll is mounted on a shaft 50 which is journaled at its ends in a frame 51. The upper of said rolls is mounted on a shaft 52 journaled at its ends in bearing members 53, 53 which are guided for vertical movement in the frame 51 in a suitable manner. Said upper roller is yieldably engaged with the lower roller by means of springs 55, 55 (see Figure 6).

The lowermost of said rollers is driven from a motor 56 which also forms a drive means for driving the leveler 11. The drive connection from said motor to said roll is not herein shown in detail since it is no portion of my present application and includes a longitudinally extending shaft 57, a parallel shaft 59 driven therefrom by means of a suitable drive connection herein shown as being a V-belt drive 60. The shaft 59 is mounted in a housing 61 extending from the frame 51 and has a worm 62 thereon which meshes with and drives a worm gear 63 freely mounted on the shaft 50. A friction disk 64 is mounted on one face of the flange of a flanged collar 65 and is adapted to engage an engaging face formed on the hub of said worm gear. Said flanged collar is feathered on the shaft 50, and said friction disk is engaged with the face of the hub of said worm gear by means of a suitable compression spring 66 interposed between said collar and a shouldered member 68 threaded on the end of said shaft. The driving tension of the rolls 14, 14 may thus be regulated by means of the shouldered member 68 on said shaft.

During normal operation, the driving tension of the rolls is such as to hold the strip metal in a taut condition which will prevent its sagging at its center and which is not sufficient to convey the metal along the system. In cases where this drive tension becomes greater and sufficient to break the stitched joints, the friction disk 64 will slip which will relieve the drive tension of

said rolls and thus prevent said rolls from exerting an excessive tension on the metal.

It will be seen from the foregoing that as the metal is uncoiled from the coil 10 and straightened and leveled by the leveler 11, that it passes over the pickling tank 21 and is moved therealong by the conveyer rolls 32 and 33 and kept in a central position with respect to said rolls by reason of their skewed relationship with respect to each other in a horizontal plane. At the same time, the upper and lower sides of said metal are sprayed with a suitable pickling acid and the excess acid is squeezed and cleaned from said metal by means of the squeegee rolls 14, 14, the revolving brushes 15, 15 engaging the upper and lower sides of said metal, and the squeegee rolls 16, 16. From the squeegee rolls 16, 16 said metal will pass through the steam drier 17 through the squeegee rolls 18, 18 to the coiler 19 which winds it into a coil ready for commercial use.

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 pickling and cleaning device

for strip metal, a pickling tank, a leveler at the entering end of said tank, said leveler being adapted to push the metal into said tank and including a plurality of leveling rolls through which the metal is adapted to pass, squeegee and cleaning rolls at the other end of said tank, and power driven means extending along said tank for conveying the sheet metal therealong between said leveler and squeegee and cleaning rolls including a plurality of transversely disposed power driven rollers arranged along said tank in skewed relationship with respect to the sides thereof so that alternate rollers are horizontally inclined in opposite directions.

2. In a continuous pickling and cleaning device for strip metal, a pickling tank, a leveler at the entering end of said tank, said leveler being adapted to push the metal into said tank and including a plurality of leveling rolls through which the metal is adapted to pass, squeegee and cleaning rolls at the other end of said tank, and power driven means extending along said tank for conveying the sheet metal therealong between said leveler and squeegee and cleaning rolls including a plurality of transversely disposed power driven rollers arranged along said tank in skewed relationship with respect to said tank so that alternate rollers are inclined in opposite directions in both horizontal and vertical planes.

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