Dec. 6, 1938. L. C. STEELE 2,139,337

LIQUID TREATMENT OF METAL SHEETS

Filed June 12, 1937 2 Sheets-Sheet 1

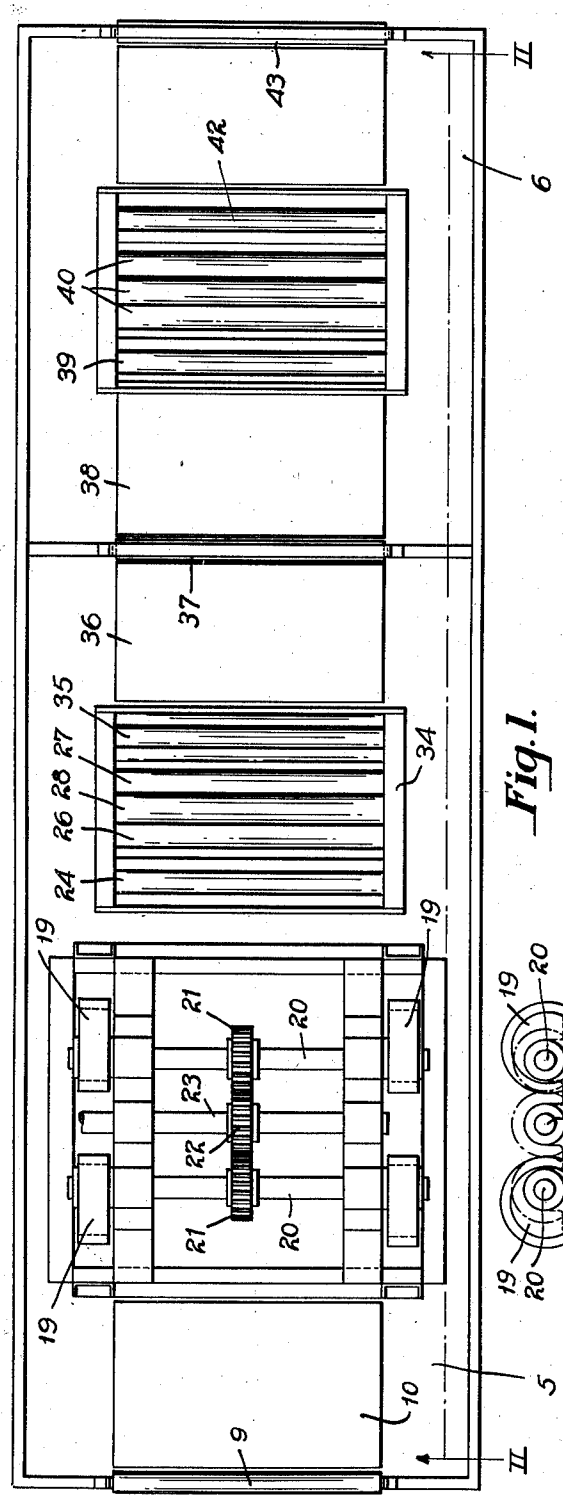

Fig. 1.

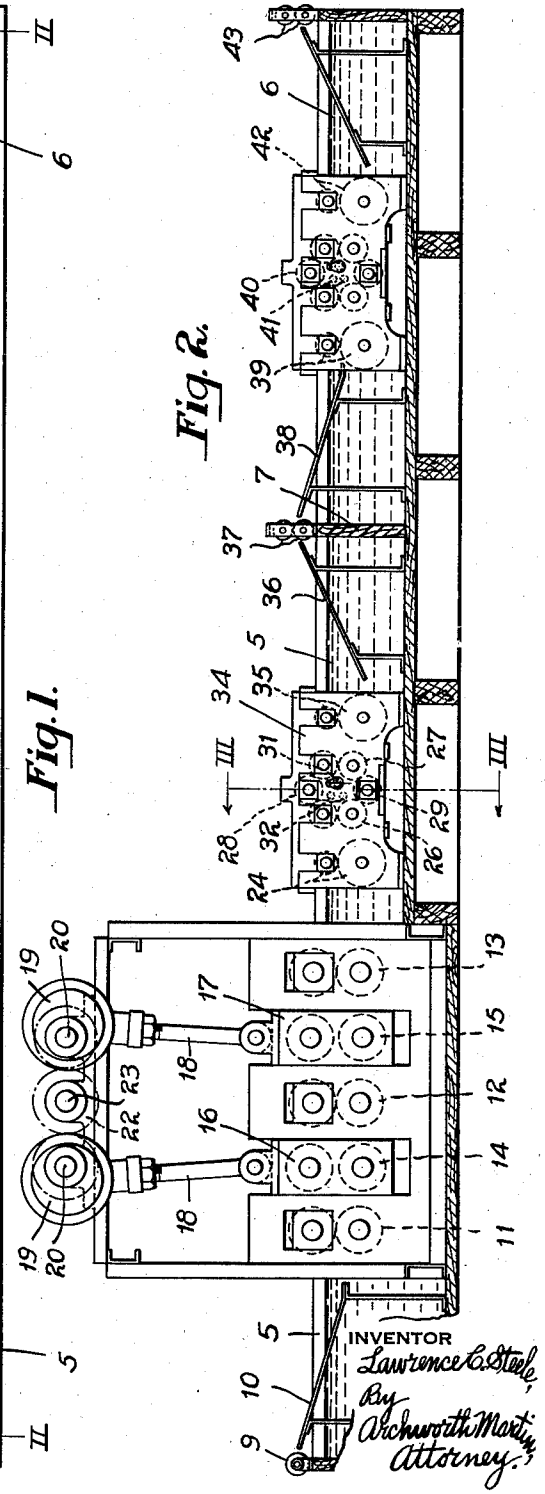

Fig. 2.

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Fig. 3.

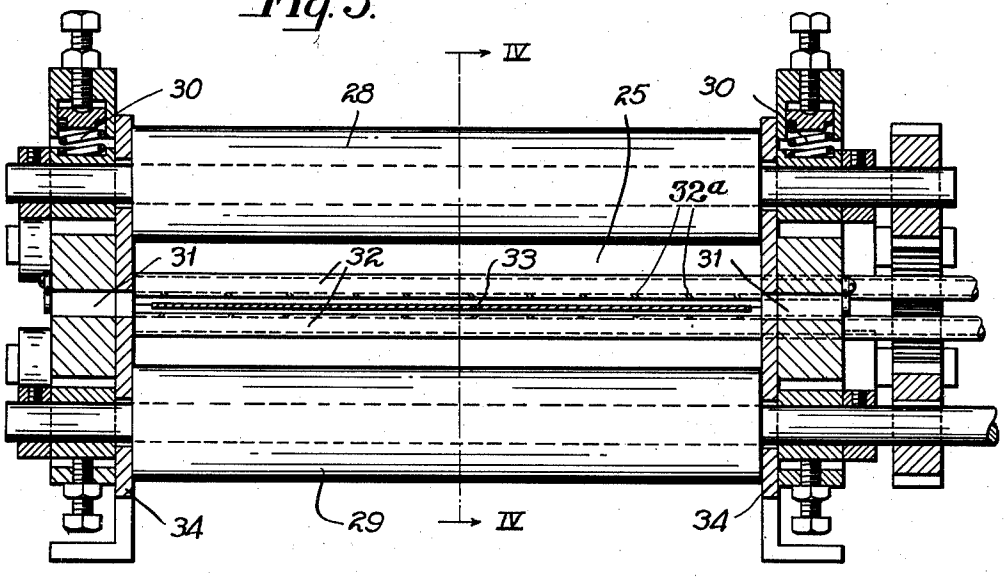
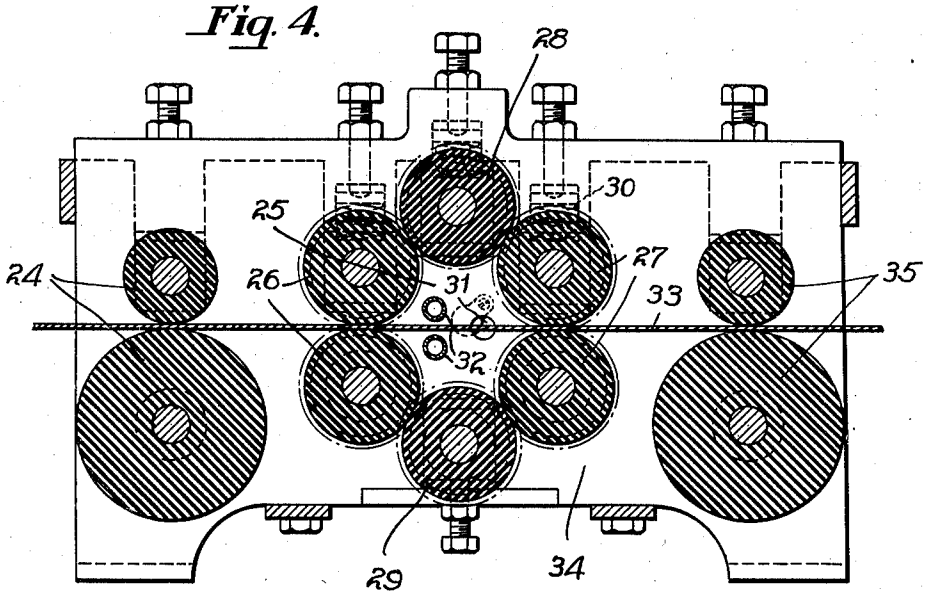


Fig. 4.



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LIQUID TREATMENT OF METAL SHEETS

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Application June 12, 1937, Serial No. 147,825

4 Claims. (Cl. 266—6)

My invention relates to the pickling or acid cleansing of sheet metal plates or strips, and the washing thereof to remove grease or other foreign matter adhering to the rolled sheets. The "pickling" and washing operations are performed either simply for the purpose of cleansing the sheets or for preparing them to be coated with tin or other plating.

One object of my invention is to provide an improved form of apparatus for effectively cleansing metal strips or sheets as above referred to.

Another object of my invention is to provide cleansing apparatus of the character referred to which can suitably be used either in the cleansing of terne plate or strips from the continuous type of rolling mill.

As shown in the accompanying drawings, Figure 1 is a plan view of the apparatus; Fig. 2 is a view taken on the line II—II of Fig. 1; Fig. 3 is an enlarged sectional view taken on the line III—III of Fig. 2, and Fig. 4 is a view taken on the line IV—IV of Fig. 3.

The apparatus includes an acid tank 5 and a water tank 6 which suitably may be of unitary construction and divided by a partition 7. The tank 5 will contain sulphuric acid or other suitable cleansing agents, while the tank 6 will be filled with water for removing the acid from the metal sheets. The sheets enter the tank 5 across a roller 9 and down a guide plate 10, and are drawn forwardly by pairs of rollers 11, 12 and 13, which may be driven in any suitable manner. Intermediate the rollers 11 and 12 and the rollers 12 and 13 are pairs of rollers 14 and 15 respectively, which are mounted in vertically reciprocable bearing blocks 16 and 17 at each end, which are carried by eccentric rods 18 connected to eccentrics 19. The shafts 20 for the eccentrics 19 have mounted thereon gear wheels 21 which are driven from a pinion 22 that is secured to shaft 23, the shaft 23 being driven from any suitable source of power.

Since the bearings for the rollers 11, 12 and 13 are stationary, it will be seen that upon operation of the eccentrics 19 during the passage of a sheet through the pickling tank, the sheets will be flexed vertically, thus agitating the acid, and making for more intimate contact between the sheets and the acid, and producing a washing effect that is not obtained when the sheets are simply placed in acid or drawn through acid.

After the sheets pass the rolls 13, they are moved forwardly by driven rolls 24 and caused to pass through a group of six rolls which together form a segregated area or space 25. These rolls are driven in any suitable manner and comprise two pairs of sheet-contacting rolls 26 and 27 and rolls 28 and 29 that closely fit the peripheries of the rolls 26 and 27. The upper rolls of this group are supported in vertically movable bearings which are yieldably urged downwardly by means of springs 30.

A pair of steam pipes 32 extend laterally across the space 25 and contain jet-like orifices 32a directed angularly against the upper and lower sides of the metal sheet 33, in a direction to effect flow of fluid transversely of the sheet, as shown in Fig. 3. The pipes 32 are supplied with steam under pressure or could be supplied with acid under pressure, or other fluid, and the jets from the pipes serve to propel from the sheets any loose scales, saponified matter etc. and may cause more intimate contact of the acid with lumps of grease that have not been fully dissolved or saponified. The rolls enclosing the space 25 serve somewhat as baffles which will prevent the jets from stirring up sediment from the bottom and lower corners of the tank.

The space 25 is further closed by plates 34, at its ends, openings or ports 31 being provided through the plates 34 for retarding flow of the fluid between the tank and the space 25. The rolls 26, 27, 28 and 29 are rubber faced, and various of the other rolls herein referred to may also be rubber faced.

Driven rolls 35 advance the sheet along an upwardly-inclined plate 36 to driven rolls 37 mounted above the partition 7, from whence the sheet will pass down an inclined plate or guide 38 to a pair of driven rolls 39 which correspond to the rolls 24, and are mounted in the water tank 6. Within the tank 6 are a group of segregating or baffle rolls 40 which are arranged similarly to and function in the same manner as the rolls 26, 27, 28 and 29. Similarly within the space enclosed by the rolls 40 are a pair of steam pipes or water pipes 41 which are of the same construction as the jet pipes 32. The jets from the pipes 41 exert a forcible mechanical cleaning action upon the sheet to remove loose matter and any adherent drops of acid therefrom. The sheets are discharged from the tank by pairs of rollers 42 and 43.

I claim as my invention:

1. Apparatus for treating sheets of metal and the like comprising a tank for containing liquid, means for advancing sheets through the liquid, a group of rollers disposed partially above and partially below the plane of travel of the sheets and arranged to form a partially enclosed area

through which the sheet passes, and devices within said area for directing jets of fluid against the faces of the sheets.

2. Apparatus for treating sheets of metal and the like comprising a tank for containing liquid, means in the tank for forming a segregated body of liquid therein spaced above the bottom of the tank, means for advancing sheets through the segregated body of liquid, means disposed within said segregated body for directing jets of fluid angularly against the faces of the sheets and effecting movement of the liquid to and from the said segregated body, and means for restricting circulation of liquid between the tank and the said segregated body.

3. The method of treating sheets of metal and the like which comprises passing the sheets through a segregated area of liquid in a liquid treating bath, directing jets of heated fluid under pressure angularly against the faces of the sheets in directions to move the fluid and liquid transversely of the sheets, to cleanse the surfaces of the sheets, and restricting the flow of circulating liquid to relatively narrow paths at points between the treating bath and the segregated area thereof.

4. Apparatus for treating sheets of metal and the like, comprising a liquid-containing tank, means for advancing sheets through the tank, means forming a segregated liquid-containing area in the tank, but having openings in its sides to permit passage of sheets through said area, and also having openings in its ends for the circulation of liquid, and jet-producing devices disposed within the said area, in position to direct jets of fluid against sheet faces and being directed angularly toward one of said openings.

LAWRENCE C. STEELE.