
Original application September 25, 1940, Serial No. 358,358. Divided and this application February 13, 1941, Serial No. 378,817

3 Claims.

This invention is concerned with a pickling, washing, and plating system for metal sheets or strip, the application being a division of the application of Robert H. Scott and myself, Serial No. 358,358, filed September 25, 1940.

In that application we disclose a system for feeding sheets and passing them in a continuously moving line through a pickling and washing unit up to and through a tin pot. The present application is directed to that part of the original disclosure concerned with method and means for treating the sheets as they pass from the washer to the flux box of the tin pot, and to means for adjusting the speed of sheet travel in the pickling and washing unit relative to that in the tin pot. Objects of the invention are to enhance the action of the flux as a result of the treatment mentioned, and to enable uniform sheet speed to be maintained in the pickling and washing unit and in the tin pot. How these objects are attained will be explained with reference to the accompanying drawing in which

Figure 1 is a vertical longitudinal section with parts in elevation of a system embodying the invention.

Figure 2 shows in elevation the main drive input for the system of Figure 1.

Figure 3 shows in axial section a certain transmission element of the system of Figure 2.

Referring to the drawing, A indicates generally for receiving sheets in tandem from a stack and discharging them in abreact relation, B designates the pickling and washing unit, and C the tin pot which includes a flux box D.

The apparatus A receives its power from a motor 11 which from a shaft 12 also drives the stack feeder. It is believed to be unnecessary to describe this apparatus in detail, since so far as the invention to be claimed herein is concerned, any suitable type of sheet or strip feeder, feeding either singly or abreact, may be utilized. The particular abreact feeding mechanism indicated at A is fully described and claimed in the parent application.

Journalized on the frame of the feeder A is a magnetic roll 13 beyond which is an inclined chute 14 terminating at unit B. The latter comprises a frame 15 supporting a pickling tank 16 equipped with infeed rolls 17 and 18 and outfeed rolls 19 and 20. Arcuate guide means 21 disposed between the infeed and outfeed rolls dips below the indicated level of the pickling solution.

Beyond tank 16 frame 15 supports on an elevated portion 22 thereof a washing tank 23 equipped with infeed rolls 24 and 25 and outfeed rolls 26 and 27, and between the roll sets is a guide 28 composed of suitably spaced bars supported in longitudinally extending relation to the tank. Spray pipes 29 and 30 extend horizontally above and below guide 28, respectively. Pipes 29 and 30 are in connection with the water supply pipe 31.

Between the pickling and washing tanks is a guide 32 which comprises upper and lower spaced apart series of longitudinally extending arcuate bars.

An apron 33 extends between the departing end of the washing tank and the entering end of the flux box D and is formed with a transverse channel 34 in which is disposed a pipe 35 adapted to deliver an upward spray or mist, this pipe being connected with the supply pipe 31 through a globe valve or the like 36. Spaced above pipe 35 in parallel relation thereto is a spray pipe 37 which is connected to the supply pipe 31 through a globe or other suitable valve 38. This pipe may be provided with a plurality of nozzles as at 39 and is designed to deliver a spray or mist in a downward direction.

The tin pot has the conventional feed rolls, those of the initial pair being designated by the reference numerals 40 and 41, the bite of these rolls being at the departing extremity of apron 33.

Referring to Figure 2, it is here assumed that drive from any suitable source of power comes to a sprocket on the far end of shaft 41' of roll 41 through a chain 42. According to the present invention, a sprocket 43 on shaft 41' is connected by a chain 44 with a sprocket 45, Figure 3. Sprocket 45 is bolted to a sprocket 46 through a radial flange 47 of a sleeve 48 rotatable on a jack shaft 49 suitably secured to a portion of frame 16 below and between rolls 26 and 27. A chain 50 connects sprocket 46 with sprockets 81 and 82 on shafts 80' and 27' of rolls 26 and 27. Sprocket 41 has a similar sprocket coaxially secured thereto and connected through a chain 51 with a sprocket 52 on the shaft 13' of the magnetic roll 13. All sprockets beginning with sprocket 43 up to sprocket 52 are of the same size except for possible variation as will be hereinafter described. The pickling and
2 washing rolls are all of the same diameter and are of rubber or the like.

In the operation of the system, the fed sheets (or strips, as the case may be) take the course of the dot and dash line L. They are first passed through the pickling solution, then via guide 32 to the infeed set of washer rolls where much of the pickling solution is squeezed off. As they leave the infeed rolls both surfaces of the sheets are thoroughly washed by spray from pipes 29 and 30. The outfeed rolls 26 and 27 squeeze the washing fluid from the sheets and discharge them in dry and clean condition. The sheets are now uniformly sprayed either top or bottom or both from spraying pipes 35 and 37 with clean water so that the sheets reach the flux box with one or both surfaces in uniformly moistened condition.

As the sheets pass through the stratum of flux in the box D, the moisture is caused to boil, setting up violent agitation directly at and throughout the surfaces of the sheets and thus enabling the flux to come into intimate and uniform contact with the sheet surfaces. Ordinarily it will be sufficient to moisten the top surfaces only of the sheets, since natural agitation of the flux beneath the sheets is conducive to a thorough contact there under ordinary conditions.

While the spray or mist creating devices are shown as connected to the water supply, ordinarily cold, they may instead be connected to a steam supply. Steam directed against the sheets condenses and the condensate boils as the sheets enter the hot flux. The application of a heated fluid has the advantage of raising the temperature of the sheets so that their cooling effect on the flux is reduced.

It will be observed that instead of letting the washing fluid through, the sheets are dried as a result of the squeegee effect of the outfeed rolls and clean fluid is thereafter applied. To avoid contamination of the flux, the acid-laden washing fluid is removed, and clean fluid is then applied in such proximity to the tin pot that the sheets will enter the flux with one or both surfaces in moistened condition. Extremely efficient action of the flux is obtained by the described treatment.

The peripheral speeds of the rolls of the pickling and washing unit and of the tin pot should be the same. However, in use, the tin pot rolls become pitted and have to be machined, thereby reducing their circumference and, hence, their peripheral speed relative to that of the rolls of the pickling and washing unit. The latter rolls being of rubber maintain their original circumference comparatively indefinitely. Therefore, most desirable that synchronization be restorable through suitable adjustment means.

In order that this adjustment may be accomplished I have provided the readily removable jack shaft sprockets 45 and 46 and, for example, by replacing sprocket 46 with a sprocket having one or more additional teeth, synchronization can be readily restored. Other ratio changing means may be utilized, but I have found the replaceable sprocket to be simple and satisfactory in use. An adjustable idler may be provided for the affected chain in order that the same may be properly tensioned for sprockets of different sizes.

It will be understood that the invention is susceptible of variation in embodiment and consequently I do not limit myself to details of the disclosure herein except as in the following claims.

I claim:

1. Apparatus of the class described comprising a sheet pickling and washing unit including sheet drying means at the outfeed end, a tin pot including a flux box, means for feeding sheets through said unit and into said flux box, and means between said drying means and said flux box for supplying moisture uniformly to at least one of the surfaces of the sheets so that the sheets reach the flux box with their said surfaces in moistened condition.

2. Apparatus of the class described comprising a sheet pickling and washing unit including sheet drying means at the outfeed end, a tin pot including a flux box, means for feeding sheets through said unit and into said flux box, and means between said drying means and said flux box for supplying steam uniformly to at least one of the surfaces of the sheets so that the sheets reach the flux box with their said surfaces in moistened condition.

3. The method which comprises treating a sheet with a pickling solution, washing the sheet subsequent to the pickling treatment to completely remove the solution therefrom, drying the sheet, uniformly moistening at least one surface of the sheet, and passing the sheet into a body of flux while in moistened condition.

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