

UNITED STATES PATENT OFFICE.

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SHEET-PICKLING METHOD.

Application filed May 12, 1925. Serial No. 29,826.

To all whom it may concern:

Be it known that I, JOHN B. TYTUS, a citizen of the United States, and a resident of Middletown, in the county of Butler and State of Ohio, have invented certain new and useful Improvements in Sheet-Pickling Methods, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing, forming part of this specification.

My invention relates to methods for pickling iron and steel sheets and plates by electrolytic action in an electrolyte through which the sheets and plates are caused to pass.

The product of the sheet and thin plate mill in the processes of today is in the form of pieces of considerable width, and of limited length. The pieces have unfinished front and back ends, and in calculating the amount of metal to be used in the pieces or packs from which the thin plates and sheets are rolled, enough excess is used to permit of the ends of the final products being cut off, as waste to leave square ends.

Any pickling operation requiring the formation of an electric contact with sheets and plates, has in the past been impractical because of the necessity of making proper contact with a large number of fairly short pieces, which is the only form in which such products have been capable of production.

It is the object of my process to provide a practical and inexpensive way of providing for electric contact with sheets, and plates, and feeding them through an electrolyte. In attaining my object I first form a continuous piece of any batch of sheets or plates to be treated, forming an electric as well as a physical connection between the pieces. After the pickling operation I cut out the portions used as a connection, thus leaving the final product with square ends, and removing those portions used for connection which will be inadequately pickled due to overlap necessary for a simple mode of connection.

This invention is a species of the two inventions set forth in my co-pending applications, Serial No. 629,764, and Serial No. 635,985, filed April 4th, 1923, and May 1st, 1923, respectively.

I accomplish my objects by that certain

series of steps to be hereinafter more specifically pointed out and claimed.

In the drawing:

Figure 1 is a plan view of a piece of sheet metal showing typical ends.

Figure 2 is a plan view indicating the mode of uniting the pieces of sheet metal into a continuous strip.

Figure 3 is a diagram of a plant for employing the process.

The result of the sheet rolling process, in which due to the nature of the mills used, the product is always short and with ends which are uneven, is indicated in Figure 1.

In this figure the body of the sheet is indicated at 1, and the line to which shearing must be done to give a square end of the length of the order on which the piece was rolled, is indicated by the dotted line 2. The rough ends of the sheet are indicated at 3 and 4, in which 4 is the back end of the sheet, as it emerges from the rolls.

In order to obtain an edge to which it is feasible to work in the operation of stitching or welding the sheets together, and to facilitate and assure a proper length individual piece at the end of the process, my first operation is to trim the sheet back to as straight an edge as possible, leaving a uniform distance between the lines 5 of this first trimming or shearing operation, and the lines 3 and 4 of final trim, at each end of the piece. The first trim thus provides a straight edge to work to in aligning the sheets, for welding, stitching or otherwise securing them together, and as noted in Figure 2, the operation will be to overlap the sheets, by the amount to be later cut out, so that the line 5 of one sheet, being its first trim will be laid over the end of the preceding sheet and brought to a position to coincide with what will be the final trim line 3, at that end of the sheet. This will also bring the cut edge 5 of the under sheet end to coincide with the imaginary line of final trim 4 of the overlapping sheet.

Thus if there is left a space one and one-half inches to be finally trimmed away, after the first trim on each sheet, the overlap will be one and one-half inches. When the process is over, and it is desired to form the sheets into individual pieces again, the operator merely cuts out the overlap, and

will then have individual pieces of the required length.

In practice the uniting of the pieces is preferably made by spot welding them, although stitching by a die and forming plate has been successfully used by me.

As a pickling apparatus I have indicated a series of acid or alkaline liquor compartments 6, filled with liquor to the line 7, or otherwise, as may be deemed most convenient.

On the top of each partition I have indicated a drum of wood 8, which drums are revolved by suitable power at the desired speed to maintain the metal in contact with the liquor the required length of time.

I have indicated the continuous band of sheets united together at 9, and this band is passed over the drums and is moved along by them, with depending loops of the band, dipping down into the electrolyte.

I have indicated curved electrodes 10, in the bottom of the tanks, and straight electrodes 11, depending into the loops. This arrangement of electrodes is merely preferential with me.

I have indicated a source of electric current by the generator 12, from which conductors 12^a lead to the several electrodes.

The piece itself is provided with current through contact rollers 13 of conductive materials, which are provided with current from the other side of the generator by conductors 13^a.

I preferably use the conductor rollers at interspaced points and not over every roll, as this permits me to manipulate the loops of metal in intermediate tanks, should there be a machine stoppage, before manipulating the loops on which the rollers bear.

As a solution in the tank, there are several accepted sulphuric acid solutions and alkaline solutions, for use in electrolytic pickling of iron and steel. The band will usually be made the cathode in the acid, and in the alkaline solutions, it may be made the anode, if desired.

The particular mode of effecting a pickling is not an invention on my part, and my invention lies in the mode of passing a large number of sheets through a pickling bath, and establishing current connections therewith.

Any piece of metal which must be produced in short lengths because of its width,

and hence rolling process limitations in length, whether a sheet or plate, lies within the scope of my invention. Also the mode of bringing the current to the band of end for end attached pieces, and feeding the band is merely preferential. Also the treatment known as pickling is not the only electrolytic treatment for which my invention is adapted.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. A process for electrolytically treating iron or steel pieces which because of their width must be produced in short lengths, which consists in uniting the pieces end for end, feeding the band so formed through an electrolyte containing suitable electrodes and establishing current connection with the band to convert it into an electrode.

2. A process for electrolytically treating iron or steel pieces which because of their width must be produced in short lengths, which consists in uniting the pieces end for end, feeding the band so formed through an electrolyte, containing suitable electrodes and establishing current connection with the band to convert it into an electrode, said connection being applied to the band as it travels.

3. A process for electrolytically treating iron or steel pieces which because of their width must be produced in short lengths, which consists in trimming the pieces to leave end portions for overlap which is excess material of the pieces, being part of the ends which would have to be trimmed off to shear the pieces to finished length, overlapping the pieces consecutively end for end, uniting the pieces into a band at the said overlaps and feeding said band through an electrolyte in the presence of suitable electrodes, and establishing current connections with the said band.

4. A process for electrolytically treating iron or steel pieces which because of their width must be produced in short lengths, which consists in uniting the pieces end for end into a band, passing said band over revolving parts to feed it in a series of loops through a bath or baths of pickling electrolyte, and establishing a rolling electric contact with the band as it passes over at least one of the revolving parts.

JOHN B. TYTUS.