Jan. 27, 1942. S. NYBERG 2,270,892

PICKLING MACHINE

Filed Oct. 12, 1940

2 Sheets-Sheet 1

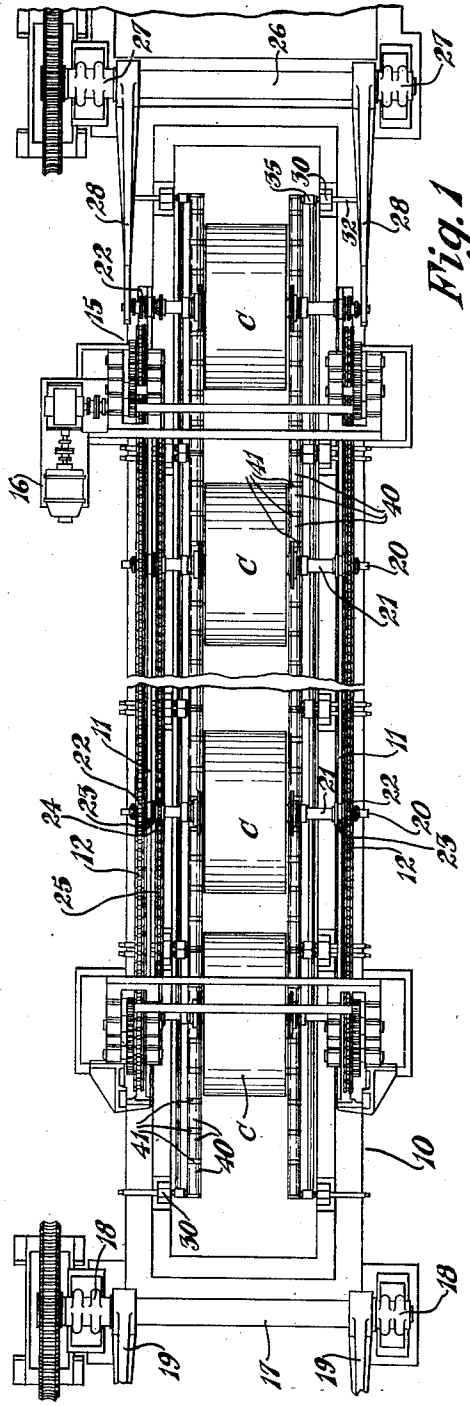


Fig. 1

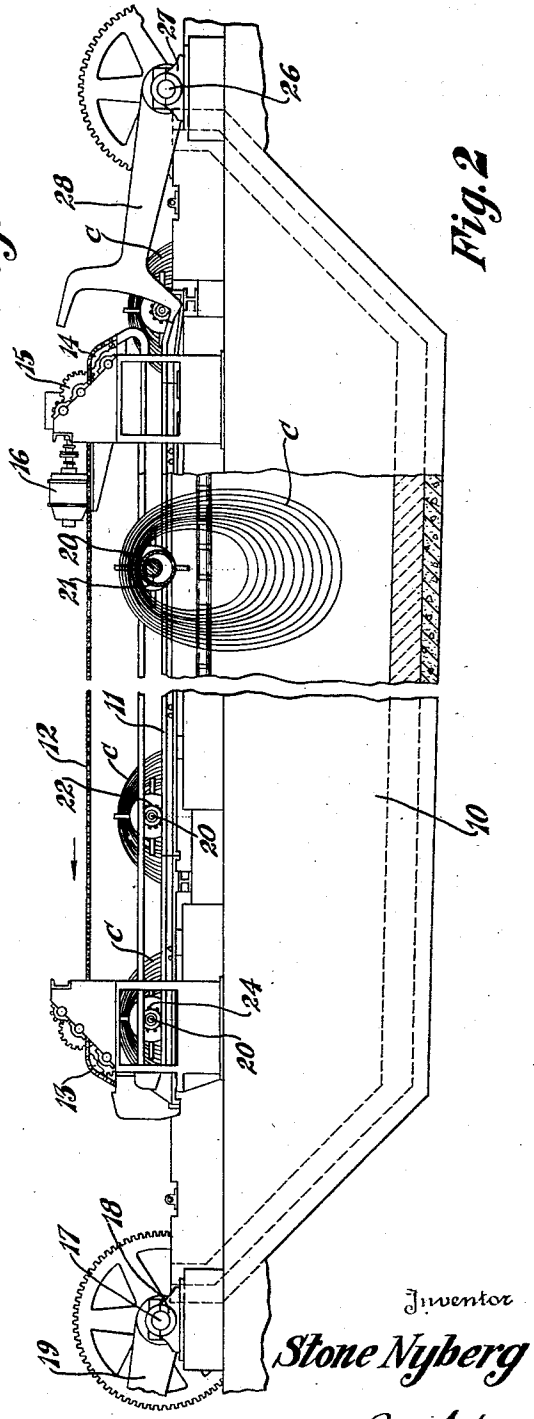


Fig. 2

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Fig. 3

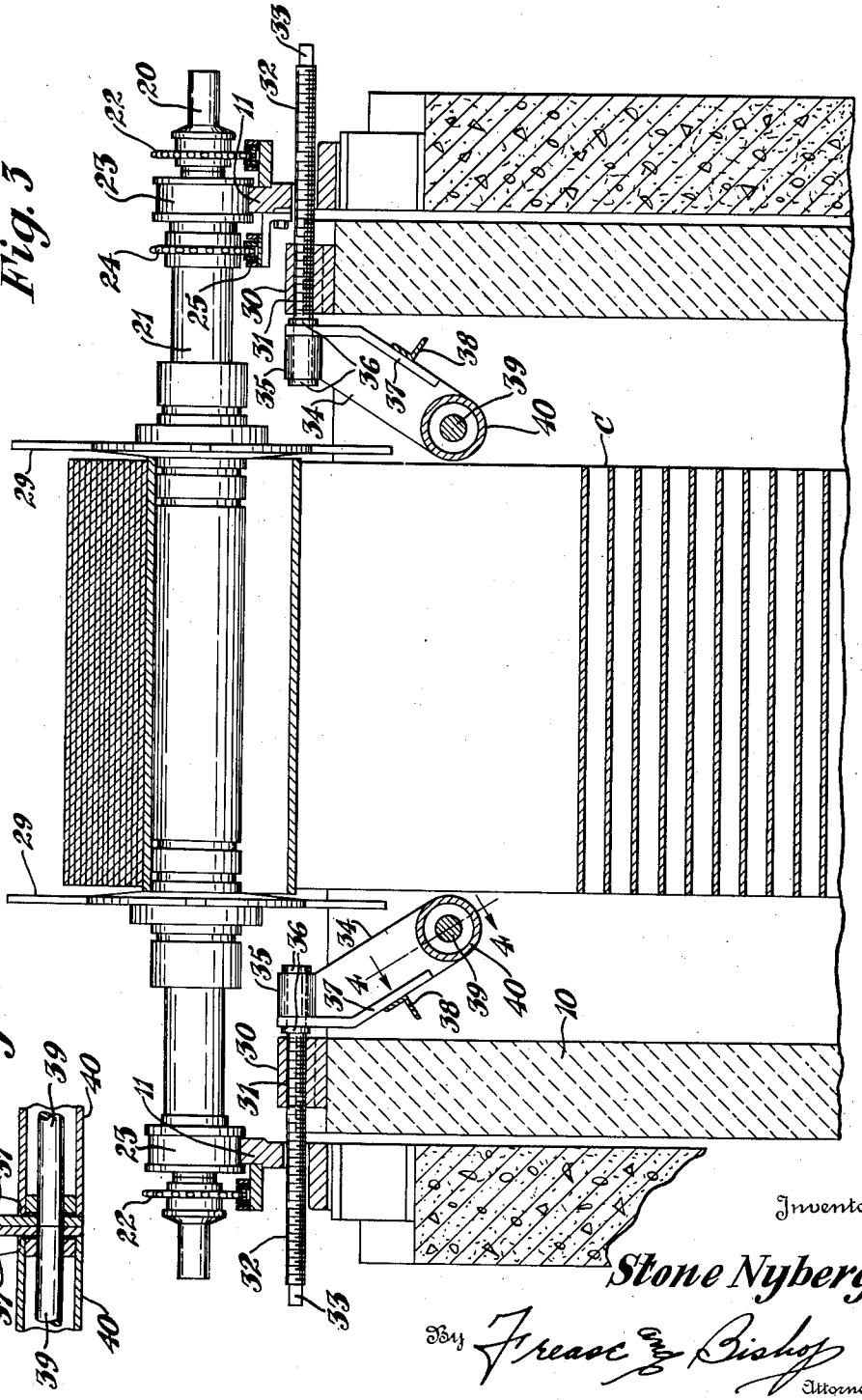


Fig. 4

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UNITED STATES PATENT OFFICE

2,270,892

PICKLING MACHINE

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4 Claims. (Cl. 266—7)

The invention relates to the pickling of coils of metal and more especially to certain improvements upon the general type of pickling machines in which the coil is immersed in the pickling and washing tanks supported upon a rotating mandrel.

The improvement to which the invention pertains is illustrated herein as applied to pickling machines of the type disclosed in Greer Patent No. 2,091,921 issued August 31, 1937; Shoemaker Patent No. 2,120,843 issued June 14, 1938, and Greer Patent No. 2,196,210 issued April 9, 1940.

Machines of this general character are so constructed and operated that they carry out the pickling and washing, or otherwise treating the coils of metal supported upon mandrels which are rotated as they are progressed through the pickling and washing tanks, whereby the coils are in turn rotated by the mandrels.

In actual practice coils of metal are being pickled with very satisfactory results in pickling machines of the general type of the Greer and Shoemaker patents above referred to.

It has been found however, that especially in extremely large coils, some of which are formed of metal strips as much as fourteen hundred feet long, there is a tendency for the portion of the coil suspended below the mandrel to telescope or open laterally to such an extent that it interferes with proper rotation of the coil upon the mandrel, making it necessary for a workman to manually collapse, or telescope the coil inwardly, by means of a wooden two by four or the like.

This not only requires continual attention, but frequently results in damage to the edges of the metal strip, and in some cases the entire coil may be so bady damaged as to make the subsequent cold rolling thereof very difficult, if not impossible.

It will be obvious that such damage, especially to metal of light gauge, may be easily caused by the outwardly telescoped or opened up, lower portion of a coil contacting the flanges upon the mandrel, bending or tearing the metal to such an extent that it cannot be properly cold rolled, as well as causing possible damage to the pickling machine.

The present invention contemplates the provision of an improvement upon pickling machines of the general character referred to which will prevent the lower, open portions of the coils from telescoping outward during the time the coils are immersed in, or passing through the pickling and washing tanks.

Another object of the invention is to provide a longitudinal series of rollers within each tank, located substantially at the liquid level of the pickling or washing solution and upon each side of the path of the coils.

A further object is to provide means for adjusting the rollers laterally within each tank in order to accommodate coils of various widths.

A still further object is to provide a plurality of gangs of rollers in each longitudinal series whereby after coils of any certain width have passed through one portion of a tank the rollers behind said coils may be adjusted to accommodate coils of a different width.

Still another object is to provide a pickling machine of the type referred to in which the mandrels have spaced flanges between which the coils are positioned, the rollers being located closer to the ends or sides of the coil than the flanges, whereby the coil is prevented from rubbing upon the flanges of the mandrel.

The above objects together with others which will be apparent from the drawings and following description, may be attained by constructing the improved pickling machine in the manner illustrated in the accompanying drawings, in which

Figure 1 is a top plan view of one tank of the improved pickling machine, showing the rollers to which the invention pertains located therein;

Fig. 2, a side elevation, partly in section, of the tank illustrated in Fig. 1;

Fig. 3, an enlarged, transverse sectional view through the tank, showing the manner in which the improved rollers prevent the coils from telescoping; and

Fig. 4, a fragmentary, detail sectional view taken on the line 4—4, Fig. 3;

Similar numerals refer to similar parts throughout the several views.

Although for the purpose of illustration the invention is shown and described only as applied to the acid tank in which the pickling is performed it should be understood that it is the intention and spirit of this invention to use the improved rollers in the washing and neutralizing tanks also, but since this does not require any change in the construction or mounting of the rollers in the tanks it is not thought necessary to illustrate and describe the rollers located in each of the other tanks, the showing herein being a complete disclosure of the construction and operation of the invention.

The tank is indicated generally at 10 and may be provided with the rail 11 associated with the side walls thereof forming a track for the man-

drels as disclosed in the above mentioned patents.

Above each rail is located an endless chain 12 located over sprockets 13 and 14 positioned near the forward and rear ends of the tank, respectively, the lower strand of each chain being positioned just above and substantially parallel with the corresponding rail.

The chains are adapted to be driven in the direction of the arrow shown in Fig. 2 through suitable gearing 15 connected to a motor or other source of power indicated at 16.

At the entrance end of the tank the usual charging mechanism disclosed in said patents may be provided comprising a rocker shaft 17 journaled in bearings 18 and having a pair of transfer or charging arms 19 adapted to deposit a mandrel with a coil thereon upon the rails 11 in the manner disclosed in detail in the Greer and Shoemaker patents.

As shown in Greer Patent No. 2,196,210, each mandrel may comprise a shaft 20 having a sleeve 21 rotatably mounted thereon.

Sprocket wheels or gears are fixed upon the mandrel shaft 20 for engagement with the endless chains 12 in order to convey the mandrels forwardly along the tank, the rollers 23 formed upon the mandrel shaft riding upon the rails 11.

If desired, a toothed wheel 24 may be fixed upon the mandrel sleeve 21 and arranged to ride upon the toothed track 25 mounted at the top of the tank, in the manner illustrated and described in detail in said Greer Patent No. 2,196,210.

At the exit end of the tank is located a rocker shaft 26 journaled in bearings 27 and having transfer arms 28 for receiving the mandrels as they are discharged from the rails 11 and transferring them to the next tank.

These transfer arms are disclosed in detail in the patents above referred to and since they form no part of the instant invention no further description thereof is considered necessary.

The coils of metal indicated at C are loosely coiled as shown in the drawings and suspended upon the mandrel sleeves between the adjustable flanges 29 adapted to be adjustably mounted upon the sleeve to accommodate coils of various widths.

When suspended upon a mandrel in this manner the convolutions at the top of the coil are in close contact with each other at the points where the coil is suspended upon the mandrel as best shown in Figs. 2 and 3 while the convolutions in the depending lower portions of the coil are spaced apart or opened up as shown in said figures.

As the mandrel travels forwardly along the tank and rotates upon the tracks the coil is rotated thereon so that the convolutions in each portion thereof are repeatedly opening and closing as they pass below and over the mandrel.

It has been found in practice that this continual rotation of the coil about its axis especially in the case of coils of extreme length or light gauge material frequently results in telescoping of the coils longitudinally, this telescoping occurring in the depending portion of the coil below the mandrel and often resulting in damage to the edge of the metal as it comes into contact with the flanges 29 while in this telescoped condition, and also providing a constant danger of injury to the machine, making it necessary for the workman to continuously watch for the telescoping of coils passing through the tank and requiring quick action on their part to manually force the telescoped portion of the coil back to normal position by the use of a wooden two-by-four or the like.

In order to overcome this difficulty the present invention contemplates the provision of means within the tank for preventing telescoping of the coils as they are rotated within the tank.

To this end the invention consists in providing a longitudinal series of rollers within the upper portion of the tank at each side of the coil and spaced slightly therefrom, the rollers being preferably located a trifle closer to the ends of the coil than the flanges 29 upon the mandrel as shown quite clearly in Fig. 3.

Each series of rollers is preferably made up of sections preferably about 10 feet long so that the different sections may be independently adjusted whereby after an order of coils of any particular width has passed part way through the tank the sections of rollers behind the coils may be adjusted to accommodate coils of any other width which it may be desired to pass through the pickling machine.

For this purpose bearings 30 are located at each end of each section of the rollers and provided with internally threaded bores 31 through which are threaded the adjusting screws 32, each screw having a squared outer end 33 to which a wrench or other tool may be applied for rotating the screw within the threaded bore of the bearing in order to move the screw inward or outward as desired.

Upon the inner end of each screw is located a depending angular arm 34 having a hollow cylindric bearing portion 35 at its upper end swivelled upon the inner end of the corresponding adjusting screw 32 between the collars 36 thereon.

Strengthening flanges 37 may be formed upon the outer edges of the arms 34 and the two arms at the opposite ends of each section of rollers are preferably tied together as by an angle-iron 38 which may be welded or otherwise secured at its ends to the flanges 37 of the arms 34.

A shaft 39 is connected at opposite ends to each pair of arms 34 and has journaled thereon a plurality of rollers 40, spacers 41 preferably being located upon the shaft between adjacent rollers.

As shown in Fig. 3, these rollers 40 are quite close to the ends of the coils, but preferably located a trifle nearer to the ends of the coils than are the flanges 29 upon the mandrels so as to entirely prevent any rubbing or scraping of the ends of the coils upon these flanges as well as to prevent any possibility of longitudinal telescoping of the coils as they pass through the tank.

I claim:

1. Pickling apparatus for pickling a coil of metal comprising a tank containing liquid, a mandrel upon which the coil is supported, means for rotating the mandrel to rotate the coil thereon, and roller means extending along the side walls of the tank below the mandrel and slightly spaced from opposite ends of the coil for preventing the coil from telescoping, the axes of the rollers being horizontal and parallel to the side walls of the tank.

2. Pickling apparatus for pickling a coil of metal comprising a tank containing liquid, a mandrel upon which the coil is supported, means for rotating the mandrel to rotate the coil thereon, horizontal, aligned series of rollers formed in independent sections extending along the side

walls of the tank below the mandrel and closely adjacent to opposite ends of the coil for preventing the coil from telescoping, and means for independently adjusting said sections laterally of the tank, the axes of the rollers being horizontal and parallel to the side walls of the tank.

3. Pickling apparatus for pickling a coil of metal comprising a tank containing liquid, a mandrel upon which the coil is supported, means for rotating the mandrel to rotate the coil thereon, means extending along the side walls of the tank below the mandrel for preventing the coil from telescoping, said means including a plurality of pairs of adjusting screws, a horizontal shaft carried by each pair of adjusting screws and parallel to the side walls of the tank, and rollers journaled upon said shaft and located closely adjacent to opposite ends of the coil and preventing the coil from telescoping, the axes of the rollers being horizontal and parallel to the side walls of the tank,

4. Pickling apparatus for pickling a coil of metal comprising a tank containing liquid, a mandrel upon which the coil is supported, flanges upon the mandrel slightly spaced from opposite ends of the coil, means for rotating the mandrel to rotate the coil thereon, and horizontal, aligned series of rollers extending along the side walls of the tank below the mandrel, the axes of the rollers being horizontal and parallel to the side walls of the tank and located slightly closer to the ends of the coil than said flanges, for preventing the coil from telescoping.

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