

March 10, 1942.

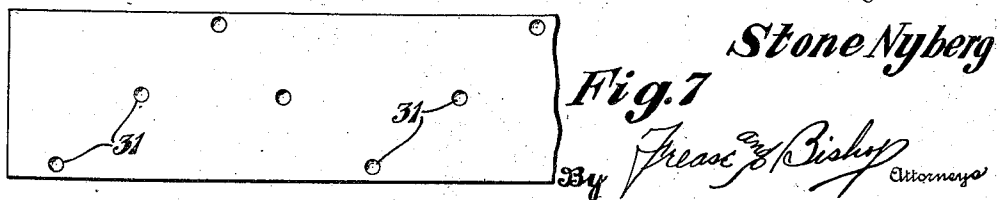
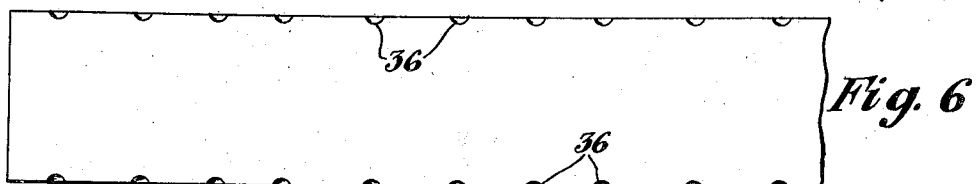
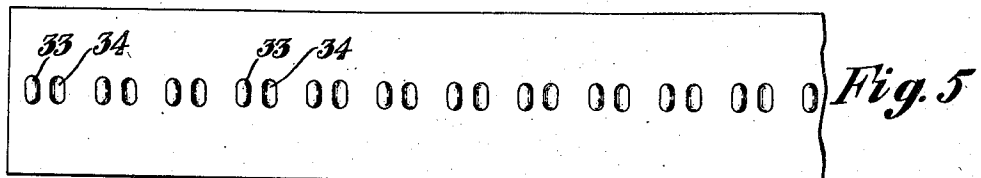
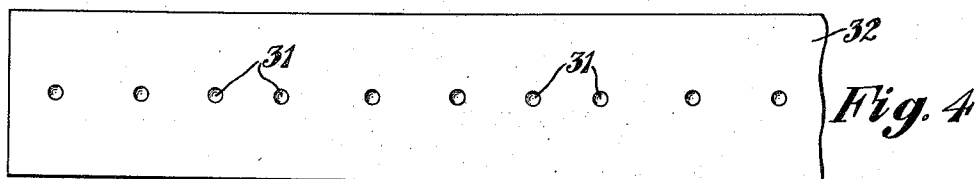
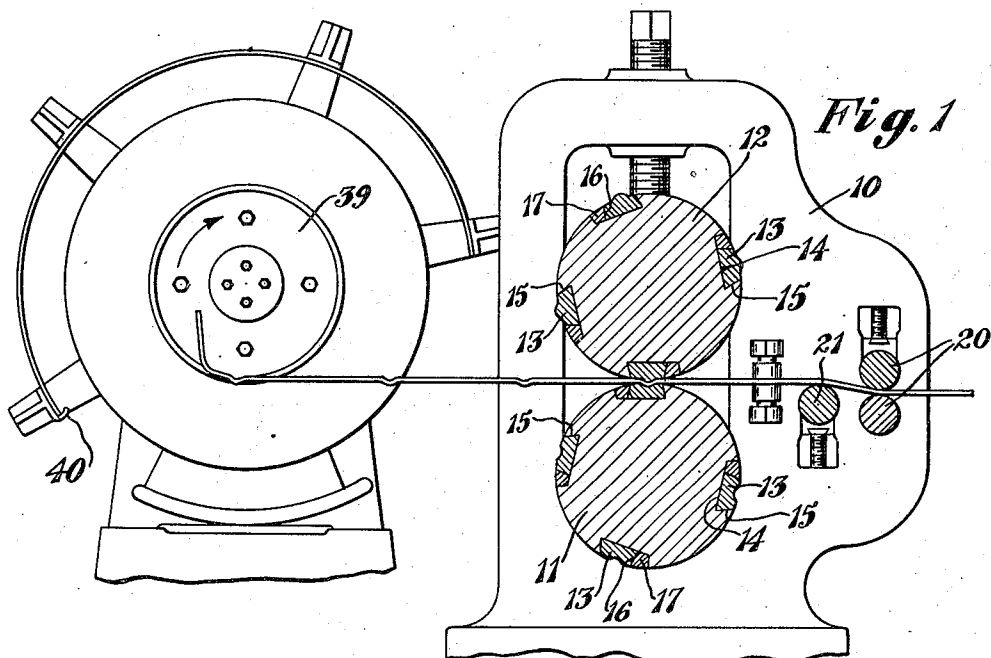
S. NYBERG

2,275,458

METAL COIL

Original Filed July 12, 1939

2 Sheets-Sheet 1



Inventor

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Fig. 7

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METAL COIL

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2 Sheets-Sheet 2

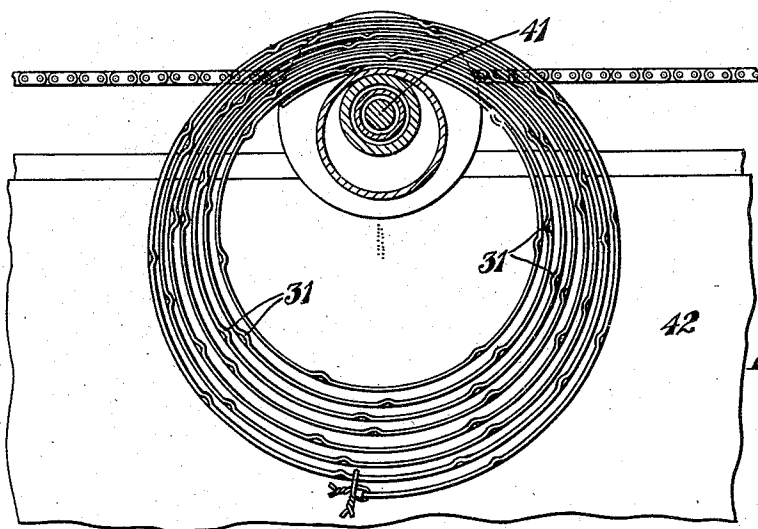


Fig. 2

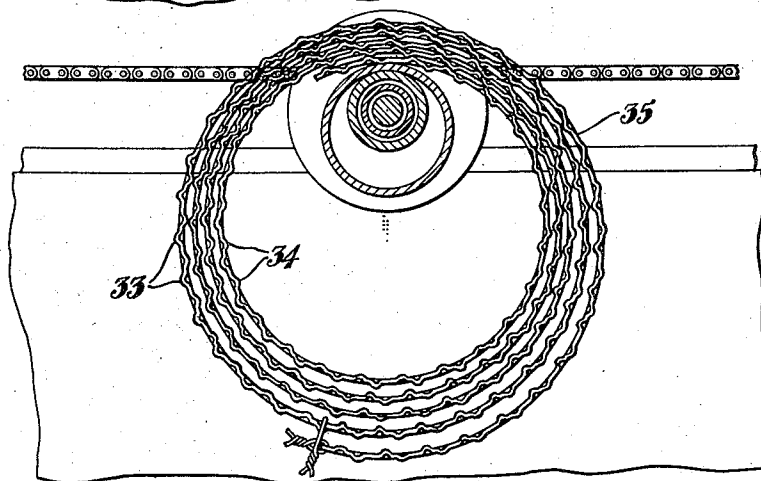


Fig. 3

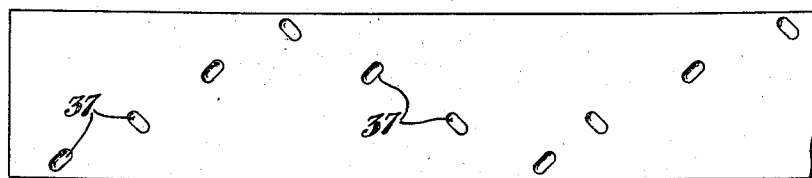


Fig. 8

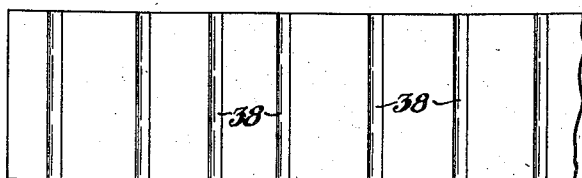


Fig. 9

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UNITED STATES PATENT OFFICE

2,275,458

METAL COIL

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Original application July 12, 1939, Serial No.
284,058. Divided and this application May 20,
1940, Serial No. 336,186

2 Claims. (Cl. 206—59)

The invention relates to the coiling of metal coils preparatory to pickling the coils and is especially adapted for properly preparing the coils for pickling in pickling machines of the general 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; and the present application is a division of my prior application Serial No. 284,058, filed July 12, 1939, and the invention pertains to the coils formed by the method and apparatus disclosed in said parent application.

The general type of pickling machines above referred to differ from the continuous strip pickling machines in which the metal is uncoiled and passed through the pickling machine in strip form, in that the pickling machines referred to provide means for pickling the coil without uncoiling the same, this being accomplished by supporting the coils upon mandrels which suspend the coils in the pickling and washing solutions, the mandrels being rotated in order to rotate the coils within the solutions.

For this purpose it is necessary that the convolutions of the coils be opened up or separated while in the pickling bath so that none of the convolutions will remain in contact with each other in the bath, thus giving the pickling acid free access to every portion of the surfaces of the metal, as otherwise the pickled metal will be marred by black spots or marks where the acid has not had access to the surface of the metal.

In the patents and application above referred to the coil shown is a conventional spiral comprising a continuous curve from the center to the outside of the coil. This frequently results in two of the convolutions of a coil contacting with each other for some distance while the coil is in the pickling solution, thus, preventing the acid from properly contacting the opposed surfaces of these convolutions of the coil and resulting in an improperly pickled coil having black spots upon the surfaces which are thus not properly exposed to the action of the acid.

Greer Patent No. 2,191,463 for Method and apparatus for recoiling metal coils, dated February 27, 1940, discloses a method and apparatus for forming coils having projections in the form of angular bends in the convolutions of the coil to keep the same properly spaced or separated while in the pickling solution, and has been found to work entirely satisfactorily in use for pickling in machines such as the above mentioned patents.

The present invention is in the nature of an improvement upon or addition to the disclosure in said Greer Patent No. 2,191,463, and contemplates the formation of a coil having projections in the form of buttons or ribs formed in the convolutions of the coil to hold the same separated or spaced from each other, and this invention is applicable not only to coils to be pickled in machines such as the above mentioned patents, but may also be used for separating the convolutions of the coil to be pickled by the old method which is still in use in many small plants, wherein the convolutions of the coil are separated by short bent rods or hairpins, as they are familiarly called, which are inserted between convolutions of the coil which is then placed on end in a tub or tank in which either the coil or pickling acid is agitated.

One object is to provide for the formation of a coil of continuous spiral form excepting for slight projections in the form of buttons or ribs formed around each convolution to space adjacent convolutions therefrom.

A further object is the provision of such a coil in which the projections may be irregularly spaced around each convolution thereof.

A still further object is the provision of such a coil in which the projections may be oppositely disposed and uniformly spaced throughout the length of the metal strip forming the coil whereby when the coil is suspended upon a mandrel the uniformly spaced, oppositely disposed projections in the convolutions above the mandrel will cooperate with each other in the manner of gear teeth so as to prevent each convolution of the coil from moving relative to adjacent convolutions whereby the convolutions of the coil will be prevented from winding or tightening up.

The above objects together with others which will be apparent from the drawings and following description, or which may be later referred to may be attained in the manner illustrated in the accompanying drawings in which

Figure 1 is a sectional elevation of a machine for forming projections upon the coil in the manner above stated in general terms;

Fig. 2, an elevation of a coil formed in accordance with the invention showing the same suspended upon a mandrel;

Fig. 3, a view similar to Fig. 2 showing a different form of projections upon the coil;

Fig. 4, a plan view of a portion of an uncoiled strip with projections thereon such as shown in the coil of Fig. 2;

Fig. 5, a similar view showing projections such as shown in the coil of Fig. 3;

Fig. 6, a similar view showing projections at opposite side edges of the strip;

Fig. 7, a similar view showing the projections in the form of buttons staggered alternately across the strip;

Fig. 8, a similar view showing the projections in the form of short ribs staggered across the strip; and

Fig. 9, a similar view showing the projections in the form of ribs extending transversely across the strip.

Similar numerals refer to similar parts throughout the several views.

The metal coil to be recoiled for pickling in accordance with the present invention is uncoiled and may be fed through a machine such as illustrated in Fig. 1 for forming projections upon the metal and recoiling the same, the projections spacing apart the several convolutions of the coil.

The machine may include spaced housings 10 within which are journaled a lower roll 11 and a cooperating, vertically adjustable upper roll 12.

These rolls are provided with complementary projections and recesses around their exteriors for the purpose of forming the projections in the metal coil.

In order that projections of any desired shape or kind may be formed in the coil either through the center thereof or near or at the edges or in various other arrangements, these projections and recesses upon the rolls may be formed upon removable die blocks 13 adapted to be adjustably mounted in longitudinal grooves 14 provided in the rolls.

As shown in the drawings each of these die blocks may be of dove-tail shape so as to fit the correspondingly inclined side wall 15 of the groove at one side and the correspondingly shaped side wall 16 of the clamping and retaining strip 17 on the other side.

The metal may be fed to the rolls 12 by means of a pair of feed rolls 20 and for the purpose of breaking or loosening any scale which may be present upon the surfaces of the metal a vertically adjustable roll 21 may cooperate with the feed rolls 20.

The dies may be arranged for producing substantially button-like projections 31 at irregularly spaced intervals throughout the center of the metal 32 in the manner indicated in Fig. 4.

It should be understood that the dies may be arranged to place these button-like projections at uniformly spaced intervals throughout the center of the strip, if desired, or by properly positioning two die blocks in each groove 14 of the rolls 11 and 12, these projections may be formed near opposite edges of the metal strip and may be either irregularly or uniformly spaced as desired.

In Fig. 5 is shown a portion of a metal strip in which the projections are oppositely disposed as at 33 and 34 so that when the metal is recoiled to form a coil as indicated generally at 35 in Fig. 3, the oppositely disposed projections 33 and 34 will be arranged throughout the convolutions of the coil in the manner illustrated in said figure.

In Fig. 6 is shown the manner in which substantially half-round projections 36 may be formed in opposite edges of the metal strip and these projections may be either uniformly or irregularly spaced, as desired.

Fig. 7 shows another arrangement of the button-like projections 31 located in staggered arrangement across the metal strip, and Fig. 8 shows a similar arrangement of slightly elongated or rib-like projections 37.

If desired, the projections may be in the form of ribs 38 extending entirely across the strip, as shown in Fig. 9.

As the projections are formed in the metal strip the same is wound into a substantially spiral coil upon the drum 39, the projections being located around each convolution of the coil thus formed spacing the convolutions apart.

If desired, the coil may be opened up to any desired extent by engaging the loose outer end thereof in the stop 40 and rotating the coiling drum 39 in reverse direction until the desired result is obtained.

The coil thus produced may then be placed upon a mandrel, indicated generally at 41 in Fig. 2, in such position that the coil is suspended within a pickling tank 42 and the mandrel may be rotated by any suitable means for rotating the coil around the same.

The projections 31 upon each convolution of the coil will thus prevent the several convolutions from contacting with each other while in the pickling solution, thus, permitting free access of the pickling acid to the entire surface of the coil.

Should any of the projections 31 contact with the surfaces of the adjacent convolutions of the coil due to the tightening of the convolutions caused by rotation upon the mandrel this will not prevent the pickling solution from contacting the surface of the coil at these points, since the rotation of the coil around the mandrel causes a continual movement of the convolutions of the coil relative to each other and these slight points of contact are continuously changing their positions.

The type of oppositely disposed projections 33 and 34 shown in Figs. 3 and 5 is especially designed to prevent any considerable winding movement or tightening of the convolutions of the coil relative to each other.

As illustrated in Fig. 3, this is accomplished by the oppositely disposed projections of the different convolutions engaging each other in the portion of the coil above the mandrel.

The action is somewhat similar to a plurality of ring gears, the downwardly disposed projections 34 of each convolution having only a slight movement in either direction between the upwardly disposed projections 33 of the next adjacent convolution.

According to the provisions of the patent statutes, I have explained the principle of my invention and described one embodiment thereof, but I desire to have it understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically illustrated and described, the invention residing in the formation of projections in the convolutions of the coil to hold the convolutions spaced from each other in the pickling solution, regardless of whether these projections are of the particular conformation of the projections illustrated and described.

I claim:

1. A metal coil comprising a continuous spiral sheet of metal composed of a plurality of convolutions, said metal sheet having spaced button-like projections of predetermined height formed therein throughout the surface of said sheet and

functioning to space each convolution from an adjacent convolution at least a distance equal to the height of said projections, the convolutions of said coil being loosely positioned with respect to each other and separated throughout the major portion of their surfaces from adjacent convolutions a distance greater than the thickness of the sheet plus the height of the button-like projections so as to permit relative movement between adjacent convolutions.

2. A metal coil comprising a continuous spiral sheet of metal composed of a plurality of convolutions, said metal sheet having spaced button-like projections of predetermined height formed

therein throughout the surface of said sheet in spaced staggered position from one side of the sheet to the other side thereof and functioning to space each convolution from an adjacent convolution at least a distance equal to the height of said projections, the convolutions of said coil being loosely positioned with respect to each other and separated throughout the major portion of their surfaces from adjacent convolutions a distance greater than the thickness of the sheet plus the height of the button-like projections so as to permit relative movement between adjacent convolutions.

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