Nov. 12, 1963 J. R. MURPHY 3,110,099

METHOD OF OPENING A WOUND COIL

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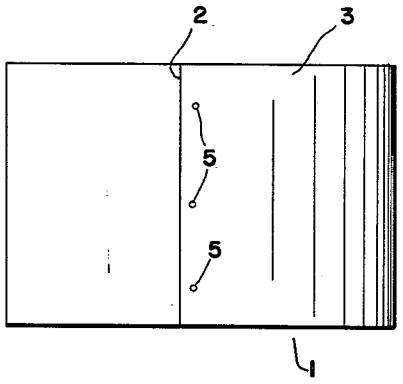


Fig. 1

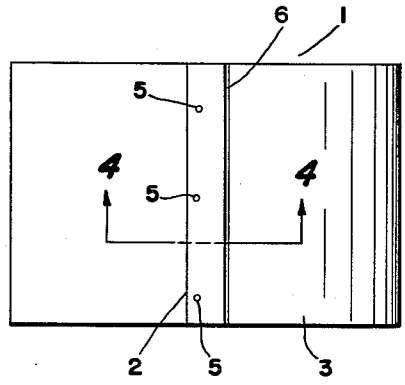


Fig. 3

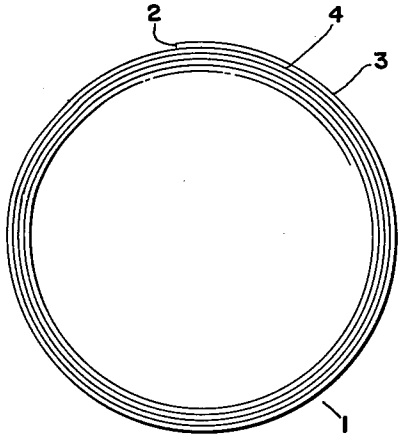


Fig. 2

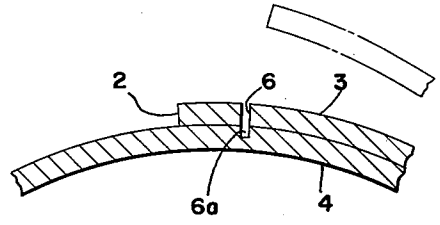


Fig. 4

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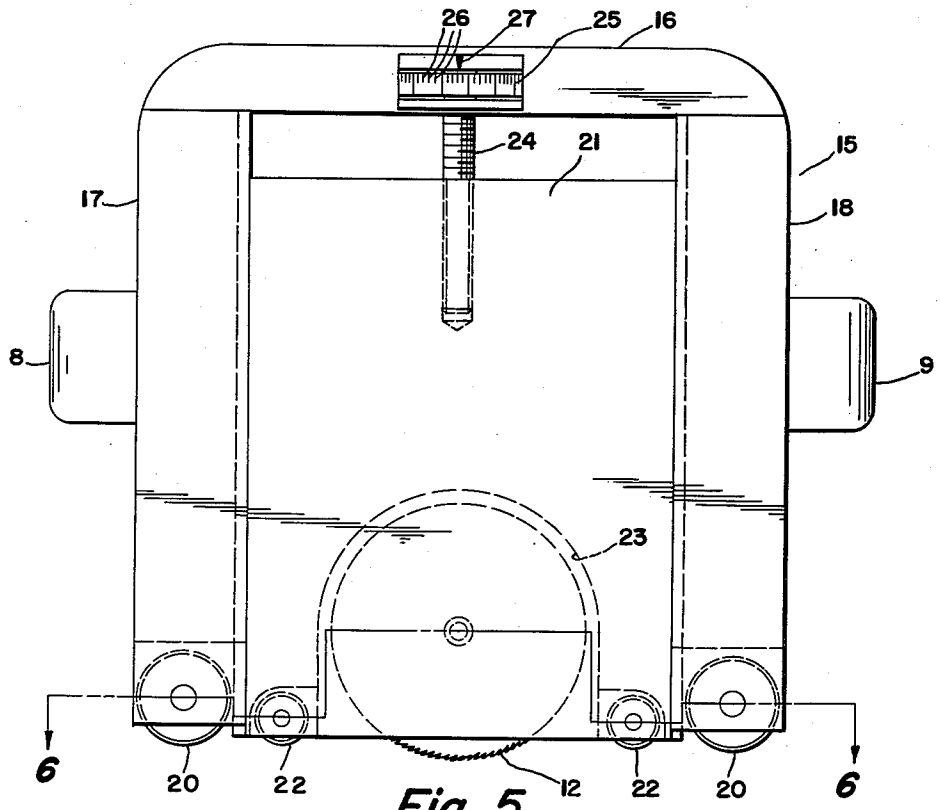


Fig. 5

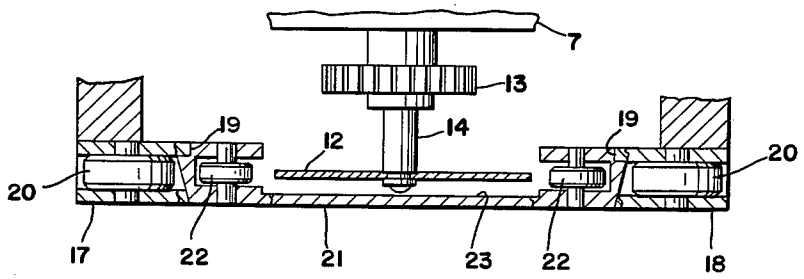


Fig. 6

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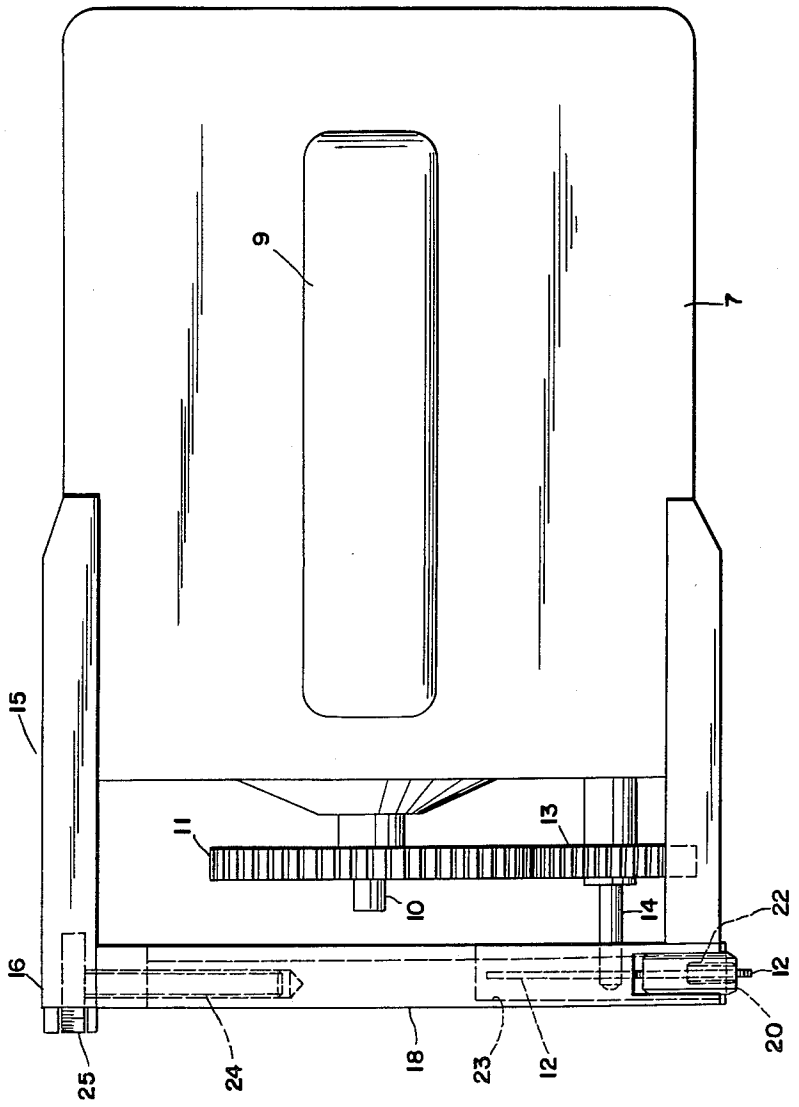


Fig. 7

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United States Patent Office 3,110,099 Patented Nov. 12, 1963

3,110,099
METHOD OF OPENING A WOUND COIL

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Filed May 8, 1962, Ser. No. 193,091
5 Claims. (Cl. 29—426)

This invention relates generally to methods of handling coils of metal.

In the handling of coils of sheet steel or steel strip, for various processing operations, such as heat treatment or annealing, it is conventional procedure to use metal strapping or bands to hold the convolutions of the coil securely together, so that the coil will not become unwound or damaged during such processing operations. This requires the use of special tools for applying and removing the strapping or bands, and in the use of such tools, the outermost convolution or convolutions of the coil are damaged to an extent requiring the removal and scrapping of such convolutions.

The use of such strapping or bands creates a further problem, in that the strapping or bands must be scrapped, so that not only is a storage problem created, but this type of scrap, being of the high-carbon variety, is of a nature such that it has little or no value.

The present invention has as its primary object a method of handling coils of sheet steel, steel strip, or coils of other metals, for various processing operations, which method not only eliminates the need for metal strapping or bands during the processing operations, but also eliminates the use of the special tools or devices for applying and removing the strapping or bands.

Another object of the invention is to provide a method of the character described, which eliminates the band-scrapping to which reference has been made.

A further object of the invention is to provide a method of the character described, in which the extent of scrapping of the outermost convolutions of the coil is reduced to a minimum, so that the maximum amount of usable sheet or strip is provided.

A still further object of the invention is to provide a novel method of removing the outermost convolution of the coil, following the processing operation or operations.

Other objects and advantages of my invention will be apparent during the course of the following description.

In the accompanying drawings forming a part of this specificaion, and in which like numerals are employed to designate like parts throughout the same.

FIG. 1 is a top plan view of a coil of strip or sheet metal, and showing the manner of closing the coil;

FIG. 2 is a front elevational view of the coil of FIG. 1;

FIG. 3 is a view similar to FIG. 1, but showing the step of opening the coil;

FIG. 4 is a fragmentary cross-sectional view, on an enlarged scale, taken on line 4—4 of FIG. 3;

FIG. 5 is a front elevtational view of a novel portable power-driven saw for producing the cut or slot shown in FIGS. 3 and 4;

FIG. 6 is a fragmentary cross-sectional view, taken on the line 6—6 of FIG. 5, and

FIG. 7 is a side elevational view of the saw, as viewed from the right side of FIG. 5.

Referring more particularly to the drawings, reference numeral 1 designates generally a coil of metal sheet or strip, the outer end of which is designated by reference numeral 2, the outermost convolution of which is designated by reference numeral 3, and the convolution underlying the convolution 3 being designated by reference numeral 4.

Prior to subjecting the coil 1 to a processing operation, such as annealing, the convolution 3 of the coil is spot welded to the convolution 4, as by a series of spot welds 5, disposed closely adjacent the end 2 of the coil, and in a line substantially parallel with the end 2. Any number of spot welds may be used, in general, two or three such spot welds will be sufficient to secure the convolution 3 to the convolution 4.

Following the processing operation, the coil is "opened" by saw-cutting or otherwise cutting through the convolution 3, as indicated by reference numeral 6 in FIGS. 3 and 4, and along a line parallel with the line of spot welds 5.

In theory it would be desirable to confine the depth of the cut 6 to the depth or thickness of the convolution 3 of the coil, since this is all that is necessary to "open" the coil, that is, to permit the convolution 3 to spring away from the convolution 4, but in practice, it would be extremely difficult to produce such a cut, without damaging the outer surface of the convolution 4 of the coil.

Consequently, it is preferred that the depth of the cut 6 be such as to penetrate slightly into the convolution 4, as indicated at 6*a* in FIG. 4.

Following this cutting operation, the convolution 3, due to its inherent resiliency, will spring away from the convolution 4, to a position such as indicated by the broken lines in FIG. 4, thus facilitating peeling of the convolution 3 from the coil. After the convolution 3 has been thus peeled from the coil, it may be readily removed from the coil, as by shearing through the portion of the convolution 4 which is below cut 6*a*.

In this manner, the convolution 3, including the portion thereof which is spot welded to the convolution 4, may be quickly and easily removed and scrapped, leaving a clean coil, substantially all of which, with the exception of a single convolution, is usable.

Although the cut 6—6*a* may be made in various ways, and by various means, it is preferred, for reasons to be presently discussed, to make the cut by means of a portable high speed circular saw, such, for example, as a saw of the type disclosed in Koett Patent 2,502,656.

A saw of this type, as modified for this particular operation, is shown more or less diagrammatically in FIGS. 5, 6 and 7 of the drawings.

Referring to FIGS. 5, 6 and 7 of the drawings, the saw will be seen to comprise a motor 7, having handles 8 and 9 secured to the sides thereof, whereby the saw may be moved laterally across the coil when the cut 6—6*a* is to be made.

The shaft 10 of the motor 7 has mounted on one end thereof a gear 11, which drives a circular saw 12, through a pinion 13, which is revolubly mounted on a shaft 14 which extends from the motor housing, below the shaft 10.

Secured to the motor housing is a frame, generally designated by reference numeral 15, and comprising a cross-member 16, and spaced guide members 17 and 18, having tracks 19 in their inboard edges. The members 17 and 18 are provided at their lower ends with rollers 20, which facilitate handling of the portable saw.

Mounted for adjustable vertical movement in the tracks 19 is a plate 21 which has journalled in its lower portion a pair of spaced wheels 22, which are adapted to roll along the surface of the coil when the cut 6—6*a* is being made.

It may be noted, at this point, that the plate 21 is provided on its inner or rear surface with a cavity 23 into which the saw 12 extends, so that the saw and wheels 22 are substantially coplanar with each other.

Means have also been provided for controlling the depth of the cut within thousandths of an inch. For this purpose, the cross-member 16 of the frame 15 has

mounted therein a screw 24 which is rotatable in the cross-member but is confined against vertical displacement from the cross-member. The screw 24 has threads of extremely fine pitch, and is threadedly secured to the plate 21.

The screw is rotated by means of a dial 25 which is secured to the screw, and has graduations 26 on its periphery, which graduations coact with an index mark 27 on the cross-member 16, for the purpose of setting or adjusting the plate 21 to any desired elevation.

By turning the dial, the vertical distance between the periphery of the saw 12 and the bottom of the wheels 22 may be adjusted to any desired extent, within thousandths of an inch, to thereby control the depth of the cut 6—6*a*.

In making the cut 6—6*a*, the saw is guided manually across the coil from one edge of the convolutions 3 and 4 to the opposite edge of such convolutions.

For reasons of safety and efficiency, the handles 8 and 9 are provided, so that control of the saw may be passed from an operator at one side of the coil to an operator at the other side of the coil, so that when the convolution 3 of the coil rises, after the cut has been made, neither operator will be in a position to be struck or injured thereby. In this connection, it may be noted that the control of the saw need not pass from one operator to another, and that a single operator, after the saw has proceeded to a point adjacent the midpoint of the coil, may move to the opposite side of the coil and complete the cut by pulling the saw.

Following annealing operations and the like, the outer convolution or face of the coil is sometimes buckled or irregular in contour. In such cases, and due to the fact that the saw 12 touches the strip along only a point or short line, and the wheels 22 are disposed fairly close to the saw and to each other, the saw will easily follow the irregular contour, so that the depth of the cut will be uniform across the entire coil.

It is thus seen that I have provided a method of handling coils of sheet steel, steel strip, or coils of other metals, for various processing operations, which method eliminates the need for metal strapping or bands, the use of special tools for applying and removing the strapping or bands, and the problem of band scrap disposal, and which reduces to a minimum the amount of coil scrapping.

It is also seen that I have provided a novel portable saw for practicing the method which has been described, and which is highly advantageous for the purposes of the invention.

It is to be understood that the form of my invention, herewith shown and described, is to be taken as a preferred example of the same, and that various changes may be made in the shape, size and arrangement of parts thereof, without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. The method of opening a wound coil of metal consisting of a multiplicity of convolutions, which coil has been subjected to a processing operation and in which the end of the coil, prior to the processing operation, has been welded to a convolution of the coil underlying the outermost convolution of the coil, said method comprising the step of producing a cut through the outermost convolution of the coil entirely transversely of the coil along a line adjacent the welded area, the depth of the cut being greater than the thickness of said outermost convolution but less than the combined thicknesses of the outermost convolution and the underlying convolution, displacing the outermost convolution of the coil from the underlying convolution, and then removing said outermost convolution from the coil and scrapping same.

2. The method, as defined in claim 1, in which after said cut has been made, the portion of said coil between the end of the coil and the cut in said underlying convolution is removed for scrapping.

3. The method, as defined in claim 1, in which, after said displacement, the cut through the underlying convolution is completed to the entire thickness of the underlying convolution.

4. The method, as defined in claim 1, in which said cut is produced by means of a circular saw moving transversely of said coil.

5. The method, as defined in claim 2, in which said cut is produced by means of a circular saw moving transversely of said coil.

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