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PAY-OFF REEL ADAPTER

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This invention relates to adapters attachable to pay-off reels to enable the mounting thereon of crushed or flattened coils of steel and the like.

In the handling of coils of steel or like materials, it commonly occurs that the coil becomes mashed or crushed down so that the central opening in the coil is flattened down. A pay-off reel is a well known coil handling device upon which a coil is mounted preliminary to feeding the coil into various other processing machinery such as slitters and so forth. Pay-off reels have their mandrels horizontally disposed with a free end which passes through the central opening of the coils when the coils are mounted thereon.

A coil with its central opening mashed or crushed down is impossible to mount on a pay-off reel without somehow opening up said central opening so as to permit the free end of the mandrel to enter therein. A common practice is to try to pry open the crushed opening with crow bars, wedges and sledge hammers sufficiently to allow the mandrel to enter therein.

This time-consuming method often fails because coils are, generally speaking, very large and heavy and wound tightly enough to prevent spreading the central hole open again in this manner. Most often it is necessary to pull the center end out; that is to peel the coil from the center until the hole is sufficiently enlarged to permit the mandrel to enter therein and then burn off the portion of the coil thus unwound. This is wasteful as well as time-consuming.

To eliminate this wasteful and time-consuming problem, I provide, in combination with a pay-off reel having a mandrel for mounting coils thereon, an annular adapter means attached at one end to the end of the mandrel and extending axially coincidentally therewith, said means tapering conically from substantially the diameter of the mandrel at its attached end to a very much smaller diameter at its tip end.

My adapter, in a sense, is a tapered extension of the mandrel tapering down to a small diameter tip which is easily inserted into even a crushed coil and once the coil is started on the adapter it is a comparatively much simpler task to work the coil onto the reel, spreading the crushed central opening of the coil as the coil is advanced onto the tapered adapter and eventually the mandrel.

Other details, objects and advantages of the invention will become apparent as the following description of certain present preferred embodiment thereof proceeds.

In the accompanying drawing, I have shown certain present preferred embodiments of the invention in which FIGURE 1 is a partial side elevational view of the mandrel of a pay-off reel with a preferred embodiment of my adapter attached;

FIGURE 2 is an end elevational view of FIGURE 1 as viewed from the left thereof;

FIGURE 3 is a partial sectional view taken on the line III—III of FIGURE 2;

FIGURE 4 is an elevational view of a segment of the preferred embodiment as viewed from the central axis of the mandrel of my adapter shown in FIGURE 1;

FIGURE 5 is an end elevational view of FIGURE 4 as viewed from the right thereof;

FIGURE 6 is a side elevational view of the mandrel of a pay-off reel with another preferred embodiment of my adapter partly in section mounted thereon.

Referring now to the drawing, and initially to FIGURE 1, I show generally a pay-off reel apparatus 5 having a mandrel 6 upon which a coil 7 is to be mounted. My adapter 8 is shown attached to the end of mandrel 6 axially coincidentally therewith. Note that coil 7 has been crushed to the extent that its center hole or eye 9 is no longer round and as such will not fit on mandrel 6, the diameter of which is too large for the width A of eye 9. Note further, however, that the much smaller diameter at the tip 10 of adapter 8 will enter eye 9. I have found that once a crushed coil such as coil 7 is started on my adapter, it is not too difficult to spread eye 9 sufficiently back to its original shape by advancing the coil further onto adapter 8 and eventually onto mandrel 6.

The means of pushing coil 7 further onto the adapter once it is started is immaterial and thus not shown. I have found that a fork truck is capable of doing this and also a crane with another coil hoisted thereon, by leaning or bumping the hoisted coil against coil 7, is capable of sufficiently pushing coil 7 over adapter 8 to go over mandrel 6. Mandrel 6 is of the common expandable type familiar to those skilled in the art and as shown in this instance is divided into three equal segments 11, 12 and 13 which permit mandrel 6 to expand its diameter to the size of the central eye of the coil mounted thereon. This is accomplished by means familiar to those skilled in the art and is not shown or described further herein.

In a preferred embodiment of my invention, I provide an adapter 8 which is divided into three matching segments 14, 15 and 16 which correspond to the segments 11, 12 and 13 of mandrel 6. Of course, when mandrels that are divided into two segments, my adapter would likewise be divided correspondingly into two segments. In short, in this preferred embodiment of my invention, the adapter is divided into a number of segments corresponding to the number of segments the mandrel is made up of, so that it may expand with the mandrel. Segments 14, 15 and 16 each have an outer wall 18, an end wall 19 and a strengthening member such as rib 20 integrally formed or assembled as shown in FIGURE 4. End wall 19 is of a substantially similar size and shape of the end wall of the corresponding segment of mandrel 6 to which it is attached. End wall 19 has openings 21 therein which match openings 22 in the end wall of mandrel 6. Segments 14, 15 and 16 are attached to corresponding segments 11, 12 and 13 of mandrel 6, respectively, by bolts 23. I have found that in order to facilitate the mounting of adapter 8 on mandrel 6 it is advisable to slot the openings 21 as shown at reference 24 in at least one of the adapter segments or all of them, so that when mounting them the last adapter segment may be slid under the heads of the bolts 23 which may then be tightened down with only one or two turns since it is quite awkward and difficult to get a wrench to bolts 23 when the segments are all in place. Bolts 23 are nevertheless accessible after mandrel 6 is expanded and the slots 24 simply make it easier to attach the adapter segments. As illustrated in FIGURES 1 and 4, adapter 8 tapers conically from its largest diameter at the end attached to mandrel 6, at which point it is about the same diameter as the free end of mandrel 6 to which it is attached, down to a relatively very much smaller diameter at its tip end 10.

It is apparent that tip 10 with its very much smaller diameter will easily start into the eye 9 of the crushed coil 7. The fact that adapter 8 is segmented correspondingly with the segments of mandrel 6 is also very helpful in that this enables the operator to help spread eye 9 by expanding mandrel 6 which, of course, expands adapter 8 while it is in eye 9. Then by closing mandrel 6 and adapter 8 back to their smallest diameter, coil 7 may be pushed and advanced onto adapter 8 and finally mandrel 6 much more easily. By repeatedly spreading and then
pushing as above described, even the most severely crushed coils can be mounted on mandrel 6 without wasting or losing material and in much less time than heretofore possible. The taper of adapter 8 as shown is at 15 degrees angle relative to the axes of the mandrel and adapter. However, I do not intend that the taper be strictly limited thereto as I have found that tapers of from 10 to 25 degrees relative to the axes of the mandrel and adapter are suitable for the purpose. Beyond 25 degrees taper however, it requires too much side pressure to the pay-off reel structure when pushing the coil onto the mandrel to be practical or safe. I have also found that less than 10 degrees of taper unduly lengthens the adapter and gives rise to excessive spring in the adapter when expanding it for eye spreading purposes and is therefore much less satisfactory.

In another preferred embodiment shown in FIGURE 6, I show an adapter 30 which is not segmented. In this embodiment, adapter 30 has a hollow cylindrical body portion 31 and a conically tapered hollow nose portion 32. Adapter 30 is attached to the end of an expandable mandrel 6' by fitting the body portion 31 over the end of mandrel 6', that is the end of mandrel 6' is fitted inside the hollow body portion 31 of adapter 30 and then the mandrel is expanded slightly until adapter 30 is firmly gripped within hollow portion 31 by the pressure of the segments of mandrel 6' bearing on the inner wall of said hollow portion.

In this manner, adapter 30 is held firmly on the end of the mandrel 6' and extends axially coincidentally therefrom. Body portion 31 is necessarily larger in diameter than mandrel 6' in collapsed position but only slightly so, it being desirable, of course, to keep the largest diameter of adapter 30 to the minimum. Thus, body portion 31 is preferably relatively thin-walled although it is, of course, necessary that it be sufficiently strong to withstand the pressure of mandrel 6' expanding thereinwith. Conical nose portion 32 tapers to a much smaller diameter tip 33 which is small enough to start into the eye of even a very severely crushed coil. As earlier explained, once a coil is started on the adapter it is comparatively much easier to force the coil onto mandrel 6'. In this embodiment, however, the operator cannot assist the expansion of the coil eye by expanding mandrel 6' and the expansion of the coil eye is entirely due to forcing the coil further onto adapter 30 until it is on mandrel 6'. It is obvious that hollow body portion 31 cannot be unduly long for there must be sufficient clear mandrel left with adapter 30 mounted thereon for the coil to be mounted thereon beyond the attached end of adapter 30 so that the adapter may be removed after the coil is so mounted. Adapter 30 must be removed after mounting the coil to permit mandrel 6' to be expanded to properly hold the coil as it is payed out. To facilitate the removal of adapter 30, as well as the handling thereof, I provide an opening 34 in nose portion 32 near tip 33 to which a line may be hooked.

As in the first described embodiment, I also recommend in this embodiment a taper in the nose portion thereof of a taper of from 10 to 25 degrees relative to the axis of said adapter, the taper shown in the drawing being about 15 degrees.

While I have shown and described certain preferred embodiments of the invention, it is to be distinctly understood that the invention is not limited thereto but may be otherwise variously embodied within the scope of the following claims.

I claim:

1. In combination with a pay-off reel having an expandable segmented mandrel for mounting coils thereon, conical adapter means attached to the end of said mandrel and extending axially coincidentally therefrom, said adapter means being segmented correspondingly with said mandrel, means attaching each segment of said adapter means to a corresponding segment of said mandrel whereby when said mandrel is expanded said adapter means likewise expands, said adapter means tapering conically from its attached end smoothly and evenly to substantially a point at its tip end.

2. In combination with a pay-off reel having an expandable segmented mandrel for mounting coils thereon, conical adapter means attached to the end of said mandrel and extending axially coincidentally therefrom, said adapter means being segmented correspondingly with said mandrel, means attaching each segment of said adapter means to a corresponding segment of said mandrel whereby when said mandrel is expanded said adapter means likewise expands, said adapter means at its attached end having substantially the same diameter as the diameter of the end of the mandrel and tapering conically therefrom smoothly and evenly to substantially a point at its tip end.

3. In combination with a pay-off reel having an expandable segmented mandrel for mounting coils thereon, conical adapter means attached to the end of said mandrel and extending axially coincidentally therefrom, said adapter means being segmented correspondingly with said mandrel, means attaching each segment of said adapter means to a corresponding segment of said mandrel whereby when said mandrel is expanded said adapter means likewise expands, said adapter means at its attached end having substantially the same diameter as the diameter of the end of the mandrel and tapering conically therefrom smoothly and evenly to substantially a point at its tip end, said taper being substantially constant and between 10 to 25 degrees of angle relative to said axes.

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