

[72] Inventors **Mario Martinez**
Dibden Mannor, Dibden Hythe;
Colin Monday, Southampton, England

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[73] Assignee **said Monday assignor to said Martinez**

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[33] **Great Britain**

[31] **11,977/68**

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Primary Examiner—Donald E. Watkins
Attorney—Fleit, Gipple & Jacobson

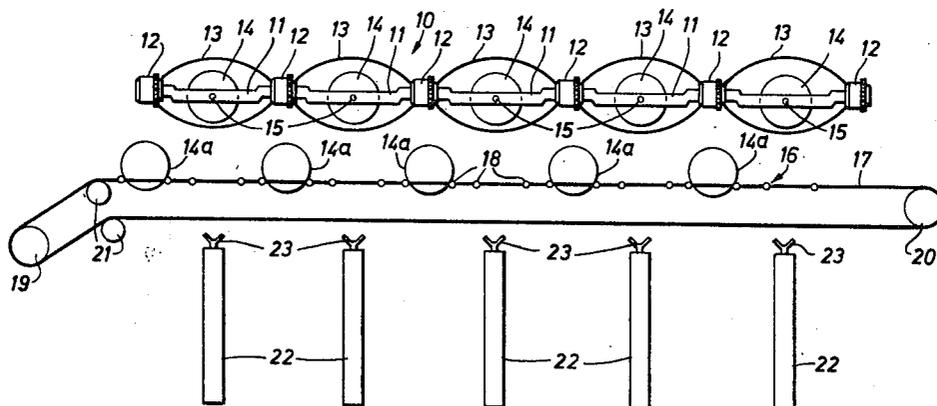
[54] **METHOD AND APPARATUS FOR LOADING BOBBINS OR REELS INTO AND OUT OF CRADLES OR MOUNTINGS**
 13 Claims, 4 Drawing Figs.

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 D07b 7/00

[50] Field of Search 57/52, 59,
 34, 58.3, 58.38, 54, 156, 160, 161, 166, 6

ABSTRACT: The invention comprises a method and apparatus for loading and unloading spools into and out of pin-ties of a machine having a plurality of spools and the method comprises the steps of loading full spools to be mounted in the supports onto a conveyor, conveying said full spools below said spool supports and locating each spool in a vertical plane displaced to one side of a vertical plane containing the respective axis of the spool support, lowering any empty spools from the spool supports onto the conveyor, lowering the conveyor to position each full spool to be loaded in the vertical plane containing the respective axis of the spool support, raising each full spool to be loaded into the respective spool support and then operating the conveyor to convey unloaded empty spools thereon away from the apparatus.



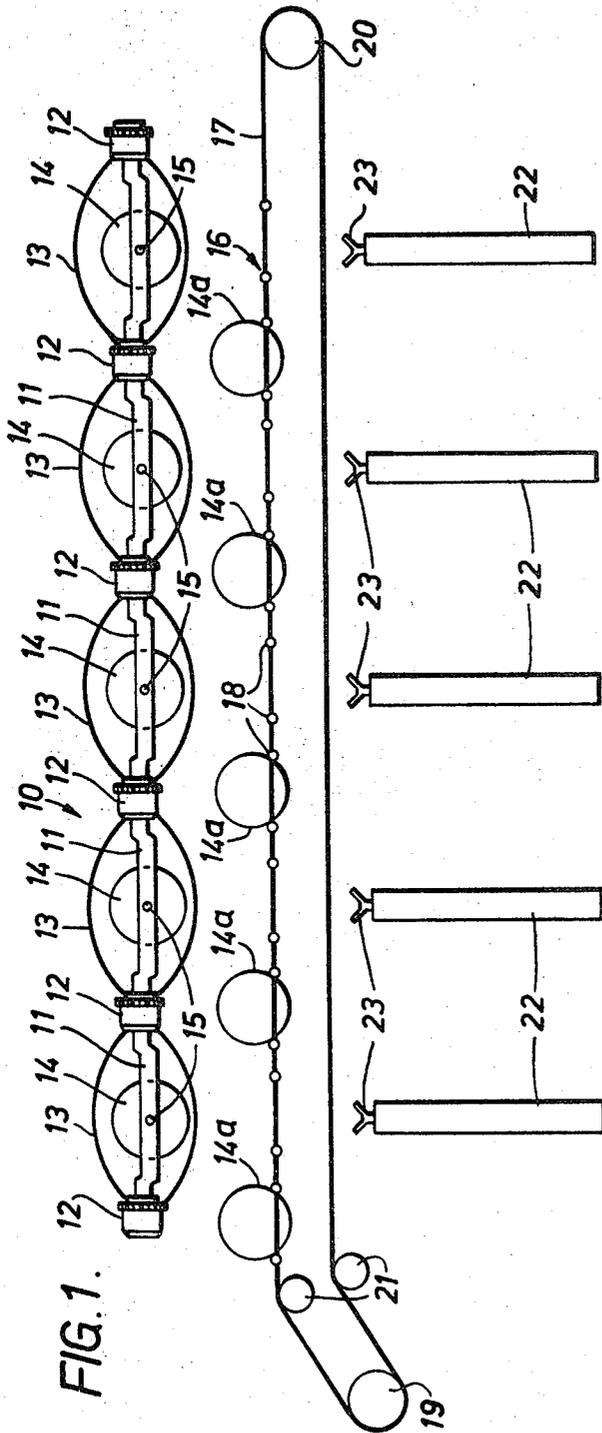


FIG. 1.

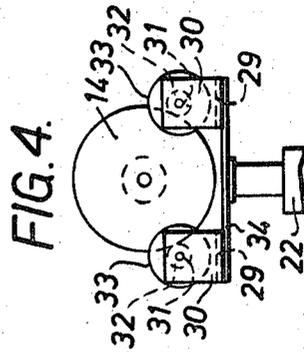


FIG. 4.

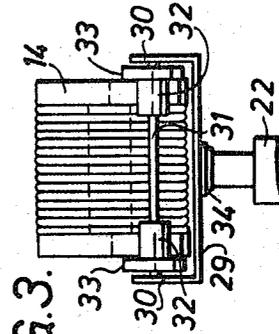


FIG. 3.

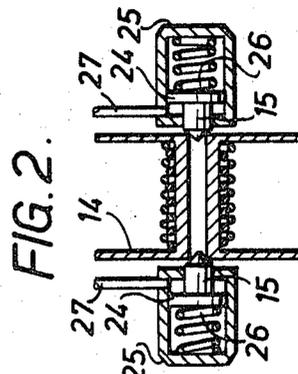


FIG. 2.

INVENTORS
MARIO MARTINEZ,
COLIN MONDAY

BY

Stevens, Davis, Miller & Mosher
ATTORNEYS

METHOD AND APPARATUS FOR LOADING BOBBINS OR REELS INTO AND OUT OF CRADLES OR MOUNTINGS

This invention relates to a method and apparatus for loading and unloading spools, bobbins or reels into and out of pintles or mountings of a machine or apparatus having a plurality of spools, bobbins or reels. Such a machine may comprise a wire-stranding machine in which each strand is drawn from a spool, bobbin or reel and twisted with a plurality of other strands into a rope or cable.

Cable and rope making stranding machines usually have a large number of spools, bobbins or reels which have to be replaced with full ones when those on the machine become empty. Some machines may include 50 or more spools, bobbins or reels and the time delay in removing the empty spools, bobbins or reels and replacing them with full ones is enormous, resulting in large delays in production. Stranding machines are being developed so as to operate at increased speeds in order to speed up production but they are still subject to long interruptions in operation due to the time spent in changing the spools, bobbins or reels which are usually replaced one at a time with the use of overhead lifting tackle.

An object of the present invention is to provide a method and apparatus for loading and unloading spools, bobbins or reels into and out of pintles or mountings in a rapid manner.

According to the present invention in one respect there is provided a method of loading and unloading spools, bobbins or reels into and out of pintles or mountings of a machine or apparatus having a plurality of pintles or mountings, comprising the steps of loading spools, bobbins or reels to be mounted in the pintles or mountings onto a conveyor, conveying said spools, bobbins or reels below said pintles or mountings and locating each spool, bobbin or reel in a vertical plane displaced to one side of a vertical plane containing the respective axis of the pindle or mounting, lowering any spools, bobbins or reels from the pintles or mountings onto the conveyor, operating the conveyor to position each spool, bobbin or reel to be loaded in the vertical plane containing the respective axis of the pindle or mounting, raising each spool, bobbin or reel to be loaded into the respective pindle or mounting and then operating the conveyor to convey unloaded spools, bobbins or reels thereon away from the machine or apparatus.

Further spools, bobbins or reels may be moved by the conveyor into said vertical planes displaced from vertical planes containing the axes of the pintles or mountings during the movement of the conveyor conveying the unloaded spools, bobbins or reels away from the machine or apparatus.

The spools, bobbins or reels unloaded from the pintles or mountings may fall by gravity on to the conveyor or they may be lowered on to the conveyor.

The method may include the step of automatically releasing the spools, bobbins or reels from the pintles or mountings.

According to the present invention in another aspect there is provided apparatus for carrying out the method recited above comprising a conveyor disposed in the vertical plane of the axis of each pindle or mounting for raising spools, bobbins or reels from the conveyor into the pintles or mountings.

Preferably said means is also used for lowering bobbins or reels from the pintles or mountings onto the conveyor.

The conveyor may comprise a pair of spaced-apart, parallel endless chains or belts interconnected by longitudinally spaced-apart rods or rails.

The means for lifting and lowering the spools, bobbins or reels may be arranged to extend upwardly between the rods or rails of the conveyor when it is stationary. The means for lifting and lowering the spools, bobbins or reels may comprise a hydraulically or pneumatically operated ram or jack having means to engage the spools, bobbins or reels.

The pintles or mountings may be in the form of hydraulically or pneumatically withdrawable pintles for mounting the spools, bobbins or reels.

To the accomplishment of the foregoing and related ends, the invention then comprises the features hereinafter fully described and particularly pointed out in the claims, the following description and annexed drawings setting forth in

detail certain illustrative embodiments of the invention, these being indicative, however, of but ways in which the principle of the invention may be employed.

In said annexed drawings:

FIG. 1 is a side view of apparatus according to the present invention;

FIG. 2 is a section through suitable pintles for supporting the bobbins;

FIG. 3 is a front view of the support member of a lifting device; and

FIG. 4 is a side view of the support member shown in FIG. 3.

Referring firstly to FIG. 1 there is shown part of a stranding machine 10 of the type disclosed and claimed in my copending U.S. Pat. application Ser. No. 748,693, filed July 30, 1968 which includes a plurality of cradles 11 suspended between bearing support structures 12 provided on stands (not shown) and between which extend wire guides 13 which rotate about the longitudinal axis of the machine 10 and are driven from each structure 12. Each cradle 11 supports a spool 14 which rotates about pintles 15. The pintles 15 may be of the kind shown in FIG. 2 and described hereafter. Located below the machine 10 is an endless conveyor 16 which comprises two parallel spaced-apart chains or belts 17 interconnected by longitudinally spaced-apart rods 18 whose spacing is chosen to suit the diameter of the spools 14. The conveyor 16 is passed over rollers or sprockets 19 and 20, one of which is preferably a drive roller or sprocket. The conveyor 16 is tensioned by means of sprockets or rollers 21.

Located in the vertical plane of the axis of the pintles 15 of each cradle 11 is a lifting device 22 which is disposed below the lower run of the conveyor 16. Each lifting device 22 may comprise a vertically extendable hydraulically or pneumatically operated ram or screw-type jack having a support member 23 adapted to contact the spools 14. The support member 23 is shown more clearly in FIGS. 3 and 4 and described in greater detail hereafter.

Referring now to FIG. 2 it will be seen that the pintles 15 each comprise a piston 24 displaceable in a cylinder 25 against the action of a spring 26. Each cylinder 25 is connected to a conduit 27 for supplying pressurized pneumatic or hydraulic fluid thereto in order to move the piston 24 against the force of the spring 26 in order to disengage the pintles 15 from the spool 14.

The apparatus so far described with reference to FIGS. 1 and 2 operates in the following manner. Whilst the stranding machine 10 is operating, full spools of wire 14a are loaded onto the conveyor 16 and are supported at predetermined distances apart by the rods 18. The spools 14a are then moved by the conveyor 16 to the position shown in FIG. 1 in which each spool 14a is disposed in a vertical plane displaced to one side of a vertical plane containing the axis of the pintles 15 in which it is to be mounted. When the spools 14 contained in the machine 10 require replacing, the stranding machine 10 is stopped and hydraulic or pneumatic fluid pressure is admitted to the conduits 27 in order to displace the pintles 15 allowing each spool 14 to drop onto the upper run of the conveyor 16. Alternatively the spools 14 may be removed by first of all raising the lifting devices 22; then retracting the pintles 15 so that the spools 14 rest on the support members 23 and then lowering them onto the conveyor 16 by lowering the devices 22.

When the spools 14 are on the conveyor 16 it is operated so as to move the spools 14a into the vertical planes containing the axes of the pintles 15. The lifting devices 22 are then raised so as to lift the spools 14a between the pintles 15 of the respective cradles 11 and when in position the hydraulic or pneumatic pressure is vented from the conduits 27 and the springs 26 engage the pintles 15 with the spools 14a. The lifting devices 22 are lowered and the conveyor 16 is operated to remove the spools 14 from below the machine 10. During the movement of the conveyor 16 to remove the spools 14 it may bring freshly loaded spools into the position previously occupied by the spools 14a.

It is necessary to join the end of the wire which has been unwound from each spool 14 to the end of the wire contained on the spool 14a which replaces it. Automatic means, not shown, may shear the end of the wire extending into the machine 10 and join it to the end of the wire on spool 14a.

All of the pneumatic or hydraulically actuated parts of the apparatus may be connected to a control circuit so as to produce an automatic-timed operation of the whole apparatus.

Even though the apparatus has been specifically described in relation to a stranding machine it will be appreciated that the invention can be applied to any kind of machine or apparatus having a plurality of spools which periodically require replacing.

The support members 23 are shown more clearly in FIGS. 3 and 4 and each comprise a pair of spaced-apart plates 29 having vertical end portions 30. Extending between the end portions 30 of each plate is a rod 31 on which are mounted rollers 32 which have an integral flange 33. The plates 29 are interconnected by a plate 34 which is attached to the rod of the lifting device 22. In use, the rollers 32 contact the peripheries of the flanges of the spools and the flange 33 of each roller 32 serves to prevent the spools moving sideways. Other modes of applying the principle of the invention may be employed, change being made as regards the details described, provided the features stated in any of the following claims, or the equivalent of such, be employed.

We claim:

1. A method of loading and unloading spools into and out of spool supports of an apparatus having a plurality of spool supports, comprising the steps of loading all of the full spools to be mounted in the supports onto a conveyor, conveying said full spools below said spool supports and locating each spool in a vertical plane displaced to one side of a vertical plane containing the respective axis of the spool support, lowering empty spools from the spool supports onto the conveyor, operating the conveyor to position each full spool to be loaded in the vertical plane containing the respective axis of the spool support, raising each full spool to be loaded into the respective spool support; and operating the conveyor to convey unloaded empty spools thereon away from the apparatus.

2. The method claimed in claim 1 in which additional full spools are moved by the conveyor into said vertical planes displaced to one side of the vertical planes containing the axes of the spool supports during the movement of the conveyor conveying the unloaded empty spools away from the apparatus.

3. The method claimed in claim 1 in which empty spools are unloaded from the spool supports and lowered onto the conveyor.

4. The method claimed in claim 1 in which the various steps are carried out in an automatically timed sequence.

5. Apparatus for loading and unloading spools into and out of spool supports of an apparatus having a plurality of spool supports comprising a conveyor disposed below said spool supports of the apparatus and means disposed in the vertical plane of the axis of each spool support for raising spools from the conveyor into the spool supports.

6. Apparatus as claimed in claim 5 in which the means for

raising the full spools is also used for lowering empty spools onto the conveyor.

7. Apparatus as claimed in claim 5 in which the conveyor comprises a pair of spaced-apart parallel endless members interconnected by longitudinally spaced-apart rods.

8. Apparatus as claimed in claim 5 in which the means for lifting and lowering the spools are adapted to extend upwardly through the runs of the conveyor when it is stationary.

9. Apparatus as claimed in claim 5 in which the means for lifting and lowering the spools comprise fluid-operated devices provided with support members which engage with the spools.

10. Apparatus as claimed in claim 5 in which the means for raising the spools comprise a ram device having at one end a support member formed by a pair of spaced-apart parallel plates, each plate having upstanding end wall portions, a transverse plate interconnecting the spaced-apart parallel plates, said transverse plate being secured to a piston rod of the ram device, a rod extending between the end wall portions of each spaced-apart plate and flanged rollers being mounted on each rod and adapted to contact the flanges of a spool.

11. Apparatus as claimed in claim 5 in which the spool supports comprise fluid-withdrawable pintles for mounting the spools.

12. In combination an apparatus having a plurality of spool supports for supporting spools and a loading and unloading apparatus disposed below said spool supports for loading full spools into said spool supports and for unloading empty spools from said spool supports, said loading and unloading apparatus comprising an endless conveyor disposed below said spool supports for moving full spools to a position in which they are each located in a vertical plane displaced to one side of a vertical plane containing the axis of the spool support in which they are to be mounted, means for lowering empty spools from said spool supports onto said conveyor, means disposed in the vertical plane containing the axis of each spool support for raising full spools from the conveyor and into the spool supports and means for driving said conveyor.

13. In combination a wire-stranding machine having a plurality of cradles, each cradle having pintles for supporting a spool of wire to be stranded with wires from the other spools, and a loading and unloading apparatus disposed below said cradles for loading full spools into the pintles of the cradles and for unloading empty spools from the pintles of the cradles, said loading and unloading apparatus comprising an endless conveyor formed by a pair of spaced-apart parallel endless members interconnected by longitudinally spaced-apart rods, said endless members at each end passing around sprockets, means for driving said sprockets to move full spools carried on said conveyor to a position in which they are each located in a vertical plane displaced to one side of a vertical plane containing the axis of the pintles in which they are to be mounted, a fluid-operated ram being disposed in the vertical plane containing the axis of each pindle and adapted to be extended between the rods of said conveyor when stationary so as to raise full spools from the conveyor into the respective pintles when empty spools have been removed from the pintles and lowered onto said conveyor.

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