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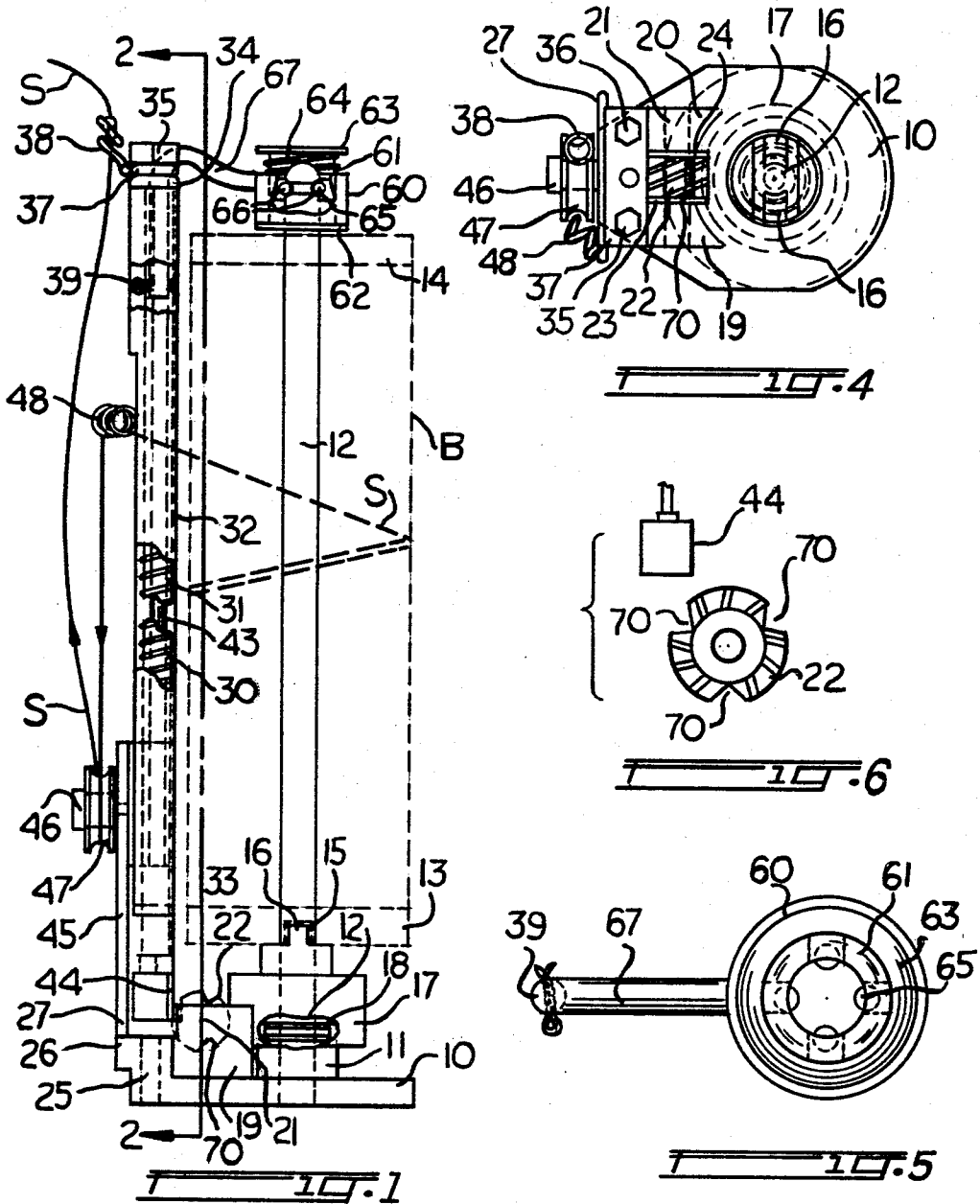
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BOBBIN CARRIER FOR BRAIDING MACHINES AND THE LIKE

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2 Sheets-Sheet 1



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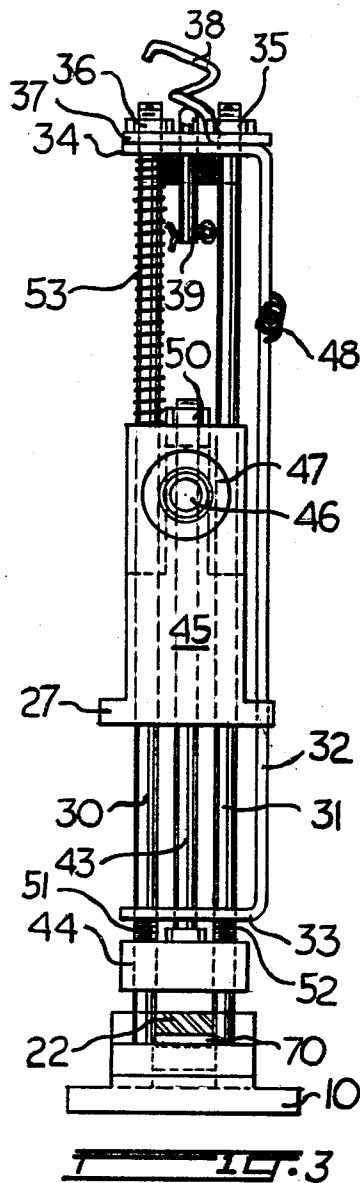
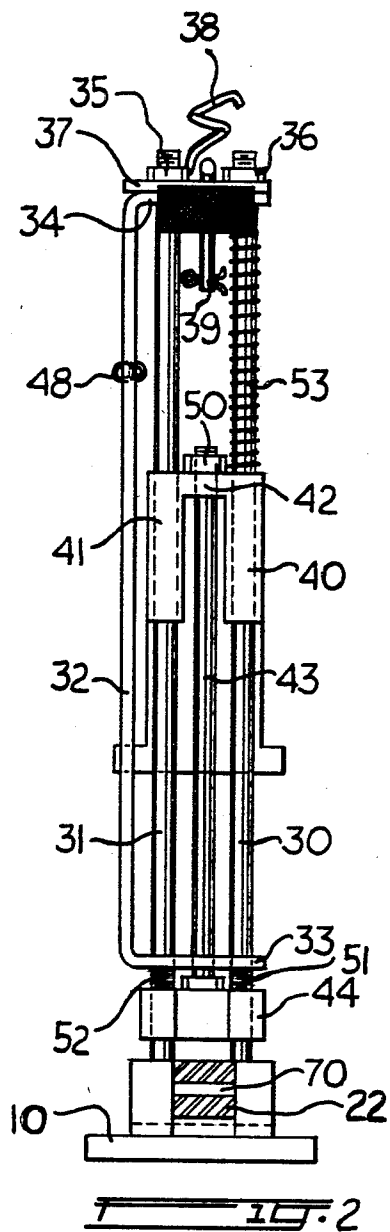
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BOBBIN CARRIER FOR BRAIDING MACHINES AND THE LIKE

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ABSTRACT OF THE DISCLOSURE

A bobbin carrier having a gear train driven by the bobbin as it dispenses a strand, one of the gears having a notch extending across its teeth and adapted to be occupied by a gear-locking means when tension in the strand drops to a predetermined value, the gear-locking means being disengaged from the notch when tension in the strand rises to a predetermined second value.

Background of the invention

(1) *Field of the invention.*—The invention relates to a bobbin carrier assembly for use with braiding machines or the like wherein the intermittent unwinding rotation of the bobbin is effected by the tension existing in the strand being dispensed therefrom, and wherein the bobbin is quickly and positively locked against rotation when such tension drops to a predetermined value and is quickly released for further rotation when the tension rises to a predetermined higher value.

(2) *Description of the prior art.*—Conventional bobbin carriers, as illustrated for example by the patents to Carter, No. 2,986,061 and Woods et al., No. 2,988,300, generally employ a ratchet type bobbin base with an engageable pawl mounted on a rocking lever, or a brake drum bobbin base with brake elements actuated by a rocking lever, for the purpose of bringing the bobbin to rest and for releasing the same for later rotation. Such levers of course are in turn actuated in dependence upon the tension existing in the strand being dispensed from the bobbin. As wear occurs, however, the problem of maintenance increases and indeed the wear may increase to the point at which skips will occur in the halting of the bobbin rotation at proper times. By contrast, the present invention employs a lubricated gear train driven by the bobbin and which is positively locked against rotation, and then released for further rotation, in rapid response to changes in the tension of the strand. Accordingly, the present structure is less susceptible to malfunctioning and requires less attention and maintenance.

Summary of the invention

A bobbin carrier is provided with a base having a spindle for rotatably mounting the bobbin and with posts for mounting a pair of slides which move in response to the tension in the strand. A first gear driven by the bobbin remains constantly in engagement with a pinion, or second gear, which has a plurality of notches axially disposed in its teeth and uniformly spaced angularly of its axis. A spring loaded locking bar on the second of the slides is mounted for rapid engagement with and disengagement from the notches in the pinion and is moved from engagement with the notch upon being actuated by the first slide which in turn is subject to the tension existing in the strand.

The objects of the invention include the provision of a bobbin carrier which requires but little maintenance and which is reliable in operation.

Brief description of the drawings

The objects of the invention will be more apparent when considered in conjunction with the following de-

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scription of the apparatus and with respect to the accompanying drawings in which—

FIG. 1 is a side elevation view, with portions broken away, of the carrier with the bobbin and the strand leading therefrom being shown on dotted lines and with the slides in rest position.

FIG. 2 is a view taken on line 2—2 of FIG. 1 but with the locking means disengaged from the gear train.

FIG. 3 is an end elevation view showing the position of the slides as indicated in FIG. 2.

FIG. 4 is a plan view of the carrier with the bobbin and bobbin latch removed.

FIG. 5 is a plan view of the bobbin latch, and

FIG. 6 is an end view to a larger scale of the pinion gear indicating its relative position with respect to the second slide.

Description of the preferred embodiment

Referring now to FIGS. 1 and 4, the carrier includes a base member 10 which, as will be understood, will have a foot portion (not shown) for engagement with the conventional race plate of a braiding machine or the like. Attached to the base member is a pedestal 11 having a flat upper surface, and projecting from the base and pedestal is an elongated spindle 12 upon which a hollow bobbin B carrying a wound strand S is adapted to be rotatably mounted. This bobbin is equipped with end plates 13, 14 having slots (one of which is shown at 15) adapted to engage with a key 16 projecting from the surface of a first gear 17 and to drive such gear when the bobbin is rotated by the unwinding of the strand therefrom. Gear 17 is journaled upon flat annular bearings 18 resting upon the pedestal and surrounding the spindle. Since the bobbin preferably is reversible end for end, the direction of rotation of gear 17 depends upon which of the bobbin end plates is keyed to that gear.

Laterally spaced from the pedestal and projecting from the base is a pair of bosses 19, 20 having a bore there-through for receiving a shaft 21. This shaft extends through a straight pinion, or second, gear 22 which is in engagement at all times with the first gear 17, and provides a gear train from the bobbin having a suitable ratio of driving to driven gears, for example 3:1, and for a purpose later to be described. Suitable thrust bearings 23, 24 are interposed between the ends of the second gear and the bosses 19, 20 respectively. The distal ends of the bosses, moreover, comprise a platform 25, the extreme portion of which serves as an abutment 26 against which the first slide 27 abuts when in its rest position.

Affixed to the platform 25 and extending generally parallel to spindle 12 is a pair of spaced elongated rods 30, 31 having undercut shoulders at their distal ends and threaded to receive fastening units. A bracket having an elongated side portion 32 laterally spaced from rod 31 and with end portions 33, 34 embracing the rods is secured to the rods by means of nuts 35, 36. Preferably, a plate 37 having a laterally projecting lead-off guide 38 for the strand passing to the braiding operation is secured between the nuts and the end portion 34 of the bracket and both the plate 37 and the bracket end portion 34 are apertured to receive the end rod portion 39 of a bobbin latch, as later to be described.

The first slide 27 is provided on its side facing the bobbin with cylindrical portions 40, 41 surrounding the respective rods 30, 31 and with a cylindrical spacer 42 surrounding the rod 43 of a second slide 44. The spacer joins the cylindrical portions 40, 41 and serves as the actuating means for moving the second slide away from its rest position. On its side opposite the bobbin the first slide preferably comprises a flat surface 45 from which a short pin 46 projects and upon which a roller 47 is mounted to receive the strand passing to the guide 38. A second guide

48 mounted upon the bracket 32 receives the strand issuing from the bobbin and passes the same to roller 47 as best seen in FIG. 1.

Rod 43 is attached at one end to slide 44 which serves as a locking bar for the pinion and at its other end is provided with a nut 50 adapted to be engaged by spacer 42 as the first slide approaches the end of its movement away from its rest position and after having moved a substantial distance, for example about 4.5 inches. By contrast, the movement of rod 43 and the attached slide 44 is relatively short, for example, about 0.75 inch, and need be only sufficient to permit disengagement of the slide from the pinion. The slide 44, moreover, is apertured so as to slide along rods 30, 31 and compression springs 51, 52 surrounding those rods are interposed between the slide 44 and the end portion 33 of the bracket. Depending upon the tension in the strand required for proper operation of the apparatus, one or more compression springs such as indicated at 53 are interposed between the end of the first slide 27 and the confronting end portion 34 of the bracket.

As best shown in FIGS. 1 and 5, the bobbin is held in engagement with the key 16 of the first gear 17 by means of an improved latch including an annular ring 60 to which a laterally extending rod 67 is attached and with that rod terminating in the end portion 39 which is arranged for a substantial axial movement in the bracket portion 34. Ring 60 has mounted therein a bushing 61 of greater depth than the ring and having one flange 62 adapted to contact the ring when the latch is disengaged from the bobbin and a second flange 63 at its other side loaded by means of a compression spring 64 bearing against the ring at all times. Interiorly the bushing is provided with a plurality of spring loaded detent balls 65 adapted to engage in the annular recess 66 adjacent the end of spindle 12. Accordingly, with the bobbin in place on the spindle the latch is rotated until the axis of the bushing coincides with the axis of the spindle and is then pressed downwardly until the detent balls engage in recess 66 thus to latch the bobbin to the spindle and to prevent disengagement of the opposite end of the bobbin from gear 17. Unlatching of the bobbin occurs in reverse order of movement of ring 60.

As a significant feature of the invention, the second gear is provided with one or more, preferably three, linear notches 70 cut into its teeth and extending axially of the gear and spaced at uniform angular distances from each other. As indicated in FIG. 1, the second gear, moreover, is journaled in bosses 20, 21 at such location that when the second slide 44 moves to its rest position it enters into the corresponding notch 70 and effectively locks the gear train and prevents further rotation of the bobbin.

As seen in FIG. 6, the notches 70 preferably are milled in the pinion teeth in symmetrical manner with respect to the axis of the gear and subtend an angle of 90° with the apices of the notch being located approximately at the root circle of the teeth. As the locking bar portion of the second slide 44 moves into engagement with a notch it contacts a plurality of teeth of the pinion gear without placing undue strain on any one tooth. Moreover, the size of the notch is sufficiently small that portions of several teeth of the pinion remain in engagement with the first gear 17 as those notches pass through their orbit with respect to the first gear.

In a typical operation and referring now to FIG. 1 with the slides and the bobbin at rest, as tension is placed upon the strand S downstream from guide 38 the strand by reason of its engagement with roller 47 lifts first slide 27 against spring 53. As this slide approaches the limit of its movement from rest position, its spacer 42 contacts nuts 50 and moves the second slide 44 out of engagement with a notch 70 in the pinion as seen in FIGS. 2 and 3. Immediately the tension of the strand is transmitted to the bobbin which begins to rotate and to drive the gear train. The gear ratio of more than unity between the first and

second gears and the plurality of notches in that second gear then assure that the bobbin can be brought to rest quickly after the tension is relaxed in the strand. When, for example, such tension drops, the first slide begins to move toward rest position and after a short movement, such as less than an inch, the rod 43 and the second slide 44 have moved into rest position to lock the gear train against further unwinding of the bobbin. If the slide 44 in its movement to rest position engages the normally lubricated threads of gear 22, the gear continues to turn momentarily until the next notch 70 arrives in position to receive the locking bar of that second slide. Meanwhile, the first slide still is moving a substantial distance toward its rest position and is taking up slack in the relaxed strand.

Various advantages of the present invention will now be apparent to those skilled in the art. The rapid and positive locking of the bobbin against overrunning or skipping will be noted as well as the rapid release of the locked gears when tension is increased in the strand to a predetermined value as dictated by the spring loadings upon, and weights of, the movable slides. For adjustment of that predetermined value the springs may be readily changed merely by removing the nuts 35, 36, 50, sliding the bracket and the two slides off rods 30, 31 and substituting other springs 51, 52, 53 as dictated by conditions.

Various modifications of the described construction may be employed without departing from the invention. It is, therefore, to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. A bobbin carrier for braiding machines or the like comprising, a base, a spindle attached to said base for rotatably supporting a tubular bobbin having a strand of material wound thereon, interengaging gears rotatably supported on said base and including a first gear detachably engaging with and adapted to be driven by the bobbin and a second gear having interrupted teeth forming a linear notch thereacross, a post attached to said base, and extending generally parallel to said spindle, first and second slides journaled for movement on said post to and from their normal rest positions, said first slide carrying means engageable by said strand passing from the bobbin, said second slide carrying gear-locking means engageable within said notch when said second slide is in its rest position, means urging said slides normally toward their respective rest positions, and means on said first slide for moving said second slide from its rest position as said first slide is moved to an intermediate position of its travel by the pull of said strand, whereby upon application of tension to said strand said first slide serves to disengage the gear-locking means from the notch in said second gear to permit rotation of the bobbin and upon relaxation of tension in said strand said first slide serves to permit said gear-locking means to reengage in the notch of said second gear and to stop rotation of the bobbin.

2. A bobbin carrier as defined in claim 1 wherein the gear ratio of said first gear to said second gear is greater than 1 to 1.

3. A bobbin carrier as defined in claim 1 wherein the extent of permitted movement of said second slide along said post is substantially less than the permitted movement of said first slide along said post.

4. A bobbin carrier comprising in combination, a base, a spindle attached to said base, a bobbin rotatably mounted on said spindle and having a strand wound thereon, interengaging gear means rotatably supported on said base and including a first gear and a second gear, means detachably securing a first end of said bobbin to said first gear, latch means detachably securing said bobbin at its second end in place on said spindle and holding the first end of said bobbin in driving engagement

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with said first gear, said second gear having interrupted teeth forming a linear notch thereacross, a post attached to said base and extending generally parallel to said spindle, first and second slides journaled for movement on said post to and from their normal rest positions, said first slide means engageable by said strand passing from said bobbin, said second slide carrying gear-locking means engageable within said notch when said second slide is in its rest position, spring means urging said slides normally toward their rest positions, bracket means detachably mounted on said post and providing an abutment mounting said spring means, and means on said first slide for moving said second slide from its rest position and to disengage said gear-locking means from said notch as said first slide is moved to an intermediate position of its travel by the pull of said strand.

5. A bobbin carrier as defined in claim 4 wherein said latch means is adjustably supported upon said bracket thereby to provide a mounting for said latch means during the changing of bobbins on said spindle.

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6. A bobbin carrier as defined in claim 4 wherein said second slide includes a rod attached thereto and extending parallel to said post, said rod including an abutment at its distal end adapted to be engaged by said first slide and to move said gear-locking means out of engagement with said notch as said first slide approaches the end of its movement away from its rest position.

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