

[54] **KNOCKDOWN REEL**

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[58] Field of Search..... **242/115, 118.61, 118.6, 242/118.62, 118.7, 118.8, 118.4, 77.3, 77.4, 73, 71.9**

[56]

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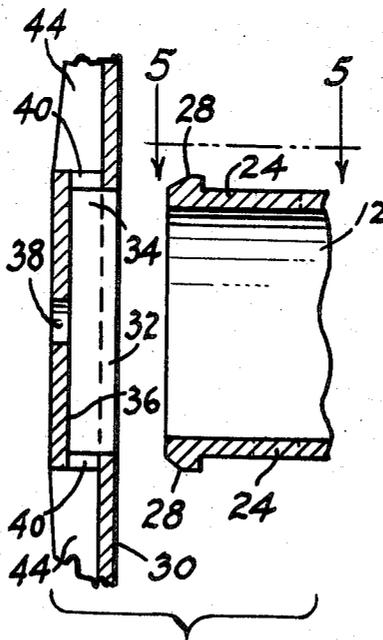
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[57] **ABSTRACT**

A knockdown reel comprising a tubular hub and having a pair of similar end flanges disconnectably attached to opposite ends of the hub by latching means capable of being released in order to separate the end flanges from the hub and thereby minimize the space consumed by said components in packaging, shipping and storing reels of this type. Actuation of the latching means is possible either manually or by relatively simple tools. The hub also may be made of a plurality of separable parts to further facilitate compactly arranging the components for the purposes described.

8 Claims, 12 Drawing Figures



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KNOCKDOWN REEL

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention pertains to so called knockdown reels of the type which, at present, comprise cylindrical or tubular hubs of predetermined length having latch members on opposite ends thereof engageable with recesses formed in various ways in disc-like flanges which are connected to said opposite ends at the time the reels are to be used. Reels of this type are shipped to the consumers in knocked down condition for purposes of compactness. Up to the present time, designing of latching means which permitted ready assembly of end flanges to the opposite ends of a tubular hub has been accomplished as is evident from prior art discussed below. The difficulty in this industry apparently has been the designing of latching means which, in addition to permitting ready assembly of end flanges to the opposite ends of a tubular hub also permitted disengagement of the flanges from the hub so that, for example, the components could be returned, for example, to the supplier of strand or ribbon like material normally merchandised upon such reels and thus provide certain economies.

Reels of the type to which the present invention pertains are consumed in large quantities by manufacturers and users of strand material such as electric wiring, both insulated and non-insulated, coils of long strips of connected elements formed on punch presses and the like such as partially formed electric contact elements, strips or ribbons of foil type material of such nature as to require being coiled upon reels having end flanges for protection, and many other types of similar products. Reels of this type quite commonly are formed at present from certain synthetic resin compounds, or plastics, while others are formed from sheet metal in various ways. Depending upon the strength required of latching means to hold the end flanges to the opposite ends of the hub, the thickness and composition of the material is selected so as to be appropriate to withstand the normal handling, such as in winding, unwinding and the shipping of the products, without accidental disassembly of the components of the reel or injury to the products and materials wound upon the same. For example, if the reel is to handle relatively light weight material, reels of fairly substantial diameters and lengths may be formed from plastics of desired strength. Conversely, heavy materials compared to the volume thereof, particularly if of substantial width, require reels formed from appropriate metal. In the latter category, relatively heavy tie-bolts are used to secure large flanges, formed from either metal or wood, against the opposite ends of suitable hubs, such reels being of the type used to transport and store heavy electrical conduits and cables for example. In general, the present invention pertains to reels of a less heavy construction than those referred to immediately above but, where applicable, the principals of the present invention may be employed for purposes of holding even so called heavy-duty end flanges connected to the opposite ends of similar heavy-duty hubs.

2. Description of the Prior Art

Patents pertaining to so called knockdown types of reels are minimal. Included among these are U.S. Pat. No. 3524604, to J. A. Morris, dated Aug. 18, 1970, and

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U.S. Pat. No. 3552677, to Hugh H. Hacker, dated Jan. 5, 1971. Although both of these patents employ flexible tongues on the opposite ends of the hub members which have laterally extending projections engageable with shoulders in apertures in the end flanges which receive the latching elements, neither of the reel structures are of such nature as to permit unlatching of the connecting means so as to effect separation of the end flanges from the hub members after the same have been assembled. Hence, such reels are not capable of being dis-assembled, for example, after material coiled thereon has been consumed and it is desired to return the reel in compact, knocked down condition so as to minimize shipping cost. It will be understood that, in particular, reels manufactured from synthetic resin of substantial size, such as the order of about 12 inches in diameter and 6 inches long have a worthwhile salvage or return value if the cost of returning the same by shipping is less than the value of the reel and particularly if the reel readily can be knocked down without injury to the components thereof. Larger sizes have greater salvage value.

The present invention comprises a knockdown reel consisting of a hub having latching means on opposite ends thereof engageable with latch-receiving means in opposite end flanges, the connection of the latching mechanism being such as to permit ready disassembly of the end flanges from the hub when the latching members are moved in unlatching direction, details of which are set forth below.

SUMMARY OF THE INVENTION

It is the principle object of the present invention to provide a knockdown reel comprising a tubular hub member and a pair of similar end flange members each having a short sidewall which extends axially from one surface thereof and is complementary in cross-sectional shape to the ends of the hub member which are adapted respectively to telescopically engage opposite ends of said hub member, said members having on the telescopically engaging portions thereof releaseable locking means which not only effectively secure a pair of flange members to the hub member but, readily permit unlatching of the latch elements of the locking means to permit disassembly of the flange members from the hub members and thus minimize the space occupied by the components and thus effect economies in packaging, shipping and storing the same.

Another object of the invention is to provide said short side wall on each end flange member in the form of a shallow socket extending outwardly from the normal innersurface of each end flange member and having a bottom wall extending across the outer end of said socket, said outer wall being provided with a bearing hole to receive a shaft upon which the assembled reel may be mounted and rotated.

A further object of the invention is to provide radially extending openings at circumferentially spaced locations around said aforementioned short side walls on the end flange members for purposes of receiving radially extending locking abutments on the outer ends of latch elements formed respectively on opposite ends of the tubular hub member and adapted to be received within said radially extending openings in said short side walls to releaseably lock the end flange members to the opposite ends of said tubular hub member.

Still another object of the invention is to form said latch elements on the opposite ends of the tubular hub member so as to be substantially co-extensive in length with said hub member.

A still further object of the invention is to form said end flange members in such manner that the short side wall thereon which defines the shallow socket extends axially outward beyond the outer surface of the end flange members, in coaxial relationship with the hub member, whereby the openings which extend radially through said side wall of the socket permit ready contact with the locking abutments on the latching fingers of the hub member when the end flange members are assembled with said hub member and thus readily permitting unlatching the latch members from said openings.

One other object of the invention is to provide the latching elements in the form of a strip of metal disposed within longitudinally extending recesses formed preferably in the inner-surfaces of the tubular hub member, at circumferentially spaced relationship to each other, the ends of said metal strips initially being longer than the hub member and the projecting outer ends of said strips being bent backwardly respectively over opposite ends of the hub member, at a very sharp acute angle to the axis of the hub member, whereby said ends constitute locking abutments receivable within the openings in the side walls of said shallow sockets of said end flange members.

Details of the foregoing objects and of the invention, as well as other objects thereof, are set forth in the following specification and are illustrated in the accompanying drawings comprising a part thereof.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is an end elevation of a knockdown reel embodying the principals of the present invention.

FIG. 2 is an end elevation of the reel shown in FIG. 1.

FIG. 3 is a fragmentary, exploded vertically sectioned elevation showing details of connecting means between one end of the hub member and one of the end flange members as seen on the line 3—1. of FIG. 1

FIG. 4 is a fragmentary vertical sectional view showing details of the hub structure as seen on the line 4—4 of FIG. 2.

FIG. 5 is a fragmentary top plan view of an end portion of the hub showing one of the latching fingers of the connecting means shown in FIG. 3, as seen on the line 5—5 of said figure.

FIG. 6 is a fragmentary vertical sectional view of the latching finger shown in FIGS. 3 and 5, as seen on the line 6—6 of FIG. 5.

FIG. 7 is a fragmentary, transverse sectional view showing details of the latching mechanism of the invention as seen on the lines 7—7 of FIG. 1.

FIG. 8 is a longitudinal sectional view, forshortened, and illustrating details of another embodiment of latching means of the invention.

FIG. 9 is a fragmentary end view of the latching means shown in FIG. 8.

FIG. 10 is a fragmentary end elevation similar to FIG. 9 and showing a slightly modified further embodiment of the type of latching means shown in FIGS. 8 and 9.

FIG. 11 is a fragmentary transverse sectional view of a portion of the hub of the invention and illustrating an

embodiment of connecting means for positioning separable portions of said hub.

FIG. 12 is a perspective exploded view showing one of the end flange members of the invention in position to be connected to an adjacent end of the hub member, the other end flange member having previously been connected thereto, certain details of the outersurface of the connected end flange being omitted for purposes of simplicity.

DETAILED DESCRIPTION

Referring to FIGS. 1 and 2, the exemplary reel 10 comprises a preferably tubular hub member 12 and similar end flange members 14. In the illustration of FIGS. 1 and 2, the type of structure of said hub member 12 and end flange members 14 is best suited for manufacturing from synthetic resin or plastics. Reels of this type, for example, readily and economically may be manufactured from synthetic resin in sizes, for example, from approximately 12 inches in diameter of the end flange members and 6 inches in length from the hub member, up to the order of several feet in both diameter and length, for example. However, these exemplary dimensions are not to be regarded as restrictive, but merely illustrative. Further, hub members and end flange members of similar design may be formed from sheet metal, by stamping operations, or from suitable metal which is die-cast, particularly in regard to forming the end flange members, while the hub member may be formed by extrusion, either from synthetic resin or metal. Further, the foregoing exemplary references to materials likewise are not to be regarded as restrictive since it is conceivable that the invention may be adapted to knockdown type reels formed from other materials, including combinations of wood and metal, for example.

For purposes of illustration and simplification of the description of the invention, it is assumed for exemplary purposes that the hub member 12 and end flange members 14 are formed from synthetic resin or plastics. The hub member 12, for example, preferably is tubular and may be formed either unitarily, or from a plurality of similar sections as shown, for example, in FIG. 4. For example, if formed from a plurality of sections, such as two, said sections may be formed with reinforcing ribs 16 extending longitudinally of said sections adjacent the edges thereof. A plurality of aligning pins 18 are provided to extend between the ribs 16 in any suitable manner such as by being pressed fitted into sockets in one rib and insertable into closely fitting sockets in the opposite rib. Further, as shown in FIG. 11, the hub member 12 may be either formed from a plurality of parts, or unitary and divided along one line, the opposite edges of which have complementary half-together joint portions 20 and 22 for purposes of suitably aligning the same. In view of the fact that the opposite ends of said hub member are received within appropriate sockets or recesses, described hereinafter, which are formed in said end of flange members 14, relatively simple aligning means such as those illustrated in exemplary manner in FIGS. 4 and 11 are highly suitable and adequate for the desired aligning purposes and particularly for initially positioning the abutting portions of the hub member 12 incident to arranging the same for insertion into said sockets in the manner described below.

Opposite ends of the hub member 12 are provided with latch members 24 which are in form of relatively short fingers defined and formed by parallel slots 26 which extend inward from opposite ends of the hub member 12 and may be formed, for example, simultaneously, such as by utilizing a pair of parallel rotary saws, or otherwise. The outer ends of latch members 24 have locking abutments 28 formed thereon in suitable manner to be integral therewith. Said abutments project radially outward from the outer surfaces of the latch members 24 and the inner faces thereof preferably are perpendicular to the exterior surfaces of said latch members for locking engagement and abutment with complimentary surfaces formed on the end of flange members 14 as described hereinafter. The material from which the hub members 12 are formed, whether synthetic resin or metal, for example, is relatively stiff but nevertheless adequately resilient to be flexed, for example, from the insertion position thereof shown in phantom in FIG. 6, for example, to the latching position shown in full lines in FIG. 6 for engagement with the outer surface of the end flange member 14 shown in FIG. 6 in phantom. Further, the outer uppermost corners of the locking abutments 28 are beveled to form camming surfaces and thereby facilitate the insertion of the latch members and locking abutments 28 thereon within suitable openings, described below, formed within the walls of the shallow sockets provided in the end of flange members 14. It is preferred that the length of the latch members 28 be adequate to enable the same readily to be flexed in the manner illustrated in exemplary manner in FIG. 6, without subjecting the members 24 to undue fatigue over long periods of use. Hence, the members 24 should be sufficiently short and of suitable width and thickness so as normally to maintain the same in latched position such as shown in full lines in FIG. 6.

The end flange members 14 preferably comprise disc-like walls 30 which preferably are planar, but the invention is not to be restricted to such feature since, if desired, the inner surfaces 30 of the members 14 may be somewhat flatly conical and useful for the coiling of certain types of strand material thereon, if desired. The end flange members 14 are provided with shallow sockets 32 which are shown in FIGS. 3 and 12 to best advantage. Said sockets are defined by short side walls 34 which, in crosssection are complimentary to the shape of the hub member 12. As illustrated, the hub member is circular in cross-section but it is to be understood that, if desired, other geometric cross-sectional shapes may be employed if desired. The sockets 32 also are defined by a preferably planar endwall 36 which preferably is provided with a central bearing hole 38 through which a supporting shaft or axle may be extended to support the reel for coiling and uncoiling operations.

One of the most important features of the present invention is the provision of openings 40 which are formed to extend entirely through the short side walls 34 of sockets 32 and preferably spaced apart circumferentially even distances as shown in exemplary manner in FIGS. 1 and 4. Said openings receive the locking abutments 28 when one end of the hub member 12 is inserted within the socket 32 in each end of flange member 14. The afore-mentioned camming surfaces on the outer corners of the locking abutments 28 facilitate

such insertion and when the end of the hub member 12 is fully inserted into the socket 32, the perpendicular inner radial faces of the locking abutments 28 will snap radially outward through the openings 40 and into locking engagement with the adjacent outer surface of the wall 30 of each of the end of flange members 14. This arrangement effectively secures the end of flange members 14 to the opposite ends of the hub member 12. Due to the fact however that the outermost surfaces of the locking abutments 28 are freely exposed within the openings 40 when in such latching position, they may be readily engaged either manually, or by suitable contracting tool, not shown, by which all of the locking abutments 28 may be depressed simultaneously, for example, to the phantom positions thereof shown in FIG. 6. The end flange members 14 then may be disengaged and removed from the hub member 12 so that the components may be re-used and reassembled, when desired. This is one of the principal advantageous features of the present invention.

In the construction of reels of the type to which the present invention pertains, it is quite customary to reinforce the walls 30, for example, of the end flange members 14 such as by forming a peripheral flange 42 thereon which preferably projects outwardly relative to the hub member 12. Further, additional reinforcement is provided in the form of radial ribs 44 which, preferably, are formed integrally with the walls 30, on the outer surfaces thereof, and, similarly, the ribs 44 are integrally connected at the opposite ends thereof respectively with the peripheral flange 42 of each member 14 and also with the exterior surfaces of the short side walls 34 which define the shallow sockets 32. For purposes of accommodating the latch members 24 as well as the locking abutments 28 thereon, particularly for purposes of said locking abutments 28 having free access to the openings 40 in the short side walls 34 in which they are formed, it will be seen especially from FIG. 1 that said openings and the locking abutments 28 are readily accommodated between circumferentially spaced pairs of the radial ribs 44 so as not to interfere with such reinforcement. Further, the connection of the inner ends of the ribs 44 with the short side walls 34 assist in bracing the side walls as well as the entire central area of the end flange members 14 which receive and are connected respectively to the opposite ends of the hub member 12.

In the embodiment of the invention which has been described hereinabove the latch members or fingers 24 have been formed integrally with the hub member 12. Such formation is achieved by the use of preferably parallel slots 26 of equal length, as best shown in FIG. 5. However, referring to FIGS. 8 and 9, a different embodiment of latch members is illustrated. The hub member 12 is essentially the same as that which is illustrated and described with respect to the embodiment shown in the preceding figures except that, on the inner surface of the hub member 12, at circumferentially spaced locations, pairs of guide ribs 46 are formed, such as by molding or otherwise in such manner as to provide undercut slots 48 which extend axially with respect to the hub member 12. The slots 48 respectively receive opposite edges of a strip of spring metal 50, said slots comprising seat means for said strip. Slots 48 also are in the form of grooves facing each other. The strips 50 are longer than the hub member 12, whereby predetermined short lengths of said strips 50 project respec-

tively beyond the opposite ends of the slots 48 as well as the ends of the hub member 12. Said projecting ends 52 are bent reversely upon the main section of the strip 50, as clearly shown in FIG. 8, so as to overlie the outer surface of the hub member 12 but preferably at a very acute angle thereto.

It can be seen especially from FIG. 8 that the formation of the projecting ends 52 of strips 50 comprise locking abutments which may be employed in lieu of the locking abutments 28 shown in the preceding embodiment illustrated in FIGS. 1-7. Also, it will be understood that the projecting ends 52 are of substantially the same length as the locking abutments 28, whereby the same will be amply accommodated within the openings 40 of the short side walls 34 in a manner in which the terminal ends of the projecting ends 52 will abut the outer surfaces of the walls 30 of the end flange members 14 in a manner similar to that described above with respect to the locking abutments 28. It also will be understood that, as a refinement of this embodiment of the invention, the opposite ends of the hub member 12 may be provided with shallow transverse notches of a depth similar to the thickness of the strips of metal 50 so that when the projecting ends 52 are bent in the manner described, the bight portion thereof will be flush with the end surfaces of the hub member 12, thereby enabling said end surfaces to firmly abut the inner surface of the planar end wall 36 of the shallow socket 32 which receives one of the ends of hub member 12. Further, if necessary to do so, the rim surfaces of the shallow sockets 32, where engaged by the projecting ends 52 which comprise latch members for the embodiment of the invention shown in FIGS. 8 and 9, may be slightly recessed to accommodate the projecting ends 52 incident to seating the ends of the hub member 12 within the shallow sockets 32, whereby the outer diameter of the hub member 12 may be closely complementary to the inner diameter of the shallow sockets 32 in the end flange members 14 and thereby provide relatively tight engagement therebetween.

Referring to FIG. 10, a slightly modified version of the embodiment of the invention shown in FIGS. 8 and 9 is illustrated and in which the hub member 12, for example, is provided on its inner surface with a shallow, axially extending recess 54 which receives the strip of spring metal 50 of the type shown in FIGS. 8 and 9 and permits the projecting ends 52 to be bent over relative to the outer surface of the hub member 12 in the manner such as described above with respect to the embodiment of FIGS. 8 and 9. The shallow recess 54 is adequate to readily position the latching strip 50 with respect to the hub member 12. Further, the additional refinements described above relative to FIGS. 8 and 9, with respect to the additional end knuckles in the hub member 12 and the like, apply to the embodiment shown in FIG. 10.

From the foregoing, it will be seen that the present invention provides a knockdown reel which may be formed from various types of material and includes latch means of such nature that they not only effectively secure the end flange members 14 to the opposite ends of hub member 12 but, of equal if not more importance as far as the prior art is concerned, the latch members may readily be disengaged from the openings which receive the locking abutments thereof, thereby permitting the end flange members to be disengaged from each other and thereby restore the components of

the reel to their initial, separate natures, without damage to any of the members, thereby enabling the same to be compactly shipped or stored until re-use of the reels is desired. While the disengagement of the latch members may be effected manually, they readily adapt themselves to being actuated simultaneously in retracting direction by the employment of relatively simple tools.

While the invention has been described and illustrated in its several preferred embodiments, it should be understood that the invention is not to be limited to the precise details herein illustrated and described since the same may be carried out in other ways falling within the scope of the invention as illustrated and described.

I claim:

1. A knockdown reel comprising in combination, a tubular hub member, a pair of similar end flange members each having a short sidewall extending axially from the outer surface thereof and complementary in cross-sectional shape to the ends of said hub member and adapted respectively to telescopically engage opposite ends of said hub member, and releasable locking means on the telescopically engaging portions of said hub member and short sidewall of said end flange members comprising yieldable latch elements having radially extending locking abutments thereon arranged at circumferentially spaced locations on the telescopically engaging portions of one of said members and radially extending openings in the telescopically engaging portion of the other member arranged complementarily to receive said locking abutments of said one member and latch the end flange members releasably to the opposite ends of said hub member, said locking abutments being accessible through said radial openings adjacent the outer surfaces of said end flange members for engagement to move said abutments radially in disengaging direction to permit separation of said end flange members from said hub for compact packaging and storage of said reel components.

2. The reel according to claim 1 in which said latch elements are on said hub member and said radially extending openings are in said short sidewalls on said end flange members.

3. The reel according to claim 2 in which said latch elements are substantially co-extensive in length with the ends of said hub member and comprise tongues defined by pairs of slots extending radially into the opposite ends of said hub members.

4. The reel according to claim 1 in which said short sidewalls on said end flange members comprise walls defining shallow sockets formed in said members and extending outwardly from the outer surfaces of said end flange members and perpendicularly to the planes of said end flange members.

5. The reel according to claim 4 in which said sockets further are defined by bottom walls parallel to the planes of said end flange members and disposed outwardly therefrom when said end flange members are connected to opposite ends of said hub member, whereby said short sidewalls defining the circumference of said shallow sockets which extend axially outward from the outer surfaces of said end flange members dispose the radial openings which extend through said sidewalls in positions which readily expose said locking abutments of said latch elements for engagement to depress the same from said openings and

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thereby permit separation of said end flange members from said hub member.

6. The reel according to claim 5 in which the depth of said shallow sockets between the outer surface of said end flange members and the inner surfaces of said bottom walls of said sockets is substantially equal to length of said locking abutments of said latch members and said abutments project radially outward beyond the outer surface of said hub members.

7. The reel according to claim 5 in which said hub member has seat means formed therein at least adjacent opposite ends thereof and said latch members comprising spring metal inserts fastened to said hub

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member and having locking abutments formed on one end thereof.

8. The reel according to claim 7 in which said seat means comprise grooves extending axially along the inner surface of said tubular hub member at circumferentially spaced locations and said latch members comprise spring metal strips extending longitudinally within said grooves and the ends of said strips being bent reversely upon the outer surface of said hub member at an acute angle to the outer surface thereof to constitute the locking abutments for said hub member.

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