Nov. 8, 1966 P. A. RYLL ETAL 3,284,021

KNOCK-DOWN REEL

Filed April 28, 1964

FIG. 1

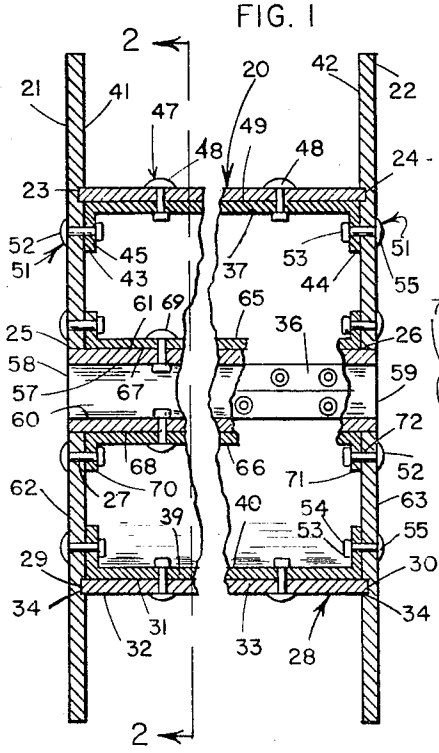


FIG. 2

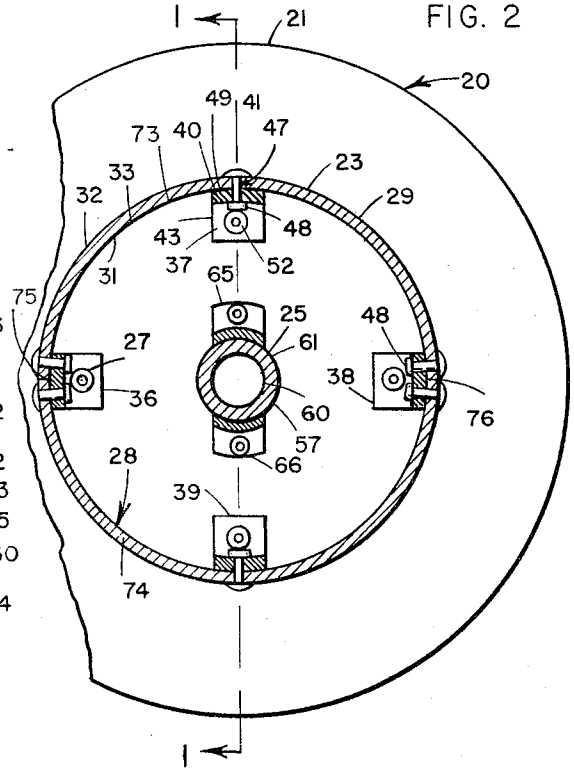


FIG. 3

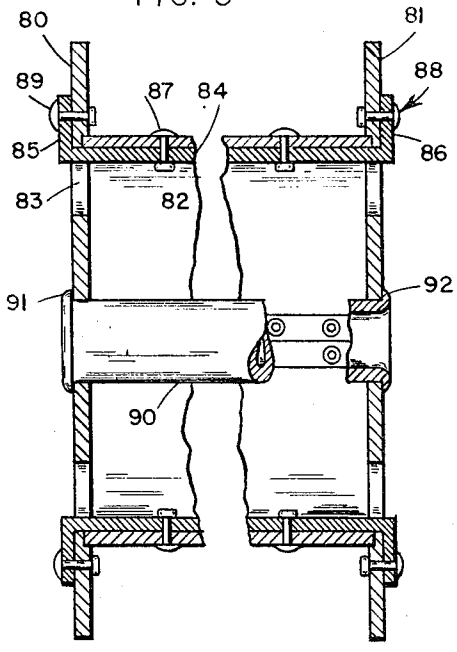
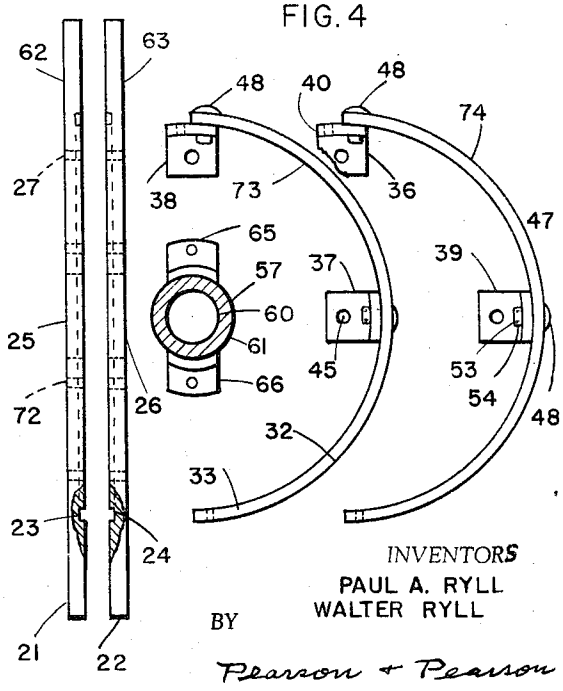


FIG. 4



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KNOCK-DOWN REEL

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This invention relates to an improved knock-down reel of the type used for wire, cables and the like.

Such reels usually include a pair of heads each having a central circular opening for a core tube, short core shafts or the like, and a drum between the heads upon which the strand is wound. When shipped empty, such reels take up considerable, costly shipping space and a knock-down capability is most desirable. However, a knock-down reel is not especially desirable unless it compares favorably in appearance, strength and cost of manufacture to reels which are unitary and integral.

It has therefore been proposed to provide tie rods extending through the drum from one head to the other for holding a reel together as in U.S. Patent 1,915,825 to Hescock of June 27, 1933, or U.S. Patent 2,977,066 to Kimmel of March 28, 1961. It has also been proposed to use flexible metal straps for the same purpose as in the said Kimmel patent and in British Patent 261,189 to Callender of November 18, 1926. However, such tie rods and straps are independent of connection to the drum and are spaced therefrom. Twisting around the axis under the torque strains of use is, therefore, possible for the heads relative to the drum.

It has also been proposed to provide integral axially extending ribs on the inside of a drum, with the heads attached by screws, as in U.S. Patent 2,225,551 to Clinton of December 17, 1940, but such a drum cannot be formed from commercially available tubular material and tends to be costly to manufacture.

It is the principal object of this invention to provide a knock-down reel having a pair of grooved, centre apertured heads and a drum of hollow cylindrical material, in which metal cross braces of U shape mechanically affixed to the inner face of the drum as ribs and integral, right-angular tongues on the braces are detachably affixed to the heads. Thus the braces form a two ply lamination with the drum, the braces secure a firm hold on the drum, the heads are firmly held on the tongues of the braces and there is no possibility of twisting of the parts or shear of the parts.

Another object of the invention is to provide a knock-down reel which can be assembled from grooved, apertured heads, commercially available drum and core, tubular material, a number of identical, generally U shaped metal cross braces and mechanical fastening means such as rivets, bolts or machine screws.

A further object of the invention is to provide U shaped, cross braces for a knock-down reel which are separate and individual but which are mechanically secured in intimate contact with the inner face of the reel drum to take advantage of the strength of the drum in resisting torsional stresses when the reel heads are secured to the braces.

Still another object of the invention is to provide a knock-down reel in which the drum is in arcuate sections and each joint or seam between the sections, is straddled by a full length cross brace firmly secured on each opposite side of the seam to form a unitary drum while preventing rotational displacement of the reel heads relative to the drum.

A still further object of the invention is to provide a knock-down reel having grooved heads, a hollow cylindrical drum seated in the heads, a hollow cylindrical core tube seated in the heads and cross braces fixed to the

inside of the drum and to the outside of the tube, with right angular, integral tongues for connecting the braces to the heads. Despite the fact that the core tube denies access to the annular space within the drum and heads, when assembled, the brace tongues are affixable to the inside faces of the reel heads by the use of hollow blind rivets, headable within the closed annular space from outside the reel.

Other objects and advantages of the invention will be apparent from the claims, the description of the drawing and from the drawing in which:

FIGURE 1 is a front elevation in half section on line 1—1 of FIGURE 2 showing an embodiment of the invention;

FIGURE 2 is a side elevation in half section on line 2—2 of FIGURE 1;

FIGURE 3 is a view similar to FIGURE 1 of another embodiment of the invention, and

FIGURE 4 is a diagrammatic, exploded view showing the manner in which the knock-down reel of the invention may be shipped, or stored in a compact, space-saving package.

As shown in FIGURE 1 a preferred embodiment of the invention comprises the knock-down reel **20**, having a pair of identical heads, or flanges, **21** and **22** each with an annular drum groove **23** or **24** and each with a central circular, core opening **25** or **26**. The heads **21** and **22** may be of any desired material such as wood, fiberboard or metal sheets. An annular series of spaced fastening holes **27** are provided in each head, for a purpose described hereinafter.

Each reel **20** also includes a hollow cylindrical drum, or barrel, **28** which is formed from commercially available tubular stock, such as fibreboard tubing, by cutting to the desired length at each opposite tube end **29** and **30**. Because the inner cylindrical face **31** and outer cylindrical face **32** of drum **28** are uniformly spaced to form a wall **33** of uniform thickness the drum is of low cost. In fact it may be of unusually thin walled, low cost, material because of the reinforcement provided by the brace structure of the invention. In assemblying the reel **20** the opposite ends **29** and **30** of the drum are firmly seated in their respective drum grooves **23** or **24**, and may also be adhesively bonded in the grooves by any well known type of adhesive **34**, such as epoxy resin.

A plurality of separate, individual cross braces, such as **36**, **37**, **38** and **39** are provided, each of substantially flat, material such as strap metal, thin bar metal or the equivalent which is preferably rigid and not easily bendable. The cross braces are of generally U shape in configuration with a main body, or web, **40** co-extensive in length with the axial length of the drum **28**, between the respective inner faces **41** and **42** of the heads **21** and **22**, so as to extend from one head to the other. Each brace includes a pair of integral, right angular tongues such as **43** and **44**, each at an opposite end thereof, each tongue having a hole **45** therethrough for mechanical fastening means such as rivets.

Permanent mechanical fastening means **47**, preferably in the form of headed rivets **48**, fixes each cross brace **36**, **37**, **38** or **39** at spaced circumferential distances around the interior of the drum **28**, to the inner face **31**. The outer face **49** of each brace is thus substantially flatwise against, and in intimate contact with, the inner face **31** to permanently affix the tongues in head engaging position while the body **40** of the brace forms a two ply, lamination, with the wall **33** of the drum and an axially extending interior rib therealong. The relatively thin, low cost, wall **33** of the drum is thereby strengthened against compression by the strand wound on the drum and the tongues are supported against angular movement around

the reel axis or shear due to torsional, rotational or axial thrust.

The reel **20** may thus be shipped with the cross braces permanently fixed to the inner face of the drum and the heads separate from the drum, the drum ends being placed in the grooves and the tongues fixed to the heads at the place of use.

Detachable, mechanical fastening means **51** is provided, preferably in the form of tubular rivets **52**, of known, commercially available, type which can be detached, and unheaded when desired by the insertion therein of a reaming head, or similar known device. The reel **20** is shipped disassembled, as mentioned above, and the user then inserts rivets **52** in the fastening holes **27** and in the registering tongue holes **45**, of one head **21**, and heads over the rivets, the holes **27** being countersunk if desired. Fastening means **51** also includes a plurality of tubular rivets **53**, of the type used in the aircraft industry, wherein the inside rivet head **54** is formed by expansion means operable from the side of the opposite rivet head **55**. Thus the reel head **22** may be mounted with its groove **24** receiving the end **30** of the drum and the tongue holes in registration with the holes **27**, rivets **53** inserted and the rivets headed from outside the reel.

The reel **20** preferably also includes a hollow cylindrical core tube **57**, of thin walled material such as fibreboard, each opposite end **58** or **59** of the core tube firmly seating in one of the core openings **25** or **26** of the reel heads **21** or **22**. Core tube **57** has an inner cylindrical face **60** and an outer cylindrical face **61**, and like drum **28**, is simply cut to the desired length from commercially available tubular material to extend from one outside face **62** to the other outside face **63** of heads **21** and **22**.

At least two additional cross braces **65** and **66**, identical with cross braces **36**, **37**, **38** or **39** have the faces **67** and **68**, corresponding to faces **49**, permanently fixed to the outside face **62** of core tube **57** by additional means **51** in the form of rivets **69**. Similarly the tongues **70** and **71** of each brace **65** and **66** are detachably affixed to the fastening holes **72** of heads **21** and **22** by additional means **51** so as to be installed and removed in the same manner as described above for the drum.

Preferably drum **28** is preformed in a plurality of arcuate sections **73** and **74**, the juxtaposed sections forming a cylinder with the axially extending seams, or joints, **75** and **76**. The sections may thus be nested as shown in FIGURE 4 with their cross braces permanently attached to make a compact package for shipment and storage. A cross brace **36**, **37**, **38** or **39** straddles each seam with the rivets **48** staggered on each opposite side of the centre line to not only join the sections into a unitary drum but also to press the body **40** of each brace tightly into contact with the curved inner face of the drum. The inexpensive fibreboard drum sections **73** and **74** may be waterproofed by impregnation with wax or polyethylene, and any suitable interlock joint may be used at the seams **75** and **76**.

In the embodiment shown in FIGURE 3 the heads **80** and **81** and drum **82** are identical with reel **20** except that the heads are provided with an annular series of brace holes **83**. The cross braces **84** are substantially identical with the cross braces of reel **20** except that they are sufficiently long, or the drum is sufficiently narrow, to permit the tongues **85** and **86** of each brace to extend through the brace holes to the outside faces of the heads. The brace holes are circular and preferably of sufficient diameter to permit the tongues to pass therethrough, or if desired the material of the strap may be bent into right angular tongues during assembly.

The cross braces **84** are permanently fixed in axially extending position on the inside face of the drum to form laminations, and to form interior ribs, therewith, by the rivets **87**, similar to rivets **48** or by any other suitable permanent mechanical connection means. The detachable mechanical fastening means **88** may be in the form of hollow tubular rivets **89** but since the rivets are accessible,

any conventional type rivet is satisfactory. The tongues may, of course, be recessed into the heads to avoid projections, if desired, and a metal core tube **90** having swaged ends **91** and **92** may be provided.

The number of sections of the drum and the number of cross braces fixed thereto is in accordance with the strength, weight and cost characteristics desired. A pair of exterior metal discs may also be used to form reinforcing flanges, the tongues of the braces being fixed to the discs rather than to the heads and the discs having suitable shaft openings.

The detachable mechanical fastening means **51** comprising the tubular rivets **53** are termed blind rivets and are commercially available under various designations such as buttonhead rivets, blind expansion rivets, blind rivets, etc. for the purpose of installation from one side of the job by one operator.

We claim:

1. A knock-down reel comprising:

a pair of reel heads, each having an outer face, an inner face with an annular drum groove, a central core opening and an annular series of fastening holes therethrough and therearound;

a hollow cylindrical drum of relatively thin material extending between said reel heads, said drum having an inner cylindrical face and having opposite drum ends, each firmly received in one of said drum grooves;

a plurality of separate, individual, U shaped, rigid cross braces, of substantially flat, metal strap material, each having an outer face in intimate contact with said inner face of said drum, each having an integral, right angular tongue at each opposite end thereof in engagement with one of the said faces of said heads, and each extending from one said head to the other;

permanent mechanical fastening means fixing each said cross brace, at spaced distances therealong to the inside face of said drum, said braces thereby forming circumferentially spaced, axially extending interior ribs on said drum;

detachable mechanical fastening means in said fastening holes of said heads, said means securing said right angular tongues firmly against the said face of said heads for retaining said heads on said drum while resisting torque and twist forces exerted on said reel; and a hollow, cylindrical, core tube, said tube having each opposite end thereof seated in one of the core openings of said heads.

2. A knock-down reel as specified in claim **1** wherein said hollow cylindrical drum is divided into at least two arcuate sections meeting at a corresponding number of axially extending seams;

each said cross brace is circumferentially positioned to straddle one of said seams, and

said mechanical fastening means fixes each said brace in intimate contact with the portions of juxtaposed sections on each opposite side of said seam to form a unitary drum.

3. A knock-down reel as specified in claim **1** wherein each said tongue extends inwardly at right angles and engages the inner face of a head within the confines of said drum;

and said detachable mechanical fastening means, at at least one end of said reel includes hollow rivets of the type headable on the inside from outside said assembled reel.

4. A knock-down reel as specified in claim **1** wherein each said head includes an annular series of brace holes, each large enough to pass a right angular tongue of said U shaped cross braces,

each said cross bar extends through said brace holes to the outside of said heads, and

each said tongue extends outwardly at right angles and engages the outer face of a head.

5. A knock-down reel as specified in claim **1** plus:

at least two additional said cross braces, each having an inner face in intimate contact with the outer face of said tube and each having the tongues thereof in engagement with said faces of said heads;

additional permanent mechanical fastening means fixing each said additional cross brace to said tube, said additional cross braces forming circumferentially spaced, axially extending, exterior ribs thereon;

and additional detachable mechanical fastening means securing the tongues of said additional braces firmly to said heads,

for retaining said tube in core forming position in said reel.

6. In a cable reel of the type having a pair of annular heads and a hollow cylindrical drum extending between the heads, the combination of:

at least two separate, individual, metal, cross braces each of rigid, U shape and substantially co-extensive in length with the axial length of said drum and each having an integral tongue extending at right angles therefrom at each opposite end thereof;

permanent mechanical fastening means fixing each said cross brace, at spaced distances therealong, in intimate contact with the inside of said drum to form an interior, axially extending rib therewithin;

detachable mechanical fastening means connecting each said tongue to the inside face of the adjacent head to secure said drum and heads against relative rotation; and a core tube secured axially between said heads for rotatably mounting said reel.

7. In a cable reel of the type having a pair of heads, each having an annular drum groove and a central circular core opening, a hollow cylindrical drum seated in said grooves and a hollow cylindrical core tube seated in said core openings the combination of:

at least four identical, separate, individual, cross braces of metal, each having a substantially flat portion extending axially of said reel from one said head to the other and each having an integral, right angular tongue at each opposite end thereof;

mechanical means fastening the flat portion of two of said braces, at spaced distances therealong to the inside of said drum and fastening the flat portion of the other two braces, at spaced distances therealong

to the outside of said tube in intimate contact therewith;

and detachable mechanical means fastening the opposite tongue portions of said braces to the inside faces of the adjacent heads of said reel;

whereby said reel may be shipped in knock-down condition with said braces fixed to said drum and tube and assembled by affixing said tongues to said heads.

8. A combination as specified in claim 7 wherein said drum is formed of a plurality of arcuate sections and

said detachable mechanical means comprises headed rivets including at least two rivets of the type headable on the inside from outside of said reel.

9. A wire holding reel, having:

a pair of annular disc-like heads,

a hollow cylindrical drum extending between said heads, and

at least two metal cross braces of U shape extending between said heads, within said drum, each brace being secured in intimate contact with the inside face of said drum at spaced distances therealong, and having a right angular tongue at each opposite end thereof in intimate contact with the inside face of said heads; a core tube secured axially between said annular disc-like heads for rotatably mounting said reel and

detachable mechanical fastening means securing said tongues to said heads;

whereby said braces form axially extending interior ribs along said drum and said drum and braces support said tongues against torsional, rotational or axial thrust.

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