

March 6, 1945.

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2,370,868

WIRE REEL

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3 Sheets-Sheet 1

Fig. 1.

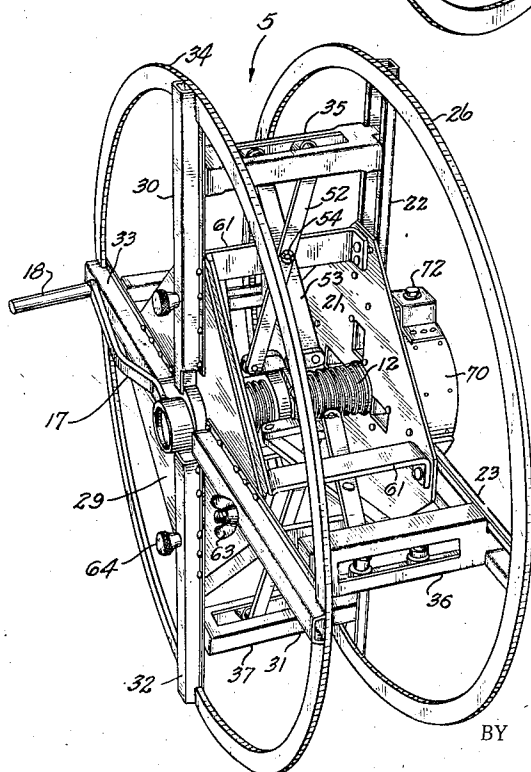
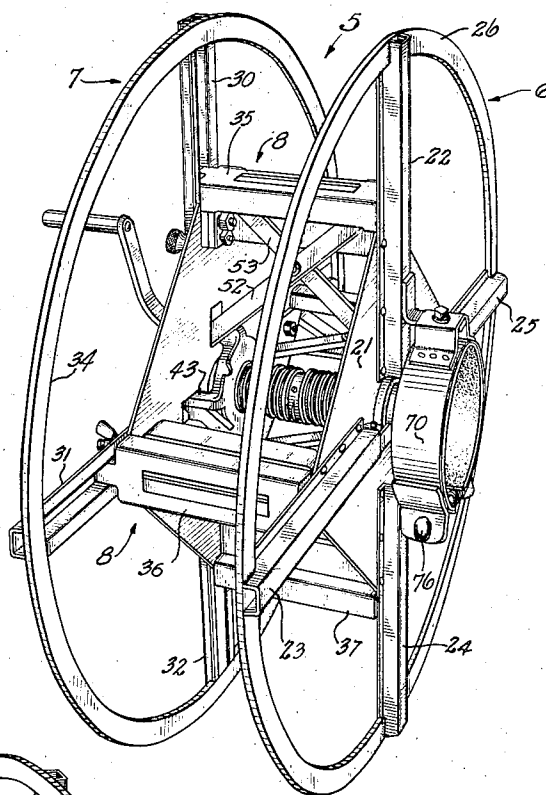


Fig. 2.

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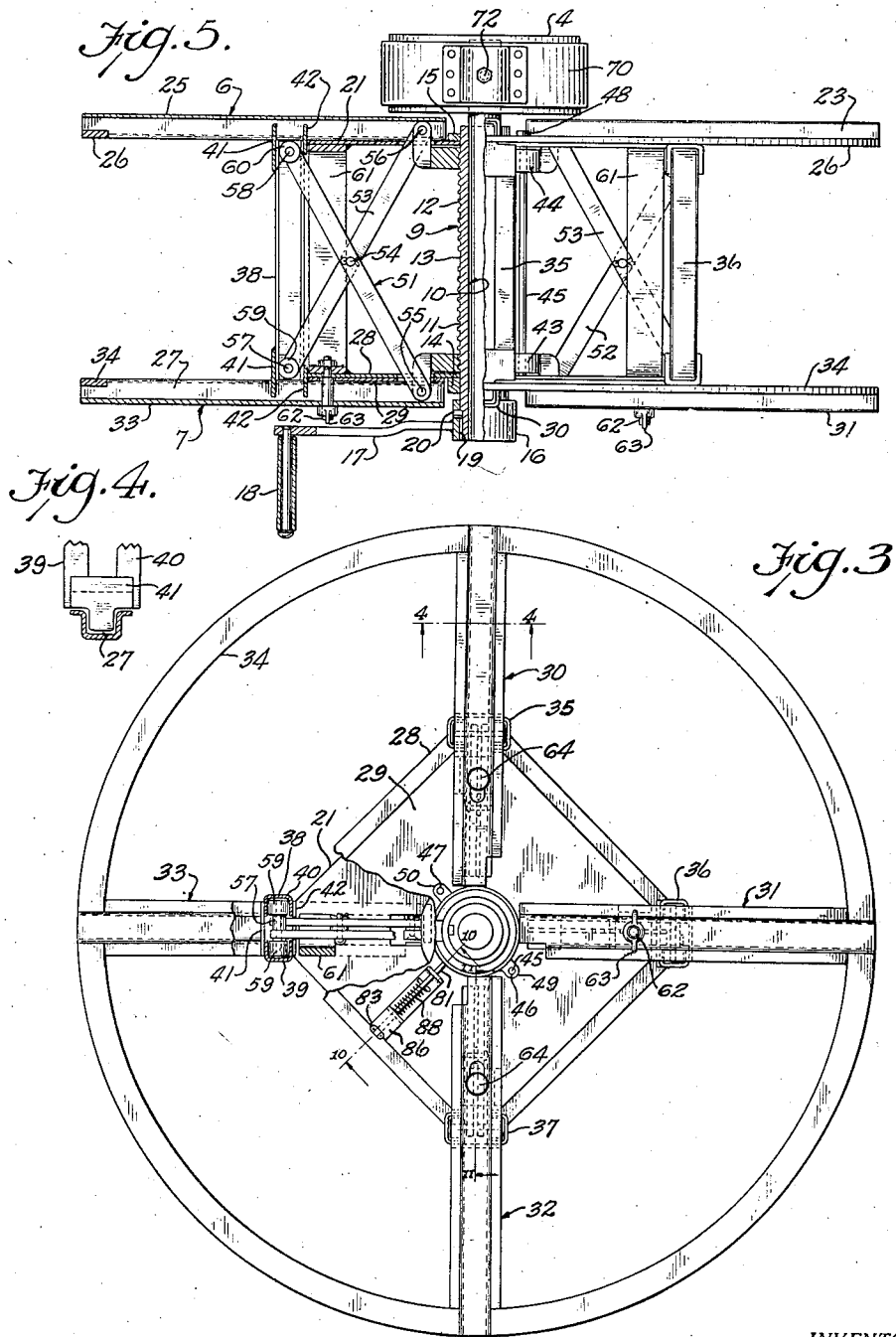
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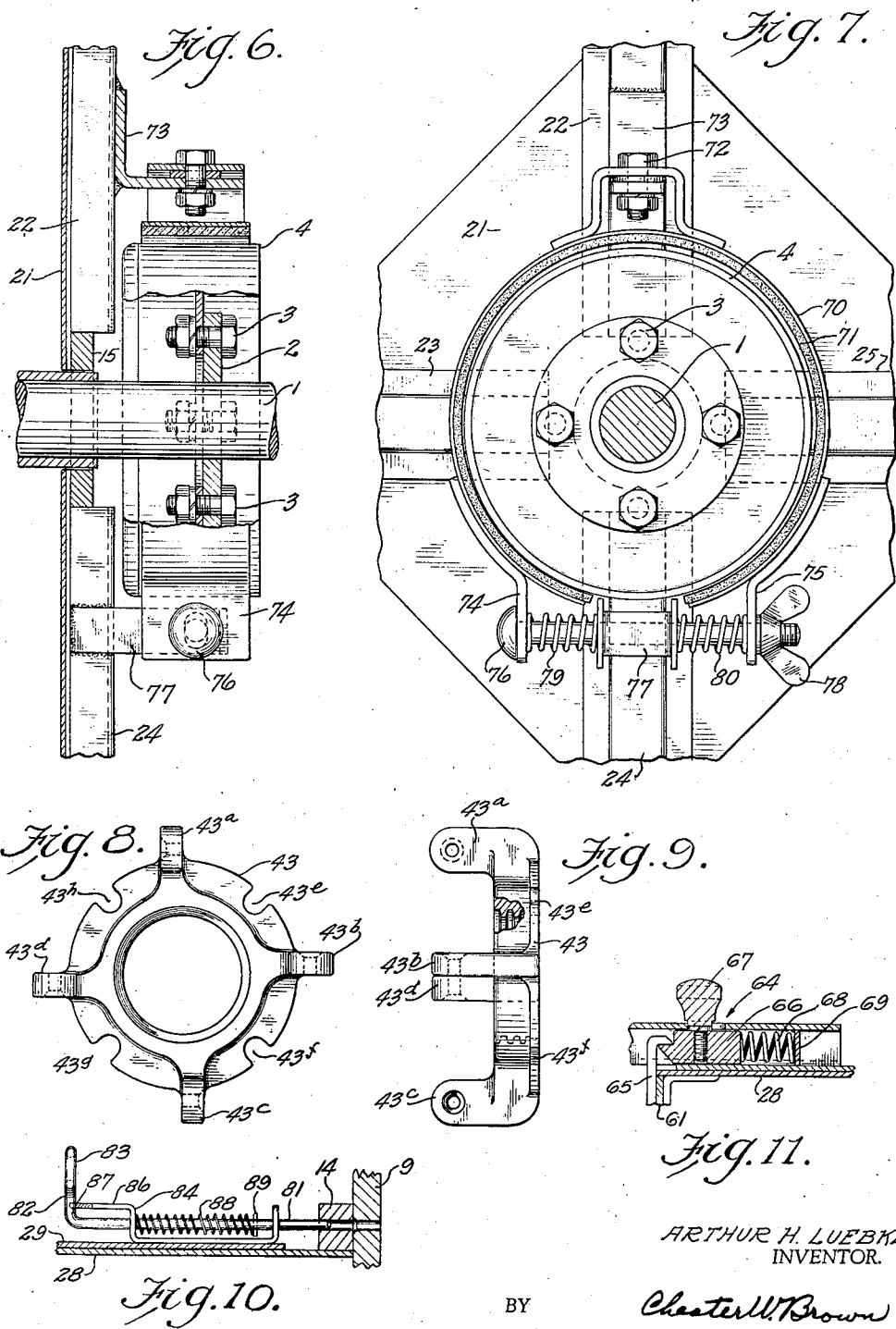
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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WIRE REEL

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Application September 2, 1942, Serial No. 457,028

9 Claims. (Cl. 242—112)

This invention relates to adjustable reels designed to support, pay out, and rewind coils of wire.

Ordinary power line and telephone wire is put up in annular coils, without spools, and the inside diameters of the coils vary through a considerable range. For obvious reasons it is practically necessary to mount such a coil on a rotatable reel for paying out and rewinding the wire; and it is desirable that the coil-supporting hub of the reel fit snugly, or nearly so, the bore of the coil. Manifestly, a reel of fixed hub diameter must be adapted to receive coils of relatively small bore if its utility is not to be greatly restricted; and the use of such a reel with coils having large bores results in operating inconveniences which spell want of efficiency. Hence, it will be apparent that a reel which can quickly be adjusted to accommodate properly coils of different inside diameters is a thing much to be desired.

On the other hand, an adjustable reel which is more or less prone to get out of order or which is excessively time-consuming in operation would entail no over-all advantage; and a reel not so afflicted would be commercially unfeasible in many instances unless it could be purchased at a fairly low price.

Primarily, it is an object of this invention to provide an expansible reel for wire coils in which radially movable carriers may be actuated from a rotary member co-axial with the reel, the rotary motion being translated to axial motion which in turn is translated to the radial movement through a system of levers, all so coordinated as to permit a minimum over-all dimension and to provide an inherently stable structure for securely engaging various diameter coils without the necessity of operating auxiliary locking mechanism, thereby enabling the operator to mount the coil and pay out the wire more facile, efficiently, and economically than devices of the prior art have heretofore permitted.

Another object is to provide an adjustable wire reel wherein radial adjustment of the coil supporting carrier members is effected through the medium of a rotatable sleeve which is co-axial with the axis of rotation of the reel and operatively associated with a plurality of link mechanisms which are actuable individually upon the aforementioned carrier members.

A further object is to provide an adjustable wire reel wherein the previously mentioned sleeve has right and left-hand external threads which are engaged respectively by follower members which are movable axially along the sleeve by said thread

in response to rotation of the sleeve and which follower members operatively engage toggle mechanism which functions to effect radial movements of the carrier members.

Still another object of the invention is to effect radial movement of the carrier members by means of lazy tongs in co-operation with the rotatable sleeve having right and left hand external threads engaging followers which serve to actuate one end of each pair of lazy tongs.

A still further object of the invention is to provide an adjustable reel which is so well constructed and so simple and sound mechanically that there is a minimum likelihood of its getting out of order and which, at the same time, can be manufactured, especially on a quantity basis, at a cost which will render permissive a selling price low enough to be attractive.

The reel hereinafter described is characterized in that all component parts can be produced economically without compromising fitness for their respective purposes, and further characterized in that the assembling of parts into a completed structure can be effected with a minimum expenditure of time.

The novel features of this invention are pointed out hereinafter in conjunction with the detailed description of the preferred structure, which is illustrated in the accompanying drawings, wherein:

Figs. 1 and 2 are perspective views of the wire reel.

Fig. 3 is a front elevational view of the reel—a part being broken away to expose details not otherwise clearly shown.

Fig. 4 is a sectional view taken along the line 4—4 of Fig. 3.

Fig. 5 is a view, partly in section, as viewed from the top relative to Fig. 3.

Figs. 6 and 7 are detail views, mutually at right angles, of the brake.

Figs. 8 and 9 are details, mutually at right angles, of internally threaded followers.

Fig. 10 is an enlarged sectional view taken along the line 10—10 of Fig. 3.

Fig. 11 is an enlarged sectional view taken along the line 11—11 of Fig. 3.

The major features of the reel are shown quite adequately in the two perspective views—Figs. 1 and 2—while the other figures of the drawings serve to illustrate construction details.

The reel has an axial bore by means of which it is rotatably mountable on a stationary supporting shaft, and it is common practice to attach the shaft at one end to the chassis of a

service truck. But it is entirely feasible to employ a supporting standard designed to be set upon the ground.

The supporting shaft is not included in the perspective views, but is shown fragmentarily in Fig. 6 and in cross-section in Fig. 7—where it is identified by reference numeral 1. Welded to the shaft is a flange 2 to which is secured, by bolts 3, a brake drum 4. The brake drum, shown in Figs. 5, 6, and 7, is not rotatable—being rigid with the shaft.

The coil of wire (not shown) is disposed in the peripheral space 5, defined by a rear flange 6 and a front flange 7, and is supported on a radially adjustable hub, identified as a whole by reference numeral 8. The front flange is removable to permit placing the coil on the hub and the latter is designed to be expanded into more or less gripping engagement with the bore of the coil, after the coil has been mounted and the front flange replaced. The hub is, of course, also contractible as a prelude to applying the coil thereto.

The front and rear flanges, together with the adjustable hub structure and all other components of the reel per se are supported, directly or indirectly on a sleeve 9 which is bored lengthwise to receive the supporting shaft 1. The bore is indicated in Fig. 5 by reference numeral 10.

On the periphery of sleeve 9 is cut a left-hand thread 11 and a right hand thread 12, or vice versa—said threads co-terminating at 13. Mounted on sleeve 9 and rotatable thereon are collars 14 and 15; and the lower end of the sleeve, as viewed in Fig. 5, is designed to receive the hub 16 of a crank 17 having a handle 18. The sleeve is key-slotted at 19 to engage a pin 20 carried by hub 16. The crank serves to rotate the sleeve independently of the remainder of the reel and also, alternatively, to rotate the reel, including the sleeve. The crank is withdrawable from the sleeve and must be withdrawn to permit removal of front flange 7.

Rear flange 6 includes a gusset plate 21 bored centrally to fit sleeve 9 on which it is rotatably mounted forwardly of collar 15 to which it is attached. This plate serves as a supporting member for four radially projecting guide arms 22-25 inclusive, which are oriented in quadrature and serve as supports for a peripheral flange rim 26. Said guide arms are of channel cross-section, (see Fig. 4) each presenting a radially trending guide slot—one of which is identified in Fig. 4 by reference numeral 27. See also Fig. 5.

Rotatably mounted on the front end of sleeve 9 and attached to collar 14 is a plate 28, which is bored centrally to receive the sleeve. This plate serves as a support for the removable front flange 7 which comprises, as major elements, a gusset plate 29, four radially projecting guide arms 30-33 inclusive, in quadrature, and a peripheral flange rim 34. Guide arms 30-33 are aligned, respectively, with guide arms 22-25 and are of like channel cross-section.

The expansible hub 8 comprises four carriers 35-38 in quadrature—each being disposed between and bridging a pair of radial guide arms and adjustably movable radially therealong. For example, carrier 35 bridges guide arms 22 and 30 and has its ends disposed, respectively, in the slots 27 of said arms. Carriers 36, 37, and 38 are similarly situated in relation to other individual pairs of guide arms respectively. Each carrier is composed of a pair of channels 39, 40 in spaced

face-to-face relation, connected together at their ends by plates 41 and 42, the configuration of which is shown in Fig. 4. These plates are welded to channels 39, 40 and are reduced widthwise at their ends to enter freely guide slots 27.

Mounted on sleeve 9 are two followers 43 and 44 respectively. Follower 43 is detailed in Figs. 8 and 9 and it will be seen that it is internally threaded to engage thread 11 on the sleeve and has four radial ears 43a-43d. Follower 44 is identical with follower 43 except that the thread is of opposite pitch—it being remembered that threads 11 and 12 are left and right hand respectively, or vice versa. For the purpose of holding the two followers in angular alignment, each is provided with four notches 43e-43h. Said notches are spaced circumferentially in quadrature and it is therefore never necessary to rotate either follower more than 22½ degrees to bring the notches into alignment. After the reel has been otherwise assembled, the notches on the two followers are lined up by rotating one or both followers and a rod 45 (see Figs. 3 and 5) is extended through an aperture 46 or 47 in plate 28 and then through a pair of aligned notches; and the rear end of the rod is secured to plate 21 by means of a machine screw 48. To permit insertion of rod 45 when front flange 7 is in place, there are cut in plate 29 a pair of notches 49 and 50. These afford access to apertures 46 and 47. Rod 45 serves to prevent substantial rotation of followers 43 and 44 relatively to rear and front flanges 6 and 7. A single aperture 46 or 47 would suffice, but it is preferable to provide both because the front flange can be mounted in either of two angular positions 180 degrees apart. The same applies to the provision of two notches 49 and 50 instead of one such notch only.

Each carrier is interconnected individually with followers 43, 44 through the medium of lazy tongs 51, each comprising a pair of crossed toggle links 52, 53 which are pivotally connected at 54. As shown most clearly in Figs. 1, 2, and 5, the inner ends of links 52, 53 are pivotally connected at 55, 56 to ears 43a, 44a, etc., individually. The outer ends of links 52, 53 extend into the spaces between the members 39, 40 of the several carriers 35-38 respectively and said outer ends each carry a transverse stud 57, 58 on which is mounted rollers 59, 60. Said rollers fit and are rollable along and within the channels of members 39, 40 as most clearly depicted in Fig. 3.

Rotation of sleeve 9 by means of crank 17, relatively to rear and front flanges 6 and 7 causes movement of followers 43, 44 toward or away from each other—depending upon the direction of rotation of the crank. If thread 11 is left-hand and thread 12 right-hand, clockwise rotation of crank 17 will cause the followers (like-wise rollers 59, 60) to approach each other and, from the position illustrated in Fig. 5, will cause the lazy tongs to extend and thus effect radial outward movement of the four carrier members. In Figs. 1 and 5 the hub is shown fully contracted whereas in Fig. 2 it is shown fully expanded.

The rear and front flanges are rigidly interconnected and restrained against relative rotation as well as against mutual axial displacement by means of four tie bars 61, the ends of which are welded to plates 21 and 28 respectively.

Front flange 7 is detachably secured to plate 28 by means of a pair of threaded studs 62 and wing nuts 63 together with a pair of latches 64,

a detail of which is shown in Fig. 11. Each latch comprises a latch plate 65, a detent 66 having a knob 67, and a backing spring 68. Latch plate 65 is attached to a tie bar 61. Detent 66 and spring 68 are disposed in a guide slot 27—the spring being interposed between the detent and a welded-in abutment plate 69.

A brake band 70 having a lining 71 is suspended by means of a bolt 72 on an angle bracket 73 which, in turn, is welded to guide arm 22. Near the ends of the brake band and welded thereto are lugs 74, 75 having aligned apertures for the reception of a brake-operating bolt 76 which passes also through a bracket 77 welded to guide arm 24 and consisting of a metal strap bent U-shape. A wing nut 78 is threaded to bolt 76 for contracting the brake band, and springs 79 and 80 encircling the bolt serve to expand the brake band when the wing nut is slackened. When paying out wire the brake is generally adjusted to drag slightly and thus prevent the reel over-running. The brake may be more forcefully applied to lock the reel or may be entirely released for rewinding.

When the reel has been loaded with a coil of wire and the hub expanded and the front flange replaced, it is desirable, if not always necessary, to lock sleeve 9 against rotation relatively to the front and rear flanges. This is because frictional drag of shaft 1 on the bore 10 of sleeve 9 tends to give rise to such relative rotation and might thereby cause the hub to contract. The locking of the sleeve is accomplished by a manually withdrawable bolt 81 (see Figs. 3 and 10) one end of which extends through an opening in collar 14 and is insertable into either of four matching holes in sleeve 9, spaced in quadrature. Bolt 81 is bent right-angularly to form a handle at 82 and has an eye at 83. It is slideably supported by a bent sheet metal bracket 84 having a shelf-like extension 86 which is notched at 87 to engage handle 82. A spring 88 encircling bolt 81 and pressing against a pin 89 extending laterally through the bolt serves to press the bolt into locking engagement with sleeve 9. As depicted in Figs. 3 and 10, bolt 81 is out of engagement with sleeve 9 and the sleeve is therefore free to rotate relatively to the front and rear flanges of the reel. By withdrawing handle 82 from notch 87 and rotating it through a small angle in either direction it is cleared of extension 86 and the bolt will then move under the impetus of spring 88 into locking engagement with the sleeve. To contract or expand the hub it is necessary that bolt 81 be in the unlocked position illustrated in Fig. 10; but when the desired diametrical adjustment of the hub has been accomplished the bolt should be released and thus allowed to lock the sleeve.

To load the reel the locking bolt is withdrawn and the hub contracted to the necessary extent by means of crank 17. Then the front flange is removed by unscrewing wing nuts 63 and releasing latches 64. The coil is placed on the hub, the front flange replaced and the hub expanded by rotating crank 17 in the reverse direction. When that has been done the locking bolt is released as above described. The brake is then generally set to act as a drag and everything is in readiness for paying out the wire. Rewinding can be accomplished by rotating the reel with crank 17 while sleeve 9 remains locked by bolt 81.

What is claimed is:

1. In a reel: a pair of spaced flanges having a common axis of rotation, a diametrically expan-

sible and contractible hub disposed between said flanges and including a plurality of carriers spaced angularly about said axis and adjustably movable radially toward and away from said axis, said flanges having means for guiding said carriers radially, a rotatable member extending axially through said flanges and rotatable relatively thereto, said member having external right and left-hand threads disposed between said flanges and co-axial with said member, a pair of followers disposed between said flanges and spaced axially of said member and engaging individually said right and left-hand threads, said followers being movable in directional opposition by said threads and axially of said member in response to rotation of said member relatively to said flanges, and a plurality of lazy tongs individual to said carriers, each comprising a pair of crossed pivotally interconnected links, pivotally connected each at one end only to said followers individually, each of said carriers being engaged by the other ends of the links of the lazy tongs individual thereto, said other ends of the links each being freely movable within said carrier in a horizontal direction opposite to the direction of movement of the follower directly actuating each such end.

2. In a reel: a pair of spaced flanges having an axis of rotation, a diametrically expansible and contractible hub rotatable with and disposed between said flanges and including a plurality of carriers spaced angularly about said axis and adjustably movable radially toward and away from said axis, said flanges each including guiding means, a sleeve co-axial with said flanges and having an axial bore for rotatably mounting the reel on a supporting shaft, said sleeve being rotatable relatively to said flanges and carriers and having external right and left-hand threads disposed between said flanges, a pair of followers disposed between said flanges and threaded internally to engage individually said right and left-hand threads, each of said followers being movable in directional opposition to the other by said threads and axially of said sleeve in response to rotation of said sleeve relatively to said flanges, a pair of crossed links for each of said carriers interconnecting said carriers with said followers for effecting radial movement of said carriers in response to rotation of said sleeve relatively to said flanges and manually operable means for locking said sleeve against rotation relatively to said flanges.

3. In a reel: a hub having an axis of rotation, said hub including a plurality of carriers angularly spaced about said axis, a member co-axial with said carriers and having external right and left-hand threads in seriatim, a pair of spaced plates in face-to-face relation co-axial with and rotatably mounted on said member, said threads being situated between said plates, a pair of annular followers threaded internally to engage said right and left-hand threads individually, said followers being spaced apart in face-to-face relation and carried by said member in engagement with said threads, each of said followers being movable in opposite directions relative to the other and along said member by said threads in response to rotation of said member relatively to said plates, radially extending guides for said carriers supported by said plates, a rod carried by and bridging said plates conjointly and extending lengthwise parallel to said member, said rod engaging said followers to prevent rotation thereof relatively to said plates, said followers being

freely movable along said rod axially of said member when propelled by said threads, and toggle link mechanism interconnecting said carriers with said followers, said toggle link mechanism being operative to translate the movements of said followers axially of said member into simultaneous co-related radial movements of said carriers, said mechanism including a plurality of links each of which is pivotally anchored intermediate its ends to cause each end to move in opposition to the other longitudinally relative to the axis of said reel.

4. In a reel: a sleeve having a longitudinal axis of rotation and bored axially to receive a supporting shaft, said sleeve having external right and left-hand threads in seriatim, a pair of plates spaced apart in face-to-face relation and rotatably mounted on said sleeve at either end of said sleeve, a pair of annular followers threaded internally to engage said right and left-hand threads individually, said followers being spaced apart in face-to-face relation and carried by said sleeve in engagement with said threads, each of said followers being movable in opposite directions relative to the other along said sleeve by said threads in response to rotation of said sleeve relatively to said plates, a plurality of carriers symmetrically disposed and revolvable about the axis of said sleeve and adjustably movable radially toward and away from said axis, a rod extending lengthwise of said sleeve, externally thereof, and supported by said plates conjointly, said rod engaging said followers to prevent rotation thereof relatively to said plates, said followers being freely movable along said rod axially of said sleeve when propelled by said threads, toggle link mechanism interconnecting said carriers with said followers, and operative to translate the movements of said followers axially of sleeve into simultaneous co-related radial movements of said carriers, a manually releasable locking bolt for interlocking said sleeve with said plates to prevent relative rotation between said sleeve and plates except while said carriers are being moved radially, a removable front flange carried by one of said plates, a brake band carried by the other of said plates and operative to engage a brake drum on the supporting shaft, and a crank removably engageable with one end of said sleeve.

5. In combination in a reel, a mounting sleeve, a pair of guide members each disposed at an end of said sleeve opposite to the other and rotatable with the other as a unit about the axis of said sleeve, said sleeve being threaded between said guide members to provide a left-hand thread adjacent one of said members and a right-hand thread adjacent the other of said members, a carrier extending between said guide members and guided thereby for movement radially of said sleeve, a pair of followers mounted on said sleeve and actuated by said threads for movement in opposition to each other axial of said sleeve, and a lazy tong interconnected between said followers and carrier for moving said carrier radially of said sleeve as said followers move axially thereof, said tong comprising a pair of links pivotally connected intermediate their ends and each pivotally connected with a follower and pivotally and slidably connected with said carrier, the sliding movement of each link on said carrier being substantially equal to the similar movement of the other link, whereby the forces exerted by said links upon said carrier are substantially equally distributed in maintaining alignment of the carrier relative to the guide members and the

stresses imposed on the links by a coil mounted on the carrier are substantially equalized in said links.

6. In combination in a reel, a mounting sleeve, a pair of guide members each disposed at an end of said sleeve opposite the other, said guide members as a unit and said sleeve being relatively rotatable, said sleeve being threaded between said members to provide a left-hand thread adjacent one of said members and a right-hand thread adjacent the other of said members, a carrier extending between said members and guided thereby for movement radially of said sleeve, a pair of followers mounted on said sleeve and actuated by said threads for movement in opposition to each other axially of said sleeve, a pair of links each pivotally connected with a follower and pivotally and slidably connected with said carrier, and a means pivotally interconnecting said links intermediate their ends.

7. In a reel: a pair of spaced flanges having a common axis of rotation, a diametrically expandible and contractible hub disposed between said flanges and including a plurality of channeled carriers spaced angularly about said axis and adjustably movable radially toward and away from said axis, said flanges having means for guiding said channeled carriers radially, a rotatable member extending axially through said flanges and rotatable relatively thereto, said member having external right and left-hand threads disposed between said flanges and coaxial with said member, a pair of followers disposed between said flanges and threaded internally to engage individually said right and left-hand threads, said followers being movable in directional opposition by said threads and axially of said member in response to rotation of said member relatively to said flanges, a plurality of lazy tong means individual to said channeled carriers, each comprising a pair of crossed pivotally interconnected links, each link pivotally connected at one end only to one of said followers individually, rollers rotatably secured to the other ends of said links, said rollers being carried within the channels of said carriers and freely movable therein.

8. In a reel: a diametrically expandible and contractible hub having an axis of rotation, a pair of guide members each disposed at an end of said hub opposite to the other and rotatable with the other as a unit about the axis of said hub, said hub including a plurality of carriers spaced angularly about said axis of rotation and adjustably movable radially in said guide members toward and away from said axis, and manually operable mechanism for concurrently moving said carriers radially, said mechanism comprising an axially extending member rotatable relatively to said carriers and having external right and left-hand threads, a pair of followers spaced axially of said member and engaging individually said right and left-hand threads, said followers being movable in directional opposition by said threads and axially of said member in response to rotation of said member relatively to said carriers, and lazy tong means for each of said carriers, each comprising a pair of link members connected individually to said followers, the other ends of the said link members being mounted individually on said carriers so as to have horizontal movement toward and away from each other as the said carriers are expanded and contracted.

9. In a reel: a diametrically expandible and

contractible hub having an axis of rotation said hub including a plurality of channeled carriers spaced angularly about said axis and adjustably movable radially toward and away from said axis, and manually operable mechanism for concurrently moving said channeled carriers radially, said mechanism comprising a member extending axially of said hub and rotatable relatively to said channeled carriers, said members having external right and left-hand threads, a pair of spaced annular followers internally threaded to engage said right and left-hand threads and movable axially in directional opposition along said member by said threads in response to ro-

tation of said member, means extending lengthwise of said member and engaging said followers for preventing rotation of said followers relatively to said member without interfering with the movements of said followers axially of said member, a plurality of toggle means individual to said carriers, each comprising a pair of crossed links pivotally connected at one end only to said followers individually, the other ends of the said links being individually mounted within said channeled carriers and having free lateral movement therein.

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