May 11, 1954 C. M. WIIG 2,678,175

SPINDLE REEL WITH TOGGLE ARMS

Filed July 5, 1951 3 Sheets-Sheet 1

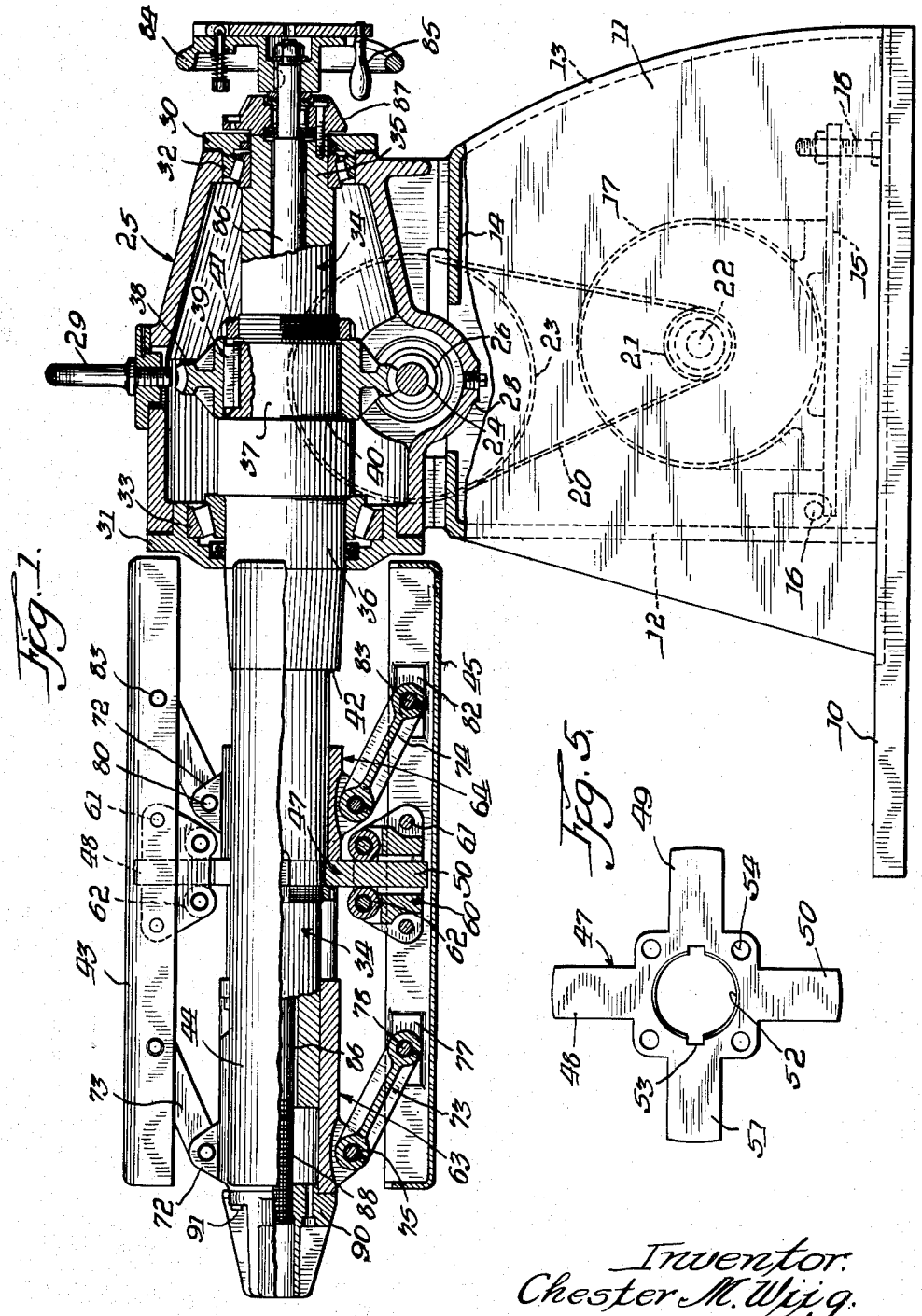


Fig. 1.

Fig. 5.

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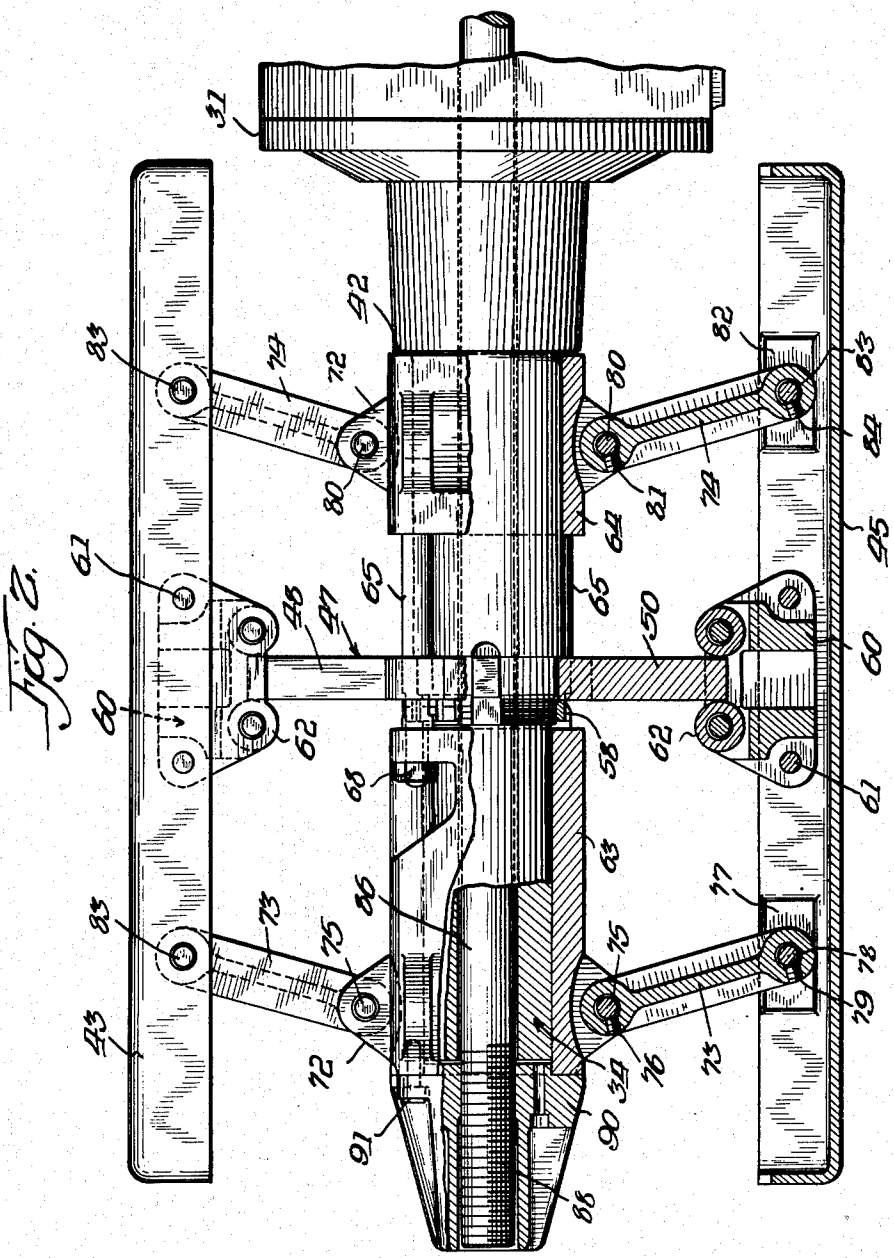


Fig. 2.

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Fig. 3.

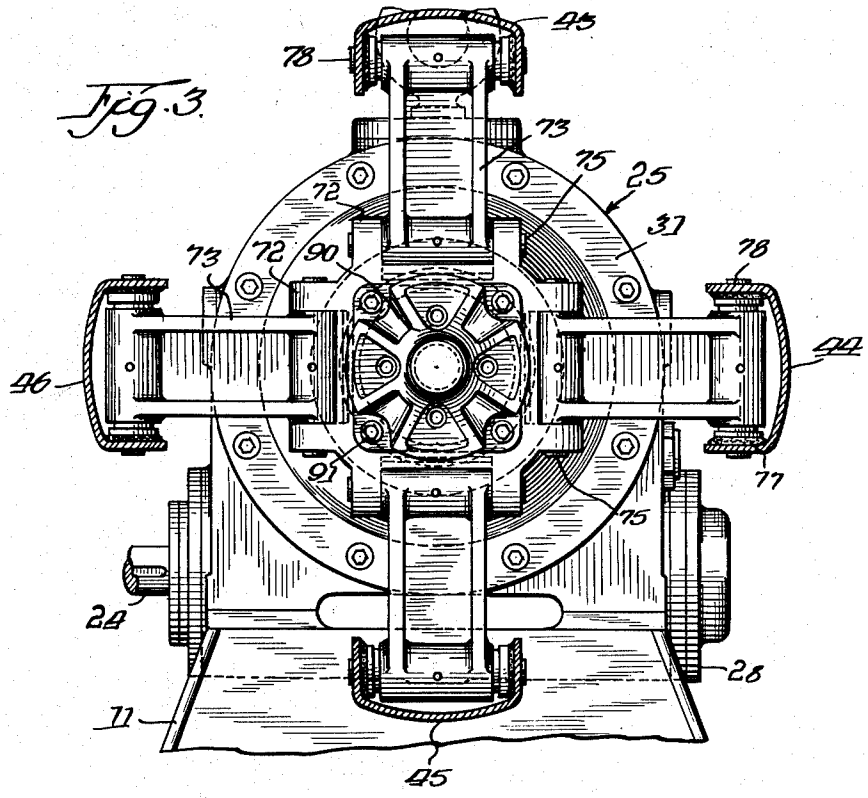
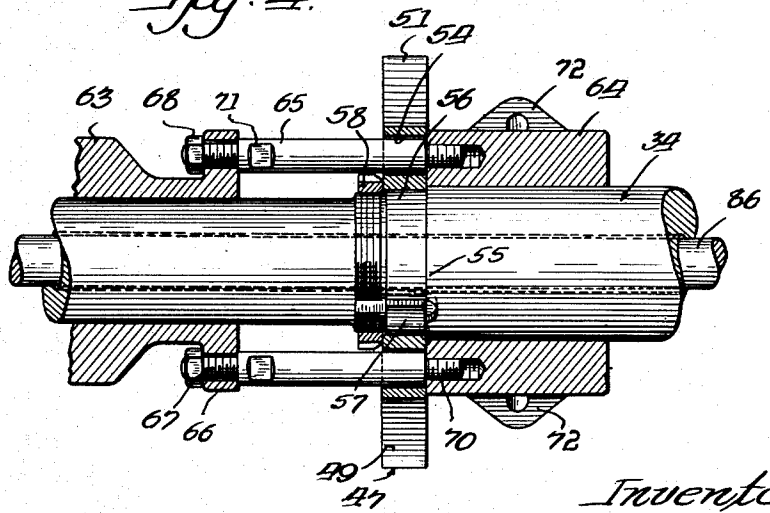


Fig. 4.



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SPINDLE REEL WITH TOGGLE ARMS

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8 Claims. (Cl. 242—111)

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The invention relates to spindle reels of the centering type for metal strip material in coil form and has reference in particular to an improved spindle reel having coil supporting arms mounted for radial movement by means of a spider and operatively connected to an actuating sleeve by toggle members.

An object of the present invention is to provide an improved reel of the spindle type having toggle members operatively connecting coil supporting arms to an actuating sleeve, and wherein the said coil supporting arms are mounted for radial movement in an expanding or collapsing direction by means of a spider which is completely encircled by the arms.

A more specific object of the invention is to provide a spindle reel having coil supporting arms located radially outward of a spider on which the arms are mounted in a manner to have radial movement with respect to a central supporting shaft and wherein said shaft in turn mounts an actuating sleeve for the arms adapted to move in an axial direction on the shaft.

Another object of the invention resides in the provision of a spindle reel characterized by coil supporting arms mounted for movement on a spider and actuated by a sleeve which effects expanding or contracting movement of the arms. In the present reel the sleeve has a forward part and a rear part located on respective sides of the spider and means are provided connecting the parts so that the sleeve moves as a unit axially of the center shaft on which it is mounted.

Another object of the invention is to provide a spindle reel characterized by a two-part sleeve adapted to have axial movement for expanding and contracting the coil supporting arms, and wherein manual means are provided at one end of the reel for positioning the sleeve to thereby adjust the arms.

With these and various other objects in view, the invention may consist of certain novel features of construction and operation as will be more fully described and particularly pointed out in the specification, drawings and claims appended thereto.

In the drawings which illustrate an embodiment of the invention, and wherein like reference characters are used to designate like parts—

Figure 1 is a sectional view, part of the drive mechanism being shown in elevation, of the spindle reel of the invention which embodies the improved form of spider and two-part actuating sleeve;

Figure 2 is an enlarged view of the coil supporting structure including the spider, the two-part sleeve, the toggle members, and the coil supporting arms in expanded position;

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Figure 3 is a front elevational view of the spindle reel, parts of the coil supporting arms being shown in section;

Figure 4 is a fragmentary sectional view taken longitudinally of the sleeve showing the two-part construction of the same and the connecting bolts which pass through openings in the spider; and

Figure 5 is an elevational view of the spider.

In the illustrated embodiment of the invention the standard for supporting the main shaft of the reel includes a base 10, Figure 1, having side members 11 and end members 12 and 13 forming a platform 14. Within the hollow base structure there is mounted a support 15 pivoted at 16 and which supports the electric motor 17. The vertical position of the motor can be adjusted by means of the threaded bolt 18, said adjustment enabling the desired tension to be maintained at all times on the pulley belts 20 which operatively connect the pulley 21, fixed to shaft 22 of the motor, with the pulley 23 fixed to shaft 24. The said shaft 24 is suitably journalled by the gear housing 28 and a worm gear 26 is fixed to shaft 24 to be thus driven by the electric motor and which comprises the driving mechanism for the spindle reel.

The gear housing 25 includes a transversely extending arcuate portion 28 which receives the worm gear 26 and forms an oil sump for the gear. Above the sump the housing is equipped with the ring 29 for connection with a hoisting chain for lifting the spindle reel. End members are provided at each end of the housing, the member 30 being located at the right hand end and member 31 at the left end. Roller bearing assemblies 32 and 33 are respectively associated with the end members and said roller bearings journal the main shaft 34 which is thus mounted for rotation in the housing 25 with a substantial portion of the shaft projecting forwardly of the housing to form the coil supporting portion of the reel. Roller bearing 32 is located on shaft 34 at the reduced end 35 and in a similar manner roller bearing 33 is located on said shaft at the shouldered portion 36. Shaft 34 has a diameter at 37 to receive the worm wheel 38 which is keyed at 39 and held against shoulder 40 by the threaded ring 41. The worm wheel 38 has meshing engagement with the worm gear 26 and through the gear and belt drive the main shaft 34 is driven by the electric motor 17. Since

the shaft is entirely journalled at one end and the heavy coil of stock material is supported by the reel at the other end of the shaft a cantilever action is set up, requiring the use of substantially frictionless bearings in the journalling means. The device has been found to operate very satisfactorily when the shaft is journalled at 32 and 33 by the roller bearings as described.

The shouldered portion 36 of the main shaft 34 is tapered slightly as it leaves end member 31 and at 42 the shaft is reduced in diameter, providing a shoulder which functions as a stop for the actuating sleeve to be presently described. The forwardly extending portion of the main shaft beyond shoulder 42 is again reduced in diameter to form shoulder 55, Figure 4, and said shaft functions as the coil supporting portion of the reel, the same having the coil supporting arms mounted thereon. Said coil supporting arms, identified by numerals 43, 44, 45 and 46 are mounted for movement on a spider indicated in its entirety by numeral 47, see Figures 2 and 5. The spider has four outwardly projecting arm portions or stud portions indicated by numerals 48, 49, 50 and 51, and which respectively mount the coil supporting arms 43, 44, 45 and 46. The spider is provided with a central opening 52 for receiving shaft 34 and said opening is formed with one or more slots 53 by means of which the spider is keyed to shaft 34 in a manner to prevent rotation. At least four openings or passages 54 are formed in the spider at the respective corners of the hub portion of the same so that the openings are spaced equi-distant from each other. These openings allow passage of connecting rods which connect the two-part actuating sleeve to be presently described.

The spider is telescoped over the forwardly extending portion of shaft 34 until it contacts shoulder 55. As a result the spider is mounted on the reduced portion 56 formed for the purpose and by means of keys 57 the spider is keyed in place to prevent rotation on the shaft. The threaded ring 58 functions as a retaining member to hold the spider in place on the main shaft 34.

Each supporting arm is provided with a roller bracket 60 and for explanatory purposes the roller bracket associated with arm 45 will be described since this bracket is shown in cross section in Figure 1. The bracket is suitably fixed or secured to the underside of its supporting arm by means of the transverse pins 61, and each bracket journals a pair of spaced rollers 62. The spacing of the rollers 62 is such as to locate a roller on opposite sides of the spider arm portion. For example, the bracket 60, associated with arm 45, has the rollers 62 located on respective sides of portion 50. In a similar manner the roller bracket 60 for arm 43 has its rollers 62 located on the respective sides of the spider arm portion 48. The structure for arms 44 and 46 is similar and as a result the coil supporting arms are mounted for movement in a radial direction with respect to the main shaft for the purpose of expanding or collapsing the arms. This radial movement of the coil supporting arms in an outward direction expands the arms for the purpose of gripping the interior opening of a coil of metal stock, whereby the coil is securely held and thus supported by the arms. When radial movement is in an inward direction the coil is correspondingly released and the same may be removed, or, if the reel is empty a coil of stock may be located thereon.

Each coil supporting arm is operatively connected with an axially movable sleeve by toggle means and in the improved spindle reel of the invention a two-part sleeve is employed, the same having a part on each side of the spider with the parts being connected by connecting bolts passing through passages 54 provided for the purpose in the spider. As best shown in Figures 2 and 4, the actuating sleeve includes a forward portion 63 and a rear portion 64. The two portions are connected by the bolts 65 which extend through the passages 54 formed in the spider 47. The part 63 of the actuating sleeve is formed at its rear with a flange 66 having a number of bolt receiving openings for receiving the threaded ends 67 of the bolts 65. The said bolts 65 are fixedly secured to the flange and thus to the forward part 63 of the sleeve by means of nuts 68. The bolts 66 at their opposite ends are reduced and threaded as at 70 and these threaded ends are threadedly connected to the rear part 64 of the sleeve. The bolts 65 are flattened at 71 so that they may be gripped and turned by a tool, thus facilitating manipulation of the bolts.

The bolts join the two parts of the actuating sleeve so that they function as a unit and in accordance with the invention each part is provided with a plurality of spaced ears 72 for receiving toggle members such as indicated by numerals 73 and 74. Four toggle members 73 are pivotally associated with the ears 72 provided by the forward part 63 of the actuating sleeve. Transverse pins such as 75 function to pivotally connect the toggle members to the ears and as shown in Figure 2 it will be seen that the pins are held to the members by set screws 76. The structure is somewhat similar for pivotally connecting the outer ends of the toggle members to the coil supporting arms. The inside surface of each arm is reinforced as at 77 and the distance between transversely spaced reinforcements is such as to receive the outer ends of the toggle members 73 which are pivotally connected to the arms by the transverse pins 78 which are in turn secured to the toggle members by set screws 79. The toggle members 74 are pivotally secured to the ears 72, provided by the rear part 64 of the actuating sleeve, by the transverse pins 80, and said pins are secured to the members by set screws 81. The coil supporting arms are also reinforced on their inside surfaces as at 82, and the spaced reinforcements of the respective arms are adapted to receive the outer ends of the toggle members 74. The pins 83 pivotally connect the members to the arms and said pins are secured to the arms by the set screws 84.

The actuating sleeve is mounted on shaft 34 for axial movement although rotation of the sleeve is prevented since the connecting bolts 65 pass through openings or passages in spider 47 which is nonrotatably fixed to the shaft. Actuating movement is imparted to the sleeve by manual means located at the rear of the spindle reel and for this purpose the wheel 84 is provided, having a crank handle 85 suitably associated therewith. The wheel 84 is secured to the rear projecting end of the actuating rod 86 which extends through a central bore formed in shaft 34. A cap member 87, suitably secured to the end of shaft 34 and having associated relation with end member 30, functions to journal the rear end of the actuating rod 86. The forward end of the actuating rod is threaded as at 88 and this end has threaded engagement with a nose portion 90, Figure 2, which is in turn secured to the front end

of part 63 of the actuating sleeve. A plurality of bolts such as 91 extend through the nose portion, having location in recesses provided therefor, and said bolts are threaded into the part 63 of the actuating sleeve.

Actuation imparted to the actuating rod 86 will effect axial movement of the two-part sleeve as will be readily understood. Rotation in one direction will effect movement of the two-part sleeve in a direction toward the left and presently part 64 will contact the spider 47, preventing further movement of the sleeve in a collapsing direction. Figure 1 shows the parts in collapsed relation with part 64 in contact with the spider, with all the toggle members diagonally positioned so as to locate the coil supporting arms in fully collapsed relation. Rotation of the actuating rod 86 in another direction will effect movement of the two-part sleeve toward the right and presently part 63 will be caused to contact the threaded ring 59, preventing further movement of the sleeve in an expanding direction. The expanded position of the parts is shown in Figure 2, with all the toggle members extended whereby to locate the coil supporting arms in maximum expanded position.

The nose portion 90 constitutes the part of the actuating sleeve having connection with the actuating rod 86. The other parts of the sleeve are mounted for axial movement on the main shaft 34. By dividing the sleeve the improved structure of the invention is made possible, namely, the location of the spider 47 on the shaft 34 approximately centrally of the length of the projecting portion of the main shaft. As a result the coil supporting arms are mounted on the spider at a location midway of the length of the arms and it will be observed that toggle members are on each side of the spider. One set of toggle members is associated with the front part 63 of the sleeve and the other set of toggle members is associated with the rear part 64 of the sleeve. The present construction of spindle reel is rugged and durable and although the size of the spider is held to a minimum it functions satisfactorily in mounting the coil supporting arms for movement in an expanding or collapsing direction.

The invention is not to be limited to or by details of construction of the particular embodiment thereof illustrated by the drawings as various other forms of the device will of course be apparent to those skilled in the art without departing from the spirit of the invention or the scope of the claims.

I claim:

1. In a spindle reel, in combination, a shaft journalled by a standard at one end and having its other end projecting forwardly of the standard, a two-part actuating sleeve in telescoping relation on the forwardly projecting end of the shaft, said sleeve including a forward and a rear part connected by connecting bolts, a spider fixed to said shaft, said spider having passages therein and being located between the parts of the sleeve with the connecting bolts thereof passing through said passages provided in the spider, whereby said spider provides a stop member limiting axial movement of the sleeve on the shaft in both directions, said spider having four radially extending stud portions angularly spaced approximately 90 degrees, a plurality of supporting arms disposed parallel to the shaft, an arm being mounted on each stud portion of the spider for movement radially to expand or collapse the arms, a roller bracket fixed to each supporting arm and providing spaced rollers having rolling contact with a stud portion of the spider for mounting the supporting arms on the spider, and a toggle member operatively connecting each part of the sleeve with each supporting arm, whereby axial movement of the two-part sleeve will produce said movement of the supporting arms in an expanding or collapsing direction.

2. A spindle reel as defined by claim 1, additionally including an actuating rod for producing axial movement of the two-part sleeve, said actuating rod extending through a central bore formed for the purpose in the shaft, and means adapted for manual operation for actuating said actuating rod.

3. In a spindle reel of the centering type, a rotatable shaft having means journalling the same at one end, a spider fixed to the shaft approximately centrally of the length of the other end of the shaft, said spider having a plurality of radially extending stud portions, a two-part sleeve on the shaft adapted to rotate with the shaft and to move axially on the same, said sleeve including a forward part on one side of the spider and a rear part on the opposite side of the spider, connecting bolts joining the two parts of the sleeve, a plurality of coil supporting arms disposed parallel to the shaft, each coil supporting arm being located outwardly of and in alignment with a stud portion of the spider, means mounting each arm on its respective stud portion for movement in a radial direction, and toggle members operatively connecting each part of the sleeve with the coil supporting arms.

4. In a spindle reel of the centering type, a rotatable shaft having means journalling one end of the shaft to provide a free forwardly extending portion, a spider fixed to the forwardly extending portion approximately mid-way of its length, said spider having openings therein and having four radially extending stud portions angularly spaced by 90 degrees, a two-part sleeve on the shaft adapted to rotate with the shaft and to move in an axial direction on the same, said sleeve including a forward part on one side of the spider and a rear part on the opposite side of the spider, connecting bolts joining the two parts of the sleeve and said bolts passing through said openings in the spider provided for the purpose, a plurality of coil supporting arms disposed parallel to the shaft and of a length approximately equal to the forwardly extending portion of the shaft, each coil supporting arm being located outwardly of and in alignment with a stud portion of the spider, a roller bracket mounting each arm on its respective stud portion for movement in a radial direction, and toggle members pivoted to each part of the sleeve and to the arms for operatively connecting the arms with the sleeve.

5. A spindle reel as defined by claim 4, additionally including an actuating rod for producing axial movement of the two-part sleeve, said actuating rod extending through a central bore formed for the purpose in the shaft, and means adapted for manual operation for actuating the said actuating rod.

6. In a spindle reel, in combination, a shaft journaled at one end by a standard and having its other end projecting outwardly of the standard, said outwardly projecting end of the shaft having a stepped formation provided by portions of different diameters, a two-part connected sleeve in telescoping relation on said shaft with a

part mounted on each of said portions of the shaft, a spider fixed to said shaft and located between the portions of different diameter, said spider having stud portions projecting radially outward from the shaft, a plurality of supporting arms, one for each stud portion of the spider and which are disposed parallel to the shaft, means mounting each arm on its respective stud portion for movement in a radial direction, and toggle members operatively connecting each part of the sleeve wtih the coil supporting arms respectively.

7. In a spindle reel, in combination, a shaft journaled at one end by a standard and having its other end projecting outwardly of the standard, said outwardly projecting end of the shaft having a stepped formation provided by portions of different diameters including a forward portion and a rear portion, said shaft having a threaded section between the portions, a two-part connected sleeve in telescoping relation on said shaft with a part mounted on each of said portions of the shaft, a spider threaded to said threaded section of the shaft and accordingly fixed to the shaft and located between the portions of different diameter, said spider having stud portions projecting radially outward from the shaft, a plurality of supporting arms, one for each stud portion of the spider and which are disposed parallel to the shaft, a roller bracket mounting each arm on its respective stud portion for movement in a radial direction, and toggle members respectively pivoted to each part of the sleeve and to the arms for operatively connecting the arms with the sleeve.

8. In a spindle reel, in combination, a shaft journaled by a standard at one end and having its other end projecting forwardly of the standard, a two-part connected sleeve mounted for axial movement as a unit on the forwardly projecting end of the shaft, a spider fixed to said shaft and located between the parts of said sleeve, said spider thereby providing a stop member limiting axial movement of the sleeve on the shaft in both a forward and a rearward direction, stud portions provided by the spider and which project radially outward from the shaft, a plurality of supporting arms, one for each stud portion of the spider, and which arm is mounted on its respective stud portion for movement to effect an expansion or a collapsing of the arms, and a toggle member operatively connecting each part of the sleeve with each supporting arm, whereby axial movement of the two-part sleeve will produce radial movement of the supporting arms in an expanding or collapsing direction.

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