F. T. NEALE.

REEL STRUCTURE.

APPLICATION FILED DEC. 3, 1920.

1,385,092.

Patented July 19, 1921.

FIG. II.

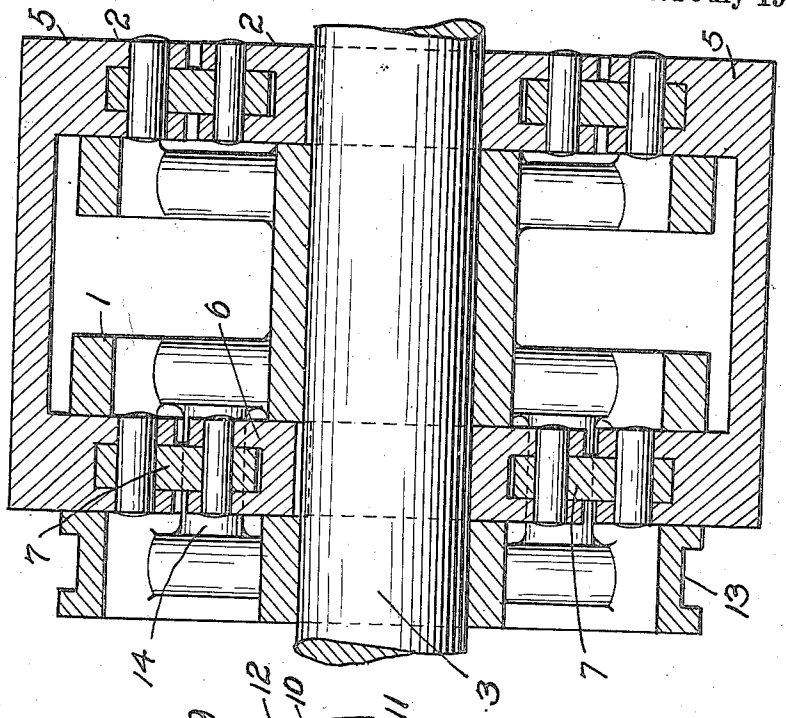
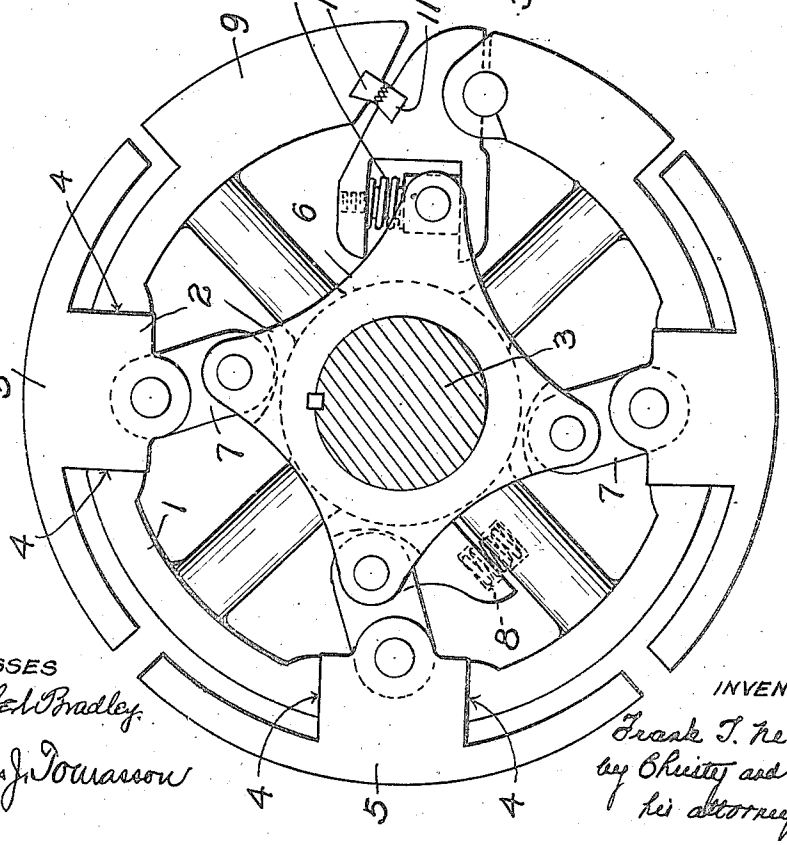


FIG. I.



WITNESSES

J. Herbert Bradley.

Francis J. Donahoe

INVENTOR

Frank T. Neale

by Christy and Christy

his attorneys

UNITED STATES PATENT OFFICE.

FRANK T. NEALE, OF CARNEGIE, PENNSYLVANIA.

REEL STRUCTURE.

1,385,092. Specification of Letters Patent. Patented July 19, 1921.

Application filed December 3, 1920. Serial No. 427,932.

To all whom it may concern:

Be it known that I, FRANK T. NEALE, residing at Carnegie, in the county of Allegheny and State of Pennsylvania, a citizen of the United States, have invented or discovered certain new and useful Improvements in Reel Structures, of which improvements the following is a specification.

My invention relates to improvements in reel structures, and is particularly applicable to reels such as are used in mills for rolling steel strip, mills for drawing wire, and elsewhere. In the accompanying drawings I show the invention applied to a reel for coiling steel strip as it comes from the rolls of a rolling mill. It will of course be understood that this showing is exemplary, and that the invention is not limited to a reel for that particular purpose, but is applicable to reels generally, where conditions are such as to recommend its use.

In the accompanying drawings Figure I shows the reel in end elevation; Fig. II shows it in medial and longitudinal section.

The reel consists essentially of two parts or members, a member 1 of general cylindrical contour, and a member 2 which is the drum proper, the material-carrying member, of the reel. A shaft 3 supports the cylindrical member 1, and on it the cylindrical member is idly rotatable. The cylindrical member 1 in turn is a support and guide for the expansible and collapsible portions of the drum, for the reel is essentially an expansible and collapsible reel, to the end that, when full it may be collapsed, permitting of the easy removal of the coil wound upon it.

The cylindrical member 1 is accordingly provided with a plurality of radial slots 4 which constitute slideways for the collapsible and expansible members of the drum. Any number of such slideways may be provided, corresponding of course to the number of drum members. The structure of the drawings possesses three such slideways, arranged at quadrant intervals about the periphery of the cylindrical member, and in place of a fourth slideway a clamp for the material is provided, a more particular description of which will be given at a later point in this specification. It is desirable that the reel be as light in weight as is consistent with strength, and accordingly it will be observed of the cylinder 1 that it is made of skeleton form, with continuous hub and with spokes and rims at opposite ends. In the rims the radial slots 4 are formed, which already have been characterized.

The drum member is composed of the drum segments 5 provided with radially extending necks. These necks enter the slots 4 in the skeleton cylindrical member 1. The drum segments are capable of sliding radially in these slots, and, by virtue of such sliding, properly controlled, the drum expands and collapses to serve its intended ends. The drum member further includes collars 6 keyed to shaft 3 (conveniently there are two, arranged at either end of the structure), and accordingly the shaft 3 may itself be considered part of the drum member. The drum segments 5 are connected to the collars 6 by the toggles 7.

The assembly is, as will be understood by a consideration of Fig. I, such that the two members now described, the cylindrical member 1 and the drum member 2, are mounted on a common axis; that they have within a limited range the capacity of rotation, the one relatively to the other; and that as they so relatively rotate, the expansible and collapsible drum expands or collapses—expanding as the relative rotation is in one direction, collapsing as it is in the opposite direction. Looking at the drum as shown in Fig. I it appears in expanded condition; if now the cylindrical member 1 be rotated in anticlockwise direction relatively to drum member 2, or if drum member 2—or, more correctly speaking, if the shaft 3 and the collars 6 of the drum member—be rotated clockwise relatively to the cylindrical member 1, the drum member will be collapsed, the drum segments moving centripetally to diminish the diameter of the drum surface.

Suitable means are provided, conveniently in the form of a spring 8, tending to hold cylinder member 1 and drum member 2 normally in that relative position which maintains the drum in collapsed position.

Allusion has been made to the spacing of the drum segments: they extend from cylinder member 1 at three of four quadrant points about its periphery. At the fourth quadrant point the body of the cylinder member is advantageously built out, as in-

dicated at 9 in Fig. I, to afford, together with the drum sections 5, a substantially continuous and substantially cylindrical material-receiving surface. To this extent the cylinder member 1 shares in the function of the drum member, 2.

At a suitable point the continuity of the surface of this extension 9 is interrupted by a recess in which are set the jaws of a clamp; while one of these jaws 10 may advantageously be rigidly anchored in the body of the cylindrical member, the other jaw 11 is pivoted in the cylindrical member, as shown. This pivoted and swinging jaw 11 is also pivoted to one of the collars 6 of the drum member, and as Fig. I clearly shows, the doubly pivoted jaw 11 so far resembles toggles 7 that it swings with the relative turning of members 1 and 2. The arrangement is such that the jaws close when the drum member expands and open when it collapses. A spring 12, interposed between jaw 11 and collar 6 serves to cushion the closing of the jaws, and to make compensation for differences in the thickness of material coiled.

Referring particularly to Fig. II a brake drum 13 appears on the left adjacent the reel as thus far described. This drum is integrated with the cylinder member 1, as is shown by webs 14 connecting the spokes of the cylinder member with those of the brake drum. Brake drum 13 like cylinder member 1 is idly mounted on shaft 1. The brake drum is adapted to be engaged by a band brake, not shown.

Operation is as follows: The direction of rotation of shaft 3 to effect winding is, as shown in Fig. I, anti-clockwise. Normally, as has been said, spring 8 is effective to hold the parts 5 collapsed. If now, the reel be in rotation and if the band be tightened on brake drum 13, immediately, the tension of spring 8 being overcome, drum member 2 will be shifted (in anticlockwise direction) and two particular features of operation will be achieved; the jaws 10, 11 will close, and the drum member will expand to the position shown in Fig. I.

Accordingly, when the reel, set in proper position relatively to a rolling mill, is about to be used, the forward end of the strip to be coiled is introduced between the open jaws 10, 11. The brake band is then tightened on brake drum 13, and shaft 3 set in normal rotation. Immediately, the jaws 10, 11 close on the material, the expansible drum segments expand, and, as rotation continues, the material is wrapped upon the now expanded drum. The speed of rotation of shaft 3 is preferably such that the reel tends to take up the material as fast as or somewhat faster than the mill delivers it. Braking power is continued until all slack is taken up between reel and mill and until the reel in consequence of its speed is exerting tension upon the length of material between reel and roll-pass. Thereupon the brake may be released, and thereafter the tension just alluded to will suffice throughout the remainder of the rolling of the particular strip, to maintain the reel in expanded condition. When, however, the end of the strip passes from the mill (the brake being released), the tension being now gone, immediately spring 8 will become effective to collapse the reel, opening at the same time the jaws 10, 11, and the now coiled bundle of strip rests on the reel, free to be removed.

I do not limit myself to details of structure; the showing here given is exemplary; in the ensuing claims I define what is of the essence of the invention; if this be employed, the invention will be practised, whatever be the particular construction.

I claim as my invention:

1. A reel structure including two members rotatable on a common axis and having additionally the capacity of rotation the one relatively to the other through a limited range, one of said members being of fixed diameter and the other expansible and collapsible, according as it moves through its range of independent rotation, yielding means normally maintaining the parts in collapsed position, means of rotation exerted directly upon the expansible and contractible member, and means borne by the inexpansible member for engaging the material to be wound, the arrangement being such that the tension of the material to be wound exerted directly upon the inexpansible member tends to effect relative shifting of the two members against the tension of the yielding means, substantially as described.

2. In a reel structure the combination of a rotatable shaft, a collar keyed to said shaft, a barrel idly rotatable on said shaft and provided with a plurality of radial slideways, and a plurality of drum segments with radial necks assembled with the parts already named, the radial necks extending within the radial slots in the barrel and connected by toggle connection to said collar, such reel structure being expansible and collapsible on every diameter.

3. In a reel structure the combination of a shaft, a pair of collars keyed to said shaft and spaced at an interval one from the other, a plurality of drum segments each provided with radial necks toggle-jointed at opposite ends to said collars, a cylinder member idly mounted on said shaft between the said collars provided with radial guideways into which the necks of said drum segments extend, means engaging one of said collars and said cylinder member tending to turn said cylinder member in one direction

upon said shaft relatively to said collar, means borne by said cylinder member for engaging material to be wound, the arrangement being such that tension exerted by the material to be wound upon said cylinder member is opposed to the stress of the means tending to effect relative turning of the parts as aforesaid, substantially as described.

4. In a reel structure a cylindrical body provided with radial slots, a winding surface including drum segments with radial necks extensible in said slots, a member rotatable relatively to said cylindrical body and on a common axis with said cylindrical body and operative toggle connection between said rotatable member and said drum segments, substantially as described.

5. In a reel structure, a cylindrical body provided with radial slots, a winding surface including drum segments with radial necks extensible in said slots, a clamp for material including a jaw pivoted in said cylindrical body, a member rotatable relatively to said cylindrical body and on a common axis with said cylindrical body, operative connections between said rotatable member and said drum segments, and between said rotatable member and said pivoted jaw, substantially as described.

6. In a reel structure, a cylindrical body hollow axially and provided with radial slots, and a winding drum including in its structure a shaft extending through and rotatable within the axial opening in said cylindrical body, a plurality of drum segments with radial necks extensibly engaged by the radial slots of said cylindrical member, the said drum segments being connected with their shaft through toggle connections, substantially as described.

7. In a reel structure, the combination of a shaft, a cylindrical body idly mounted on said shaft, a clamp for material borne by said cylindrical body, means operated by independent rotation of said shaft relatively to said cylindrical body for closing said clamp, and a brake for said cylindrical body, substantially as described.

8. In a reel structure, the combination of a shaft, a collar keyed to said shaft, a cylindrical body idly mounted on said shaft on one side of said collar, a brake drum idly mounted on said shaft on the opposite side of said collar and united to said cylindrical body beyond the periphery of said collar, a radial slot in said cylindrical body, a drum segment provided with a radial neck borne in the slot in said cylindrical body, a clamp borne by said cylindrical body, connection between collar and drum segment, whereby rotative movement between shaft and cylindrical body shifts said drum segment radially, connection between collar and clamp, whereby rotative movement between shaft and cylindrical body closes said clamp, substantially as described.

In testimony whereof I have hereunto set my hand.

FRANK T. NEALE.

Witnesses:
BAYARD H. CHRISTY,
FRANCIS J. TOMASSON.