M. LEITCH.

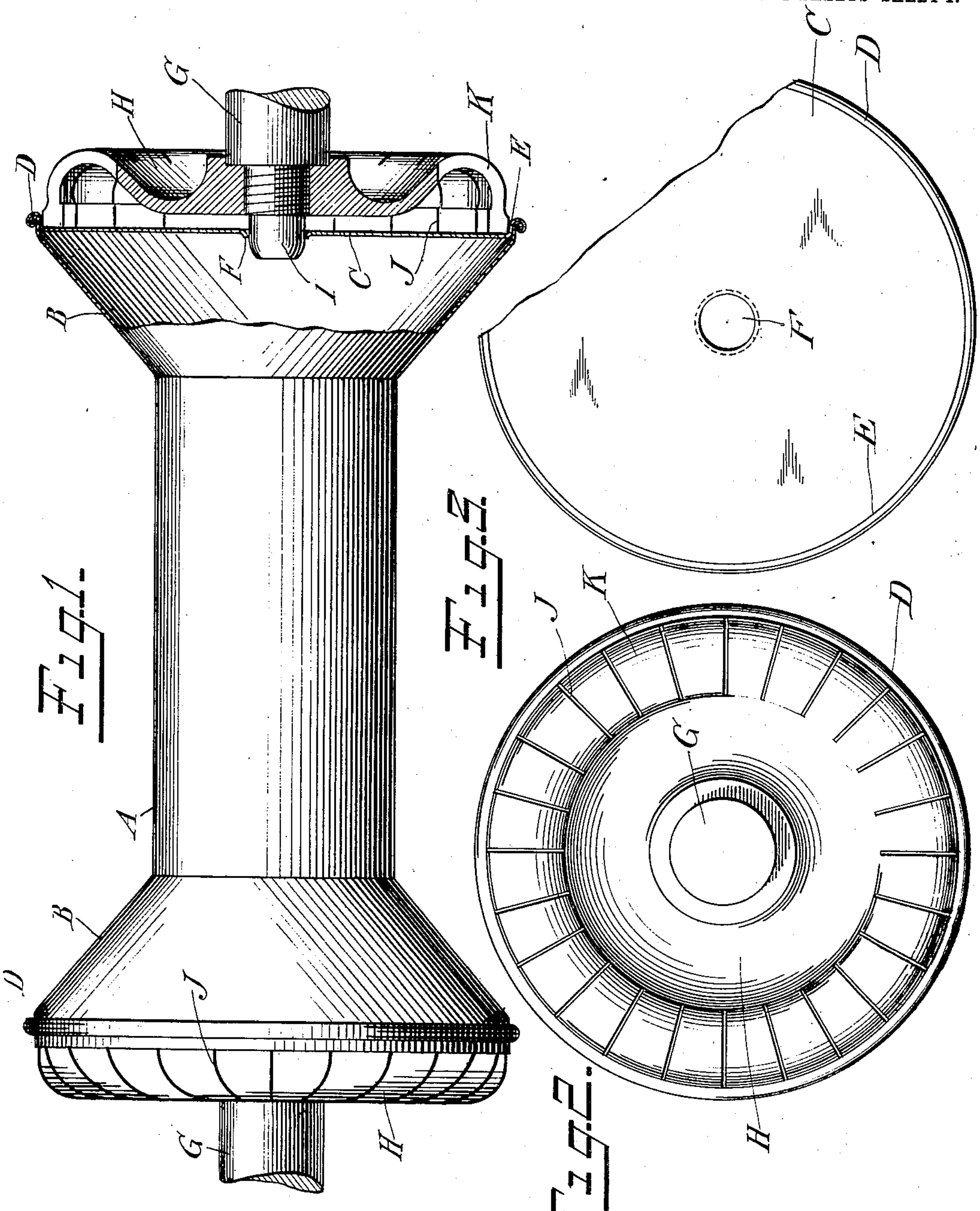
WINDING APPARATUS.

APPLICATION FILED APR. 4, 1910.

977,104.

Patented Nov. 29, 1910.

2 SHEETS—SHEET 1.



Witnesses:

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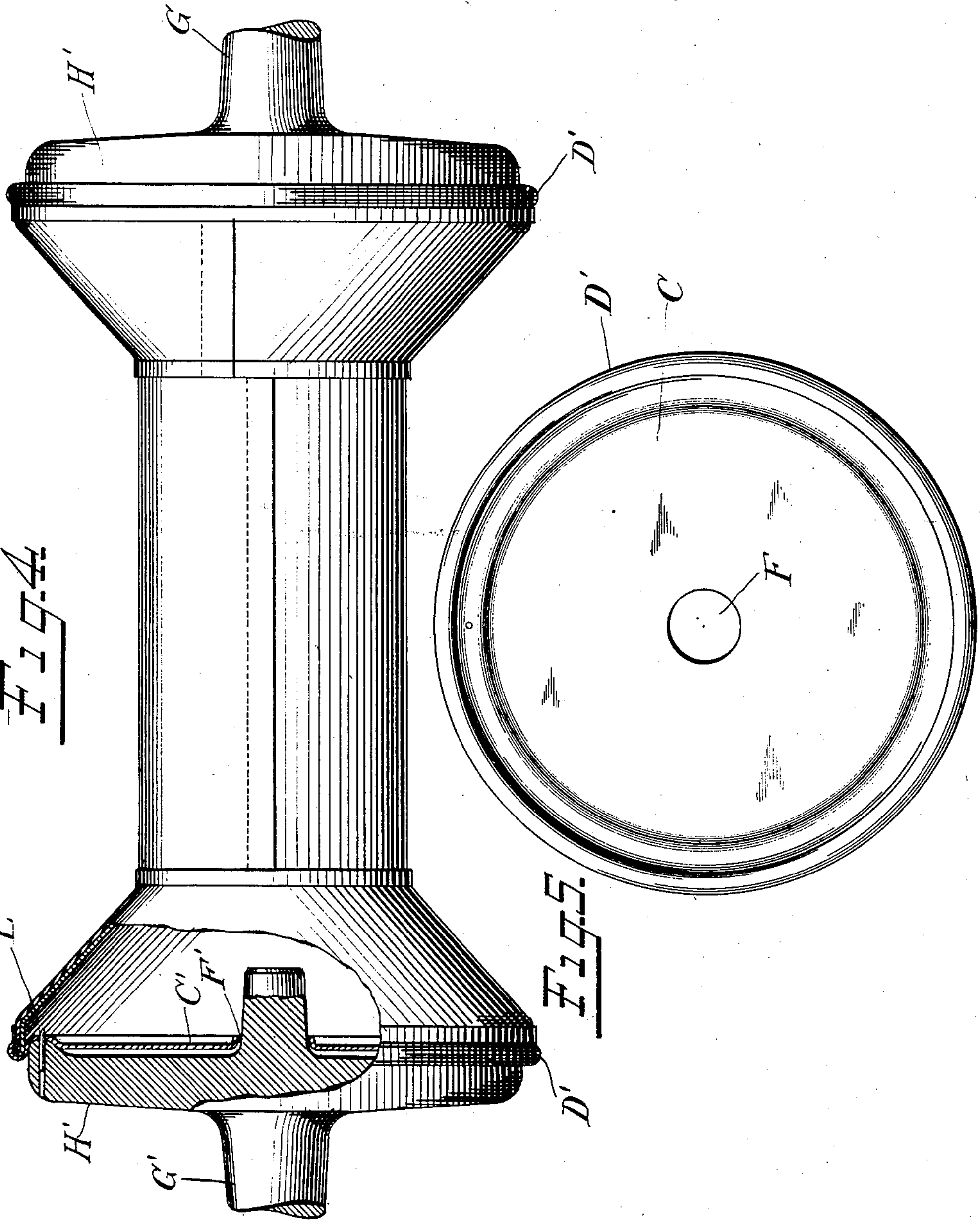

Fig. 4.

Fig. 5.

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UNITED STATES PATENT OFFICE.

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WINDING APPARATUS.

977,104. Specification of Letters Patent. Patented Nov. 29, 1910.

Application filed April 4, 1910. Serial No. 553,286.

To all whom it may concern:

Be it known that I, MEREDITH LEITCH, a citizen of the United States, residing at Springfield, county of Hampden, State of Massachusetts, have invented certain new and useful Improvements in Winding Apparatus, of which the following is a full, clear, and exact description.

My invention relates to winding apparatus, and has for its object to so secure the rotation of metallic spools about their proper axes as to permit the use of lighter stock in the spools and produce more accurate centering. The spools in connection with which my invention is embodied are made of thin metal and are in the general form of spools as commonly known, having cylindrical bodies and tapered heads, the outer ends of the heads being closed by sheet metal closures. Such spools, when the end closures are made of light material, are liable to have their holes torn or worn by the spindle if driven by ordinary spindles passing through the holes in the end closures, and the flexibility of the metal permits of a longitudinal movement or vibration of the spool due to the yielding of the thin metal heads which interferes with a correct lay of the thread as it is being wound thereon. This liability to longitudinal vibration and the danger of having the spindles ream or tear the holes so that there will be no longer a fixed engagement between the spool and spindle, is a serious matter and is eliminated by my invention. Moreover, with my invention the centering of the spool does not depend upon the accurate centering of the hole. Another advantage of my invention is that the driving engagement with the spindle is near the periphery of the spool head, so that a large friction driving surface is afforded. Another advantage of my invention is that the spool is clamped to the driving spindle by centrifugal force, so that the greater the speed the greater the frictional engagement between the spool and the driving spindle.

The following is a description of my invention, reference being had to the accompanying drawings, in which,

Figure 1 shows the spool and driving spindles partly in side elevation and partly in section; Fig. 2 shows an end view of the spool and driving spindle; Fig. 3 shows an end view of the spool alone; Fig. 4 shows a modification partly in side elevation and partly in section; Fig. 5 shows an end elevation of the spool of Fig. 4.

Referring more particularly to the drawings, A is the metallic cylindrical body portion of the spool, the same being made of sheet or drawn metal. To this cylindrical body portion are secured tapering metallic heads B—B. To the tapering portions B, end closures C are secured by lock joints D, the end closures having reëntrant recesses so as to form inner shoulders E. These joints D are formed by seaming machines, such as are used in the manufacture of tin cans and the like, and inasmuch as in the process of manufacture the body portion A is cylindrical and the portions C are concentric therewith, the seams D have both their internal and external surfaces accurately concentric with the axis of the body portion A, that is, the external surfaces of the seam D and also the shoulder E are concentric with the axis of the body portion A. I take advantage of this accurately concentric relation of the shoulder E to secure the revolution of the spool about its proper axis regardless of the holes F in the end closures. In order to do this, I provide driving spindles G having extended driving heads H, whose outer surfaces are concentric with the axis of the spindle G. Power is applied to one of the spindles G so as to drive the spool in the ordinary way. The spindles G may have projections I, which enter the holes F. These projections I, if used, should not fit the holes F closely but be loose within them since a tight fit would interfere with proper centering unless the holes F are accurately centered. The extended driving heads H should be of such size as to accurately engage the surfaces of the inner shoulder E of the joints D, as shown in Fig. 1, and also bear against the flat surface of the end closures. The engagement of the inner surfaces E with the peripheries of the heads H centers the body A, so that its axis is concentric with the spindle and so that upon the rotation of the spindle G about its axis the spool will be rotated about the proper axis of the body A. The lateral engagement of the enlarged spindle heads with the end closures of the spool near the peripheries of the heads furnishes a large driving surface, such that the frictional engagement alone is sufficient, under many conditions, to drive the spool.

In order to increase the frictional engagement between the heads H and the surfaces E, I make the spindle heads hollow or of a somewhat cup-shaped form, and mill slots J in the edges thereof so as to form a plurality of yielding arms K around their peripheries. The slots are preferably radial. After the spools have been placed in position and the spindles started, the outer ends of these arms K, which are made somewhat thicker, so as to increase their weight, are thrown out by centrifugal force so as to hug the surfaces E more tightly. Inasmuch as the arms K are of the same weight, they will be thrown out equally, and the centering of the spool will still be preserved. The greater the speed of rotation of the spindle G, the greater will be the pressure of the ends of the arms K upon the surfaces E, and the greater, therefore, will be the driving friction. Inasmuch as the heads H bear against the end closures C at their periphery, there is no pressure upon the centers of the end closures C which will tend to cause them to yield. There is, therefore, no longitudinal movement of the spool in winding which would interfere with the true lay of the thread thereon. Furthermore, inasmuch as the centering is brought about by the engagement with the surfaces E, there is no strain or stress upon the hole F in the end closure when such holes are provided.

In the modification shown in Fig. 4, some of the advantages above referred to are secured in a slightly different manner. In this form, G′—G′ are the spindles, and have affixed thereto enlarged spindle heads H′—H′, which fit within the reëntrant surfaces of the end closures C′ and thereby center the spool, irrespective of the holes F′, when such holes are used. The bearing of the spindle heads against the end closures at their peripheries prevents the spools from having any end motion by reason of the yielding of the end closures, and thereby secures a true and accurate lay of the thread upon the spool. The engagement of the spool head H′ with the peripheries of the end closures forms an extended driving surface of large diameter, and therefore provides a high degree of friction for driving purposes. The friction thus produced is sufficient under many conditions, but if desired, the spindle heads may be provided with one or more pins L, which prick the end closures C so as to form a positive connection between the end closures and the spindle heads.

The embodiment of the invention shown in Fig. 4 is shown and described in my pending application No. 466,456, filed December 5th, 1908, but is not claimed therein, the claims having been divided out of that application.

By the means above described, the advantages above referred to are secured. The spools are accurately centered independently of any central perforations in the spool heads, and longitudinal movement of the spool heads due to the yielding of the end closures, is eliminated, with the result that the end closures may be made of metal of lighter weight than would otherwise be necessary, large frictional driving surfaces are provided and, in the form shown in Fig. 1, the greater the driving speed, the greater will be the coefficient friction between the spool and the spindle.

My invention permits of various other modifications in form, as will be evident to those skilled in the art, but the forms which I have shown are the forms preferred.

What I claim is:

1. In a winding apparatus, a sheet metal spool having a cylindrical body portion and two enlarged heads, said heads having thin sheet metal closures provided with recesses having near the peripheries of said heads internal surfaces concentric with the cylindrical body portion, in combination with two driving spindles having faces engaging the bottoms of said recesses adjacent to their peripheries and having extended portions provided with external surfaces adapted to engage said internal concentric surfaces upon said heads, the external engaging surfaces of the extended portions being concentric with the axis of revolution of said spindles.

2. In a winding apparatus, a spool having a cylindrical body portion and two enlarged heads, the enlarged heads having yielding sheet metal closures, in combination with two driving spindles having enlarged portions carrying opposing faces engaging with said yielding end closures adjacent to their peripheries, and means for centering said spools relatively to the axis of said spindles.

3. In a winding apparatus, the combination of a sheet metal spool having a cylindrical body portion and two enlarged heads having thin sheet metal closures and recesses therein provided near the peripheries of said heads with internal surfaces concentric with the cylindrical body portion, with two driving spindles having extended portions carrying external surfaces engaging the internal concentric surfaces upon said heads, the external surfaces being concentric with the axis of revolution of said spindles, and having faces engaging the bottoms of said recesses adjacent to their peripheries said heads being perforated approximately at their centers and said spindles having portions entering said perforations and fitting loosely therein.

4. In a winding apparatus, a spool having a cylindrical body portion and enlarged

heads, the enlarged heads having near their peripheries internal surfaces concentric with the cylindrical body portion, in combination with driving spindles having extended portions engaging said concentric surfaces upon said heads, the engaging surfaces of the extended portions being concentric with the axis of revolution of said spindles, said extended portions having yielding arms on their outer peripheries adapted to hug said internal surfaces under the influence of centrifugal force.

5. In a winding apparatus, a spool having a cylindrical body portion and enlarged heads, the enlarged heads having near their peripheries internal surfaces concentric with the cylindrical body portion in combination with driving spindles having extended portions engaging said concentric surfaces upon said heads, the engaging surfaces of the extended portions being concentric with the axis of revolution of said spindles, said extended portions being cup-shaped and having slits formed in their outer peripheries so as to produce yielding arms adapted to hug said internal surfaces under the influence of centrifugal force.

6. In a winding apparatus, a spool having a cylindrical body portion and enlarged heads, the enlarged heads having near their peripheries internal surfaces concentric with the cylindrical body portion in combination with driving spindles having extended portions engaging said concentric surfaces upon said heads, the engaging surfaces of the extended portions being concentric with the axis of revolution of said spindles, said extended portions being cup-shaped and having slits formed in their outer peripheries so as to produce yielding arms adapted to hug said internal surfaces under the influence of centrifugal force, the outer extremities of said arms being weighted.

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Frederick K. Fearnside.