July 19, 1932. G. W. HOPKINS 1,867,743

REEL

Filed May 16, 1928

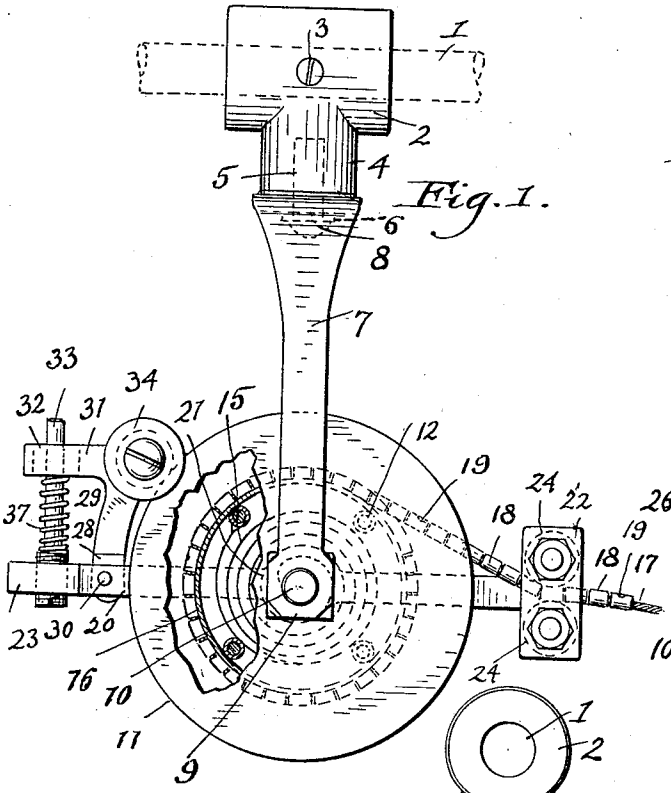


Fig. 1.

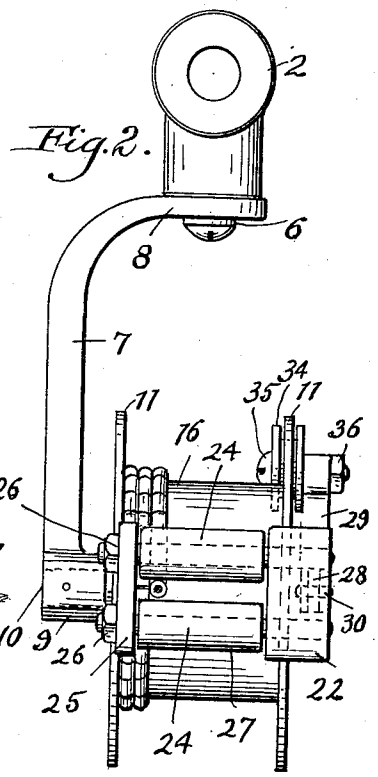


Fig. 2.

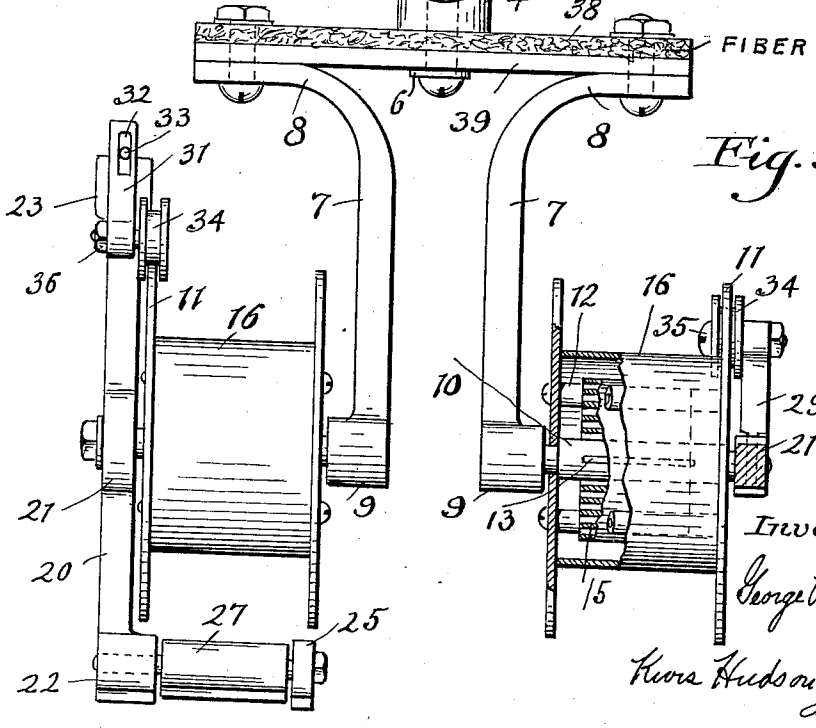


Fig. 3.

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REEL

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This invention relates to a reel and has particular utility in connection with X-ray cord reels and the wire cord used therewith, although, of course, susceptible of other uses.

In X-ray machines the current is conducted from the current supply circuit to the X-ray tube by means of a flexible conducting medium, such as a wire cord; this medium being extensibly carried by a self-acting spring reel electrically connected to the current supply circuit.

An object of the invention is to provide a reel of the self-acting spring type wherein means is employed to relieve the reel spring of sudden and undue strains and to regulate the rotative speed of the reel drum.

Another object is to provide a reel with means whereby the medium contained thereon may be wound or unwound therefrom without danger of injuring the same because of friction or bending.

Another object is to provide in combination with an improved reel a metallic cord adapted to be wound thereon and so formed that it will not be injured or twisted by the winding or unwinding operations.

Another object is to provide a reel adapted to be used with an X-ray machine which insures a maximum protection to the patient, operator, and equipment.

Additional objects and advantages will become apparent as the description proceeds.

Several embodiments of the invention are illustrated in the accompanying drawing, wherein—

Fig. 1 is a side elevation of one form, a portion of the reel drum being broken away;

Fig. 2 is an end elevation of the reel shown in Fig. 1, looking from the right hand side thereof; and

Fig. 3 is an end elevation of a modified form employing two reels with a single hanger, portions of one of the reels being broken away.

In X-ray machines, the X-ray tube is connected to the current supply circuit by means of a flexible wire cord extensibly carried by a self-acting spring reel, the current supply circuit generally comprising an overhead conducting pipe 1 on which a reel hanger 2 fits. The reel hanger 2 is electrically connected with the pipe and is held in the desired adjusted position thereon by means of a set-screw 3 arranged in the tubular pipe fitting portion of the hanger to engage the pipe. A portion 4 extends from the underside of the tubular portion and receives within a tapped opening in its underside, the bolt 5 which, together with a lock washer 6, secures the reel supporting post to the hanger.

The reel supporting post comprises a downwardly extending arm 7 connected to the hanger at its upper end by a laterally extending arm 8 while its lower end is provided with an enlarged bearing portion 9 adapted to fixedly support a transversely extending reel hub post 10. This hub post extends from the portion 9 in the same direction as the lateral arm 8 of the reel supporting post a sufficient distance to accommodate the reel and a mechanism later to be described, the intermediate portion of the hub post being larger in diameter than its opposite ends.

Two annular metal discs 11 of the same size and each provided with a central opening adapted to rotatably fit over the reduced ends of the hub post from the sides of the reel proper. These discs are held in associated position and against the shoulders formed by the opposite ends of the intermediate enlarged portion of the hub post by a plurality of annularly arranged transversely extending screws 12, each screw being carried by and secured to the discs. The screws 12 are located inwardly of the circumference of the discs and are held therein in any suitable manner, tubular metal spreaders being arranged therein, if desired. The structure thus far described presents the connected discs rotatably mounted upon the reel hub post which in turn is carried by the supporting post.

In order to provide for spring actuated rotation of the reel, the hub post has a central slot 13 (shown more clearly in Fig. 3) within which is fixed one end of a coiled strip spring 14, the convolutions of which surround the hub post while the opposite end 15 is connected to one of the transverse screws 12. It is evident that this spring will be placed

under tension when the reel is rotated in one direction and hence will act to rotate the same in the opposite direction.

In ordinary reel constructions of this type the wire cord is wound directly upon the transverse tie screws which act as cord winding posts or spindles, this practice being disadvantageous, however, because it subjects the cord to sharp bends. Therefore, it is contemplated herein to use a strip of material substantially of the width of the space between the discs and to form the same into a circular drum 16 which surrounds the transverse screws 12. In order to prevent creeping of the drum and to hold the same stationary it may be secured to some other part of the reel as, for example, in the present instance it is soldered along one edge to one of the discs 11 at the same time the end of the wire cord is being similarly secured. Of course, the transverse abutting meeting ends of the strip are suitably joined together, such joinder being also preferably by means of soldering. The use of this smooth drum encircling the screws 12 eliminates any sharp bending of the wire cord and at the same time does not materially increase the dimensions of the reel.

The wire cord which the reel is adapted to have wound thereon is indicated at 17 in Fig. 1, one end of this wire being soldered to one of the discs 11 and the drum 16, as already stated. These cords are relatively fragile and soon become frayed or kinked when used in the ordinary way with the usual form of reels, whereby the patient, operator and equipment are subjected to unnecessary hazards. It has also been the practice in some cases to use insulated wire cord, which through inadequate protection rapidly becomes frayed and unfit for use. The cord 17 used with the reel herein is not subject to such difficulties since it is covered with a durable protective material, such as metal beads, which may be formed in relatively short lengths or in longer lengths as desired. It has been found advantageous to employ for this purpose short beads 18 of copper tubing sliding freely enough on the wire cord to provide flexibility without bending or twisting the wire, but held against unnecessary or unlimited movement or slippage thereon by means of certain of the beads being fixedly connected to the wire, as for example, by upsetting a part of such beads into the wire as indicated at 19. In order to further protect the wire cord, the same is not permitted to pass through the usual rigid guide-holes as in previous reels, but is guided through or between flexible, rotating guide rollers as will later be made more apparent.

The mechanism now about to be described is employed for the purpose of guiding the wire cord, as just above mentioned, for protecting the spring, and limiting the speed of the reel. Swingably mounted upon the reduced end of the hub post 10, opposite to that upon which the hub bearing portion 9 is arranged, is a member which will be designated as the reversible cord guide and brake beam. This beam comprises a substantially rectangular metal member 20 having an enlarged bearing portion 21 (indicated in dotted lines in Fig. 1) at its center which is loosely mounted upon the end of the hub post and held against axial displacement therefrom by a nut and washer, (not numbered). The opposite ends of the beam 20 are provided with enlargements 22 and 23, respectively, the enlargement 22 extending vertically above and below the end of the beam, while the enlargement 23 extends transversely of its beam end and is provided with a centrally arranged tapped opening, for a purpose later to be described. The beam is also provided with a vertically and longitudinally extending centrally disposed slot adjacent the enlargement 23, likewise for a purpose later to be referred to.

Two pins 24, having an enlarged middle section and reduced threaded ends, are secured to the enlargement 22 by screwing one of the threaded ends of each into spaced tapped openings therein, while a tie-plate 25 is held on their opposite threaded ends by nuts 26. Tubular rollers 27 are loosely mounted upon the middle portion of the pins 24 between the enlargement 22 and the tie-plate 25, and it is between these rollers that the wire cord is adapted to pass and be guided.

A bell crank lever is pivotally secured to the beam 20 adjacent to the enlargement 23 by mounting a reduced part 28 of its arm 29 upon a pivot 30 extending transversely of the vertically and longitudinally extending centrally disposed slot in the beam. The other arm 31 of the lever extends away from the reel and is provided with a slot 32 through which an adjusting pin 33 passes, the lower end of which is enlarged and threaded so that it may be adjustably screwed into the tapped centrally disposed opening in the enlargement 23. A grooved wheel 34 is rotatably supported adjacent to the junction of the arms 29 and 31 of the bell crank lever upon a bolt 35 secured in an opening in the lever at this point by a nut 36. The grooved wheel 34 engages the circumferential edge of the disc 11 adjacent thereto, the pressure of such engagement being adjustably exerted and regulated by means of a coil spring 37 surrounding the adjusting pin 33 between the shoulder formed by the enlarged lower threaded end thereof and the underside of the arm 31 of the lever. It is thus apparent that an adjustment of the pin 33 will increase or decrease the pressure of the spring upon the arm 31 and correspondingly alter the pressure of the wheel 34 upon the edge of the disc

because of the pivotal mounting of the lever. The wheel 34 and its associated mechanism, therefore, acts as a brake for the reel to regulate the speed thereof as desired and to relieve the spring 15 against sudden and unusual strains. Of course, this action may be accomplished by different forms of regulating or braking means; however, the form just described is at present deemed to be the preferable one.

The reel being secured to the conducting pipe 1, as already described, it is clear because of the swinging mounting of the beam 20 that the wire cord may be drawn from the reel between the rollers 27 when the latter are in the position shown in Fig. 1 or in any other position on the circumference of the circle of movement of the ends of the beam.

The form shown in Fig. 3 is the same as that previously described, the difference residing in the fact that two independently operated reels are supported from the one reel hanger 2. This is accomplished by securing a strip of fiber 38 and a metal strip 39 to the underside of the portion 4 and connecting to the opposite ends of these strips right and left hand reel supporting posts 7, respectively.

Although several preferred embodiments of the invention have been illustrated and described, it should be understood that the invention is not to be limited thereto but is susceptible of such modifications and adaptations as fall within the scope of the following claims:

Having thus described my invention, what I claim is:

1. A reel comprising a supporting post, a hub carried thereby, a rotatable winding drum spring actuated in one direction arranged on said hub, and a member pivoted on said hub including means for guiding the medium wound on said drum and adjustable spring tension means for governing the spring actuated speed of the drum and constantly in effective engagement with said drum.

2. A reel comprising a supporting post, a hub carried thereby, a rotatable winding drum spring actuated in one direction arranged on said hub, and a member associated with said hub including adjustable spring tensioned means for governing the spring actuated speed of the drum and roller means for guiding the medium wound on said drum.

3. A reel comprising a supporting post, a hub carried thereby, a rotatable winding drum spring actuated in one direction arranged on said hub, and a member pivoted on said hub including a rotating element under adjustable spring tension adapted to engage against a portion of said drum to govern the spring actuated speed thereof.

4. A reel comprising a supporting post, a hub carried thereby, a rotatable winding drum spring actuated in one direction arranged on said hub, and a member associated with said hub including a rotating element under adjustable spring tension arranged adjacent one end thereof and adapted to engage against a portion of said drum to govern the spring actuated speed thereof and a roller adjacent the other end of the member over which the medium wound on said drum is guided.

5. A reel comprising a supporting post, a hub carried thereby, a rotatable winding drum spring actuated in one direction arranged on said hub, and a member pivoted on said hub including a lever pivoted adjacent one end of such member under adjustable spring tension and having a rotatable element adapted to engage a portion of the drum to govern the speed thereof, and a plurality of spaced rollers carried by said member adjacent its other end between which the medium wound in said reel is guided.

6. A reel comprising a support, a hub carried thereby, a drum rotatably arranged on said hub having annular end portions connected by a tubular portion of less diameter, said drum being spring actuated in one direction, a member pivoted on said hub on the side thereof opposite to the support, a lever pivoted adjacent one end of said member under adjustable spring tension and having a rotatable element adapted to engage the circumferential edge of one of said annular end portions of the drum to govern the speed thereof, and a plurality of spaced rollers substantially equal in length to the tubular portion of the drum extending from the opposite end of said member and parallel to the hub for guiding therebetween the medium wound on said drum.

In testimony whereof, I hereunto affix my signature.

GEORGE W. HOPKINS.