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2,412,440

PLANETARY DRIVE FOR WIRE SPOOLING DEVICES

Filed Dec. 15, 1944

2 Sheets-Sheet 1

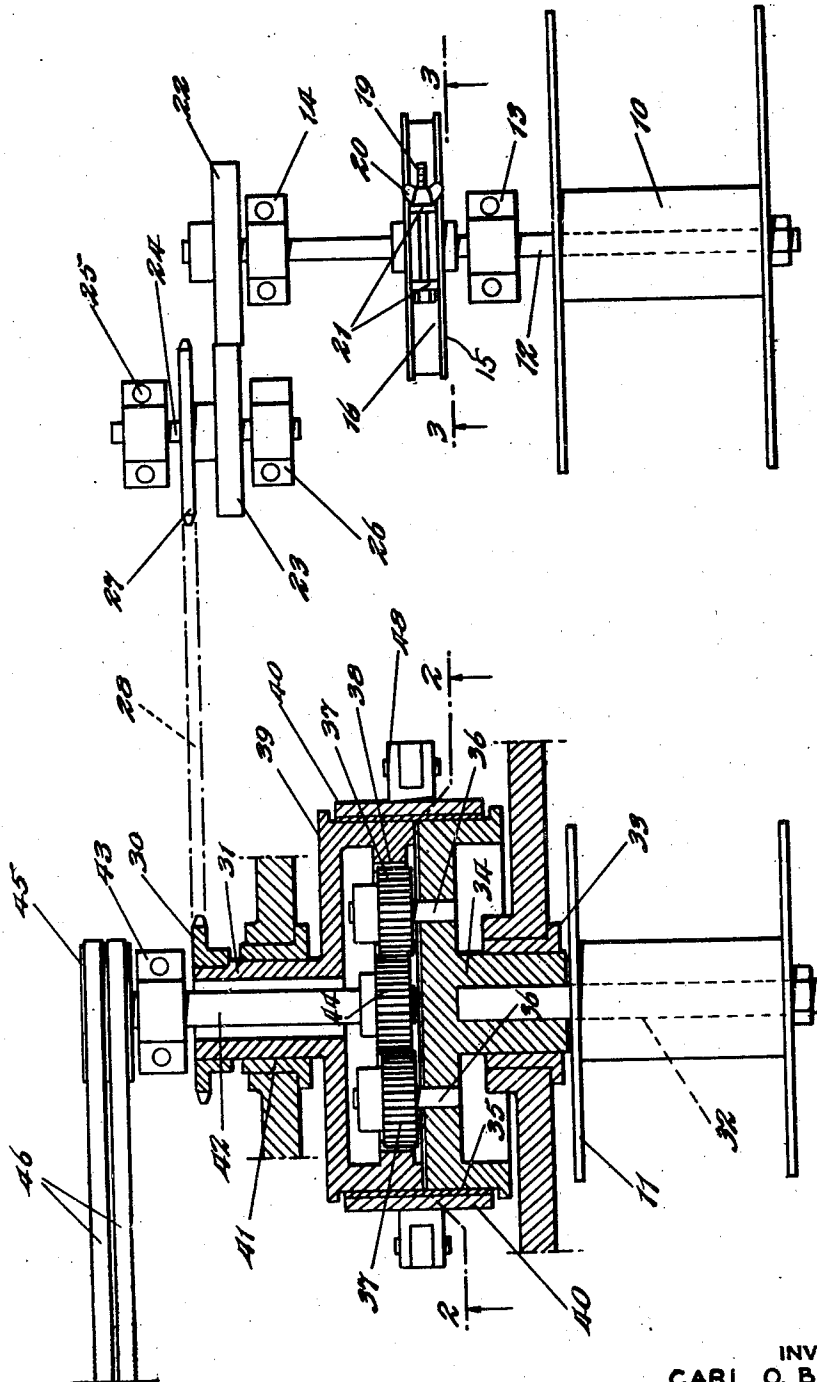


Fig 1.

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2 Sheets-Sheet 2

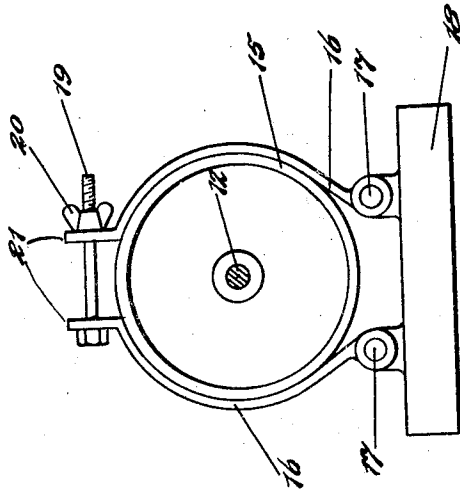


Fig. 3.

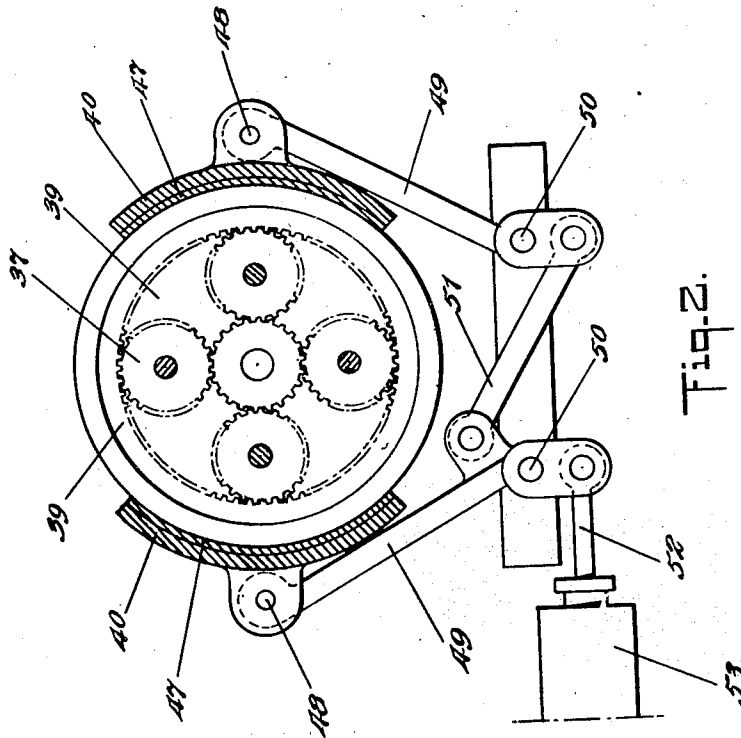


Fig. 2.

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PLANETARY DRIVE FOR WIRE SPOOLING DEVICES

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6 Claims. (Cl. 242-45)

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The present invention relates to a planetary type of drive for a wire spooling device and particularly to such a drive so arranged as to make it possible to coil the wire under a constant tension.

In the process of manufacturing both bare and insulated conductors it is customary to reel the wire on a large reel at the conclusion of the final drawing or insulating operation, as the case may be. However, the normally used shipping reel is considerably smaller and it, therefore, becomes necessary to re-spool the finished product prior to shipping.

Frequently inspection of the finished product is combined with the re-spooling operation. This complicates the re-spooling problem since it requires relatively frequent starting and stopping which brings into being problems of inertia due to the large weights involved and the relative weakness of many types of wire.

With the present invention it is possible to re-spool at high speeds from large and heavy reels even when relatively weak wire is the product undergoing re-spooling.

Furthermore, starting and stopping can be accomplished without imparting undue strain to the wire and the tension on the wire can be selected and held constant throughout the spooling process.

The invention is, furthermore, useful in connection with tinning of wire in which the wire is unreeled from a spool, passed through a tinning bath and reeled on another spool. The passage through the heated tin in the bath tends to weaken the wire and, consequently, this invention is of particular use in connection with such a process.

It is an object of the invention to provide a drive for a wire spooling device which will render it possible to re-spool at high speeds from large and heavy spools having considerable inertia.

It is another object of the invention to provide a drive for a wire spooling device arranged so that starting and stopping can be accomplished without putting strain upon the wire strand.

It is a further object of the invention to provide such a drive for a wire spooling device so arranged that a desired tension can be procured and maintained throughout the spooling process.

It is a still further object of the invention to provide a drive for a spooling device which comprises a planetary gear unit.

Further objects and features of the invention will be apparent when the following description

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is considered in connection with the appended drawings in which—

Figure 1 is a top plan view of a spooling device showing the application of the planetary drive of this invention thereto, the drive unit itself being in section;

Figure 2 is a vertical cross-section taken on the plane of the line 2—2 of Figure 1; and

Figure 3 is a vertical cross-section taken on the line 3—3 of Figure 1 and showing particularly the mode for applying a constant basic tension to the pay-off reel and through it to the wire being re-spooled.

Referring now to the drawings and particularly to Figure 1, there is shown at 10 a large reel from which the wire is payed off and fed to the smaller take-up spool or reel 11. The reel 10 is fixed to shaft 12 for rotation therewith, the shaft being supported in the bearings 13 and 14. Also affixed to the shaft 12 for rotation therewith is a drum 15 with which the brake bands 16 cooperate. These bands are pivoted at points 17 to a fixed support 18 and the amount of braking effected may be adjusted by means of the screw 19 and wing nut 20. The screw 19 passes through the ears 21 on the brake bands 16 and this serves to make the adjustment mentioned possible, the operation being obvious.

Likewise fixed to the shaft 12 is a gear 22 which meshes with a similar gear 23 fixed to shaft 24 which shaft is supported in the bearings 25 and 26. Fastened on shaft 24 for rotation therewith is a sprocket wheel 27 which is driven by any suitable means as, for example, the chain 28 from sprocket wheel 30 mounted on sleeve or hub 31 hereinafter described.

The take-up reel 11 is mounted on a shaft 32 which shaft is supported in the bearings 33 and carries a spider 34 at the end opposite the take-up reel 11. The spider 34 has a drum-like outer surface as indicated at 35, as will be hereafter described, and is in addition provided with four stub shafts 36 each one of which carries a planet gear 37. Surrounding the planet gears 37 is an annular gear 38 which gear is integral with the drum 39 which drum is in alignment with the drum 35 so that brake shoes 40 cooperate with both drums.

The drum 39 and integral annular or ring gear 38 are provided with a sleeve or hub 31 which is supported in the bearings 41 and to which the sprocket wheel 30 is fixed as above described.

A shaft 42 extends through the sleeve 31 and is supported by a bearing 43. This shaft carries at its lower end, as seen in Figure 1, the sun

gear 44 of the planetary drive. As is customary, this sun gear meshes with each of the planet gears 37. On its opposite end the shaft 42 carries a pulley 45 which is driven by the belts 46. This showing is, of course, merely conventional and any other form of drive from the power source may be employed.

The two aligned drum surfaces 35 and 39 are adapted to cooperate with the brake shoes 40 which shoes are lined as is customary with the brake lining 47 and are pivotally mounted at 48 to the levers 49. Levers 49 are in turn pivoted to a fixed portion of the mechanism at points 50 and the two levers 49 are connected for simultaneous movement by the link 51. The lower arm of the lefthand lever 49 is connected by means of the piston rod 52 to the brake actuator 53.

By reference to the drawings, it will be seen that any movement of the sun gear 44 will cause rotation of the cooperating planet gears 37 and that the parts mentioned together with the spider 34 and the ring gear 38 comprise a planetary transmission or differential. As is usual in such cases, if the spider 34 should be held stationary, the ring gear 38 would rotate in one direction at a speed depending upon the gear reduction effected through the sun, planet and ring gears. However, if the ring gear should be held, the spider 34 would then rotate in the opposite direction. Thus any tendency to hold one of the members 34 or 38 causes an increase in speed of the other member.

Since the present arrangement provides the reversing gears 22 and 23, it will be clear that the take-up reel which is driven by the spider 34 and the pay-off reel which is driven by the sleeve 31 tend to rotate in the same direction. The tension in the wire may be adjusted by means of the brake bands 16, as previously described, and is, of course, adjusted in accordance with the strength of the wire which is to be re-spooled.

It will be clear that if, for any reason, the tension on the wire extending between the spools 10 and 11 increases, this will act as a brake upon the spool 11 and the spider 34. Consequently, the annular gear 38 will increase its speed and in so doing will increase the speed of rotation of the reel 10 thereby paying off the wire more rapidly and lessening the tension so that the pay-off and take-up reels will again rotate at the same linear speed.

Of course, if the tension lessens, the braking effect upon the reel 11 will diminish and, as a consequence, it will tend to operate more rapidly resulting in a decrease in speed of the annular gear 38 and the reel 10 driven thereby thus bringing the tension back to the initial tension as determined by the adjustment of bands 16 on drum 15.

Moreover, as the wire is payed off of the reel 10 the radius is lessened constantly and, of course, the winding radius of the wire on the reel 11 is constantly increased. The drive above described maintains the tension constant both when the reels are full and when they are substantially empty and thus achieves the chief aim of the invention.

When it is desired to stop the mechanism the brake actuator 53 is operated causing the brake shoes 47 to bear against the aligned surfaces of the brake drum 39 and the brake drum 35 of the spider 34. This results in braking both the spider member 34 and the annular gear 38 simultaneously thereby bringing the pay-off reel 10 and

the take-up reel 11 to a stop at the same rate of deceleration since, of course, the tension effects of the wire are present during the braking operation as well as during running conditions.

While I have described a preferred embodiment of my invention many other forms and modifications are possible and, therefore, I do not desire to be limited to the description given herein solely for the purposes of illustration but rather to be limited only by the scope of the appended claims.

What is claimed is:

1. In a wire spooling device, in combination a pay-off reel, a take-up reel to which the wire is directly fed from said pay-off reel, a common driving means for said reels and a planetary transmission interposed between said common driving means and each of said reels to insure the maintenance of a constant tension upon the wire being unwound from said pay-off reel and wound upon said take-up reel, the pull of the wire upon said reels serving to determine the relative speeds thereof.

2. In a wire spooling device, in combination a pay-off reel, a take-up reel, a common driving means for said reels, a planetary transmission interposed between said common driving means and each of said reels to insure the maintenance of a constant tension upon the wire being unwound from said pay-off reel and wound upon said take-up reel, and adjustable means for applying a tension to said pay-off reel, to thereby adjust the tension upon the wire to a desired value for the particular wire.

3. In a wire spooling device, in combination a pay-off reel, a take-up reel, a planetary transmission comprising a sun gear, a plurality of planet gears engaged with said sun gear, and an annular gear cooperating with said planet gears, drive means for said sun gear, a spider on which said planet gears are mounted, said spider being fixed to said take-up reel for rotation therewith, means fixed to said annular gear for rotation therewith for driving said pay-off reel in the same direction as said take-up reel, and means associated with said pay-off reel for applying a braking effect to said reel.

4. In a wire spooling device, in combination a pay-off reel, a take-up reel, said pay-off reel and take-up reel being in alignment, whereby wire may be uncoiled from said pay-off reel and wound upon said take-up reel, common driving means for said pay-off and take-up reels, a differential drive connecting said driving means to said reels, means for applying a constant braking effect to said pay-off reel, and means associated with said differential mechanism for applying equal braking effects to both said reels simultaneously.

5. In a wire spooling device, in combination a pay-off reel, a take-up reel, a planetary transmission comprising a sun gear, a plurality of planet gears engaged with said sun gear, and an annular gear cooperating with said planet gears, drive means for said sun gear, a spider on which said planet gears are mounted, said spider being fixed to said take-up reel for rotation therewith, means fixed to said annular gear for rotation therewith for driving said pay-off reel in the same direction as said take-up reel, means associated with said pay-off reel for applying a braking effect to said reel, a brake drum integral with said spider, a second brake drum integral with said annular gear, said brake drums being in alignment, and braking means common to

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said two brake drums and operable to apply equal braking effects to said pay-off and take-up reels simultaneously.

6. In a wire spooling device, in combination a pay-off reel, a take-up reel, a planetary transmission comprising a sun gear, a plurality of planet gears engaged with said sun gear, and an annular gear cooperating with said planet gears, drive means for said sun gear, a spider on which said planet gears are mounted, said spider being fixed to said take-up reel for rotation therewith, means fixed to said annular gear for rotation therewith, a reversing mechanism asso-

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ciated with said last mentioned means for driving said pay-off reel in a direction the reverse of the movement of said annular gear, means associated with said pay-off reel for applying a braking effect to said reel, a brake drum integral with said spider, a second brake drum integral with said annular gear, said brake drums being in alignment, and braking means common to said two brake drums and operable to apply equal braking effects to said pay-off and take-up reels simultaneously.

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