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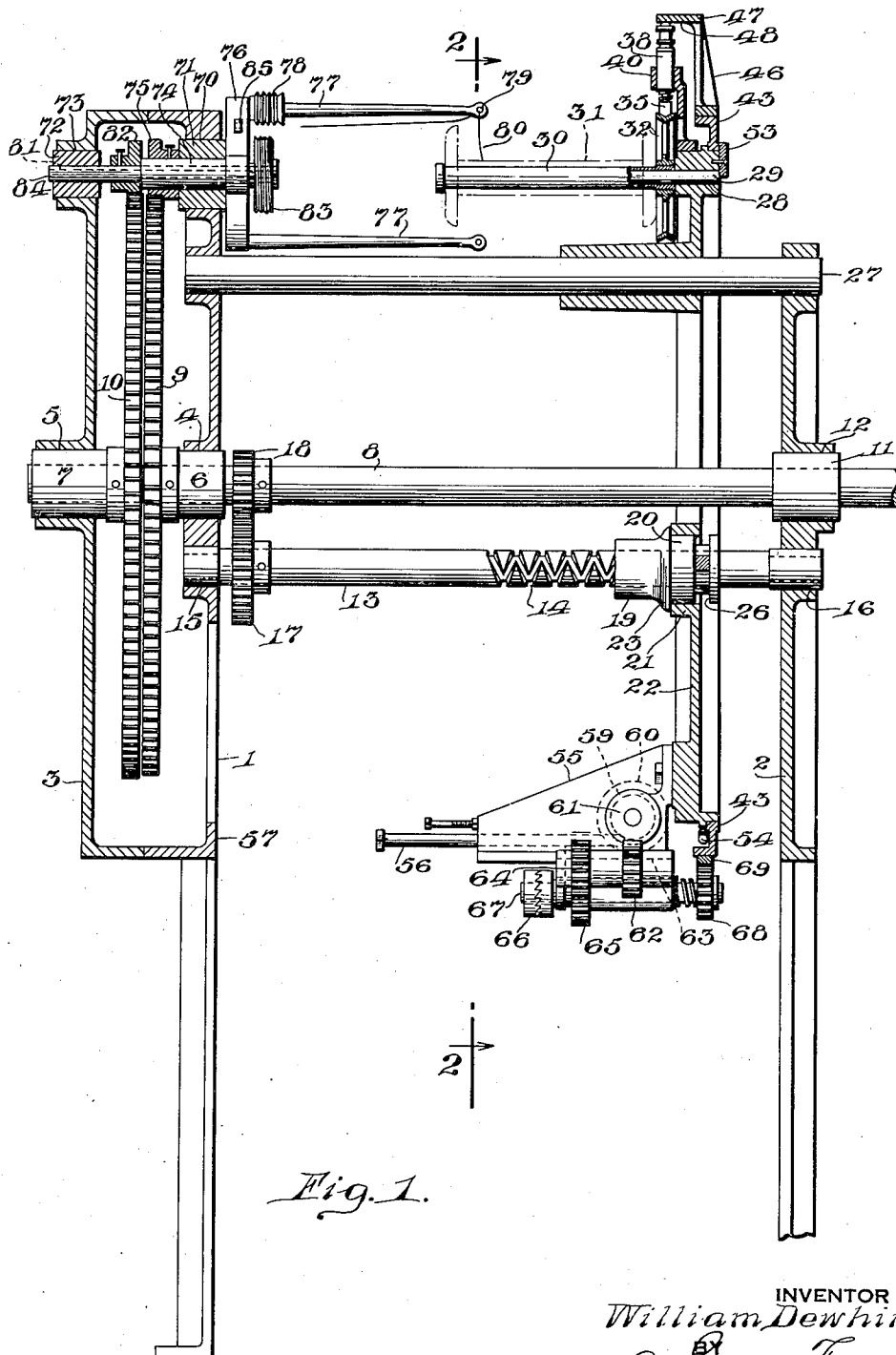
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AUTOMATIC FRICTION REGULATOR FOR TUBING TWISTERS

Filed Nov. 15, 1935

4 Sheets-Sheet 1



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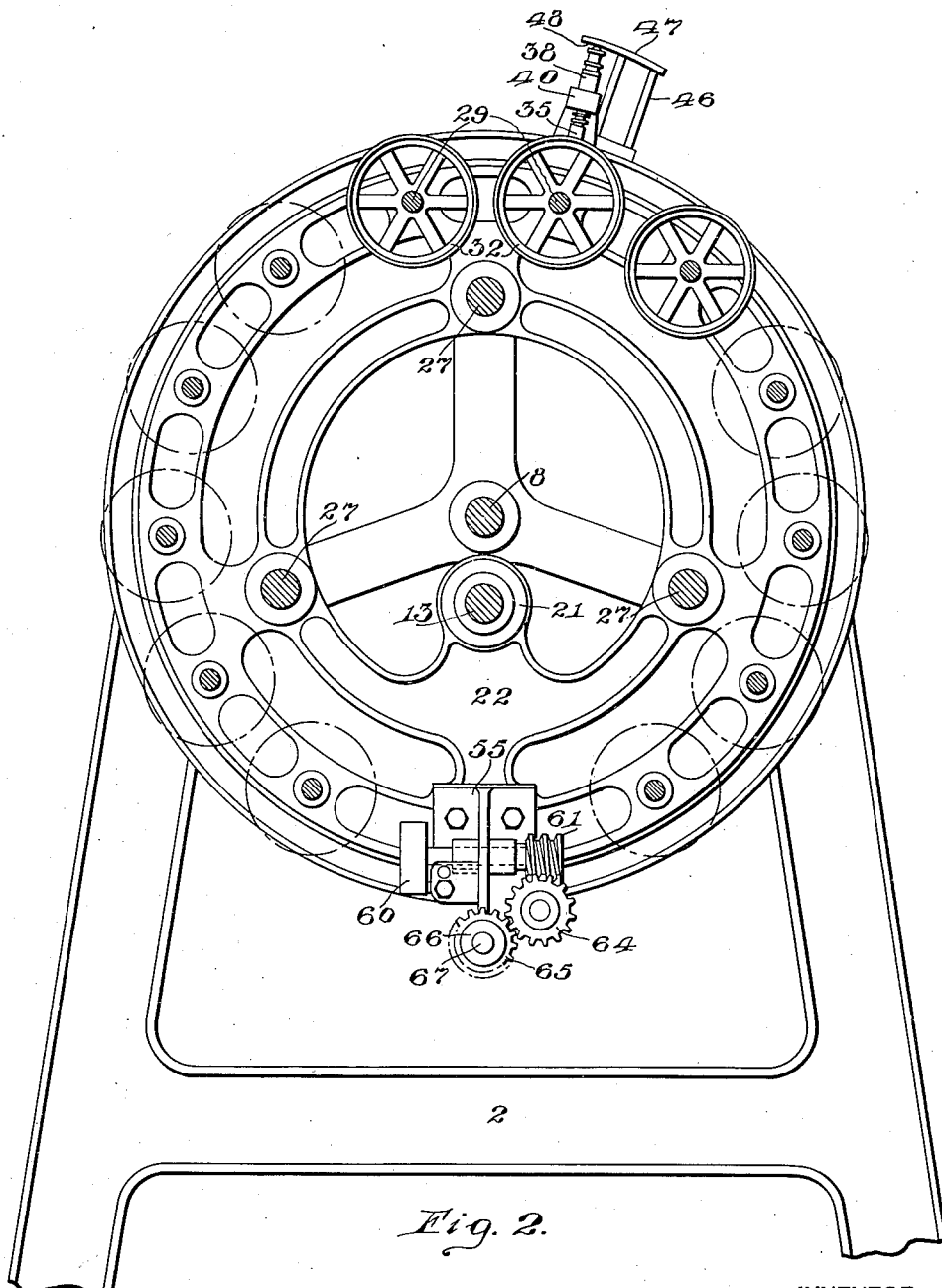
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AUTOMATIC FRICTION REGULATOR FOR TUBING TWISTERS

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4 Sheets-Sheet 2



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AUTOMATIC FRICTION REGULATOR FOR TUBING TWISTERS

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4 Sheets-Sheet 3

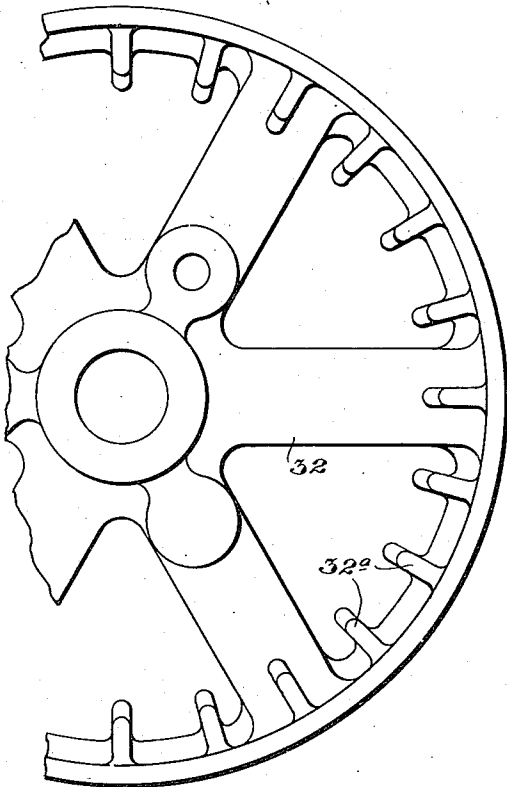


Fig. 4.

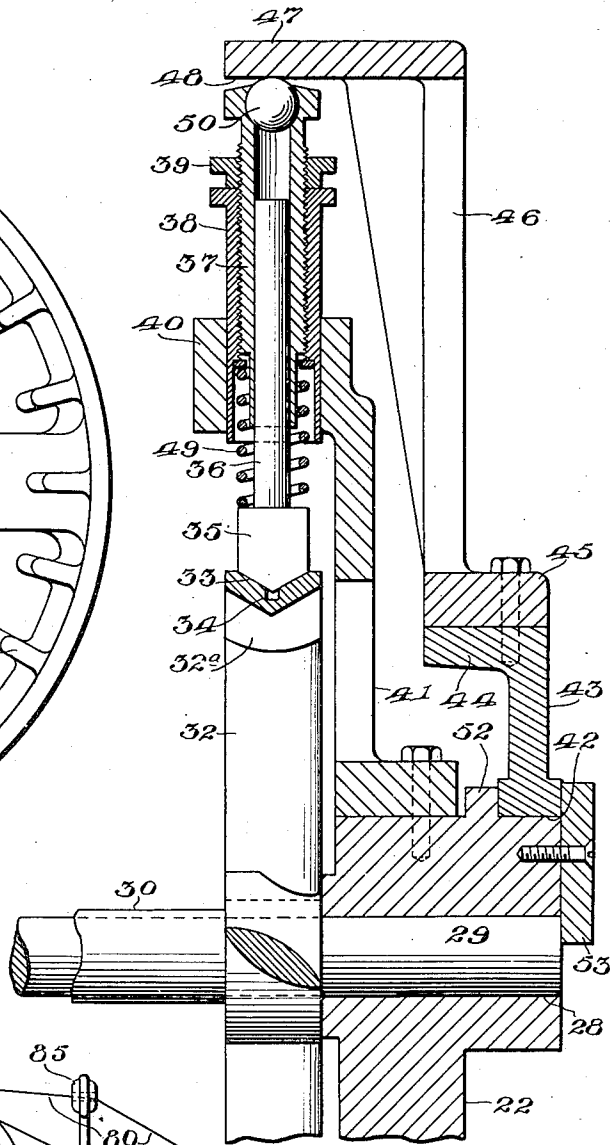


Fig. 5.

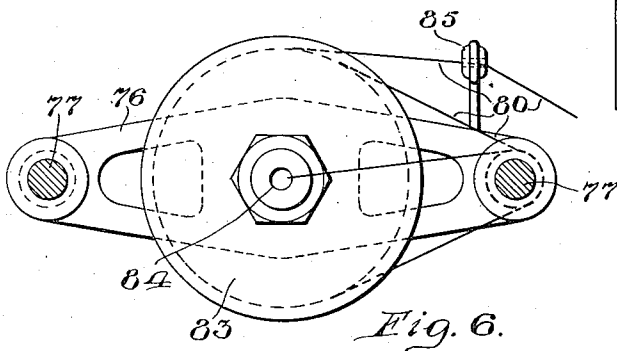


Fig. 6.

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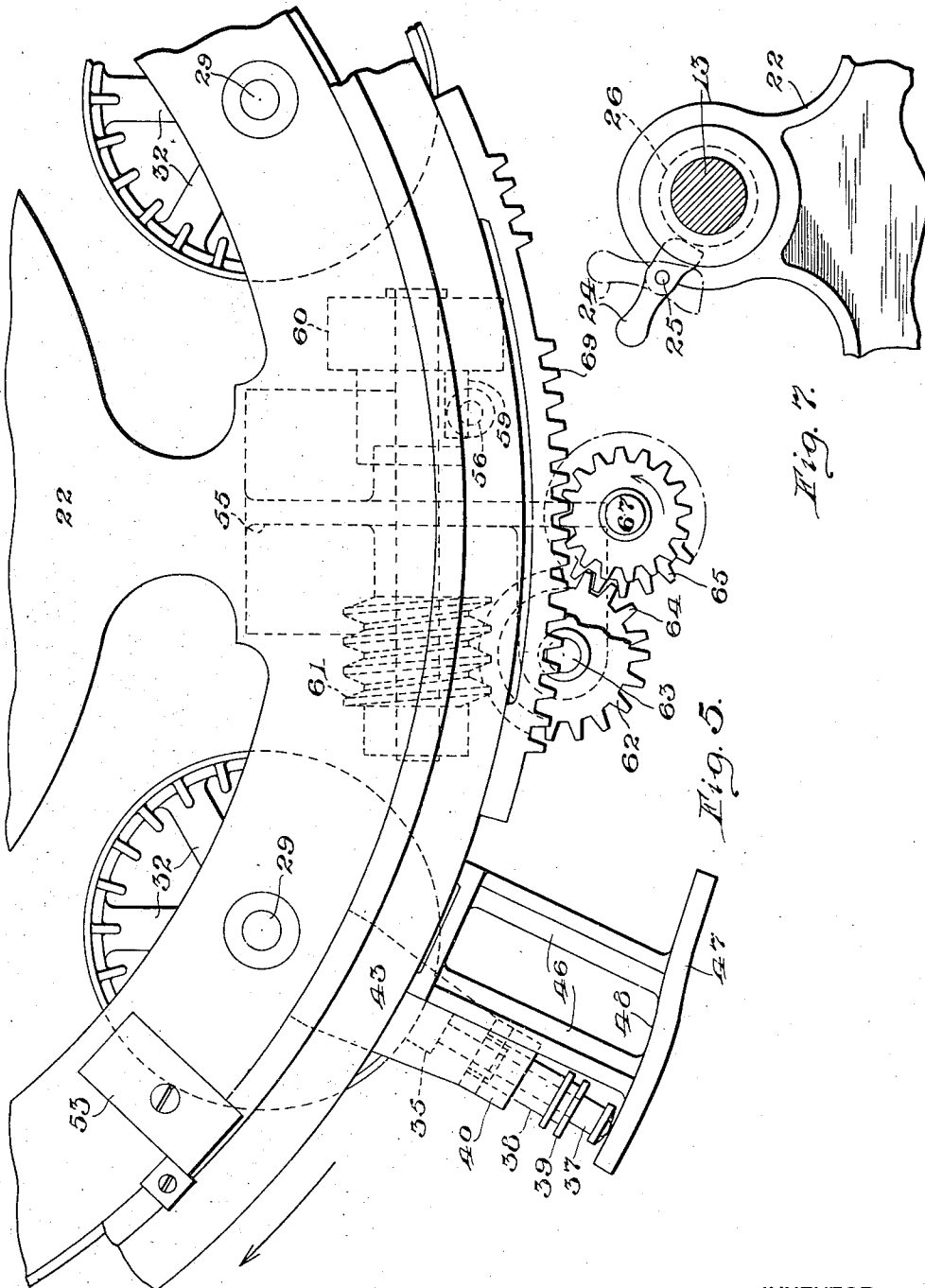
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AUTOMATIC FRICTION REGULATOR FOR TUBING TWISTERS

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4 Sheets-Sheet 4



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AUTOMATIC FRICTION REGULATOR FOR
TUBING TWISTERS

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5 Claims. (Cl. 117—27)

The object of the invention is to provide an improved friction regulator for tubing and other twist-ers, and particularly in the means for making such regulator fully automatic.

5 In winding bobbins in such a twister, only enough tension is placed upon the threads at the start to hold the bobbins back and permit the flyer mechanism to effect the desired winding. Thereafter, this counter tension is gradually in-
10 creased upon and in proportion to the increase in the diameter of the successive layers of thread as they are wound upon the respective bobbins.

Heretofore, this increase in tension has been manually and therefore more or less irregularly
15 applied, so that another object of the invention is to produce a mechanism for automatically effecting the desired result, making it possible for one attendant to efficiently care for a number of twist-ers.

20 Still another object is, more specifically, to cause the increase in tension to be effected in accordance with the traverse of the thread winding mechanism, and as the direct result of the reciprocatory movement of the bobbin support,
25 thru the medium of a separate mechanism which consists in suitably related rack, pinion, gears, clutch, and cam-regulated friction means.

With the objects of the invention thus broadly stated, the invention comprises further details
30 of construction and operation, which are hereinafter fully brought out in conjunction with the accompanying drawings, in which

Fig. 1 is a vertical, longitudinal sectional view of a twister comprising one embodiment of the
35 invention;

Fig. 2 is a vertical transverse section on the line 2—2 of Fig. 1;

Fig. 3 is an enlarged axial sectional view of one of the friction regulating units of the im-
40 proved twister;

Fig. 4 is a fragmentary elevational view of one of the friction wheels;

Fig. 5 is an enlarged fragmentary elevational view of the friction-increasing mechanisms of the improved twister;

Fig. 6 is an enlarged fragmentary section showing the thread-feeding or capstan mechanism; and

Fig. 7 is an enlarged fragmentary elevational
50 view of the case-securing latch mechanism.

Referring to the drawings, the embodiment of the invention here shown comprises primarily a pair of upstanding frame members 1 and 2, the former of which is provided with a detachably
55 mounted casing 3, which with the adjacent frame

member comprises a housing, the opposite walls of which are provided with aligned bearings 4 and 5, in which are positioned the respective bushings 6 and 7, surrounding a driving shaft 8, and being secured respectively to relatively large
5 gear wheels 9 and 10, the diameters of which differ very slightly, as shown in Fig. 1, for a purpose hereinafter described. The shaft 8 also extends thru a bushing 11, which is journaled in an aperture 12 in the frame member 2, said shaft
10 being provided with any desired form of power transmitting means, such as a belt, pulley, screw or equivalent member (not shown).

A countershaft 13 provided with traverse screws 14 is also journaled at its opposite ends
15 in bearings 15 and 16, carried by the respective frame members 1 and 2, said countershaft carrying a gear 17 which meshes with a substantially smaller gear 18, carried by the driving shaft 3, whereby said countershaft at all times rotates in
20 predetermined relationship with said driving or main shaft. Said countershaft is furthermore provided with a case nut or bushing 19, having a pin or other projection engaging within the threads of the traverse screw 14, and provided
25 with a cylindrical surface 20, which is normally surrounded by the centrally apertured hub portion 21 of a so-called case 22, said case being normally secured longitudinally upon said nut or bushing and against the peripheral flange 23 by
30 means of a latch 24, which is pivotally mounted at 25 upon said case adjacent to its said central aperture, and so as to permit its shorter arm to enter the circumferential groove 26 in said nut or bushing.

In order to remove said case from this nut or bushing, said latch is oscillated into its dot-and-dash position, indicated in Fig. 7, whereupon said case can be radially shifted axially for a purpose hereinafter described. The case 22 is not
40 supported by the auxiliary shaft 13, but is slidably carried instead by a plurality of parallel rods 27, having their opposite ends secured in the frame members 1 and 2, between which said rods extend, and thus permitting a reciproca-
45 tory movement of said case under the control of the traverse screw 14.

The case 22 is provided peripherally with any desired number of equally spaced apertures 28, in which are secured an equal number of bobbin
50 spindles or studs 29, only one of which is shown in detail in Figs. 1 and 3, wherefore this spindle or stud will be described and claimed in the singular number together with its associated mechanism, altho it is to be understood that it is
55

2 duplicated and multiplied throughout the periphery of the supporting case. Said stud 29 carries a rotatable sleeve 30, upon which is detachably mounted a bobbin 31, said sleeve being provided adjacent to said case with a friction wheel 32, the peripheral friction surface 33 of which is preferably of substantial V-shape, and may be if desired provided with a central radially inwardly extending groove 34, said wheel being provided about its periphery with radially inwardly extending fins or vanes 32^a, which perform the double function of radiating and dissipating the heat generated at the surface 33 of said wheel in contact with the shoe 35, and also operating to increase the circulation of air thru said wheel, in order to thereby augment the dispersion of said friction-produced heat from such wheel.

A brake shoe 35 of suitable material and shape normally engages the friction surface 33, and is carried upon the radially inner end of a reciprocating rod 36, which is slidably positioned within an externally threaded tubular member 37, in turn adjustably positioned within and in threaded engagement with a surrounding cylindrical member 38, the relative positions of said cylindrical members being fixedly maintained in predetermined adjustable position by means of a lock nut 39, and said members as a unit being slidable within the bored head 40 of a bracket 41, which is secured to the radially outer portion of the case 22.

Said case is also provided with a cylindrical surface 42, upon which is slidably mounted a ring 43 of substantially L-shaped cross section, in order to provide a flange 44 having a radially outwardly directed cylindrical surface, to which are secured at spaced intervals the base portions 45 of radially outwardly extending brackets 46, each of which is provided upon its free end portion with an angularly directed overhanging extension 47, the radially inner surface 48 of which comprises a cam surface, against which the brake shoe supporting unit hereinbefore described is normally thrust by means of a coil spring 49, but thru the medium of suitable anti-friction means 50 (shown in Fig. 3). The ring 43 is normally positioned against an annular flange 52, with which the radially upper portion of the case 22 is provided, and is secured in that position but in slidable engagement with said case by means of spaced clamping blocks 53, said ring and its cam-carrying brackets being yieldingly maintained in an initial and relatively inoperative position by means of a suitable spring 54, and gradually shifted from said initial position by means of the mechanism hereinbefore described.

This shifting mechanism is carried by a bracket 55, which is preferably secured to the lowermost portion of the case 22, and comprises a reciprocating bar 56, which is maintained in extended position (Fig. 1) by any suitable means, and is so positioned as to cooperate with and impinge the opposed portion 57 of the frame member 1, as the traverse screw 14 propels the case 22 in a left-hand direction, as viewed in Fig. 1, said bar being held in line contact with a hardened pin 59 upon an infinitely variable clutch nut 60, by means of a spring on the outer race of the clutch, said clutch operating to impart rotation to the worm 61, and thereby gradually but intermittently imparting rotation to the worm gear 62, mounted upon the same countershaft 63 with a pinion 64, which in turn meshes with a gear 65, in turn connected thru a clutch 66 with a shaft 67, upon

which is also carried a gear 68, in mesh with the rack teeth 69 carried by the ring 43.

For each bobbin-carrying spindle there is an individual winding mechanism constructed as follows:—

The frame member 1 is provided about the axis of the driving shaft 8 with a plurality of apertures 70, in each of which is positioned a bearing 71 in alignment with a second bearing 72, positioned in an aperture 73 in the outer wall surface of the casing 3. Rotatably positioned in the bearing 71 is a tubular shaft 74, upon the inner end of which is secured a pinion 75 meshing with the gear 9, while upon the opposite end of said tubular shaft is carried the flier head 76, the oppositely directed arms of which rotatably support the respective flier arms 77 carrying the idler capstans 78, each flier arm being provided at its free end with an aperture 79, which guides the thread 90 as it progresses thru each subsequent traverse or layer about the bobbin 31.

Journalled in the bearing 72 is a rotatable countershaft 81, provided with a pinion 82 which is in mesh with the gear 10, said countershaft extending rotatably thru the tubular shaft 74, and also thru the flier head 76, and carrying upon its opposite or outer end the main capstan 83. With this construction, it is to be understood that only one of the flier arms is employed at a time, the two flier arms being employed alternatively for left-hand and right-hand twisting, respectively, and when not in use the idle flier arm operating as a counter-balance for the flier arm in service. The strand to be wound upon the bobbin may comprise any desired number of threads, the number frequently ranging from 30 to 60 threads for each such strand. These multiple threads enter thru the axial bore 84 in the countershaft 81, and emerge at the other end adjacent to the capstan 83, whence they are wound alternately about the grooves of one of the idler capstans 78 and main capstan 83, and finally pass thru the eye of a suitable guide 85 carried by the flier head 76, thence passing along the adjacent flier arm and thru the aperture 79 in the latter, and thence towards the bobbin 31 upon the spindle sleeve 30.

In the operation of this device, it is well known that the bobbin spindle must rotate, but that if unrestricted the bobbin will rotate at substantially the same speed as that of the flier arms, and fail to accomplish any winding at all. Therefore, in order to accomplish a winding of the strand of threads upon the bobbin, the rotation of the latter must be slower than that of the flier arms, and as the diameter of the layers of the strand upon the bobbin increases, progressively outwardly, obviously more restraint by means of friction must be placed upon the rotation of said bobbin, in order to maintain the proper speed differential. Heretofore, the increase in friction has been manually adjusted with consequent irregularity of increase, and resultant completion of the winding upon certain bobbins in such a machine ahead of the other bobbins being wound, and a tendency towards less uniformity or tighter winding of certain bobbins than others.

By contrast, the present machine increases the friction applied to the wheels 32 both regularly and uniformly, and at the instant that the strands being wound pass from one traverse or layer to the next. This is accomplished by the reciprocation of the case 22 under impulsion by the traverse screw 14, operating thru the bar 56 and associated mechanism, to advance the cams 46 simul-

taneously and in equal steps, thereby maintaining at all times a definite predetermined differential between the speeds of the flier arms and the respective bobbins. Finally, after the bobbins have been wound as much as desired, the latch 24 is released, the case 22 is shifted free from the bushing 19, the shaft 67 engages the frame member 2 and momentarily releases the clutch 66, thereby permitting the spring 54 to return the cam-carrying ring 43 to its initial position upon said case, after which the winding of a second set of empty bobbins may be commenced, following the locking of the case upon the bushing 19 by means of the latch 24.

15 Having thus described my invention what I claim as new and desire to secure by Letters Patent is:—

1. In a tubing twister, the combination of a rotatable bobbin support, a friction wheel rotatable therewith, a case carrying said support, means to reciprocate said case, a friction element in slidable engagement with said wheel, a cam cooperatively connected to said element to vary the friction between said element and said wheel, and means automatically actuated by and in accordance with the reciprocation of said case, to shift said cam and increase the frictional engagement of said element with said wheel, as the diameter of layers of thread upon a bobbin carried by said support increases.

2. In a tubing twister, the combination of a rotatable bobbin support, a friction wheel rotatable therewith, a case carrying said support, means to reciprocate said case, a friction element in slidable engagement with said wheel, a pressure-applying member for said element, a spring between said member and said element, a cam in slidable engagement with said member, and means automatically actuated by and in accordance with the reciprocation of said case, to shift said cam and increase the frictional engagement of said element with said wheel, as

the diameter of layers of thread upon a bobbin carried by said support increases.

3. In a tubing twister, the combination of a reciprocatory case, a rotatable bobbin support carried by said case, an auxiliary ring carried by said case and axially movable with respect thereto, friction means to vary the freedom of rotation of said bobbin support, a cam carried by said ring and operative to vary the friction exerted by said last-named means, and means to automatically shift said ring upon and in accordance with the traverse of said case.

4. In a tubing twister, the combination of a reciprocatory case, a rotatable bobbin support carried by said case, an auxiliary ring carried by said case and axially movable with respect thereto, friction means to vary the freedom of rotation of said bobbin support, a cam carried by said ring and operative to vary the friction exerted by said last-named means, means to automatically shift said ring upon and in accordance with the traverse of said case, a clutch operative to release said ring with respect to said case, and a spring to automatically return said ring when released to its initial position upon said case.

5. In a tubing twister, the combination of a reciprocatory case, a rotatable bobbin support carried by said case, an auxiliary ring carried by said case and axially movable with respect thereto, friction means to vary the freedom of rotation of said bobbin support, a cam carried by said ring and operative to vary the friction exerted by said last-named means, a worm-and-gear mechanism to shift said ring upon said case, actuating means for said mechanism adapted to cooperate intermittently with a relatively fixed portion of the twister, and operative to automatically actuate said mechanism in accordance with the traverse of said case, to shift said cam as the diameter of the layers of thread wound upon said bobbin increases.

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