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C. F. VAN HOOK

GEARING FOR TWISTING MACHINES

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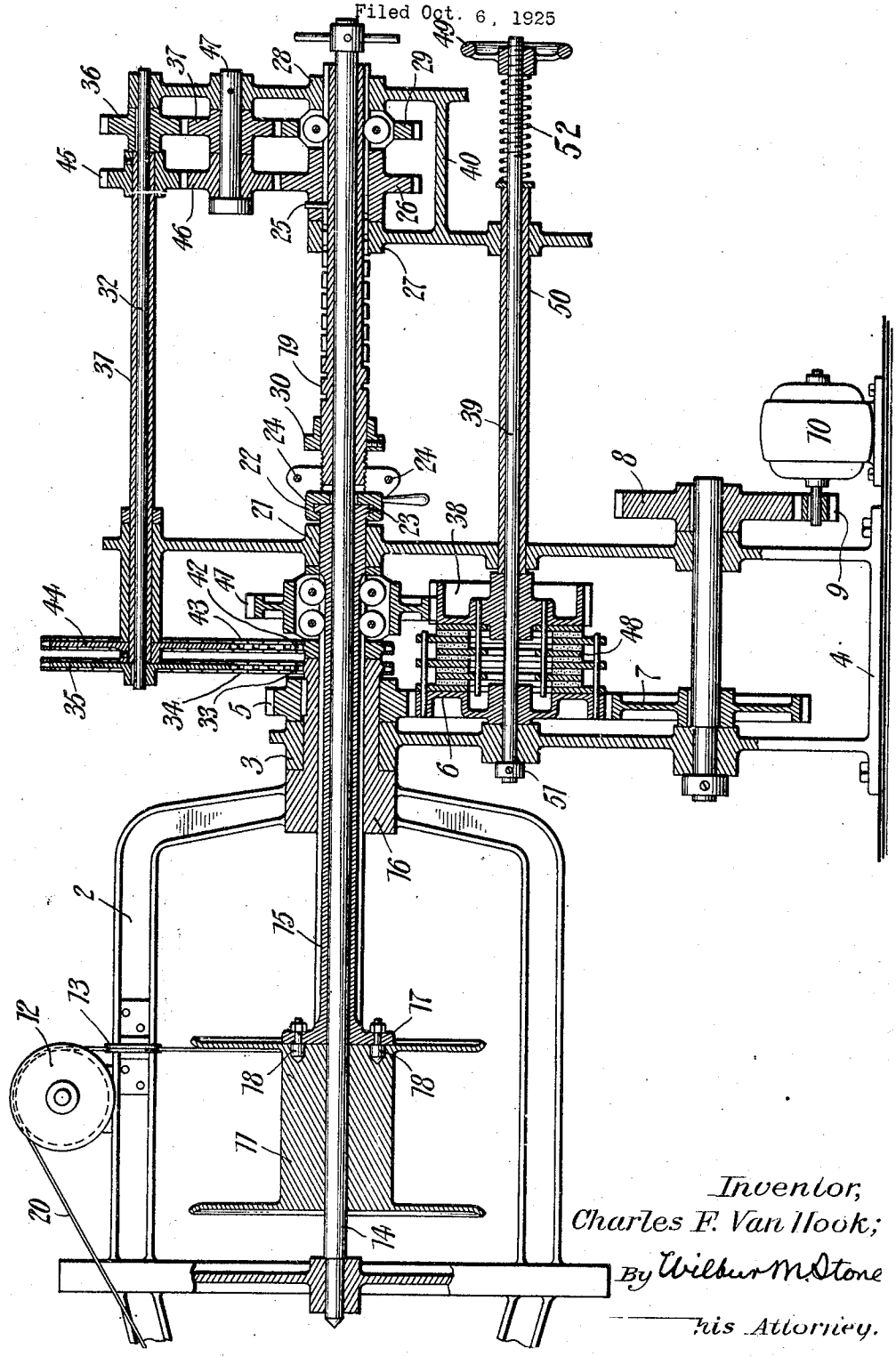

Inventor,
Charles F. Van Hook;
By Wilbur M. Stone
his Attorney.

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UNITED STATES PATENT OFFICE.

CHARLES F. VAN HOOK, OF PATERSON, NEW JERSEY, ASSIGNOR TO THE WATSON MACHINE COMPANY, OF PATERSON, NEW JERSEY, A CORPORATION OF NEW JERSEY.

GEARING FOR TWISTING MACHINES.

Application filed October 6, 1925. Serial No. 60,819.

This invention relates to gearing for twisting machines. The object of my improvements is to provide mechanism of the character specified, simple in construction, reliable in operation and which may be easily modified by change gearing to accommodate various desired combinations of drive.

With these ends in view my improvements comprise features illustrated in their preferred embodiment in the drawing accompanying this specification wherein the figure of the drawing is a vertical longitudinal section of so much of a twisting machine as will suffice to show my improvements.

The present showing is of the drive end of a machine particularly adapted for assembling and twisting together a plurality of wires to form a strand or cable. The usual flyer 2 is mounted in opposite bearings, only one of which, 3, is shown. Said bearing is in one leg of frame 4 and hub 16 of said flyer has gear 5 fixed thereto. Said gear, through the train of gears 6, 7, 8 and 9, is driven from motor 10. Mounted within flyer 2 and coaxial therewith is reel 11, onto which the strand 20, the wires of which have been previously assembled and twisted by known means, not shown, is wound. Said strand approaches and passes onto flyer 2 over grooved wheels 12 and 13 pivotally mounted on one arm of said flyer. Reel 11 is removably sustained in flyer 2 by axial rod 14, which may be withdrawn to the right to release said reel. Said rod is within tubular shaft 15 and said shaft passes concentrically through hub 16 of said flyer and is free to rotate relatively thereto. The right hand end portion of said shaft has a bearing 21 in the right hand leg of frame 4 wherein it both rotates and reciprocates endwise. The left hand end of tubular shaft 15 terminates in flange 17, having opposite pins 18, 18 for engagement with suitable holes in reel 11, for rotating that reel at the speed of said shaft 15.

Said shaft 15 is caused to reciprocate endwise, to cause reel 11 to traverse back and forth on rod 14, whereby the strand 20 is built up in successive layers on said reel, by the following means. The usual cross-thread, right and left hand screw 19 is in the nature of an extension to hollow shaft 15 and is itself hollow for the passage of rod 14. Said screw 19 is adjustably coupled to shaft 15 by coupling 22, head 23 of said shaft turning in said coupling but being held against endwise movement therein. The right hand end portion of said coupling is in threaded engagement with the left hand end of said screw, whereby said coupling 22 and shaft 15 may be adjusted endwise relatively to screw 19, and by means of clamp screws 24, 24 said coupling may be held secure in any adjusted position on screw 19. By this adjusting means reel 11 may be moved endwise a slight amount in either direction to cause the cable 20 to wind properly between the reel flanges and to counteract any tendency of the cable to climb either flange. For causing screw 19 to reciprocate endwise when rotated, to give traverse to reel 11, dog or fork 25 fixed in gear 26 on said screw, engages the thread of said screw. Said gear is constrained against endwise movement by its position between opposite screw bearings 27, 28 of frame 40, its adjacent gear 29 filling the remaining space between said bearings. For limiting the endwise movement of screw 19 to correspond with the distance between flanges of any given reel, adjustable collar 30 is provided.

It is impracticable to make the pitch of screw 19 sufficiently fine to correspond with the desired lay of strand 20 on reel 11, and even if that pitch was fine enough, means must be provided for varying the effective endwise movement of shaft 15 and reel 11 for different lays of strand and for different sizes of strand. To effect such differential movement, and particularly to greatly reduce the relative movement of screw 19 and its dog 25 and to govern that relative movement with predetermined accuracy, the following means are provided: Mounted for rotation in the upper ends of frames 4 and 40 is tubular shaft 31, and within that tubular shaft is rotatably mounted shaft 32. Fixed to hub 16 of flyer 2, sprocket 33 is operably connected by chain 34 with sprocket 35 fixed to shaft 32, and to the opposite end of said shaft 32 is fixed gear 36 operably connected, through intermediate gear 37, with gear 29 in which screw 19 is slidably keyed by means of my improved anti-friction keying device, for which a patent application was filed August 6, 1925, Ser. No. 48,659. Thus rotative movement is transmitted from flyer 2 to screw 19 at any

desired ratio of rotation, sprocket 35 and gears 36, 37 being changeable at will. For rotating nut gear 26 at any predetermined desired speed, gear 38, friction driven from gear 6, both freely mounted on rod 39, engages gear 41 slidably keyed to tubular shaft 15 and sprocket 42 fixed to said gear 41 is operably connected by chain 43 with sprocket 44 fixed to the left hand end of tubular shaft 31. To the other end of said shaft is fixed gear 45 operably connected through intermediate gear 46 with nut gear 26. Intermediate gears 37 and 46 rotate freely on stud 47 fixed in frame 40. Thus rotative movement is transmitted from reel 11 at any desired ratio of rotation, sprocket 44 and gears 45 and 46 being changeable at will.

Frictional drive 48 between gears 6 and 38 is provided so that there may be slip between flyer 2 and reel 11 as the cable accumulates on said reel. Also to govern the tightness of wind, said friction drive is adjustable as to pressure between its elements by means of hand wheel 49 in threaded engagement with the right hand end of shaft 39, spring 52 being interposed between said hand wheel and the right hand end of tube 50, the left hand end of said tube bearing against gear 38, the pull being taken by collar 51. As shaft 39 is a still shaft, said friction may be adjusted while the machine is running by turning hand wheel 49.

The operation of my improved gearing will be understood from the foregoing description. Suffice it to add that, as power is transmitted from motor 10 through gears 9, 8, 7 and 6 to gear 5 fixed to hub 16 of flyer 2, that flyer is rotated. At the same time through friction 48 and gear 38, power is transmitted to gear 41, whereby shaft 15 and reel 11 are rotated.

Reciprocating movement of shaft 15 and reel 11 is had through sprocket 33 fixed to gear 5 and thence by chain 34 to sprocket 35 fixed to shaft 32, then through gear 36, fixed to said shaft, through gear 37 to gear 29 slidably keyed to screw 19. Said screw is in engagement with dog 25 in gear 26 and which gear 26 is rotated to modify the endwise movement of screw 19 through intermediate gear 46 in engagement therewith and with gear 45 fixed to tubular shaft 31, on the other end of which is fixed sprocket 44 connected by chain 43 with sprocket 42 fixed to gear 41.

The tension with which cable 20 is wound on reel 11 is governed by the amount of pressure exerted on friction 48 and, as said cable accumulates on reel 11, said friction slips more and more to compensate for the increased diameter of such accumulation.

I claim:

1. In gearing for twisting machines the combination of a flyer, a shaft concentrically mounted for rotation and reciprocation in said flyer, a reel carried by said shaft, means for rotating the flyer, means for rotating said reel from said flyer at a predetermined speed different from the speed of the flyer, friction means interposed between said flyer driving means and said reel driving means for modifying the relative speeds of said two driving means, and means for adjusting the tension of said friction means while the gearing is running.

2. In gearing for twisting machines the combination of a flyer, a shaft concentrically mounted for rotation and reciprocation in said flyer, a reel carried by said shaft, means for rotating the flyer, means for rotating said reel from said flyer at a predetermined speed different from the speed of the flyer, friction means interposed between said flyer driving means and said reel driving means for modifying the relative speeds of said two driving means, a right and left hand screw concentric with said reel shaft and coupled thereto while permitting relative rotation therebetween, means for adjusting the lengthwise relation of said shaft and screw, a rotatable dog for engagement with said screw, said dog being constrained against endwise movement, means for rotating said screw from said flyer, and means for rotating said dog from said reel shaft.

3. In gearing for twisting machines the combination of a flyer, a shaft concentrically mounted for rotation and reciprocation in said flyer, a reel carried by said shaft, means for rotating the flyer, means for rotating said reel from said flyer at a predetermined speed different from the speed of the flyer, friction means interposed between said flyer driving means and said reel driving means for modifying the relative speeds of said two driving means, a right and left hand screw concentric with said reel shaft and coupled thereto while permitting relative rotation therebetween, means for adjusting the lengthwise relation of said shaft and screw, a rotatable dog for engagement with said screw, said dog being constrained against endwise movement, means for rotating said screw from said flyer, change gearing interposed between said flyer and said screw, and means for rotating said dog from said reel shaft whereby the rate of reciprocation of said reel shaft and reel may be changed at will.

4. In gearing for twisting machines the combination of a flyer, a shaft concentrically mounted for rotation and reciprocation in said flyer, a reel carried by said shaft, means for rotating the flyer, means for rotating said reel from said flyer at a predetermined speed different from the speed of the flyer, friction means interposed between said flyer driving means and said reel driving means for modifying the relative speeds of said two

driving means, a right and left hand screw concentric with said reel shaft and coupled thereto while permitting relative rotation therebetween, means for adjusting the lengthwise relation of said shaft and screw, a rotatable dog for engagement with said screw, said dog being constrained against endwise movement, means for rotating said screw from said flyer, means for rotating said dog from said reel shaft, and change gearing interposed between said reel shaft and said dog whereby the rate of reciprocation of said reel shaft and reel may be changed at will.

5. In gearing for twisting machines the combination of a flyer, a shaft concentrically mounted for rotation and reciprocation in said flyer, a reel carried by said shaft, means for rotating the flyer, means for rotating said reel from said flyer at a predetermined speed different from the speed of the flyer, friction means interposed between said flyer driving means and said reel driving means for modifying the relative speeds of said two driving means, a right and left hand screw concentric with said reel shaft and coupled thereto while permitting relative rotation therebetween, means for adjusting the lengthwise relation of said shaft and screw, a rotatable dog for engagement with said screw, said dog being constrained against endwise movement, means for rotating said screw from said flyer, change gearing interposed between said flyer and said screw, means for rotating said dog from said reel shaft, and change gearing interposed between said reel shaft and said dog whereby the rate of reciprocation of said reel shaft and reel may be changed at will.

In witness whereof, I hereby affix my signature, this 3rd day of October, 1925.

CHARLES F. VAN HOOK.