June 21, 1955 E. D. HANSON 2,711,293

DUAL REEL-ENGAGING TAKEUP STAND

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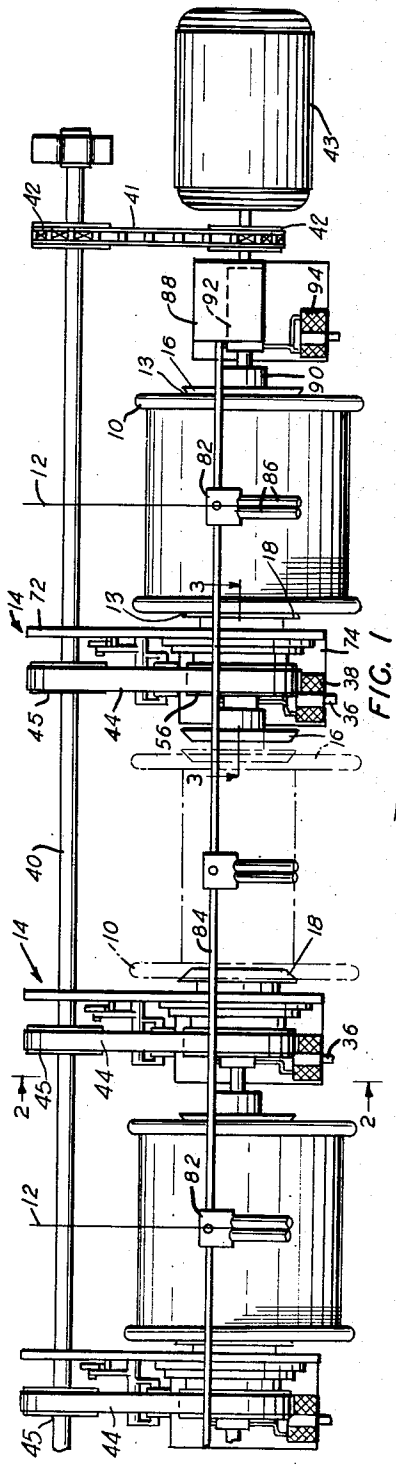


FIG. 1

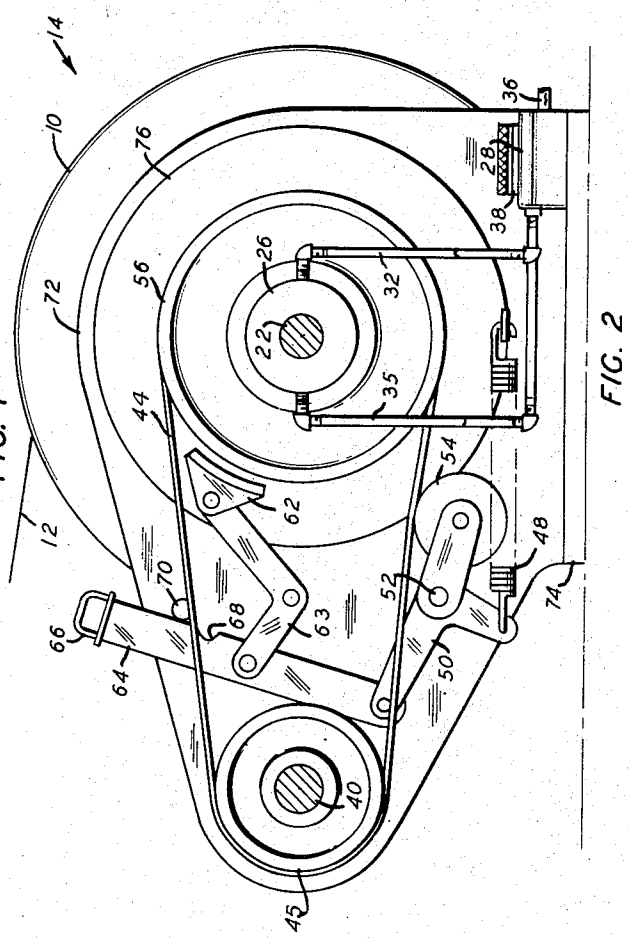


FIG. 2

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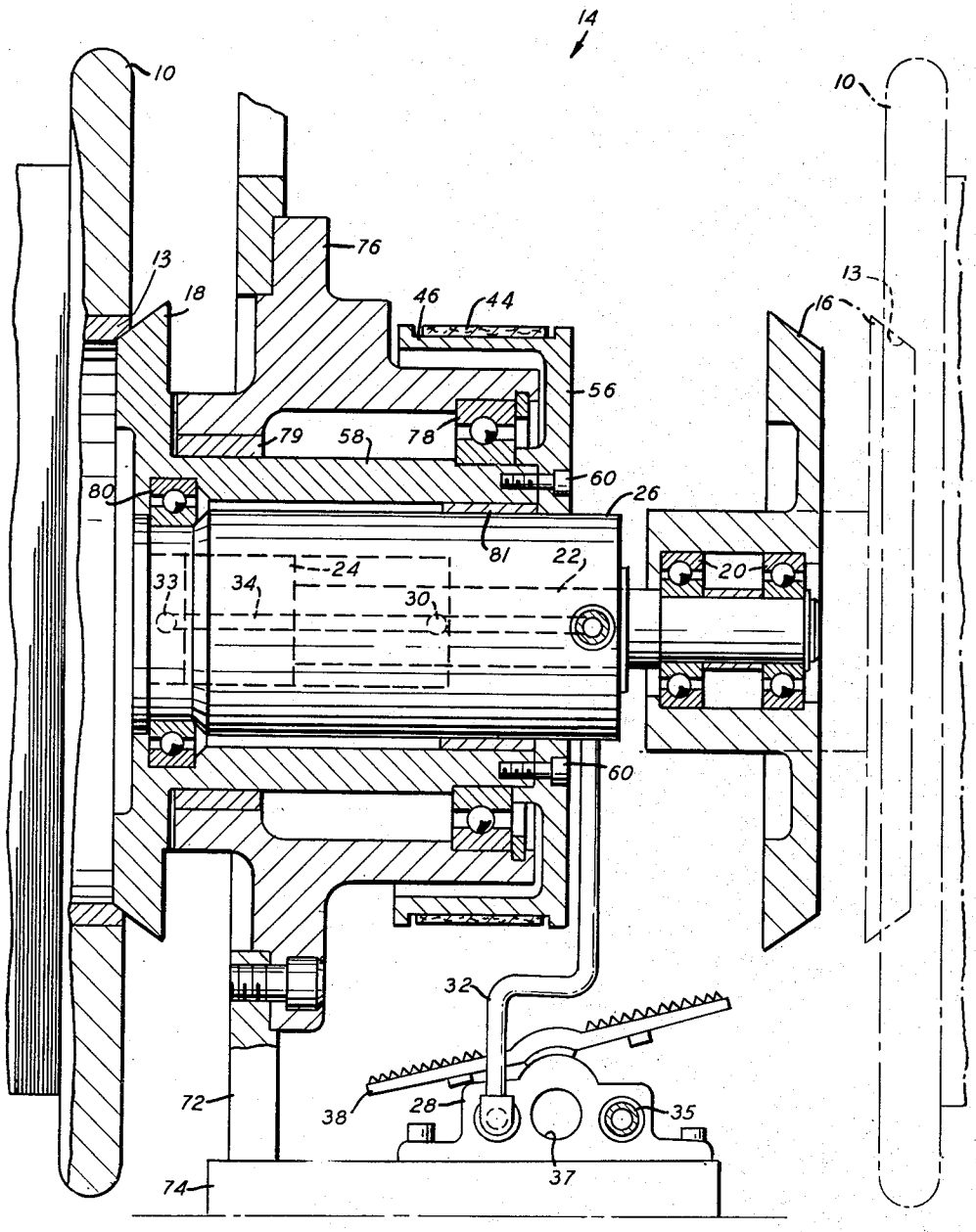


FIG. 3

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DUAL REEL-ENGAGING TAKEUP STAND

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5 Claims. (Cl. 242—130)

This invention relates to takeup stands for winding filaments onto reels, and more particularly to takeup stands for supporting a plurality of reels in a row while winding filaments thereon.

In some large scale manufacturing operations performed on filaments, such as the electroforming of copper-clad steel wires, a large number of reels may be mounted rotatably on takeup stands arranged in one or more rows. Each of said takeup stands generally includes a pair of separate arbors mounted at opposite ends of each reel in the row. Where manufacturing floor space is limited or at a premium, this arrangement may not be satisfactory. In some cases an excessive amount of floor space may be occupied, and in other cases it may not be possible to accommodate the desired number of reels per row required to attain maximum efficiency. It would be advantageous to reduce the space occupied by the arbors in each takeup stand, but this has not been possible with the takeup stands known heretofore.

An object of this invention is to provide new and improved takeup stands for winding filaments onto reels.

Another object of the invention is to conserve manufacturing floor space when a plurality of such takeup stands are mounted in a row.

Apparatus illustrating certain features of the invention may include a pair of rotatable members facing in opposite directions and designed to engage and support the hubs of a pair of adjacent reels in a row thereof, and means for effecting relative movement between the members along their longitudinal axes.

A complete understanding of the invention may be obtained from the following detailed description of apparatus forming a specific embodiment thereof, when read in conjunction with the appended drawings, in which:

Fig. 1 is a plan view of a row of reels supported on apparatus embodying the invention;

Fig. 2 is an enlarged, vertical section taken along line 2—2 of Fig. 1, and

Fig. 3 is an enlarged, vertical section taken along line 3—3 of Fig. 1.

In accordance with the invention, when a plurality of takeup stands are mounted side by side in a row, the space occupied by the stands is reduced by substituting a single stand embodying the invention for the two separate stands formerly employed between each pair of adjacent reels in the row. As shown in Fig. 1, a plurality of reels 10—10 are positioned side by side in a row while taking up a plurality of wires 12—12. The reels 10—10 are supported rotatably on their hubs 13—13 by a plurality of dual reel-engaging stands 14—14, one of which is mounted between each pair of adjacent reels in the row.

Referring to Fig. 3, each of the stands 14—14 includes a frustoconical, longitudinally movable, reel-engaging member 16 mounted on one side of the stand, and a frustoconical, longitudinally fixed, reel-engaging member 18 positioned on the other side of the stand. The frustoconical members 16 and 18 function as the reel-engaging portions of arbors, which face in opposite directions away from the stand and support the reels 10—10 on opposite sides thereof. The movable member 16 is freely rotatable on a plurality of ball bearings 20—20 mounted at one end of a piston 22 having a piston head 24 secured at the other end thereof. The piston 22 is reciprocable through one end of a cylinder 26 in which the piston head 24 is slidably mounted, and the reciprocation of the piston 22 is fluid actuated. One end of the cylinder 26 is connected to a double acting four way valve 28 by means of an orifice 30 leading to a pipe 32. At the opposite end of the cylinder 26 an orifice 33 communicates with a channel 34 which extends through the wall of the cylinder for the entire length thereof to a second pipe 35, which is also connected to the four way valve 28. Another pipe 36 (Fig. 1) provides the valve 28 with a supply of a fluid medium, such as air under pressure, and an exhaust port 37 (Fig. 3) leads from the valve to the atmosphere.

A see-saw type foot treadle 38 controls the operation of the four way valve 28. By stepping on the proper end of the foot treadle 38, compressed air is admitted to one end of the cylinder 26 and simultaneously exhausted from the other end thereof. This action slides the piston head 24 from one end to the other of the cylinder 26, thereby shifting the movable reel-engaging member 16 between a reel-engaging position and a reel-disengaging position. In Fig. 3 full lines are used to show the member 16 in its reel-disengaging or retracted position, and phantom lines are used to show it in its reel-engaging or advanced position. One of the reels 10—10 is shown in phantom lines in Fig. 3, with the hub 13 at the left hand end thereof engaged and supported by the movable member 16 when this member is in its advanced position to the right. The right hand end of this reel is supported by a longitudinally fixed member which is identical with the member 18 shown in Fig. 3, and is mounted on the adjacent one of the stands 14—14, to the left as viewed in Fig. 1.

A constantly rotating drive shaft 40 (Figs. 1 and 2) connected by a chain 41 and sprockets 42—42 to a motor 43 supplies power to a plurality of endless belts 44—44, one of which is looped around each of the stands 14—14. As shown in Fig. 2 each belt 44 engages a pulley 45 on the drive shaft 40, and it engages a ring 46 on the stand 14. A spring 48 normally urges an arm 50 to turn about a pivot 52, thereby bringing a jockey roller 54 to bear against the belt 44 at a point intermediate the pulley 45 and the ring 46. This action places the bell 44 under tension, and causes power to be transmitted from the drive shaft 40 to the ring 46. As shown in Fig. 3, the ring 46 is provided with a radial flange 56 which is connected directly to a tubular shank 58 of the longitudinally fixed reel-engaging member 18, by means of a plurality of bolts 60—60. Thus, the member 18 and the reel 10 supported thereon rotate when the belt 44 is placed under tension by the action of the jockey roller 54 riding thereon.

The rotation of the reel 10 may be halted by releasing the tension applied to the belt 44 by the jockey roller 54, and at the same time applying a brake 62 against the ring 46. A pivoted link 63 connects the brake 62 to a lever 64 having a handle 66 on the upper end thereof to enable it to be grasped by the operator. The lower end of the lever 64 is joined pivotally to the arm 50, so that upward movement of the lever 64 pivots the arm 50 against the action of the spring 48 and moves the roller 54 away from the belt 44. This action puts sufficient slack in the belt 44 to prevent the drive shaft 40 from transmitting power to the ring 46. A notch 68 on the lever 64 engages a lug 70 when the brake 62 is applied, and this holds the brake on against the action of the spring 48, but the lug 70 can be disengaged readily when it is desired to release the brake.

The lug 70 is mounted on a vertical frame 72 which rises from a base 74 of each stand 14. The frame 72 forms a transverse wall between the reels 10—10 on the opposite sides of each of the stands 14—14, as shown in Figs. 1 and 2. An annular housing 76 (Fig. 3) is mounted in and extends transversely through the frame 72. A plurality of ball bearings 78—78 and a plurality of self-lubricating bearings 79—79 permit the rotation of the tubular shank 58 of the member 18 within the housing 76. The cylinder 26 is mounted on a plurality of ball bearings 80—80 and a plurality of self-lubricating bearings 81—81 within the shank 58. By virtue of the support incidently obtained from the pipes 32 and 35 which rise thereto from the valve 28 on the base 74, the position of the cylinder 26 remains fixed while the shank 58 of the member 18 is free to rotate thereon.

It is evident that the reels 10—10 are mounted independently, so that when one of the reels becomes full it may be removed and replaced by an empty reel without interferring with the takeup operations being performed on any of the other reels in the row. Each of the reels 10—10 is supported and rotated by the joint action of a longitudinally fixed arbor having a reel-engaging member corresponding to the member 18 on one of the stands 14—14, and by a cooperating longitudinally movable member corresponding to the member 16 on another, adjacent one of the stands. Of course, the frustoconical members 16 and 18 on all of the stands 14—14 are aligned so that they support the row of the reels 10—10 in a straight line. The frustoconical shape of the reel-engaging members 16 and 18 matches the shape of the hubs 13—13 of the reels 10—10, thereby enabling these members to center and elevate a reel placed between them. When the movable member 16 is shifted towards the longitudinally fixed member 18, these members enter the hub 13 of a reel positioned between them, and raise the reel off the floor by a camming action.

In order to stop and remove one of the reels 10—10 from between an adjacent pair of the stands 14—14, on the stand carrying the driving member corresponding to the member 18 the brake 62 is applied to stop the rotation of the reel, and on the cooperating adjacent stand the foot treadle 38 is operated to retract the movable member corresponding to the member 16. This releases the full reel, and drops it to the floor so that it may be rolled out of the row. The operator then substitutes an empty reel in its place, and advances the member 16 towards the cooperating longitudinally fixed member 18, thereby elevating this reel above the floor and supporting it in position for rotation to take up one of the wires 12—12 thereon.

The wires 12—12 are distributed evenly upon the reels 10—10 by means of a plurality of traversing guides 82—82, which are mounted upon a traverse shaft 84 at spaced points corresponding to the positions of each of the reels in the row thereof. The traverse shaft 84 moves the traversing guides 82—82 in unison alternately back and forth across the reels 10—10 from one end to the other thereof. Each of the traversing guides 82—82 includes a pair of spaced guide rolls 86—86 between which one of the wires 12—12 passes. A control mechanism 88 motivates the reciprocation of the traverse shaft 84 and automatically reverses its direction of movement at the proper intervals. Distribution units like the traversing guides 82—82 are well known in the art of winding wire. Further details of the construction and operation of such guides are disclosed in my copending application Serial No. 308,132, filed September 5, 1952, entitled "Strand-Advancing Apparatus."

By the use of dual reel-engaging stands embodying the invention inbetween each pair of adjacent reels in a row thereof as well as at opposite ends of the row, the number of such stands required to support the entire row may be reduced to only one more stand than the number of reels in the row. Or, the number of such stands needed may be further reduced to one stand less than the number of reels in the row, by substituting at the extreme opposite ends of the row stands having only a single reel-engaging member. In the latter case, as shown in Fig. 1 the extreme right hand end of the row is provided with a freely rotatable, longitudinally movable arbor 90, which is reciprocable by an air cylinder 92 operated by a foot treadle 94. The opposite end of this row is provided with a power driven, longitudinally fixed type of arbor (not shown). Thus, the use of takeup stands embodying the invention effectively conserves manufacturing floor space.

Although only a single embodiment of the invention is illustrated and described herein, numerous other embodiments may be devised to meet special requirements, without departing from the spirit and scope of the invention.

What is claimed is:

1. In a takeup stand including a pair of cooperating arbors for supporting one reel in a row thereof, the improved structure which comprises a vertical frame, a longitudinally movable reel-engaging member mounted rotatably on one side of the frame, means for moving said member between an advanced position and a retracted position to engage and disengage a reel, a longitudinally fixed reel-engaging member mounted rotatably on the opposite side of the frame and designed to engage and support the hub of an adjacent reel in the row thereof, and means for rotating said longitudinally fixed member to rotate the reel supported thereon.

2. In a takeup stand including a pair of cooperating arbors for supporting one reel in a row thereof, the improved structure which comprises a vertical frame, a pair of rotatable reel-engaging members mounted on opposite sides of the frame and designed to engage and support the hubs of a pair of adjacent reels in the row thereof, a piston having one end secured rotatably to one of the members and having the other end mounted slidably on the frame, means for reciprocating the piston to move said member between a reel-engaging position and a retracted position, and means for positively rotating the other member to rotate a reel supported thereon.

3. In a takeup stand including a pair of cooperating arbors for supporting one reel in a row thereof, the improved structure which comprises a vertical frame having a cylinder mounted therein, a piston having one end mounted slidably within the cylinder, a frustoconical member designed to engage and support the hub of a reel mounted on one side of the frame and secured rotatably to the other end of the piston, pneumatic means for reciprocating the piston to move said member between a reel-engaging position and a retracted position, a second reel-engaging member mounted rotatably on the opposite side of the frame for supporting one end of an adjacent reel in the row thereof, and means for driving said second member to rotate a reel supported thereon.

4. In a takeup stand including a pair of cooperating arbors for supporting one reel in a row thereof, the improved structure which comprises a vertical frame extending transversely between an adjacent pair of the reels in the row thereof, a pneumatic cylinder mounted within the frame, a piston having one end mounted slidably within the cylinder and having its other end projecting beyond one side of the frame, a reel-engaging member secured rotatably to the projecting end of the piston for engaging one end of one of said adjacent pair of reels, a valve for controlling a supply of air to the pneumatic cylinder to reciprocate the piston and thereby move the member between a reel-engaging position and a retracted position, a second reel-engaging member mounted rotatably on the opposite side of the frame for supporting one end of the other one of said pair of reels, and means for driving said second member to rotate the reel supported thereon.

5. In a takeup stand including a pair of cooperating arbors for supporting one reel in a row thereof, the improved structure which comprises a vertical frame extending transversely between an adjacent pair of the reels in the row thereof, a pneumatic cylinder mounted within the frame, a piston having one end mounted slidably within the cylinder and having its other end projecting beyond one side of the frame, a reel-engaging member secured rotatably to the projecting end of the piston for engaging one end of one of said adjacent pairs of reels, a valve for controlling a supply of compressed air to the pneumatic cylinder to reciprocate the piston and thereby move the member between a reel-engaging position and a retracted position, a second reel-engaging member projecting beyond the opposite side of the frame for supporting one end of the other one of said pair of reels, said second member having a tubular shank mounted concentrically and rotatably on the cylinder, and means for driving the shank to rotate the reel supported on said second member.

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