Aug. 23, 1932. C. J. KELLER 1,873,422

WIRE UNREELING AND TENSIONING DEVICE

Filed Oct. 16, 1930 2 Sheets-Sheet 1

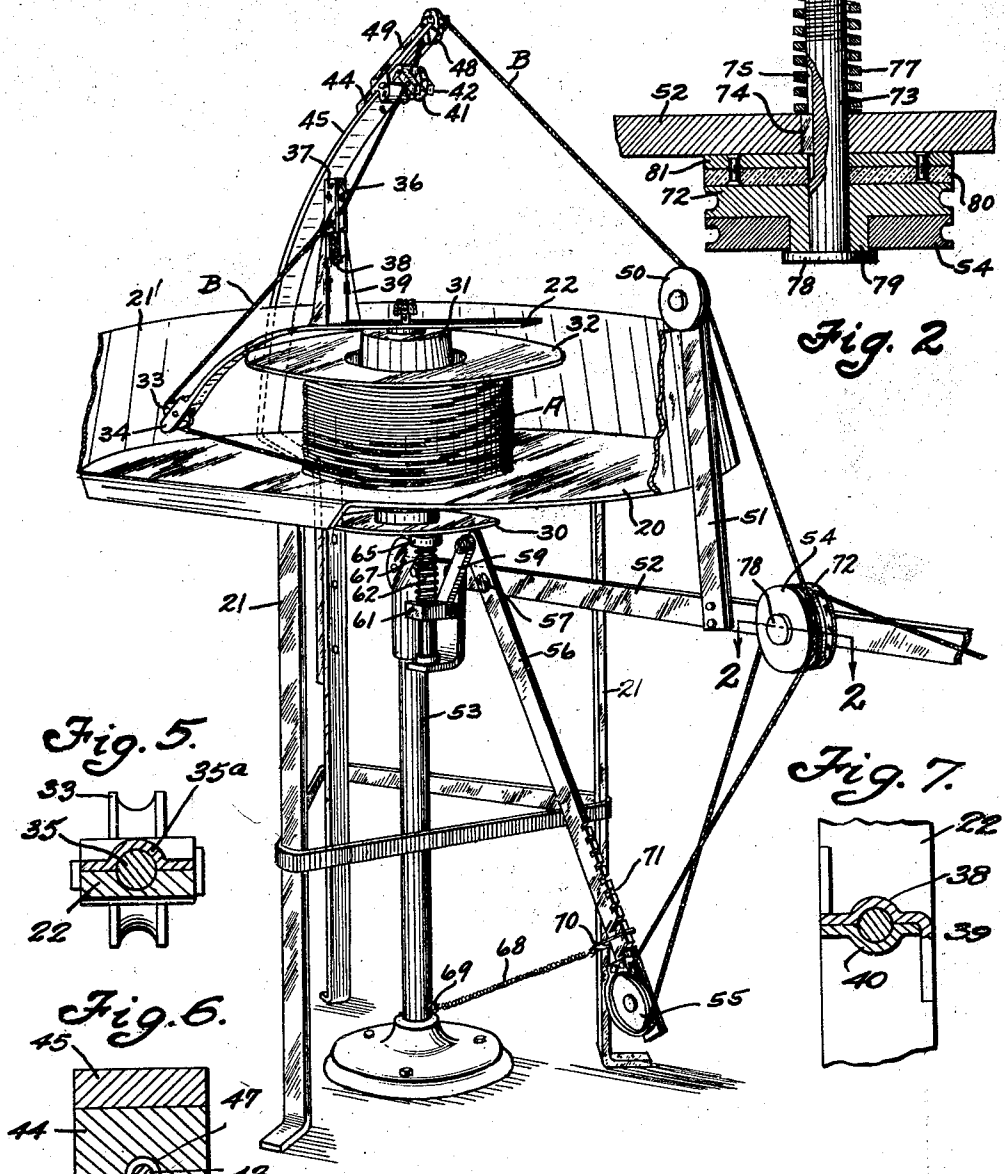

Fig. 1

Fig. 2

Fig. 5.

Fig. 6.

Fig. 7.

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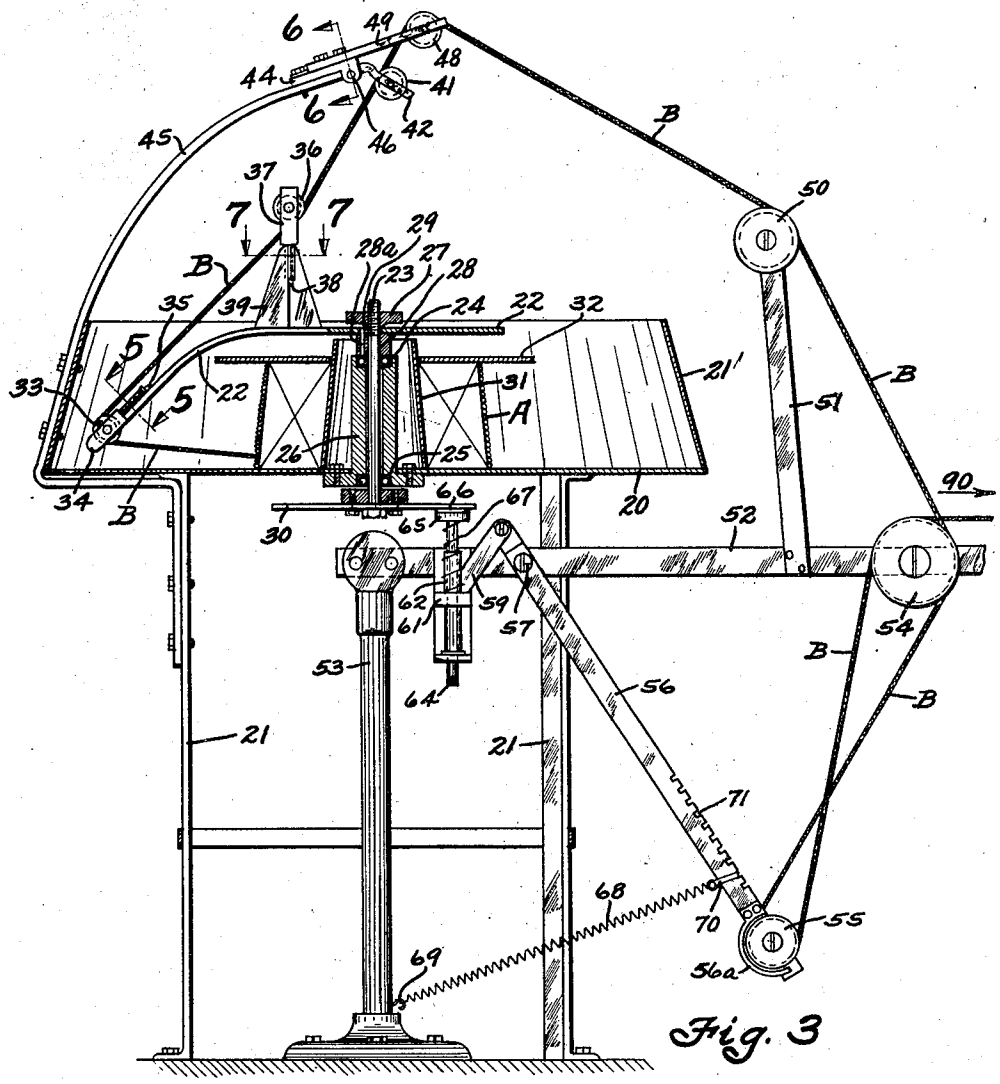

Fig. 3

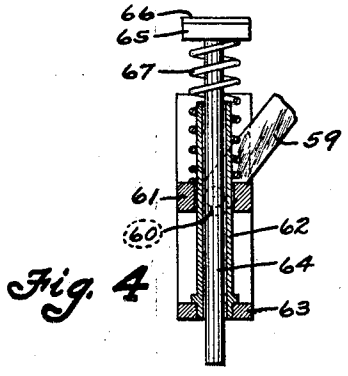

Fig. 4

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UNITED STATES PATENT OFFICE

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WIRE UNREELING AND TENSIONING DEVICE

Application filed October 16, 1930. Serial No. 489,116.

This invention relates to apparatus for unreeling wire from a coil or supply reel and for taking up the slack in the wire while it is being fed to other apparatus such as a machine for cutting off measured lengths of wire. One type of such unreeling and wire tensioning apparatus is shown in the copending application of D. V. Atwood, Serial Number 411,056, filed December 2, 1929 now patent No. 1,834,993, issued Dec. 8, 1931. In that apparatus the wire is uncoiled from the supply coil or reel by an unreeling arm which extends transversely above the coil from its operating shaft which rotates substantially co-axially with respect to the coil. The unreeling arm carries a guide pulley about which the wire passes to the machine which consumes the wire as is well known to those skilled in this art. When the wire is pulled from the supply reel the unreeling arm turns to permit one coil at a time to be unreeled. In order to maintain the wire taut substantially at all times, means are provided for resisting the turning of the unreeling arm when there is a tendency for the wire to slacken. This means comprises a brake disc attached to the unreeling arm shaft and cooperating friction member which is caused to be pressed against the brake disc when the wire tends to become slack.

One of the objects of the present invention is to provide certain improvements whereby unreeling and wire tensioning devices of this type will be rendered more sensible to variations in the force applied by the wire-consuming machine to pull the wire from the supply reel. It is particularly an object to secure a greater uniformity of tension in the wire although the force tending to pull the wire from the supply reel may vary greatly.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein a preferred embodiment of one form of the present invention is clearly shown.

In the drawings:

Fig. 1 is a perspective view of a machine embodying the present invention, certain parts being broken away for sake of clearness.

Fig. 2 is a sectional view on an enlarged scale, the section being taken on line 2—2 of Fig. 1.

Fig. 3 is a side elevation particularly a vertical longitudinal section of the machine shown in Fig. 1.

Fig. 4 is a fragmentary view partly in section of the friction disc and operating mechanism.

Figs. 5, 6 and 7 are sectional views taken respectively on the lines 5—5, 6—6 and 7—7 of Fig. 3.

The wire unreeling and tensioning apparatus comprises a table 20 supported by legs 21 and attached at its edge to a band 21′ which provides a housing for enclosing the reel of wire A and the unreeling arm 22. The arm 22 is detachably secured to an unreeling arm shaft 23 rotatably supported by bearings 24 and 25 carried by a central pedestal 26 attached to the table 20. The lower end of the shaft 23 carries the brake disc 30. The upper end of the shaft 23 is threaded to receive a nut 27 by which the arm 22 is clamped against a block 28 drivingly connected with the shaft 23. The block 28 carries a pin 28*a* which engages a notch 29 in the arm 22 so that the arm 22 is drivingly connected through the block 28 with the shaft 23. When the nut 27 is removed, the arm 22 may be removed from connection with the shaft 23 to permit placing of the reel A upon the table 20 and around a frustro-conical tubular member 31 which surrounds the pedestal 26. After the reel A is placed upon the table a heavy metal disc is placed upon it and then the arm 22 is placed in position and is secured by screwing down the nut 27.

The wire B is passed around a pulley 33 supported by a bracket 34 having a pintle 35 mounted between the arm 22 and a member 35*a* which may be welded to the arm. The wire B then passes around a pulley 36 carried by a bracket 37 having a pintle 38 pivotally supported by a bracket 39 and a part 40 welded thereto. Bracket 39 is attached to arm 22. Wire B then passes over a pulley 41 and is tangent thereto at a

point substantially vertically above the axis of the unreeling arm shaft 23. Pulley 41 is carried by a bracket 42 having a pintle 43 pivotally connected with a block 44 attached to a bracket 45 and secured to position by a taper pin 46 which passes through an annular groove 47 in the pintle 43. The wire B then passes over a pulley 48 pivotally attached to a bracket 49 attached to an arm 45 supported by the table.

Wire B then passes around a pulley 50 pivotally attached to a post 51 supported by a horizontal bar 52 having one end supported by a pedestal 53 and the other end (not shown) attached to any suitable support such as the machine which consumes the wire. The wire B then passes around a pulley 54 pivotally supported by the bar 52 in a manner to be described and then around a pulley 55 pivotally supported by a tension lever 56 pivoted at 57 upon the bar 52. The bar 56 is attached to a link 59 (see Fig. 4) and at 60 to a block 61 which slides vertically along a tube 62 supported by a bracket 63 attached to the bar 52. The tube 62 guides a vertically movable rod 64 carrying at its upper end a disc 65 covered by a disc of friction material 66. Motion is transmitted from the block 61 to the disc 65 through a spring 67. A wire tension spring 68 is attached at 69 to the pedestal 53 and at the other end to a hook 70 which is received by any one of a series of notches 71 with which the tension lever 56 is provided.

After passing around the pulley 55 the wire B passes around a pulley 72 pivotally supported by the bar 52 coaxially with the pulley 54.

Referring to Fig. 2 the bar 52 supports a rod 73 which may move endwise relative to the bar 52 but which can not rotate by reason of the fact that it is keyed to the bar 52 by key 74 received by a longitudinal groove 75 in the rod 73. The nuts 76 upon the rod 73 confine a coiled spring 77 between the nuts and the bar 52. The spring 77 being in a state of compression, rod 73 is urged toward the rear side of the bar 52 thus causing a head 78 of the rod 73 to bear against the hub 79 of the pulley 72 and causing the pulley 72 to be urged against a leather friction disc 80 riveted to a metal friction disc 81 secured to the bar 52. The hub 79 of the disc 72 is greater in length than the thickness of the pulley 54 thus preventing the head 78 of the rod 73 from engaging the adjacent side surface of the pulley 54. It is therefore seen that the pulley 54 is free to turn in either direction, and that the turning of the pulley 72 is frictionally resisted.

The lower end of the lever 56 is provided with a guard 56*a* for the purpose of confining the wire B in the groove of the pulley 55.

The operation of the apparatus will now be explained with reference to its use with a device for cutting off measured lengths of wire. Such a device comprises principally a reciprocating gripper which will grip the wire and move it in the direction of arrow 90 of Fig. 3 and then stop while the measured length of wire is cut off. Just before cutting off this length of wire, a second reciprocating gripper will grip the wire between the wire cutting knife and wire tensioning device and will thus hold the end of the wire remaining in the machine after the measured length has been cut off. This second gripper will begin moving in the direction of the arrow 90 as the first reciprocating gripper returns to normal position. It will be readily understood by those skilled in this art that the gripper tends to jerk the wire particularly when movement of the wire begins, and therefore causes the wire to become unduly taut. When the motion of the wire ceases the wire between the machine and the supply reel becomes unduly slack due to the tendency of the unreeling arm to continue its motion after movement of the wire in the measuring machine has ceased. The present invention, however, operates to render the tension of the wire more nearly uniform with variations in the forces exerted upon the wire as it is moved in the direction of the arrow 90 by the gripper device of the wire measuring machine.

The brake disc 66 is maintained at all times against the brake disc 30 located at the lower end of the shaft 23. The force causing the disc 66 to move upwardly against the disc 30 is delivered through the spring 67 so that this force may be less or greater according as the block 61 is further away or closer to the disc 66. The spring 68 causes a certain maximum pressure to be applied through the lever 56, link 59, block 61 and spring 67 and friction disc 66 to the disc 30 thus resisting the turning of the arm 22. When the measuring machine starts the wire B into motion, there is a tendency to increase the tension on the wire beyond that which it would normally have due to the action of the spring 68. The increase in pull on the wire tends to cause the lever 56 to move counterclockwise in order to shorten the distance between the pulley 55 and the pulley 54. This upward movement of the lever 56 causes downward movement of the block 61 thus increasing the effective length of the spring 67 and diminishing the pressure exerted upwardly by it. Since the clockwise movement of the lever 56 does not jerk the disc 66 away from the disc 30 but gradually relieves pressure upon the disc 30, the resistance to the turning of the shaft 23 is gradually diminished so that the unreeling arm 22 gradually starts into motion. In this way, there is a gradual yielding of the moving parts of the unreeling device and hence a tendency to relieve a condition of abnormal tension in the wire which is approximately in

proportion to the tendency to produce abnormal tension in the wire when starting it in motion.

The reciprocating grippers of the wire measuring machine come to rest relatively abruptly. Hence, the wire ceases moving abruptly. There is a tendency, therefore, for the wire to become unduly slack due to the fact that the moving parts of the unreeling device tend to continue motion. However, the tendency of the wire to become slack is accompanied by clockwise rotation of the lever 56 thereby increasing the pressure applied by the spring 67 to the brake disc 66. Since this portion is applied through a yielding spring there is a relatively gradual increase of pressure applied to the brake disc 23*a*. Hence, the unreeling arm 22 is brought to rest by a somewhat gradually increasing braking force which tends to increase the tension in the wire at about the same proportion as the tendency to decrease the tension of the wire when motion of the wire through the measuring machine ceases. By thus avoiding a sudden application of braking pressure or a sudden release of braking pressure applied to the brake disc 30, jerking of the wire has been very materially reduced with the result that there is no substantial breaking of parts of either the unreeling and tensioning device or the machine which consumes the wire.

While the form of embodiment of the present invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow:

What is claimed is as follows:

1. Wire unreeling and tensioning apparatus comprising a support for a coil of wire, a rotatable shaft substantially coaxial with the coil, an unreeling arm carried by the shaft and providing a guide for the wire, and means for variably resisting rotation of said shaft, said means comprising a brake disc attached to the shaft, a friction member movable against the brake disc, a part movable toward or from the brake disc, a spring for transmitting motion from said part to the friction member, and a movable mechanism for controlling the movement of said part, said movable mechanism including a part around which a loop of the wire passes.

2. Wire unreeling and tensioning apparatus comprising a support for a coil of wire, a rotatable shaft substantially coaxial with the coil, an unreeling arm carried by the shaft and providing a guide for the wire, and means for variably resisting rotation of said shaft said means comprising a brake disc attached to the shaft, a friction disc, rod supporting the disc, a guide tube supporting the rod so as to guide the friction disc against the brake disc, a spring surrounding the guide tube and bearing against the friction disc, a block slidable upon the guide tube and bearing against the spring, and a movable mechanism for controlling the block so as to control the force applied by the spring to the friction member, said movable mechanism including a part around which a loop of the wire passes.

In testimony whereof I hereto affix my signature.

CLARENCE J. KELLER.