June 6, 1939. F. M. LITTELL 2,161,228

AUTOMATIC REEL

Filed Aug. 27, 1936 2 Sheets-Sheet 1

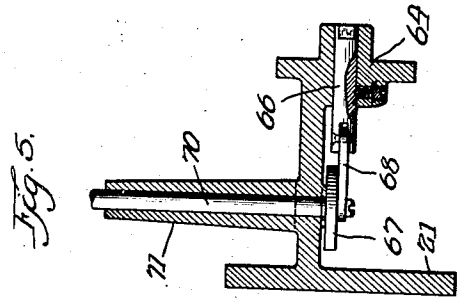


Fig. 5.

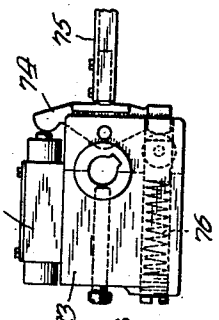


Fig. 6.

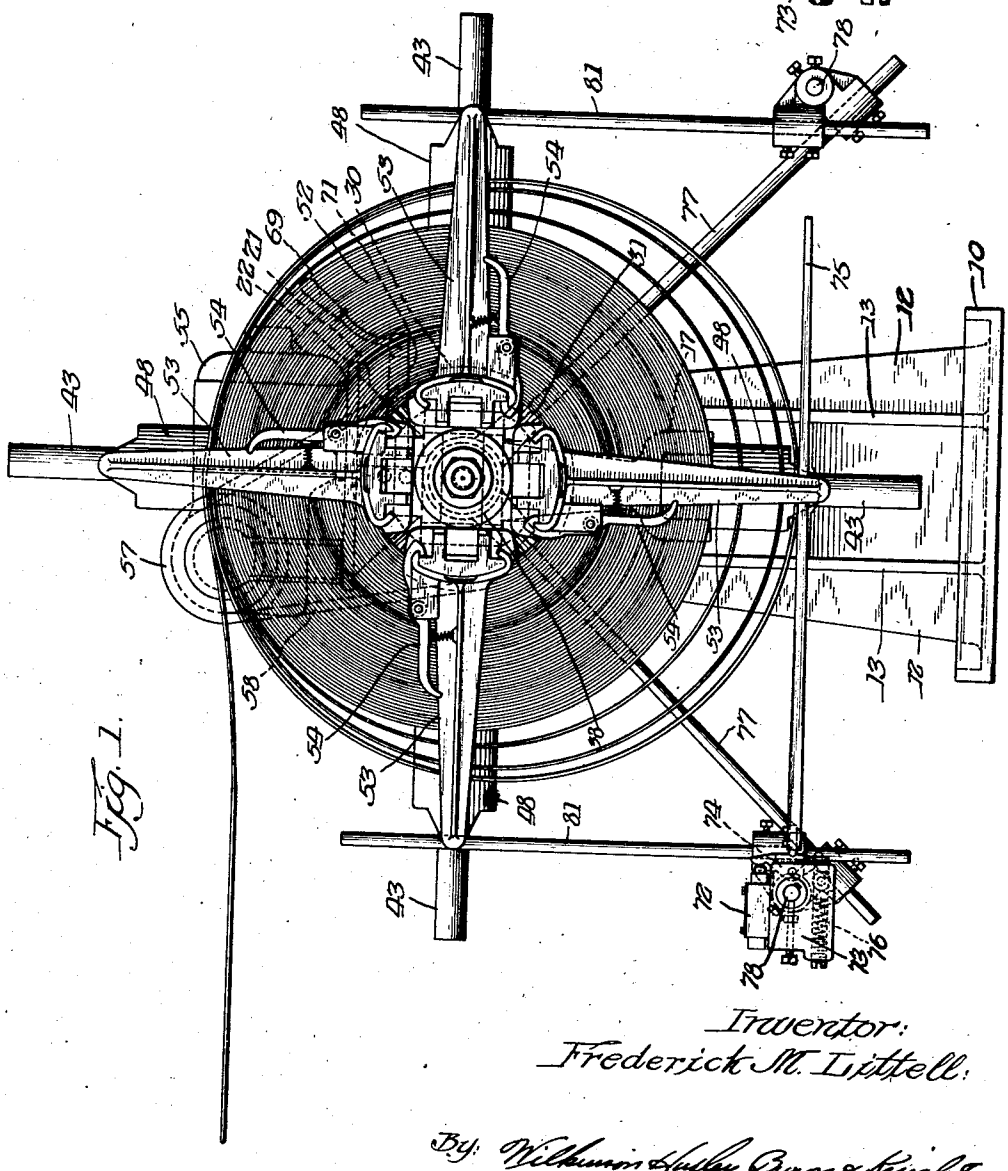


Fig. 1.

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AUTOMATIC REEL

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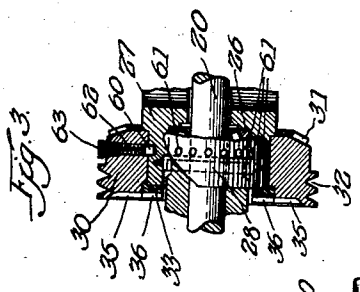


Fig. 3.

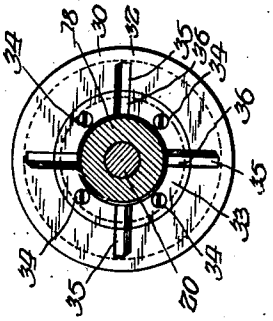


Fig. 4.

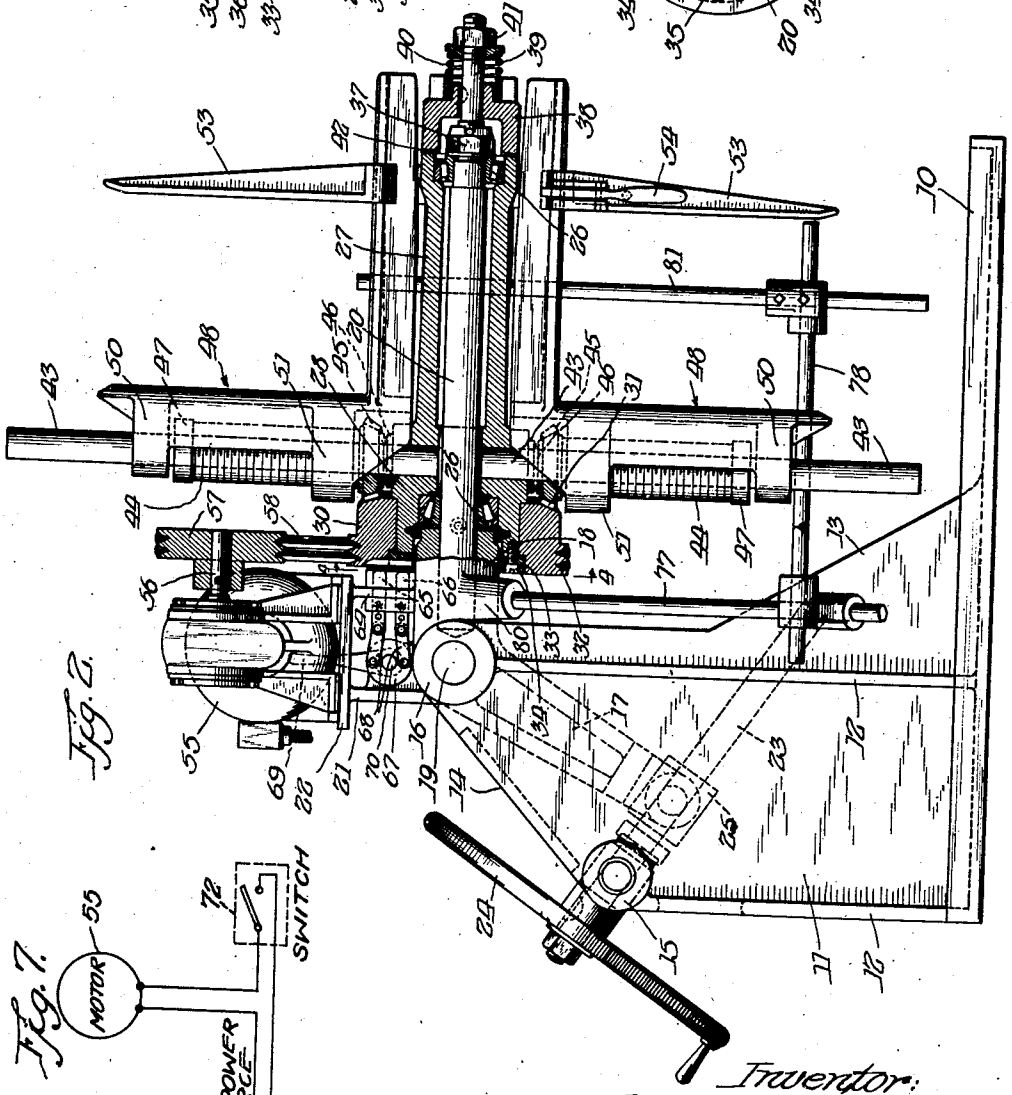


Fig. 2.

Fig. 1.

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Patented June 6, 1939

2,161,228

UNITED STATES PATENT OFFICE

2,161,228

AUTOMATIC REEL

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Application August 27, 1936, Serial No. 98,112

6 Claims. (Cl. 242—78)

The invention relates to reels for supporting coil stock and has reference more particularly to an automatic centering reel having mechanism for rotating the reel in order to unwind the coil stock thereon for feeding to metal working machines such as punch presses and the like.

The present invention has for its object to provide novel drive mechanism for rotating stock supporting reels which will maintain the outside loop free of the coil, and of the proper size to insure accurate and efficient operation of the feeding mechanism to which the stock material is presented.

A further object is to provide mechanism for driving a spindle type reel having automatic operation to rotate the wheel in response to the size of the outer loop of the coil stock, which will not interfere with the operation of the reel and which will be operative at all angles of adjustment of the reel.

A further object is to provide an automatic centering reel and drive mechanism therefor that can be utilized for producing inward and outward movement of the stock supporting arms for receiving a coil of stock and centering the same with respect to the reel.

A further object is to provide an automatic centering reel having improved drive mechanism and which can be manually connected and disconnected with the coil supporting and centering means.

A further object is to provide improved switch mechanism for actuation by the outer loop of the coil which will be economical to manufacture and which will not readily get out of order.

With these and various other objects in view, the invention may consist of certain novel features of construction and operation as will be more fully described and particularly pointed out in the specification, drawings and claims appended hereto.

In the drawings which illustrate an embodiment of the invention and wherein like reference characters designate like parts—

Figure 1 is a front elevational view of an automatic centering reel embodying the improvements of the invention;

Figure 2 is a side elevational view, partly in section, of the reel shown in Figure 1;

Figure 3 is a fragmentary sectional view showing the lock for locking the driven pulley to the spindle of the reel;

Figure 4 is a vertical sectional view taken substantially along line 4—4 of Figure 2;

Figure 5 is a horizontal sectional view showing the manual means for actuating the reciprocating locking lugs;

Figure 6 is a side elevational view of the housing for the switch actuating means; and

Figure 7 is a diagrammatic view of the electrical connections between the motor and switch.

The reel selected for illustration in the drawings comprises a base 10 substantially rectangular in shape and having at one end an upstanding supporting portion consisting of the longitudinally extending ribs 11, the transversely extending ribs 12, which confine the ribs 11 therebetween, and the diagonal ribs 13. The supporting structure has a sloping top wall 14 and provides at the lower end of the wall 14 spaced bearings 15 and at the upper end spaced bearings 16. The bearings 16 provide journalling means for spindle arm 17, which is therefore rotatable on pivot 19, said spindle arm having a forwardly extending portion 18 to which is suitably fixed the forwardly extending spindle shaft 20. The portion 18 of the spindle arm also supports uprights 21 integral with the base 22, which supports an electric motor, to be more particularly described as the description proceeds. Bearings 15 journal an elevating screw 23, said screw having handle 24 fixed to the outer projecting end thereof and being threaded at its other end to sleeve 25 having pivotal connection with the spindle arm 17.

Rotatably mounted on the spindle shaft 20 by roller bearing assemblies 26 is a spindle sleeve 27 having a hub portion 28. Mounted on the hub portion so as to rotate relative thereto is a combined pulley and gear 30 having teeth 31 formed on the forward inclined surface thereof and having grooves 32 formed in its cylindrical portion. The combined gear and pulley is held on the hub 28 of the spindle sleeve by the retaining plate 33, Figure 4, secured to the hub by the screws 34. The face of the member 30 and likewise the retaining plate is provided with grooves 35 and 36, respectively, which project radially with respect to the spindle shaft 20, the purpose of which will presently appear.

The spindle sleeve 27 is retained on shaft 20 by means of the collar 37 suitably pinned to the shaft and which directly engages the bearing race 26. The collar is enclosed by the cap member 38 which is keyed to extension 39 of the spindle shaft and is yieldingly urged into engagement with the end of the spindle by the coil spring 40 retained on the extension by the nut 41. As the cap member is yieldingly urged against the spindle the same retards the rotation thereof and

for this purpose a friction washer 42 is positioned between the rotating and nonrotating parts.

The hub portion 28 of the spindle carries a plurality of radially projecting rods or supporting members 43, each of which rotatably mounts an elongated screw 44 having at its lower end the pinion 45 meshing with the gear teeth 31 on the combined gear and pulley 30. Each elongated screw rests on a bearing race 46, the same being confined between the pinion and the hub 28 of the spindle shaft. The screw is retained on its respective rod by the collar 47. Supported from each of the members 43 is a right angle arm designated in its entirety by 48, having spaced lugs 50 and 51 projecting from one leg thereof, the upper lug receiving the outermost end of the rod 43, while the lower lug is threaded to the elongated screw 44. Each arm is held against rotation on its rod 43 but has movement longitudinally of the rod upon rotation of the elongated screw 44. Upon rotation of the combined pulley and gear 30 the pinions will rotate simultaneously to cause movement of the arms on their respective rods, the direction of movement of the arms being determined by the direction of rotation of the pinion and its integral elongated screw. From the foregoing it will be understood that the supporting arms 48 of the reel have movement toward the spindle 27 or outwardly away from the spindle, depending upon the particular direction of rotation given the pinions 45.

The arms of the reel are adapted to support a coil of stock 52, Figure 1, which is retained on the arms by keepers 53, each arm receiving a keeper which is detachable by means of the spring pressed retaining lever 54. Difficulty has been encountered in controlling the unwinding of the coil from the reel, especially with respect to machines having an intermittent feed due to the shortage of excess stock which causes the loops to snag around the coil. The invention contemplates a power drive for spindle reels which will embody automatic switch mechanism for connecting and disconnecting the drive, depending on the size of the loops of excess stock.

The structure 21—22 supports an electric motor 55 which drives shaft 56, having suitably keyed thereto the driving pulley 57. Said pulley is operatively connected with the combined pulley and gear 30 by means of endless belts 58 so that operation of the motor will result in rotation of said member 30. It is preferred that the endless belts 58 have slippage with respect to the pulleys 30 and 57 so as to relieve the power means of strain incident to the rotation of a heavy coil of stock and which will permit continued rotation of the heavy coil after the power means has ceased to operate. For locking the member 30 to the hub of the spindle so that rotations of the member 30 will be imparted to the spindle, the invention provides a manual lock, Figure 3, comprising a locking member 60 having reciprocating movement within a cylindrical bore formed in the member 30 and which is adapted to fit within openings 61 located in spaced relation around the periphery of the hub 28. The locking member 60 is lifted against the tension of coil spring 62 by the knob 63 and when lifted so as to entirely retract member 60 from its opening 61 and turned substantially ninety degrees the member will be held in released position so that member 30 and the spindle may have relative rotation.

Mounted in a support 64, Figure 5, are a pair of locking lugs 65—66, each lug being eccentrically connected to disc 67 by link 68. Disc 67 is fixed to shaft 70, suitably journalled in boss 71 formed integral with the support 64. The shaft 70 is manually actuated by handle 69, Figure 1, so that either locking lug 65 or 66 can be projected forwardly, depending on whether the operator desires to lock the member 30 or the spindle against rotation. Said member 30 and the retaining plate 33 have been previously described as provided with grooves 35 and 36 and it will be understod by reference to Figure 2 that when the locking lugs are caused to project beyond their support, said lugs will enter the particular recess disposed directly opposite thereto. When shaft 70 is rotated so as to actuate lug 65 the same will enter one of the recesses 35 in the member 30 and accordingly said member will be held against rotation and the spindle will be free to rotate, provided, of course, locking member 60 is still held in retracted position. Reverse rotation of shaft 70 will withdraw lug 65 and project lug 66 which will enter recess 36 in the retaining plate and thus hold the spindle 27 against rotation.

The electric switch for controlling the current to the motor 55 is indicated by numeral 72, Figure 1, the same being suitably fixed to casing 73 housing the switch arm 74. Said arm has suitably fixed thereto the stock supporting lever 75 which is adapted to engage with the outermost loop of the coil stock supported on the reel. One end of the switch arm 74 engages with the switch 72 and is yieldingly held in contact therewith by the coil spring 76 retained within the casing and having contact with the other end of said switch arm. The casing is suitably supported below and to one side of the coil of stock on the reel by the diagonal and horizontal supporting rods 77 and 78, the former being fixedly secured to a boss 80 integral with the portion 18 of the spindle arm. Projecting vertically from the horizontal rods 78 are rods 81 which are accordingly positioned on each side of the coil of stock.

With the lever 75 in the position shown in Figure 1 the switch 72 is in "on" position and current is supplied to the motor 55, rotating pulley 57, and through belt 58 the combined pulley and gear 30 is rotated, which upon release of the locking member 60 will effect rotation of the spindle and thus the reel. If the amount of stock unwound by the rotation of the spindle is in excess of the requirements of the metal working machine, stock will accumulate and the outermost loops of the coil will increase in size. An increase in the size of these loops, however, will actuate the stock supporting lever 75, causing movement of the same downwardly and actuation of the switch to "off" position. This will interrupt the current supplied to the motor, stopping the drive to the spindle.

The switch will remain in "off" position until the excess stock has been used up, whereupon the lever 75 will gradually move upwardly, being urged in this direction by spring 76. At a predetermined point the switch 72 wil be actuated to "on" position to again cause actuation of the motor and rotation of the reel.

To place a coil of stock on the present reel the locking member 60 is first retracted and the spindle is then locked against rotation by actuation of shaft 70 to project the locking lug 66. The motor is started and the member 30 is rotated to simultaneously rotate the elongated screws in that direction to cause travel of the arms inwardly. After the coil is placed on the arms the rotation of the motor is reversed and therefore the arms will travel outwardly and center the coil with respect to the spindle shaft. For very heavy

coils of stock it may be desirable to tighten the arms with respect to the coil, for which operation the reel is used as a capstan. First, however, the spindle must be released, which requires retraction of locking lug 66, and the member 30 is locked against rotation, for which purpose the locking lug 65 is projected forwardly. Rotation of the heel as a capstan in the proper direction will now produce outward travel of the arms until they are in tight engagement with the coil, whereupon the locking member 60 is located in locking relation with the spindle and the lug 65 is withdrawn to release the member 30. The reel is now loaded and is operatively connected with the source of power so that current can be supplied to the motor to rotate the reel for feeding stock material as has been previously described.

As the reel is supported on base 10 by the spindle arm and elevating screw, the same can be bodily rotated with respect to pivot point 19. Actuation of the spindle arm is accomplished by rotation of handle 24 which will locate the spindle reel at various angles to the vertical, as may be desired.

What is claimed is:

1. A spindle reel of the character described, including in combination, a supporting standard, a shaft pivotally supported at the upper end of said standard, elevating means for locating the shaft in desired rotated position with respect to the standard, a reel rotatably mounted on said shaft and adapted to support a coil of stock, an electric motor supported by said reel and operatively connecting with the reel to cause rotation thereof, an arm carried by the reel and being resiliently biased into contact with the outermost loop of said coil, a switch controlling the operation of said electric motor, and connections between said switch and said arm whereby said switch is actuated to start or stop said motor in response to the increase or decrease in the size of the outermost loop of said coil.

2. A device for supporting coils of stock including in combination, a support, a shaft supported thereby having a reel rotatable thereon, said reel including a spindle, a plurality of rods extending radially therefrom, actuating means rotatably mounted on each rod, and a supporting arm associated with each rod for supporting the coil of stock, each arm being slidably mounted on its rod and having connection with the actuating means, a gear rotatably mounted on said spindle for simultaneously rotating the actuating means for said supporting arms, and an electric motor supported by the reel for rotating the gear.

3. A device for supporting coils of stock including in combination, a support, a shaft supported thereby having a reel rotatable thereon, said reel including a spindle, a plurality of rods extending radially therefrom, actuating means rotatably mounted on each rod, and a supporting arm associated with each rod for supporting the coil of stock, each arm being slidably mounted on its rod and having connection with the actuating means, a gear rotatably mounted on said spindle for simultaneously rotating the actuating means for the supporting arms, an electric motor supported by said reel, and means operatively connecting said motor and said gear.

4. A device for supporting coils of stock comprising, in combination, a support, a reel mounted for rotation on said support and including a shaft journalling a spindle, a gear rotatably mounted on said spindle, means for locking said gear and spindle, whereby they rotate as a unit, an electric motor supported by said reel, and means operatively connecting said motor and said gear.

5. A device for supporting coils of stock comprising, in combination, a support, a reel mounted for rotation on said support and including a shaft journalling a spindle, a gear rotatably mounted on said spindle, means for locking said gear and spindle, whereby they rotate as a unit, an electric motor supported by said reel, means operatively connecting said motor and said gear, and means responsive to the quantity of excess stock unwound from said reel for controlling the operation of said electric motor.

6. An automatic reel for winding or unwinding strip stock comprising a stand, a stock reel journaled on said stand, a brake operating to hold said reel in the periods of rest, a free swinging arm mounted on said stand and located to be engaged and positioned by a slack loop of the strip material winding on or unwinding from said reel, switch means including a tilting switch contact connected to and actuated by said free swinging slack engaging arm, a motor mounted on said stand, drive connections from said motor to said reel and electrical connections on said stand from said tilting control switch mechanism to said motor.

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