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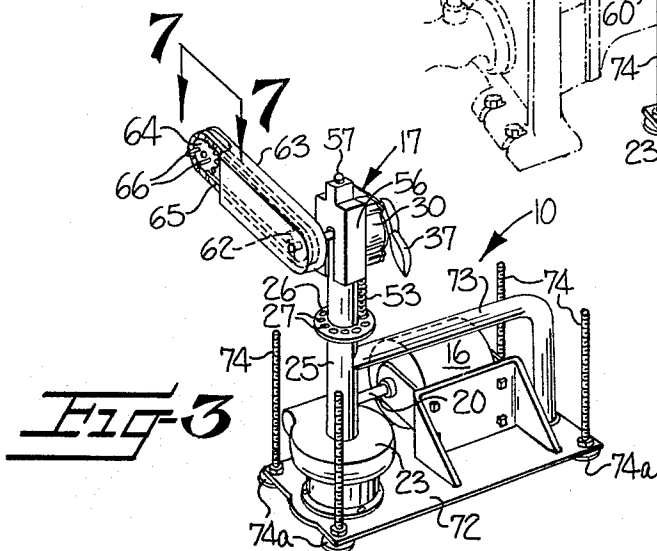
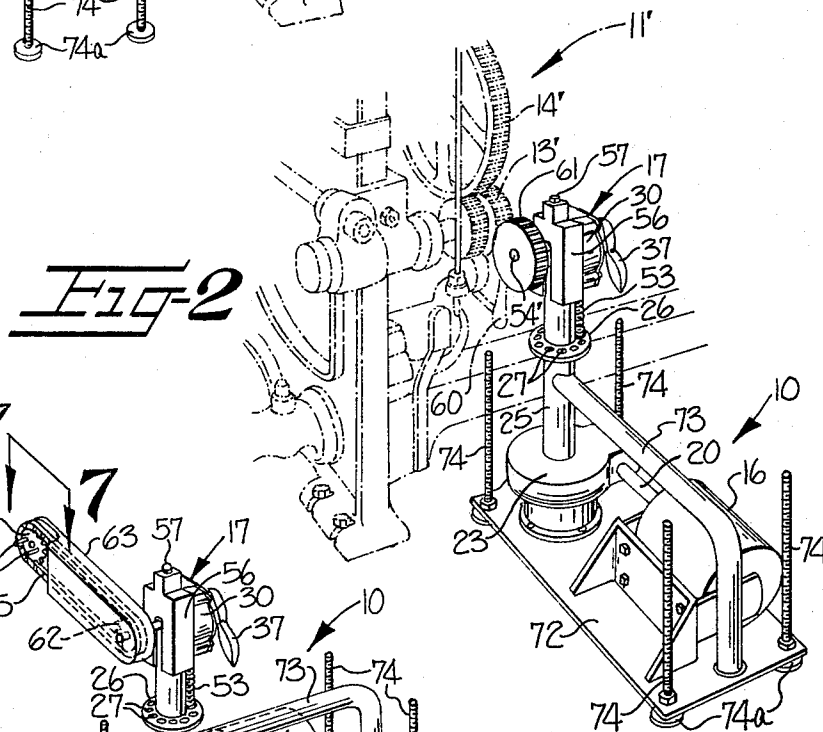
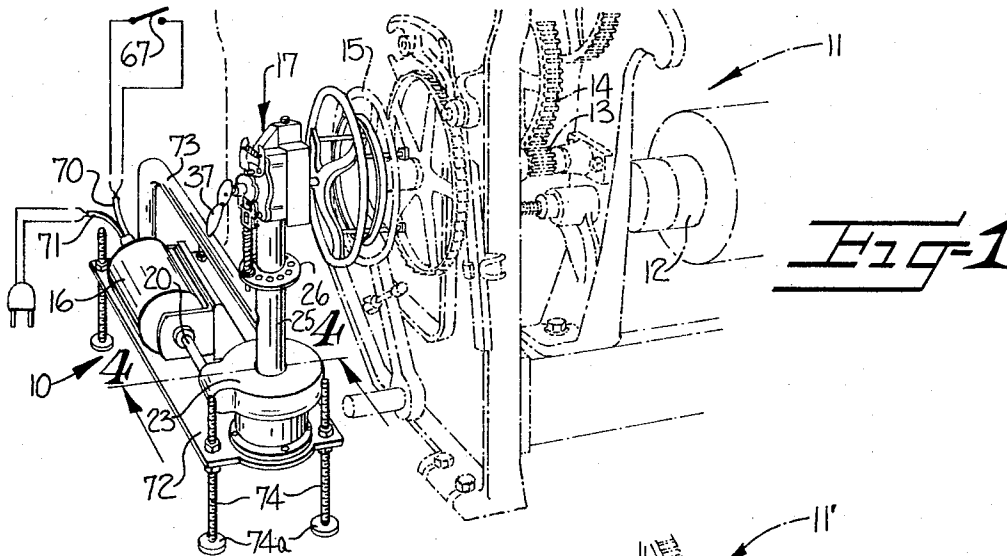
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3,265,094

APPARATUS FOR ROTATING THE CLOTH ROLL OF A LOOM

Filed Feb. 8, 1965

2 Sheets-Sheet 1



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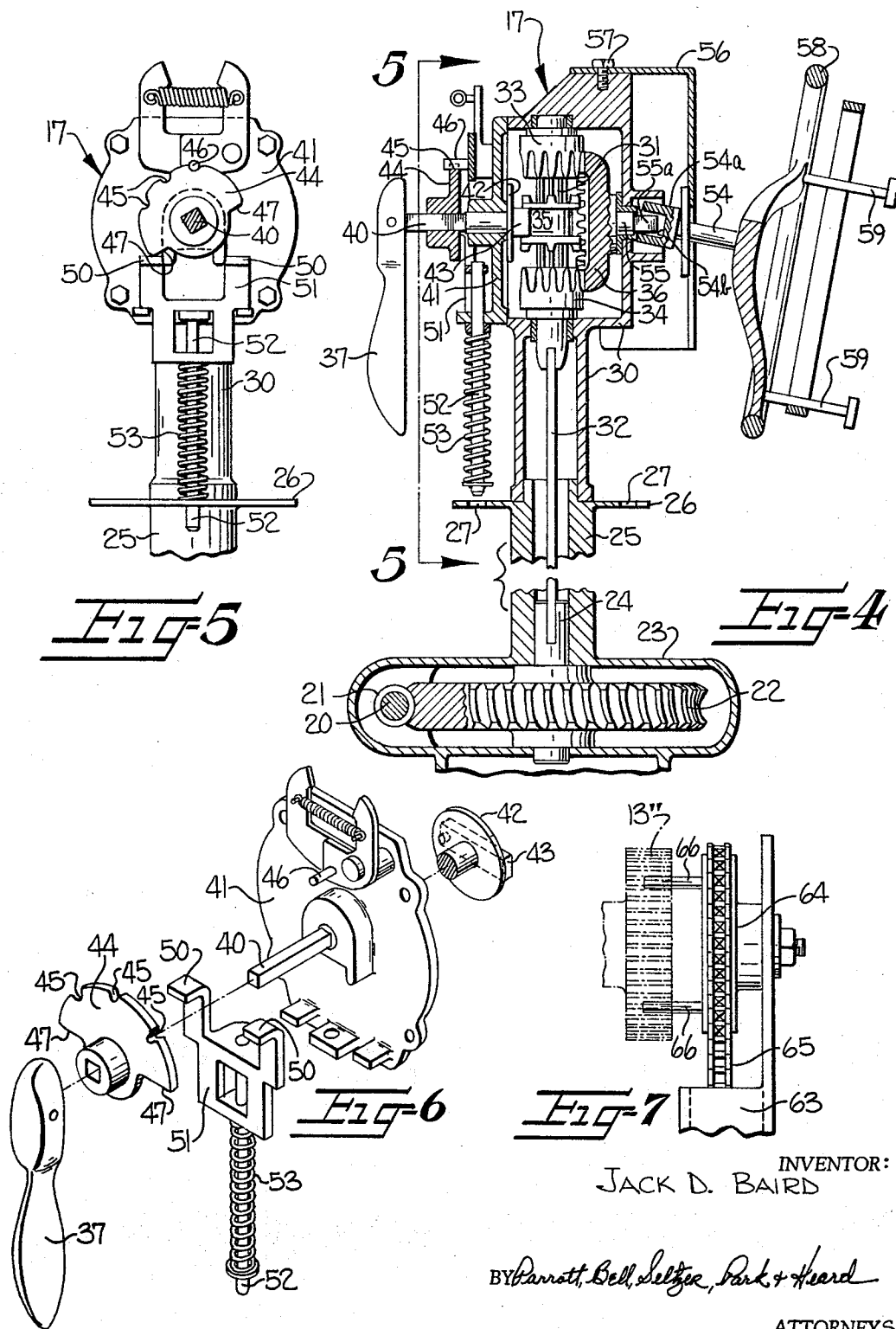
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APPARATUS FOR ROTATING THE CLOTH ROLL OF A LOOM

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16 Claims. (Cl. 139-1)

My invention pertains to an apparatus for rotating the cloth roll of a loom, independently of the normal drive means for such a loom, and more particularly, to a portable apparatus detachably connectable to the cloth rolls of a variety of types and arrangements of looms for rotating such cloth rolls to facilitate the pulling of knotted together ends of warp threads through the operating instrumentalities of the loom following the "tying-in" operation.

In the manufacture of woven textile materials on looms, warp threads are wound on a warp beam which is normally mounted at the rear portion of the loom and from which the warp threads are supplied to the operating instrumentalities of the loom through which the warp threads are threaded. By these operating instrumentalities, the warp threads are manipulated and interwoven with filling threads and the resulting cloth is wound onto a cloth roll at the front of the loom which is driven in coordination with the weaving operation.

When the supply of warp threads upon a warp beam becomes exhausted, a new warp beam is moved into operative position on the rear of the loom and the leading ends of the warp threads thereon are knotted to the trailing ends of the warp threads of the old warp beam in an operation commonly referred to as a "tying-in" operation. Before normal operation of the loom may be resumed, the knots connecting these warp threads must be moved and guided through the operating instrumentalities of the loom since such knots would become caught or jammed in such operating instrumentalities during normal operation of the loom which would result in excessive breakage of the warp threads.

Conventionally, this movement and guiding of the knotted-together ends of such warp threads is accomplished manually which is a very laborious, time consuming and expensive operation. In this respect manually operable elements, such as handwheels, ratchet drives or crank means, are conventionally provided for manual rotation of the cloth rolls of looms to slowly pull the knotted together warp threads forwardly. This manual rotation of the cloth roll is normally performed by an operator disposed at the front of the loom while another operator at the rear or one side of the loom guides the knots through the operating instrumentalities of the loom. This manual rotation of the cloth roll by the manually operable element is considerably laborious and time consuming. Also, the loom on which this operation is performed is necessarily out of production for an extended time period, and this loss of production coupled with the requirement for two operators, renders this conventional pulling through operation quite expensive.

Accordingly, it is an object of this invention to provide an apparatus connectable to the cloth roll of a loom for rotating the same to pull knotted-together warp threads forwardly following a tying-in operation and which obviates the aforementioned problems and difficulties encountered in a conventional pulling through operation by considerably reducing the time, labor and expense required therefor.

It is a further object of this invention to provide a portable apparatus connectable to the cloth roll of a loom for rotating the cloth roll following a tying-in operation to pull the knotted-together warp threads for-

wardly and wherein the apparatus may be operated by a single operator positioned at the rear of the loom who may also guide the knotted together ends of the warp threads through the operating instrumentalities of the loom.

A more specific object of the present invention is to provide an apparatus of the character described which may be operatively associated with the cloth rolls of a variety of types and arrangements of looms.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds when taken in connection with the accompanying drawings, in which:

FIGURE 1 is a perspective view of the apparatus of this invention with portions shown schematically and showing the apparatus in association with the cloth roll of a loom shown in phantom lines;

FIGURE 2 is a perspective view similar to FIGURE 1 of another embodiment of the apparatus of this invention;

FIGURE 3 is a perspective view of still another embodiment of the apparatus of this invention;

FIGURE 4 is an enlarged detail view in section, taken substantially along the line 4-4 in FIGURE 1;

FIGURE 5 is a vertical section taken substantially along the line 5-5 in FIGURE 4;

FIGURE 6 is an exploded isometric view of the portion of the apparatus shown in FIGURES 4 and 5;

FIGURE 7 is an enlarged top plan taken substantially along the line 7-7 in FIGURE 3 and showing the apparatus in association with a gear (shown in phantom lines) in the gear train to the cloth roll of the loom.

In FIGURE 1, the portable apparatus of this invention is shown in full lines and is indicated generally 10, while one type of conventional loom is shown in phantom lines and is indicated generally 11. The loom 11 includes a cloth roll 12 about which cloth is rolled, and a gear train including spur gears 13, 14 connected to the cloth roll 12 for rotating the same from drive means for the loom (not shown). Conventionally, the gear train including gears 13 and 14 may be driven by a handwheel 15 which is connected to the gear train and will thus controllably rotate the cloth roll 12 when manually operated.

The portable apparatus 10 of this invention obviates the necessity of having an operator manually turn the handwheel 15, and permits a single operator, who may also watch for and clear jammed knots, to control the rotation of the cloth roll 12. Broadly, this is accomplished by providing a rotatable means detachably connected to the cloth roll 12, a power means for driving the rotatable means, and a remote control means adapted for use by the operator standing adjacent the warp beam, controlling the operation of the power means and thereby controlling the rotation of the cloth roll 12.

The power means of the apparatus of this invention includes a motor 16 and a reversible transmission indicated generally as 17, drivingly connecting the motor 16 and the rotatable means which is detachably connectable to the cloth roll 12. As best shown in FIGURES 1 through 4, the motor 16 is drivingly connected to the reversible transmission 17 by a motor shaft 20 which carries a worm gear 21 (FIGURE 4). The worm gear 21 engages a worm wheel 22 within a right angle gear housing 23, and the worm wheel 22 is in turn fixed to a vertical shaft 24 supported for rotation about a vertical axis by the housing 23. The right angle housing 23 has an upwardly extending support portion 25, which carries at its upper end a locator flange 26 having a number of locator holes 27, for purposes to be made more clear shortly.

In order to accommodate a variety of types of looms and a variety of floor arrangements of such looms, the reversible transmission 17 of the apparatus of this invention is supported on the upwardly extending portion 25 of the right angle housing 23 for rotation about an axis substantially coincident with the axis of rotation of the vertical shaft 24. As will be made more clear when the operation of the apparatus of this invention, in combination with a loom, is described hereinafter, this angular adjustment permits the portable apparatus of this invention to be properly positioned to detachably engage the cloth roll of any of a variety of looms, even though the looms are installed in the weave room with only narrow alleys between adjacent looms. The reversible transmission includes a transmission case 30 and a splined shaft member 31 supported within the casing 30 for rotation about a vertical axis substantially coincident with the vertical shaft 24 carried within the right angle housing 23. The splined shaft 31 and the lower vertical shaft 24 are drivingly connected by a bar 32.

The splined shaft 31 carries an upper intermediate gear 33 and a lower intermediate gear 34, rotately supported on the splined shaft 31 to freely rotate relative to that shaft and respectively defining first and second clutch elements. Additionally, the splined shaft 31 carries a floating gear 35, which is internally splined to be in driven engagement with the splined shaft 31, while being vertically movable along that shaft to various positions. The floating gear 35 defines a third clutch element and has toothed upper and lower end surfaces, adapted to drivingly engage the upper and lower intermediate gears 33, 34, when moved to opposite extremities of its range of travel along the splined shaft 31. Floating gear 35 has an intermediate or neutral position wherein the toothed upper and lower surfaces thereof do not engage either of the intermediate gears 33, 34.

The transmission housing 30 additionally supports, for rotation about a horizontal axis, a face gear 36 which is constantly in mesh with the upper and lower intermediate gears 33, 34. The driven direction of the face gear 36 is selected by controllably engaging the sliding gear 35 with either of the upper and lower intermediate gears 33, 34, while the other, or unengaged, gear idles about the splined shaft 31.

In order to control the selection of the direction of rotation of the face gear 36 and simultaneously lock the transmission 17 in a desired angular relation, a selection and locking mechanism is provided as shown in detail in FIGURES 4 through 6. As there shown, a manually operable handle 37 is fixed to a selector shaft 40 which extends through a housing cover 41, in which it is rotatably supported. This shaft 40 carries at its inner end a selector plate 42 and bar 43 which engage the sliding gear 35. The selector handle 37, when moved to various positions, causes the selector plate 42 to rotate and, by the engagement of the selector bar 43 with sliding gear 35, moves the sliding gear upwardly or downwardly to engage one of the upper or lower intermediate gears 33, 34. The selector shaft 40 additionally carries a cam plate 44, adjacent the outer surface of the housing cover 41, which has a number of selector notches 45. The selector notches 45 are engaged by a spring loaded detent rod 46, and serve to hold the selector shaft 40 in a selected one of three possible positions. In one position, the sliding gear 35 is engaged with the upper intermediate gear 33, to cause the face gear 36 to rotate in one direction. At the other extreme position of the cam plate 44, the selector shaft 40 is held in a position in which the sliding gear 35 is engaged with the lower intermediate gear 34 to drive the face gear 36 in the opposite direction. In the centered or neutral position of the selector shaft 40, the sliding gear 35 is held out of engagement, and the face gear 36 is not driven.

The cam plate 44 additionally is provided with lower abutment surfaces 47, which engage outwardly project-

ing bearing surfaces 50 of a sliding locking plate 51. As best shown in FIGURES 4 and 5, the sliding locking plate 51 has a depending rod member 52, which is adapted to enter into a selected one of the locator flange holes 27 when the selector shaft 40 is moved to a position in which the transmission is drivingly engaged. This is best shown in FIGURE 5, where the transmission is shown as drivingly engaged and locked against angular movement about the vertical axis of adjustment. The depending rod member 52 carries a compression spring 53 which, when the rod 52 is lockingly engaged with the flange 26, biases the rod upwardly to assist in freeing the locking engagement when the selector shaft 40 is returned to a neutral position as shown in FIGURE 4.

In order to permit a detachable connection to the cloth roll of the power loom, and to accommodate a variety of types of looms, the apparatus of this invention is provided with rotatable means operatively connected to the face gear 36 of the transmission 17 and detachably connectable to the cloth roll of a loom. Three types of rotatable means are illustrated in FIGURES 1 through 3 and 7, each which is particularly constructed and adapted to be detachably connected to the cloth roll of a particular type of loom. However, although not specifically illustrated, any rotatable means connectable to the cloth roll of a loom of any character is contemplated within the scope of the present invention. In each instance as illustrated in the drawing and perhaps most clearly brought out in FIGURE 4, the rotatable means includes a shaft 54 having an enlarged portion 54a at its inner end which has a square opening 54b therein. Opening 54b receives a corresponding shaped end portion 55a of a shaft 55 fixed to face gear 36 for rotation therewith. It is noted that opening 54b is slightly larger than end portion 55a of shaft 55 to permit a predetermined amount of relative angular movement while drivingly connecting the two shafts 54 and 55 together. A cover member 56, which is removably secured to the transmission case 30, as by a bolt 57, holds the enlarged end portion 54a of shaft 54 in surrounding relation to end portion 55a of shaft 55.

Where the loom with which the apparatus 10 of this invention is to be used is the type having a handwheel 15 as the normally manually operable element for rotating the cloth roll 12 as illustrated in FIGURE 1, the rotatable means of the present invention preferably takes the form illustrated in FIGURES 1 and 4, and comprises a wheel member 58, which may be a modified form of a handwheel such as the handwheel 15, which is fixed to the outer end of shaft 54 for rotation in a generally vertical plane. The wheel member 58 has at least one and preferably a plurality of lateral projections 59 spaced therearound to coincide with the spacing of the radial spiders or webs of the handwheel 15. Thus, when the rotatable means is positioned in facing relation and adjacent to the handwheel 15, the lateral projections 59 extend within the handwheel 15 and, upon relative rotation of the rotatable means and handwheel 15, will detachably drivingly engage the radial webs of the handwheel 15 for rotating the handwheel. Thus, the apparatus 10 of this invention is detachably connected to the cloth roll 12 for rotating the same.

With a second type of loom, as illustrated in FIGURE 2, the drive for a cloth roll (not shown) is transmitted through a gear train including gears 13' and 14' substantially similar to gears 13 and 14 of the type of loom shown in FIGURE 1. The manually operable element of such a drive conventionally is a ratchet handle 60, operatively connected to the gear train including gears 13' and 14' in a manner not shown so as to controllably rotate the cloth roll. With this type of loom, the rotatable means is preferably a gear wheel 61, as shown in FIGURE 2, which is supported on a shaft 54' for rotation therewith in a manner substantially identical to the wheel member 58 shown in FIGURE 1, and in fact the two rotatable means are interchangeable. The gear wheel

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61 is adapted to drivingly engage one gear 13' in the cloth roll gear train, and thus be detachably connected to the cloth roll for controllably rotating the same.

In a third type of loom, the cloth roll has a drive which includes a gear train (not shown) substantially similar to that shown in FIGURE 2 and includes a gear 13" (FIGURE 7) very similar to gear 13' in FIGURE 2 except that gear 13" conventionally has two substantially diametrical holes in one side face thereof. A ratchet handle (also not shown) similar to the handle 60 is provided and is manually operable to controllably rotate the cloth roll. However, in this third type of loom, the gear train, including gear 13", is not so exposed as to permit the use of a rotatable means such as the gear wheel 61 in FIGURE 2, and a rotatable means as shown in FIGURES 3 and 7 is used which is also interchangeable with either the gear wheel 61 or wheel member 58. This third type of rotatable means includes a drive sprocket 62 mounted on a shaft 54", similar to shafts 54 and 54', for rotation therewith. An elongate chain guard 63 is supported on shaft 54" at one end in surrounding relation to drive sprocket 62 and extends laterally outwardly therefrom. A driven sprocket 64 is rotatably mounted on the other end portion of chain guard 63 and a sprocket chain 65 drivingly connects the two sprockets 62, 64. The driven sprocket 64 is provided with laterally projecting pins 66, which are so dimensioned and spaced as to be adapted to be received within the two holes in the side face of gear 13" for rotating the cloth roll through the gear train of which gear 13" is a part.

From this discussion of the three distinct types of rotatable means illustrated herein and which may be interchangeably used with the apparatus 10 of this invention, it has been shown that the apparatus of this invention is adapted for use with a variety of types of looms having a variety of drive arrangements connected to the cloth roll.

In order to permit a single operator, working at the rear or side of the loom remote from the cloth roll 12, to control the rotation of the cloth roll 12 of the loom, the apparatus of this invention includes a remote control means, schematically illustrated in FIGURE 1, as a switch 67 which may be carried by the operator working adjacent the rear of the loom who may stop and start the rotation of the drive motor 16 and thus control the rotation of the cloth roll 12. This switch may be connected by means of a length of cord 70 to the power terminals of the electric motor 16, which derives electrical power from any convenient outlet into which power cord 71 may be plugged.

The relatively small bulk and light weight of the apparatus 10 of this invention, and the desirability of employing a single apparatus to service a large number of looms, adapt the apparatus to portable use. In order to facilitate such use, the motor 16 and right angle gear housing 23 are supported on a suitable base 72 and a handle 73 is provided to facilitate transportation of the apparatus between various use and storage locations. Further, in order to accommodate the varying heights of cloth roll drive elements on various looms, provision is made for vertical adjustment of the height of the base 72 above the weave room floor. This vertical adjustment may be conveniently made by means of a plurality of mounting bolts 74, threaded through the base 72 and having enlarged head portions 74A adapted to rest on the weave room floor, for example.

In operation, following a tying-in operation when a loom is prepared for the knotted-together leading ends of new warp threads and trailing ends of old warp threads to be pulled through the operating instrumentalities of the loom, the apparatus 10 of this invention may be brought to the loom and disposed adjacent the loom in the position required for the rotatable means to be detachably connected to the cloth roll of the loom. Where looms are of the first type shown in FIGURE 1, and are so arranged on the floor of the weave room as to leave only

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a narrow alley between adjacent looms, the transmission 17 of the apparatus 10 of this invention may be angularly adjusted so as to place the base 72 of the apparatus generally perpendicular to the direction of the axis of rotation of the rotatable means, permitting the apparatus to be placed in the narrow alley space available. Where looms are so arranged on the weave room floor so that a wide alley is provided, the transmission 17 may be positioned at any other angular relationship considered convenient as, for instance, with the base extending in the same direction as the axis of rotation of the rotatable means. The rotatable means is then detachably connected to the cloth roll, and the power cord 71 for the motor 16 connected to a suitable source of power. The operator may then carry the switch 67 to the operating position adjacent the rear of the loom, and from that point, control the rotation of the cloth roll to pull in the new warp threads while guiding the knotted portions of the warp threads through the operating instrumentalities of the loom. When this is accomplished and normal operation of the loom may again begin, the apparatus 10 of this invention is detached from its connection to the cloth roll of the loom, and returned to storage or used in combination with another loom where required.

The operation of the embodiments illustrated in FIGURES 2 and 3, respectively, are substantially the same as described above except that the rotatable means thereof will be connected to the cloth roll in a different manner and may occupy a different angular position and vertical height.

It is therefore believed apparent that the present invention provides a novel apparatus detachably connectable to the cloth roll of a loom for rotating the same to pull the knotted-together warp threads through the operating instrumentalities of the loom following a tying-in operation and wherein the apparatus is controllable by a single operator from a position remote from the cloth roll so that the same operator may also guide the knots through the operating instrumentalities of the loom. Also, the present invention provides an apparatus of the character described which may be operatively associated with the cloth rolls of a variety of types of looms.

In the drawings and specification there have been set forth preferred embodiments of the invention and, although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation, the scope of the invention being defined in the claims.

I claim:

1. In combination with a loom having a cloth roll adapted to be controllably rotated following a tying-in operation to pull the knotted-together trailing ends of the threads of an old or exhausted warp and leading ends of the threads of a new or full warp through the operating instrumentalities of the loom, portable apparatus for rotating the cloth roll comprising:

- (a) rotatable means detachably connected to the cloth roll for rotating the same,
- (b) power means operatively connected to said rotatable means for driving the same at a predetermined speed, and
- (c) control means operatively connected to said power means and adapted to be operated from a position remote from said cloth roll for controlling the operation of said power means and thereby controlling the rotation of the cloth roll.

2. The combination claimed in claim 1 in which said power means is reversible for driving said rotatable means in either direction for operative association of said rotatable means with the cloth roll of a variety of types of looms.

3. The combination claimed in claim 1 in which said rotatable means is angularly adjustable about an axis perpendicular to the axis of rotation of the same for operative association of said rotatable means with the cloth rolls of a variety of types of looms.

4. In combination with a loom having a cloth roll adapted to be controllably rotated following a tying-in operation to pull the knotted-together trailing ends of the threads of an old or exhausted warp and leading ends of the threads of a new or full warp through the operating instrumentalities of the loom, portable apparatus for rotating the cloth roll comprising:

- (a) rotatable means detachably connected to the cloth roll for rotating the same and angularly adjustable about an axis perpendicular to the axis of rotation of the same for operative association of said rotatable means with the cloth rolls of a variety of types and arrangements of looms,
- (b) reversible power means operatively connected to said rotatable means for driving the same at a predetermined speed in either direction for operative association of said rotatable means with the cloth rolls of a variety of types of looms, and
- (c) control means operatively connected to said power means and adapted to be operated from a position remote from said cloth roll for controlling the operation of said power means and thereby controlling the rotation of the cloth roll.

5. The combination claimed in claim 4 in which said rotatable means is supported for rotation about a substantially horizontal axis, and is mounted for angular adjustment about a vertical axis and for vertical adjustment for operative association with the cloth rolls of a variety of types and arrangements of looms.

6. The combination claimed in claim 4 in which said power means comprises:

- (a) a motor, and
- (b) a reversible transmission operatively connecting said motor and said rotatable means.

7. In combination with a loom having a cloth roll adapted to be controllably rotated following a tying-in operation to pull the knotted-together trailing ends of the threads of an old or exhausted warp and leading ends of the threads of a new or full warp through the operating instrumentalities of the loom, portable apparatus for rotating the cloth roll comprising:

- (a) rotatable means supported for rotation on a substantially horizontal axis and detachably connected to the cloth roll for rotating the same, said rotatable means being mounted for angular adjustment about a vertical axis and for vertical adjustment for operative association with cloth rolls of a variety of types and arrangements of looms,
- (b) a motor,
- (c) a reversible transmission operatively connecting said motor and said rotatable means for driving the latter in either direction at a predetermined speed, and
- (d) control means operatively connected to said motor and adapted to be operated at a position remote from the cloth roll and adjacent the rear portion of the loom for controlling the operation of said motor and hence the rotation of the cloth roll.

8. The combination claimed in claim 7 in which a handwheel is connected to said cloth roll for normally manual rotation thereof, and in which said rotatable means comprises:

- (a) a wheel member rotatable in a generally vertical plane and having at least one lateral projection adapted to detachably engage the normally manually operable handwheel to controllably rotate the cloth roll.

9. The combination claimed in claim 7 in which a gear train is connected to the cloth roll for rotation thereof normally by the drive means of the loom during operation of the loom, and in which said rotatable means comprises:

- (a) a gear member rotatable in a vertical plane and detachably engaging the gear train to controllably rotate the cloth roll.

10. The combination claimed in claim 7 in which a gear train is connected to the cloth roll for rotation thereof normally by the drive means of the loom during operation of the loom, and in which said rotatable means comprises:

- (a) a drive sprocket operatively connected to said transmission and driven thereby,
- (b) a driven sprocket detachably engaging the gear train, and
- (c) a drive chain connecting said drive and driven sprocket to drive the latter to controllably rotate the cloth roll.

11. Portable apparatus for controllably rotating the cloth roll of a loom following a tying-in operation to pull the knotted-together trailing ends of old warp threads and leading ends of new warp threads through the operating instrumentalities of the loom comprising:

- (a) rotatable means supported for rotation on a substantially horizontal axis and adapted to be detachably connected to the cloth roll for rotating the same and being angularly adjustable about a vertical axis for operative association with cloth rolls of a variety of types and arrangements of looms,
- (b) reversible power means operatively connected to said rotatable means for driving the same in either direction, and
- (c) control means operatively connected to said power means and adapted to be operated at a position remote from said rotatable means for controlling the operation of said power means and thereby controlling the rotation of the cloth roll of the loom.

12. The apparatus claimed in claim 11 in which said rotatable means comprises:

- (a) a wheel member rotatable in a generally vertical plane and having at least one lateral projection adapted to detachably engage a handwheel connected to the cloth roll of one type of loom.

13. The apparatus claimed in claim 11 in which said rotatable means comprises:

- (a) a gear member rotatable in a vertical plane and adapted to detachably engage a gear train connected to the cloth roll for rotation thereof.

14. The apparatus claimed in claim 11 in which said rotatable means comprises:

- (a) a drive sprocket operatively connected to said transmission and driven thereby,
- (b) a driven sprocket adapted to detachably engage a gear train connected to the cloth roll, and
- (c) a drive chain connecting said drive and driven sprocket to drive the latter and controllably rotate the cloth roll.

15. Portable apparatus for controllably rotating the cloth roll of a loom following a tying-in operation to pull knotted together trailing ends of old warp threads and leading ends of new warp threads through the operating instrumentalities of the loom comprising:

- (a) rotatable means supported for rotation on a substantially horizontal axis and adapted to be detachably connected to the cloth roll for rotating the same,
- (b) means for adjusting the vertical position of said rotatable means with respect to the loom to adapt said rotatable means for operative association with cloth rolls of a variety of types of looms,
- (c) a motor,
- (d) reversible transmission means operatively connecting said motor and said rotatable means for driving the latter in either direction at a predetermined speed,
- (e) means for angularly adjusting said transmission means and said rotatable means about a vertical axis to adapt said rotatable means for operative association with cloth rolls of a variety of types and arrangements of looms,

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(f) latch means for releasably retaining said transmission means and said rotatable means in a selected one of a plurality of discrete angular positions, and
 (g) control means operatively connected to said motor and adapted to be operated at a position remote from said rotatable means for controlling the operation of the cloth roll of the loom.

16. The apparatus claimed in claim 15 in which said reversible transmission means includes first and second spaced clutch elements operatively connected to said rotatable means for respectively rotating the same in opposite directions and a third clutch element selectively movable from a neutral position out of engagement with said first and second clutch elements to operative positions in engagement with one of said first and second

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clutch elements, and means for moving said third clutch element between its neutral and operative positions and for simultaneously operating said latch means to retain said transmission means against angular adjustment when said third clutch element is engaged with one of said first and second clutch elements.

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