Dec. 3, 1968 A. ABOWITZ 3,413,700

FABRIC UNRAVELING MACHINE

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FIG. — 1

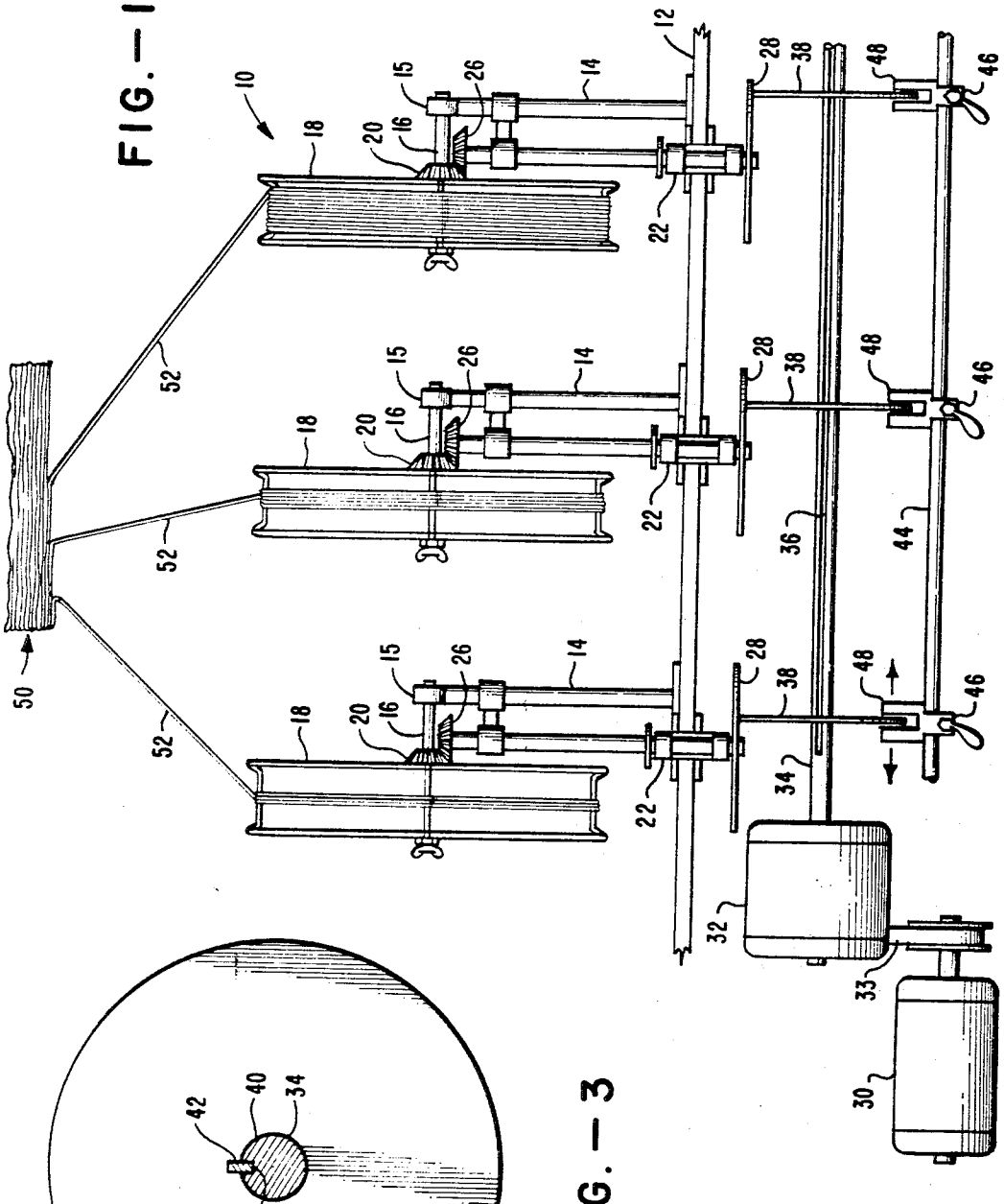



FIG. — 3




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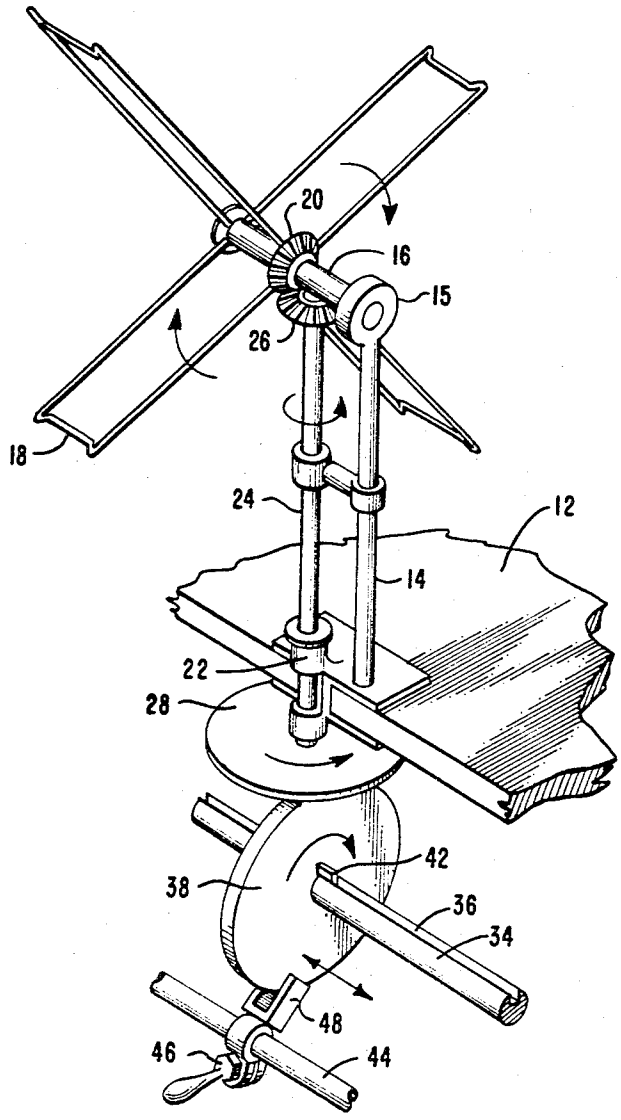



FIG. — 2

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# FABRIC UNRAVELING MACHINE

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## ABSTRACT OF THE DISCLOSURE

This invention relates to a fabric unraveling machine wherein yarn-winding reels are mounted on a support. Means are provided for separately adjusting the speed of each yarn-winding reel. In addition, means are provided for adjusting the speed of all the winding reels without disturbing the relative speeds of the winding reels, so that the fabric unraveling machine may be started slowly to determine whether or not the yarn-winding reels have the correct speed in relation to each other for the particular fabric to be unraveled.

This invention relates to a yarn unraveling machine.

When knitted cloth is knit by a knitting machine, numbers of separate cones of yarn are mounted on the machine and the yarn on these cones is fed into the knitting machine during its operation. The number of separate cones of yarn used with the knitting machine depends on the weave or knit and the yarn from each cone is fed into the knitting machine simultaneously but often at different speeds. For example, the yarn on one cone may be fed into the knitting machine at twice the speed of another cone and one-and-one-half times the speed of a third cone, etc.

When the knitted cloth is defective or too much yarn is knitted, it would be desirable to be able to unravel the knitted cloth and rewind it so that it could be used again. Heretofore this was not economically feasible because of the difficulty in devising a yarn unraveling machine which could operate automatically and without supervision. The difficulty in designing a practical yarn unraveling machine was due to problems caused because different quantities of yarn from the numbers of cones of yarn mounted on the knitting machine were consumed to make the knitted cloth. Furthermore, the relationship between the quantities of yarn fed into the machine from each of the cones of yarn also varied with changes in the knit or weave.

What is needed therefore, and comprises an important object of this invention, is to provide a yarn unraveling machine which can unravel knitted cloth regardless of the weave.

Still another object of this invention is to provide a yarn unraveling machine which can operate automatically and without supervision regardless of the weave of the knit cloth.

Still another object of this invention is to provide a yarn unraveling machine which is simple to construct and economical to operate.

This and other objects of this invention will become more apparent when better understood in the light of the accompanying specifications and drawings, wherein:

FIGURE 1 is an elevational view of a portion of a yarn unraveling machine constructed according to the principles of this invention.

FIGURE 2 is a perspective view showing a winding reel and a speed control mechanism associated with the winding reel.

FIGURE 3 is an elevational view of a friction driving disk used with this invention.

Referring now to FIGURE 1 of the drawing, the yarn unraveling machine indicated generally by reference numeral **10** comprises a table **12**. A plurality of vertical supports **14** are rigidly mounted on the table. The upper ends of the vertical supports **14** are, in this embodiment, enlarged to form bearings **15**. These bearings carry horizontal shafts **16** rotatably mounted therein. Yarn winding reels **18** are removably mounted on the shafts **16** by any suitable means, not shown. With this arrangement, winding reels **18** can be separately removed from the yarn unraveling machine when full and replaced by empty winding reels. In addition, each horizontal shaft **16** carries a beveled gear **20** rigidly secured thereto.

The table **12** is provided with forked vertically disposed bearings **22** rigidly secured thereto. Vertical shafts **24** are rotatably mounted in these bearings. A beveled driving gear **26** is rigidly mounted on the upper end of each shaft **24** and this beveled driving gear is in engagement with bevel gear **20** and has the added function of supporting shaft **16**. With this arrangement, rotation of the vertical shafts **24** causes the horizontal shafts **16** to rotate. This in turn causes the yarn unwinding reels **18** to rotate with the shafts **24**. A horizontally disposed friction driving disk **28** is rigidly secured to the lower end of each shaft **24** by any suitable means, not shown, and is rotatable therewith.

The yarn unraveling machine **10** is powered by an electric motor **30**. The motor **30** is connected to any suitable driving shaft speed adjustment mechanism **32** by such means as a belt drive **33**. The driving shaft speed adjustment mechanism is connected to a driving shaft **34** and operates to control the speed of rotation of this driving shaft for reasons to become apparent below.

The driving shaft **34** is provided with a tooth receiving groove **36** extending longitudinally therein, see FIGURE 2. A friction driving disk **38** is provided for each friction disk **28**. Each friction driving disk **38** is formed with a shaft receiving hole **40** and includes an integrally formed and inwardly radially extending tooth **42**, see FIGURE 3. As shown in FIGURE 2, the tooth **42** rides in grooves **36**. With this arrangement the friction driving disks **38** are movable longitudinally on the driving shaft **34**, but must rotate with the driving shaft. Consequently, when the motor **30** operates and causes driving shaft **34** to rotate, all the friction disks **38** also rotate at the same angular rotational speed as driving shaft **34**.

As seen in FIGURES 1 and 2, the serrated periphery of the friction driving disks **38** engage the rough planar surface of the friction disks **28**. With this arrangement rotation of the driving shaft **34** causes the friction disks **28** and vertical shafts **24** to rotate. This, as explained above, causes the yarn winding reels **18** to rotate.

The speed of rotation of the yarn winding, reels may be varied by adjusting the distance of the periphery of the friction driving disks **38** from the center of the friction disk **28**, in a manner well known in the art. Furthermore, if desired, a reversal of the angular direction of rotation of the yarn winding reels is possible by moving the friction driving disk **38** so its periphery engages the rough planar surface of the friction disk **28** on the opposite side of the center of the friction disk from that shown in the drawings.

In order to hold the friction driving disks in any desired position along the axis of the driving shaft **34** a support bar **44** is rigidly mounted below the driving shaft **34**. A plurality of lever actuated clamps **46** carrying a forked member **48** are adjustably mounted on the support bar and are movable along the longitudinal axis of the bar. By actuation of the clamps **46**, in a manner well known in the art, the forked member **48** may be moved longitudinally to any point on the bar and locked there. The spacing between the tines of the forked member **48** is sized to loosely receive the sides of the friction driving disk **38**. In this way, by actuating clamps **46** the friction driving

disks **38** may be moved longitudinally along the axis of the driving shaft **34** and locked in any desired longitudinal position.

In operation the free ends **52** of yarn in a piece of knit cloth **50** mounted on a support (not shown) and which was originally knit into the knitted cloth from the separate cones of yarn on the knitting machine, are attached to separate winding reels, see FIGURES 1 and 2. Then the electric motor is started and by controlling the driving shaft speed adjustment mechanism **32**, the driving shaft **34** is caused to rotate slowly. By inspection it can be seen which of the free ends of yarn unravel the fastest and which unravel the slowest. Then the positions of the friction driving disks **38** are adjusted so the speeds of rotation of the various winding reels to which the free ends **52** of the yarn are attached have the same ratio to each other as the quantities of yarn consumed to make the knit cloth and which are associated with each of the free ends **52** from the separate cones of yarn in the knitted cloth. Then, when the winding reels are rotating at the proper rotational speed relative to each other, the driving shaft speed adjustment **32** can be actuated to increase the over all speed of the winding reels without disturbing the adjustment of the relative speeds of rotation of the winding reels. Consequently, the yarn can be unraveled rapidly and the machine will function without supervision.

It is, of course, apparent that when the machine is required to unravel different weaves or knits of material, the relative speeds of rotation of the winding reels would have to be adjusted accordingly.

Although a specific mechanism for supporting the winding reels **18** and for varying the speed has been shown and described, it is understood that various other mechanisms for supporting the winding reels and for varying their speeds can be used to practice this invention.

I claim:

**1.** A fabric unraveling machine of the class described comprising a table, a plurality of supports mounted on the table and extending transversely from the surface of the table, bearings mounted on each of said transversely extending supports, first shafts rotatably mounted in each of said bearings, a winding reel removably mounted at each of said first shafts and rotatable therewith whereby each winding reel is separately removable from the machine for replacement when they become full of yarn, a first gear mounted on each of said first shafts, a second shaft associated with each first shaft, each second shaft rotatably mounted on said table and provided with a second driving gear at one end and a friction disc at the opposite end, the second driving gear on each second shaft engaging the first gear on each first shaft, whereby rotation of the second shaft causes the first shaft and the winding reel mounted on the first shaft to rotate, a driving shaft, said driving shaft having a longitudinally extending tooth-receiving groove formed therein, a friction driving disc for each friction disc mounted on said shaft, the center of each friction driving disc provided with a driving shaft receiving opening, each friction driving disc having an integrally formed tooth inwardly and radially extending into said shaft receiving opening and entering the longitudinal tooth-receiving groove in said driving shaft, whereby the friction driving disc are movable longitudinally along the axis of a driving shaft but must rotate with the driving shaft, the periphery of each friction driving disc engaging a planar surface of the friction disc whereby rotation of the friction driving disc causes the friction disc to rotate so that the winding reels connected thereto also rotate at a rotational speed depending on the distance of the periphery of the friction driving disc from the center of the friction disc so that the speed of rotation of the winding reels may be individually varied by adjusting the longitudinal position of the friction driving disc on the driving shaft, means for causing said driving shaft to rotate, and means for adjusting the speed of rotation of said driving shaft whereby the overall speed of rotation of all the yarn winding reels may be varied without disturbing their relative rotational speeds.



**2.** The yarn unraveling machine described in claim **1** including an electric motor, said electric motor connected to said driving shaft, means for varying the speed of rotation of said driving shaft whereby the fabric unraveling machine may be started slowly to determine whether the rotational speeds of the yarn winding reels are correct for the particular fabric to be unravelled.

**3.** The fabric unraveling machine described in claim **1** wherein an electric motor is used to power the fabric unraveling machine, a driving shaft speed adjustment mechanism associated with the fabric unraveling machine, means connecting the electric motor with the driving shaft speed adjustment mechanism whereby after the winding reels are adjusted so that they have the proper relative rotational speed for the particular fabric to be unravelled, the rotational speed of the driving shaft may be increased to increase the speed of all the yarn winding reels without disturbing the adjustment of the relative rotational speeds of the winding reel.

**4.** The fabric unraveling machine described in claim **3** including means for holding each friction driving disc at a desired longitudinal position along the axis of the driving shaft.

**5.** The fabric unraveling machine described in claim **4** wherein said means for holding the friction driving discs at a desired position on the longitudinal axis of the driving shaft comprises a support bar extending parallel to said driving shaft, a lever-actuated clamp for each friction disc mounted on the support bar for a longitudinal and a pivotal movement thereon, each lever-actuated clamp having a forked member rigidly mounted thereon, the tines of the forked member sized to loosely engage the size of the friction driving disc, whereby moving the lever-actuated clamp with the forked member to any desired longitudinal position on the support bar moves the friction driving disc to any desired position on the longitudinal axis of the driving shaft.

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