Dec. 5, 1944. F. G. KRAFT 2,364,375

YARN PRODUCTION

Filed Oct. 12, 1943 2 Sheets-Sheet 1

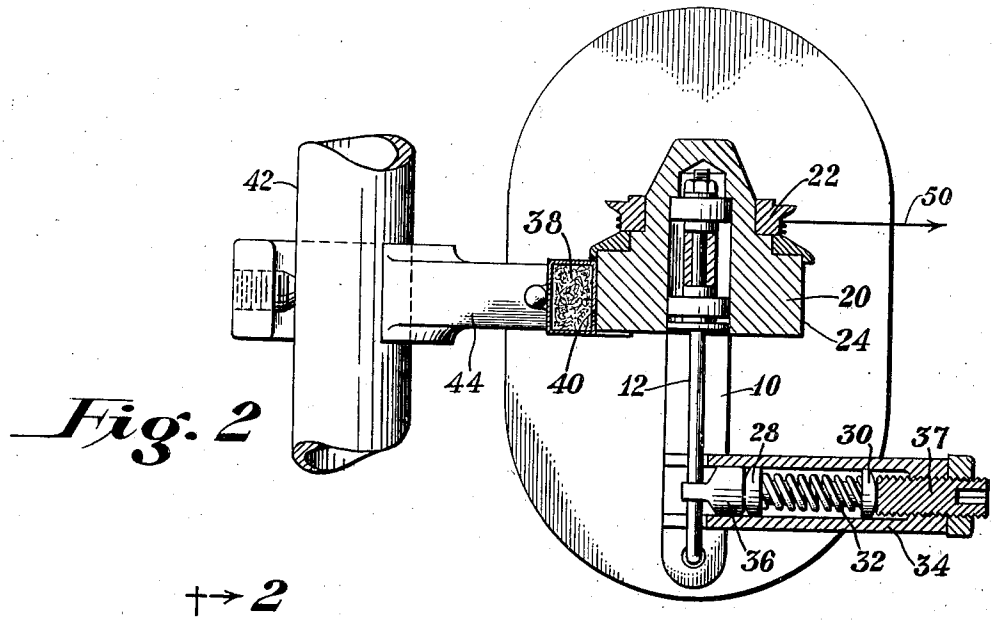

Fig. 2

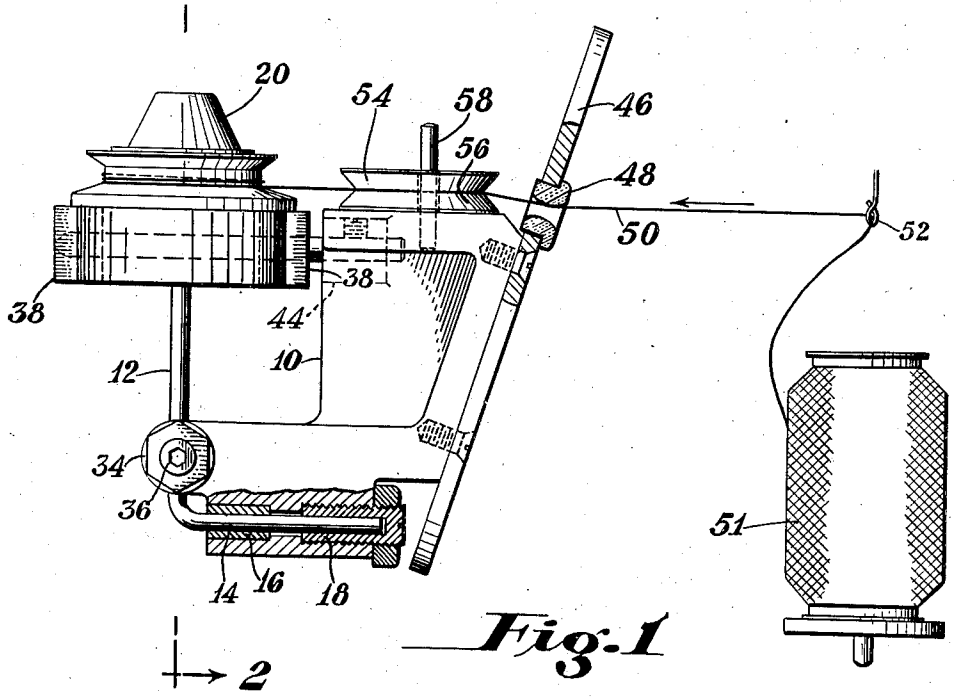

Fig. 1

Frederick G. Kraft INVENTOR.

BY Louis A. Wicke

ATTORNEY

Dec. 5, 1944. F. G. KRAFT 2,364,375

YARN PRODUCTION

Filed Oct. 12, 1943 2 Sheets-Sheet 2

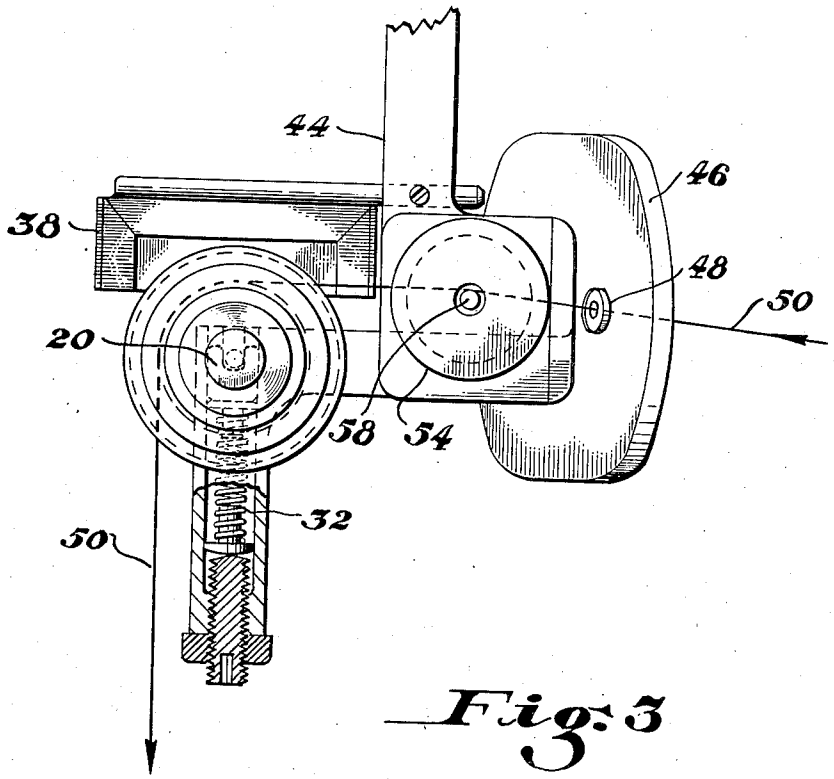

Fig. 3

Frederick G. Kraft INVENTOR.

BY Louis Adler

ATTORNEY

Patented Dec. 5, 1944 2,364,375

UNITED STATES PATENT OFFICE

2,364,375

YARN PRODUCTION

Frederick G. Kraft, Richmond, Va., assignor to E. I. du Pont de Nemours & Company, Wilmington, Del., a corporation of Delaware

Application October 12, 1943, Serial No. 505,897

4 Claims. (Cl. 242—155)

This invention relates to a yarn tensioning apparatus. More particularly, it relates to a yarn tensioning apparatus which is adapted to accept yarn under varying tensions and forward the yarn at greatly reduced tension variations.

It is therefore an object of this invention to provide a yarn tensioning apparatus which is adapted to apply a given tension to a yarn and forward the same at a substantially uniform tension despite slight variations in tension on the yarn passing to said apparatus.

Other objects of the invention will appear hereinafter.

The objects of the invention may be accomplished, in general, by the provision of a yarn tensioning apparatus comprising a yarn-driven roller which is yieldably forced against a braking member, the yieldable means forcing the roller into frictional contact with the braking member operating against the tension imparted to the yarn by drawing the latter from the said roller.

The deails of the invention will be more clearly apparent by reference to the following detailed description when taken in connection with the accompanying drawings in which:

Figure 1 is a side elevational view of one embodiment of the invention.

Figure 2 is a section, taken along the line 2—2, of Figure 1.

Figure 3 is a top plan view of the apparatus shown in Figures 1 and 2.

Referring to the drawings, reference numeral 10 designates a supporting bracket which may be fixed to any desired apparatus in which the tensioning device of the present invention is to be used. A shaft 12 is pivoted to the supporting bracket 10 by providing the shaft with a portion 14 projecting at right angles to the main portion of the shaft. The right angularly projecting pivot portion 14 of the shaft may be provided with journals 16 and 18 to prevent excessive wear. As shown in Figure 1, the journal 18 is screw threaded into the bracket 10 in order to provide for adjustment and replacement.

A yarn-driven roller 20 is positioned on the end of the main portion of shaft 12. This roller 20 is comprised of a yarn engaging portion 22 and a cylindrical portion 24 adapted to engage a braking member 38. The shaft 12 is forced against the braking member 38 by means of a yieldable element which operates in a direction opposite to the pull of the yarn as the latter is drawn from the roller 20. The yieldable element as shown in the drawings, comprises a spring 32 pushing against plunger 28, which in turn is directed against shaft engaging element 36. The plunger 28, as well as an oppositely disposed plunger 30, the spring 32 and shaft engaging element 36 are all mounted within a housing 34, the latter being fixed to the supporting bracket 10. As shown, a screw threaded adjusting element 37 is positioned in the end of housing 34 to adjust and regulate the force of the spring 32.

The spring 32 will force the cylindrical braking portion 24 of the roller 20 against the arcuate braking member 38. The braking member 38 may be composed of a slightly yieldable material such as felt, or the like, and the surface of the braking member in frictional engagement with the cylindrical braking portion of roller 20, may be composed of a leather 40 or like material. The braking member is held in a fixed position by means of arm 44 which is attached to a fixed support 42.

Preferably, the yarn passing to the yarn-driven roller 20 is first passed through a yarn guide 48 positioned in guide support 46. From yarn guide 48, the yarn is preferably passed through a preliminary tensioning device as shown in Figure 1 of the drawings. The preliminary tensioning device as shown in the drawings comprises upper and lower discs 54 and 56, both of which are freely-rotatably mounted on a pin 58. Ordinarily the weight of the upper disc 54 will be sufficient to place a preliminary tension on the yarn to hold the same in a straight line as it passes from the preliminary tensioning device to the yarn driven roller 20. If desired, the upper disc 54 may be weighted or spring-pressed to increase the tension on the yarn to any desired degree. Preferably, the preliminary tensioning device is so positioned, relative to the roller 20, that the yarn passes toward the roller at an angle of approximately 90° to the yarn passing from the roller.

The yarn 50 may be taken from any desired source. For example, it may be taken from a package 51 from which it is drawn, over end, through a fixed guide 52 and then to the yarn guide 48. The yarn is passed from guide 48 between tension discs 54 and 56 and then around the yarn-driven roller 20 with a sufficient number of turns to prevent yarn slippage. The yarn is pulled from roller 20 in a direction substantially opposite the action of spring 32. The yarn may be pulled from the roller by any desired means such as feed rolls, wind-up rolls or the like.

In the apparatus shown in the drawings, the yarn is shown as passing about the yarn driven roller 20, 2¼ turns which is generally sufficient

to avoid slippage of the yarn about the roller 20. Furthermore, by passing the yarn about the roller 20 a whole number of turns plus ¼ turn, the path of the yarn passing to roller 20 will be approximately 90° to the path of the yarn passing from roller 20 (see Fig. 3). This 90° angle between on-going and off-going yarn will minimize the effect of tension variations in the on-going yarn. The yarn must cause a rotation of the roller 20 without substantial slippage about the surface thereof. As will be noted from Figures 1 and 3, the yarn is withdrawn from the roller in a direction substantially opposite to the action of spring 32 which presses the roller 20 against the braking member 38. By this construction, momentary increases in the tension on the yarn passing to roller 20 cause the shaft 12 to rotate upon its pivot against the action of spring 32 and thereby decrease the force pressing roller 20 against braking member 38.

It is, of course, to be understood that the invention is not to be limited to the exact details disclosed in the drawings and in the detailed description given above. For example, the preliminary tensioning device comprising the discs 54 and 56 may be omitted entirely, if desired, or it may consist of any other type of conventional tensioning device which may impart a slight tension to the yarn before the latter is passed about the yarn-driven tension roller 20. A tension device such as disclosed in U. S. patent to Guenther No. 2,223,912 may be used to excellent advantage to impart a preliminary tension to the yarn. The yarn-driven tension roller 20 may be pivoted from a point spaced above or to the side of the roller as well as from a point spaced below the roller as shown in the drawings. The yarn driven roller must, however, be pressed against the braking member by yieldable means operating in a direction substantially opposite to the pull of the yarn as the latter is drawn from the roller. The yieldable means may comprise a spring pressed member as shown, or it may comprise a rubber, an air-pressed plunger or the like.

The total tension on the yarn as it is drawn from roller 20 comprises, 1) the tension on the yarn which is necessary to turn roller 20 against the braking member, 2) the tension imposed on the yarn by the preliminary tension device, and 3) the tension imposed on the yarn in drawing the same from its source, for example, the tension necessary to pull the yarn from package 51. The two last named tensions will sometimes vary momentarily and therefore it is necessary that the first named tension be varied correspondingly to compensate for the momentary variations in tension imparted to the yarn before it passes onto roller 20. This will be automatically accomplished by the apparatus of the present invention by drawing the yarn against the yieldable member to reduce the force pressing the roller against the braking member.

Since many changes and modifications can be made in the above-described details without departing from the nature and spirit of the invention, the invention is not to be limited to said details except as set forth in the appended claims.

I claim:

1. A yarn tensioning apparatus comprising a yarn-driven roller, a braking member, yieldable means forcing said roller into frictional contact with said braking member against the pull exerted on the yarn in drawing the latter from said roller, and means for passing the yarn to said roller at an angle of approximately 90° to the path of the yarn drawn from said roller.

2. A yarn tensioning apparatus comprising a yarn-driven roller having a yarn driving surface and a cylindrical braking surface, an arcuate braking member adapted to cooperate with the cylindrical surface of said roller, yieldable means for forcing said roller into frictional contact with said braking member against the pull exerted on the yarn in drawing the latter from said roller, and means for passing the yarn to said roller at an angle of approximately 90° to the path of the yarn drawn from said roller.

3. A yarn tensioning apparatus comprising a yarn-driven roller mounted on a fixed pivotal shaft, a braking member, yieldable means for rocking said pivotal shaft and forcing said roller into frictional contact with said braking member against the pull exerted on the yarn in drawing the latter from said roller, and means for passing the yarn to said roller at an angle of approximately 90° to the path of the yarn drawn from said roller.

4. A yarn tensioning apparatus comprising a yarn-driven roller, a fixed braking member, yieldable means forcing said roller into frictional contact with said braking member against the pull exerted on the yarn in drawing the latter from said roller, means for passing the yarn to said roller at an angle of approximately 90° to the path of the yarn drawn from said roller and yarn tensioning means positioned between the source of said yarn and said yarn-driven roller.

FREDERICK G. KRAFT.