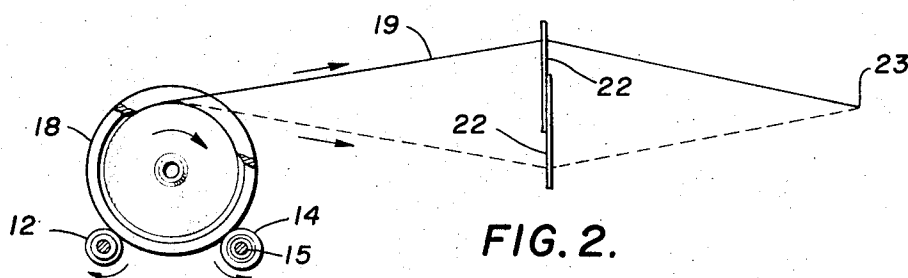
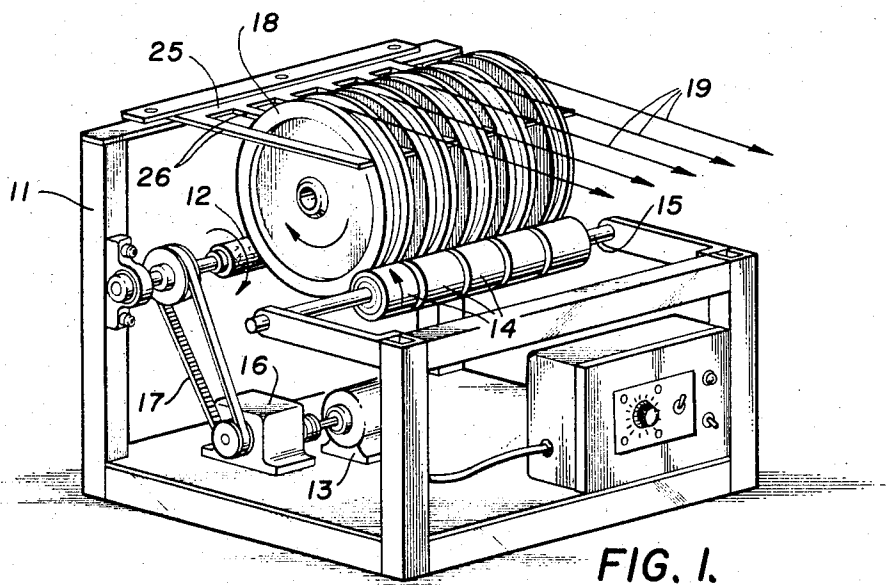


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E. P. CARTER ET AL
FILAMENT SUPPLY SYSTEM

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INVENTORS
ERNEST P. CARTER
ROBERT P. BELL, JR.
BY *Robert L. Broad*
ATTORNEY

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FILAMENT SUPPLY SYSTEM

Ernest P. Carter, Durham, N.C., and Robert P. Bell, Jr.,
Decatur, Ala., assignors to Monsanto Company, St.
Louis, Mo., a corporation of Delaware

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ABSTRACT OF THE DISCLOSURE

The purpose of the present invention is to prevent slack in a filament or yarn being fed to a fabric-producing machine. A reel holding a supply of yarn is supported on a pair of spaced rolls in such a manner that the reel and the rolls rotate in contact with each other, the yarn on the reel being pulled off the reel by the fabricating machine as it is needed. One of the rolls is driven in a direction counter to the direction of rotation of the reel so that slippage occurs between the reel and this roll when the filament is under tension. When the fabric-producing machine pulls a length of the filament off the reel and then allows the filament to become slack the driven roll will drive the reel backward to take up the slack.

This invention relates to filament supply systems and more particularly to systems for supplying a non-extensible filament to a loom or other processing machine.

BACKGROUND OF THE INVENTION

Filaments of non-extensible materials such as boron or carbon can be woven into fabrics which are useful in extreme conditions where very high strength is required. Such fabrics may, for example, be used as ablative coverings for nose cones and re-entry vehicles. One of the major problems encountered in making such a fabric is that filaments or yarns such as these are non-extensible, i.e., will break rather than stretch when too much tension is applied. For this reason, great care must be exercised to insure that the amount of tension applied to these filaments in a fabric-producing operation is not too great.

Further, the non-extensibility of filaments such as boron and carbon makes these filaments extremely difficult to weave into a fabric. The reason for this is that, as the heddles of the loom move upward and downward, the length of the filament feed path changes, thereby allowing slack in the filament. The slack filaments will become entangled with each other and may even snag on the shuttle. With this in mind, one of the objects of this invention is to provide a novel and improved system for supplying a filament to be used by a fabric-producing machine.

Another object of this invention is to provide a system for feeding a filament to a fabric-producing machine under substantially constant tension.

A further object of this invention is to provide a filament supply system which removes any slack in a filament being fed to the yarn producing machine.

Still another object of this invention is to provide a filament supply system wherein a drive roll rotates a supply reel backward to take up slack found in a filament being fed to a fabricating machine.

Other objects and advantages of the invention will become apparent when the following detailed description is read in conjunction with the drawing, in which:

FIGURE 1 is a perspective view of a machine embodying the principles of the invention; and

FIGURE 2 is a side view showing a filament feed path and the rolls which support the filament supply reel.

Referring now in detail to the drawing, there is shown a frame 11 supporting a rotatably mounted drive roll 12

which is driven at a constant speed by a motor 13 through a gear reduction box 16 and a belt 17. The drive roll 12 may be covered with a material such as cork. The frame 11 also supports a plurality of idle rolls 14 mounted on a shaft 15 having its axis parallel to the axis of the drive roll 12. The idle rolls 14 are free to rotate on the shaft 15 independently of each other. The idle rolls 14 are spaced from the drive roll 12 for supporting a plurality of reels 18 (which may be made of aluminum) each of which carries one end of a non-extensible filament 19 of a material such as boron or carbon to be used as the warp filaments of a woven fabric. The drive roll 12 is elongated so that it is in contact with all of the reels 18 while each of the idle rolls 14 contacts only one of the reels 18.

FIGURE 2 shows the extreme paths that the filament 19 takes as it moves from the reel 18 to a point 23 where the weaving actually takes place. Heddles 22 of the loom (not shown) move the filaments 19 from one extreme position (solid line in FIGURE 2) to the other extreme position (shown in dotted lines), the shuttle (not shown) passing between these filament paths near the point 23. Any slack in the non-extensible filaments 19 will allow them to sag into the path of the moving shuttle. (The inherent extensibility of ordinary filaments such as nylon, cotton, etc., will remove any slack occurring in these filaments, since they will stretch when the loom applies tension.) Also, slack in the filaments 19 will cause them to become entangled with each other near the point 23. This would not happen with ordinary filaments which are soft and flexible and would merely sag if slack were present. However, the boron filaments 19 are non-extensible and relatively stiff. Thus, slack in these filaments would cause them to not only sag but to move laterally into contact with adjacent filaments. For these reasons, it is vital that no slack be allowed to remain in the filaments 19 as the weaving operation takes place.

It will be noted that individual reels 18 are used for each of the filaments 19 so that these filaments can be fed independently of each other and so that the slack in each filament can be accurately controlled. In order to keep the reels 18 upright and to prevent longitudinal movement of these reels, the frame 11 is provided with a bracket 25 having a plurality of projecting fingers 26 positioned on opposite sides of each of the reels 18 to hold these reels upright and prevent their longitudinal movement.

In operation of the apparatus, the loom (not shown) pulls the filaments 19 off the reels 18 as the weaving operation takes place. The roll 12 is driven continuously in a direction counter to the direction of rotation of the reel 18. By direction of rotation, we are not referring to the actual direction in which the roll 12 and the reel 18 rotate but are referring to the direction of travel of the peripheries of these elements at their point of contact. Both the roll 12 and the reel 18 will move either clockwise or counterclockwise but the surfaces of these elements at the point of contact will be moving in different directions, i.e., one counter to the other.

It can readily be seen that, since the filament 19 will prevent any substantial backward movement of the reel 18, the roll 12 continually slips on the reel 18 when the filament 19 is under tension. However, when slack appears in the filament 19, the roll 12 will drive the reel 18 backward a sufficient distance to take the slack out of the filament 19. Thus, the filament 19 remains under substantially constant tension with all slack being removed therefrom as it occurs.

It is to be understood that the embodiment of the invention disclosed herein is merely illustrative and that numerous other embodiments may be contemplated without departing from the spirit and scope of the invention.

What is claimed is:

1. A system for supplying a filament to a fabric-producing machine comprising a frame, a pair of spaced rolls mounted on the frame and having parallel axes, a reel for holding a supply of a filament to be pulled off the reel by said machine, said reel being positioned on the spaced rolls with the axis thereof parallel to the axes of said rolls so that the reel and the rolls rotate in contact with each other, said reel rotating in one direction when the filament is pulled off said reel, and means for driving one of said rolls in a direction counter to the direction of the rotation of the reel so that slippage occurs between the reel and said one roll when the filament is under tension, said one roll driving the reel backward when the machine allows slack in the filament.

2. The system of claim 1 wherein the frame is provided with spaced guides extending past the reel on opposite

sides thereof to prevent longitudinal movement of said reel.

3. The system of claim 1 wherein the other of said rolls is an idle roll.

5 4. The system of claim 1 wherein a plurality of reels are used, said one roll being elongated so as to engage each of said reels.

5. The system of claim 1 wherein said one roll has a surface of cork.

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HENRY S. JAUDON, *Primary Examiner*.