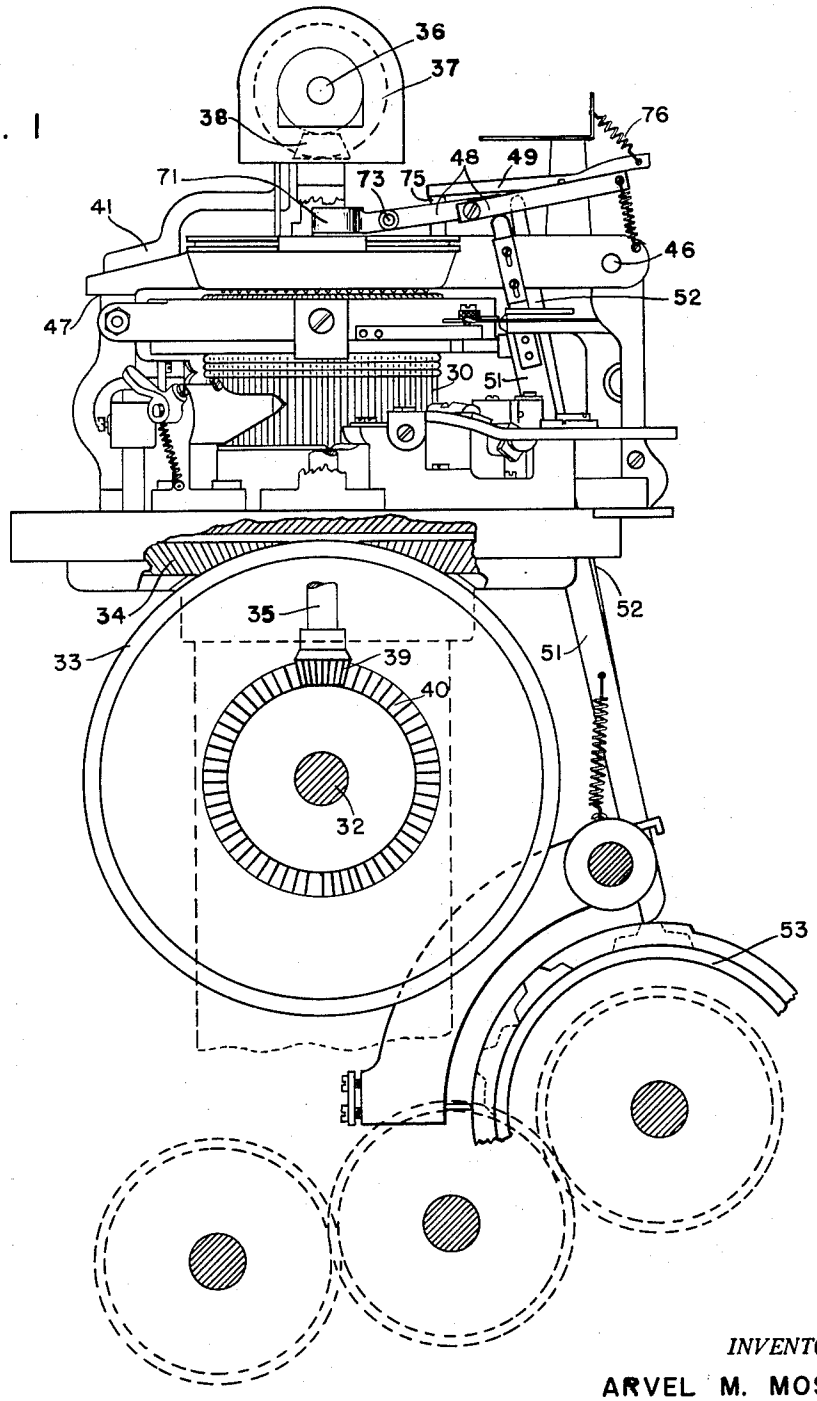
June 12, 1956 A. M. MOSER 2,749,731

FLOATING YARN CUTTER MECHANISM

Filed Sept. 30, 1953 3 Sheets-Sheet 1

FIG. 1



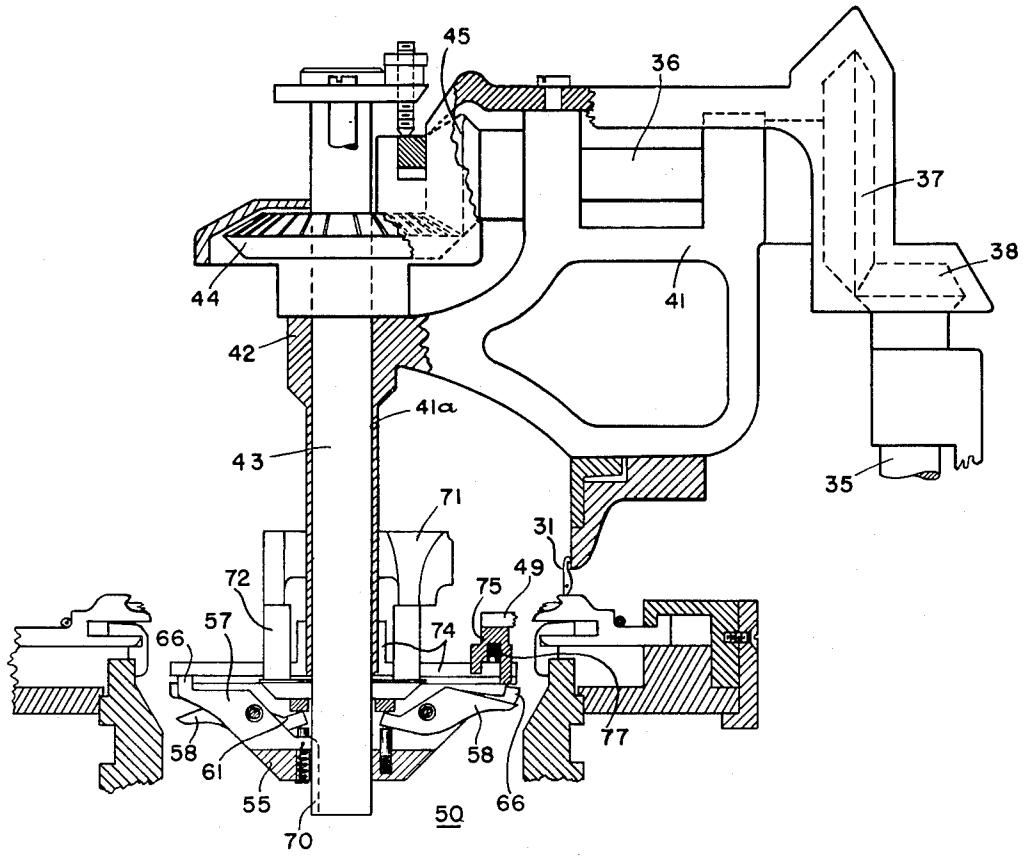
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FLOATING YARN CUTTER MECHANISM

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FIG. 3



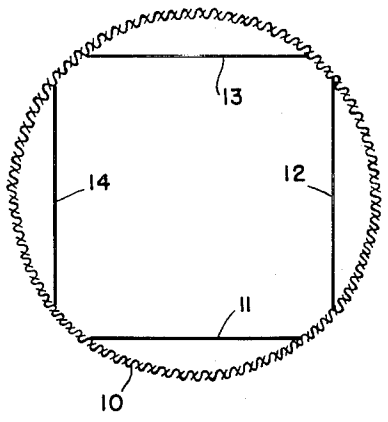


FIG. 2

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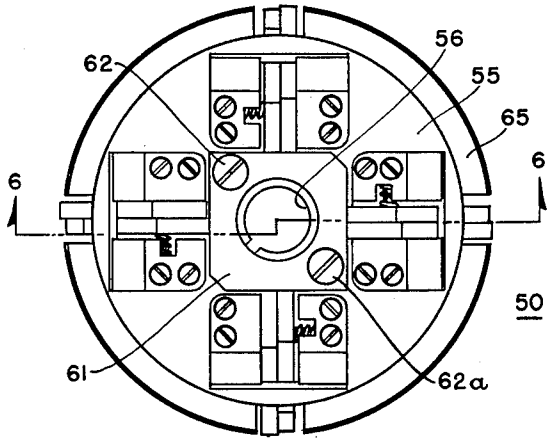


FIG. 4

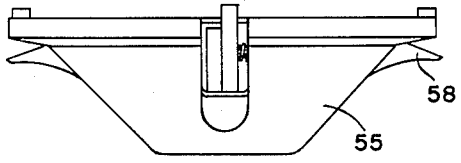


FIG. 5

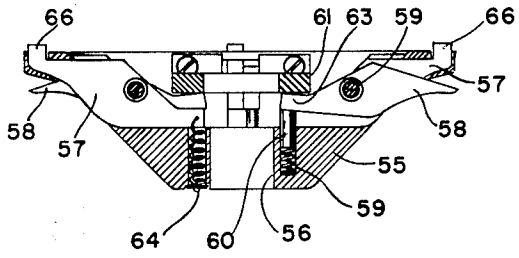


FIG. 6

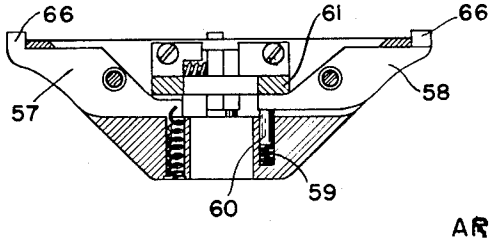


FIG. 7

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2,749,731

FLOATING YARN CUTTER MECHANISM

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Application September 30, 1953, Serial No. 383,196

10 Claims. (Cl. 66—147)

The present invention relates to improvements in circular knitting machines of the type commonly used to generate knitted stocking tubes or the like.

Circular knitting machines to which the improvements of this invention may be applied are well known as may be shown for example in Patent 1,148,055 to Scott, July 27, 1915, Patent 1,641,101 to Scott, August 30, 1927, and Patent 2,516,697 to Haddad, July 25, 1950. As shown in the exampled patents, circular knitting machines generally comprise a revolving cylinder formed of a plurality of aligned knitting needles which are arranged to cooperate with other knitting needle mechanisms to knit a plurality of yarns into a tube of fabric extending inward from the mouth of the needle cylinder. In some forms of circular knitting machines such as that shown in Patent 1,641,101 referred to above, an additional set of knitting needles carried by a so-called revolving dial mechanism is rotatably positioned within the tube forming mouth of the needle cylinder and operated to produce a ribbed formation on the knitted tube useful for ribbed top stockings. In still other forms of circular knitting machines such as that shown in Patent 2,516,697, the plurality of yarns of different colors forming the knit tube are so manipulated as to produce desirable pattern formations which are termed float patterns since the various pattern formations are interconnected by floating yarns extending across the interior of the knit tube as it is delivered from the knitting machine. Before a knit tube having float patterns may be used for a stocking or the like, the floating yarns within the tube must be severed, and prior to this invention the severance of the floating yarns was a hand operation.

It is therefore a principal object of the present invention to provide an improved circular knitting machine of the float pattern type having means to cut the floating yarns as they are formed so that the floating yarns of the knit tube as delivered from the machine will be severed, thus simplifying the subsequent hand finishing procedures as may be required to produce a knit stocking.

A feature of the invention is the provision of a rotating cutter head in substitution for and in a position corresponding to the position of the previously known rotating dial head which, under the circumstances, is not used when practicing the present invention. The rotating cutter head is provided with one or more cutting elements positioned to engage and sever the floating yarns in the mouth of the knit tube as they are formed.

In the more detailed aspects of the invention, each cutting element may comprise a pair of cutting shear blades normally maintained in an open position to pick up floating yarns as the cutter head is rotated, there being additional means to momentarily close the cutting blades periodically as the cutter head is rotated to thereby sever the floating yarns.

Yet another feature of the invention is the provision of control means that may be selectably actuated to maintain the cutting blades in the closed position during

rotation of the cutter head when the severance of floating yarns is not desired, such as when the knitting of a float pattern is completed.

Further objects, features and the attending advantages of the invention will be apparent with reference to the following specification and drawings, in which:

Fig. 1 is a fragmentary side elevation partly broken away to show various details and arrangements of a well-known form of circular knitting machine to which the improvements of the present invention are applied;

Fig. 2 is a diagrammatic view transversely of the longitudinal axis of a knitted fabric tube having a float pattern incorporated therein and showing the floated yarns to be cut by the apparatus of this invention;

Fig. 3 is an enlarged detailed fragmentary cross-section of the knitting portions of a circular knitting machine and showing details of the floating yarn cutting mechanism of the invention in the operative position as applied to the knitting machine;

Fig. 4 is a top plan view of the floating yarn cutter head;

Fig. 5 is a side elevation of the cutter head;

Fig. 6 is a cross-section on the line 6—6 of Fig. 4 with the cutting blades in the open position; and

Fig. 7 is a cross-section similar to Fig. 6 but with the cutting blades in the closed positions.

The floating yarn cutting attachment of the invention will be described in detail in connection with its application to a circular knitting machine such as the #6 Scott & Williams Model HH spiral, although it should be understood that the invention may be advantageously applied to any other generally known type of circular knitting machine. Inasmuch as the general arrangement and the details of the Scott & Williams knitting machines are well known, certain of the features being shown and described in the aforementioned Scott Patents 1,148,055 and 1,641,101, the present specification will refer only to those details necessary for an understanding of the invention.

Referring first to Fig. 2 of the drawings, a knitted stocking tube 10 of the float pattern type is shown to have a plurality of floating yarns 11—14 extending across the interior of the tube and interconnecting different floated pattern portions of the knit fabric tube. The manner of producing the floated patterns resulting in the floating yarns 11—14 does not form a part of this invention but reference may be made to Patent 2,516,697 to Haddad issued July 25, 1950, for a description of one arrangement of circular knitting machines designed to knit floated patterns. It is the floating yarns 11—14 that are severed by the apparatus of this invention substantially as soon as they are formed in the knitted tube when passing through the machine.

Referring now to Figs. 1 and 3 of the drawings, various portions of a circular knitting machine are shown such as the cylinder 30 of knitting needles 31, which cylinder is rotatably mounted for revolution about a vertical axis. The lower drive shaft 32 is connected to be rotated from a source of power (not shown) and through the medium of bevel gears 33 and 34 transmits rotation to the needle cylinder 30. A vertically extending shaft 35 also interconnects the upper drive shaft 36 and the lower drive shaft 32 through the medium of bevel gears 37—40.

The upper drive shaft 36 is journalled in a frame member 41 that also provides a journal support at 42 for a vertically depending drive shaft 43 driven by bevel gears 44, 45 from the upper drive shaft 36. In some of the circular knitting machines of the prior art, the depending drive shaft is arranged to rotatably support a so-called dial of knitting needles such as has been shown in the Scott Patent 1,641,101, aforementioned, for the purpose

of producing a rib formation. According to my invention, when making knitted tubes having floated patterns without ribbing, the dial is replaced with the floating yarn cutting attachment generally shown at 50, which is rotated by the shaft 43 and, under circumstances to be described, will pick up and sever the floating yarns as they are formed in the knit tube passing into the throat of the knitting needle cylinder 30.

The frame member 41 is pivoted at the hinge point 46 to permit it to be raised from the resting block support 47 and thereby withdraw the cutting assembly from the throat of the needle cylinder 30 when desired. When the frame member 41 is raised, the bevel gear 37 is lifted out of engagement with the bevel gear 38; and the control arms such as shown at 48 and 49 are also separated from their respective operating push rods 51, 52. The push rods 51, 52 are operated by suitable cams on the main control drum 53. The control arms 48 and 49 will later be referred to in more detail.

Referring now to Figs. 4–7 of the drawings, the details of the floating yarn cutting assembly 50 will now be described. The cutter head 55 is preferably a circular body having a generally cone-shaped cross-section and is provided with an axial bore 56 arranged to receive an end of the vertically depending shaft 43. A plurality of cutting elements or cutter blade assemblies, each of which preferably may be comprised of an upper cutting blade 57 and a lower cutting blade 58, are pivotally mounted at 59 to form pairs of cutting shears which are radially positioned in the cutter head 55. Each of the lower cutter blades 58 is normally urged downward out of the cutter head 55 by the action of a compression spring 59 and plunger 60.

A pressure plate 61 is slidably mounted on pins 62 and 62*a* and engages each inner end 63 of the lower cutter blade 58 so that when the plate 61 is moved towards the cutter head 55 (as shown in Fig. 7 of the drawings), each lower cutting blade 58 is moved against the force of spring 59 to a position within the cutter body 55, thus preventing any floating yarns from being picked up to be severed as will be later described.

Each of the upper cutter blades 57 is normally positioned within the body of the cutter head 55 in response to the force of the tension spring 64. It will be noted that the upper surface of the cylindrical cutter head is provided with a circumferential groove 65 through an aperture of which each upstanding end 66 of the upper cutting blade 57 is projected. It should be apparent that a downward force on each projecting end 66 of the upper cutting blade 57 will move the blade against the force of the tension spring 64 out of the body of the cutter head 55 and towards the respective lower blade 58 in a shearing action to cut any floating yarn threads that may have been picked up on the respective lower cutting blade.

Referring again to Figs. 1 and 3 of the drawings, it will be seen that the body of the cutter head 55 is keyed at 70 to the end of the shaft 43 for rotation therewith. The yoke 71 of the control arm 48 engages the upper surface of the pressure plate 61 by means of the connecting member 72 which is arranged to permit free rotation of the cutter head 55 and pressure plate 61 without corresponding rotation of the yoke 71. When the push rod 51 is actuated by suitable cams on the control drum 53 (not shown) the control arm 48 will be pivoted counterclockwise about the pivot 73 to cause the yoke 71 and connecting member 72 to move the pressure plate 61 downward to a position to withdraw each lower cutter blade 58 into the cutter head as shown in Fig. 7, thus making the cutter head ineffective at times that floating yarns are not to be picked up and severed.

However, when the push rod 51 is not actuated, each lower cutter blade 58 is projecting out of the cutter head as shown in Fig. 3 in a manner to pick up the floating yarns as they are formed in the knit tube. It will be noted that the shaft 43 is enclosed in a stationary sleeve portion 41*a* of the support member 41 and that additional stationary supporting framework 74 is secured thereto. Mounted on the stationary framework 74 is a spring-pressed cam follower member 75, the lower end of which engages the upper end 66 of each upper cutting blade 57 passing thereby as the cutter head 55 is rotated. The control arm 49 normally engages the upper end of the cam follower 75 responsive to the tension of the spring 76 to urge the cam follower downward so that each upper cutting blade 57, in passing the cam follower 75, is caused to move towards the respective lower cutter blade 58 and sever any floating yarns picked up on the lower cutting blade. Actuation of the push rod 52 by suitable cams on the control drum 53 will rotate the control arm 49 in a clockwise direction against the tension of spring 76 to allow the cam follower 75 to move upward responsive to the force of compression spring 77. With the cam follower raised in such manner, each upper cutter blade 57 will not be engaged and moved downward in passing so that the shearing movements of the cutting blades can be prevented and controlled as desired.

It should be apparent that the exact positioning of the cutter head 55 within the throat of the cylinder 30 of knitting needles will be best determined to allow each extended lower cutting blade 58 to pick up the floating yarns to be severed as they are formed and that the position shown in the drawings is illustrative only. Furthermore, while four pairs of radially positioned cutting blades are specifically shown, it should be understood that the invention is operative with one or more cutting elements of any suitable shape and form that are effective to pick up and sever the floating yarns as they are produced during rotation of the cutter head and needle cylinder.

Various modifications may be made within the spirit of the invention and the scope of the appended claims.

I claim:

1. In a circular knitting machine of the type having a revolving needle cylinder arranged to generate a knitted tube of fabric extending inward from the mouth of the needle cylinder, the knitted tube being generated from a plurality of yarns in a predetermined float pattern with floating yarns extending within the knitted tube and interconnecting various float pattern portions, a floating yarn cutter mechanism including in combination, a cutter head, means to rotatably support said cutter head in the mouth of the needle cylinder adjacent the area of formation of the knitted tube, means to rotate said cuttter head as said needle cylinder is revolved, cutting means carried by said cutter head in proximity to the floating yarns formed in the knitted tube, and means for actuating said cutting means whereby the floating yarns are severed as said cutter head is rotated.

2. In a circular knitting machine of the type having a revolving needle cylinder arranged to generate a knitted tube of fabric extending inward from the mouth of the needle cylinder, the knitted tube being generated from a plurality of yarns in a predetermined float pattern with floating yarns extending within the knitted tube and interconnecting various float pattern portions, a floating yarn cutter mechanism including in combination, a circular cutter head, means to rotatably support said circular cutter head in the mouth of the needle cylinder adjacent the area of formation of the knitted tube with its axis of rotation in substantial alignment with the axis of revolution of the needle cylinder, means to rotate said cutter head as said needle cylinder is revolved, cutting means carried by said cutter head and radially extending in proximity to the floating yarns formed in the knitted tube, and means for actuating said cutting means whereby the floating yarns are severed as said cutter head is rotated.

3. In a circular knitting machine of the type having a revolving needle cylinder arranged to generate a knitted tube of fabric extending inward from the mouth of the needle cylinder, the knitted tube being generated from

a plurality of yarns in a predetermined float pattern with floating yarns extending within the knitted tube and interconnecting various float pattern portions, a floating yarn cutter mechanism including in combination, a cutter head, means to rotatably support said cutter head in the mouth of the needle cylinder adjacent the area of formation of the knitted tube, means to rotate said cutter head as said needle cylinder is revolved, at least one pair of cutting shear blades carried by said cutter head in proximity to the floating yarns formed in the knitted tube, means to normally maintain each of said pair of shear blades in an open position during rotation of said cutter head, and means to momentarily close each of said pair of shear blades periodically during rotation of said cutter head whereby the floating yarns are picked up and severed as said cutter head is rotated.

4. In a circular knitting machine of the type having a revolving needle cylinder arranged to generate a knitted tube of fabric extending inward from the mouth of the needle cylinder, the knitted tube being generated from a plurality of yarns in a predetermined float pattern with floating yarns extending within the knitted tube and interconnecting various float pattern portions, a floating yarn cutter mechanism including in combination, a circular cutter head, means to rotatably support said circular cutter head in the mouth of the needle cylinder adjacent the area of formation of the knitted tube with its axis of rotation in substantial alignment with the axis of revolution of the needle cylinder, means to rotate said cutter head as said needle cylinder is revolved, at least one pair of cutting shear blades carried by said cutter head in proximity to the floating yarns formed in the knitted tube, means to normally maintain each of said pair of shear blades in an open position during rotation of said cutter head, and means to momentarily close each of said pair of shear blades periodically during rotation of said cutter head whereby the floating yarns are picked up and severed as said cutter head is rotated.

5. In a circular knitting machine of the type having a revolving needle cylinder arranged to generate a knitted tube of fabric extending inward from the mouth of the needle cylinder, the knitted tube being generated from a plurality of yarns in a predetermined float pattern with floating yarns extending within the knitted tube and interconnecting various float pattern portions, a floating yarn cutter mechanism including in combination, a cutter head, means to rotatably support said cutter head in the mouth of the needle cylinder adjacent the area of information of the knitted tube, means to rotate said cutter head as said needle cylinder is revolved, at least one pair of cutting shears carried by said cutter head and radially extending in proximity to the floating yarns formed in the knitted tube, each of said pairs of cutting shears comprising a lower blade and an upper blade, means to normally maintain said lower blade in a position extending outward of the cutter head in a manner to pick up floating yarns as said cutter head is rotated, means to normally maintain said upper blade in a position substantially within the cutter head to thus maintain each pair of cutting shear blades in an open position as the cutter head is rotated, and means to momentarily move said upper blade towards said lower blade periodically as said cutter head is rotated to thereby periodically close each of said pairs of cutting shear blades whereby said floating yarns picked up on the lower blades of each of said pairs of cutting shear blades are severed.

6. In a circular knitting machine of the type having a revolving needle cylinder arranged to generate a knitted tube of fabric extending inward from the mouth of the needle cylinder, the knitted tube being generated from a plurality of yarns in a predetermined float pattern with floating yarns extending within the knitted tube and interconnecting various float pattern portions, a floating yarn cutter mechanism including in combination, a circular cutter head, means to rotatably support said circular cutter head in the mouth of the needle cylinder adjacent the area of formation of the knitted tube with its axis of rotation in substantial alignment with the axis of revolution of the needle cylinder, means to rotate said cutter head as said needle cylinder is revolved, at least one pair of cutting shears carried by said cutter head and radially extending in proximity to the floating yarns formed in the knitted tube, each of said pairs of cutting shears comprising a lower blade and an upper blade, means to normally maintain said lower blade in a position extending outward of the cutter head in a manner to pick up floating yarns as said cutter head is rotated, means to normally maintain said upper blade in a position substantially within the cutter head to thus maintain each pair of cutting shear blades in an open position as the cutter head is rotated, and means to momentarily move said upper blade towards said lower blade periodically as said cutter head is rotated to thereby periodically close each of said pairs of cutting shear blades whereby said floating yarns picked up on the lower blades of each of said pairs of cutting shear blades are severed.

7. In a circular knitting machine of the type having a revolving needle cylinder arranged to generate a knitted tube of fabric extending inward from the mouth of the needle cylinder, the knitted tube being generated from a plurality of yarns in a predetermined float pattern with floating yarns extending within the knitted tube and interconnecting various float pattern portions, a floating yarn cutter mechanism including in combination, a cutter head, means to rotatably support said cutter head in the mouth of the needle cylinder adjacent the area of formation of the knitted tube, means to rotate said cutter head as said needle cylinder is revolved, at least one pair of cutting shears carried by said cutter head and radially extending in proximity to the floating yarns formed in the knitted tube, each of said pairs of cutting shears comprising a lower blade and an upper blade, means to normally maintain said lower blade in a position extending outward of the cutter head in a manner to pick up floating yarns as said cutter head is rotated, means to normally maintain said upper blade in a position substantially within the cutter head to thus maintain each pair of cutting shear blades in an open position as the cutter head is rotated, means to momentarily move said upper blade towards said lower blade periodically as said cutter head is rotated to thereby periodically close each of said pairs of cutting shear blades whereby said floating yarns picked up on the lower blades of each of said pairs of cutting shear blades are severed, and control means selectively actuated to move said lower blade towards said upper blade to be maintained in a position within the cutter head during rotation of said cutter head when the picking up and severing of floating yarns is not required while said control means is actuated.

8. In a circular knitting machine of the type having a revolving needle cylinder arranged to generate a knitted tube of fabric extending inward from the mouth of the needle cylinder, the knitted tube being generated from a plurality of yarns in a predetermined float pattern with floating yarns extending within the knitted tube and interconnecting various float pattern portions, a floating yarn cutter mechanism including in combination, a circular cutter head, means to rotatably support said circular cutter head in the mouth of the needle cylinder adjacent the area of formation of the knitted tube with its axis of rotation in substantial alignment with the axis of revolution of the needle cylinder, means to rotate said cutter head as said needle cylinder is revolved, at least one pair of cutting shears carried by said cutter head and radially extending in proximity to the floating yarns formed in the knitted tube, each of said pairs of cutting shears comprising a lower blade and an upper blade, means to normally maintain said lower blade in a position extending outward of the cutter head in a manner to pick up floating yarns as said cutter head is rotated,

means to normally maintain said upper blade in a position substantially within the cutter head to thus maintain each pair of cutting shear blades in an open position as the cutter head is rotated, means to momentarily move said upper blade towards said lower blade periodically as said cutter head is rotated to thereby periodically close each of said pairs of cutting shear blades whereby said floating yarns picked up on the lower blades of each of said pairs of cutting shear blades are severed, and control means selectably actuated to move said lower blade towards said upper blade to be maintained in a position within the cutter head during rotation of said cutter head when the picking up and severing of floating yarns is not required while said control means is actuated.

9. In a circular knitting machine of the type having a revolving needle cylinder arranged to generate a knitted tube of fabric extending inward from the mouth of the needle cylinder, the knitted tube being generated from a plurality of yarns in a predetermined float pattern with floating yarns extending within the knitted tube and interconnecting various float pattern portions, a floating yarn cutter mechanism including in combination, a cutter head, means to rotatably support said cutter head in the mouth of the needle cylinder adjacent the area of formation of the knitted tube, means to rotate said cutter head as said needle cylinder is revolved, at least one pair of cutting shear blades carried by said cutter head in proximity to the floating yarns formed in the knitted tube, means to normally maintain each of said pair of shear blades in an open position during rotation of said cutter head, means to momentarily close each of said pair of shear blades periodically during rotation of said cutter head whereby the floating yarns are picked up and severed as said cutter head is rotated, and control means selectably actuated to close each of said pair of shear blades

and maintain closed said shear blades during revolution of said cutter head when the cutting of floating yarns is not required while said control means is actuated.

10. In a circular knitting machine of the type having a revolving needle cylinder arranged to generate a knitted tube of fabric extending inward from the mouth of the needle cylinder, the knitted tube being generated from a plurality of yarns in a predetermined float pattern with floating yarns extending within the knitted tube and interconnecting various float pattern portions, a floating yarn cutter mechanism including in combination, a circular cutter head, means to rotatably support said circular cutter head in the mouth of the needle cylinder adjacent the area of formation of the knitted tube with its axis of rotation in substantial alignment with the axis of revolution of the needle cylinder, means to rotate said cutter head as said needle cylinder is revolved, at least one pair of cutting shear blades carried by said cutter head in proximity to the floating yarns formed in the knitted tube, means to normally maintain each of said pair of shear blades in an open position during rotation of said cutter head, means to momentarily close each of said pair of shear blades periodically during rotation of said cutter head whereby the floating yarns are picked up and severed as said cutter head is rotated, and control means selectably actuated to close each of said pair of shear blades and maintain closed said shear blades during revolution of said cutter head when the cutting of floating yarns is not required while said control means is actuated.

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