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DEVICE FOR DRAWING OFF ARTIFICIAL FIBERS
FROM THE SPINNERET, ESPECIALLY FIBERS
SPUN FROM THE MOLTEN MASS
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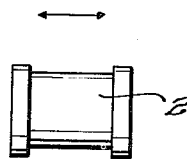
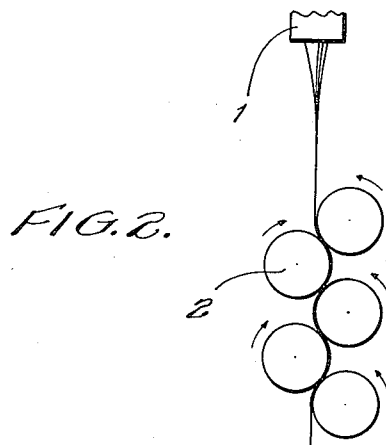
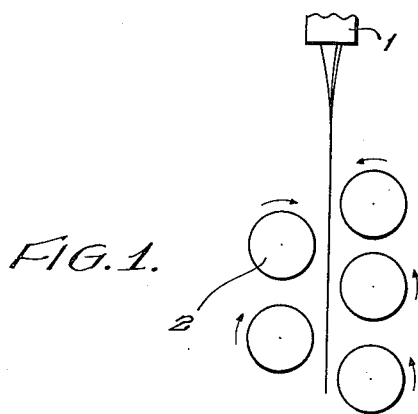


FIG. 3.

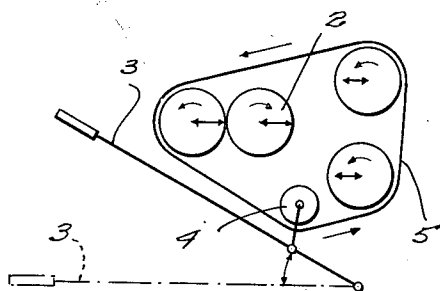


FIG. 4.

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DEVICE FOR DRAWING OFF ARTIFICIAL FIBERS FROM THE SPINNERET, ESPECIALLY FIBERS SPUN FROM THE MOLTEN MASS

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17 Claims. (Cl. 18—8)

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Fibers which are spun from the molten mass, e. g. polyamide fibers, are usually drawn off from the spinneret by means of a metal cylinder. Said cylinder has a rather great diameter and a considerable weight in order to cool instantaneously the fiber which is, after having left the spinneret, still in a plastic condition. The fiber or the fiber bundle has to be wound several times round the drawing off cylinder in order to obtain the necessary friction. This is rather difficult to do at high spinning speeds. The design and the material of such a high speed heavy rotatory cylinder must be chosen very carefully.

The device according to the present invention consists of two vertical rows of cylinders, placed under the spinneret in a mutually staggered position which rows may be removed from each other or tightly approached, all of the said cylinders rotating with the same speed and in opposite direction in each row so that the fibers may fall freely from the spinneret, between distanced cylinder rows, being on the contrary caught, when the said cylinder rows are closely approached, and drawn forcibly in a wave-like line from the spinneret. The cylinders of one row may be provided with an elastic surface of rubber or the like, the cylinders of the other row being made of metal; the friction is then so increased that one of the rows may consist only of a single rubber coated cylinder, the other row consisting of two metal cylinders, having the same diameter and rotating with the same speed in opposite direction regarding the rubber coated cylinder. The rubber coated cylinder is pushed between two metal cylinders according to the diagram shown in Figs. 1 and 2 of the accompanying drawing.

Fig. 1 shows distanced cylinders before the beginning of drawing off spun fibers, said fibers falling freely through the gap between the said cylinders.

In the Fig. 2 the same device is illustrated after the cylinder rows having been shifted close together so that the fibers are engaged and forcibly drawn in a wave-like line due to the friction of the fiber on the surface of the cylinders, especially of the rubber coated one. The cylinders of each row rotate in opposite direction as shown by arrows. The known joint driving is not shown in this diagram.

A known water cooling device (not shown) may be arranged between the spinneret and the drawing off device.

It has been found that it is not necessary to press the fiber between the cylinders, the friction being high enough, especially when using a rubber

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coated cylinder in one row. The cylinders may be accordingly shaped as shown in Fig. 3, their central part having a reduced diameter so that the cylinders of both rows are rolling on each other with their borders only.

Above the cylinders may be arranged a known fiber shifting device for changing the place on which the fiber comes into contact with the cylinder in order to prevent the fiber to cut a groove into the cylinder surface. Such changing devices are commonly used when winding yarn on bobbins and it is therefore not necessary to go into details. It is only to be mentioned that this changing device may run very slowly.

The described device is advantageous especially when high spinning speeds are used and in connection with preceding cooling with water or with another liquid. The winding of the fiber bundle on the drawing off cylinder is fully omitted because the device may be put in action simply by means of a lever (3, Fig. 4) which is acting directly on the tension roller 4, serving for stretching the driving band or belt 5. The diagram of the driving arrangement is shown in Fig. 4 where the shifting of the cylinders is illustrated by horizontal arrows.

The shifting may be naturally arranged in a relative manner so that only one cylinder row is horizontally shifted, the other one standing firmly.

We claim:

1. Apparatus for drawing off artificial molten spun fibers from a spinneret having a discharge opening in its bottom, comprising at least three rotatably mounted rollers located below the spinneret having substantially horizontal axes; two of said rollers being vertically aligned and having their axes positioned equal amounts above and below, respectively, of said third roller; means for relatively shifting said third roller with respect to said two other rollers in a horizontal direction between an operative position in which the distance between the projections of the axes of said rollers in a horizontal plane is less than the sum of their radii, and an inoperative position in which the distance between the projections of the axes of said rollers on said horizontal plane exceeds the sum of their radii and in which the projection of the axis of said discharge opening on said horizontal plane is being located between and spaced from the projections of said rollers on said horizontal plane, permitting entering of a molten fiber between said rollers by the force of gravity in inoperative position of said rollers; and means for ro-

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tating all rollers, said third roller rotating in the opposite direction from said two rollers.

2. A device for drawing off artificial molten spun fibers from a spinneret having a discharge opening in its bottom, comprising at least two rotatably supported cooperating rollers arranged below the spinneret having horizontally extending vertically displaced axes spaced so that their cooperating surfaces are permanently at a distance exceeding the diameter of the fiber, at least one of said rollers shiftable in a horizontal direction between an operative position in which the distance between the projections of the axes of said rollers on a horizontal plane is less than the sum of their radii and an inoperative position in which the distance between the projections of the axes of said rollers on a horizontal plane exceeds the sum of their radii and in which the projection of the axis of said discharge opening on said horizontal plane is being located between and spaced from the projections of said rollers on said horizontal plane, permitting entering of a molten fiber between said rollers by the force of gravity in inoperative position of said rollers; means for shifting said shiftable rollers to and fro between said operative and inoperative positions; and means for rotating said rollers in opposite directions, whereby when said rollers are in said operative position and rotated, they will exert on the fiber a frictional drag only without compressing it.

3. A device for drawing off artificial molten spun fibers from a spinneret having a discharge opening in its bottom, comprising at least two rotatably supported cooperating rollers arranged below the spinneret having parallel axes relatively displaced in the direction of the extension of the fiber, at least one of said rollers being shiftable between an operative position in which the distance between the projections of the axes of said rollers in a horizontal plane is less than the sum of their radii, and an inoperative position in which the distance between the projections of the axes of said rollers on said horizontal plane exceeds the sum of their radii and in which the projection of the axis of said discharge opening on said horizontal plane is being located between and spaced from the projections of said rollers on said horizontal plane, permitting entering of a molten fiber between said rollers by the force of gravity in inoperative position of said rollers; means for rotating said rollers in opposite directions; at least one roller having at least one rim preventing the cooperating surfaces of said rollers to approach closer than a distance exceeding the diameter of the fiber; and means for shifting said shiftable roller towards and away from said other roller.

4. A device for drawing off artificial molten spun fibers from a spinneret having a discharge opening in its bottom, comprising two cooperating vertically aligned columns of rotatably supported rollers arranged below the spinneret having parallel axes, each column displaced vertically with respect to the other column, said columns being so arranged that the cooperating circumferences of adjacent rollers of different columns are permanently at a distance at least slightly exceeding the diameter of the fiber, at least one of said vertical columns shiftable in a horizontal direction between an operative position in which the projection on a horizontal plane of the distances between the axes of each pair of adjacent rollers of different columns is less than the sum of the radii of the respective adja-

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cent rollers and an inoperative position in which the projection on a horizontal plane of the distances between the axes of each pair of adjacent rollers of different columns exceeds the sum of the radii of the respective adjacent rollers and in which the projection of the axis of said discharge opening on said horizontal plane is being located between and spaced from the projections of said rollers on said horizontal plane, permitting entering of a molten fiber between said rollers by the force of gravity in inoperative position of said rollers; means for shifting said shiftable column to and fro between said operative and said inoperative position; and means for rotating the rollers in said two columns in opposite directions.

5. A device for drawing off artificial molten spun fibers from a spinneret having a discharge opening in its bottom, comprising at least two rotatably supported cooperating rollers arranged below the spinneret at least part of the surface of one roller consisting of a material having a high coefficient of friction, said rollers having horizontally extending vertically displaced axes spaced so that their cooperating surfaces are permanently at a distance exceeding the diameter of the fiber, at least one of said rollers shiftable in a horizontal direction between an operative position in which the distance between the projections of the axes of said rollers on a horizontal plane is less than the sum of their radii and an inoperative position in which the distance between the projections of the axes of said rollers on a horizontal plane exceeds the sum of their radii and in which the projection of the axis of said discharge opening on said horizontal plane is being located between and spaced from the projections of said rollers on said horizontal plane, permitting entering of a molten fiber between said rollers by the force of gravity in inoperative position of said rollers; means for shifting said shiftable roller to and fro between said operative and said inoperative positions; and means for rotating said rollers in opposite directions, whereby when said rollers are in said operative position and rotated, they will exert on the fiber a frictional drag only without compressing it.

6. A device for drawing off artificial molten spun fibers from a spinneret having a discharge opening in its bottom, comprising at least two rotatably supported cooperating rollers arranged below the spinneret at least part of the surface of one roller consisting of rubber, said rollers having horizontally extending vertically displaced axes spaced so that their cooperating surfaces are permanently at a distance exceeding the diameter of the fiber, at least one of said rollers shiftable in a horizontal direction between an operative position in which the distance between the projections of the axes of said rollers on a horizontal plane is less than the sum of their radii and an inoperative position in which the distance between the projections of the axes of said rollers on a horizontal plane exceeds the sum of their radii and in which the projection of the axis of said discharge opening on said horizontal plane is being located between and spaced from the projections of said rollers on said horizontal plane, permitting entering of a molten fiber between said rollers by the force of gravity in inoperative position of said rollers; means for shifting said shiftable roller to and fro between said operative and said inoperative positions; and means for rotating said rollers in

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opposite directions, whereby when said rollers are in said operative position and rotated, they will exert on the fiber a frictional drag only without compressing it.

7. A device for drawing off artificial molten spun fibers from a spinneret having a discharge opening in its bottom, comprising two cooperating vertically aligned columns of rotatably supported rollers arranged below the spinneret having parallel axes, each column displaced vertically with respect to the other column, at least part of the surface of at least one roller consisting of a material having a high coefficient of friction, said columns being so arranged that the cooperating circumferences of adjacent rollers of different columns are permanently at a distance at least slightly exceeding the diameter of the fiber, at least one of said vertical columns shiftable in a horizontal direction between an operative position in which the projection on a horizontal plane of the distances between the axes of each pair of adjacent rollers of different columns is less than the sum of the radii of the respective adjacent rollers and an inoperative position in which the projection on a horizontal plane of the distances between the axes of each pair of adjacent rollers of different columns exceeds the sum of the radii of the respective adjacent rollers and in which the projection of the axis of said discharge opening on said horizontal plane is being located between and spaced from the projections of said rollers on said horizontal plane, permitting entering of a molten fiber between said rollers by the force of gravity in inoperative position of said rollers; means for shifting said shiftable column to and fro between said operative and said inoperative position; and means for rotating the rollers in said two columns in opposite directions.

8. A device for drawing off artificial molten spun fibers from a spinneret having a discharge opening in its bottom, comprising two cooperating vertically aligned columns of rotatably supported rollers arranged below the spinneret having parallel axes, each column displaced vertically with respect to the other column, at least part of the surface of at least one roller consisting of rubber, said columns being so arranged that the cooperating circumferences of adjacent rollers of different columns are permanently at a distance at least slightly exceeding the diameter of the fiber, at least one of said vertical columns shiftable in a horizontal direction between an operative position in which the projection on a horizontal plane of the distances between the axes of each pair of adjacent rollers of different columns is less than the sum of the radii of the respective adjacent rollers and an inoperative position in which the projection on a horizontal plane of the distances between the axes of each pair of adjacent rollers of different columns exceeds the sum of the radii of the respective adjacent rollers and in which the projection of the axis of said discharge opening on said horizontal plane is being located between and spaced from the projections of said rollers on said horizontal plane, permitting entering of a molten fiber between said rollers by the force of gravity in inoperative position of said rollers; means for shifting said shiftable column to and fro between said operative and said inoperative position; and means for rotating the rollers in said two columns in opposite directions.

9. A device for drawing off artificial fibers from the spinneret, comprising at least two rotatably

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supported cooperating rollers having horizontally extending vertically displaced axes spaced so that their cooperating surfaces are permanently at a distance exceeding the diameter of the fiber, at least one of said rollers shiftable in a horizontal direction between an operative position in which the distance between the projections of the axes of said rollers on a horizontal plane is less than the sum of their radii and an inoperative position in which the distance between the projections of the axes of said rollers on a horizontal plane exceeds the sum of their radii; means for shifting said shiftable roller to and fro between said operative and said inoperative positions; an idle roller contacting the surface of one of said cooperating rollers; a driving belt engaging said other cooperating roller along a portion of its axial extension and said idle roller; and means for driving said belt, whereby when said belt is driven the two cooperating rollers will rotate in opposite directions.

10. A device for drawing off artificial fibers from the spinneret, comprising at least two rotatably supported cooperating rollers having horizontally extending vertically displaced axes spaced so that their cooperating surfaces are permanently at a distance exceeding the diameter of the fiber, at least one of said rollers shiftable in a horizontal direction between an operative position in which the distance between the projections of the axes of said rollers on a horizontal plane is less than the sum of their radii and an inoperative position in which the distance between the projections of the axes of said rollers on a horizontal plane exceeds the sum of their radii; an idle roller contacting the surface of one of said cooperating rollers; a driving belt engaging said other cooperating roller along a portion of its axial length and said idle roller; means for driving said belt; and means for tensioning said belt.

11. A device for drawing off artificial fibers from the spinneret, comprising at least two rotatably supported cooperating rollers having horizontally extending vertically displaced axes spaced so that their cooperating surfaces are permanently at a distance exceeding the diameter of the fiber, at least one of said rollers shiftable in a horizontal direction between an operative position in which the distance between the projections of the axes of said rollers on a horizontal plane is less than the sum of their radii and an inoperative position in which the distance between the projections of the axes of said rollers on a horizontal plane exceeds the sum of their radii; means tending to maintain said rollers in said inoperative position; an idle roller contacting the surface of one of said cooperating rollers; a driving belt engaging said other cooperating roller along a portion of its axial length and said idle roller; means for driving said belt; and means for tensioning said belt, whereby said cooperating rollers will assume their operative position when said belt is tensioned and their inoperative position when said belt is relaxed.

12. A device for drawing off artificial fibers from the spinneret, comprising at least two rotatably supported cooperating rollers having horizontally extending vertically displaced axes spaced so that their cooperating surfaces are permanently at a distance exceeding the diameter of the fiber, at least one of said rollers shiftable in a horizontal direction between an operative position in which the distance between the projections of the axes of said rollers on a horizontal

plane is less than the sum of their radii and an inoperative position in which the distance between the projections of the axes of said rollers on a horizontal plane exceeds the sum of their radii; a shiftably supported tensioning roller; an idle roller contacting the surface of one of said cooperating rollers; a driving belt engaging said tensioning roller, said idle roller and the cooperating roller not contacting said idle roller; means for driving said belt; and means for shifting said tensioning roller.

13. A device for drawing off artificial fibers from the spinneret, comprising at least two rotatably supported cooperating rollers having horizontally extending vertically displaced axes spaced so that their cooperating surfaces are permanently at a distance exceeding the diameter of the fiber, at least one of said rollers shiftably in a horizontal direction between an operative position in which the distance between the projections of the axes of said rollers on a horizontal plane is less than the sum of their radii and an inoperative position in which the distance between the projections of the axes of said rollers on a horizontal plane exceeds the sum of their radii; a shiftably supported tensioning roller; an idle roller contacting the surface of one of said cooperating rollers; a driving belt engaging said tensioning roller, said idle roller and the cooperating roller not contacting said idle roller; means for driving said belt; a lever connected to said tensioning roller and adapted to control the shifting thereof.

14. A device for drawing off artificial fibers from the spinneret, comprising at least two rotatably supported cooperating rollers having horizontally extending vertically displaced axes spaced so that their cooperating surfaces are permanently at a distance exceeding the diameter of the fiber, at least one of said rollers shiftably in a horizontal direction between an operative position in which the distance between the projections of the axes of said rollers on a horizontal plane is less than the sum of their radii and an inoperative position in which the distance between the projections of the axes of said rollers on a horizontal plane exceeds the sum of their radii; means tending to maintain said rollers in said inoperative position; a shiftably supported tensioning roller; an idle roller contacting the surface of one of said cooperating rollers; a driving belt engaging said tensioning roller, said idle roller and the cooperating roller not contacting said idle roller; means for driving said belt; a lever connected to said tensioning roller and adapted to control the shifting thereof.

15. A device for drawing off artificial fibers from the spinneret, comprising at least two rotatably supported cooperating rollers having parallel axes relatively displaced in the direction of the extension of the artificial fiber, at least one of said rollers being shiftably; means for rotating said rollers in opposite direction; at least one roller having at least one rim preventing the cooperating surfaces of said rollers to

approach closer than a distance exceeding the diameter of the fiber; means tending to maintain said rollers in said inoperative position; an idle roller contacting the surface of one of said cooperating rollers; a driving belt engaging said other cooperating roller along a portion of its axial length and said idle roller; means for driving said belt; and means for tensioning said belt whereby said cooperating rollers will assume their operative position when said belt is tensioned and their inoperative position when said belt is relaxed.

16. A device for drawing off artificial fibers from the spinneret, comprising at least two rotatably supported cooperating rollers having parallel axes relatively displaced in the direction of the extension of the artificial fiber, at least one of said rollers being shiftably; at least one of said rollers having at least one rim preventing the cooperating surfaces of said rollers to approach closer than a distance exceeding the diameter of the fiber; a shiftably supported tensioning roller; an idle roller contacting the surface of one of said cooperating rollers; a driving belt engaging said tensioning roller, said idle roller and the cooperating roller not contacting said idle roller; means for driving said belt; and means for shifting said tensioning roller.

17. A device for drawing off artificial fibers from the spinneret, comprising at least two rotatably supported cooperating rollers having parallel axes relatively displaced in the direction of the extension of the artificial fiber, at least one of said rollers being shiftably; at least one of said rollers having at least one rim preventing the cooperating surfaces of said rollers to approach closer than a distance exceeding the diameter of the fiber; means tending to maintain said rollers in non-contacting position; a shiftably supported tensioning roller; an idle roller contacting the surface of one of said cooperating rollers; a driving belt engaging said tensioning roller, said idle roller and the cooperating roller not contacting said idle roller; means for driving said belt; a lever adapted to control the position of said shiftably tensioning roller.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,389,655	Wende	Nov. 27, 1945
2,418,974	Henry	Apr. 15, 1947

FOREIGN PATENTS

Number	Country	Date
395,251	Great Britain	July 13, 1933