Nov. 18, 1958 C. J. SCHMIDT 2,860,373

FILAMENT GUIDE

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Fig. 1.

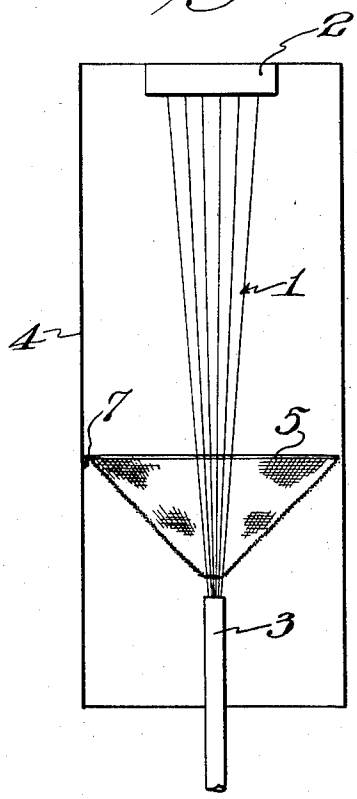



Fig. 2.

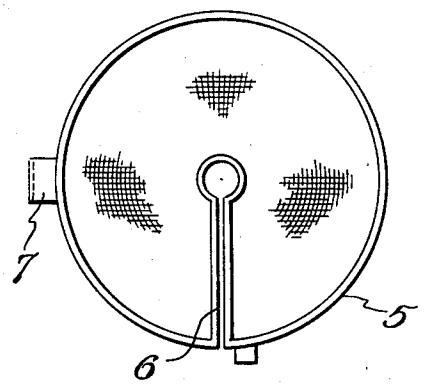
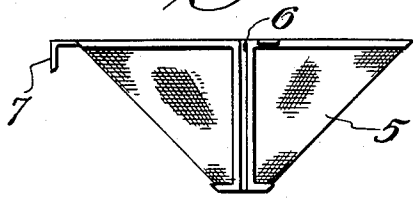



Fig. 3.




INVENTOR:
Charles Joseph Schmidt
BY
C. H. Mortenson
ATTORNEY.

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# FILAMENT GUIDE

Charles Joseph Schmidt, Seaford, Del., assignor to E. I. du Pont de Nemours and Company, Wilmington, Del., a corporation of Delaware

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6 Claims. (Cl. 18—8)

This invention relates to the forwarding of yarn bundles at high speed. More particularly, it relates to apparatus for use in such a process and still more particularly to an auxiliary apparatus for handling filament bundles travelling in an essentially downward direction.

In a melt spinning process, yarn is drawn away vertically from a spinneret. At particularly high draw-off rates a jet forwarding means, such as a high velocity air jet, is used in moving the filaments away from the spinneret. Considerable air is entrained with these downwardly moving filaments. This is true even if an air jet is not used, for the yarn velocities involved are sufficiently high to cause a column of air to move along with the filaments.

Usually, the filament bundle passes downwardly through a chimney such as that shown in U. S. Patent 2,252,684, frequently open on one side, to the air jet and from there to the wind-up device or to a cutter if staple is to be produced. If one of the filaments breaks, it usually strays from the air stream and is not forwarded by the air jet. It merely collects at the base of the chimney until it is eventually sucked back into the filament bundle by the air jet. This filament frequency has a much larger denier (of the order of 10 fold) and a much lower state of orientation than the other filaments which are pursuing the normal path. Consequently, when the filament eventually is sucked back into the bundle it produces an objectionable non-uniformity. The amount of non-uniform material will, of course, depend on how soon the stray end is sucked back into the bundle. But any amount of non-uniform filaments in the final package or product reduces the quality of the product. An even greater disadvantage arises because of the usual tendency of this strayed filament to return to the bundle as a tangled mass which at the very least causes a gross quality defect in the product or which more often than not completely disrupts the yarn forwarding operation with consequent loss of production and/or damage to equipment.

It is, therefore, an object of this invention to improve the continuity of the yarn forwarding operation and to improve the quality of the forwarded product. A further object is the provision of apparatus for directing broken, straying ends back into the running filament bundle. Other objects appear hereinafter.

The objects of this invention are accomplished by the use of a perforated guide located above the entrance to the yarn forwarding means. The guide is perforated so that the air stream is kept in its normal path without causing turbulence and so that the filament or filament bundle is kept in its proper path. The large opening (approximating the inner dimension of the passageway) covers the area in which straying occurs and the exit end, just above the forwarding means, is small, being somewhat larger than the filament or filament bundle diameter.

In the figures

Figure 1 shows a schematic view of the guide, chimney, jet and spinneret;

Figure 2 is a plan view of a guide and

Figure 3 is a side view of a guide.



As can be seen from Figure 1, a filament bundle 1 passes, essentially vertically downward, from a spinneret 2 to an air jet 3. During this passage the filament bundle traverses a chimney 4 which may be open on one or more sides or may be of perforated or louvered construction. Above the spinneret 2 is some means (not shown), such as a piston, for forcing the material being spun through the spinneret and below the air jet 3 is a collection device or a staple cutter (not shown). The air jet moves the filaments away from the spinneret at high speeds. If an end breaks, the stray filament accumulates in a tangled pile. This is later pulled into the moving stream of filaments and causes stoppage of the air jet or produces a quality defect in the forwarded yarn. To thread the straying end into the bundle automatically a funnel guide 5 is provided between the spinneret 2 and the air jet 3. This guide may be constructed of screen, from perforated metal or it may be a system of baffles or a system of louvers.

The funnel guide is usually conveniently made of screen about 16 mesh size, although screen of about 4 to about 250 mesh may be used. A conventional sheet metal funnel cannot be used since it deflects the air entrained with the rapidly moving filaments. A considerable turbulence is set up and the deflected air not only blows the broken filaments out of the downwardly moving filament bundle but it sets up such a turbulence in the filament bundle itself that appreciable denier and dye affinity variations result. With a screen funnel these obstacles are not created but rather a self-threading result is attained. The screen guide of this invention directs the broken filaments to the forwarding means, thereby minimizing the amount of non-uniform filaments. The screen structure permits the desired guiding of the broken filaments with a minimum effect on the air flow in the chimney. Preferably the throat of the screen guide is made somewhat larger than the diameter of the yarn bundle so that normally there is no contact with the moving bundle. The guide is constructed so that the large diameter extends to catch substantially all of the stray filaments. For example, when spinning from a 4 inch spinneret with the guide 30 to 45 inches removed, the outer diameter is at least 6 inches although it may be varied somewhat with the yarn speed. At the exit end the small diameter is somewhat larger than the filament bundle in order to prevent the filament bundle from contacting the guide in normal operation. If the guide is made of screen or perforated plate, the mesh size is such that the stray filaments do not pass through the sides of the guide but necessarily pass downwardly to the exit. On the other hand, the mesh size is such that the air stream passes through the guide without setting up unwanted turbulence. For this, the guide is so constructed that it has about 20% to about 80% open area.

The guides may be constructed from wire screen, plastic screen, open mesh cloth, perforated metal, expanded metal grating and the like.

The guide of this invention is very useful when the vertical fall or the distance between the point of delivery and take-up by the forwarding means is appreciable. When this distance is short, the number of broken filaments likely to stray may be smaller depending somewhat on the process but the device of this invention is still used very effectively in such situations. Generally, yarn forwarding processes involve substantial distances between these points, and the apparatus of this invention has wide application.

The forwarding means may be an air jet, a fluid jet, a blower, a Beria or similar cutter, a bobbin or the like. Any number of the guides may be used at various places in the run. The guide need not be shaped like a funnel. For example, it may be in the form of a trough, e. g.,

when a plurality of yarn bundles are fed to a jet with a slot-like entrance. For convenience, the guide **5** has a slot **6**, shown in Figures 2 and 3. This makes the stringing up of the bundle very simple. Also, a bracket **7** is usually used to anchor the guide in place, be it in a chimney as described above, or be it in the open. In locating the guides of this invention a guide is placed preferably immediately above the entrance to the air jet or close to whatever forwarding means is being used.

By use of the guide of this invention, the life of a cutter blade is materially increased when used in a staple process employing a high speed yarn feed to the cutter. Where an ejector is used to feed a cutting device, a tangled pile which has resulted from stray broken ends is frequently presented to the rotating knives. The guide of this invention prevents the accumulation of filaments and eliminates the tangled piles so that the life of the knives is greatly increased.

Off-length cuts are reduced. Denier and dye uniformity are increased. The amount of non-uniform filament in the product is negligible. These results make the guide of this invention an important contribution to the art of yarn forwarding.

Any departure from the above description which conforms to the present invention is intended to be included within the scope of the claims.

I claim:

1. Yarn bundle forwarding apparatus comprising a yarn bundle producing means; forwarding means spaced from the producing means and adapted to move the yarn bundle away from the producing means; and, mounted in the yarn bundle path between the producing means and the forwarding means a stationary perforated guide element having a large opening tapering to a smaller exit and having a slot at one side running from the large opening to the smaller exit for stringing up the yarn bundle.



2. Yarn bundle forwarding apparatus comprising a producing means for forming a plurality of continuous filaments; a passageway for said filaments; a forwarding means spaced substantially vertically below the producing means and adapted to form the filaments into a yarn bundle and move it away from the producing means; and a stationary perforated guide element mounted in the filament path between the producing means and the forwarding means, the said guide element being mounted within the said passageway and having a large opening approximating the inner dimension of said passageway and tapering to a small exit approximating but larger than the diameter of the yarn bundle.

3. Apparatus in accordance with claim 2 wherein said guide element is a funnel made of screen.

4. Apparatus in accordance with claim 2 wherein said guide element is a screen of about 4 to 150 mesh.

5. Apparatus in accordance with claim 2 wherein said guide element is a screen of about 16 mesh.

6. Apparatus in accordance with claim 2 wherein said producing means is a spinneret.

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