

June 14, 1960

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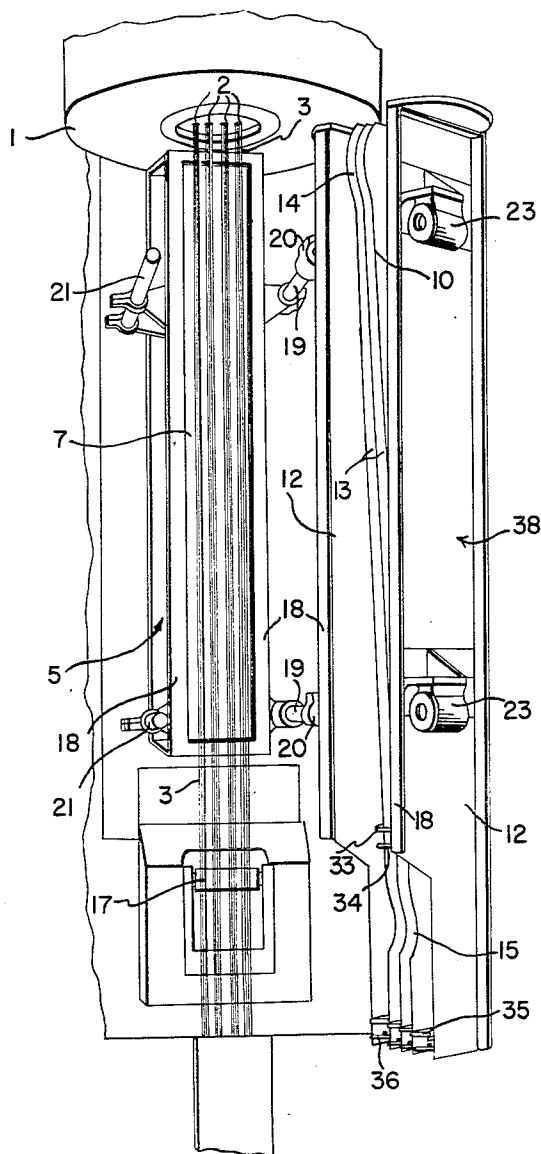
2,940,122

MELT SPINNING APPARATUS WITH PIVOTALLY MOUNTED BLOWBOX

Filed Nov. 13, 1953

4 Sheets-Sheet 1

FIG. 1.



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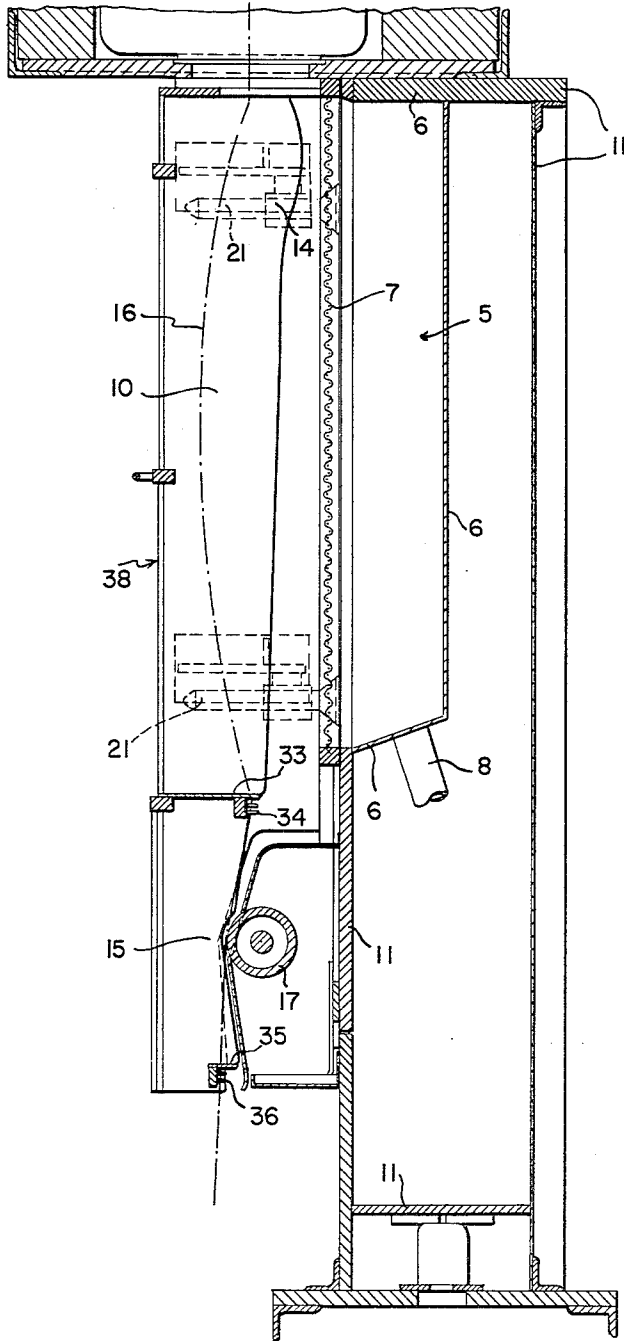


FIG. 2

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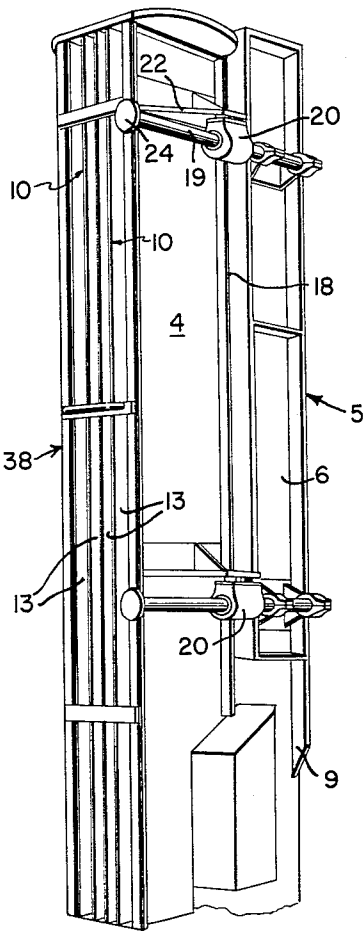
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FIG. 3.



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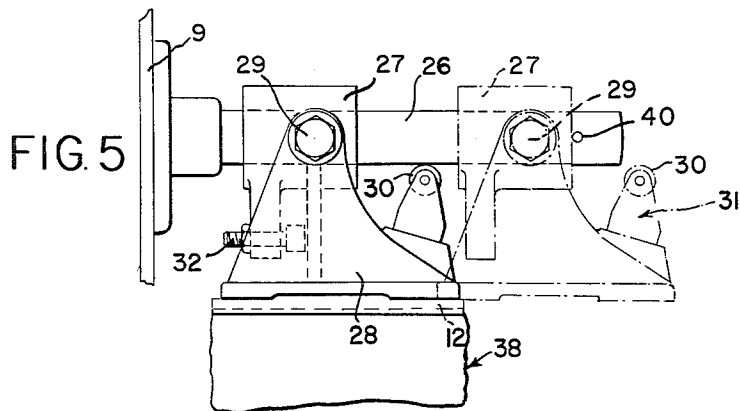
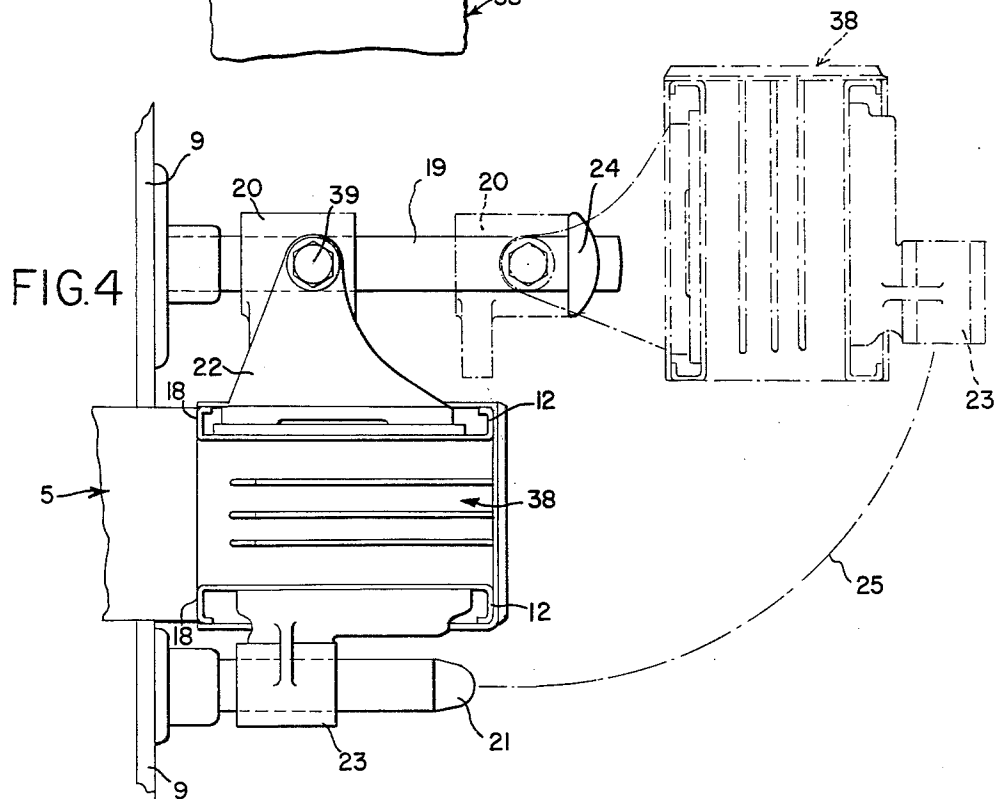
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4 Sheets-Sheet 4



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MELT SPINNING APPARATUS WITH PIVOTALLY MOUNTED BLOWBOX

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1 Claim. (Cl. 18—8)

This invention relates to the spinning of filaments. More particularly, it relates to multi-end spinning and to means for keeping filaments that are running in a group in their group positions, thereby preventing filaments running in one group from straying over and into filaments running in another group.

Usually in the spinning of filaments from synthetic materials such as cellulose esters, vinyl polymers, polyamides and polyesters, a plurality of filaments coming from a single spinneret are wound as a single yarn end. For more economic production, it is desirable to spin more than one end of yarn from each spinneret. Therefore, spinnerets have been designed that contain a number of sections, each section having a plurality of orifices. The filaments formed from one of these sections are kept running together in a group and that group is formed into a bundle. Each bundle coming from its respective section is wound into a separate yarn package. It is possible to have each of the yarn packages formed on individually driven spindles or formed through the driving of a single spindle.

Because of their close proximity and because of minor disturbances in the cell, filaments from one group tend to stray to another group. Prevention of this straying has been a serious problem in multi-end spinning procedures. Further, in a transfer of filaments from a plurality of yarn bundles, off-standard yarn results when straying has occurred. Uniform denier and uniform filament count are desired. Since the multi-end spinning operation is conducted at a high rate of speed, the straying can produce substantial quantities of the off-standard yarn.

Accordingly, it is an object of this invention to provide means for preventing the straying. A further object is the passing of a group of filaments through a spinneret cell in a continuous manner and winding up the group of filaments without variation in filament count or denier. A still further object is the handling of several groups of filaments in such a manner that the identity of each group is maintained throughout the spinning and winding operations.

The objectives of this invention are accomplished by the provision of a system of baffles in a cell or chimney assembly. The baffles constitute an integral part of the filament hardening chimney or cell. String-up of the filaments running from the spinneret head to a collecting means is accomplished while the cell or chimney is in an open position. After the stringing-up, the assembly is closed and the desired partition is accomplished. During this spinning operation a plurality of yarn bundles is kept running in a continuous manner without change in the identity of any of the yarn bundles.

In the figures:

Figure 1, an elevation in perspective, shows one form of the apparatus of this invention, the apparatus being in an open position;

Figure 2 is a sectional side elevation with one of the

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chimney wings removed, showing the contour of the baffles.

Figure 3 is an elevation showing the compartments;

Figure 4, a plan view, shows one form of a support for the unit of the apparatus containing the baffles; and

Figure 5, also a plan view, shows another form of support for this baffle-containing section.

In Figure 1 the spinneret head 1 contains a plurality of sections 2 each of which has a plurality of orifices. From these sections a plurality of filaments is formed and each section gives rise to a filament bundle 3. These filament bundles 3 are passed downwardly through the spinning cell or chimney assembly 4, shown in closed position in Figure 3, to a winding up device (not shown). The assembly is made up of two sections, plenum chamber 5 and baffle unit 38. For convenience, the invention is described in respect to a cross-flow chimney such as that as is disclosed in U.S. Patent 2,273,105. Thus, as shown in Figure 2, a plenum chamber 5 is formed of appropriate walls 6 and screen 7. When the apparatus is in the closed position as shown in Figures 2 and 3, the vapor being used passes from the vapor inlet 8 into the plenum chamber 5, through screen 7 and across the path of the travelling filament bundles 3, through the compartments 13 formed by baffles 10 and out into the atmosphere or into a collection chamber. The plenum chamber can be supported by beams 11 as shown in Figure 2.

The baffles 10, in perspective, can be seen in Figure 1. These baffles are located in between the two chimney wings 12 which enclose the area of operation and which prevent the setting up of eddy currents. Steady state operation is obtained through the use of these wings and baffles. The number of baffles 10 that will be used will depend upon the number of filament bundles that are being spun. Each of the four sections 13 that is formed usually has no more space than exists between the sections in the spinneret containing the groups of orifices. That is, the distance from baffle to baffle is about the same as the distance between the center lines of the groups of orifices which go to make up the separate filament bundles or between the center lines of adjacent filament bundles. The baffles do not operate on these center lines but are displaced into the spaces between these groups. The baffles are spaced apart in increments to fit into the spacings between the filament bundles. Preferably, the spacings of the baffles will equal the spacings of the filament bundles. The baffles 10 may have outward protuberances 14 at the top portion and may have indentations 15 at the bottom portion as required. A baffle where the outward protuberance at the top is simply the projection formed by a slant line inclined at about 3° to the vertical has operated successfully.

As shown in Figure 2, the path of a filament in its downward travel through the chimney cell corresponds approximately to the path designated by dotted line 16. The medium that is being blown into the plenum chamber 5 and through the screen 7 tends to blow the filaments away from the screen. The bowing effect prior to complete string-up is greater at the bottom of the device. Further, as shown in Figure 1, each of the separate filament bundles 3 are converged and may be passed over the finish roller 17 where the installation includes one. This roller is usually driven in the direction of the travelling filaments and the finish is applied to the roller or to aprons in contact with the roller. The filaments as they travel over the finish roller 17 pick up a designated amount of the finish. The outward protuberances 14 at the top cause each of the separate filament bundles 3 to pass into one of the chambers 13 formed either by the walls of the baffles 10 or by the walls of the baffles 10 in combination with the chimney wings 12. As can be seen in Figure 2, the edges of the baffles 10

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are further away from the screen 7 at the bottom than at top where the outward protuberances are. Since stringing up is usually accomplished before the chimney assembly is closed, the filaments are bowed out somewhat as shown by path 16 except that they are also bowed out considerably in the lower part of the cell as well. With the contour of the baffles 10 as shown, the unit containing the baffles can be swung into position without touching the filaments in the upper zone and with very little contact in the lower zone. The minor baffle protuberances at the top enter the spaces between the filament bundles just below the extruding means and thus ensure the proper partitioning of the filament bundles as the baffle unit is pushed in and seated. Although the bowing effect and unsteadiness in the filament bundles caused by the string-up may have produced some intermingling of filaments from adjacent bundles in the lower zone, as the baffles are pushed in these filaments are forced into their proper compartments by a sort of rolling contact with the baffle edges. The inward cuts 15 at the bottom are adjusted to conform to the contour of the finish roller 17. This roller may be recessed or placed further away from unit 38, but it is usually desirable to have it approximately vertically below the center line of the spinneret. The converged filament bundles leaving the chimney assembly are passed to the wind-up devices.

As shown in the drawings, particularly in Figures 4 and 5, the unit 38 containing the baffles is pivotally mounted so that the unit may be swung into or out of position. When the units 5 and 38 are in the closed position, the surfaces 18 are in close contacting position. The support shown in Figure 4 is a slide bar 19 mounted on the beam 9. Cooperating with the slide bar 19 are members 20 each appropriately mounted on a chimney wing 12. In a corresponding position on unit 5 through beam 9, are mounted polished rods 21 which cooperate with bushings 23. At the pivot points, a pair of slide bars are connected to one of the chimney wings 12 through brackets 22 and members 20. Pins 39 connecting these members and brackets permit pivoting. At the ends of the slide bars 19 are stops 24. The unit is pulled straight out until the members 20 contact the stops 24. At this point the chimney assembly 38 clears the rods 21 and may be swung into the open position as shown by the dotted lines 25 in Figure 4. The arc through which the unit may be swung is 90° or more as required.

Another type of support is shown in Figure 5. In this modification, the polished rod 26 is mounted on the beam 9. On this rod is a slide bushing 27 to which is attached bracket 28 fixed at its other extremity to a chimney wing 12. This bracket pivots about point 29 on the bushing. Mounted on the bracket is roller 30 which holds the wing parallel while the wing is being opened. The sliding bushing can be moved forward or backwards, and in the forward movement the unit containing roller 30 moves to a position against stop 40 which position is shown by dotted lines 31. In this position, roller 30 has cleared the end of the bar 26 and the wing can be swung into an open position without any appreciable play. This modification permits the disposal of the two left hand sliding bars 21. Mounted on the bushing 27 is an adjustable stop 32 which can be used to adjust the pressure of the roller 30 on rod 26.

As shown in Figures 1 and 2 there can be mounted between the baffles toward the lower end of the chimney unit 38 guide pins 33 and fingers 34. These guide pins and fingers are usually in the form of a V and their func-

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tion is to converge the filament bundles and to pass the bundles into the proper guide throat. A similar set of convergence guides 35 and 36 can be located at the lowermost part of the assembly to insure that the bundles coming from the assembly for delivery to the winding means are still correctly positioned and constituted.

The apparatus of this invention prevents straying of filaments from one bundle to another. The final yarn package is made up of filaments that are uniform in denier and in count. During the spinning operation the doffing of full bobbins of yarn and the starting up of empty bobbins are accomplished without disturbing the running of the filaments through the chimney assembly and without any interchange of filaments among the plurality of bundles. This is a distinct advantage, because in doffing and starting operations, in the absence of the baffles of this invention, considerable disturbance occurs in the filament bundle lines in the chimney. Previously such disturbance led to considerable straying of filaments. This operation eliminates the disturbance, and high standard yarn is produced at a high rate of speed.

The apparatus of this invention has been shown in use with a single spinneret producing a multiplicity of filament bundles. It may also be used in apparatus comprising a plurality of closely spaced spinnerets producing a plurality of yarn bundles using a single large hardening cell. In either case the baffles are readily removed during such necessary operations as installation of spinnerets, wiping, threading-up and maintenance. The self-partitioning effect insures a proper division of the filaments into the desired plurality of bundles. In connection with a single spinneret, this automatic partitioning is most important and desirable because of the close spacings and because the filaments are traveling over long distances in close proximity through a zone through which a gaseous medium is moving rapidly. Separation of filament bundles by hand is eliminated and the separation effected by this invention is complete and correct. Upon separation there is no possibility of straying while the unit is in closed position.

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

I claim:

A spinning apparatus for the spinning of filament bundles comprising a spinneret, a spinning cell adjacent thereto and through which the filaments from the spinneret pass, a plenum chamber for directing vapor across the path of the filaments in the said cell, and a unit pivotally mounted to the plenum chamber for horizontal movement, said unit containing a baffle positioned substantially parallel to the filaments and extending substantially the full length of the said cell, dividing the cell into chambers.

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