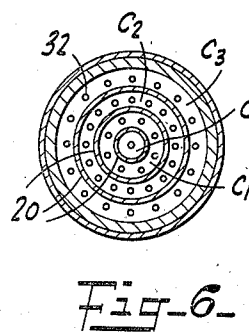
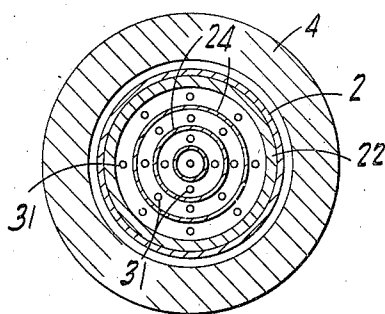
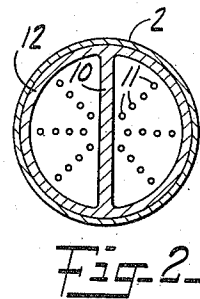
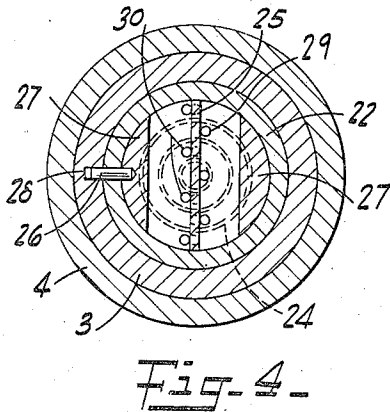
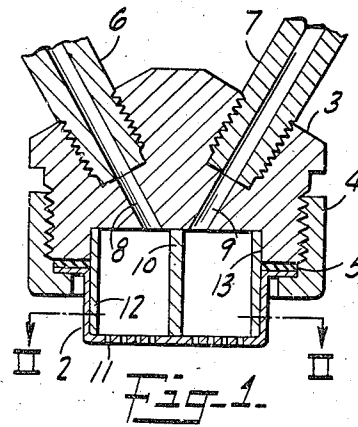
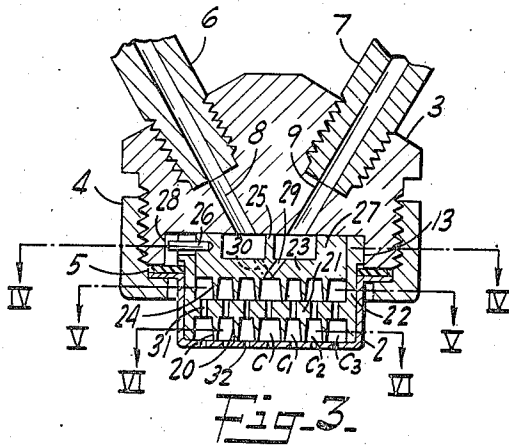


April 16, 1946.

R. J. TAYLOR ET AL
FILAMENT EXTRUSION DEVICE

2,398,729

Filed June 29, 1943



BY

INVENTORS.
ROBERT J. TAYLOR
WESLEY L. WEBB
Carl A. Castellino
ATTORNEY.

UNITED STATES PATENT OFFICE

2,398,729

FILAMENT EXTRUSION DEVICE

Robert J. Taylor, Claymont, Del., and Wesley L. Webb, Glen Moore, Pa., assignors to American Viscose Corporation, Wilmington, Del., a corporation of Delaware

Application June 29, 1943, Serial No. 492,702

8 Claims. (Cl. 18—8)

This invention relates to filament extrusion devices and is particularly concerned with a novel type of extrusion device adapted to spin a plurality of spinning materials to form filaments of different sizes, compositions or both therefrom simultaneously.

It is an object of this invention to provide an extrusion device comprising a plurality of filament forming orifices, certain of which are arranged to be supplied through a separate channel from that through which certain others of the orifices are fed. A further object is to provide a multiple chambered extrusion device, at least two chambers or two groups of chambers thereof being associated with separate feeding channels and separate orifices or groups of orifices. A further object is to arrange the chambers of such an extrusion device to facilitate uniform distribution of the spinning materials to the orifices associated with either chamber or groups of chambers. A further object is to so arrange the chambers and orifices or separate groups of chambers and orifices that the different filaments are thoroughly intermingled in the filamentary bundle issuing from the spinneret associated therewith. Further objects and advantages will be apparent from the drawing and the description thereof.

In the drawing, illustrative of the invention,

Figure 1 is a mid-section of one embodiment of the extrusion device of the invention,

Figure 2 is a cross-section thereof on line II—II of Figure 1,

Figure 3 is a mid-section of another embodiment,

Figure 4 is a cross-section on line IV—IV of Figure 3,

Figure 5 is a cross-section on line V—V of Figure 3, and

Figure 6 is a cross-section on line VI—VI of Figure 3.

In Figures 1 and 2, the spinneret 2 is attached to a supply head 3 for the spinning material or solution by a coupling 4. A gasket 5 is positioned between the flange of the spinneret 2 and the supply head 3 to assure a tight seal. Feed pipes 6 and 7 communicate with passages 8 and 9 respectively. A transverse partition 10 divides the space back of the spinneret face into two completely separate regions each associated with a distinct group of orifices 11 and with but one of the feed passages 8 and 9. To assure that the partition 10 is held in proper position, it may be secured to or be formed integrally with a cylindrical sleeve 12 fitting within the side walls of the

spinneret and of the recess 13 in the supply head 3.

The extrusion device of Figures 1 and 2 lends itself readily to operation under a variety of conditions for various purposes. For example, lines 6 and 7 may be connected to separate pumps which may be connected to a single spinning material supply line or to separate supply lines. Where they are connected through separate pumps to a single supply of spinning material, the pumps may be operated independently of one another at different speeds to yield filaments of different sizes. Under such circumstances, the orifices associated with one of the passages 8 or 9 may, if desired, be of different size or more numerous or both of different size and more numerous, than those associated with the other to allow of further variation in the filaments obtained.

Where the lines 6 and 7 are connected with separate supplies of spinning materials, the filamentary bundle issuing from the spinneret may comprise filaments having different compositions. Again, the orifices associated with one of the passages 8 or 9 may, if desired, be of different size or more numerous, or both of different size and more numerous, than those associated with the other passage. In this arrangement, the extrusion device lends itself to the simultaneous spinning of two or more different kinds of filaments which may be of the same or of different diameter. The several kinds of filaments may be present in any desired proportion since such spinning conditions as number of orifices, size of orifices and pump speed for each spinning material are independently controllable. Thus a bundle comprising a mixture of filaments formed from different viscoses, from different cuprammonium cellulose solutions, from different cellulose esters or solutions thereof, from different proteins, or from different resins, such as nylons, vinyl polymers and copolymers, vinylidene polymers and copolymers, can be produced from a single spinneret. Also a mixture of filaments of unrelated types can be so produced. For example a viscose may be spun with a vinyl resin, such as the copolymer of vinyl chloride and vinyl acetate, or a cellulose ester, such as cellulose acetate, and the resin or ester filaments in the resulting fully set yarn or bundle may be activated after fabrication by knitting, weaving, braiding, doubling and the like to produce ladderproof knitted structures and stable woven, braided, and corded structures. Again, solid filaments may be formed simultaneously with hollow filaments of the same or dif-

ferent constitution. For example, filaments which may be of fine diameter may be spun from one solution of a copolymer of vinyl acetate and vinyl chloride and hollow filaments of larger diameter may be spun from a similar solution containing a gas generating agent and such a mixture may be used to produce light weight filamentous mat products such as are disclosed in the copending application for United States Letters Patent of Robert J. Taylor, Ser. No. 490,009 filed June 8, 1943. In general, the extrusion device finds a wide field of usefulness in the production of yarns and fabrics of mixed textile filaments of continuous or discontinuous nature. For making a blended staple fiber mixture, the yarn-like bundle of mixed continuous filaments produced from the spinneret need merely be cut at any stage subsequent to extrusion.

If desired, any predetermined number of spinning materials greater than two may be spun simultaneously by the extrusion device of this invention by providing a corresponding number of lines (6 and 7), passages (8 and 9), and the proper partitioning of the space back of the spinneret face.

Figures 3 to 6 show a modification in which the space immediately back of the spinneret face is divided by a plurality of concentric partitions 20 (three being shown though any number may be used) into concentric annular chambers C₁, C₂, C₃ about a central chamber C. These partitions 20 may extend from a transverse plate 21 secured in or integrally formed in a sleeve 22 fitting within the walls of the spinneret 2 and the recess 13 in the supply head 3. In the space back of the plate 21, there is disposed a distributor member having a transverse plate 23 from which the concentric partitions 24 extend into contact with plate 21. A transverse rib or partition 25 divides the space back of the plate 23 into two compartments or chambers. A locating pin 26 extends from a bore in one of the walls 27 extending back of the plate 23 through a slot in sleeve 22 to a slot 28 in the supply head 3. This locator pin 26 is arranged so that the passages 8 and 9 are each associated with only one of the compartments on either side of the rib 25. Passages 29 connect that one of the compartments communicating with passage 9 with alternate regions or chambers including the central region or chamber between the concentric partitions 24 while passages 30 connect the other compartment communicating with passage 8 to the other annular regions or chambers between partitions 24. Passages 31 connect corresponding regions and chambers in front of and in back of the plate 21. The orifices 32 of the spinneret are arranged in concentric circles so that one circle is associated with but one of the annular chambers C₁, C₂, and C₃ and a central orifice is associated with the central chamber C.

If desired, a plurality of circular rows of spinneret orifices may be associated with a given one of the chambers C₁, C₂, and C₃. The partitions 20 and 24 may be arranged to provide any number of annular regions or chambers for spinnerets having a greater number of circles of orifices. Also the device may be arranged to spin filaments from three, four or more spinning materials by changing the rib partition 25 into one of Y-shape, X-shape or other shape to divide the space back of plate 23 into three, four, or more compartments and providing additional groups of passages similar to 29 and 30 associated with separate annular regions or chambers alternating

with those associated with passages 29 and 30 in any desired sequence.

As in the device of Figures 1 and 2, that of Figures 3 to 6 is adaptable to the production of filamentary bundles composed of mixtures of a plurality of types of filaments in any desired proportions and having any desired filament sizes. Both devices may spin mixtures of filaments of different kinds and of different sizes and the filament of one type may be of different sizes as well. The device of Figures 3 to 6 has the advantage of more uniformly and more thoroughly intermingling the filaments of different types and permits of close control over such intermingling and distribution. The device of Figures 3 to 6 lends itself to the accomplishment of all of the objectives mentioned above in connection with the device of Figures 1 and 2.

In the claims, the terms "alternate" and "alternating" are intended to refer to the members of a repetitive series of two or more than two members.

It is to be understood that changes and variations may be made without departing from the spirit and scope of the invention as defined by the appended claims.

We claim:

1. A filament extrusion device comprising a spinneret having a plurality of circular orifices, a space back of the spinneret face, partition means comprising at least one annular partition within the space dividing it into a plurality of chambers, each of such chambers communicating with a separate group of spinneret orifices, and a plurality of separate spinning material supply passages, each communicating with at least one chamber separate from the remainder of the chambers with which the remainder of the supply passages communicate.

2. A filament extrusion device comprising a spinneret having a plurality of orifices, a space back of the spinneret face, at least one annular partition within the space dividing it into concentric chambers, each communicating with a separate group of spinneret orifices, and separate spinning material supply passages communicating with the respective chambers.

3. A filament extrusion device comprising a spinneret having a plurality of orifices, a space back of the spinneret face, a plurality of generally annular partitions dividing the space into a plurality of substantially concentric chambers each communicating with a separate group of spinneret orifices, and a plurality of separate spinning material supply passages each communicating with a separate group of chambers.

4. A filament extrusion device comprising a spinneret having a plurality of orifices, a space back of the spinneret face, a plurality of generally annular partitions dividing the space into a plurality of substantially concentric chambers, each communicating with a separate group of spinneret orifices, and a plurality of separate spinning material supply passages, each communicating with a separate group of chambers, the chambers with which one of the passages communicates alternating with the chambers with which the other passage or passages communicate.

5. A filament extrusion device comprising a spinneret having a plurality of concentric groups of orifices, a space back of the spinneret face, a plurality of generally annular partitions dividing the space into a plurality of substantially concentric chambers, each communicating with a

separate group of spinneret orifices, and a plurality of separate spinning material supply passages, each communicating with a separate group of chambers, the chambers with which one of the passages communicates alternating with the chambers with which the other passage or passages communicate.

6. A filament extrusion device comprising a spinneret having a plurality of orifices, a space back of the spinneret face, partition means comprising at least one annular partition within the space dividing it into a plurality of chambers, distributor means back of the partition means dividing the space immediately in back of the partition means into a plurality of regions each communicating with a separate corresponding chamber, the distributor means also dividing the more remote space back of the partition means into a plurality of compartments, passages in the distributor means, each compartment being connected by a separate group of the passages to a separate group of the regions, and a plurality of separate spinning material supply passages, each communicating with a separate compartment.

7. A filament extrusion device comprising a spinneret having a plurality of concentric groups of orifices, a space back of the spinneret face, a plurality of generally annular partitions divid-

ing the space into a plurality of substantially concentric chambers, distributor means back of the annular partitions dividing the space therebehind into a plurality of substantially concentric regions each communicating with a separate corresponding chamber, a rib on the distributor means dividing the more remote space back of the distributor means into at least two compartments, passages in the distributor means between one of the compartments and a group of the regions and other passages between at least one other compartment and a separate group of the regions, and at least two separate spinning material supply passages, each communicating with a separate compartment.

8. A filament extrusion device comprising a spinneret having a plurality of concentric groups of orifices, a space back of the spinneret face, a plurality of annular partitions dividing the space into a plurality of substantially concentric chambers, each communicating with a separate group of spinneret orifices, two spinning material supply passages each of which communicates with a separate group of chambers arranged alternately with those with which the other communicates.

ROBERT J. TAYLOR.
WESLEY L. WEBB.