This invention relates to a spinning device for the manufacture of filaments from synthetic materials. In particular, this invention relates to spinning devices comprising improved means for fastening the spinning nozzle to the feed material source.

It is an object of this invention to provide a spinning device wherein the spinning nozzle can be installed and removed horizontally from the front or service side of the spinning equipment.

It is another object of this invention to provide a spinning device wherein the spinning nozzle can be installed and removed more quickly without disturbing air blower ducts beneath the spinning nozzle so that production stoppage due to breakdown requiring an exchange of spinning nozzles can be greatly reduced.

It is another object of this invention to provide a spinning device wherein the spinning nozzles are fastened to the feed material source by being wedged thereagainst by means of either wedges or cam surfaces pressing against the underside of the spinning nozzle.

It is another object of this invention to provide a spinning device for the manufacture of filaments from synthetic materials comprising a spinning nozzle having an inlet opening for the receipt of feed material, a nozzle block having an outlet opening communicating with said inlet opening for supplying feed material, a mounting plate attached to said nozzle block with said spinning nozzle located therebetween, and either at least two wedges or at least two rotatable shafts having cam surfaces supported by said mounting plate for bearing against the spinning nozzle for wedging the spinning nozzle in place against the nozzle block.

In the drawings where like reference numerals denote same or equivalent parts throughout,

FIG. 1 shows the front view of a spinning device of this invention;
FIG. 2 shows a section II—II of FIG. 1;
FIG. 3 shows a section III—III of FIG. 1;
FIG. 4 shows a longitudinal section through an alternative construction of the spinning device of this invention;
FIG. 5 shows a top view of the mounting plate shown in edge view in FIG. 4;
FIG. 6 shows a section along the line VI—VI of FIG. 4;
FIG. 7 shows a section along line VII—VII of FIG. 5;
FIG. 8 shows a section along line VIII—VIII of FIG. 5.

Referring to the form of the device shown in FIGS. 1, 2 and 3, the nozzle housing is preferably of welded construction. The nozzle housing is formed of a nozzle block 1 and a nozzle block 2 which are welded together in the middle with the interposition of a plate 3. At the ends, plates 4 and 5 are also welded on. The shape of the blocks defines an access opening towards the service side as can be seen from the individual views.

The threads emerging from nozzles 6 and 7 are discharged through an opening 8 in the nozzle block which provides support surfaces 10 and 10' for the wedges 9. At the ends 11, the spinning nozzles are provided with recesses 12 and 12'. The upper surfaces of these recesses 13 and 13' are inclined at a slight downward angle from the service side to the rear, opposite side of the device.

The wedges 9 are shorter than the width of the spinning nozzle and the clearances 12 and 12', and the upper surface of each wedge is slightly rounded lengthwise or curved in the longitudinal direction. This provides a linear area of contact between the wedge and the spinning nozzle, preventing a large amount of friction against the nozzles 6 and 7 and preventing jamming of the wedges in the respective recesses.

The nozzles 6 and 7, which in other respects, consist in a known manner of several parts and inserts, are not a part of invention and are therefore not described in greater detail.

The hex head bolts 17, having a recess in the heads of hexagonal cross section, extend through a longitudinal passageway through each wedge and are secured in the passageway by a snap ring 18. According to the idea of the invention, the assembly bolts secured by snap rings do not, as in previous devices, project directly through the heated nozzle plate, but rather project through the wedges. These wedges do not, however, have a large surface in contact with each of the inclined surfaces of the spinning nozzle, for they are slightly curved in the longitudinal direction so that between the two surfaces there results a linear contact area transverse with respect to the wedges.

According to this invention, the spinning nozzle is fastened by means of only two bolts. Furthermore, the heat loss from the spinning nozzle is much smaller than in previous devices which employed eight bolts that had to be driven in from below. In addition, it is possible to use weaker bolts because they are exposed to less heat than those employed in previous devices.

Gaskets 14 which are said to be made of a highly heat-resistant material are positioned between the spinning nozzle and the nozzle block surrounding the opening therethrough. Annular recess seats for the ring can be provided. The gasket prevents escape of material passing through the openings.

Referring to FIGS. 4 through 8, an embodiment of the device of this invention is shown wherein there are two shafts provided with cams supported in such a way that during their rotation the nozzle is pressed by the cams against the feed insert.

The nozzle block manufactured of high temperature structural steel is designated by 21, the feed insert is designated by 22, and the drawer-like spinning nozzle insert to be pushed as a whole in the direction of the arrow is designated by 23. This insert consists of an upper part 24 and a lower part 25 between which are arranged the distributor 26, the filter 27, the strainer 28, the final filter 29, and the spinning nozzle orifice block 30. The upper part 24 and the lower part 25 are connected together. In the nozzle block 21, tappets 31 are provided by which mounting plate 32 can be fastener with bolts 33. This fastening occurs only once, when the spinning apparatus is initially assembled. The bolts 33 need not be removed later, since the spinning nozzle 23 can be replaced in a sipler manner, as shall be shown later.

Two shafts 34 are pivoted in the space 32' defined by the mounting plate 31. In FIG. 5 one shaft is omitted. As can be seen, the shafts are arranged in such a way that they run parallel to the longitudinal edges of the nozzle 23.

The ends of the shafts 34 are provided with a square or hexagonal tip 34'. In this latter the shafts can be turned with a single open-end or box-end wrench and several cams press against the spinning nozzle simultaneously. On each shaft are attached two cams 35, the effective curved surfaces of which have the shape of a spiral. Each shaft 34 rests on three support points. The support points consist of bearing 36, which are removably set into circular
8,299,471

3 recesses 37 of the mounting plate 32. Here, the arrangement is such that the bearings 36 and the shafts 34, with the exception of the shaft ends 34', are contained within the mounting plate 32. Thus small construction dimensions are attained. Furthermore, a considerably larger number of spinning orifices 38 can be incorporated in the spinning nozzle 30. Removable wearing plates 39 which provide bearing surfaces for the cams 35, are inserted in the lower part 25 of the spinning nozzle.

If the spinning-nozzle insert 23 is pushed in from the front, i.e., from the direction of its arrow, it is guided like a drawer by the contact surfaces 40 of the nozzle block 1, said contact surfaces assuring the transfer of heat. If in FIG. 6 the left shaft 34 is turned to the left and the right shaft is turned to the right, the cams 35 lift the spinning nozzle insert 23 and press its upper surface against the nozzle block 21, and therefore the insert gas-filled gaskets are pressed towards the opening 41 of the feed insert 22. From the service side of the device, the spinning nozzle 23 can be covered with a plate 42 of aluminum, so that optimum temperature conditions prevail with the nozzle block 21. The nozzles are heated in the known manner with biphynol. If spinning nozzle 23 is to be changed, only the shafts 34 must be turned, now in the opposite direction, and the insert can be taken out horizontally and a new one can be inserted.

According to another characteristic of this embodiment of the invention, the effective curved surfaces of the cams have the shape of a spiral beginning at the surface of the shaft. This construction is preferred because at the beginning of the shaft and cam rotation, the required power is small. If, as furthermore proposed in the invention, each shaft is supported at three points, and if one cam is placed on two surfaces for support against the nozzle block, then an evenly distributed transfer of heat from the nozzle block to the spinning nozzle.

Obviously many modifications and variations of the invention as hereinabove set forth can be made without departing from the essence and scope thereof, and only such limitations should be applied as are indicated in the appended claims.

I claim:

1. A spinning device for the manufacture of filaments from synthetic materials comprising: a spinning nozzle having at least one filament emission orifice; a nozzle block having walls defining a hollow interior and having in said walls a filament discharge opening and a spinning nozzle insertion opening; said spinning nozzle situated in said interior with each of its orifices facing said discharge opening; and means to wedge said spinning nozzle in a fixed position relative to said nozzle block; said insertion opening having dimensions larger than the maximum dimensions of said spinning nozzle in cross sectional planes facing the insertion opening; said discharge opening displaced from said insertion opening; at least two wedges supported by said nozzle block and tightening means to cause said wedges to bear against the underside of the spinning nozzle to hold the nozzle in a fixed position relative to said nozzle block; said device having a service side for access to said insertion opening, wedges and tightening means.

2. The spinning device of claim 1, said tightening means comprising: a bolt extending longitudinally from said service side through a passageway in each wedge, an annular seal in said passageway for supporting the head of the bolt, a snap-ring means retaining said bolt in position in said passageway, threaded holes in said nozzle block cooperating with the threads of said wedge bolts, whereby the wedges can be forced into and out of a wedging relationship with the spinning nozzle by turning the wedge bolts in the respective directions.

3. The spinning device of claim 2 wherein the underside of the spinning nozzle is inclined downward from the service side to the rear side of the device, and wherein the upper surface of each wedge is convexly curved in the longitudinal direction and is shorter in length than the width of the spinning nozzle from the service side to the rear side thereof.

4. A spinning device as claimed in claim 2 wherein the underside of the spinning nozzle is inclined downward from the service side to the rear side of the device, and wherein the upper surface of each wedge is convexly curved in the longitudinal direction and is shorter in length than the width of the spinning nozzle from the service side to the rear side thereof.

5. The spinning device of claim 2 wherein the underside of the spinning nozzle is inclined downward from the service side to the rear side of the device, and wherein the upper surface of each wedge is convexly curved in the longitudinal direction and is shorter in length than the width of the spinning nozzle from the service side to the rear side thereof.

6. A spinning device as claimed in claim 1, said means to wedge comprising: a mounting plate and partially covering said filament discharge opening attached to said nozzle block, and at least two rotatable shafts supported by said mounting plate, said shafts being provided with said nozzle block, and said shafts being provided with said nozzle block.

7. A spinning device as claimed in claim 6, said insertion opening and said filament discharge opening both having an axis, that of said insertion opening being defined by the linear direction of movement of the spinning nozzle during insertion and withdrawal, and that of said discharge opening being defined by the linear direction of filaments passing through said emission orifice; the amount of displacement of said discharge opening from said insertion opening being such that the axis of the insertion opening is approximately perpendicular to the axis of the discharge opening.

8. A spinning device as claimed in claim 2, said insertion opening and said filament discharge opening both having an axis, that of said insertion opening being defined by the linear direction of movement of the spinning nozzle during insertion and withdrawal, and that of said discharge opening being defined by the linear direction of filaments passing through said emission orifice; the amount of displacement of said discharge opening from said insertion opening being such that the axis of the insertion opening is approximately perpendicular to the axis of the discharge opening.

References Cited by the Examiner

UNITED STATES PATENTS

1,947,202 2/1934 Homier .................. 12
2,045,722 6/1936 Pierret et al. .......... 8
2,217,743 10/1940 Grenewald ............... 8
2,803,851 8/1957 Baumlisch et al. ........ 8
3,068,515 12/1962 Thomas ................ 12
3,203,047 8/1965 Fleming et al. ......... 12
3,229,330 1/1966 Ferrier et al. .......... 8

WILLIAM J. STEPHENSON, Primary Examiner.