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INTERMINGLING JETS FOR MULTIFILAMENT YARN

Filed April 29, 1968

3 Sheets-Sheet 1

FIG. 1a

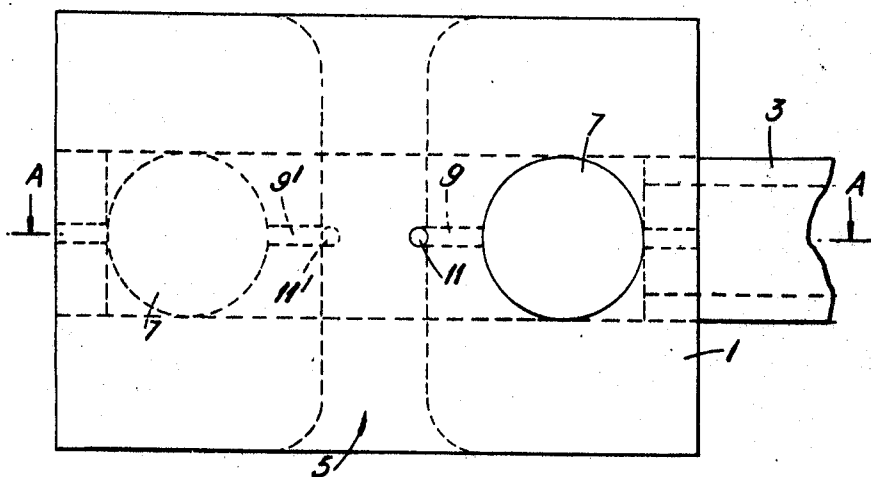
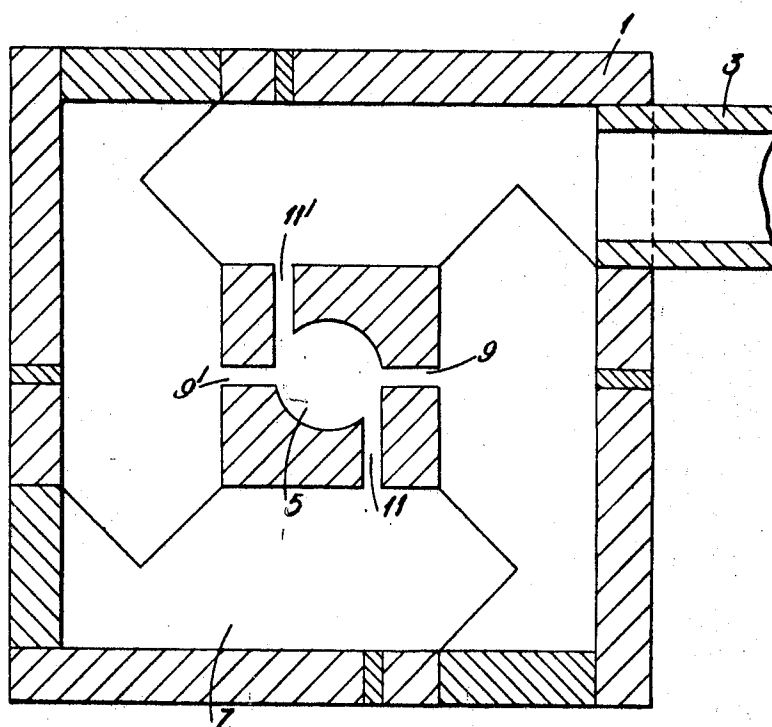


FIG. 1b

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FIG. 2a

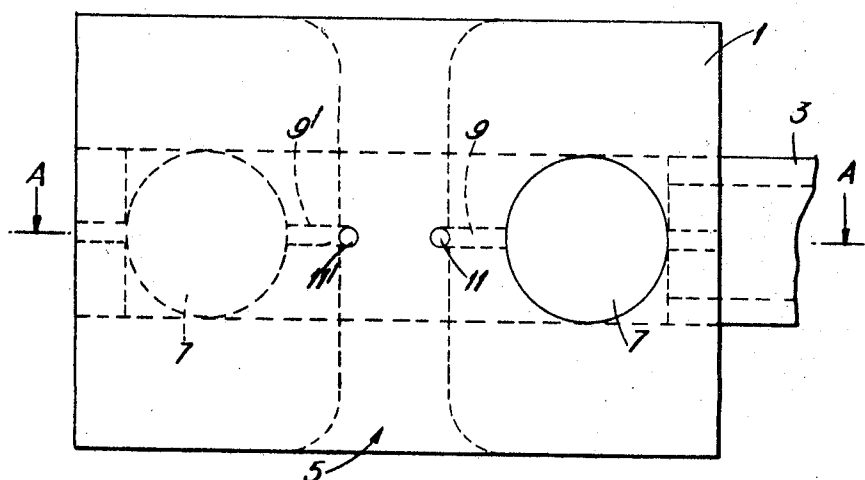
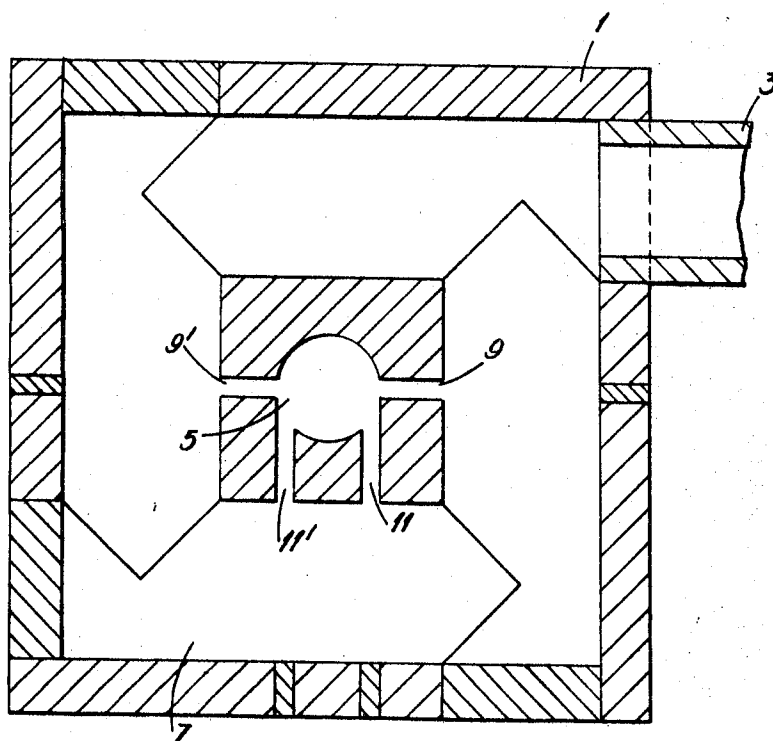


FIG. 2b

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FIG. 3a

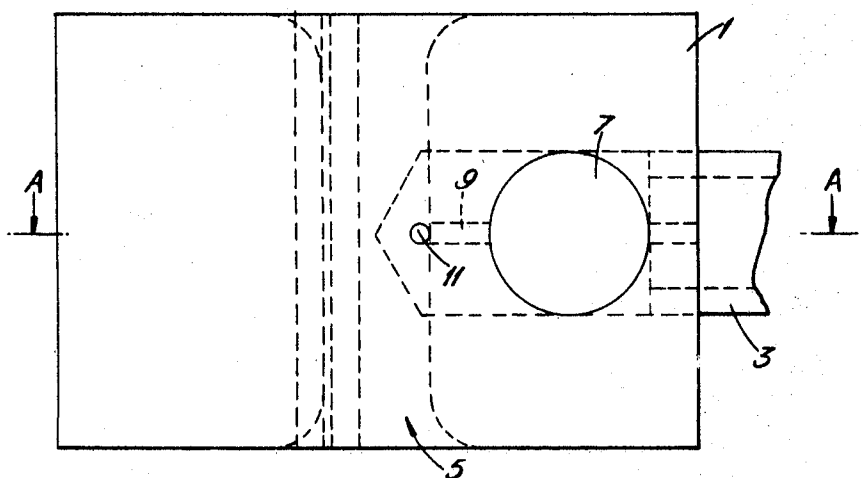
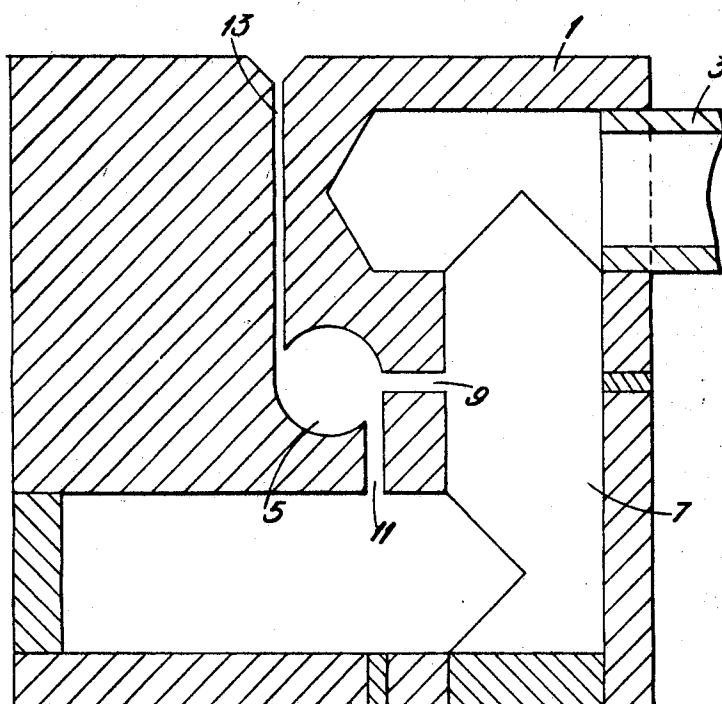


FIG. 3b

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INTERMINGLING JETS FOR MULTIFILAMENT YARN

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Int. Cl. D02g 1/16

U.S. Cl. 28—1.4

4 Claims

ABSTRACT OF THE DISCLOSURE

An intermingling jet with increased vorticity has one or more pairs of gas inlets, one inlet of each pair being radially directed and the other directed perpendicularly thereto and tangentially to the yarn passageway.

The invention concerns improvements in or relating to intermingling jets for multifilament yarn.

BACKGROUND OF THE INVENTION

Of recent years, the requirement for replacing twist as the compacting agency for multifilament yarns has come to the fore for mainly economic reasons; and sundry manners of compacting, some of them, like air jets, being old ones disclosed for the purpose, have therefore been evaluated.

In selecting a particular jet for use as a means for compacting a multifilament yarn by causing the filaments to become intermingled, the two primary criteria of acceptability are its intermingling efficiency and its gas consumption rate.

Clearly, for a given required level of intermingling, the optimum condition of operation of an intermingling jet coincides with the minimum usage of gas, e.g. air

Having now appreciated that the mechanism of intermingling is associated with the vorticity, or moment of turbulent momentum, of the gas flow prevailing in the yarn passageway of an intermingling jet, we have devised a jet construction in which vorticity is increased, compared with, say, a jet having gas inlets radially disposed around a cylindrical yarn passageway, or a jet having a single gas inlet tangential to said passageway.

SUMMARY OF THE INVENTION

Apparatus according to the invention consists of an intermingling jet comprising a member containing a bore adapted for passage of a multifilament yarn therethrough, and at least one associated pair of gas inlets leading into said bore, one inlet of said pair being directed radially into said bore, and the other inlet being directed tangentially into said bore to emerge therein in close proximity to the location of emergence of said one inlet.

By "directed radially" we mean that the longitudinal mid-line, of the gas inlet is directed to intersect the longitudinal mid-line of the bore; and by "directed tangentially" we mean that the longitudinal mid-line of the gas inlet is tangential to the peripheral surface of the bore. Naturally, slight deviations from these exact lines are permissible, although it is unlikely that any advantage will be gained by deviating from them.

If more than one such associated pairs of gas inlets is to be employed, they should themselves be disposed diametrically opposite one another in a pair, or pairs; and the tangentially directed gas inlets may all be directed either clockwise, or anti-clockwise, in vortical assistance of each other, or they may be opposed in direction.

Preferably, the longitudinal mid-line of the radially-directed gas inlet or inlets shall lie in a plane perpen-

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dicular to that of the bore axis; and preferably said bore and all said inlets are of circular cross-section. The tangentially-directed gas inlet of each pair of gas inlets may be of the same diameter as, or smaller diameter than, the associated radially-directed inlet.

The association of gas inlets in the manner defined above leads to an increase of vorticity compared with all-radial, or all-tangential, gas inlets.

THE DRAWINGS

The invention will now be described by reference to the accompanying drawings, in which

FIG. 1 shows vertical (a) and horizontal (b) sectional views of an intermingling jet according to the invention, and having two associated pairs of gas inlets acting in vortical-assistance of each other;

FIG. 2 shows similar views (a) and (b) of an intermingling jet according to the invention and having two pairs of associated gas inlets acting in vortical opposition to each other; and

FIG. 3 shows similar views (a) and (b) of an intermingling jet according to the invention and having a single pair of associated gas inlets.

In each of the figures, reference numerals for the same parts are the same.

The intermingling jet body 1 is drilled to provide a yarn passageway 5 and gas supply ducts 7 into which latter gas pipe 3 directs gas, e.g. air, under pressure from a source of compressed gas (not shown).

Radially-directed gas inlets 9, 9¹ and associated tangentially-directed gas inlets 11, 11¹ (only one each of such inlets in FIG. 3) are drilled through the metal which surrounds yarn passageway 5, in a plane perpendicular to the axis thereof and in the respective dispositions of associated pairs as shown in the three figures.

In FIG. 3, a narrow threading slot 13 is provided for the yarn, which can thus be flicked in or out of the jet whilst running.

All drillings are plugged and sealed as indicated.

Instead of making the intermingling jets by drilling, it is possible and less complex to machine the two halves of a jet separately and then braze them together, thus eliminating the use of any plugs.

Exemplary dimensions for two intermingling jets according to the invention, each having a single pair of associated gas inlets, are as follows:

Component part	Jet No. 1, in.	Jet No. 2, in. (Fig. 3)
Yarn passageway (bore) diameter.....	0.070	0.125
Radial gas inlet diameter.....	0.030	0.020
Tangential gas inlet diameter.....	0.020	0.020
Diameter of gas supply channel to each said inlet.....	0.125	0.1875

For optimum intermingling efficiency, it is important to position yarn guides behind and in front of the jet, respectively, accurately to align the yarn co-axially with the yarn passageway, and at a distance from one another such that, for the given yarn and filament deniers, the lateral vibratory movement imparted to the filaments, to achieve intermingling thereof, is at its optimum.

EXAMPLE OF USE

Intermingling jets according to the invention, either with or without an ejector action, have proved very efficient in compacting synthetic multifilament yarns before winding after drawing.

For instance, when draw-winding 60 denier/20 filament yarn of polyhexamethylene adipamide at 7,200 feet/minute, a jet comprising two diametrically-opposed, assisting pairs of associated air inlets had between 1/2 and 1/3 the air consumption, for equivalent levels of intermingling

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and for equivalent air pressures, of a jet comprising 8 radially directed air inlets.

I claim:

1. An intermingling jet comprising a member containing a bore adapted for passage of a multifilament yarn therethrough and gas inlets leading into said bore, having the characteristic that said gas inlets are arranged in at least one associated pair of gas inlets, the points of emergence of the inlets lying in the same perpendicular plane to the bore axis, one inlet of said pair being directed radially into said bore, and the other inlet being directed tangentially into said bore to emerge therein in close proximity to the location of emergence of said one inlet.

2. An intermingling jet according to claim 1 and having two such associated pairs of gas inlets disposed opposite one another.

3. An intermingling jet according to claim 2 in which the tangentially-directed gas inlets are disposed to dis-

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charge in opposite directions so as to act in vortical assistance of each other.

4. An intermingling jet according to claim 2 in which the tangentially-directed gas inlets are disposed to discharge in the same direction so as to act in vortical opposition to each other.

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15 JAMES KEE CHI, Primary Examiner

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