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[54] **SPINNING MACHINE**

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[51] **Int. Cl.²** **B39C 25/00;** B29D 23/06

[58] **Field of Search** ..... 425/66, 72, 382.2, 462, 425/463, 464; 264/210 F, 171, 177 F

[56] **References Cited**

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[57] **ABSTRACT**

A synthetic fibre spinning and reeling machine comprising at least one row of spinning units. In each unit the rows of spinnerets and the axles of the rollers and rolls in the finishing and reeling device are disposed transversely to the longitudinal axes of the row of units in which that unit lies. In the case of two rows of units common drive arrangements are provided. The machine provides ready access to the rolls and yet at the same time does not undesirably twist the fibres during their transit from the spinnerets to the rolls.

6 Claims, 3 Drawing Figures

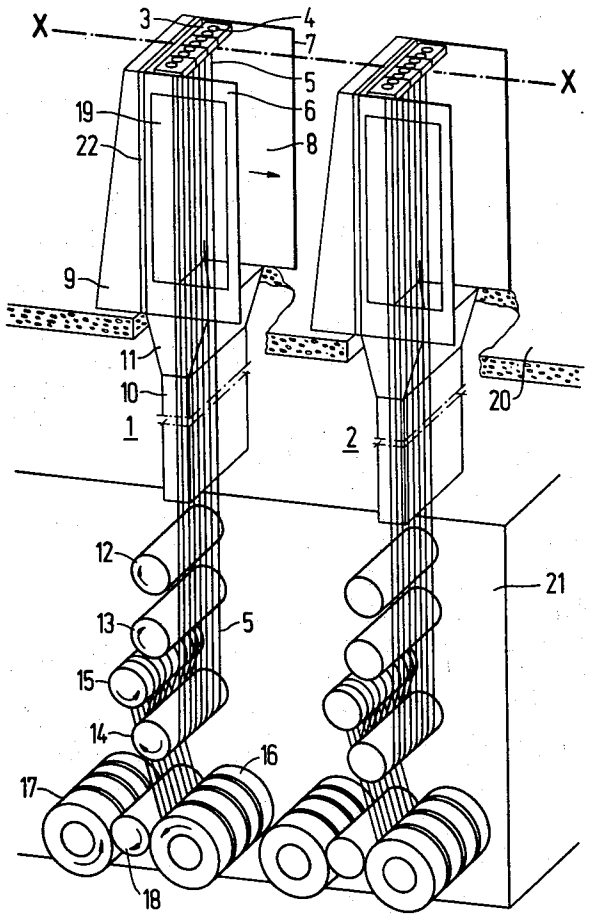


Fig. 1

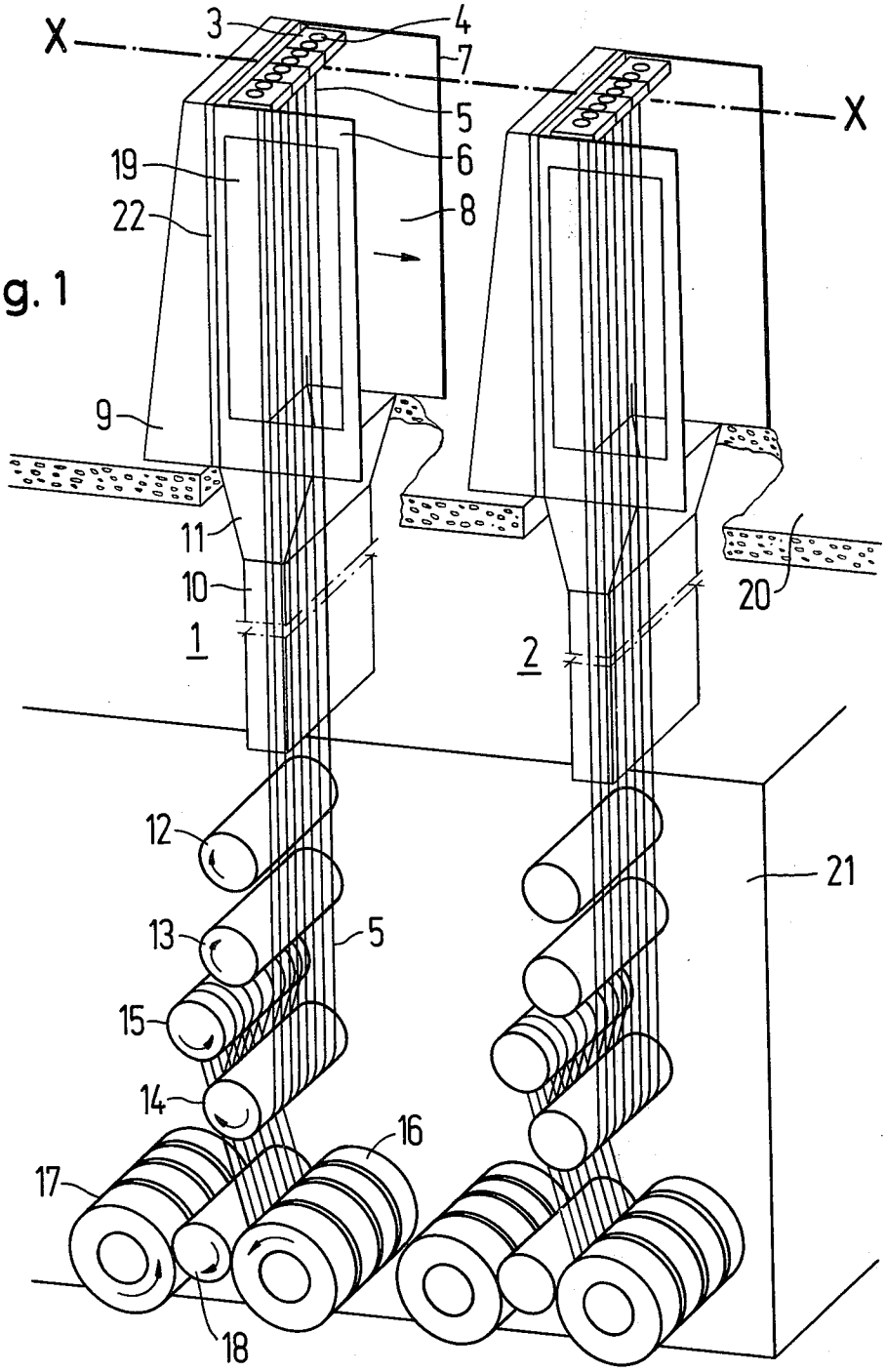


Fig. 2

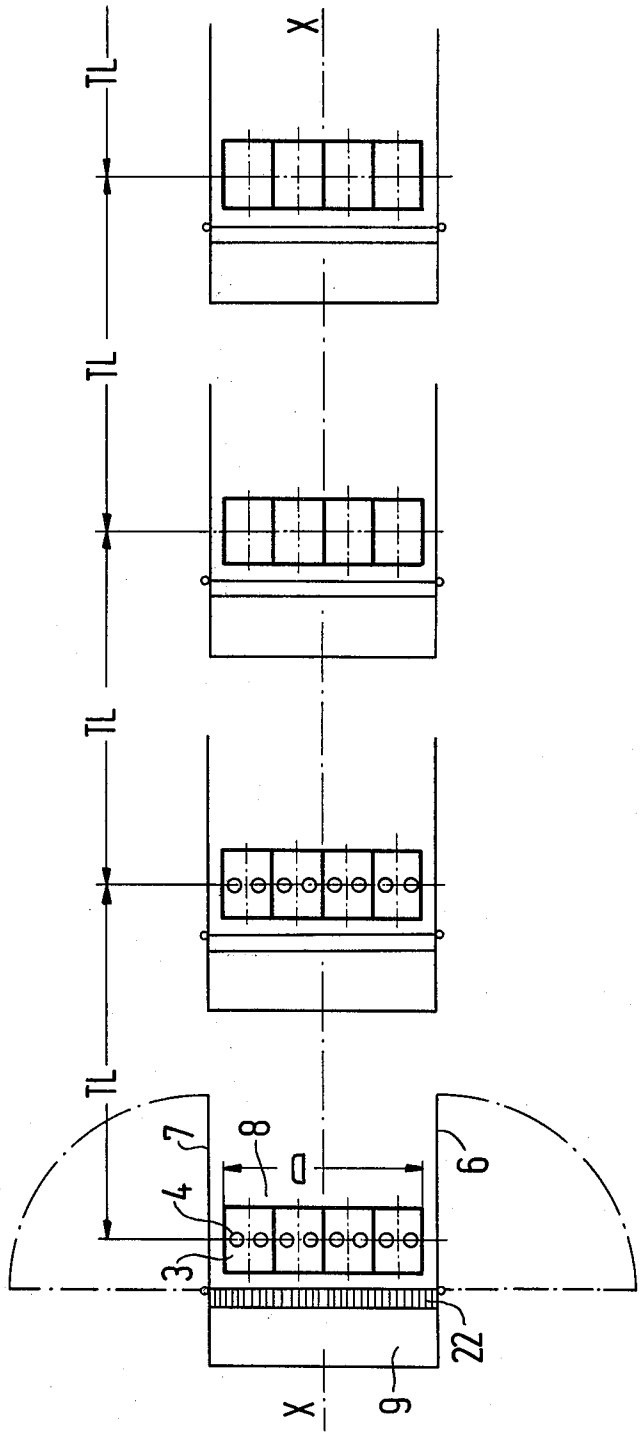
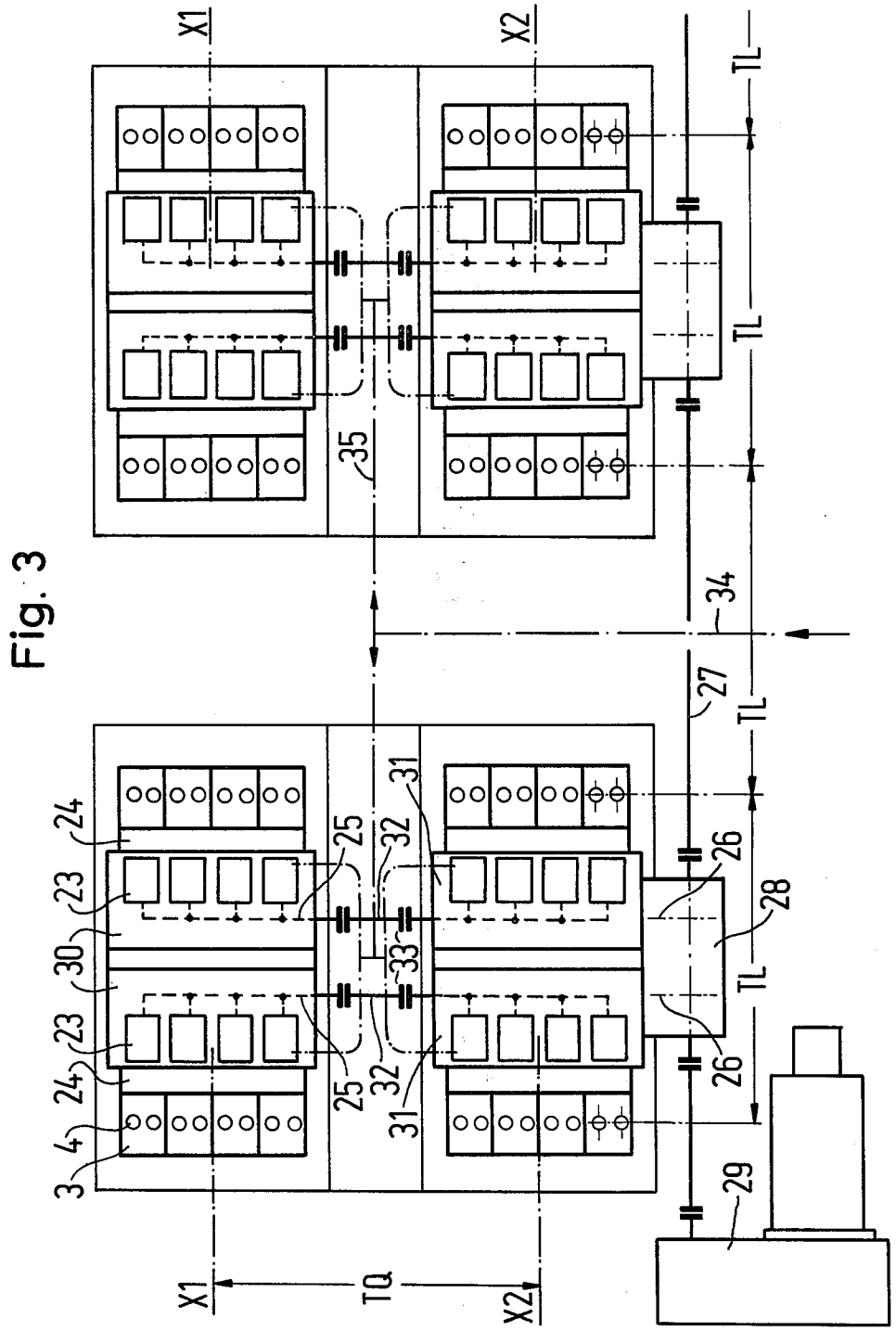


Fig. 3


X1
X2
TL
TL
35
34
27
TL
31
24
25
32
26
23
28
30
33
TL
23
24
25
32
31
26
4
3
29
X1
TQ
X2

SPINNING MACHINE

The invention relates to a spinning machine for producing and reeling synthetic fibres. Spinning machines of this type generally contain a plurality of spinning units, each of which comprises a spinneret unit having one or more parallel rows of spinnerets, at least one spinning pump, a blowing channel for blowing air onto the fibres exiting from the spinnerets, and a spinning channel through which the blown fibres are passed, and also a finishing and reeling device which contains a plurality of axles for rollers, reels and the like.

In known spinning machines of this form, the rows of spinnerets and the planes of the blowing and spinning channels lie parallel to the longitudinal axis of the spinning machine. The axles of the rollers and of the reeling and winding elements are, however, arranged transverse to the longitudinal axis of the spinning machine, so that the fibres must be twisted between the spinnerets and the take-up rollers. This has a disadvantageous effect on the quality of the fibres.

In other known spinning machines, the rows of spinneret nozzles, the planes of the fibres in the blowing and spinning channels and the axles of the rollers, reeling and winding elements are arranged parallel to the longitudinal axis of the spinning machine. This results in a row of fibres, which is merely conducted across rollers and without the row being twisted about its longitudinal axis. Modern spinning machines have high take-up speeds and heavy reel weights and consequently automatic reel change is required. In the above described spinning machines, the rolls and rollers in the finishing and reeling device are, because of their disposition relative to the longitudinal axis of the machine, difficult to remove. This means that machines of this type are not particularly suitable for automation.

It is an aim of the invention to provide a spinning machine in which the fibres are not undesirably twisted between the nozzle and the take-up rolls. It should also be possible for heavy weight rolls to be removed in a relatively simple and as automised a fashion as possible.

A further aim of the invention is to provide a machine in which a relatively large number of spinnerets may be accommodated in the individual rows in each spinning unit. It should also be possible to use particularly large nozzles, without greatly increasing the longitudinal spacing.

It is a further aim of the invention to be able to use particularly wide rolls.

According to the present invention there is provided a a spinning machine for producing and reeling synthetic fibres containing a plurality of spinning units, arranged in at least one row, each unit comprising a spinneret unit having one or more parallel rows of spinnerets, at least one spinning pump adapted to supply a melt to said spinnerets, a blowing channel adapted to supply a flow of air to fibres exiting from said spinnerets, and a finishing and reeling device adapted to receive fibres exiting from said blowing channel, which contains a plurality of rollers, rolls and the like, wherein in each spinning unit the rows of spinnerets, the planes in which, during use, the fibres lie during their passage through the blowing channel and the axles of the rollers, rolls and the like of the finishing and reeling device are disposed transversely to the longitudinal axis of rows of spinning units in which that spinning unit is disposed.

The above machine is a fundamental digression from the principle on which the known machines are based. Generally speaking, it is thus achieved that, compared to the prior art, there is a reduction in the space required for the longitudinal direction of the machine, whilst there is provision for a particularly large number of spinnerets. This is of particular significance for production systems of the type in question. In the case of the above machine, it is above all necessary to accept an elongation in the direction transverse to the longitudinal axis of the machine, where, however, there is generally space available, whereas in a conventional machine construction, the longitudinal extent of the machine often conflicts with the available space. The above construction results above all in the advantage that the axles for the rolls which project transversely from the machines can easily be sufficiently extended for the use of particularly wide rolls. Furthermore this arrangement of the rolls facilitates the automatic transportation thereof onto reel wagons, which is of considerable significance in view of their often heavy weight and the associated danger of injury to the spun yarn.

Hitherto, the rows of nozzles were generally arranged parallel to the longitudinal axis of the machine. The reason for this was obviously the assumption that the blowing channels which were arranged in the same direction in respect of their planes would allow the blown air which was conducted through said channels to emerge at the operating end free of obstructions. The invention deliberately digresses from this principle, since the supply of blown air can easily be discharged on the one hand through the spinning channel, and on the other hand via the interspace from unit to unit. Thus the individual filaments or fibres can be exposed to the same blowing speed and blowing direction.

The arrangement of the rows of spinnerets transverse to the longitudinal axis of the machine also results in the advantage that the fibres can be observed in a direction which was not possible in the known machines, namely in the plane of the juxtaposed fibres. This does not on the other hand mean that it is not possible to observe the fibres in the direction of the plane of the taken-up fibres as was in fact possible in the known machine. When the doors of the blowing channel are open during the commencement of the spinning, it is also possible to observe the direction of the longitudinal axis of the machine. By observing the fibres or filaments both perpendicular to and parallel to the longitudinal axis of the machine it is possible to see whether all the capillary channels of a spinneret are correctly emitting the relevant material.

The alignment of the components of the machine, as provided in the above machine, also means that in the case of a spinning machine having two rows of units arranged parallel to one another, the drive means for the spinning pumps may be simplified. For this purpose the spinning pumps are driven by drive axles which are likewise arranged transverse to the longitudinal axis of the spinning machine and which extend across the one row of the machine to the second row.

In known machine constructions on the other hand it was necessary to undertake a branching of the drive means for each row of parallel units, a through drive axle extending along each row. In the above machine, this type of drive axle is required only for one row, from which the relevant spinning pumps are driven, the drive of the spinning pumps of the second row being effected

merely by short extensions of the drive axles for the spinning pumps of the first row.

Embodiments of the invention will now be described making reference to the drawings, in which:

FIG. 1 is a perspective diagram, partly in section, of part of a spinning machine in accordance with the present invention;

FIG. 2 is a schematic plan view of the machine shown in FIG. 1; and

FIG. 3 is a schematic plan view of a machine in accordance with the present invention having two rows of units arranged in parallel next to one another.

The spinning machine shown in FIG. 1 comprises two units 1 and 2 which fully correspond to one another. The following description will, therefore, now refer solely to the unit 1. The unit 1 possesses a spinneret member 3, having individual spinnerets 4 arranged therein, which are disposed in a series either in a straight row or staggered in relation to one another. These are known spinnerets which are provided in the usual manner with a plurality of perforations. The synthetic melt is pressed in known manner through the spinnerets 4, by means of known spinning pumps which are not represented. From each of the spinnerets 4 emerges a group of fibres 5 which is firstly conducted through a blowing channel 8 laterally bounded by two doors 6 and 7, through which channel 8 air is blown as shown by the arrow. The air is supplied from below via the channel 9 which narrows in the form of a funnel, and is uniformly distributed to the blowing channel 8.

The blowing channel is followed, below, by a spinning channel 10 with a funnel-shaped attachment 11. The supply of blown air flows between the two doors 6 and 7 out into the open. The blowing action causes the individual groups of fibres to harden.

Having emerged from the spinning channel 10, the groups of fibres 5 pass to preparation rollers 12 and 13 which act in known manner on the individual groups of filaments. Subsequently the groups of fibres 5 are guided across rollers 14 and 15 which serve to stretch the groups of fibres in a uniform fashion; the groups of fibres 5 are finally conducted to the rolls 16 and 17. These rolls 16 and 17 are rotated by virtue of friction by the driven friction roller 18.

As shown, in this machine, the plane of the blowing channel 8 and of the spinning channel 10 (governed by the plane through which the groups of fibres 5 pass) with the row of spinnerets 4 and the axles for the preparation rollers 12, 13, rollers 14, 15, friction roller 18 and rolls 16, 17, lies perpendicular to the longitudinal axis of the spinning machine, which is indicated by the line XX. The rolls 16 and 17 are thus readily accessible from the operating side and can also be wound into a relatively large diameter, as generally there is plenty of room available in this direction. There is also good accessibility to the space beneath the spinneret member 3, as on the one hand it is possible to open the doors 6 and 7 outwards, and on the other hand the necessary interspace between the units 1 and 2 is sufficient to easily enable one to work on the nozzles when the door 6 is opened. The groups of fibres 5 may be observed during production through a window 19 inset into the door 6.

In a complete machine, a plurality of units 1 and 2 are arranged to the right and to the left along the axis XX. The machine components are supported with the blowing channel and above the latter by at least one stage 20 which is provided with apertures through which the spinning channels 10 project downwards. Also shown is a machine housing 21 which contains the drive means for the above mentioned rollers, rolls etc.

If a larger number of spinnerets is to be provided in a machine of this type, it is only necessary to widen the arrangement i.e., to provide space transverse to the axis XX, in which direction space is generally available.

FIG. 2 shows the machine represented in FIG. 1, in a schematic illustration, viewed from above. This Figure also shows how the doors 6 and 7 may be opened outwards. Between the air supply channel 9 and the blowing channel 8 is arranged a honeycombed grid 22 which serves to steady the air flow.

The spacing between the individual units is referenced TL. This spacing TL is quite independent of how many nozzles 4 are provided per row. The overall length of the spinneret member 3 is referenced D. If, instead of 8 spinnerets 4 as are provided here, for each row, e.g. 16 nozzles and more are to be provided, the machine must be extended accordingly transverse to the longitudinal axis XX. Using additional spinnerets does not extend the machine longitundinally, in the direction of the axis XX.

FIG. 3 illustrates the effect of the alignment of the rows of spinnerets 4, if two rows of parallel units 1, 2 are provided. The longitudinal axis of the one row is referenced *x* 1 *x* 1, and the longitudinal axis of the other row is referenced *x* 2 *x* 2. The distance between these two rows is determined by the transverse spacing TQ. The spinning pumps required for the operation of the nozzles 4 are referenced 23. The spinning pumps 23 are in each case arranged on a pump block 24. The drive axles 25 and 26 run transverse to the longitudinal axes of the machine *x* 1 *x* 1, and *x* 2 *x* 2. The drive axles 26 are set in rotation by a shaft 27 in each case via a level gear 28. The shaft 27 which extends along the entire row with the axis *x* 2 *x* 2, finally projects into the main drive 29 and is driven by the latter. This type of drive by means of a common shaft is known.

The position of the drive axles 25 and 26 transverse to the longitudinal axes *x* 1 *x* 1 and *x* 2 *x* 2 now enables the drive axles 26, which project into the spinning pump drive 31, to be continued in the direction of the spinning pump drive 30 of the adjacent row, and, in fact, via the continuation axles 32. These are relatively short shaft portions, and thus no problems arise in respect of the drive of the spinning pumps 23. The spinning pump drive 30, and with the latter, the spinning pump 23 thus operate synchronously with the spinning pump drive 31 and the spinning pumps driven by the latter. The continuation axles 32 also contain couplings 33 which act in the manner of cardan joints, in order on the one hand to decouple the relevant spinning pump drives from one another and on the other hand to compensate any possible spatial displacement.

FIG. 3 also shows the manner in which the flow of the melt is conducted, the relevant conduits being indicated merely by dash-dotted lines. The melt is supplied through the conduit 34, then passes to a distributor line 35, from where it flows to the individual spinning pumps 23.

It should also be pointed out that in the exemplary embodiments which have been discussed above, it is not absolutely necessary to arrange the relevant components and axles perpendicular to the relevant longi-

tudinal axis of the machine. An inclined position is also possible, for example up to 45°.

What I claim as my invention and desire to secure by letters patent of the United States is:

1. In a spinning apparatus for producing and reeling synthetic fibers from a melt by spinning means including spinnerets with orifices arranged in at least one row to receive a supply of said melt from a respective pump means, air blowing means located relative to said spinnerets for supplying a flow of air to fibers produced by said spinnerets, said spinning means further including finishing and take-up roller means located vertically below said air blowing means, said apparatus having a longitudinal main axis, the improvement comprising a horizontal supporting stage, apertures in said supporting stage, a plurality of spinning units supported on said stage in vertical alignment with said apertures, each unit including said spinning means, each spinning unit having a longitudinal vertical axis, said spinning units being arranged in parallel to each other so that each vertical spinning unit axis extends perpendicularly to said longitudinal apparatus main axis, and wherein said finishing and take-up roller means of each spinning unit comprise a plurality of cooperating rollers arranged below said stage substantially adjacent to the respective vertical axis to define a corresponding plurality of vertical paths for the produced fibers, said path extending through said apertures in said stage, said vertical paths also extending substantially in parallel to each other so as to keep the synthetic fibers produced by one spinning unit on a substantially vertical path for its entire length of travel from the spinneret to the take-up roller means and thus out of the vertical path of the synthetic fibers produced by an adjacent parallel spinning unit.

2. The spinning apparatus according to claim 1, wherein said air blowing means comprise blowing channel means including a vertical blowing housing (8) having one open vertical side and means (6, 7) for selectively closing said housing on two sides located opposite each other, as well as an air supply channel (9) located opposite said one open vertical side and tapering upwardly so as to deflect air into and through said housing substantially in a direction extending in parallel to said main apparatus axis.

3. The spinning apparatus according to claim 2, wherein said blowing means further comprise grid means (22) located between said tapering air supply channel (9) and said housing (8) for steadying the air flow through the housing.

4. The spinning apparatus according to claim 2, further comprising a spinning channel (10, 11) disposed vertically between said blowing housing (8) and said finishing and reeling means.

5. The spinning apparatus according to claim 1, wherein said plurality of spinning units (1, 2) are arranged in rows and columns whereby all units are arranged vertically and in parallel to each other.

6. The spinning apparatus according to claim 5, further comprising drive means for said pump means, said drive means including drive axles disposed transversely to the rows of spinning units and passing through one row of spinning units to the other row of spinning units.

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