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FALSE-TWIST SPINDLES

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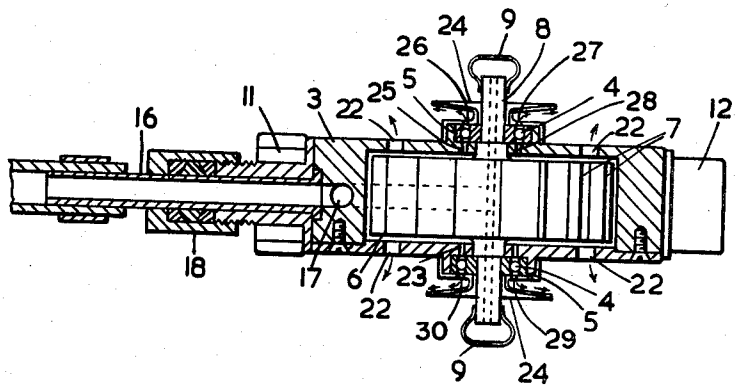


FIG. 1

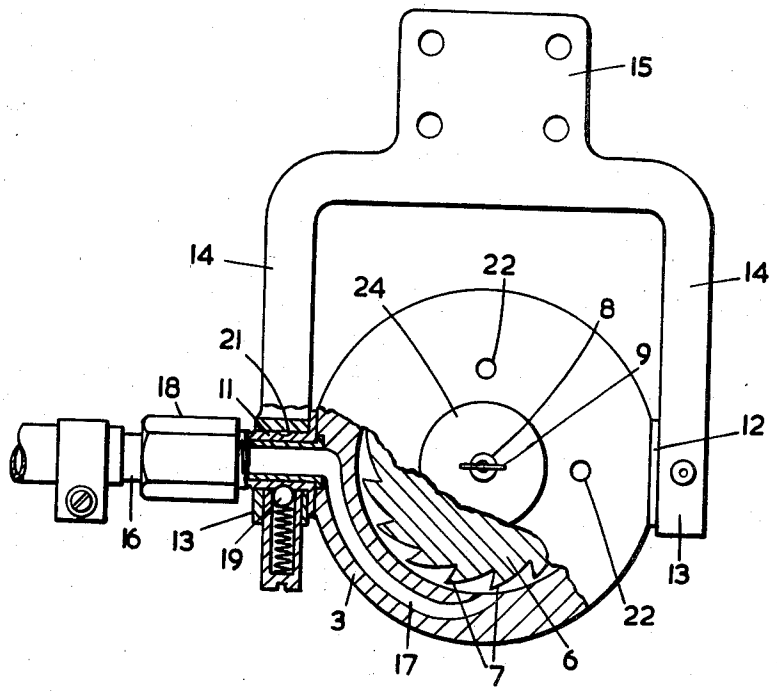


FIG. 2

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FALSE-TWIST SPINDLES

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This invention relates to false-twist spindles and particularly to pneumatically driven spindles adapted for imparting a high degree of temporary twist to a yarn or like textile product, e.g. slivers, rovings and continuous filament tows, which twist is set in the yarn or the like so that, when the twist leaves the yarn, the individual fibres retain the distortions imposed on them by the false twist.

According to the present invention a false-twist spindle comprises a rotor in the form of a hollow member having external vanes, a stator surrounding said rotor and means for supplying said stator with compressed air or other fluid which said stator is adapted to direct against said vanes so as to rotate said rotor, said stator being trunnion-mounted so that it can readily be inverted whereby the direction of rotation of said spindle can be reversed. Preferably, the compressed air is supplied to the stator through the trunnion, or one of the trunnions, on which the stator is mounted, the trunnion being in the form of a suitable gland for this purpose, to allow freedom of rotation of the stator while the air supply pipe remains stationary. A second trunnion is preferably provided, opposite the first but without provision for the supply of compressed air. Both trunnions can be carried on the arms of a suitable forked bracket for attachment to the machine in which the supply, temporary twisting, setting and re-winding of the yarn are effected.

By the use of a light, well balanced, pneumatically driven spindle, very high speeds of rotation can be attained, e.g. 70,000 r.p.m. or more. Consequently the yarn can be treated at an increased linear rate. At the same time, the ready reversibility of the spindle according to the invention enables the direction of the false twist to be selected at will and readily changed as and when desired. The invention is therefore of particular importance in connection with that described in U.S. application S. No. 579,344, filed April 19, 1956, now abandoned, according to which voluminous yarns are produced by false-twisting two component yarns in opposite directions, setting in the fibres of the yarn the distortions imposed by the false twist and subsequently doubling the two components together. For this purpose, it is necessary to provide false-twist spindles which can give a false twist in either direction, and the spindle according to the present invention is particularly suitable for this purpose. It is generally desirable that false-twist spindles, like other textile spindles, should be arranged in a long series along the length of a textile machine having, in association with each spindle, the necessary provision for mounting supply packages of yarn, for forwarding the yarns through the several spindles, for setting the yarn over a zone where temporary twist is imparted to it by the spindle, and for collecting the yarn as it leaves the setting means, the several means for each of these purposes being disposed in a corresponding series along the length of the machine. When the spindle according to the present invention is employed, its nature allows of a variety of convenient arrangements, e.g. one in which all the spindles impart false twist of the same direction of twist, or in which one-half of the series

of spindles imparts false twist of one direction and the remainder of the other direction, or in which alternate spindles impart false twist in opposite directions. In the last-mentioned case, take-up devices may be provided, one for each pair of false-twist spindles, so as to take up simultaneously a pair of yarns which have been false-twisted in opposite directions. Or again, provision may be made for mounting two supply packages in association with each spindle so that two ends of yarn can be false-twisted together by the same spindle, the two ends being separated after false-twisting and setting, and each being taken-up as one of a pair with an end from an adjoining spindle, the collecting devices being arranged in series, and in alternation with the false-twist spindles.

On account of the extremely high speeds attainable by the spindles in accordance with the present invention, it is desirable to pay particular attention to the lubrication of the spindles. It is a further feature of the present invention that this can be done by mounting the spindles in suitable bearings above and below the point of application to the rotor of the compressed air for driving the rotor, which bearings (preferably ball- or roller-bearings) are supplied with lubricant in the form of a small content of oil mist or vapour carried in the compressed air supply, the air supplied to the vanes having access, by suitable passages formed in the stator/rotor assembly, to the bearings before leaving the stator casing. Or again, the escaping air may be so directed as to provide, in the bearings, a cushion of air which itself acts as bearing medium and permits extremely high rates of rotation to be maintained.

By way of example, one form of false-twist spindle in accordance with the present invention will now be described in greater detail with reference to the accompanying drawings in which:

Figure 1 is a sectional side elevation of the spindle, and

Figure 2 is a plan view partly broken away.

The spindle comprises an outer casing **3** carrying a pair of ball-bearings **4** mounted in plastic races **5**. Within the casing **3** is mounted a rotor **6** having a series of projecting blades or vanes **7** (Figure 2) round its periphery and having a central tube **8** pressed into it along its axis, and extending through and engaging the bearings **4**. The central tube **8** projects equally from both sides of the casing **3** and is provided at each end with a metal loop **9** extending diametrically across the bore of the tube **8** and symmetrically disposed with reference thereto so as to maintain the static and dynamic balance of the spindle. The metal loop **9** constitutes means round which the yarn may be passed for one or more turns so as to ensure proper frictional engagement of the spindle with the yarn as is necessary to impart the required false twist to the yarn. The outer casing **3** is furnished with a pair of trunnions **11, 12** at opposite ends of a diameter, the trunnions being carried in bearings **13** at the two ends of a forked bracket **14** adapted at **15** to be bolted to a suitable rail in the frame of the machine adapted to carry a long series of the spindles. Axially through the trunnion **11** extends a tube **16** for the supply of compressed air, the tube being aligned and communicating within the casing **3** with a passage **17** extending part-way round the casing and opening tangentially on the vanes **7** of the rotor **6**. The outer end of the trunnion **11** carries a suitable gland **18** surrounding the tube **16** so that the casing **3** can be rotated on the trunnions **11, 12** without rotating the tube **16**. A spring-loaded ball **19** mounted in either or each arm of the bracket **14** carrying the trunnion bearings **13** engages either of two dimples **21** in the corresponding trunnion and serves to locate the outer casing **3** in either of two operating positions.

Air supplied through the tube **16** is directed, by way of

the passage 17, against the vanes 7 of the rotor 6 and drives the rotor at high speeds. The air escaping axially from the rotor mainly leaves the casing by way of apertures 22 formed therein. A minor proportion of the air, however, passes across the end surfaces of the rotor 6 and leaves the casing through the bearings 4 and through apertures 23 and 25 to 30 inclusive. Deflector discs 24 are provided to direct the air so escaping away from the axis of the device so that it does not disturb yarn passing through the central tube 8. By supplying oil to the air at any convenient point before it reaches the trunnion 11, the oil passes in the form of a mist through the bearings 4, and assists in their lubrication.

The spindle described above enables high speeds of rotation to be readily obtained with quite moderate air supply pressures. For example, with a pressure of only 1 lb. per square inch gauge pressure a spindle speed of 17,000 r.p.m. can readily be maintained while with a higher pressure of 5 lb. per square inch 30,000 r.p.m. can be obtained, and at still higher pressures of 15 lb. per square inch or more speeds of 70,000 r.p.m. or more can be obtained.

Having described our invention, what we desire to secure by Letters Patent is:

1. A false-twist spindle for the treatment of yarns and like textile products, said spindle comprising a rotor in the form of a hollow spindle having external vanes, a stator surrounding said rotor, means for supplying said stator with compressed fluid which said stator is adapted to direct against said vanes so as to rotate said rotor, and a trunnion-mounting for said stator whereby it can be readily inverted and the direction of rotation of said spindle reversed.

2. A false-twist spindle according to claim 1, comprising a pair of trunnions disposed at opposite ends of a diameter of the rotor and a forked bracket carrying said trunnions one on each limb of the bracket.

3. A false-twist spindle according to claim 1, comprising a trunnion in the form of a gland for the passage of the compressed air or other fluid to the rotor.

4. A false-twist spindle according to claim 1, comprising bearings for the rotor, secured to the stator and mounted one on each side of the plane of the rotor blades, the assembly of stator and rotor being formed with passages by which the compressed fluid has access to said bearings for the lubrication thereof.

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