The present application is a continuation-in-part of application Serial No. 122,560, filed October 20, 1949, now Patent No. 2,725,276, dated November 29, 1955.

This invention relates to tube spinning and more particularly to a subassembly of tube spinning apparatus by the use of which both original installations and repairs are greatly facilitated.

The essence of tube spinning is the propulsion of a yarn or thread through a tube by a liquid which also effects the desired chemical treatment. In such apparatus as is shown in my said Patent No. 2,725,276 the treating tube has an enlarged or flared mouth and a jet of liquid is discharged into the mouth from a nozzle axially aligned with but spaced from the mouth. Between the end of the nozzle and the mouth of the treating tube a low pressure or suction zone is created and the yarn is drawn into the zone by the stream of liquid.

Referring now in greater detail to Figure 1 of the drawings, the numeral 10 designates a jet box of the type shown in said Patent No. 2,725,276. In tube spinning, two jet boxes are arranged in spaced relation facing one another. Each box accommodates a number of assemblies of the type shown in Figure 1 so that the yarn is introduced into the mouth of a tube which is located in one box, is propelled through that tube and is discharged and drawn into the mouth of another tube in another box. It continues in this fashion back and forth between the boxes until the desired liquid treatment has been accomplished. For example, in Figure 1, which is taken at the middle of a group of spinning tubes, the yarn moves in the direction of the arrow through tube 11, discharges into deflector 12 and is guided thereby to the mouth 13 of a tube 14. When the yarn leaves the tube 14, it will discharge into a deflector in the opposite box of the system from which it will be returned to the box 10 in another tube running substantially parallel to the tube 11. This brief explanation is here inserted to clarify the function of the present invention, and full details of operation of a tube spinning system incorporating the present invention can be had by reference to said Patent No. 2,725,276.

It will be noted that liquid in the tube 14 is supplied from a tube 15 which has a nozzle 16 at its end. The nozzle 16 is coaxial with and spaced from the mouth 13 of the tube 14. The space between each nozzle and the respective tube mouth is a low pressure zone into which the yarn is sucked for entrainment by, and treatment with, the liquid issuing from the nozzle, such as the nozzle 16. Once the yarn is running in the tubes, the deflectors 12 are moved from the broken line to the solid line position. Thus liquid from the tube 14 will discharge through a spout at 17, while any waste liquid, wiped off the yarn or resulting from the action of jet 16, is separately discharged through a spout at 18.

With the foregoing background it will be appreciated that the alignment of the jet 16 with the mouth 13 is of absolutely critical importance. A major misalignment would result in a great deal of splashing and insufficient liquid velocity in the tube 14, with resulting bad propulsion, and inadequate liquid treatment. Since the liquid projected from the nozzle 16 is necessarily conical in form, the axial spacing between the nozzle and mouth is also critical. In order to maintain these critical adjustments, a supporting member 19 is provided to hold the nozzle and mouth in correct relative positions.

The supporting member 19, which is constructed according to the principles of the present invention, includes a base portion 20, having upwardly extending arms 21 and 22 at its opposite ends. The arm 21 supports an integral sleeve 23 in alignment with a very much longer integral sleeve 24 which is supported by the arm 22. The sleeve 24 is actually composed of two sections of different external diameter; a section to the left, as viewed in Figure 1, which is of large diameter, and a section to the right, which is of smaller diameter and which is intended to be encompassed and supported by a part of the box 10. The part of the sleeve 24 which is supported by the box 10 is designated by character 24a in Figure 1.

The supporting member 19, including its arms 21 and 22 and the sleeves 23 and 24, is cast as an integral body from a soft metal, such as brass, so that the sleeves 14 and 15 are cast in situ with the casting of the supporting member 19. In this manner, an excellent glass-to-metal seal is obtained and tubes 14 and 15 become securely mounted in the supporting member 19. The glass tubes are not damaged if a low melting metal, such as lead, is used in the casting operation. The nozzle and tube apertures in the sleeves 23 and 24 are preferably a part of the supporting member as
cast. This will be the case, of course, if the tubes are cast in situ. If desired, however, the apertures may be drilled out afterward and the tubes cast in place in the aperture. The accuracy of the casting need not be very great despite the fact that the spacing and alignment of the nozzle and mouth is highly critical. The reason for this is that when the supporting member 19 is made of a soft metal, such as lead, it is very easy to bend the same, or either of its arms 21 or 22, to correct even major misalignments of the nozzle and mouth. Furthermore, lead being a metal characterized by softness and exceedingly low elastic limit, minor adjustments are possible without spring back, as would be the case with materials of higher elastic limit.

The structure of the supporting member 19, involving an elongated base portion 20 and upstanding arms 21 and 22, presents a bendable portion both horizontally and vertically whereby both horizontal and vertical adjustments are easily made. Because of the softness of lead the incorporation of the tubes into the sleeves can be accomplished with minor danger of glass breakage.

The portion 24 of the sleeve 24 acts as a support for the entire member 19. It need not so function, however, as can be seen by reference to Figures 2 and 3 wherein there is shown a supporting member 25 having a depending stem 26 which constitutes the support but which is otherwise similar to the supporting member in Figure 1. The member 25 includes arms 27 and 28 respectively which support integral sleeves 29 and 30 which in turn support nozzles 31 and 32 respectively. Although the jet box 33 of Figure 2 is different from the jet box 10 shown in Figure 1, the box differences do not themselves constitute a part of this invention, since this invention is directed to the supporting member 25 rather than the jet box. The details of the jet box of Figure 2 are described in application Serial No. 341,529, filed March 10, 1953, now Patent No. 2,724,956, dated November 11, 1955.

It should be noted that the supporting member 25 is quick detachably removable from the box 33. To this end the box 33 is provided with a series of sockets at 34, each of a contour and depth to receive the lower end of a stem 26. To remove the supporting member and its tubes it is only necessary to pull the member upwardly and then move it up and to the right from the Figure 2 position. The long sleeve 30 of the member 25 is not encompassed by any part of the jet box but merely rests in a saddle at 35.

It will be appreciated that by supporting a short nozzle and a short tube length in a device, such as the supporting member 19 or 25, it is possible also to support other tubes connected by rubber sleeves to the short lengths held in the member. Figure 3 illustrates the details of the supporting member 25 shown in Figure 2 and the manner in which the nozzle of tube 31 and the mouth of tube 32 are held in axial alignment. As previously pointed out, the cast assembly shown in Figure 3 may be quickly inserted into or removed from a jet box in event of tube breakage.

What is claimed is:

1. A jet suction device for a tube spinning machine comprising a jet box, a first hollow tube having a mouth disposed within said jet box, a second hollow tube having a nozzle disposed within said jet box in cooperative axial alignment with and spaced from the mouth of said first tube, a supporting member formed of metal having a low elastic limit for adjustable mounting said first and second tubes in said spaced and aligned relationship within said jet box, arms projecting from the ends of said supporting member, means defining substantially aligned apertures in said arms for the reception of said first and second tubes, respectively, and mounting means for positioning said supporting member in said jet box.

2. A jet suction device for a tube spinning machine comprising a jet box, a deflector mounted within said jet box, said deflector being adaptable for receiving yarn from a source of supply and for changing the direction of travel thereof, a first hollow tube having a mouth disposed within said jet box in alignment with said deflector whereby yarn emerging from said deflector may be received by said first tube, a second hollow tube having a nozzle disposed within said jet box in cooperative axial alignment with and spaced from the mouth of said first tube, a supporting member formed of lead for detachably and adjusting mounting said first and second tubes in said spaced and aligned relationship within said box, arms projecting from the ends of said supporting member, means defining substantially aligned apertures in said arms for the reception of said first and second tubes, respectively, and mounting means for positionally mounting said supporting member in said jet box in a fixed relationship with respect to said deflector.

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