

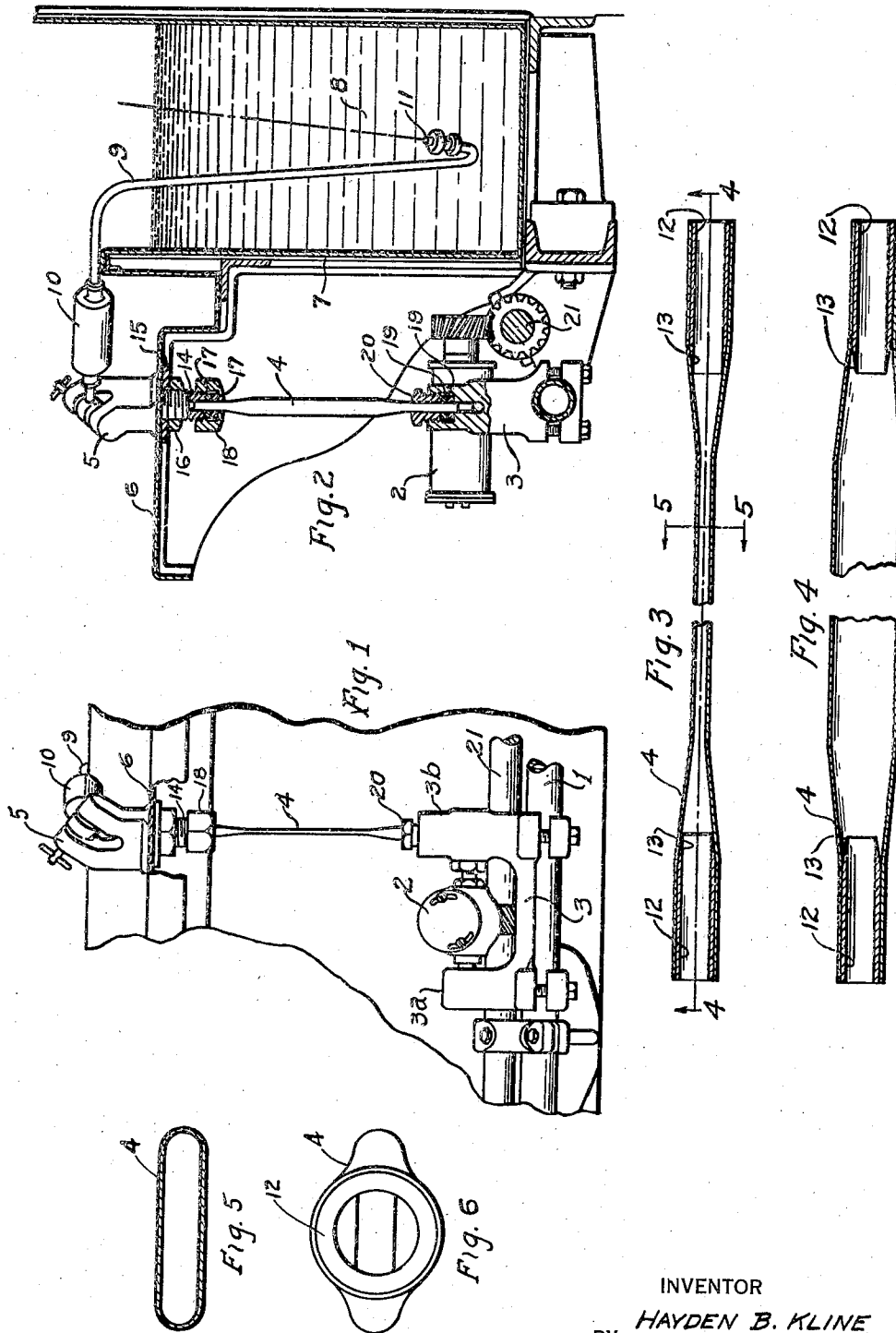
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RAYON SPINNING APPARATUS

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RAYON SPINNING APPARATUS

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This invention relates to rayon spinning apparatus.

Heretofore in the manufacture of rayon it has been customary to incorporate in the spinning apparatus, ordinarily in intimate association with the pump, a pressure bottle the function of which has been to reduce the effect of pulsations introduced by the pump. This pressure bottle has generally been mounted on the pump itself in such relation to the discharge thereof that pulsations have to a greater or less extent been cushioned by means of a body of air entrapped within the pressure bottle. Various difficulties have attended the use of such pressure bottles, among them the fact that rayon mass, especially viscose, by setting up within the pressure bottle soon impairs its functioning; the fact that such bottles, being of glass, are easily broken; and the fact that extensive cleaning and other conditioning is necessary after relatively short periods of use.

More recently it has been proposed in Patent No. 1,958,009 to McKee, granted May 8, 1934, to employ, in lieu of the pressure bottle, a pulsation eliminator comprising a non-rigid vessel through which rayon mass continuously flows, such vessel being located at some convenient point in the line between the pump and the spinneret. This patent discloses the use, among other things, of a thin-walled metal tube formed into a coil or helix adapted, by expansion of the tube, to cushion pulsations. While such an arrangement is wholly operative in that it largely or entirely eliminates pulsations from the rayon spinning apparatus with which it is associated, it is not always possible to use the same in view of the fact that existing rayon spinning machines are in general not well adapted to accommodate such devices. The principle of operation therein involved is, however, undoubtedly entirely sound.

It is an object of the present invention, employing the principle of this patent, to provide a practicable means for reducing the effect of pulsations, such means being adapted to be interposed in the relatively limited amount of room available between the pump or, more accurately, the pump bracket and the apron block, candle filter or other trough fitting, to one or both of which such means must in practice be directly connected. A further object of the invention is to provide a short, straight, upwardly extending, normally collapsed, thin-walled metal expansion tube capable of cushioning the effect of the pulsations introduced by the pump. Still a further object of the invention is to provide means of this type adapted to be employed in existing spin-

ning machines without the necessity of making extensive changes. Other objects and advantages of the invention will in part be obvious and will in part appear more in detail hereinafter as the description of the invention proceeds.

For illustrative purposes, the invention will be shown and described as applied to rayon spinning apparatus employed in the manufacture of multiple filament viscose rayon; more particularly, to such apparatus in which is employed a positive displacement pump as, for example, a piston pump of the type usually used. It is obvious that the invention is equally applicable to other methods of manufacturing rayon as, for example, the cuprammonium, cellulose acetate and nitrocellulose processes. It will be understood that while for convenience reference is made herein to rayon manufacture, the fact of the matter is that the invention is equally applicable to the manufacture of other artificial materials similarly produced as, for example, artificial horsehair, staple fiber, artificial straw, bands, ribbons and the like.

In the accompanying drawing, in which like reference characters refer to like parts throughout, Figure 1 represents a front elevation of rayon spinning apparatus employing the instant invention, parts being shown as broken away for simplicity in illustration. Figure 2 shows a corresponding side elevation with parts in section. Figures 3 and 4 show in section in somewhat greater detail the thin-walled metal tube employed in the rayon spinning apparatus of Figures 1 and 2, the former showing the tube viewed from the direction from which it is seen in Figure 1 and the latter showing it viewed from the direction from which it is seen in Figure 2. Figure 5 is a cross section on the line 5—5 of Figure 3. Figure 6 is an end elevation of the same tube.

Referring now to Figures 1 and 2, pipe line 1 supplies viscose to the pump 2 through side 3a of pump bracket 3. Directly connected at one end thereof to the pump bracket 3 and at the other end thereof to the apron block 5 is the expansion tube 4. As more clearly shown in Figure 2, apron block 5 is mounted on trough apron 6, which is in turn mounted on trough 7 containing coagulating bath 8. Projecting downward into the latter is mass tube 9 carrying candle filter 10 in close proximity to the point of its connection to apron block 5. Disposed at the outer end of mass tube 9 is spinneret 11. The flow of rayon mass is from pipe line 1 through one side, 3a, of pump bracket 3 to pump 2, thence through the other side, 3b, of pump bracket 3 to expansion tube 4, from which

it flows in turn to apron block 5, mass tube 9 and spinneret 11.

Pump 2 is a conventional positive displacement pump of the piston type. The pressure bottle commonly employed on pumps of this kind is absent, its function being performed pursuant to the teachings of the invention by means of expansion tube 4 from which rayon mass is piped from the pump bracket 3 to the apron block 5. Expansion tube 4 is generally similar to the cylindrical tube previously employed in apparatus using, in addition thereto, a pressure bottle; but differs therefrom in that it is deformed from the cylindrical so as to be normally collapsed, its normally collapsed shape, shown to best advantage in Figures 1, 3 and 5, permitting it to expand slightly to assume under the influence of pulsations in the rayon mass a somewhat more nearly cylindrical shape. The expansion tube 4 is connected to the pump bracket 3 and the apron block 5 in exactly the same way as cylindrical tubes of the type previously employed in conjunction with pressure bottles.

As shown in Figures 3 and 4, the tube 4 is deformed from the cylindrical to such an extent that in cross section it has the appearance shown in Figure 5. It is preferably made of thin-walled seamless steel tubing approximately 0.004 inch in thickness and three-eighths of an inch in original outer diameter; i. e., before being deformed to the shape shown. In order to reinforce it at its ends, where it is connected respectively to pump bracket 3 and apron block 5, it is provided at each end with a hollow cylindrical plug 12 having a tapered portion 13, such plug 12 being fitted into the tube 4 by a press fit. Such plugs 12 may be of a length in the neighborhood of one or one and one-quarter inches and may conveniently have a bore one-quarter of an inch in diameter. The tubes 4 will be as long as necessary, as, for example, in a typical case some eight to ten inches.

The apron block 5 represents only one type of trough fitting that may be employed, since various trough fittings are available and can be used in the practice of the invention in much the same way as the apron block 5. As most clearly appears from Figures 1 and 2, the apron block 5 has a threaded portion 14 extending downward through the trough apron 6 into which threaded portion 14 projects one end of the expansion tube 4. The apron block 5 is clamped to the trough apron 6 by means of a washer 15 and threaded nut 16. The expansion tube 4 connecting the pump bracket 3 and the apron block 5 is held rigidly in place at its upper end by means of washers 17 and a nut 18 serving to clamp the same into tight relation to the tube. At its other end, the expansion tube 4 is held in place in the pump bracket 3 by conventional means; to wit, washers 19 and nut 20.

In operation, the pump 2 is driven by the shaft 21 shown in Figures 1 and 2, which operates the pistons of the pump and thereby introduces the pulsation effect above referred to. These pulsations tend to appear in the rayon extruded from the spinneret 11 unless some provision is made for their cushioning, which in this instance takes the form of the expansion tube 4. The pressure of the rayon mass under the influence of the pulsations causes the expansion tube 4 to expand slightly, providing the desired cushioning effect. The rayon mass is then transmitted in the usual manner to the apron block 5, through the candle filter 10, and thence by means of mass tube 9 and

the spinneret 11 to the coagulating bath 8, wherein it assumes the form of thread. Experiments have shown that an expansion tube of this type is capable of cushioning pulsations to an extent at least as great as that previously provided by the pressure bottle. The expansion tube 4 replaces the tube, round in cross section, commonly used heretofore in conjunction with a pressure bottle mounted directly on the pump: it does not, therefore, introduce an additional element, but instead makes possible the elimination of the pressure bottle without elimination of its function.

It is obvious that numerous changes may be made without departing from the spirit of the invention. Thus the expansion tube of the invention may be made longer or shorter than that illustrated and may be fitted by different means on the one hand to the pump or, more accurately, the pump bracket and on the other to the trough fitting as, for example, the apron block shown and described. The cross section may have a different normal shape, as, for example, a triangular shape, rather than the somewhat flat shape shown in Figure 5. Obviously, the tube may be disposed so that it is mounted to extend at a substantial angle to the vertical rather than generally upward or vertically in the manner shown. It may, of course, be made of any material that over a prolonged period of time will stand up under the effect of the pulsations introduced by the pump. For this purpose, a thin-walled, seamless tube of high grade steel, preferably hardened and tempered after being deformed to the desired shape, is preferred.

It will be understood that while in the embodiment herein shown and described a candle filter is employed in addition to the apron block, one or the other of these may, if desired, be omitted. Where the apron block is omitted, the candle filter is ordinarily permitted to rest directly on the trough apron or trough wall; so that it serves to some extent the same functions as the apron block, particularly in lending rigidity to the organization. In such case, the expansion tube of the invention may be connected at one end to the candle filter. As herein used, the term "trough fitting" is intended to include any element, such as a candle filter, that takes the place of the apron block, regardless of whether the mass tube and associated apparatus is disposed to pivot about such trough fitting, as in the embodiment of the invention herein shown and described, or, as is sometimes the case, about the pump bracket.

It is intended that the patent shall cover, by suitable expression in the appended claims, whatever features of patentable novelty reside in the invention.

What I claim is:

1. In rayon spinning apparatus including a positive displacement pump and a trough fitting, a pressure responsive element operating to minimize pulsations resulting from the use of the positive displacement pump comprising a short, straight, open-ended, internally unobstructed metal tube having thin, flexible walls of a length sufficient to permit the tube to serve as a direct connection between the pump and the trough fitting, said tube being normally collapsed along a portion of its length but being capable, under the influence of pulsations from the pump, of expanding against the pressure of the atmosphere to minimize the effect of said pulsations before they are transmitted beyond the trough fitting.

2. In rayon spinning apparatus including a positive displacement pump and a trough fitting,

5 a pressure responsive element operating to minimize pulsations resulting from the use of the positive displacement pump comprising a short, straight, open-ended, internally unobstructed metal tube having thin, flexible walls of a length sufficient to permit the tube to serve as a direct connection between the pump and the trough fitting, said tube being normally collapsed along a portion of its length but being capable, under the influence of pulsations from the pump, of expanding against the pressure of the atmosphere to minimize the effect of said pulsations before they are transmitted beyond the trough fitting and, at at least one end thereof, reinforcing means conforming to the shape of the end of said tube.

10 3. In rayon spinning apparatus including a positive displacement pump and a trough fitting,

a pressure responsive element operating to minimize pulsations resulting from the use of the positive displacement pump comprising a short, straight, open-ended, internally unobstructed metal tube having thin, flexible walls of a length sufficient to permit the tube to serve as a direct connection between the pump and the trough fitting, said tube being normally collapsed along a portion of its length but being capable, under the influence of pulsations from the pump, of expanding against the pressure of the atmosphere to minimize the effect of said pulsations before they are transmitted beyond the trough fitting and, at each end thereof, internal reinforcing means conforming to the shape of the end of said tube.

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