Dec. 8, 1953 E. J. GRISET, JR., ET AL 2,661,588

THREAD COLLECTOR

Filed July 19, 1951

Fig. 1.

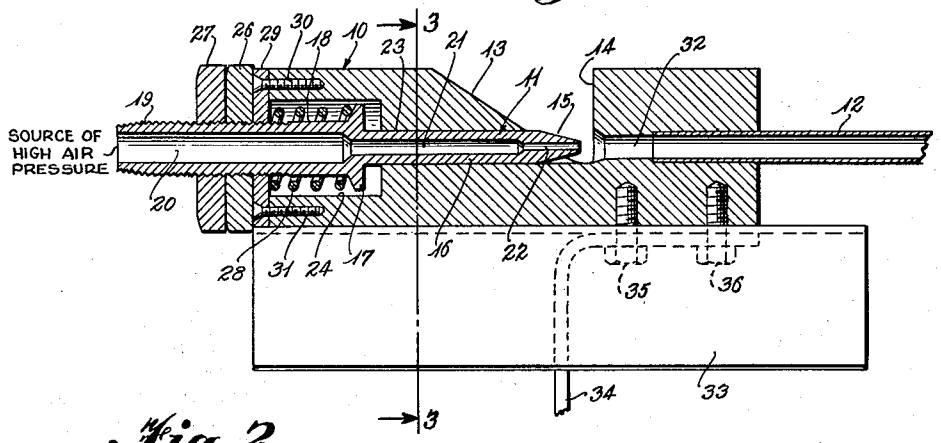
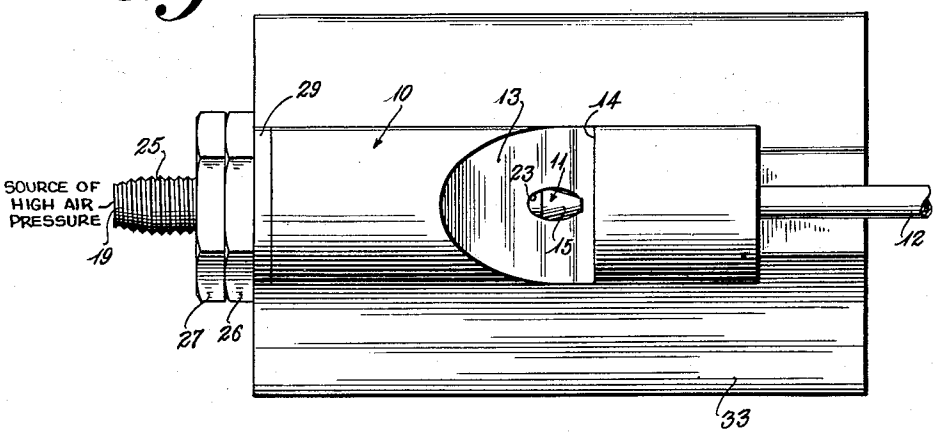


Fig. 2.



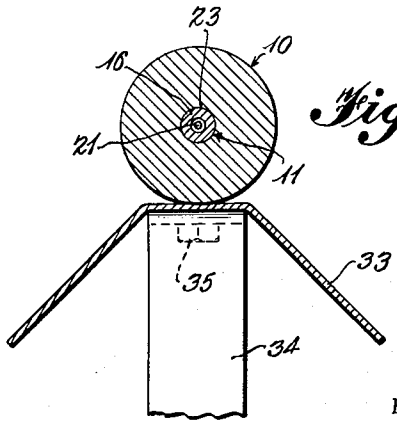


Fig. 3.

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Patented Dec. 8, 1953

2,661,588

UNITED STATES PATENT OFFICE

2,661,588

THREAD COLLECTOR

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Application July 19, 1951, Serial No. 237,526

4 Claims. (Cl. 57—34.5)

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This invention relates to the collection of thread, and more particularly it relates to an improved air-operated suction device for temporarily collecting one or more running threads.

The collection of a running thread has become a problem to an increasing extent in the synthetic fiber art, especially with the advent of the many continuous spinning and treating processes that have been developed in recent years.

The essence of the problem resides in the fact that whatever type of yarn or thread body is wound it is necessary periodically to remove a full package of yarn from this collection means and to begin a new package.

It can thus be realized that there is a period when the thread must be temporarily disconnected from the full package for transfer to the empty collection means. As the present trend in the art of continuous spinning is toward higher spinning speeds it becomes more and more difficult to make such transfer efficiently. Manual handling operations, which are practical at relatively low speeds (i. e. 50 meters per minute) become unsatisfactory at higher speeds (i. e. 100 meters per minute).

The problem is particularly acute in the case of a ring twister, where passing the thread through the traveler and down through the ring necessarily consumes considerable time during which accommodation for the running end must be provided. An improved and simplified method of threading-up a ring twister with a continuously issuing thread is described in copending application Serial No. 209,785, filed February 7, 1951, now Patent No. 2,572,138, of Ernest J. Griset, assigned to the same assignee as the present application. In practicing that method the requirements of the temporary collecting device are very severe indeed and none of the prior art devices has been sufficiently satisfactory to permit achievement of the full potentialities of the Griset method.

While the Griset method of threading-up a ring twister requires a temporary collection device which is capable of handling such running ends at the same time even when those ends may not be delivered at the same speed, in British Patent 359,627 there is disclosed a suction device which is capable of use with the Griset method in the sense that it can handle simultaneously a plurality of running ends delivered at different speeds. On the other hand the running end has to be delivered to the take-up point on the device of the British Patent with very considerable precision and the device is difficult to adjust and

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requires considerable maintenance in the sense that the clogging of the very small orifice through which the thread is received is fairly common occurrence.

It is an object of this invention to achieve the advantages of the suction device of the British patent while at the same time overcoming its limitations in respect to use of threading-up, adjustment and maintenance.

It is likewise an object of this invention to provide an improved temporary collecting device that is capable of more efficiently handling high speed running ends either single or plural.

It is another object of this invention to provide an improved thread collection device of the suction type.

It is another object of this invention to provide an improved air-operated suction device for collecting either dry or wet threads.

It is a further object of this invention to provide an improved light-weight and portable thread collection device of the suction type which can be easily cleaned and adjusted.

It is a still further object of this invention to provide a thread collection device which will effectively fulfill the desiderata set forth above.

Other objects and advantages of the present invention will be apparent from the following detailed description when considered in conjunction with the accompanying drawings wherein:

Figure 1 shows a side elevation in section of a suction device construction in accordance with the teaching of this invention;

Figure 2 is a plane view of the suction device; and

Figure 3 is a section taken on the lines 3—3 of Figure 1.

Referring now to the drawings in greater detail, the numeral 10 indicates generally a solid cylindrical support or housing in which a jet generally indicated at 11 and discharge tube 12 are maintained in spaced axial registry and separated by a small gap. A notch in the support 10 provides an inclined shoulder 13 and a perpendicular shoulder 14. The jet projects through the shoulder 13 and an aligned aperture in the shoulder 14 leads to the tube 12.

Jet 11 as it is designated in the present specification refers to an entire assembly which comprises a tip portion 15, a narrow barrel 16, a flange or shoulder 17, an enlarged barrel 18, and a connecting tapered portion 19. Through the center of this jet assembly there are provided three bores of varying diameter. The largest bore 20 extends from taper 19 to the proximity of flange

17. The next largest bore 21 extends from this point to approximately midway along narrow barrel 16, from which point the smallest bore 22 extends to tip 15. By designing the interior of the jet in this manner, the drilling operation can be carried out rapidly and economically while at the same time a stepwise reduction in internal diameter is achieved.

Support 10 is provided with two bores 23 and 24 that receive the narrow barrel 16 and flange 17 of jet 11 respectively. The fit of the elements of jet 11 into bores 23 and 24 in support 10 need not be any closer than is necessary to assure accurate registry and the fit should be loose enough to permit jet 11 to slide in the bores of support 10.

It will be observed that the enlarged barrel 18 is screw-threaded at 25 and two nuts 26 and 27 can be screwed upon these threads to serve as adjusting means as will be described more fully hereinafter.

A helical spring 28 is placed around the enlarged barrel 18 of jet 11, with one end bearing against flange 17 and the other end bearing against an annular thrust ring 29, which is removably attached to the end of support 10 by screws 30 and 31. Spring 25 is compressed when thrust ring 29 is affixed to support 10, and as a result the flange 17 and jet 11 are urged to the right as viewed in Figure 1. By adjusting the position of nut 26 with respect to enlarged barrel 18, the extent to which spring 28 forces the jet 11 to the right can be limited. Nut 26 is locked in position by lock nut 27.

Tip 15 of jet 11 extends partially into the notch-like opening formed by perpendicular shoulder 14 and inclined shoulder 13 that are provided in support 10. Also in support 10 is another bore 32 in axial alignment with bore 23. The end of tip 15 preferably does not extend into the end of bore 32, but is spaced therefrom a small distance, this distance being regulated by adjustment of nut 26 as described above.

It is important that spring 28 firmly maintain jet 11 in position while at the same time allowing the easy retraction of it for a short distance.

Discharge tube 12 is frictionally affixed within bore 32 of support 10. Thread that is passed therethrough can be collected in any suitable manner, as for example a detachable wire basket, not shown.

A source of air under high pressure is connected to jet 11 at taper 19. Any suitable connecting means, such as a rubber tube, can be employed. It is desirable to insert some flow-regulating device, i. e., a simple valve, between the source of air supply and the jet.

A thread shield 33 is provided underneath support 10, the purpose being to prevent any thread from wrapping around the device. A bracket 34 is attached at one end under the support 10 and shield 33, the screws 35 and 36 serving as attaching means. The other end of the bracket may be rigidly attached to whatever machine it may be employed with, or it may be attached to a portable stand.

In operation, the device functions very simply. Air is introduced from a high pressure source of supply through taper 19 into jet 11, from which it emerges at tip 15 at a high velocity. It then enters bore 32 in support 10, passes through discharge tube 12, and finally is emitted from discharge tube 12 to the atmosphere. The high velocity stream of air leaving tip 15 creates a

reduced pressure zone in the notch formed by shoulders 13 and 14, with the result that any thread placed in the wedge shaped portion is immediately conveyed into the stream of high velocity air by the flow of air from the surrounding atmosphere to the region of reduced pressure at tip 15. It is important that tip 15 is spaced from the opening of bore 32 by some small distance. Thus, as the thread is brought to the bottom of the notch, either by the aforesaid suction, by mechanical manipulation, or as is usually the case, by a combination of both, the fast-moving stream of air engages the thread and propels it on into bore 32.

This device, then, functions neither as a simple suction device nor as a blowing device, but actually as an extremely efficient combination of both. Consequently the process of introducing the thread into the device is practically instantaneous.

By means of the adjusting nut the spacing between tip 15 and bore 32 can be accurately and positively regulated. Once the best adjustment for a certain set of conditions is made, no further adjustments are needed. If the size of the thread, the number of threads, the pressure of the air supply, or the condition of the thread, i. e., either wet or dry, is varied, then it is possible to reset the spacing to give the most satisfactory results. This adjustment is made empirically by making a slight change, observing the operation, making another change, and repeating the process until the best adjustment is achieved.

If the device should become fouled, which may happen if a slub, snarl, or knot of thread should become lodged between tip 15 and bore 32, the obstruction can be readily removed simply by temporarily retracting jet 11 to the left, as viewed in Figure 1, against the compression of spring 28. This momentarily increases the separation between the tip and the opening of the bore, and allows the obstruction to be propelled by the stream of air through discharge tube 12 and out of the device.

To aid in this cleaning and to achieve the most efficient action, it is desirable to provide a slight flare in bore 32 toward the notch, the angle of the flare being roughly parallel to the angle of external taper of tip 15. Satisfactory results, however, can be obtained without such a flare.

The length and diameter of discharge tube 12 can be designed to meet varying conditions. With a longer tube, greater tension is imposed upon any thread collected thereby, but with a longer tube it may be desirable to use a higher pressure in the air supply and a greater tube diameter.

As mentioned above, the device of this invention is of especial application for threading-in a ring twister by the method described in said U. S. application No. 209,785, now Patent No. 2,572,138, but it is, of course, understood that this device is of value in a variety of applications. It is especially adapted to be used as a portable light weight temporary collection device.

This device can accommodate either dry or wet threads, in the latter instance being especially handy as an aid in threading-up continuous spinning machines.

It is understood that the description of the above embodiment is for purposes of illustration and is not intended to limit the scope of this invention except to the extent defined in the claims.

What is claimed is:

1. A portable, light-weight suction device for

temporarily collecting a running thread which comprises a housing, a notch in said housing having two opposite defining walls and forming a wedge-shaped opening for guiding a thread, one of said walls having a bore therein, a jet projecting through the other wall in axial alignment with the bore in the said first wall but spaced therefrom a small distance, means to supply air under high pressure to said jet thereby creating a reduced pressure zone near the bottom of the notch in the region of the jet tip whereby when thread is brought to the bottom of the notch, it is engaged by the air stream and propelled through the bore.

2. A portable, light-weight suction device for temporarily collecting a running thread which comprises a generally cylindrical housing, a notch in said housing having two opposite defining walls and forming a wedge-shaped opening for guiding a thread, one of said walls having a bore therein, a jet projecting through the other wall near the bottom of the notch in axial alignment with the bore in the said first wall but spaced therefrom a small distance, a discharge tube in said bore, means to supply air under high pressure to said jet thereby creating a reduced pressure zone near the bottom of the notch in the region of the jet tip whereby when thread is brought to the bottom of the notch, it is engaged by the air stream and propelled through the bore.

3. A portable, light-weight suction device for temporarily collecting a running thread which comprises a generally cylindrical housing, a perpendicular shoulder and an inclined shoulder cut in said housing to form a wedge-shaped opening for guiding a thread, a jet adjustably positioned in said housing, one end of said jet being connected to a supply of high pressure air and the other end discharging into said opening, a discharge tube in said housing rigidly positioned in axial registry with said jet and communicating with said opening so as to receive a thread propelled from said opening by a stream of air issuing from said jet towards said discharge tube, means for adjusting the separation of said jet and said discharge tube, and spring means for yieldably maintaining said jet in operating position while permitting the rapid and temporary retraction of said jet away from said discharge tube, whereby any obstruction between said jet and said discharge tube can be removed.

4. A portable light-weight suction device for temporarily collecting a running thread which comprises a housing, a notch in said housing having two opposite defining walls, a tubular jet member projecting through one of said walls, means to supply air under high pressure to said tubular jet member, said tubular jet member progressively decreasing in effective cross-sectional area in the direction of air flow, a second tubular member projecting into the other of said walls, in axial alignment with the bore of said jet member but spaced therefrom a small distance whereby when thread is brought to the region between said jet and said second tubular member it is engaged by the air stream and propelled through said second tubular member.

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