

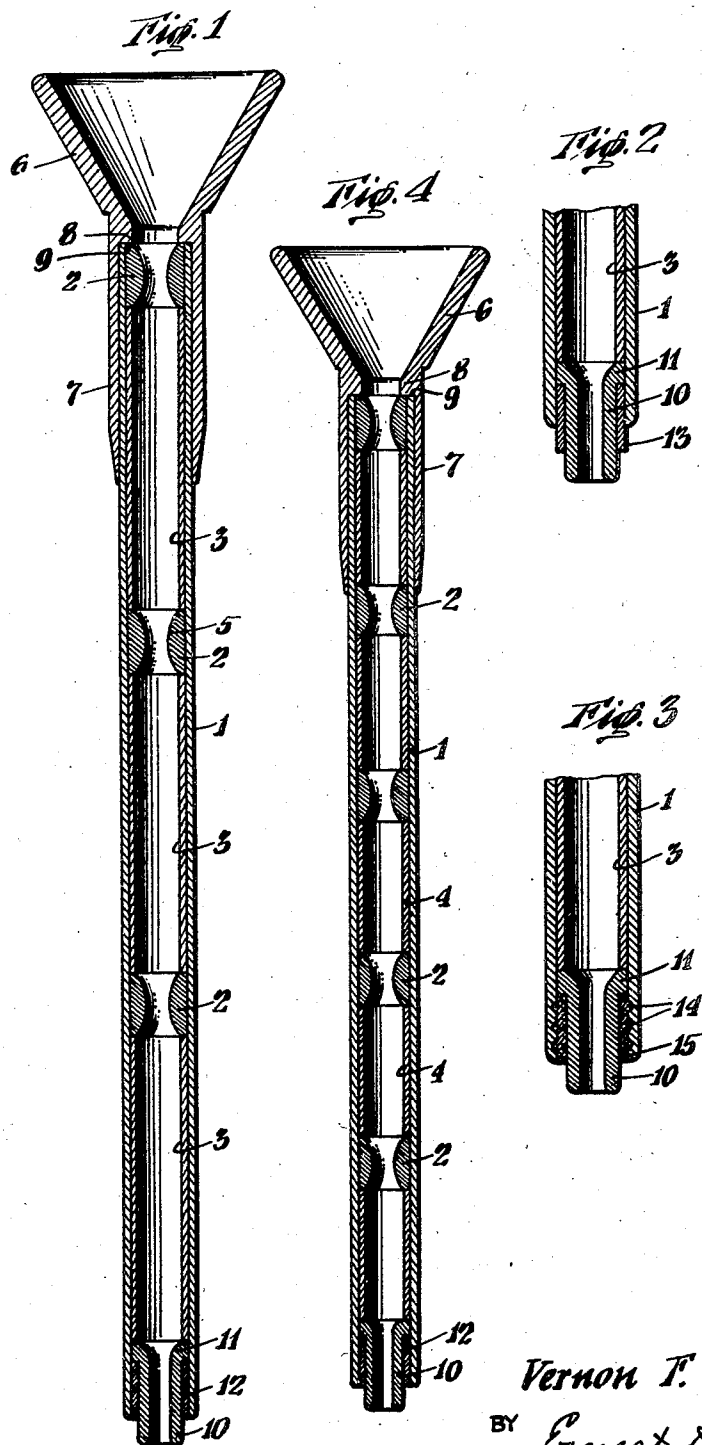
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FUNNEL FOR RAYON SPINNING

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FUNNEL FOR RAYON SPINNING

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1 Claim. (Cl. 57—76)

1 This invention relates to funnels for use in connection with apparatus for the spinning of artificial filaments, thread or yarn such is viscose rayon, particularly by the pot spinning method, and more particularly to a novel construction for such a funnel, which is superior to the funnels now commercially available for this same general purpose, as will be more specifically pointed out hereinafter.

It is conventional at this time to use one piece glass funnels supported by a suitable "traverse mechanism" by which they are substantially vertically reciprocated during their normal operation. The rayon thread passes down through the funnel to the interior of a spinning pot and there builds up in the form of a cake, which is removed from time to time by the operators of the apparatus. When it is desired to start up the operation of the unit again after a cake has been built up to a desired extent and removed, the end portion of the thread is placed in the upper substantially conical portion of the funnel and then washed down through it by a small amount, such as a small cupful, of a liquid which may be the spinning bath.

Due to the fact that glass is substantially a solid solution of various oxides including sodium oxide, the action of the acid of the spinning bath, used incident to starting the operation and also that which is entrained on the thread during normal operation, has a chemical erosive action in some respects similar to an etching action on the glass. It has also been the experience of the art that there is a substantial amount of mechanical abrasive wear on the glass, particularly at the funnel tip, incident to the thread wiping across this surface. As a result glass funnels tend to become somewhat abrasive in their action on the thread, sometimes causing the breaking of thread filaments. This action is especially noted when a thread of a type known as "chalk lustre yarn" is being made, wherein the delustering is accomplished by the use as an ingredient of the material forming the thread, of very tiny particles of pigment. This causes an even more rapid mechanical abrading action upon the funnel and a consequent higher frictional wear on the thread than with lustrous types of rayon thread. Even though the abrading of the thread may not cause the breakage thereof, it may still affect it to such an extent as to diminish its strength and consequent value substantially. In addition, the physical formation of the raw yarn cake depends to a certain extent

2 upon the smoothness and upon the accurate and uniform traverse motion of the funnel.

Another difficulty which has arisen with prior art funnels is that it is very difficult to clean them. In the course of normal commercial operations it has been found that a so-called "red deposit" or deposit of some character, which is reddish in color tends to accumulate within the funnels. While the exact chemical composition of this deposit is not known, it is suspected that it comprises sulfur and certain lead salts resulting from the chemical action of the spinning bath materials upon the lead lining of the troughs in which this bath is contained. However, it is known that these deposits do in fact build up and cause substantial difficulties in practical commercial operation. The cleaning of funnels, particularly one-piece funnels, such as are commonly in use in the prior art, is very difficult as this cleaning must be of a quite drastic character and includes not only mechanical cleaning, but treatment of the parts to be cleaned with chemicals.

It has also been proposed in the prior art to form funnels with removable inserts or of separable portions, in an attempt to obviate some of the difficulties which have been experienced with the conventional glass funnels. Some of these proposals are shown in the patents to Haley, Nos. 2,320,590 and 2,320,591, both granted June 1, 1943. These structures have solved some, but not all, of the difficulties of the prior art above referred to; but are themselves open to various criticisms from a practical operative point of view.

Among the objects of the present invention are the provision of a funnel construction which is substantially non-shatterable in character; wherein there are a plurality, and preferably a variable number, of spaced inserts, which are preferably interchangeable with one another; and wherein the entire construction is rigid, relatively light, substantially non-breakable and easily disassembled for cleaning or the replacement of some portions as may be required.

Further and more specific objects of the present invention include the provision of an inexpensive funnel construction of the character above set forth, wherein the supporting body for the funnel may be formed of a strong acid-resistant material such as laminated phenolic tubing and wherein the inserts may be interchangeable, easily cleaned, and formed of material which will be highly resistant to chemical erosive action and physical abrasion.

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A further object of the present invention is to provide a funnel construction of the character generally set forth, which is internally streamlined and which will permit the easy "piecing up" of the apparatus in starting the operation for the forming of a new cake after one cake has been completed and removed.

Other and more detailed objects of the present invention will become apparent from the following specification and appended claim, when taken in connection with the accompanying drawings in which:

Figure 1 is a view in central vertical section of a funnel construction in accordance with the present invention;

Fig. 2 is a fragmentary view of the lower end portion of a funnel similar to Fig. 1, but showing a modified construction for this lower end;

Fig. 3 is a view similar to Fig. 2 showing a still further modification; and

Fig. 4 is a view similar to Fig. 1, but showing a different number of thread-guiding inserts with shorter spacing sleeves therebetween.

Turning now to the accompanying drawings, the funnel comprises an outer tubular member 1 having a substantially uniform inside diameter. This member may be formed of a piece of laminated phenolic tubing or may be of any other suitable material, which is preferably relatively light, strong and acid-resistant. Within the member 1 is arranged a vertical group or stack of thread-contacting or guiding inserts 2 separated by intermediate spacer sleeves 3, as shown in Fig. 1, or somewhat shorter sleeves 4, as shown in Fig. 4, these sleeves being essentially similar to each other with the exception of their length longitudinal of the funnel.

The thread-guiding inserts 2 are preferably formed of some material which is hard and chemically acid-resistant to a high degree. It should also be such that it may be easily cleaned and is not chemically attacked by cleaning agents. Lava inserts are quite suitable for this purpose.

It is also desired that the inserts be of the same size, so as to be interchangeable with one another. Thus in practice but one type or size of inserts need be stocked and no care need be taken as to the order in which the inserts are placed in the funnel in assembling the parts.

The internal contour of the inserts is preferably composed of a solely convex surface in respect to the center line of the funnel, that is as seen in central vertical section as shown at 5, Fig. 1. The inserts are preferably at least one-half inch in length in a direction measured parallel with the center line of the funnel, i. e., longitudinal thereof. Furthermore, it is preferred that the length of each insert in its longitudinal direction be at least four times the minimum inside diameter of the aperture through which the thread passes.

The spacing sleeves 3 and 4 preferably have an outside diameter just small enough to be easily slidable within the outer tubular member 1, so that the parts may be easily assembled as shown in the drawings. These spacing sleeves may be of any desired light weight, relatively cheap material, which is preferably acid-resistant and which is sufficiently rigid so as to retain the inserts 2 at predetermined positions longitudinal of the funnel. It is contemplated, for example, that a relatively low strength paper-reinforced phenolic material may be used as the spacing sleeves 3 or 4. It is also contemplated that short sections of glass tubing could, if desired, be used

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for this purpose, as under normal circumstances the thread will not contact the sleeves 3 or 4, but will solely contact the inserts 2 during its passage down through the funnel.

At the upper end of the tube 1 there is suitably secured a substantially conical mouthpiece 6 having a depending sleeve portion 7 adapted to surround the upper end of the tube 1 and to be secured thereto in any suitable manner as by the use of a small amount of an adhesive or cementitious material. The mouthpiece has a portion 8 with a downwardly directed shoulder 9 serving to determine the upper limit of the group of inserts and spacing sleeves 2 and 3, or 2 and 4, as the case may be. The inside diameter of the portion 8 is preferably substantially the same as that of the spacing sleeves 3 or 4.

Secured in and to the lower end of the funnel is a tip insert 10, which may be formed as shown of substantially cylindrical portions or surfaces of revolution around the central longitudinal axis of the funnel. As shown, the tip insert 10 is provided with an outwardly directed flange 11 having an outside diameter substantially the same as the inside diameter of the tube 1. This flange serves to determine the lower limit of the group of inserts 2 and spacing sleeves 3 or 4.

Means are provided for holding the tip insert 10 in the lower end portion of the tubular member 1. For this purpose there may be provided as shown in Figs. 1 and 4 a filling of cement and/or packing material 12, which is forced into the space between that portion of the tip insert below the flange 11 and the lower end of the tubular member 1. This material 12 preferably has a bearing on the tip insert 10 and on the tubular member 1 extending at least one-half inch in length in a direction longitudinal of the funnel and is designed to hold the tip insert rigidly and non-rotatably within the tubular member 1.

There is shown in Fig. 2 a modified form of means for holding the tip insert 10 within the member 1. For this purpose there is provided a removable sleeve or bushing 13 which generally fills the space between the tubular portion of the tip insert 10 below the flange 11 and the lower end portion of the tubular member 1. The construction shown in Fig. 2 provides by inherency from the particular showing in that figure for two desirable functions or advantages. First, it will be noted that the tip insert 10 projects a substantial distance beyond either the tubular member 1 or the bushing 13. Thus, when the funnel is being moved downwardly, in the downward stroke of its traverse movement, and the thread is winding inside the pot at a level higher than the instantaneous level of the bottom of the tip insert 10, the thread will even then be maintained out of contact with all elements of the funnel except the tip insert 10, i. e., it will not touch either the bushing 13 or the tubular member 1. In this way, as the tip insert 10 is made of smooth polished, abrasion resistance material, damage to the thread is prevented, which would be likely to ensue if the thread could come into contact with any other member or portion of the funnel. The second advantageous result, also inherent from the structure shown in Fig. 2, is in the disassembly of the funnel parts, the bushing 13 as shown extends sufficiently beyond the tubular member 1 so that it may be grasped by pliers to remove it and the tip insert 10 as a unit. This bushing 13 is in practice a relatively cheap part which may be thrown away after a single use. It serves to protect the tip insert 10, which is in

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practice considerably more expensive, so that even though the bushing 13 be damaged in the process of removal of it and the tip insert 10, the latter is not damaged but may be reused. Also, the tubular member 1 is usually not damaged by the removal of these parts.

It is contemplated that this bushing 13 may be secured to the tip insert 10 by the provision of a cementitious material therebetween and that the bushing 13 may be similarly fixedly secured to the lower end of the member 1. It is contemplated, however, that the type of cement used for cementing the bushing 13 to the tip insert 10 may be different from that used to cement the bushing to the member 1. The type of cement employed in each case should be chosen in accordance with the characteristics and compositions of the several materials.

In Fig. 3 there is shown a still further modification of the means for securing the tip insert 10 within the lower end of the tubular member 1. As shown in this figure, the lower end of the tubular member is provided with a plurality of depressions 14 of any suitable size, shape and number, and possibly including annular grooves or discontinuous semi-annular grooves. The space between the lower end of the tubular member 1 and including the depressions 14 is then filled with a suitable material 15, which may be cast in place and rigidified in a suitable manner, depending upon the characteristics of the material 15, and serves to hold the tip insert 10 rigidly and non-rotatably within the member 1.

It is contemplated that the tip insert 10 may be made of any suitable material having characteristics similar to the material described for the inserts 2; although it is to be considered within the purview of this invention that the tip insert may be made from material different from the inserts 2, if desired.

There is thus provided, in accordance with the present invention, a funnel construction which is internally streamlined, so as not to afford recesses in which a thread might be trapped during the "piecing up" of the spinning unit, that is, during the time that the end portion of the thread is being caused to move through the funnel in starting the formation of a new cake in the spinning pot with which the funnel is associated. Also, the absence of recesses and sharp corners diminishes the opportunity for fouling of the funnel by a "red deposit" as above generally referred to. The construction further provides for the easy disassembly and re-assembly of the parts, permitting the cleaning of the parts individually and of the funnel construction as a whole when necessary. It permits the removal of minute abrasive areas of the several inserts, which have an undesired effect upon the operation, and permits the replacement or repair of any parts which may for any reason be damaged in use, and thus attains all the objects hereinabove set forth.

While there is shown and described herein but one basic embodiment of the present invention

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and certain detailed variants thereof, I do not wish to be limited except by the scope of the appended claim, which is to be construed validly as broadly as the state of the art permits.

What is claimed is:

A funnel for spinning rayon, comprising an outer rigid tubular member having a substantially uniform inside diameter, a plurality of spaced thread-guiding inserts of rigid abrasion-resistant material in said member, substantially non-resilient spacing sleeves having larger internal diameters than said inserts for separating said inserts and positioning them longitudinally of said member and holding them rigidly and non-rotatably as thus positioned, said inserts and spacing sleeves making up a group in their assembled relation in the funnel, a substantially conical mouthpiece secured externally to the upper end of said member and constructed and arranged to determine the upper limit of said group of said inserts and spacing sleeves, a tip insert associated with the lower end of said member and constructed and arranged to determine the lower limit of said group of inserts and spacing sleeves, means for holding said tip insert rigidly and non-rotatably to and within said member, whereby said thread guiding inserts and spacing sleeves and said tip insert will be held rigidly with said outer tubular member during all movements of said funnel, said tip insert being of such length and so located in respect to said outer tubular member as to extend beyond said member by a distance sufficient so that the thread passing from said tip insert will be maintained out of contact with said tubular member during the operation of the apparatus, said means for holding said tip insert rigidly and non-rotatably within said member comprising an intermediate annular sleeve having a bearing on both said member and said tip insert of at least one-half inch longitudinally of said funnel, and said intermediate sleeve extending out beyond the end of said member by an amount sufficient to permit the grasping thereof in disassembling the parts of the funnel, but short of the end of said tip insert, so as not to be engaged by the thread during the normal functioning of the device.

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REFERENCES CITED

The following references are of record in the file of this patent:

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Number	Name	Date
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2,052,731	Taylor	Sept. 1, 1936
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Number	Country	Date
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257,830	Great Britain	1926