Dec. 1, 1942. O. VON KOHORN ZU KORNEGG 2,303,476

DRIER FOR TEXTILE THREAD

Filed July 26, 1940

Fig. 1

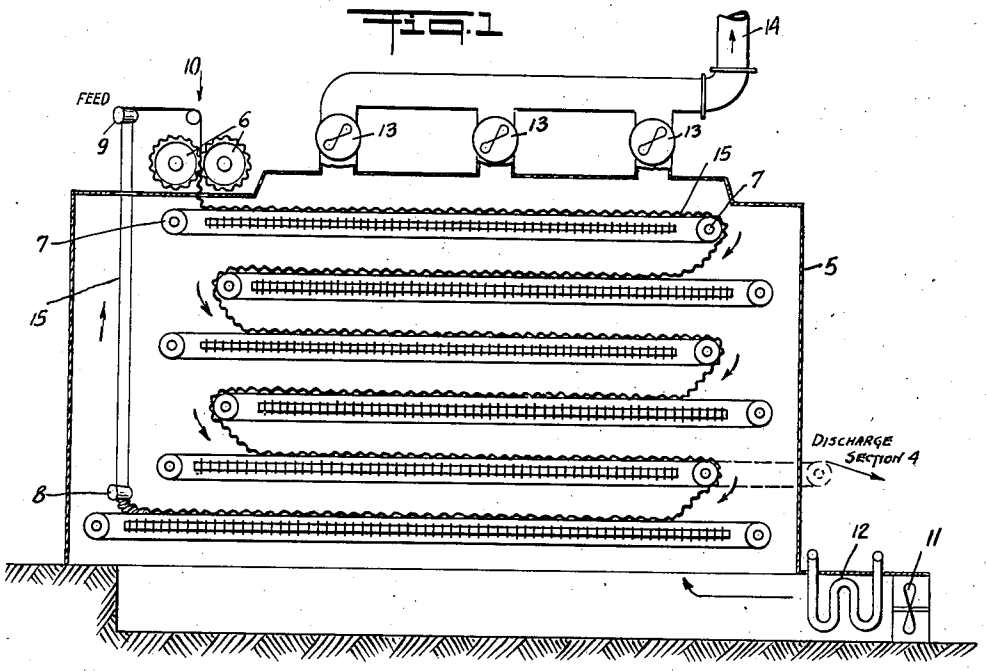


Fig. 2

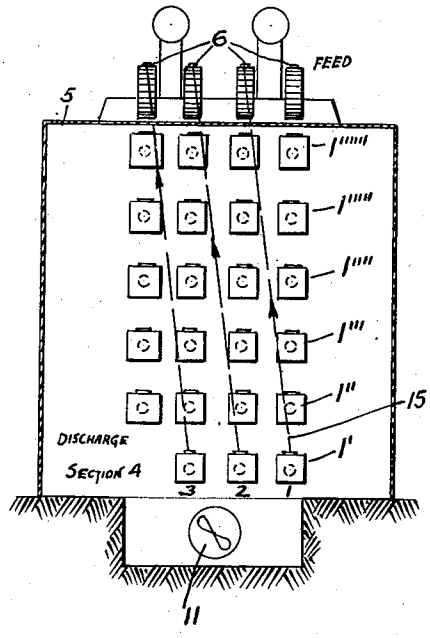
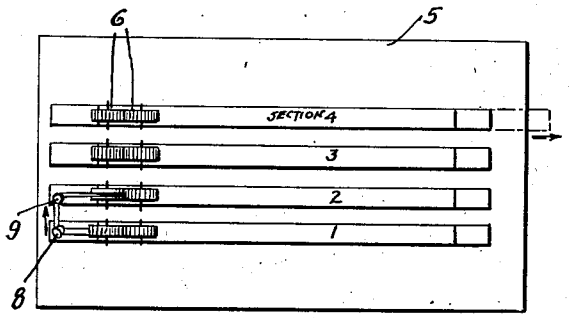


Fig. 3



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DRIER FOR TEXTILE THREADS

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3 Claims. (Cl. 34—159)

The present invention relates to the drying of textile threads and more particularly to the continuous drying of the artificial thread used in the manufacture of yarns and slivers.

It has been well known in the art to dry short fibers such as cotton wool and staple fiber in driers of the conveyor belt type, in which endless ropes or tows were dried on one or several endless belt conveyors.

A further object of this invention is the provision of a new process for drying threads or filaments particularly those relating to synthetic fibers before cutting same and in a manner to provide the necessary shrinkage in drying.

The drying of continuous tows or ropes as practised today is usually carried out over drums which are either heated themselves, or which are placed into a heated chamber. This method of drying does not afford the fibers the opportunity of following their natural tendency such as for instance shrinking in the case of viscose fibers. It is, however, desirable to permit viscose fibers to follow their natural shrinking tendency during the drying, because such shrinking results in a crimp or curl which improves the feel and appearance of yarns and fabrics made from such fibers.

If viscose filaments, for instance, are cut into staples, forming staple fiber, they are no more under tension and therefore can shrink and curl in accordance with their shrinking or tendency to contract. This, on the other hand, destroys the continuity of these fibers, which requires another opening, lap-forming, carding and spinning process, according to one of the known methods of yarn spinning.

My invention makes it possible to obtain a yarn consisting, for instance, of viscose fibers or any other fibers having a shrinking and curling tendency during drying, which has all the desirable properties of yarn spun from short fibers and dried in "stock," without, however, necessitating the same spinning operations required for the short fibers. I attain this result by affording continuous threads, such for instance as viscose rayon threads, the opportunity to shrink and curl freely while being dried in a continuous operation. According to my invention I provide a drier of the design and construction as shown on the drawing and described hereinafter, and I use this drier in accordance with the following method:

My drier consists of a number of endless belt conveyors, carrying the fiber material to be dried, these belts being driven, and the drying air passing through them. As one preferred embodiment of my invention, I drive all these conveyor belts individually and at variable speeds which can be individually controlled. I also arrange these belt conveyors in several adjacent sections, each section consisting of a number of belts arranged vertically or substantially vertically above each other.

When drying continuous threads it is assumed that a multitude of such threads, consisting of many thousands, will be dried simultaneously and that these threads will be fed into the drier in parallel and adjacent position, and that these threads have been spread out by a set of squeeze rollers or similar device so as to form a flat ribbon of several inches width and only a fraction of an inch thickness.

I feed this ribbon on to the conveyor belts in very loose condition and preferably in wave form. This allows the fibers to shrink freely. I provide a large number of individual conveyor belts in order to obtain the necessary drying time for the fibers carried by these belts, the drying time depending on the quantity of fibers to be dried.

On the attached drawing:

Figure 1 shows a side elevation of the drier used by me, partly in section;

Figure 2 is a sectional view of the drier; and

Figure 3 is a top plan view of the drier, partly in section.

On Figures 1, 2 and 3, the drying chamber **5** contains the drying sections **1, 2, 3** and **4**. Each such drying section consists of a number of endless conveyor belts **1'**, **1''**, **1'''**; **2'**, **2''**, **2'''**; and so forth.

On Figure 2 are shown, for instance, six endless conveyor belts, **1**, **1''**, **1'''**, and so forth, arranged vertically above each other, making up the drying section **1**. The ribbon **15** is fed into the drier on to the top belt conveyor by means of a feed arrangement consisting of feed gears or other suitable devices. On the drawing is shown a pair of toothed gears **6**, one such feeding device being provided on top of each drying section. The feeding device on top of the drying section **1** feeds the fiber ribbon on to the top belt of drying section **1**. The top belt of drying section **1** is driven by means of pulley or pulleys **7**. The speed of this belt can be controlled and I have found it desirable to control individually the speed of each belt in the drier. Due to the shrinking of the fibers taking place during drying, it will be necessary to operate each successive belt over which the ribbon passes at a slightly lower speed. Thus, for instance, the

top belt 1'''' will move at a slightly higher speed than belt 1''', which in turn will move at a slightly higher speed than 1'' and so forth. When drying materials which do not have too high a shrinking tendency, it is also possible to run all belts in one drying section at the same constant speed but to operate the belts of drying section 2 at a slightly lower speed than that of drying section 1, the belts of drying section 3 at a slightly lower speed than that of the belts of drying section 2, and so forth.

By means of the feed gears 6 the ribbon is fed on to the top belt of drying section 1 in wave form, as shown on Figure 1. It is carried through the drier from left to right, as shown on Figure 1, and after having traversed the drier on the top belt 1'''' of section 1, it drops on to the belt 1'''. This belt moves from the right to the left as shown on Figure 1, and in turn discharges the ribbon on to belt 1''. This operation is repeated until the ribbon finally reaches the bottom belt 1' of section 1. From there it is taken up by the guide pulleys 8, 9 and 10. The ribbon then passes through the feed gears provided over the drying section 2 and is again in wave form fed on to the top belt of the drying section 2.

It passes through the drying section 2 in the same manner as through drying section 1 and is then fed into the drying section 3 as described above. After the ribbon has reached drying section 4, it passes through this section down to the last belt which at the same time is the discharge belt of the drier. On Figures 1, 2 and 3 only five drying belts have been provided in section 4 in order to discharge the ribbon at the end of the drier opposite to that at which the ribbon has been fed into it. Where required, it is, of course, possible, to discharge the ribbon from the drier at the feeding end.

The air circulates through the drier from the bottom upward in order to obtain a counter-current effect of the air on the fibers, bringing the dry air in contact with the dry fibers on the bottom belts and the wet air with the wet fibers at the top bell. On Figures 1 and 2 a fan 11 is shown forcing the air through the radiator 12 into the drier through which the air rises. It is then drawn off at the top of the drier by the fans 13 and escapes through duct 14.

In order to make even better use of the counter-current system, it is also possible to conduct the heated air first through the drying section 4 in upward direction, then forcing it by means of a fan through a double wall between the sections 3 and 4 back to the bottom of section 3, allowing it to rise by virtue of its higher temperature through drying section 3, forcing it by means of a fan through the double wall provided between the drying sections 3 and 2 back to the bottom of drying section 2 and repeating this process the required number of times or until the air has passed through all sections of the drier. The drier can, of course, have any number of drying sections necessary. The size of the gears 6 must be properly calculated in order to provide the necessary curl or curlage desired in the fiber itself during the drying operation.

After the fiber ribbon leaves the drier in dried, shrunk and curled condition, it is either cut into pieces or the continuous ribbon is converted immediately into a spinnable roving yarn by means of one of the known methods. Such a yarn will have excellent physical properties because it will consist of individually curled or crimped fibers which will give the yarn and the resulting fabrics the volume and bulkiness usually not obtainable from continuously dried endless tows or ropes.

I claim:

1. Apparatus for drying continuously running threads comprising a plurality of endless driven belts supporting the threads during drying, said belts being arranged in a series of adjacent drying sections, each section comprising a number of endless belts positioned vertically above each other and driven alternately in opposite directions, means to feed the threads into the drier on to the top belt of one section carrying the threads through the length of the drier and dropping the said threads on to the belt below moving in opposite direction to the bottom belt of the first section, and driven means to transport the threads laterally and upwardly on to the top belt of the second adjacent drying section through the required number of drying sections, means for admitting hot air into the drier, means for circulating the hot air over said belts and means for removing moist air from the drier.

2. Apparatus for drying continuously running threads comprising a plurality of endless driven belts supporting the threads during drying, said belts being arranged in a series of adjacent drying sections, each section comprising a number of endless belts positioned vertically above each other and driven alternately in opposite directions, means to feed the threads into the drier on to the top belt of one section carrying the threads through the length of the drier and dropping the said threads on to the belt below moving in opposite direction and continuing to convey the threads through the drier down to the bottom belt of the first section, driven means to transport the threads laterally and upwardly on to the top belt of the second adjacent drying section and means to continue to convey the threads through the required number of drying sections, means for admitting hot air into the drier, means for circulating the hot air over said belts and means for removing moist air from said drier.

3. Apparatus for drying continuously running threads comprising a plurality of endless driven belts supporting the threads during drying, said belts being arranged in a series of adjacent drying sections, each section comprising a number of endless belts positioned vertically above each other and driven alternately in opposite directions, each subsequent belt moving progressively slower than the preceding one, means to feed the threads into the drier on to the top belt of one section carrying the threads through the length of the drier and dropping the said threads on to the belt below moving in opposite direction and continuing to convey the threads through the drier down to the bottom belt of the first section, driven means to transport the threads laterally and upwardly on to the top belt of the second adjacent drying section and means to continue to convey the threads through the required number of drying sections, each subsequent section progressively moving at a slower average speed than the preceding section, means for admitting hot air into the drier, means for circulating the hot air over said belts and means for removing moist air from said drier.

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