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COMBINED EXTRACTOR AND DRIER FOR YARNS

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2 Sheets-Sheet 1

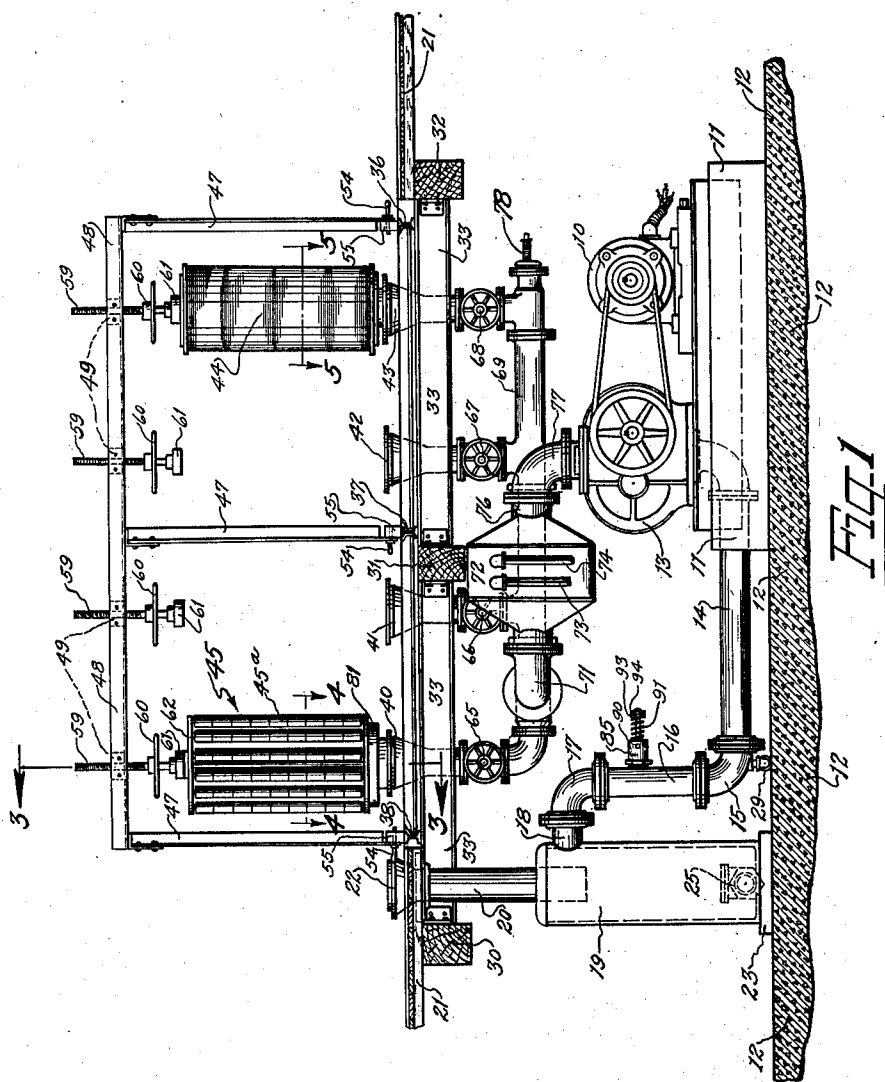


Fig. 1

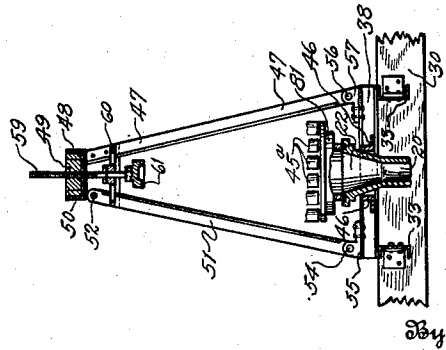


Fig. 3

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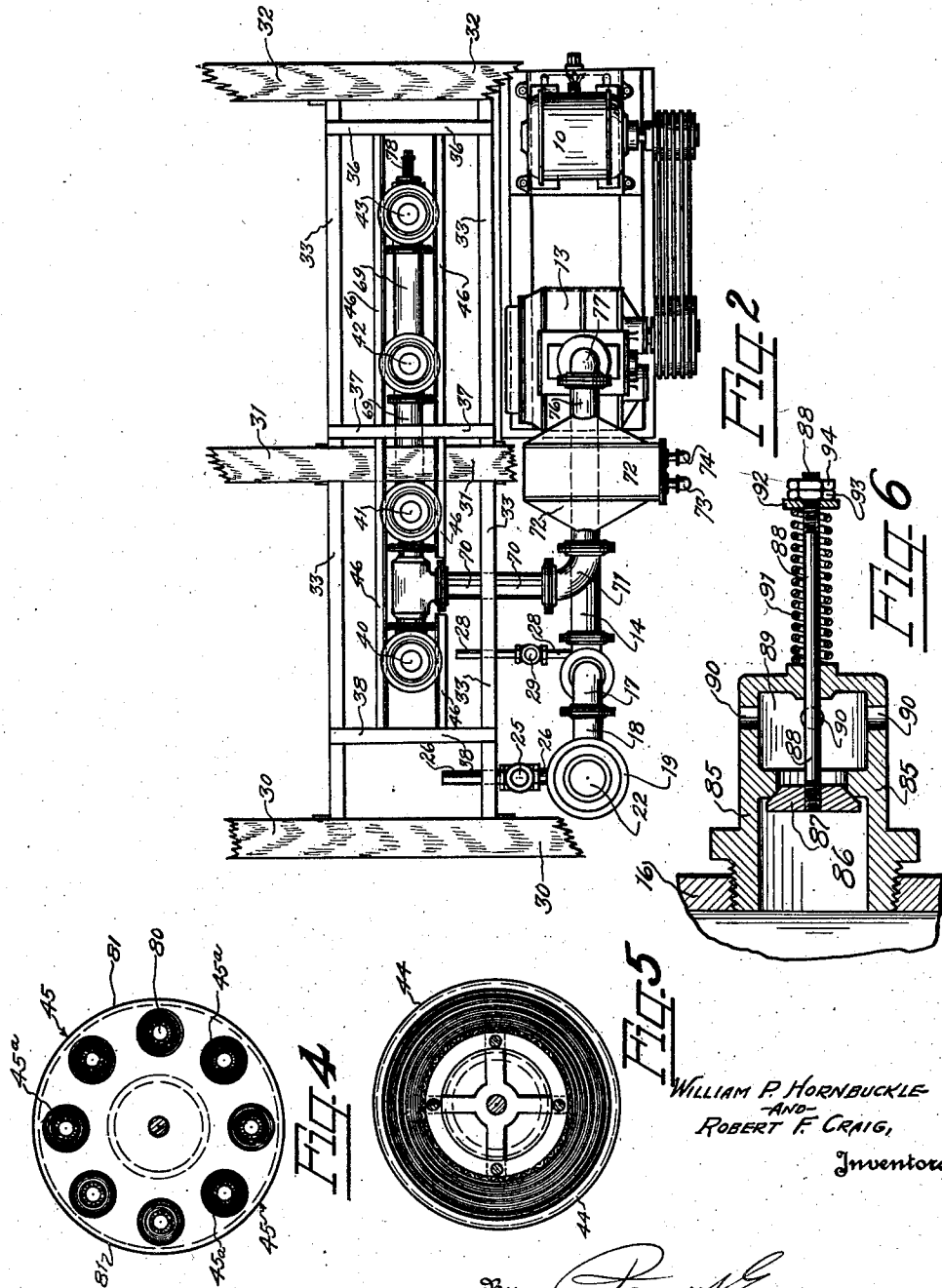
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COMBINED EXTRACTOR AND DRIER FOR YARNS

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3 Claims. (Cl. 34—26)

This invention relates to a combined extractor and drier for packages of yarn and the like and relates more especially to means for extracting moisture from packages of yarn after the same have been dyed, bleached, or otherwise treated, wherein a partial vacuum is employed for withdrawing the superfluous dye and moisture from the packaged yarn and then placing the packages of yarn, together with their holders, over a drier where heated air is forced outwardly thru the packages of yarn to finish the operation by drying any remaining moisture from the yarn.

In dyeing operations heretofore carried out, it has been customary to place the beam, having the warp thereon, or a package holder having a plurality of packages of yarn thereon, in a suitable dyeing machine and passing the dye liquor thru the yarn, first in one direction and then the other, and after the yarn has been dyed to the desired shade or color, the beams of yarn, or the package holders full of the dyed yarn, have been removed from the kier and the method of removing the surplus dye and the moisture from the yarn has been to place the package of yarn over a device thru which heated air is passed under pressure to cause the air to be forced outwardly thru the warp beam or the packages of yarn to force the excess dye out of the packages and to dry the excess moisture in the packaged yarn or beam as the case may be.

This operation resulted in the surplus dye and moisture being forced to the outer surface of the yarn whether it be in package form or on warp beams and has resulted in the excess dye liquor flowing down the exterior surface of the yarn and causing a streaking of the yarn due to an uneven application of the dye by the drying operation taking place on the streaks of dye running on the exterior surfaces of the yarn, so as to cause uneven dyeing. By the process of first employing a partial vacuum to withdraw the surplus dye and moisture from the dyed or otherwise treated yarn to a point where only a slight amount of moisture remains in the yarn and then placing the yarn over the drying apparatus to cause the heated air to be forced thru the yarn and outwardly where it will do no damage because the surplus dyestuff has been removed from the yarn before the drying operation is carried out. It usually required about six or eight hours to remove the surplus dye and moisture from packages or beams of yarn by the process wherein the heated air was forced outwardly thru the yarn, whereas, by the combination of the two processes it is possible to withdraw a great amount of dye

liquor and moisture from the dyed yarn by the vacuum means and then by inserting the yarn over the drying means, it is possible to make a finished product within less than three hours, thus saving not only in the quality of the finished yarn, but also cutting down the time consumed in the drying operation to about fifty per cent of what has heretofore been employed.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds when taken in connection with the accompanying drawings, in which—

Figure 1 is a side elevation of our device;

Figure 2 is a plan view of our device with the super-structure removed;

Figure 3 is a vertical sectional view taken along the line 3—3 in Figure 1, but omitting a part of the package holder;

Figure 4 is a cross sectional view taken along the line 4—4 in Figure 1;

Figure 5 is a cross sectional view taken along the line 5—5 in Figure 1;

Figure 6 is a sectional view of the vacuum relief valve.

Referring more specifically to the drawings, 25 the numeral 10 indicates a suitable motor mounted on a suitable foundation 11 which is usually placed on the floor 12 made of concrete or any other suitable material and mounted on foundation 11 is a positive rotary air pump 13 having an intake pipe 14 connected thereto. The intake pipe 14 is bent as at 15 and has upwardly projecting portion 16 and is again bent as at 17 and has horizontal portion 18 which is connected to the top of a tubular tank member 19 which is closed at its top except for the up- standing pipe 20 which projects thru floor 21 and has a seat member 22 on the upper end thereof.

The lower end of member 19 is closed and rests on a suitable foundation 23. A check valve 25 is mounted in a pipe 26 which communicates with the lower end of member 19. Member 15 also has a pipe 28 extending therefrom in which a check valve 29 is mounted. The purpose of these check valves being that when suction is applied in pipe 14 and member 19 the valves 25 and 29 will remain closed, but when the pump 13 stops, whatever water or moisture or dye liquor or other liquids which may have collected in the lower end of member 19 or in portions 14 and 15, will automatically be dumped to the exterior of the apparatus.

Floor 21 is supported by any suitable means such as beams 30, 31 and 32 having supporting

members 33 extending there-between for forming a rigid framework. Also auxiliary supports 46 are provided and extend parallel to members 33. Mounted on these members 33 are the transverse members 36, 37, and 38 and projecting between these members 36 are the seat members 40, 41, 42 and 43 for the reception of packages of yarn such as 44 or package holder 45. Pivotally mounted at their lower ends are the members 47 which are connected rigidly to angle iron member 48 and a block 49 is also connected to angle iron member 48 and is secured at its other end to angle iron member 50.

Downwardly projecting members 51 are pivotally secured as at 52 to angle iron member 50 and the lower ends of these members 51 are secured by any other suitable means such as pins 54 to lugs 55 which members 47 are secured pivotally as at 56 to lugs 57. Threadably secured in blocks 49 are screws 59 which have hand wheels 60 thereon and enlargements 61 adapted to engage the upper ends 62 of a package holder 45 and the lower end of said package holder is adapted to seat on one of the seat members 40 to 43 inclusive.

The seat members 40 to 43 inclusive have valves 65, 66, 67 and 68 secured at their lower ends and these valves, in turn, are secured to a pipe 69 which pipe, in turn is secured to a pipe 70 which is bent as at 71 and enters a heating chamber 72 which is heated by steam or any other suitable means passing thru pipes 73 and 74 and the other side of the heating chamber 72 is connected by means of a pipe 76 to elbow member 77 which in turn is connected to the exhaust side of pump 13. Pipe 69 has at one end thereof a relief valve 78.

Beams 44 are adapted to have wound thereon yarn, whereas, package holder 45 has a plurality of perforated pipes 80 leading to the manifold 81 at the bottom thereof. Packages of yarn 45a are stacked end to end on pipes 80.

In operation, a package holder 45 or a beam package 44 having the yarn thereon is placed on seat member 22 and when pump 13 is started it draws air thru the yarn from the outside and carries with it any surplus dye or moisture or any other agent with which the yarn has been treated and this moisture or liquid falls into the bottom of member 19 because the pipe 20 passes below pipe 18 and therefore, causes the liquid to fall into the bottom of member 19. At the same time air is being expelled thru pipe 77 and to the seats 40 to 43 inclusive, it is being drawn inwardly thru the yarn on seat 22. In about ten or fifteen minutes, the surplus dye and moisture is withdrawn from the yarn into the tank 19 and this package is then removed from the seat 22 and placed on one of the seats 40 to 43 inclusive, and secured in position as shown. At this point the heater 72 is called into operation and the air passing thru the seats 40 to 42 inclusive is heated. It might be added that the seats 40 to 43 inclusive which are not occupied by a package of yarn for drying purposes is cut off by means of the valves 65 to 68 inclusive associated therewith.

While the package of yarn is being further dried by having warm air expelled from the interior thereof outwardly thru the package, another package is placed on the seat 22 and the surplus dye, bleaching agent, or moisture is extracted therefrom by drawing the same from the outside of the package inwardly thru pipe 20 and into tank 19. When this operation is

completed this package of yarn is also placed on one of the seats 40 to 43 inclusive and the operation is continued until the entire line of seats 40 to 43 inclusive are filled. In view of the fact that the surplus dye, moisture, and the like can be extracted from the packages of yarn within about ten minutes it is evident that many more seats 40 to 43 can be used than seat 22 as shown in the drawings, as it takes about two hours of expelling heated air thru the packages to finish the drying operation after the extraction has taken place on seat 22. It is thus seen that one seat 22 will work in conjunction with as many as twelve seats 40 to 43 inclusive because of the small amount of time consumed by a package of yarn while on seat 22.

The method as carried out contemplates the extracting of the surplus dye, bleaching agent, or any other fluid from the yarn by causing it to be withdrawn from the inside and therefore avoiding streaking or other defective dyeing or treating of the yarn and finishing this operation by blowing heated air thru the yarn from the interior thereof to the exterior thereof.

In order that the amount of vacuum applied to the yarn while on seat 22 may be regulated, I provide a vacuum relief valve comprising a shell 85 screwed into pipe 16 and having a chamber 86 communicating with the interior of pipe 16 in which is seated a valve 87 having a valve stem 88 extending thru chamber 89, said chamber communicating with the atmosphere thru ports 90 and on the exterior of casing 85 and around valve stem 88 is mounted a compression spring 91 confined on valve stem 88 by means of a washer 92 and nuts 93 and 94. Nuts 93 and 94 may be adjusted to regulate the point at which air will be drawn into pipe 16 past valve 86 to limit the amount of vacuum exerted on the yarn.

In the drawings and specification, there has been set forth a preferred embodiment of the invention, and although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation, the scope of the invention being set forth in the appended claims.

We claim

1. That method of extracting liquid from packages of yarn, which comprises applying suction to the interior of a package to extract moisture therefrom, and forcing the air employed in extracting the liquid from one package into the interior of and outwardly through another package to dry said other package while the first package is having the liquid extracted therefrom.

2. That method of drying hollow packages of yarn which comprises applying suction to the interior of one package to draw air from the exterior of the package through the yarn and then forcing said air under pressure into the interior of and outwardly through another package of yarn.

3. That method of drying hollow packages of yarn which comprises applying suction to the interior of one package to draw air at room temperature, from the exterior of the package and through the package and out of the interior of the package, then trapping the liquid thus extracted from the package, then forcing the air which has been drawn through said package into the interior of another package and outwardly through said other package to dry the same.

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