

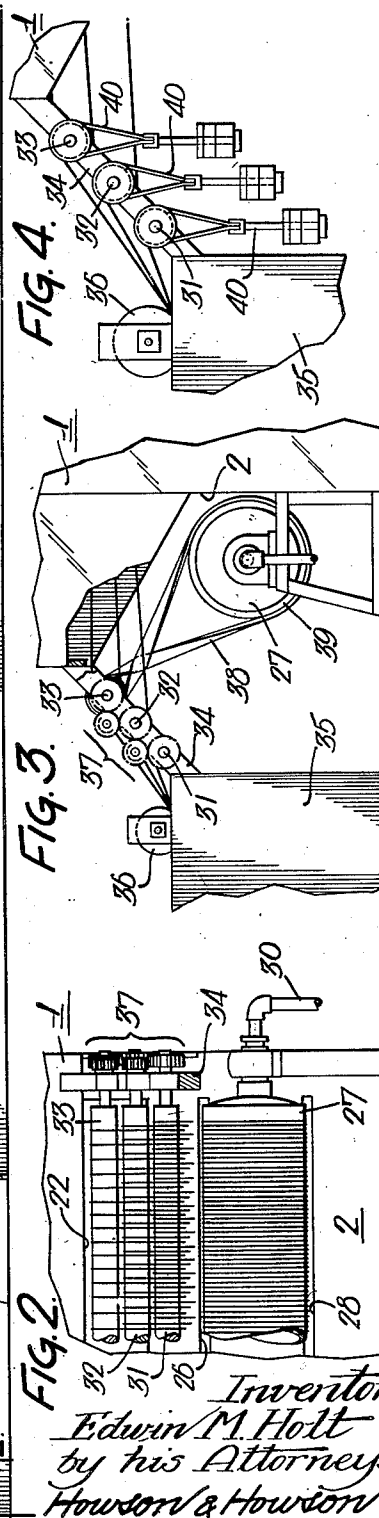
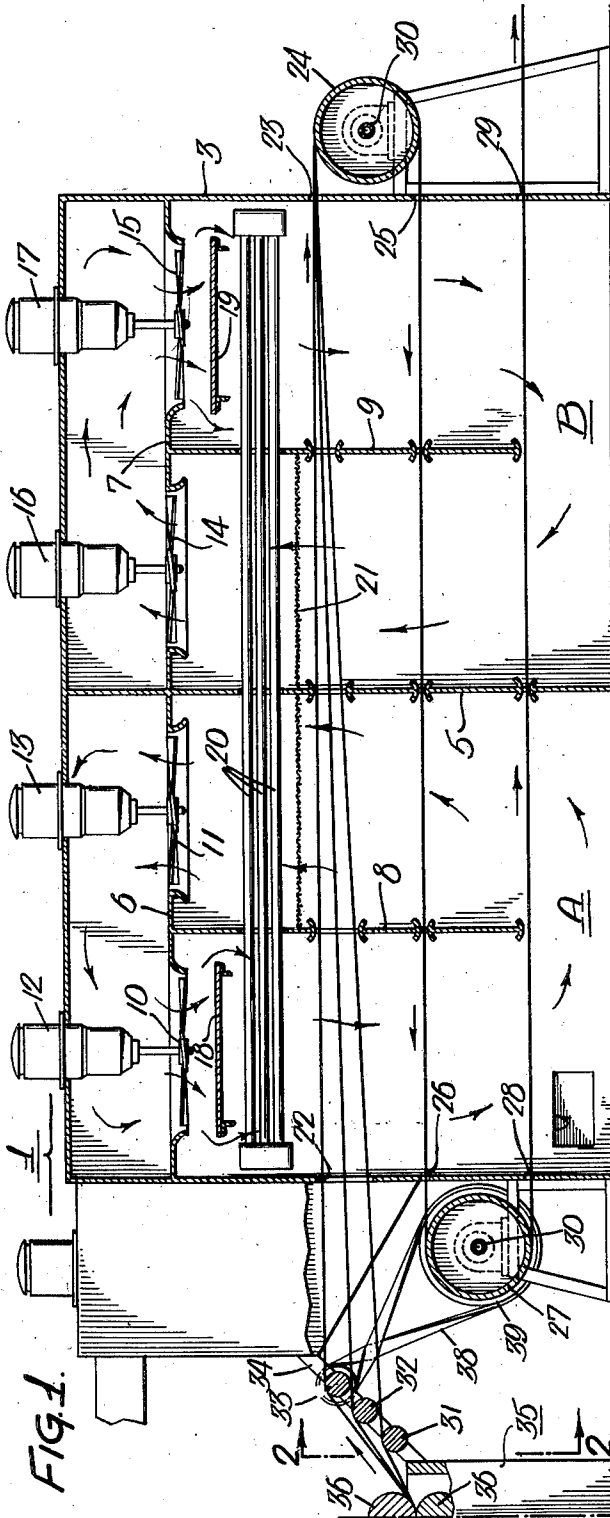
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AIR DRIER FOR WARP

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AIR DRIER FOR WARP

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6 Claims. (Cl. 34—154)

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This invention relates to new and useful improvements in driers, and more particularly to driers especially adapted for the air drying of warp.

In the drying of warp, one practice consists in passing a shed comprising a plurality of sized warp elements into and through a drier where the sized warp is subjected to a drying current of air. In order to enhance the drying action of the air in the drier upon the warp passing therethrough, the shed of warp is split into a plurality of levels as it enters the drier by passing each successive warp over one of a plurality of splitting rolls. Within the drier the warp traverses a plurality of generally horizontal courses longitudinally thereof during which the warp is passed about relatively large drums at the opposite ends of the drier.

One of the difficulties in warp driers of this type is presented by the splitting rolls becoming coated with the size on the warp with the result that these rolls become sticky and collect lint and other particles which interfere with efficient operation of the drier and the production of satisfactory warp. Another difficulty is presented by the tendency for the drums within the drier to collect lint which is borne by the drying air which is circulated through the drier.

With the foregoing in mind the principal object of the present invention is to provide an air drier for warp whereby the tendency for the warp splitting rolls to become sticky and collect lint is substantially minimized.

Another object of the invention is to provide an air drier for warp as set forth wherein the collection of lint upon the drums at the opposite ends of the courses of travel of the warp likewise is substantially minimized.

Another object of the invention is to provide an air drier for warp embodying the foregoing features and advantages which is of relatively simplified construction and is highly efficient in operation and use.

These and other objects of the invention and the various features and details of the construction and operation thereof, are hereinafter fully set forth and described with reference to the accompanying drawing, in which:

Fig. 1 is a vertical sectional view longitudinally through an air warp drier made according to the present invention;

Fig. 2 is a fragmentary sectional view taken on line 2—2, Fig. 1;

Fig. 3 is a side elevational view of the disclosure in Fig. 2; and

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Fig. 4 is a fragmentary side elevational view illustrating an alternate arrangement for controlling rotation of the splitting rolls relative to the speed of travel of the warp.

Referring now more particularly to the drawing, an air drier for warp made according to the present invention may comprise an elongated generally rectangular housing structure 1 comprising inlet and outlet end walls 2 and 3, respectively, and a top wall 4. The drier housing 1 may be subdivided into compartments A and B, for example, by means of a vertical partition 5 which extends entirely to the housing top 4. The top of each compartment A and B may be defined by a so-called false ceiling structure 6 and 7, respectively, and each compartment in turn may be subdivided into longitudinally adjacent portions by means of transverse vertical partitions 8 and 9 which extend downwardly from the ceiling structures 6 and 7 and terminate at a point spaced a substantial distance above the floor or surface on which the housing 1 rests.

Mounted in the ceiling structure 6 of the compartment A at respectively opposite sides of the partition 8 is a downdraft fan 10 and an updraft fan 11, respectively, which may be driven, for example, by means of motors 12 and 13. Similar updraft and downdraft fans 14 and 15 are provided in the ceiling structure 7 of the compartment B at respectively opposite sides of the partition 9 and driven, for example, by means of electric motors 16 and 17. Positioned below the downdraft fans 10 and 15 in the respective compartments are dispersion plates 18 and 19 which serve to baffle the downwardly moving air entering the compartments A and B and, with reference to Fig. 1 of the drawing, it will be observed that the construction and arrangement of the several fans and partitions is such that the drying air is caused to be circulated downwardly and then upwardly at respectively opposite sides of the partitions 8 and 9.

Arranged below the dispersing plates 18 and 19 and extending longitudinally of the housing structure 1 are a series of steam pipes 20 which serve to heat the air circulated within the two compartments A and B to the temperature required to perform the drying operation. Extending crosswise of the updraft sections of each compartment A and B and below the bank of heat pipes 20 there is provided a suitable lint screen 21 which functions in the usual manner to remove from the upwardly flowing air lint which is borne and entrained thereby.

In accordance with the present invention the

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warp to be dried enters the housing 1 through an opening 22 in the inlet end wall 2 thereof and travels in a first generally horizontal course longitudinally through the housing 1, suitable openings for the warps being provided in the central partition 5 and the auxiliary partitions 8 and 9, respectively. At the end of this first horizontal course the warp passes through an opening 23 in the outlet end wall 3 of the housing 1 and thence about a relatively large diameter drum 24 after which the warp re-enters the housing through an opening 25 in said end wall. Upon re-entering the housing the warp traverses a second lower horizontal course in a reverse direction through the drier toward the inlet end of the latter, and then again passes exteriorly of the housing through an opening 26 in the inlet end wall 2 thereof where it passes about a second relatively large diameter drum 27. After passing about the drum 27 the warp again re-enters the housing 1 through an opening 28 in the inlet wall 2 and traverses a third horizontal course through the housing from which it finally emerges through an opening 29 in the outlet end wall 3 thereof.

A feature of the invention is the mounting of the drums 24 and 27 exteriorly of the housing 1. Heretofore these drums have been mounted within the drier in order to gain the added drying effect derived from the heated air circulating therein. However, it has been determined by mounting the drums 24 and 27 exteriorly of the drier and removed from the lint-laden air circulating within the drier that the collection of lint on these drums 24 and 27 is substantially minimized. The drums 24 and 27 may be provided with steam connections 30 thereto in order that the drums may be heated if desired or required for a particular warp-drying operation. The drums 24 and 27 are rotationally driven by any suitable means (not shown) at a predetermined surface speed to cause the warp to travel through its several courses in the drier at a predetermined linear rate of speed.

Prior to entering the housing 1 through the inlet opening 22 the shed of warp is split into a plurality of groups of warp elements maintained at different levels. This is accomplished by splitting the warp between a plurality of so-called splitting rolls 31, 32 and 33, for example, so that warp elements one, four, seven, and so on of the shed pass over the lowermost splitting roll 31, while warp elements two, five, eight, and so on pass over the intermediate splitting roll 32, and warp elements three, six, nine, and so on pass over the uppermost splitting roll 33.

In accordance with the present invention the splitting rolls 31, 32 and 33 are mounted exteriorly of the drier housing 1 and are spaced substantially from the inlet opening 22 thereto. In the illustrated embodiment of the invention the splitting rolls 31, 32 and 33 are arranged horizontally and have their opposite ends rotationally mounted in suitable side frames 34 which are arranged outboard of the inlet end structure of the drier housing 1 and between the latter and a size box 35 so that as the shed of warp emerges from the latter through the usual squeeze rolls 36 the shed passes directly over the several splitting rolls 31, 32 and 33 in the manner described. By placing the splitting rolls 31, 32 and 33 exteriorly of the drier housing 1 and at a point relatively removed from the heat of the drier, the tendency for the sizing material on the warp to become tacky and adhere to and coat the splitting

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rolls is greatly reduced. While in the present embodiment of the invention three splitting rolls 31, 32 and 33 are shown, the invention contemplates the use of any number of splitting rolls, two or more, that may be required depending upon the requirements of the particular drying operation such as, for example, the number of warp elements in a particular shed to be dried.

In addition to the benefits obtained by mounting the splitting rolls 31, 32 and 33 in the described relation with respect to the drier housing 1, it has been found that coating of the rolls and the collection of lint thereon is further reduced and substantially minimized, for example, by driving the splitting rolls 31, 32 and 33 at a surface speed which is different from the speed of linear travel of the warp, for example, at a surface speed either slightly faster or slightly slower than the travel of the warp. By driving the splitting rolls faster than the speed of the warp a wiping action takes place which keeps the rolls clean and this, together with the minimizing of the adherence of the size to the rolls as previously described, substantially precludes the collection of lint on the splitting rolls and results in improved efficiency of the drier and a more uniform stable product.

Thus, with reference to Figs. 2 and 3 of the drawing, the several splitting rolls 31, 32 and 33 may be suitably geared together in well-known manner as indicated generally by reference numeral 37 to be driven as a unit from one of the said rolls, for example, the roll 33 which may be driven by a belt 38 from a pulley 39 associated with the drum 27, the gearing being such that the rolls are driven at a speed either slightly faster or slightly slower than the speed of linear travel of the warp through the drier housing 1. In lieu of positively driving the splitting rolls 31, 32 and 33 at a speed slightly faster or slower than the linear speed of travel of the warp, the same results can be obtained by mounting the splitting rolls 31, 32 and 33 for free rotation and applying to each thereof a friction drag or brake device 40 which likewise causes a wiping action to be produced on the rolls by the warp elements passing thereover.

From the foregoing it will be apparent that the present invention provides an air drier for warp whereby the tendency for the warp splitting rolls to become sticky and collect lint is substantially minimized. The invention further provides an air drier for warp wherein the collection of lint upon the drums at opposite ends of the courses of travel of the warp likewise is substantially minimized. In addition, the invention provides an air drier for warp embodying the foregoing features and advantages which is of relatively simplified construction and is highly efficient in operation and use.

While a particular embodiment of the invention has been illustrated and described herein, it is not intended to limit the invention to such disclosure, and changes and modifications may be made therein and thereto within the scope of the following claims.

I claim:

1. In an air drier for warp comprising a housing through which a shed of warp is adapted to travel in a plurality of spaced generally parallel courses, a plurality of splitting rolls rotatably mounted exteriorly of the housing and spaced from the inlet thereto operable to divide the shed of warp into a plurality of spaced groups each containing a plurality of warp elements,

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relatively large diameter drums rotationally mounted exteriorly adjacent the housing and operable to feed the warp through the housing at a predetermined linear speed, one of said drums being positioned for the warp to pass thereabout in transferring from the first to second course of travel through the housing and a second drum being positioned for the warp to pass thereabout in transferring from said second to the third course of travel through the housing, and means to cause said splitting rolls to rotate at a surface speed different from the linear speed of travel of the warp elements so that a wiping action takes place between the said warp elements and said rolls.

2. In an air drier for warp comprising a housing through which a shed of warp is adapted to travel in a plurality of spaced generally parallel courses, a plurality of splitting rolls rotatably mounted exteriorly of the housing and spaced from the inlet thereto operable to divide the shed of warp into a plurality of spaced groups each containing a plurality of warp elements, relatively large diameter drums rotationally mounted exteriorly adjacent the housing and operable to feed the warp through the housing at a predetermined linear speed, one of said drums being positioned for the warp to pass thereabout in transferring from the first to second course of travel through the housing and a second drum being positioned for the warp to pass thereabout in transferring from said second to the third course of travel through the housing, and brake means cooperable with said splitting rolls to cause the same to rotate at a surface speed slower than the linear speed of travel of the warp elements so that a wiping action takes place between the said warp elements and said rolls.

3. In an air drier for warp comprising a housing through which a shed of warp is adapted to travel in a plurality of spaced generally parallel courses, a plurality of splitting rolls exteriorly of the housing and spaced from the inlet thereto operable to divide the shed of warp into a plurality of relatively spaced groups each containing a plurality of warp elements, relatively large diameter drums rotationally mounted exteriorly adjacent the housing and operable to feed the warp through the housing at a predetermined linear speed, one of said drums being positioned for the warp to pass thereabout in transferring from the first to second course of travel through the housing and a second drum being positioned for the warp to pass thereabout in transferring from said second to the third course of its travel through the housing, and a driving connection between one of said drums and said splitting rolls operable to drive the said rolls at a surface speed different from the linear speed of travel of the warp through the housing.

4. In an air drier for warp comprising a housing through which a shed of warp is adapted to travel in a plurality of spaced generally parallel courses, a plurality of splitting rolls exteriorly of the housing and spaced from the inlet thereto operable to divide the shed of warp into a plurality of relatively spaced groups each containing a plurality of warp elements, connections between said rolls operable to cause the same to rotate as a unit at the same speed, relatively large diameter drums rotationally mounted exteriorly adjacent the housing and operable to

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feed the warp through the housing at a predetermined linear speed, one of said drums being positioned for the warp to pass thereabout in transferring from the first to second course of travel through the housing and a second drum being positioned for the warp to pass thereabout in transferring from said second to the third course of its travel through the housing, and a driving connection between one of said drums and one of said splitting rolls operable to drive the said rolls at a surface speed different from the linear speed of travel of the warp through the housing.

5. In an air drier for warp comprising a housing through which a shed of warp is adapted to travel in a plurality of spaced generally parallel courses, a plurality of splitting rolls exteriorly of the housing and spaced from the inlet thereto operable to divide the shed of warp into a plurality of relatively spaced groups each containing a plurality of warp elements, relatively large diameter drums rotationally mounted exteriorly adjacent the housing and operable to feed the warp through the housing at a predetermined linear speed, one of said drums being positioned for the warp to pass thereabout in transferring from the first to second course of travel through the housing and a second drum being positioned for the warp to pass thereabout in transferring from said second to the third course of its travel through the housing, and a driving connection between said second drum and said splitting rolls operable to drive the said rolls at a surface speed different from the linear speed of travel of the warp through the housing.

6. In an air drier for warp comprising a housing through which a shed of warp is adapted to travel in a plurality of spaced generally parallel courses, a plurality of splitting rolls exteriorly of the housing and spaced from the inlet thereto operable to divide the shed of warp into a plurality of relatively spaced groups each containing a plurality of warp elements, connections between said rolls operable to cause the same to rotate as a unit at the same speed, relatively large diameter drums rotationally mounted exteriorly adjacent the housing and operable to feed the warp through the housing at a predetermined linear speed, one of said drums being positioned for the warp to pass thereabout in transferring from the first to second course of travel through the housing and a second drum being positioned for the warp to pass thereabout in transferring from said second to the third course of its travel through the housing, and a driving connection between said second drum and one of said splitting rolls operable to drive the said rolls at a surface speed different from the linear speed of travel of the warp through the housing.

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