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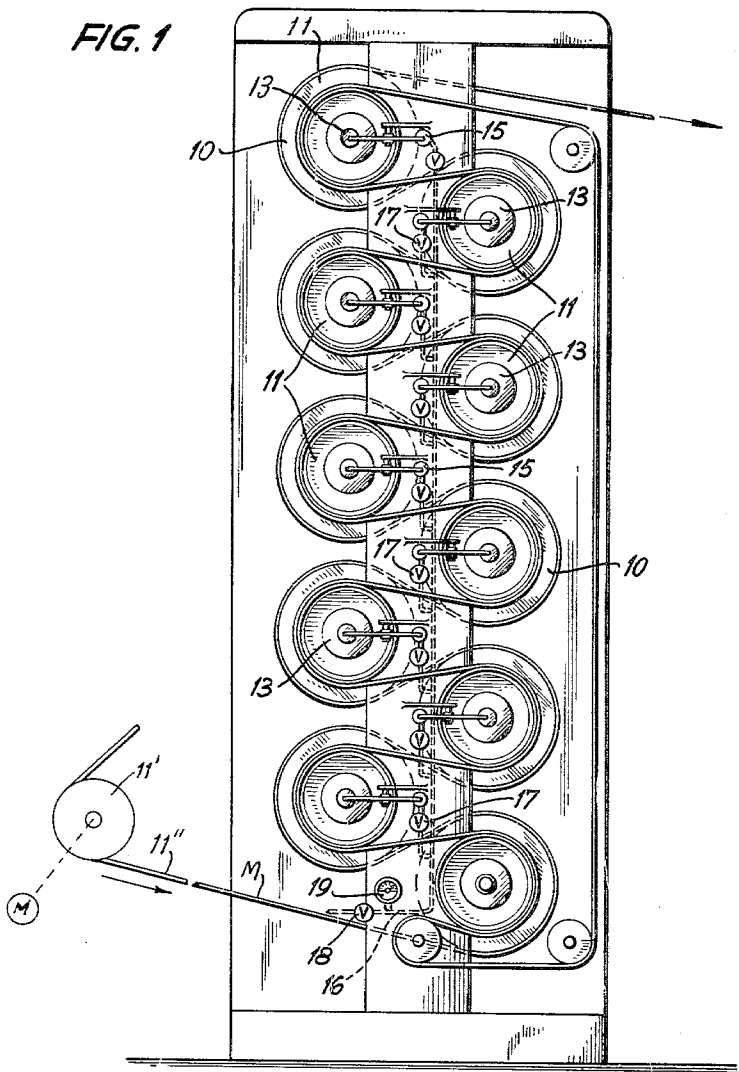
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CYLINDER-DRYING MACHINE

Filed Nov. 13, 1961

2 Sheets-Sheet 1



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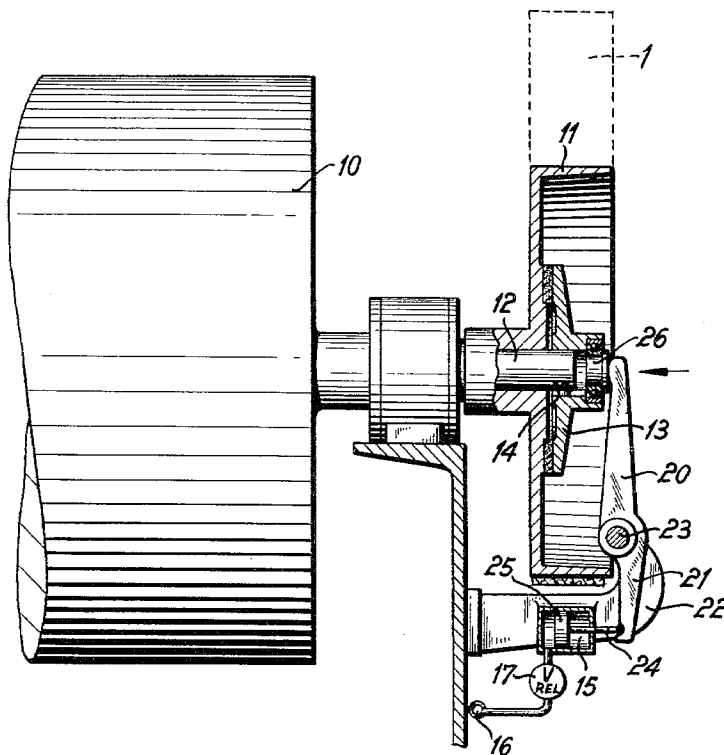
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FIG. 2



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CYLINDER-DRYING MACHINE

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1 Claim. (Cl. 34-121)

The present invention relates to a cylinder-drying machine having a plurality of drying cylinders forming one or a plurality of groups of such drying cylinders.

The drive of the individual drying cylinders of a cylinder-drying machine is brought about generally by a general belt drive, a V-belt drive, a chain drive or a gear drive equally for the entire group of drying cylinders. If a drying machine consists of a plurality of groups, a compensator is arranged in many instances between the individual groups, in order to equalize occurring tensions in the fabric due to the shrinking occurring during the progressive drying process. The requirements for the tension-free drying, particularly in the treatment of sensitive fabrics, have recently appreciably increased. For this reason each drying cylinder should be driven possibly in such manner that no pull is exerted upon the fabric or goods and that the goods are guided through the entire machine completely without any tension.

In order to bring about this result, machines have been proposed, in which each of the drying cylinders has been driven by a separate friction drive. It is clear, however, that the expenses for such arrangement are extremely high, and a correct adjustment can hardly be obtained for a long time operation.

Another type of driving means provides an elastic drive by means of a spiral spring drive over an intermediate drive for each cylinder, the driving side of the spiral spring drive yielding upon occurring of over-tension, and the running-off side being released from the tension again, whereby the cylinder is correspondingly driven at a lower speed. This drive was likewise not individually controllable and was subjected to a rather fast wear for a long-term operation.

It is, therefore, one object of the present invention to provide a cylinder-drying machine which includes a drive means which permits a drying with a controllable tensioning up to a completely tension-free drying.

It is another object of the present invention to provide a cylinder-drying machine, where in a group of drying cylinders always the first drying cylinder of this group, and in case of a plurality of groups, only the first drying cylinder of the first of the groups, has a self-drive, while all following drying cylinders are driven from this first drying cylinder, whereby a friction coupling with adjustable friction pressure is provided between the drives of each of the following drying cylinders and the cylinders of said following drying cylinders and their driving shafts, respectively.

In this arrangement an individual pressure cylinder is coordinated to each of the friction coupling discs, and all pressure cylinders are connected to a common pressure fluid conduit, whereby, in order to control the friction pressure between their pressure conduit and each of the pressure cylinders, an adjustment valve is always provided.

For a practical embodiment of the present invention, it is favorable and suitable, if the piston rod of the pressure piston of the pressure cylinder does not operate directly on the friction coupling disc, rather to connect the piston rod indirectly to the pressure coupling discs by means of a control lever, in which the control lever itself is formed as a double-armed swinging lever with

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different lever lengths, whereby the length of the lever arm, cooperating with the friction coupling disc, is a multiple of the length of the other of the arms of the lever, on which the piston rod operates. In this manner a particularly favorable ratio of transmission is brought about, whereby a reliable adjustment is favored.

It is yet another object of the present invention to provide a cylinder-drying machine in which always only the first drying cylinder is self-driven, while all following drying cylinders are driven from said first cylinder, and it is found advantageous, to arrange the drive of the following cylinders in such manner that a driving disc is provided freely rotatable on each driving shaft of the drying cylinders, which driving disc is connected by means of a belt drive or the like with the self-driven first drying cylinder, while a friction coupling disc, which is non-rotatable and axially movable on the end of the driving shaft of each of the drying cylinders cooperates with this driving disc.

It is now possible, with this new cylinder-drying machine, in which only the first drying cylinder is self-driven, while all following cylinders are driven by an intermediate arrangement of a friction coupling for each of the cylinders from the first cylinder, to treat the fabrics in accordance with the requirements for such fabrics in a drying process correspondingly free of tension and with a controllable tension, respectively, to an extent not achieved until now and also reliably. This end is brought about with structurally simple, yet effective means.

With these and other objects in view, which will become apparent in the following detailed description, the present invention will be clearly understood in connection with the accompanying drawings, in which:

FIGURE 1 is a side elevation of a cylinder-drying machine, shown schematically; and

FIGURE 2 is a fragmentary view of one drying cylinder indicating in axial section the drive for said cylinder.

Referring now to the drawings, it should be emphasized at first that in accordance with the shown embodiment of the cylinder-drying machine, the first drying cylinder of a group only and in case of arranging a plurality of groups, likewise the first cylinder of the first group only is self-driven, while all following cylinders are driven by the first cylinder. The first cylinder is driven by an unlimited speed variation means, whereby the speed of the goods is determined.

The drive of the first drying cylinder 10 is transmitted by any conventional drive means, as a belt drive 1 or the like, to the following cylinders, and to a driving disc 11, respectively, which driving disc 11 is driven by a disc 11' and belt 11'' rotated by a motor M (FIG. 1), the latter being mounted freely rotatably on the drive shaft 12 of the drying cylinder 10. In addition a friction coupling disc 13 is mounted on the drive shaft 12, which friction coupling disc 13 is non-rotatable on the drive shaft 12 by means of a key 14, however, is mounted for axial movement on the drive shaft 12. In order to produce an axial control movement of the friction coupling disc 13, a pressure fluid drive is provided, by using hydraulic or pneumatic means, whereby a particular pressure cylinder 15 is coordinated to each friction coupling disc 13, all the pressure cylinders 15 communicating with a common pressure fluid conduit 16. An adjustment valve 17 is provided between the pressure fluid conduit 16 and each of the pressure cylinders 15. The pressure within the common pressure fluid conduit 16 can be produced in known manner by any known pressure creating device, whereby the pressure is set by means of a main control valve 18, and the pressure can be read on a pressure indicator 19 disposed downstream behind the main control valve 18 in the pressure fluid conduit 16.

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In order to transmit the pressure between the pressure cylinder 15 and the friction coupling disc 13 of each of the drying cylinders, a double arm swinging lever 20 and 21 is provided, which is mounted in a bearing 22 forming a pivot 23. The lever arm 21 is in direct connection with the piston rod 24 extending from the pressure piston 25, while the lever arm 20 exerts pressure on a ball bearing 26 of the friction coupling disc 13, and, thus, transmits the axial pressure onto the driving disc 11, so that the friction coupling disc 13 joins the rotation and the drying cylinder 10 starts in turn the rotation.

Due to the controllable pressure, equal pressure of the friction coupling disc 13 is exerted onto the driving disc 11 of each of the cylinders 10, with the exception of the first cylinder in the group. One is, thus, in a position to control and to adjust the pulling force of all pressure cylinders 15 selectively, up to the completely tension-free drying, whereby the pressure is so reduced, that the drying cylinders 10 are just driven.

This device is absolutely safe for operation, and also the wear in the friction layer, as well as small structural differences, have no bearing whatsoever on a reliable function.

As already stated, the shown and described embodiment of the present invention amounts to merely an example of the present invention, and the latter is not limited to this structure, rather other embodiments and applications are possible within the framework of the present invention. This relates not only to the constructive arrangement of the drive, but also to the drive means which can be applied in deviation of the described drives, the scope of the present invention being determined by the objects and the claim.

I claim:

- A cylinder-drying machine for tension-free drying, comprising
 - a plurality of rotating drying cylinders forming at least one group of said drying cylinders,
 - a drive shaft coordinated to each of said drying cylinders,
 - said drying cylinders including a first drying cylinder and a plurality of additional drying cylinders,
 - a driving disc freely rotatable on each of said drying shafts,
 - a friction coupling means between each of said driving discs and the corresponding of said driving shafts, each of said driving discs being driven by means of a common continuous belt,

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- a common pressure fluid means for including a common pressure fluid line applying pressure simultaneously to each of said friction coupling means, valve means for adjusting the pressure of said pressure fluid means associated with and acting on each of said friction coupling means,
- said friction coupling means comprising a friction coupling disc non-rotatably but axially movably secured to said drive shaft of each of said drying cylinders,
- a pressure cylinder coordinated to each of said friction coupling means,
- a piston having a piston rod reciprocating in said pressure cylinder,
- a double-armed control lever pivotally mounted intermediate its ends,
- one end of said double-armed control lever being pivotally connected to said piston rod,
- the other end of said double-armed control lever engaging said friction coupling drive,
- said friction coupling disc being mounted on said shaft for fixed rotation therewith, but for fixed axial movement and having a friction face perpendicular to the longitudinal axis of said drive shaft for engagement with a complementary face of said driving disc, and said friction coupling disc being engaged by said other end of said double control lever and imparting motion by axial movement of said friction coupling disc to said other end of said lever to vary the pressure in said common pressure fluid line.

References Cited by the Examiner

UNITED STATES PATENTS

1,131,401	3/15	MacPherson	192—85
1,433,399	10/22	Modine	192—85
1,595,237	8/26	Minton	34—9
2,144,074	1/39	Maybach	192—85
2,248,333	7/41	Burbank	226—37
2,599,632	6/52	Hindmarch	192—87
2,966,746	1/61	Melbin	34—121

FOREIGN PATENTS

1,043,072 11/53 France.

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