

May 31, 1927.

1,630,331

G. DOD

MULTIPLE CYLINDER DRYING MACHINE

Filed March 24, 1926 3 Sheets-Sheet 1

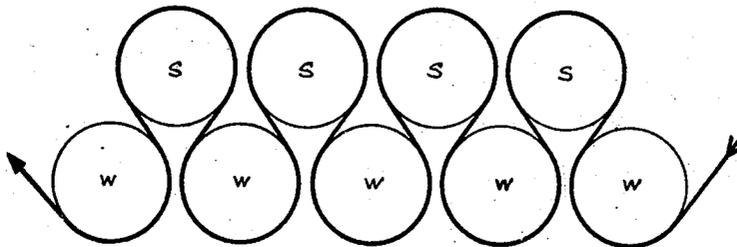


Fig. 1.

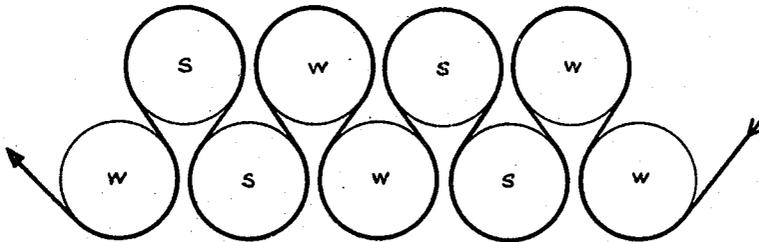


Fig. 2.

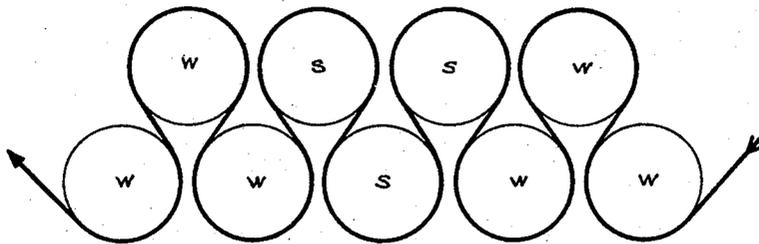


Fig. 3.

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3 Sheets-Sheet 3

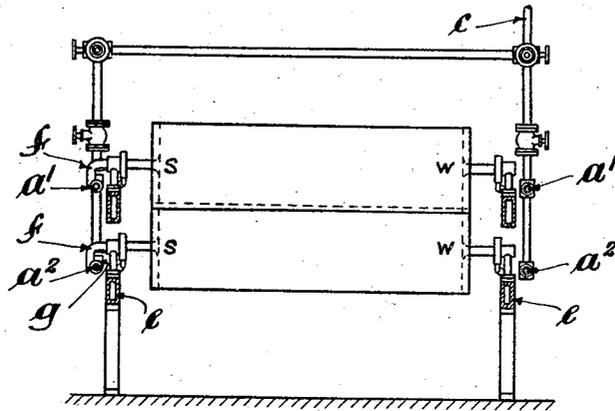


Fig. 4^a.

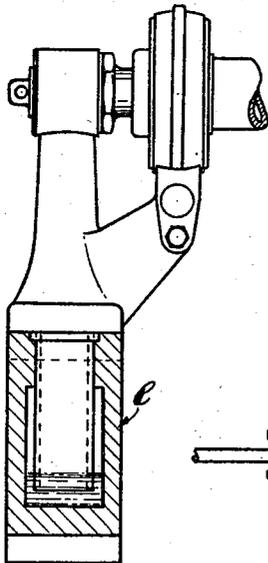


Fig. 8.

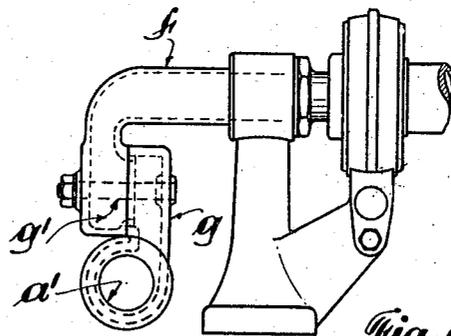


Fig. 6.

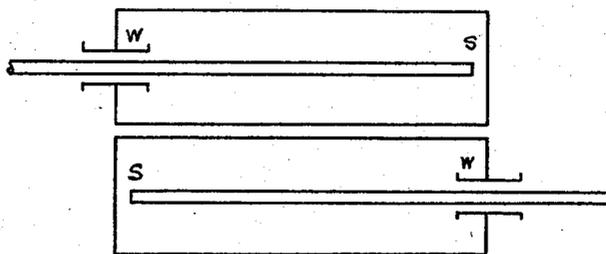


Fig. 7.

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UNITED STATES PATENT OFFICE.

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MULTIPLE-CYLINDER DRYING MACHINE.

Application filed March 24, 1926, Serial No. 96,993, and in Great Britain March 31, 1925.

This invention refers to multiple cylinder drying machines as used in the drying of fabric, paper, and like materials.

The objects of the invention are (1) to equalize the drying of the material across its full width, or in the case of two lengths of material passing through the machine side by side, to equalize the drying of the whole width of each length, and (2) to more effectively maintain the supply of sufficient heat units in the body of each cylinder for drying the material to the required degree.

According to the invention, instead of the steam being fed to all the cylinders as heretofore at corresponding ends, it is fed to consecutive cylinders, or consecutive pairs or sets of cylinders from opposite ends, the order of cylinders following the traverse of the material to be dried. The water of condensation is discharged from the cylinders in like manner from opposite ends of consecutive cylinders, or consecutive pairs or sets of cylinders.

In thus feeding steam to the cylinders and leading away the water of condensation, the material passing through the machine is more evenly dried across its full width, especially when the cylinders are fed with steam in pairs from opposite ends, when every part of the cloth at each edge comes in contact with the steam end of a cylinder.

According to a further feature of the invention, the steam is fed to the cylinder by a conduit or conduits of comparatively small bore, and preferably independently of the usual hollow frames of the machine, and the water of condensation is discharged into and conveyed away by a conduit or conduits of comparatively large bore, preferably the hollow frames of the machine.

By such arrangement of conduits, loss of heat units by radiation or convection on the steam inlet side of the cylinders is reduced to a minimum, while on the water outlet side of the cylinder more efficient condensation takes place, which results in the more effective maintenance of the heat units in each cylinder body and the more efficient utilization of the latent heat of the steam than has previously taken place when using the machine frame as conduits for both the steam and the water of condensation.

Upon the accompanying drawings:—

Figs. 1, 2 and 3 illustrate diagrams of three examples of the invention as applied

to a two-row multiple cylinder drying machine.

Fig. 4 illustrates a side elevation, and

Fig. 5 a plan of a two-row drying machine (in part) embodying the example of the invention shown in Fig. 2.

Fig. 4^a illustrates a vertical cross section of Fig. 4 on line *x, x*.

Fig. 6 illustrates a transverse sectional elevation of one of the steam inlet connections between the steam piping and the doll head bearing of a cylinder.

Fig. 7 illustrates a modification.

Fig. 8 illustrates a detail hereinafter described.

Referring to Figs. 1, 2 and 3, the letter *s* is used to denote the ends of the cylinders at which steam is admitted, and the letter *w* is used to denote ends of the cylinders from which water of condensation is discharged.

In Fig. 1, following the direction of the traverse of the material to be dried, steam is admitted at the opposite ends of consecutive cylinders, while the water of condensation is discharged from opposite ends of such consecutive cylinders.

In Fig. 2 steam is admitted to opposite ends of consecutive pairs of cylinders, while the water of condensation is discharged from the opposite ends of said pairs of cylinders.

In Fig. 3, steam is admitted to opposite ends of consecutive sets of cylinders (three to a set) while the water of condensation is discharged from the opposite ends of said consecutive sets of cylinders.

In the machine shown in Figs. 4, 4^a, and 5, (embodying example Fig. 2) the steam piping is arranged in a manner such that one half of the machine can be controlled or supplied with steam independently of the other half, and certain of the cylinders of each half can be controlled independently of the other cylinders of such half.

Said piping consists of pairs of small bore steam pipes *a*¹, *a*² and *b*¹, *b*² on each side of the machine supplied with steam from a common supply pipe *c* under the control of four valves one for each section of cylinders.

As will be readily understood from a consideration of Fig. 2, the piping in Figs. 4 and 5 is arranged to convey steam into consecutive pairs of cylinders in opposite directions, while the water of condensation is discharged from said pairs of cylinders at op-

posite ends into the machine frames *e, e* via the doll head bearings.

To allow for longitudinal expansion and contraction of the piping, and also for any error in fixing the connection between each cylinder doll head and the steam piping, each connection is preferably in the form of a pipe *f*, see Fig. 6, coaxial with the cylinder trunnion at one part and at another part coaxial with a hollow boss *g* on the piping, and held thereto by a bolt *g'* the pipe *f* being free to swivel with any slight endwise movement of the piping.

Usually there will not be less than three sets of cylinders in a machine, and there will preferably be not more than four or five cylinders to a set. Where desired, and especially in machines having a large number of cylinders, there may be consecutive cylinders supplied with steam from opposite ends at one part of the machine and consecutive pairs (or sets) of cylinders supplied with steam from opposite ends at another part, the arrangement or order of the cylinders being varied to suit requirements.

It will be understood that, although showing the inlet and outlet connections of each cylinder at opposite ends, both the inlet and outlet connections may be at the same end, the connections for the next cylinder being at the opposite end. In this connection the steam inlet pipe will extend the full length of the cylinder, see Fig. 7.

Although preferring to employ small bore steam pipes (say 2") and large bore exhaust conduits, the method of supplying steam to opposite ends of consecutive cylinders, or consecutive pairs or sets of cylinders may be adopted with any other and suitable arrangement of piping and conduits. Large bore pipes with or without gills may be used in place of the frames. And in place of a single large bore pipe, two or more smaller pipes may be used.

When the steam is fed to consecutive pairs of cylinders from opposite sides of the machine, see Figs. 4 and 5, the invention is advantageous in that both faces of the material to be dried at each edge come in contact with the steam heated end of a cylinder, instead of only one face as in the case of the consecutive single cylinders shown in Fig. 1.

In connection with the drying of fabrics, the equalization of the drying helps to prevent the displacement of the weft relatively to the warp. In addition to even drying, the invention also serves to expedite the drying, or permits of fewer cylinders and less

steam being used for a given degree of dryness.

The machine frames or condenser conduits may be blanked off at intervals, and each divided off portion have its own outlet control valve or trap.

To guard against the steam escaping into the frames or conduits, especially when the cylinders are not rotating, water seals may be provided, one arrangement being a pipe from the doll head (see Fig. 8) dipping into a well of water in the frame, produced by an annular flange around the final water outlet of the conduit. Alternatively, a U or S bend may be provided in the outlet pipe.

The invention may be applied to drying machines other than the two-row type, and also to vertical, as well as to horizontal drying machines.

What I claim is:—

1. A multi-cylinder drying machine comprising a plurality of sections, each section consisting of at least one cylinder, a steam-conduit along each side of the machine, means for supplying steam from one of said conduits to alternate sections, means for supplying steam from the other of said conduits to the intermediate sections, and means for discharging water of condensation from each cylinder at the end opposite its steam supply.

2. In a multi-cylinder drying machine according to claim 1, small bore pipes for conveying steam to the cylinders, and large bore conduits for conveying water of condensation from the cylinders.

3. In a multi-cylinder drying machine according to claim 1, small bore pipes for conveying steam to the cylinders, and hollow machine frames for conveying water of condensation from the cylinders.

4. In a multi-cylinder drying machine according to claim 1, a small bore pipe for conveying steam to each cylinder, a control valve in said pipe, a large bore conduit for conveying water of condensation from each cylinder, and a water seal in said conduit.

5. In a multi-cylinder drying machine according to claim 1, a small bore pipe for conveying steam to each cylinder, a control valve in said pipe, a large bore conduit for conveying water of condensation from each cylinder, a water seal in said conduit, and swivel connections for connecting the small bore pipes and large bore conduits to the cylinders.

In testimony whereof I have signed my name to this specification.

GERALD DOD.