

(No Model.)

J. H. LORIMER.  
APPARATUS FOR DRYING WARP, &c.

No. 454,913.

Patented June 30, 1891.

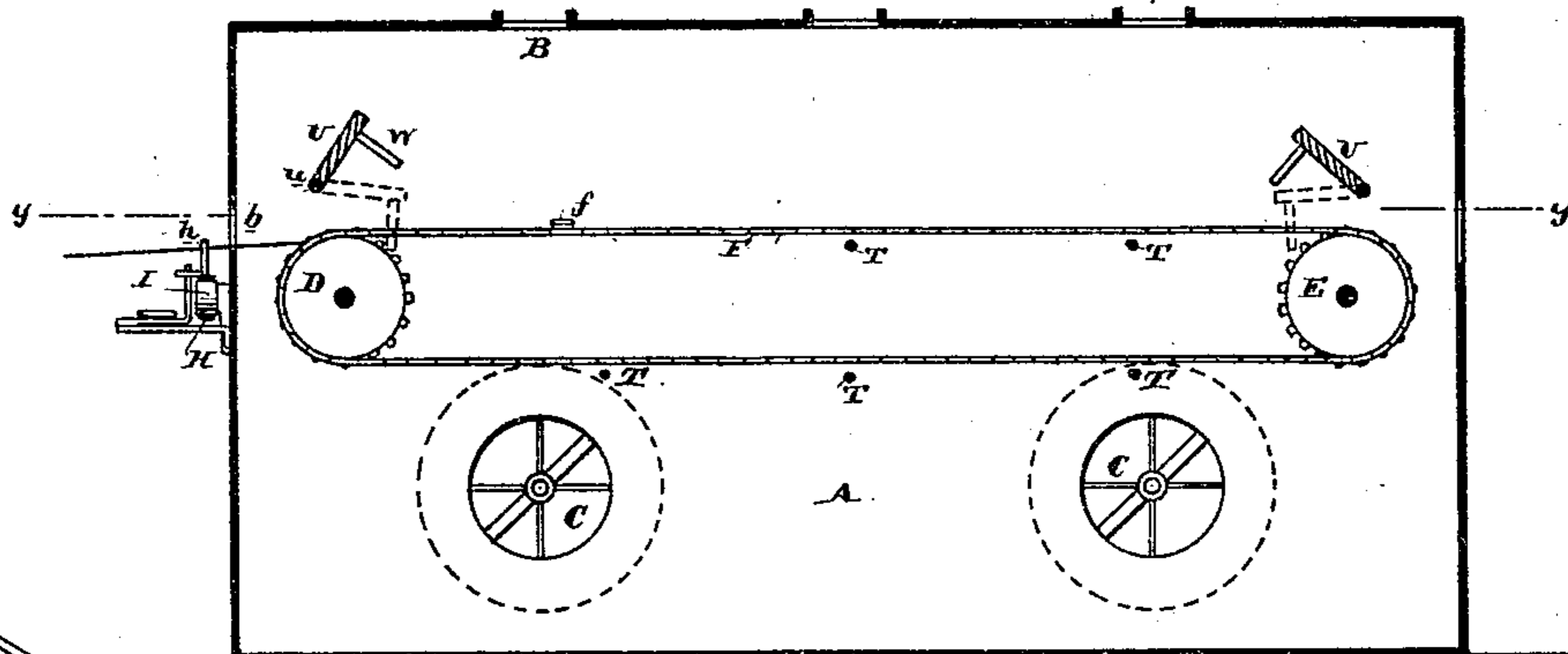


FIG. 1.

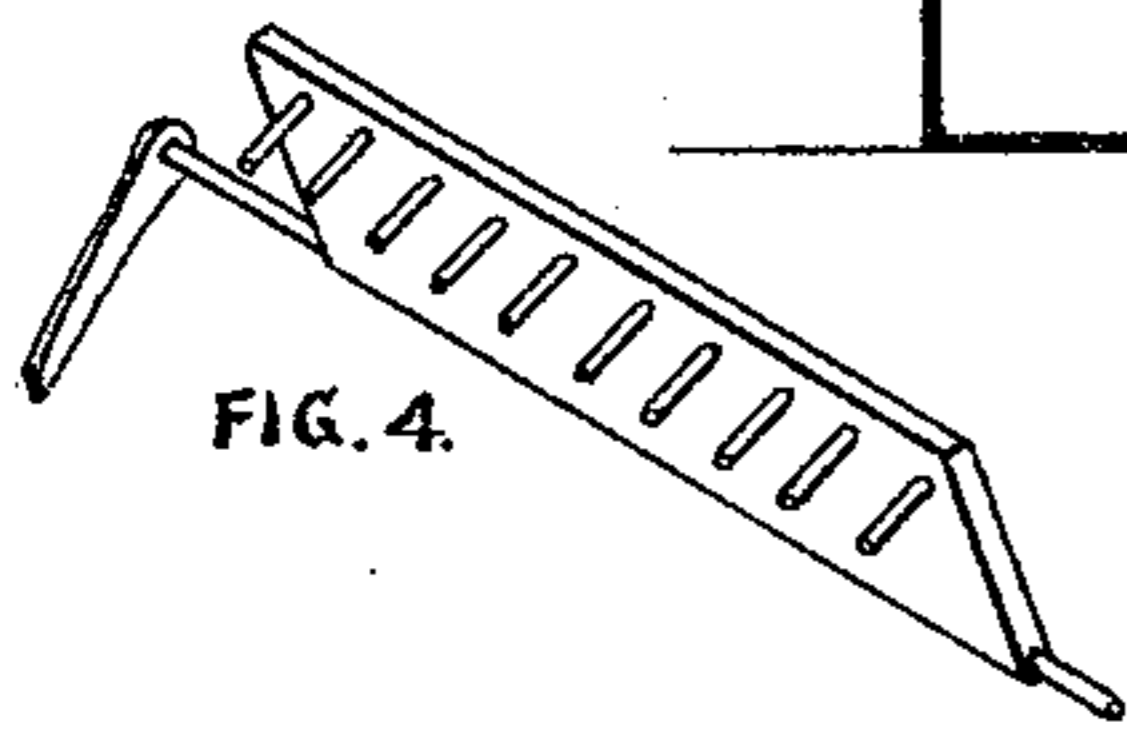


FIG. 4.

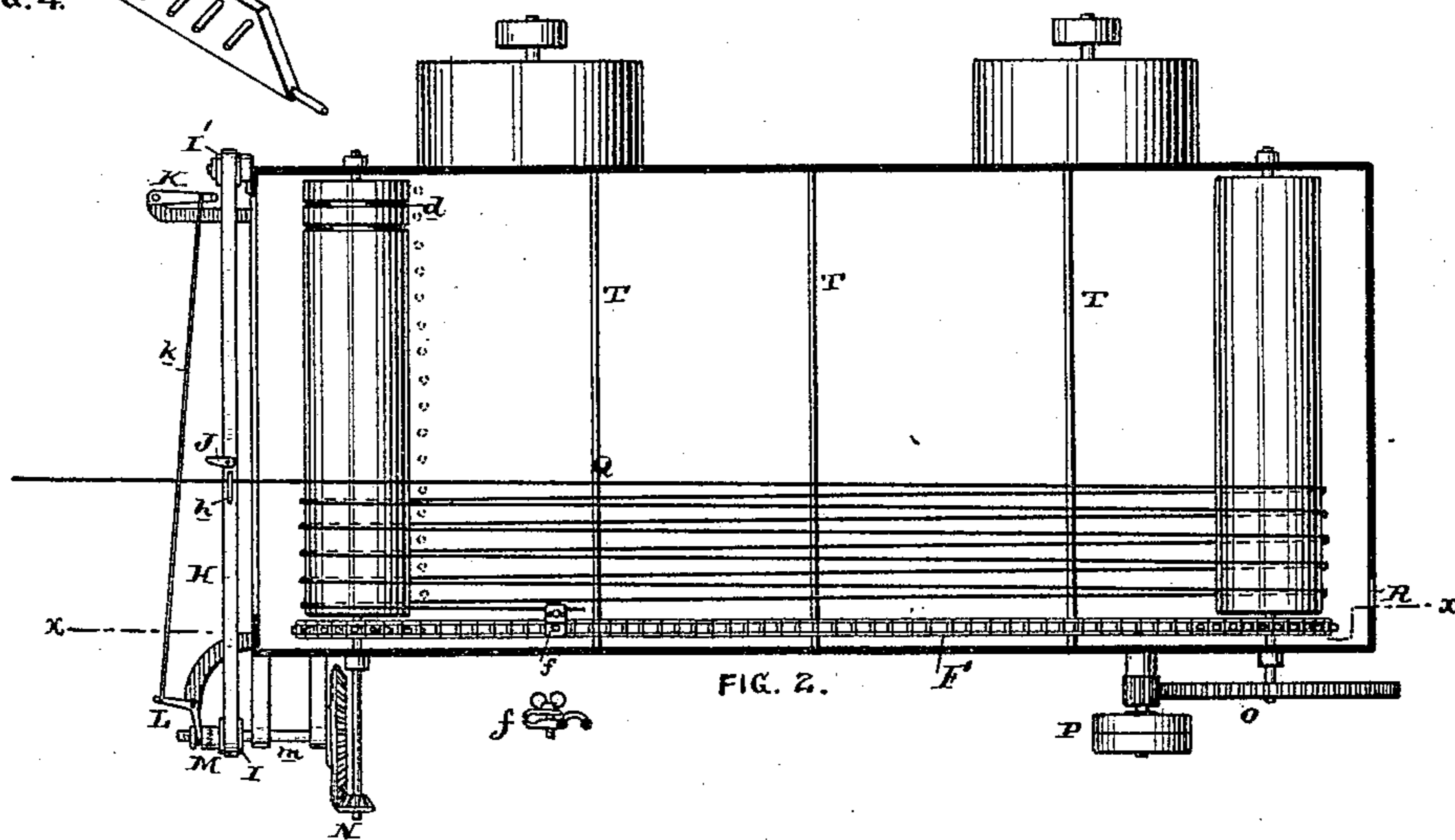


FIG. 2.

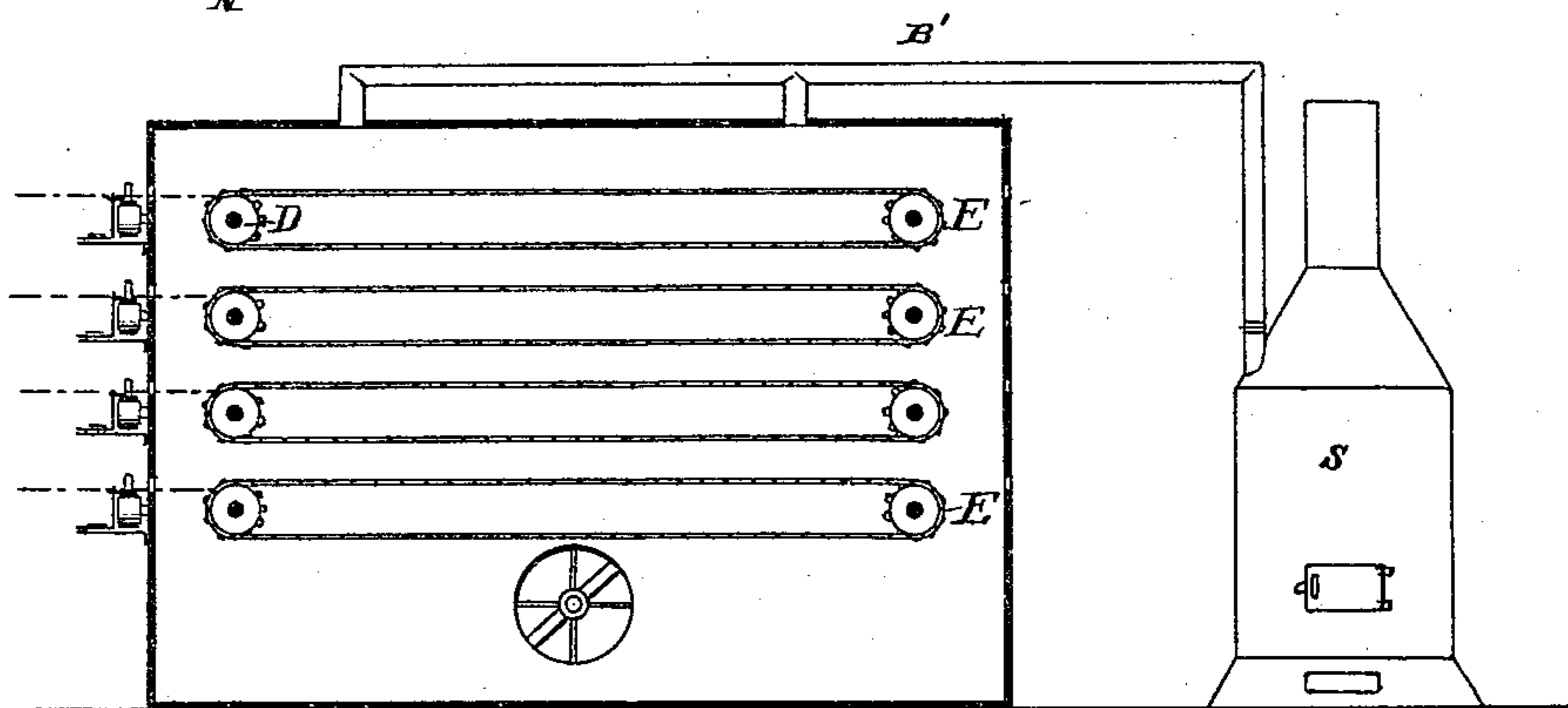


FIG. 3.

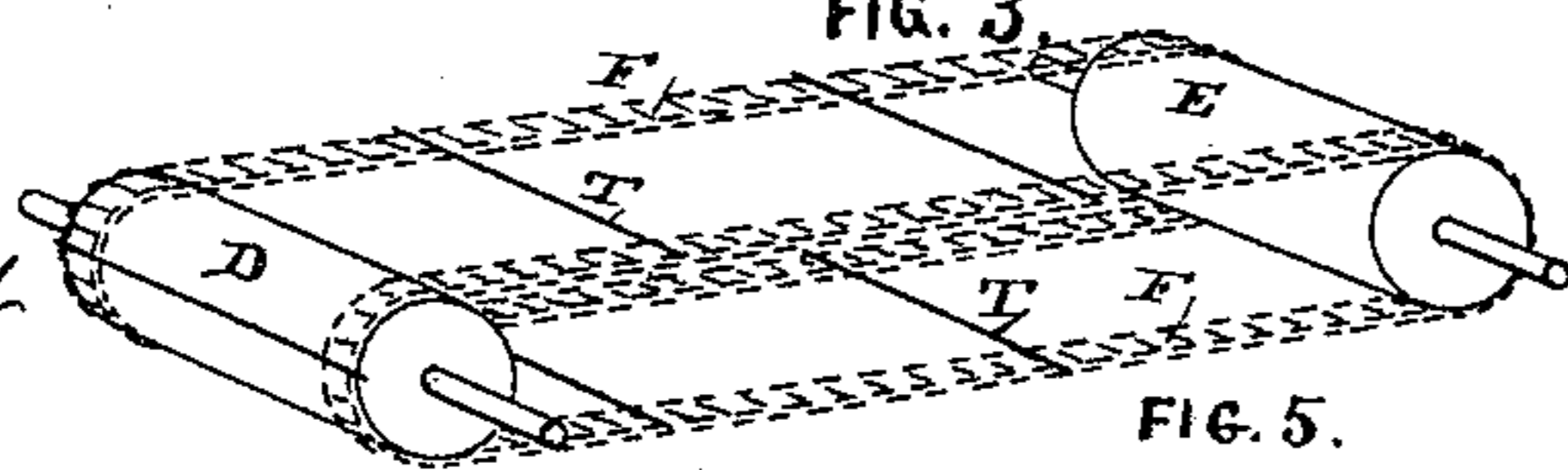


FIG. 5.

Attest:  
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Inventor:  
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By *[Signature]*

# UNITED STATES PATENT OFFICE.

JOHN H. LORIMER, OF PHILADELPHIA, PENNSYLVANIA.

## APPARATUS FOR DRYING WARP, &c.

SPECIFICATION forming part of Letters Patent No. 454,913, dated June 30, 1891.

Application filed January 4, 1888. Serial No. 259,758. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN H. LORIMER, of the city and county of Philadelphia, and State of Pennsylvania, have invented an Improvement in Apparatus for Drying Warp, &c., of which the following is a specification.

My invention has reference to drying-machines for textile strands, such as warp; and it consists in certain improvements, all of which are fully set forth in the following specification, and shown in the accompanying drawings, which form part thereof.

Heretofore it has been customary in drying warp to pass a chain or strand composed of, say, one hundred warp-threads around hollow steam-heated cylinders, such as are used in calico-drying, and relying upon the evaporation which must take place by the contact of the wet or damp warp with the solid surface of the hot cylinders. Such apparatus is very expensive to make, takes up a large amount of room, dries slowly, and is costly in operation.

My object is to produce a machine capable of overcoming the objections to the above-specified form of machine.

In carrying out my invention I provide two cylinders, about which I cause the long warp or strand of warps to travel, on the principle of a helix or corkscrew, one end winding on said cylinders while the other end unwinds therefrom, and in which currents of air or gas, hot or cold, are caused to pass through the layer or layers of warp-strands formed about or between the cylinders, whereby the said drying air or gas in passing in contact with the traveling warp carries off the moisture. This operation may take place within a close chamber, if desired. In this manner the wet yarn passes into the chamber at one place and emerges at another, but not until it has passed back and forth within said chamber a large number of times, so as to form one or more layers of warp threads or strands through which the hot or cold drying air or gases is forced or drawn.

I provide suitable means for the proper manipulation of the warp in starting up the machine, as will be found fully described hereinafter.

I would here remark that I do not limit myself to any specific details of construction of

the machine for carrying out my invention, though I describe a preferred form.

In the drawings, Figure 1 is a sectional elevation of my improved drying-machine on line *xx* of Fig. 2. Fig. 2 is a sectional plan view of Fig. 1 on line *yy*. Fig. 3 is a sectional elevation of a modification of my machine, showing duplication of parts, and also the heater for the drying medium. Fig. 4 is a perspective view of one of the comb-guides; and Fig. 5 is a perspective view of cylinders, chains, and traveling supporting guides or bars.

A is the drying-chamber.

B are inlets at the top, and C are suction-fans at the bottom for keeping up a current of dry air or gas, which may be cold or heated, as indicated in Fig. 3, in which S is the heater, and B' is a pipe or flue for leading the hot air or gas to the inlets B.

It is evident that, if desired, a pressure-blower might be used in place of the exhaust-fans, as these are equivalents in practice.

Preferably within the chamber A and at its sides are arranged two cylinders or shafts D E, between which the air-currents are caused to pass. These two cylinders or shafts are mechanically connected together, preferably as shown—that is to say, by a chain F, whereby both shafts or cylinders are caused to rotate at equal surface speeds. The shaft or cylinder E is driven by gears O and belt-pulleys P or otherwise, as desired. The front end of the chamber A is formed with a transverse slot *b*, through which the warp or strands pass to the cylinders.

H is a transversely-moving belt arranged below the opening *b* and guided about the wheels I I', the former of which is driven from shaft *m* by a clutch device M. The shaft *m* is driven from cylinder D by gears N. The clutch is operated by levers L K and rod *k*. The belt H is provided with a yarn-guide *h* and a projection J, which latter (when the guide *h* reaches the distant end of the cylinder D) strikes the lever K and throws out the clutch, arresting further movement of the belt H.

The belt or chain F may be provided with a clamp *f* or any suitable holder or catch upon which the end of the warp may be temporarily secured when starting up the ma-

chine to form the layers of warp, as shown in Fig. 3, in which the formation of such layers is in progress. The guide *h* insures the warp passing onto the cylinders in a gradual and uniform manner and equally separated from adjacent warps or parts of the same warp. It is evident that two or more warp-strands may be run in at the same time parallel to each other without any material modification of the apparatus. If the cylinders D and E are separated a considerable distance the warp-strands might tend to sag, and to avoid undue tension transverse rods or supports of wire T may be employed. These rods T may be stationary, as shown in Figs. 1 and 2, or they may be secured to two chains or belts F F and carried around with the warp, as indicated in Fig. 5. This latter construction would in a large degree remove the friction of the warp on the guides T, which is of course desirable. When the warp traverses the chamber and is wound upon the cylinders, its two ends will be located at opposite ends of the cylinders. The inlet and outlet for the warp are thus located at relatively opposite ends of the cylinders. When the machine is full, the travel of guide *h* will have ceased and the end of the warp or strand is taken out of the clamp *f*, and as the cylinders continue to rotate the warp or strand enters through the slot *b*, and after passing back and forth through the chamber, forming two parallel layers, it may emerge from aperture R or may be taken out from the slot *b*, if desired. It will thus be seen that as fast as one end of the warp-strand Q enters the chamber the other end leaves it, and fifty to a hundred yards long may be exposed at one time to the currents of dry air or gas passing through the said layers of warp so formed. As the strand of warp-threads traverses the chamber around the guide-cylinders it is constantly presenting different threads and giving all of the threads the same opportunity to be treated with the drying medium. The passing air or gas, hot or cold, absorbs the moisture from the warp and dries it thoroughly before it leaves the chamber. The cylinders D E may be grooved, if desired, as indicated at *d*, to insure the proper running of the warp.

U are movable comb-guides, which are preferably hinged to the chamber at *u* and are formed with teeth W, which when lowered enter between the strands passing around the cylinders D and E and act as positive guides. They will only be used after the cylinders have been filled. One of these guides is shown in perspective in Fig. 4, and the guides are shown as thrown out of position in Fig. 1. When the end of a strand Q is reached, in place of running it through and then again filling the machine with a new one, the beginning of the new one is tied to the end of the previous one, and the machine is thus made to act continuously.

In Fig. 3 a number of the guide-cylinders

D E are shown in the same chamber. Otherwise it is the same as above described.

By this apparatus it is evident that a most thorough drying can be accomplished without excessively heating the room in which the operators work, and as the air can be changed most rapidly a quick drying is the result. The apparatus is cheap to construct, easy to operate and keep in order, and requires but small space for the work which it accomplishes.

While I have described this invention with particular reference to drying of warp-strands, yet it is evident that I do not limit myself thereto, as it may be applied to ribbons or any long strands, such as cord, ropes, &c. It is self evident that the strands might run up and down with horizontal air-currents, if desired, as such change would be simply equivalent to turning the apparatus on end.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a drying-machine, a close chamber having openings for inlet and outlet of the warp arranged at relatively opposite ends of the cylinders within the chamber, and means, substantially as described, to cause currents of air or gas to pass vertically through said chamber, in combination with two parallel and horizontal cylinders respectively arranged at each end of the chamber, and between which the air or gas passes, and around which cylinders the warps are wound and travel on and off in a continuous manner, forming two simple layers of warp-threads at right angles to the currents of air or gas.

2. In a drying-machine, a close chamber having openings for inlet and outlet of the warp arranged at relatively opposite ends of the cylinders within the chamber, means, substantially as described, to cause currents of air or gas to pass vertically through said chamber, in combination with two parallel and horizontal cylinders respectively arranged at each end of the chamber, and between which the air or gas passes, and around which cylinders the warps are wound and travel on and off in a continuous manner, forming two simple layers of warp-threads at right angles to the currents of air or gas, and power mechanism independent of the warp to cause both of said cylinders to rotate at the same surface speed.

3. In a drying-machine, a close chamber, means, substantially as described, to cause a current of air or gas to pass through said chamber, in combination with two cylinders or shafts between which the air or gas currents pass, about which the warps are wound and travel on and off in a continuous manner, a movable warp-guide to guide the warp upon the cylinders or shafts, power devices to operate said warp-guide, and clutch mechanism to connect or disconnect the movable guide with the power devices.

4. In a drying-machine, a close chamber,

means, substantially as described, to cause a current of air or gas to pass through said chamber, in combination with two cylinders or shafts between which the air or gas currents pass, about which the warps are wound and travel on and off in a continuous manner, a movable warp-guide to guide the warp upon the cylinders or shafts, power devices to operate said warp-guide, clutch mechanism to connect or disconnect the movable guide with the power devices, and mechanism, substantially as set out, carried by the warp-guide, to operate the clutch after the guide has traveled the length of the cylinder or shaft.

5. In a warp-drying machine, the combination of a drying-chamber having a guide-opening for the warp, two cylinders or shafts arranged at a distance apart within said cylinder, an endless chain connecting the two cylinders or shafts, a holder for the end of the warp on said chain, and means to create a forced current of drying air or gas through said chamber and between the warps wound upon the cylinders.

6. In a warp-drying machine, the combination of a drying-chamber having a guide-opening for the warp, two cylinders or shafts arranged at a distance apart within said cylinder, stationary guides located immediately above the cylinders to insure the warp traveling about said cylinders or shafts in the proper position, and means to create a forced current of drying air or gas through said chamber and between the warps wound upon the cylinders.

7. In a warp-drying machine, the combination of a drying-chamber having a guide-opening for the warp, two cylinders or shafts arranged at a distance apart within said cylinder, removable stationary guides located immediately above the cylinders to insure the warp traveling about said cylinders or shafts

in the proper position, and means to create a forced current of drying air or gas through said chamber and between the warps wound upon the cylinders.

8. The combination of a close chamber through which a drying medium is caused to pass, two parallel or substantially parallel cylinders arranged at a distance apart, and between which the drying medium passes, and about which the warps to be dried are wound from one to the other, like a helix or corkscrew, positive mechanical power-transmitting connections between the two cylinders to maintain their surface speeds uniform, so as not to injure the warp winding about them, and means to cause said drying medium to pass through the chamber.

9. In a drying-machine, a close chamber and means to cause a current of air or gas to pass through said chamber, in combination with two parallel cylinders or shafts arranged horizontally, between which the air or gas currents pass, about which the warps are wound and travel on and off in a continuous manner, and transverse guides for supporting the warps between the cylinders or shafts.

10. In a warp-drying machine, the combination of a drying-chamber having a guide-opening for the warp, two parallel cylinders or shafts arranged horizontally and at a distance apart within said cylinder, means to create a forced current of drying air or gas through said chamber and between the warps wound upon the cylinders, and transverse guides for supporting the warps between the cylinders or shafts.

In testimony of which invention I hereunto set my hand.

JOHN H. LORIMER.

Witnesses:

GEO. W. REED,  
E. M. BRECKINREED.