

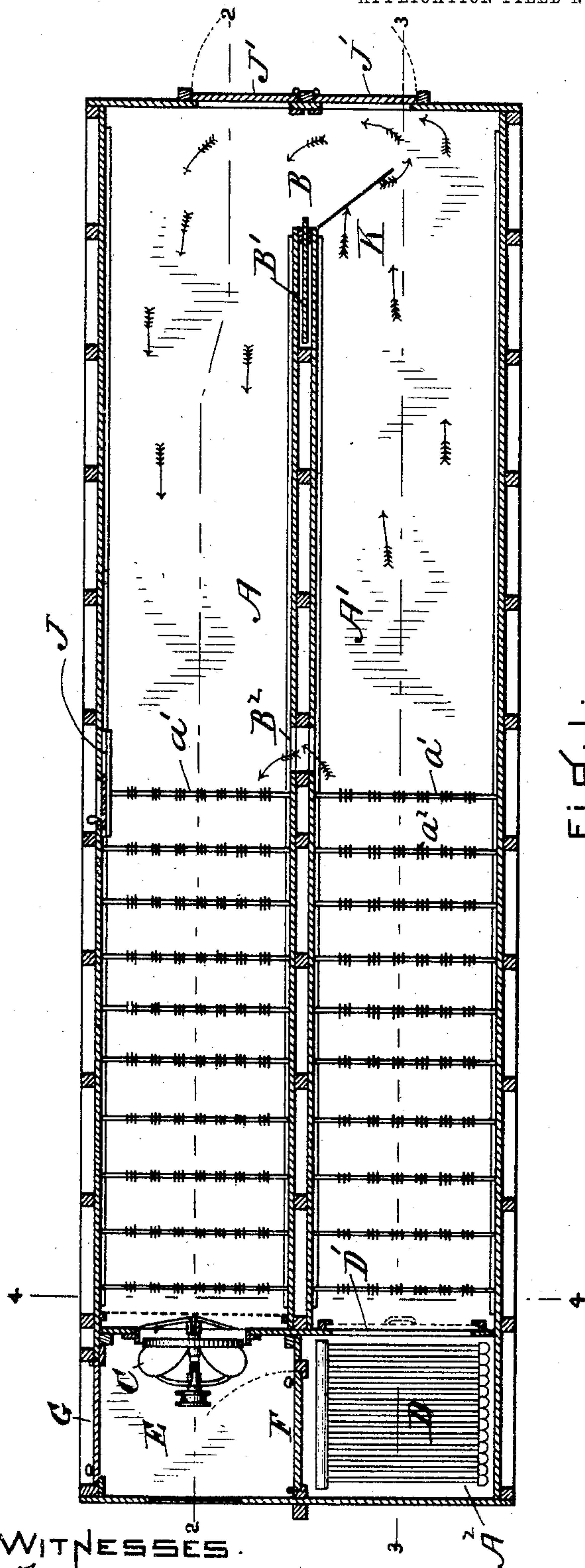
No. 779,759.

PATENTED JAN. 10, 1905.

A. H. BERRY & E. C. WOODWARD.
APPARATUS FOR DRYING YARN.

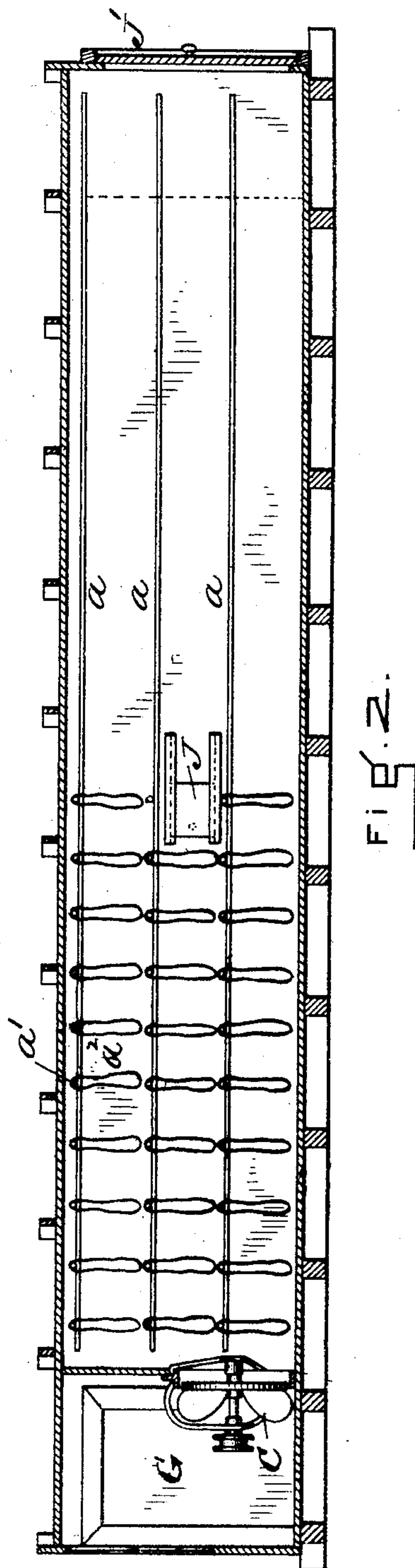
APPLICATION FILED NOV. 14, 1896.

2 SHEETS—SHEET 1.



WITNESSES.

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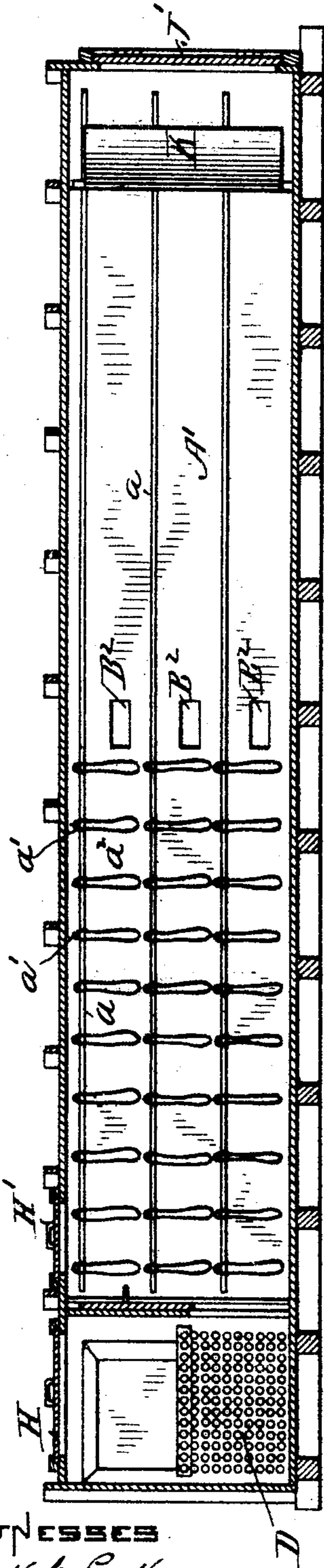


FIG. 3.

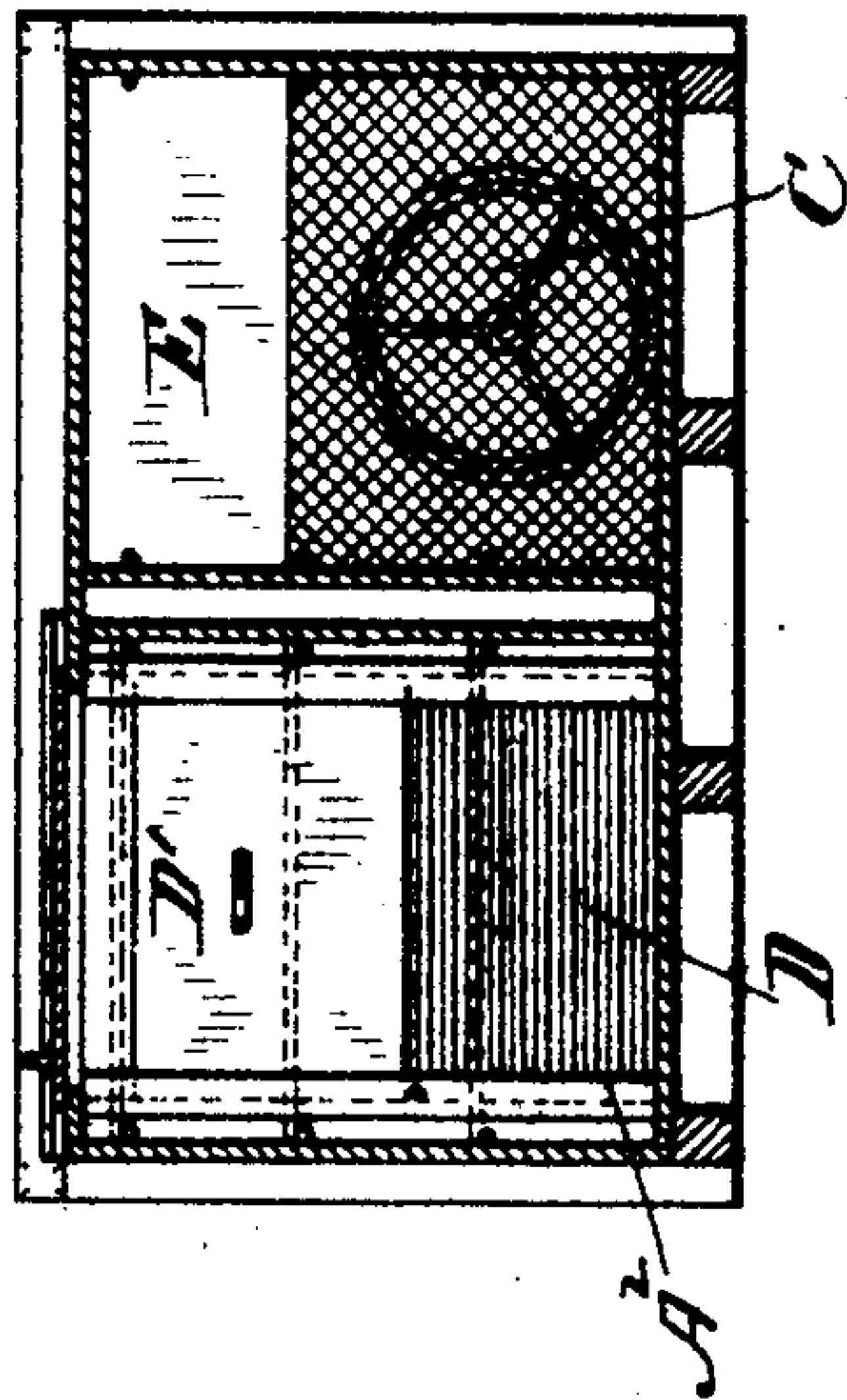


FIG. 4.

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UNITED STATES PATENT OFFICE.

ABRAHAM HUN BERRY, OF WALTHAM, AND ERVINE C. WOODWARD, OF
MEDFORD, MASSACHUSETTS.

APPARATUS FOR DRYING YARN.

SPECIFICATION forming part of Letters Patent No. 779,759, dated January 10, 1905.

Application filed November 14, 1896. Serial No. 612,166.

To all whom it may concern:

Be it known that we, ABRAHAM HUN BERRY, of Waltham, and ERVINE C. WOODWARD, of Medford, in the county of Middlesex and State
5 of Massachusetts, have invented a new and useful Improvement in Machines for Drying Yarns and Mechanism Therefor, of which the following is a specification.

After yarn has been dyed and while it is
10 still damp it becomes necessary to dry it thoroughly. For this purpose various processes and means have been employed, but so far as we are aware none of these processes have been satisfactory. Such yarn cannot be economic-
15 ally dried in the atmosphere, because of the length of time which it takes. Moreover, in damp weather it is practicably impossible to get it dry. Therefore the atmosphere cannot be relied upon for this purpose. Heat has been
20 applied for the purpose, but merely in various primitive ways, the theory being that the higher the temperature the more rapidly the yarns would dry. A very high temperature has often been used for this purpose. In
25 some cases the heat applied has been so great as to injure the more delicate dyes and also the fiber of the yarn, and where great heat is applied in a chamber the yarns at the top of the chamber are often found to be injured
30 by heat before those in the lower part of the chamber are entirely dried. Our improvement does away with all this danger and is economical, as it neither requires great heat nor does it require a great length of time in
35 which to accomplish the drying of the yarn.

Our machine will be understood from the drawings, in which—

Figure 1 is a sectional plan of a plant adapted to carry out our invention, Fig. 2 being a
40 vertical section on line 2 2 of Fig. 1 and Fig. 3 a vertical section on line 3 3 of Fig. 1, Fig. 4 being a cross-section on line 4 4 of Fig. 1.

In the drawings, A A' represent two parallel chambers connected at one end by an
45 opening B, controlled by a sliding door B'. In these chambers provision is made by suitable cleats *a* for the support of the poles *a'*, on which are hung the hanks of the yarn *a''*. At one end of the chamber A is mounted a

ventilating-fan C. The kind of fan which is
50 best for the purpose is that described in Letters Patent to said Berry, No. 370,920, dated October 4, 1887, or No. 557,758, dated April 7, 1896. At the adjacent end of the chamber A' is located an air-heater—for example, a
55 steam-coil D. This coil is, in fact, located in a small supplemental chamber A², separated from the chamber A' by a sliding door D', which may be closed to completely cut off the steam-coil from the chamber A', but which
60 during the drying process is opened, so as to allow the air which enters the chamber A' to come in contact with the coil D.

E is a chamber into which the fan C delivers the air from the chamber A, and be-
65 tween the chamber E and the chamber A² there is a door F, which is also open during the drying process.

G is a door opening from the chamber E to the atmosphere, and a corresponding sliding
70 door H is provided in the roof of the chamber A² to allow fresh air to pass into that chamber when desired. The chambers E A² may, in effect, be considered one chamber,
75 which is provided with a division of some kind whereby the heater D and fan C may be separated.

The wall which separates the two chambers A A' is provided with openings B², each of
80 which is controlled by a slide. Suitable observation-doors J J' are provided where necessary—for example, along the side of one or both of the chambers and at the ends, as shown, those, J', at the ends being sufficiently large
85 to allow the yarn to be carried in and out.

K is a deflector located near the opening B to deflect the currents of air, as indicated by the arrows.

To dry yarns by means of our machine, the yarn is hung in some convenient manner in
90 the two chambers—for example, as shown—and the slide H being opened, the door B' being also open, the fan C is started to withdraw the air from the chamber A A'. This results in a current of fresh air being started
95 through the opening H, through the coils D, and around through the chambers A' A in the direction indicated by the arrows, and out

through the fan, the door G being opened to allow the original air of the chambers to be driven out. When the chambers A A' have been filled with fresh air, the door F is opened, and the door G is closed and also the slide H. Then by means of the fan C a current is caused to circulate through the coil D, chamber A', chamber A, fan C, and through the opening between the chambers E A² to the coil D again, then through the chamber A', &c., as before. After the air has become thoroughly charged with moisture, as can be easily discovered by observation—at, for example, the side door J—the door G is opened and also the slide H, the door F being closed. The air is then drawn out from the chambers A' A and a fresh supply of air drawn in, when the process is repeated. After a second body of air has thus been circulated in the manner above described through the chambers A' A for a time the yarn will usually be found to be dry. Then by closing the slide D' and opening a slide H' at the top of the chamber A' fresh air is drawn into the chambers A' A by the fan C, and the yarn is thoroughly cooled, the door F being of course first closed, and the door G being opened for the purpose of allowing the hot air to escape. We have found that the temperature of the air may be as low as 130°, perhaps lower. The temperature need only be sufficiently high to make the air easily receptive of the moisture which it is intended to absorb.

It is very desirable that the fan shall be placed near the floor of the chamber A, for as the air becomes cooled and heavy with the moisture it tends to fall toward the floor, from which it may be more easily drawn out if the fan is located as shown. Moreover, it is very desirable that the two chambers shall be horizontal in order that the air as it is drawn through the yarn may tend to separate the threads, and hence pass through the hank rather than close the threads of the hank together, as would be the case if the current were downward upon it.

The openings B², connecting the chambers A A', are useful at times, for it is evident that the temperature of the air which has passed through both chambers decreases as it approaches the fan. It is therefore desirable that a portion of this while hot shall not pass through the entire length of the chambers, but cut across, and mingling with the air which has passed around through the opening tend to warm it and so cause better work.

The deflector K is quite desirable in order to properly deflect the air into the extreme corners of both chambers A' A. By means of the slide B' the size of the opening B may be regulated so as to govern in some degree the circulation.

The main utility of our machine lies in constant circulation of air through the chamber containing the yarn, the air giving up heat in

its passage, but taking an equal number of degrees of heat again from a suitable source of heat, so that the yarn is kept at a substantially normal temperature during the drying process, and then discharging the air when it approaches a point of complete saturation and repeating the process with a fresh supply of air.

We have for convenience referred to the drying apparatus as consisting of two chambers; but it is evident the two form but one passage for the air, and hence are really but one chamber, which may be divided for convenience into two or more parts and which contain suitable air moving and heating apparatus for the purposes described.

In operating our machine we prefer to use warm air, because we have found that it will absorb moisture more easily and rapidly than cool air, and while in its contact with the yarn and during the absorption of the moisture, therefore, the air gives up a certain amount of heat it is only necessary that the coil shall supply the few units of heat so given up, and hence the temperature of the coil need not be high.

What we claim as our invention is—

1. The drying apparatus above described, consisting of a normally air-tight chamber comprising two compartments located side by side, a fan located at the end of one compartment and a heater at the end of the other compartment, said fan and heater being inclosed in said air-tight chamber whereby a current of air may be forced from one compartment to the other and thence returned to the first compartment continuously, and means whereby such return of air to the first compartment may be intermittently interrupted and the air in the second compartment discharged from the chamber entirely.

2. The drying apparatus above described consisting of two chambers connected at each end and having at their adjacent ends, the one a ventilating-fan and the other an air-heating apparatus, in combination with openings B² connecting said chambers intermediate their ends, all as set forth.

3. In a drying apparatus consisting of two chambers located side by side and connected together at one end by a passage controlled by a door F, a heater and a fan located one on each side of the opening controlled by said door, in combination with two doors opening into the outer air, one located to receive the discharge from the fan and the other located to admit fresh supply to the heater, said two doors being of substantially the same area and located one on each side of the opening controlled by the door F, as and for the purposes set forth.

4. The drying apparatus above described consisting of two chambers located side by side and connected together at each end and means whereby it may be connected with the

outer air, each chamber containing means for hanging hanks of yarn or the like, a ventilating-fan located to cause a circulation of air through said heater and said chambers when said heater and said chambers are connected, and to draw air through said chambers from the outer air when said heater is cut off therefrom, said chambers being adapted to be closed during the drying operation against any indraft of fresh air and provided with a discharge-opening in proximity to said fan and of a size approximating the area of said fan and means whereby said discharge-opening may be normally closed, as and for the purposes set forth.

5. The drying apparatus consisting of two chambers located side by side and connected at their extreme ends, the deflector K located near the connection between the extreme ends of said chambers and adapted to throw the current of air into the extreme corners of said chambers, all as set forth.

6. The drying apparatus above described consisting of two chambers located side by side and connected at one end, one of said chambers having at its opposite end a partition containing a fan whereby a fan-chamber is formed, the other chamber having at its adjacent end a partition provided with an opening, whereby a heater-chamber is formed, a heater located within said chamber, said

heater-chamber and said fan-chamber being connected as described, said fan-chamber and said heater-chamber each being provided with openings whereby each may be connected with the outer air, and means whereby said openings may be closed during the drying operation, as and for the purposes set forth.

7. The drying apparatus above described consisting of two parallel chambers located side by side and closed from the outer air and connected at one end and having a third chamber connected with both of said chambers, said third chamber being provided with a fan located in an opening between said connecting-chamber and one of said parallel chambers, and a heater located in front of an opening between said connecting-chamber and the other of said parallel chambers, the openings between the connection-chamber and said parallel chambers being of approximately equal area and said third chamber being provided with openings into the outer air, and means whereby said openings are normally closed during the drying operation, as described.

In testimony whereof we have hereunto set our hands this 31st day of October, 1896.

ABRAHAM HUN BERRY.
ERVINE C. WOODWARD.

Witnesses:

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E. A. GUILD.