

A. N. MARR.
 APPARATUS FOR DRYING SIZED YARNS AND WARPS.
 APPLICATION FILED JAN. 6, 1912.

1,052,074.

Patented Feb. 4, 1913.

2 SHEETS—SHEET 1.

Fig. 1.

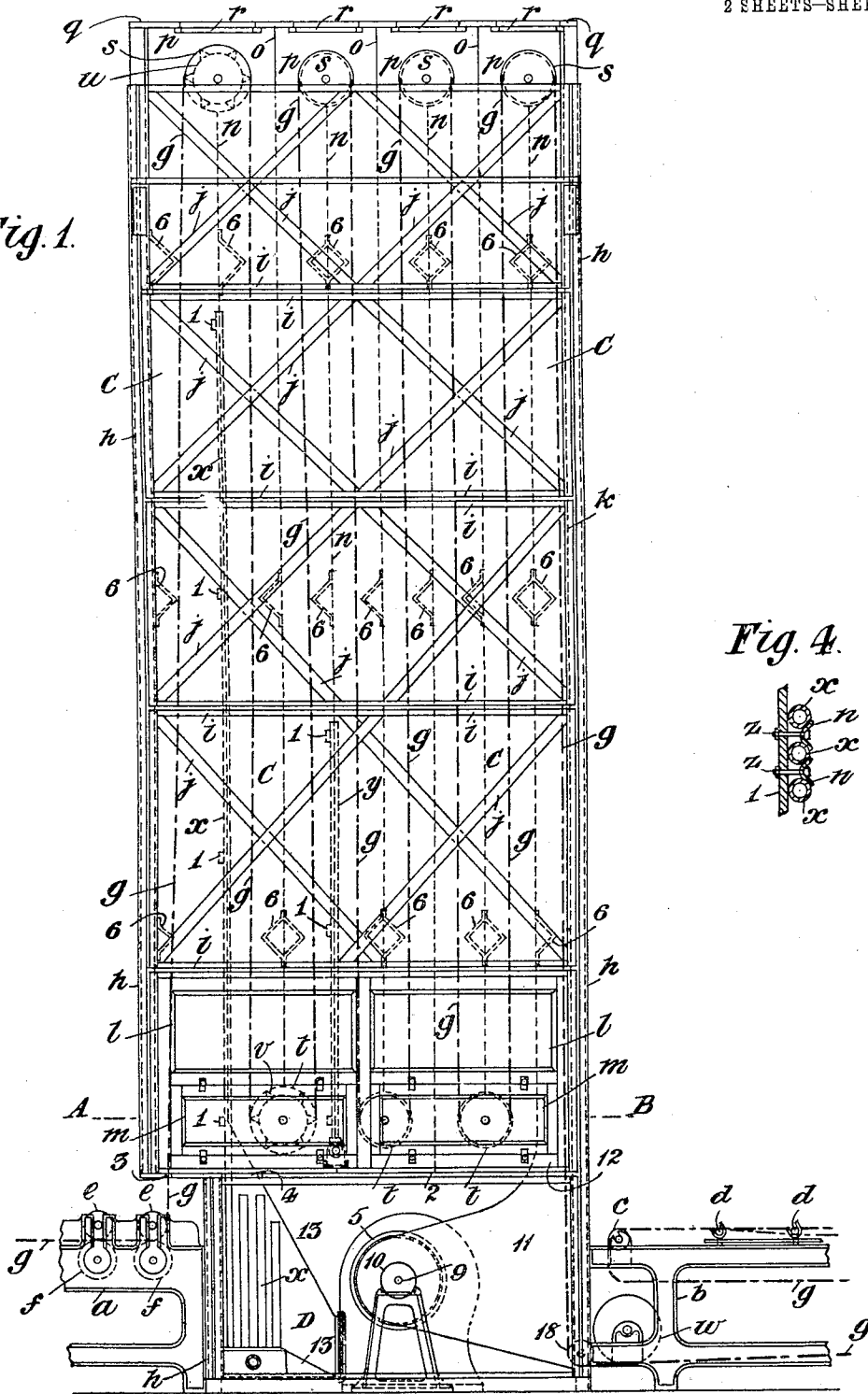
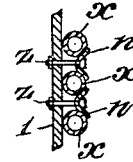


Fig. 4.



Witnesses
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2 SHEETS—SHEET 2.

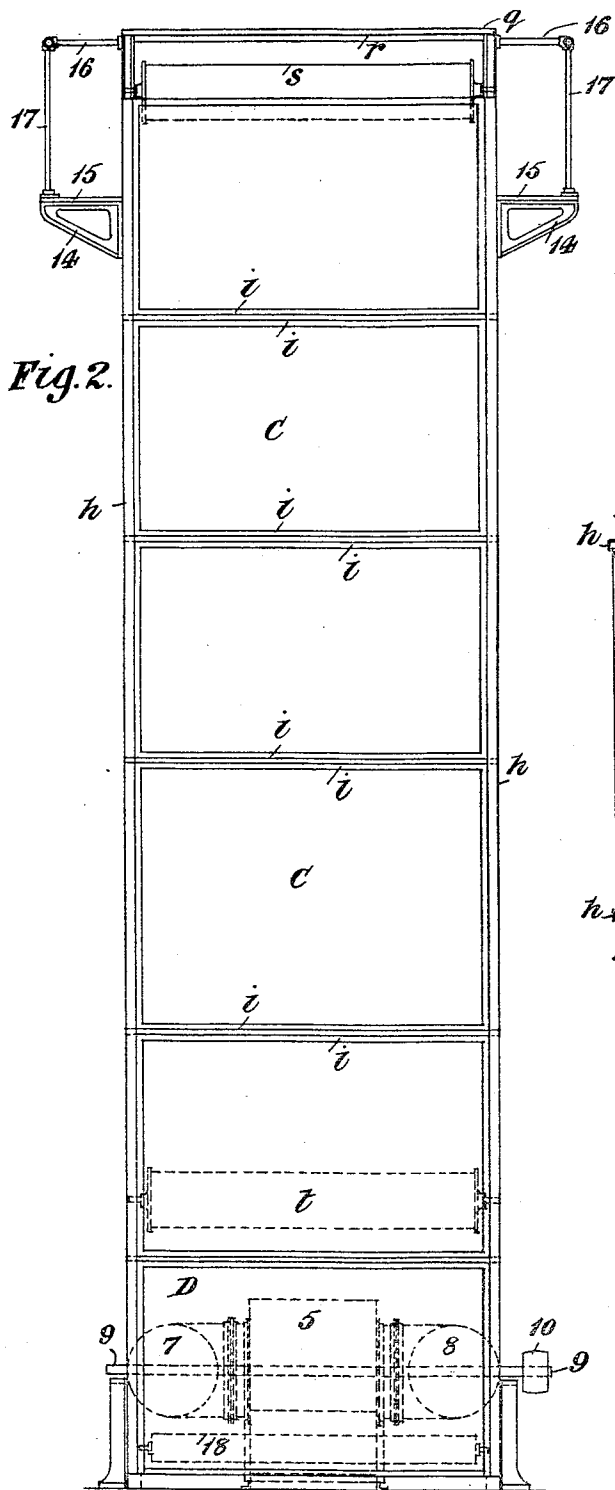


Fig. 2.

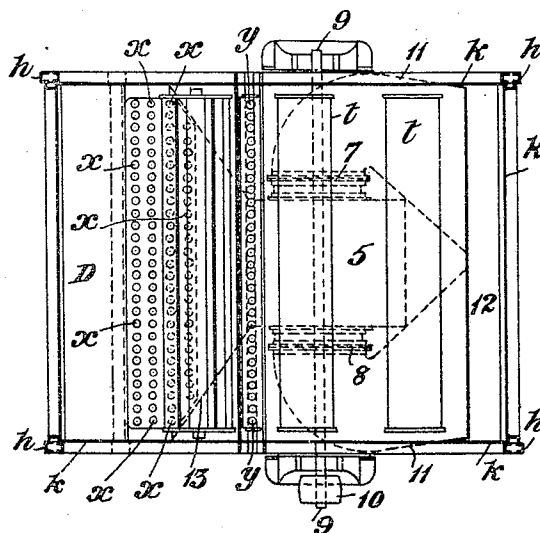


Fig. 3.

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APPARATUS FOR DRYING SIZED YARNS AND WARPS.

1,052,074.

Specification of Letters Patent.

Patented Feb. 4, 1913.

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To all whom it may concern:

Be it known that I, ARTHUR NORRISON MARR, residing at "Rangiora," Thorner, near Leeds, in the county of York, England, have invented new and useful Improvements in Apparatus for Drying Sized Yarns and Warps, of which the following is a specification.

This invention relates to improvements in machines or apparatus for drying sized cotton, or worsted, or woolen or other yarns and warps, and it is particularly applicable to that class of machines known as "cylinder sizing machines" provided with positive driving mechanism and having a creel and sizing box on one side of the cylinders, and on the other side a headstock with cooling fan, or fans, conducting rollers, polishing dividing rods, and revolving yarn beam presser.

The object of this invention is to dispense with the above named cylinders,—which are heated to the required temperature, and over and partially around which the sized wet yarns or warps are made to proceed or pass in their passage from the creel and sizing box to the yarn beam,—and to substitute therefor an air drying chamber of a vertical type provided with a number of partitions and rollers, heating apparatus, and fan or fans for drawing and circulating the heated air simultaneously through the several portions of the drying chamber, and the warp or "sheet" as it passes from the creel and sizing box to the said yarn beam.

In the drawings hereunto annexed is shown a method of carrying this invention into practice in which a small portion of the sizing box only and the headstock of a cylinder sizing machine is shown.

Figure 1. is an elevation showing the vertical air drying chamber; Fig. 2. is an elevation drawn at right angles to Fig. 1; Fig. 3. is a sectional plan on line A, B, Fig. 1; Fig. 4. is a part sectional plan showing a detail of the division plates which adjoin the radiator tubes.

Like parts in all the views are marked with similar letters and numerals of reference, the small letters being underscored.

a is a portion of the sizing box of a cylinder sizing machine, and *b* the headstock provided with conducting rollers *c*, *w* and 18 and polished dividing rods *d*.

e, *e*, and *f*, *f*, are rollers of the sizing box

from which the warp or sheet *g* is led to the chamber of the drying machine.

All the above parts are of the usual and ordinary type and will be readily understood by those engaged in the trade without further description.

Between the sizing box and headstock portions of a sizing machine is inserted the vertical air drying chamber of any suitable size and shape in cross section, such as rectangular as disclosed in the accompanying drawings. The vertical air drying chamber takes the place of one, two, or more revolving drying cylinders which are usually employed in this class of machine. The vertical air drying chamber is wholly or partially formed of wood, or iron, or a combination of two or more of such materials, and it is horizontally divided into two chambers or compartments C, D, of unequal size and area. The upper and larger compartment C is employed for drying purposes, and the smaller one D which is located in the base of the structure is for the reception of a portion of the heating apparatus, and one or more fans which are employed for causing the air first to enter the drying chamber C, and then to circulate through the several vertical compartments or sections into which it is divided, and to withdraw the air and moisture therefrom into the fan; the lower chamber D is preferably open to the atmosphere.

A convenient way for forming the drying chamber is to make a framework of four uprights *h*, preferably of channel-beam construction, with ends and sides in sections and arranged between a number of spaced and suitably formed horizontal cross pieces or beams *i* fixed by their ends to the uprights *h*. The sections are made in panel form, for convenience of transit and erection, and placed in position between each pair of cross beams *i*, being strengthened by suitably constructed cross stays *j* which form part of each section. By employing a number of horizontal cross pieces or beams the frame work in the first case is built up in skeleton form, and divided horizontally into the two chambers C, D. The inner walls of the structure are lined with wood, or other suitable material not being affected to any appreciable extent by climatic or other temperature changes. The lower por-

tion of one or more sides of the drying chamber is made in panel form *l* and provided with access doors *m* fitted with glass.

The upper chamber C is divided by partitions *n* and *o* into any required number of vertical compartments, or sections, for example, first into four vertical compartments *p* by the partitions *o*, and afterward each vertical compartment *p* is again sub-divided by the partitions *n*. The vertical partitions *n* which come against the heating or radiating pipes *x* and *y* are formed of strips of sheet iron, as shown at Fig. 4, and they are made secure to the pipes of the heaters *x* and *y*, and are retained in position by the bolts *z* arranged to pass through the cross bearers *1* which are formed of iron. The cross bearers *1* also aid in retaining the radiator pipes of the heaters *x* and *y* in a level position. The portions of the partitions *n* above the top of the radiator pipes *x* and *y* are either formed of wood, or of sheet iron.

The chamber C is closed at its top with a cover *q* preferably having a number of openings therein, one for each compartment *p* and being closed by doors *r*. In the top of each compartment *p* is mounted in suitable ball or other bearings a roller *s*, and at the bottom of each partition *o* is a roller *t* extending partly into each of the adjacent compartments. The first two rollers *s* and *t* over which the warp or sheet passes are preferably lagged and provided with driving elements *u*, *v*, disclosed in the form of sprockets. The remaining rollers preferably are not lagged. The rollers *t* are arranged at a suitable distance above the bottom of the vertical chamber C.

The warp or sheet of yarn to be dried as it leaves the rollers *e* and *f* of the sizing box is carried upward and downward and through the compartments over the rollers *s*, *t* in the sinuous manner as shown at Fig. 1 of the drawings. The rollers *s* are arranged at a suitable distance below the top *g* of the chamber C. The partitions *n* extend from the bottom 2 of the drying chamber C to the underside of the rollers *s* while the partitions *o* extend from the top *g* of the chamber C down to, and near the top, of the rollers *t*. By this means and by closing the vertical chamber C on its bottom, except providing openings 3 and 4 therein respectively for the entrance of the warp or sheet *g* and the heated air for drying purposes, provision is made for leading the warp or sheet *g* up and down between the whole or any number of the compartments so as to be subjected to the action of the heated air which is driven into the chamber by the fan 5. The partitions are arranged to be about the center of their respective rollers and are provided for each layer of yarn, or warp, or sheet being isolated for drying purposes.

On the partitions *n* and *o*, and also on one or more of the inner sides of the vertical chamber C, are fixed horizontally at suitable distances apart a number of triangular shaped blocks 6 for contracting the size of the compartment, and also for directing the air currents on to and through the wet warp or sheet *g*, thereby causing them to slightly vibrate and separating them from one another, and also preventing the individual threads forming the warp or sheet adhering to each other. The blocks 6 are made the full width of the partition in each compartment. At Fig. 1 it will be seen that on the entrance side of the vertical chamber three of such horizontally angular shaped blocks are fixed to its inner side, and at the first division *n* only one of such angular shaped blocks 6 are used, and in other instances it will be noted that such angular blocks 6 are placed on both sides of the partitions. The number and position of the angular shaped blocks may be varied as circumstances, and the number of the warp or sheet *g*, requires. In some cases it may be found necessary to employ more of these horizontally fixed angle blocks 6 than in other cases, therefore it must be distinctly understood that they may be varied as required. The sides of the blocks are required to be at such an angle that they will direct an upward or downward current of warm air against and through the warp or sheet *g*.

The heaters *x* and *y* are radiators of the ordinary type formed of a number of pipes of varying lengths arranged in rows, and extend the full width of the warp or sheet *g*.

The pipes in one row of the radiators *x*,—which are placed in the chamber D,—pass through the opening 4 and extend a suitable distance within the vertical chamber for drying the warp or sheet *g* as it passes up to the first roller *s* and down to the first roller *t*. If desired two or more radiators *x* may be used in chamber D for obtaining a variation of temperature. An additional radiator *y* is provided for occasional use in very cold or very wet weather, and for circumstances when extra heat is required for drying purposes. The heaters or radiators *x* and *y* being of ordinary construction will be readily understood without further explanation.

5 is a fan of any ordinary construction placed in the chamber D, and it may be provided with one or more suction inlets. In the drawings the outline of a fan of the "Sirocco" type is shown provided with two suction inlets 7 and 8.

9 is the fan shaft upon which the driving pulley or motor 10 is mounted.

To each suction inlet 7 and 8 is provided a funnel shaped opening or air trunk 11, 11, as shown by the dotted lines

at Fig. 3, and it will be noted that at one point the suction inlets are in very close proximity to each other, and they are also made to communicate at 12 with the last compartment or section of the chamber C, thereby providing means for causing air to circulate through the compartments of the said chamber and to be drawn out therefrom through suitable openings or apertures. The air, after passing through the fan or fans 5 is discharged through the outlet 13 on to the heater or radiator ω and passes through opening 4 into the drying chamber.

In practice it has been found that none of the rollers s and t need be driven from the driving elements u, v as the frictional contact of the warp or sheet passing over the roller is found to be sufficient.

Around the top of the drying chamber C may be fixed the supports 14 to which the platform 15 is fixed, and around the platform may be fixed the rail 16 carried by the pillars 17. This platform provides a ready means for getting to the top rollers for lubricating and adjusting purposes, and also for opening or closing the doors r . The platform may be reached by a ladder not shown in the drawings.

The action of the apparatus is as follows:—The warp or sheet g as it leaves the sizing box portion of a sizing machine is passed through the opening 3 which extends the full width of the chamber C and it is then carried up and passed over the first roller s down to the first roller t and is led in a sinuous manner up and down, and over and under the rollers until it reaches the bottom conducting roller 18 and from thence it is drawn and divided through the headstock and wound on to the loom beam. As the warp or sheet g is drawn through the vertical compartments the air that has been drawn into the fans is passed through the air trunk 13 and after passing among the tubes or coils of the heater ω it enters the drying chamber C through the opening 4 and passes up the first chamber or compartment p , and in so doing comes in contact with the blocks 6. In the ascent of the air through one compartment it will strike against the undersurface of the blocks, and as it passes down on the opposite side, say, of partitions n and o it will come in contact with the upper sides of another set of blocks and as it comes in contact with each angular face of the blocks 6, the air will be directed against and through the traveling sheet thereby causing the latter to slightly vibrate for separating the threads of yarn. The fan by being connected at 12 with the last vertical compartment of chamber C will draw the air through the whole of the compartments, and back into chamber D and fan 5, thereby more quickly and evenly drying the yarn. By isolating each layer of

yarn or warp in the compartments as described permits of the warm air following the same sinuous path as the warp or sheet g at the same or at a different surface speed, and also allows the maximum time for contact between the warm drying air and the wet warps, and further, in the event of broken ends, such ends are carried along with the air current. By opening the doors r at the top of one or more of the compartments, moist air is allowed to escape, or cold air may be drawn into such compartments when and as desired.

The above described vertical drying chamber C and parts connected therewith are arranged to form part of, and supersede the cylinders of a sizing machine, and the parts of the cylinder sizing machine not herein particularly mentioned or described may be of the usual and ordinary construction.

What I claim is:—

1. In warp and yarn drying apparatus a vertical chamber divided into an upper and lower compartment by a horizontal floor and having openings for the admission and exit of the warp and yarn, heating apparatus and fans arranged in the lower compartment, and means for directing the air from two sides of the said chamber into the fans, the upper chamber being divided by vertical partitions into sections for isolating the yarn as it passes sinuously through the said chamber and through a current of heated air.

2. In a warp and yarn drying machine a vertical drying chamber adapted to be interposed between the sizing box and headstock of a sizing machine, said chamber being divided into an upper and lower compartment by a horizontal floor, the upper compartment being sub-divided by vertical partitions into sections for isolating the yarn as it passes through the said chamber, each section being in communication with each other alternately at the top and bottom and provided with a roller over which the yarn is passed, the said vertical partitions alternately extending from the bottom of the horizontal floor to a roller arranged at its top and from the top of the compartment to a roller at a distance from said floor, heating apparatus and fans arranged in the lower compartment, plates for directing currents of air from two sides of the lower compartment into the fans and from thence on to the heating apparatus and through the upper compartment, and angular shaped blocks fixed at distances apart in the isolating sections for directing the heated current of air through the yarn passing through the drying chamber.

3. In warp and yarn drying apparatus a vertical chamber divided by a horizontal floor into two compartments and having openings therein for the passage of the yarn,

the upper compartment being divided by vertical partitions into sections for isolating the yarn as it passes through the drying chamber and heated currents of air traveling therein, said vertical partitions projecting alternately from the top and bottom of the compartments so as to provide a communication between each section for directing the air currents and allowing them to circulate freely and sinuously therein, angular blocks fixed at distances apart in each section for directing the heated air through the yarn passing therein, rollers arranged at the top and bottom of the upper compartment alternately above and below the said partitions, heating apparatus arranged in the lower compartment and part of which projects into the upper compartment, air current producing means placed in the lower compartment and plates for directing the air from two sides of the compartment into said means and for drawing the air passing through the upper compartment back into said means, and plates for directing the current of air after passing through said means into the upper chamber.

4. In an apparatus for drying yarn, a vertical inclosing tower having relatively small and spaced inlet and outlet openings in its lower end, a plurality of partitions arranged in vertical spaced relation in the tower and being of a length slightly less than the height of the tower, said partitions alternately engaging the upper and lower ends of the tower at their opposite ends whereby to form a sinuous passage up and down through the tower, rollers arranged in the upper and lower ends of the tower at the extremities of the partitions which are spaced from the ends of the tower and adapted to receive thereover a web of the yarn, means for moving said web over said rollers, and an air current producing means associated with the inlet and outlet openings in the lower end of the tower for creating a current of air through the sinuous passage.

5. In a yarn drying apparatus, a vertical tower having a sinuous passage up and down therethrough and having but two openings located in its lower end, rollers arranged in the upper and lower ends of the tower and adapted to receive a web of the yarn and carry the same through the sinuous passage, an air current producing means communicating with the tower through said openings adapted to create a draft through the sinuous passage, and a heating element extending into the tower and associated with said air current producing means adapted to increase the moisture absorbing capacity of the air in the sinuous passage.

6. In a yarn drying apparatus, a tower provided with spaced partitions forming a sinuous passage within the tower, means for

conveying a web of yarn through the sinuous passage between the partitions, and angle-blocks carried against the sides of the partitions and adapted to engage the web and hold the same from contact with the partitions.

7. In a yarn drying device, a tower, spaced partitions arranged in the tower providing a sinuous passage therein, means for conveying a web of yarn through the sinuous passage between the partitions, an air current producer connected with said tower to create a draft of air through the sinuous passage, and angle-blocks carried against the partitions and having inclined faces adapted to direct the air current against the web located between the partitions.

8. In an apparatus for drying yarn, a body having a sinuous passage therethrough and an opening at each end of the passage, air current producing means associated with the body and communicating therewith through the openings to create a draft through the sinuous passage, a heating element associated with said air current producing means whereby to heat the air prior to its passage into the body, and air deflecting devices located in the body and in the sinuous passage to deflect the air current against the yarn placed in the body.

9. In a yarn drying apparatus, a body, spaced partitions in the body adapted to form a sinuous passage, rollers mounted in the body and adapted to receive a web of yarn for conveying the same through the sinuous passage between the partitions, means connected with the body for creating a draft of air through the sinuous passage about the web, a heating element associated with said means whereby to heat the air prior to its introduction into the sinuous passage, and angle-blocks carried by the partitions and adapted to engage the web to distance the same from the partition, said angle-blocks also deflecting the draft of air against and through the web.

10. In an apparatus for drying yarn, a body provided with a sinuous passage therethrough, means for conducting a web of yarn through the sinuous passage, an air current producing device connected to the body and adapted to create the draft of air through the sinuous passage about the opposite faces of the web, a heating element associated with said air current producing device to take the moisture out of the air prior to its introduction into the sinuous passage, and deflectors arranged in the body at the opposite sides of the web within the sinuous passage, said deflectors being adapted to direct the warm air against and through said web to separate the strands thereof.

11. In a yarn drying apparatus, an inclosing body having but two openings and

provided with a sinuous passage there-
through opening at its ends through said
openings, means for creating a draft of air
through the sinuous passage and having
5 connection therewith through said openings,
yarn conveying mechanism arranged within
the body and adapted to convey a web of
yarn through the sinuous passage, and a
heating element associated with the air cur-
10 rent producing means for heating the air
prior to its introduction into the sinuous
passage.

12. In an apparatus for drying yarn, a
closed body having a passage therethrough,

an air chamber communicating with one end 15
of the passage, air current producing means
connected with said chamber and adapted to
force air therethrough into the passage, a
heating element located in said chamber,
and an air trunk connecting said air current 20
producing device with the opposite end of
the passage and through which the air is
drawn from said passage.

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Witnesses:

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