May 4, 1943. C. E. McALLISTER 2,318,511

YARN DRYING APPARATUS

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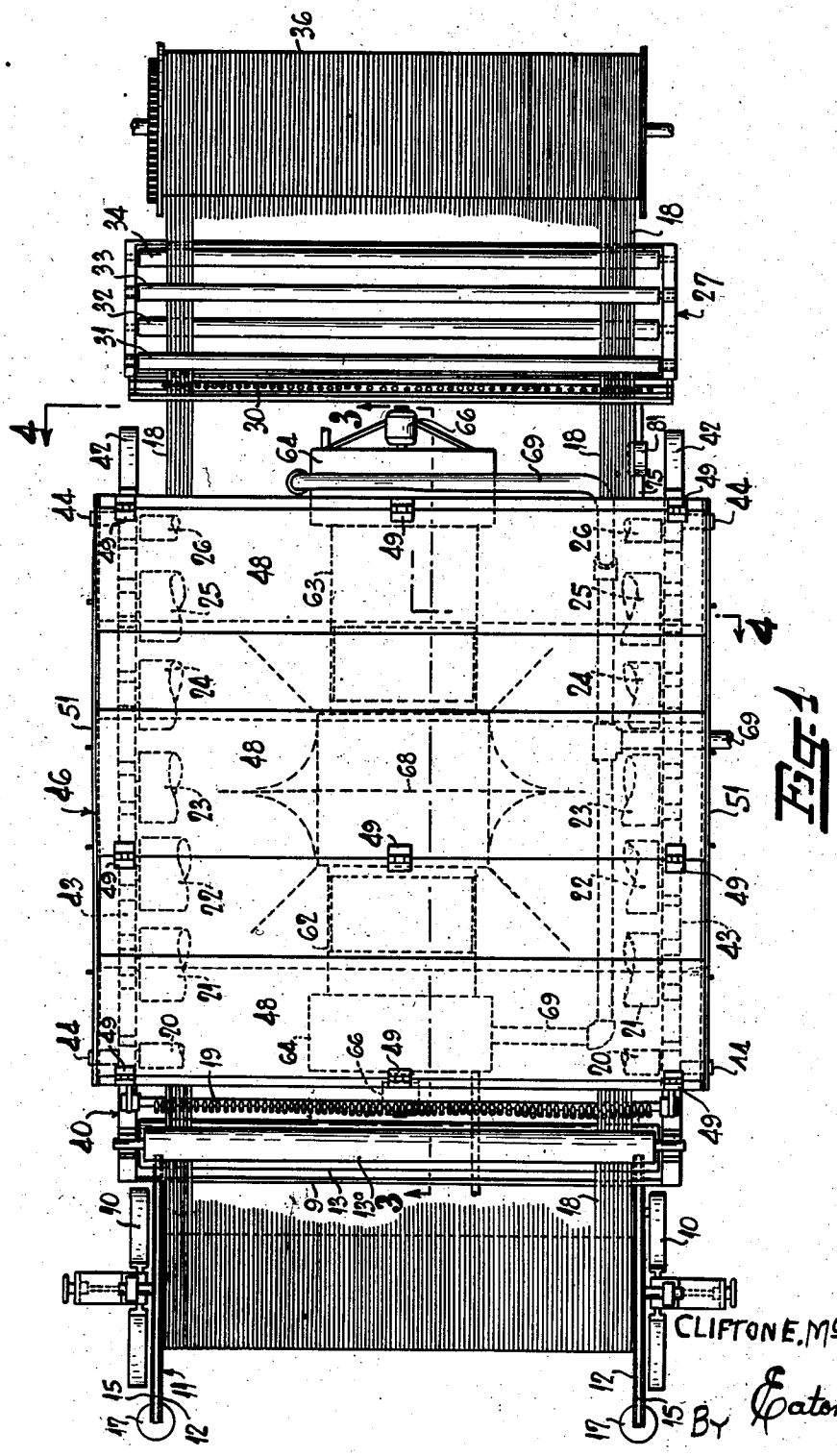


Fig. 1

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YARN DRYING APPARATUS

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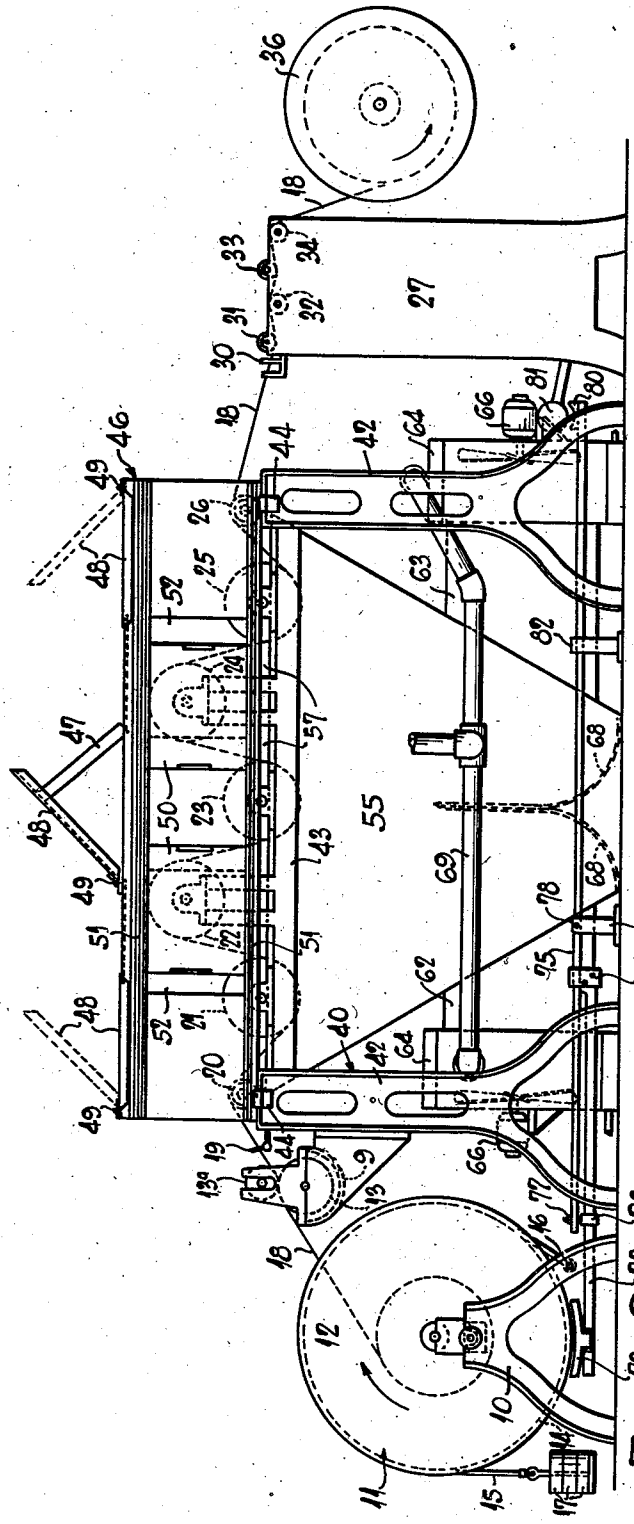


Fig. 2

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YARN DRYING APPARATUS

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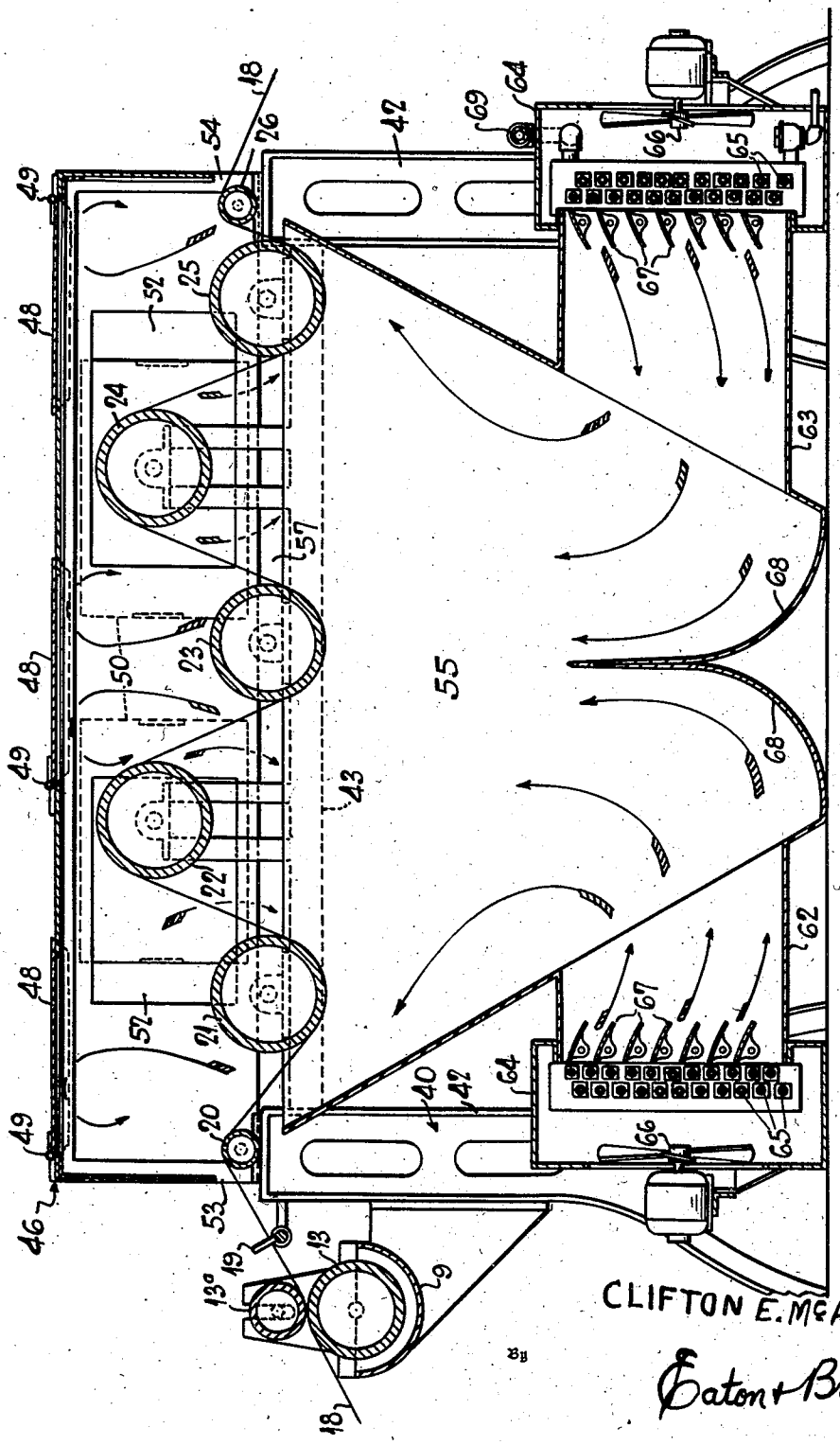


Fig. 3

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YARN DRYING APPARATUS

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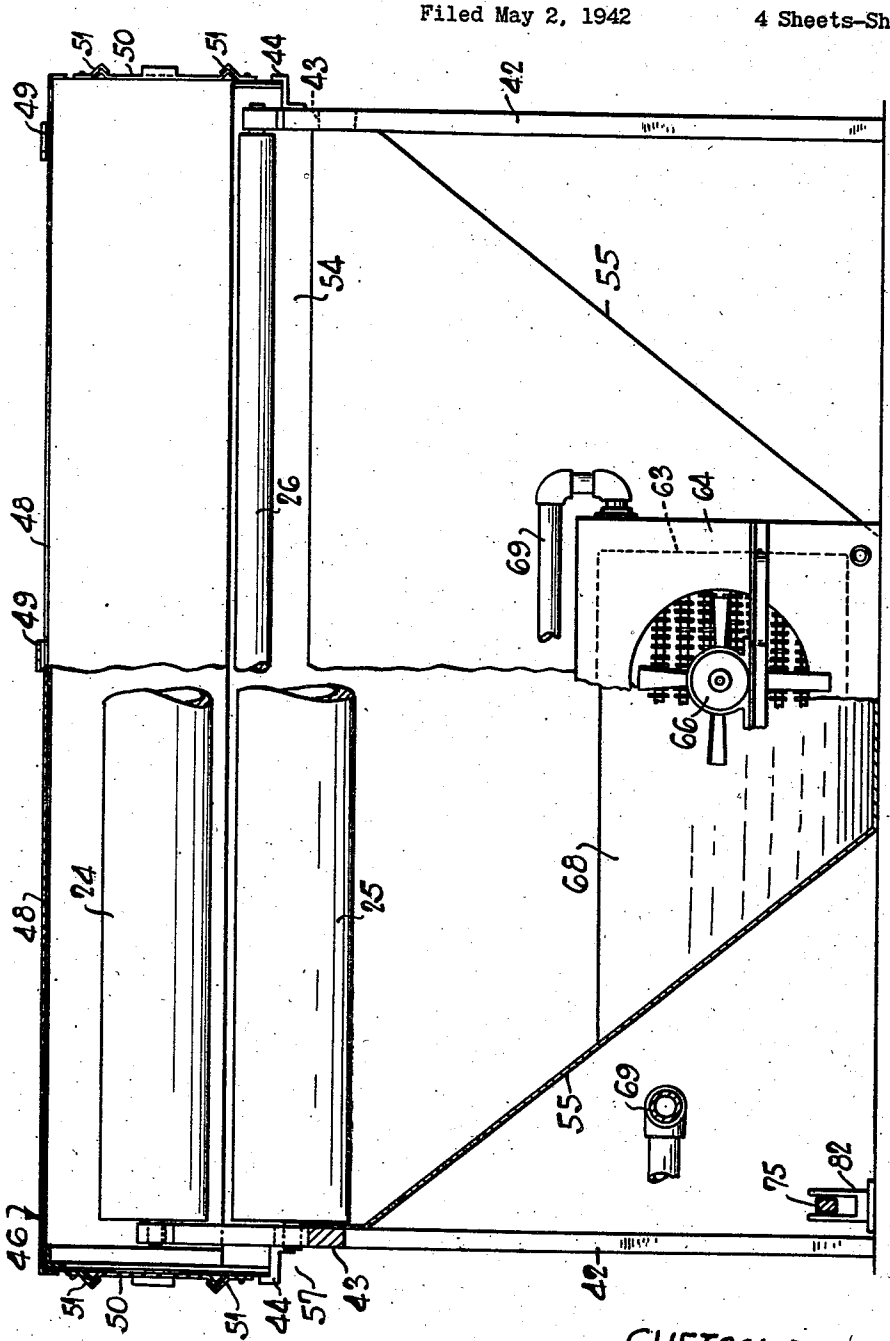


FIG. 4

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UNITED STATES PATENT OFFICE

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YARN DRYING APPARATUS

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Application May 2, 1942, Serial No. 441,498

3 Claims. (Cl. 34—114)

This invention relates to an improved drying apparatus for textile materials such as yarn and the like.

It is an object of this invention to provide a drying apparatus in which the guide rollers for the material are housed in such a manner that highly effective drying operations will result when currents of air are directed through the housings. This improved result is obtained by positioning an open-sided housing on each side of the guide rollers so that the open sides will be oppositely disposed and spaced apart from each other a small amount. Then a draft of warm air is forced from one housing, over the rolls and the material, and into the second housing. The construction of this apparatus is such that the air may escape by way of the space between the housings and/or suitable doors in the second housing.

It is another object of this invention to provide a drying apparatus of the class described in which the opening in the second housing is somewhat larger in size than the oppositely disposed opening in the first housing, but similar in shape, thereby providing a passageway around the mouth of the first housing for the escape of currents of air which rebound upon engagement with the interior of the second housing.

It is another object of this invention to provide a braking mechanism in combination with a let-off beam, a drying apparatus, and a warper, wherein the actuation of the conventional warper stop motion will cause a brake to be applied to the let-off beam.

This brake will overcome the momentum of the beam and prevent unwinding of the let-off beam after the warper has been stopped. If no braking action is provided the momentum of the let-off beam will cause this beam to rotate for a portion of a revolution after the warper has stopped. This additional rotation will produce an undesirable slack in the yarn or material as it is being delivered to the drying mechanism.

It is another object of this invention to provide a yarn drying apparatus having a housing construction as above described, which apparatus has associated therewith a suitable heating unit capable of circulating currents of air over the material which is being dried. In other words, the air is driven from heating units, into the smaller housing, through the material which is being dried, and then into a second larger housing. The closed end of the second housing reverses the air currents, and directs the same back through the material to be dried. Such a construction will insure an improved drying efficiency.

It is another object of the invention to provide a drying apparatus which is especially desirable for use in drying warp beams which have been vat-dyed. This yarn has a high moisture content, thus making this apparatus especially suitable for drying the same.

Some of the objects of the invention having been stated other objects will appear as the description proceeds when taken in connection with the accompanying drawings in which—

Figure 1 is a plan view of my improved drying apparatus, used in association with a let-off beam, a warper, and a take-up beam;

Figure 2 is an elevation, looking at the near side of Figure 1;

Figure 3 is a vertical sectional view taken along the line 3—3 in Figure 1 showing the interior construction of the drying apparatus;

Figure 4 is a sectional view taken along the line 4—4 in Figure 1.

Referring more particularly to the drawings the numeral 10 indicates suitable supports between which a let-off beam 11 is rotatably mounted. This let-off beam has head portions 12. Each head portion has a peripheral groove 14 therein for the accommodation of a cord or rope 15, said rope having one end secured to the support 10 as at 17 and having suitable weights 17 removably secured to the other end thereof. The intermediate portion of the cord 15 rests on the periphery of the beam head 12 and in the groove 14, thereby providing a normal friction which resists the rotation of the beam 11.

The beam 11 is adapted to have a material such as a wet warp 18 wound therearound. The yarn on this beam is usually vat-dyed, bleached, or otherwise treated. Material, such as warp threads 18, passes upwardly between squeeze rolls 13 and 13a, which have a trough 9 below the same. Then the yarn passes through a conventional comb 19, over guide roller 20, beneath roller 21, over roller 22, beneath roller 23, over roller 24, beneath roller 25, over guide roller 26, and then through a conventional warper 27. This warper is provided with a comb 30 through which the warp 18 passes and is also provided with rollers 31, 32, 33 and 34 which direct the warp 18 through the warper. After leaving the warper the warp 18 passes onto a suitable take-up beam 36 which is driven from any suitable source of power, not shown.

The rollers 20 to 26 inclusive have the ends thereof rotatably supported by a framework

broadly designated by the reference character 40. Specifically the framework 40 comprises a pair of upright supports 42 at each end of the roller assembly, and the upper ends of each pair of supports are joined together by a longitudinal strut 43. The upper end of each support 42 has a bracket 44 extending outwardly therefrom which, in turn, supports the lower open side of an upper housing broadly designated by the reference character 46.

By observing Figure 1 it is seen that the housing 46 is rectangular in shape and is so designed that its horizontal projection will entirely cover all of the rollers 20 to 26 inclusive as well as provide a substantial amount of covering beyond the ends and sides of the roller assembly. The elevation of the brackets 44 is substantially the same as the elevation of the axes of rotation of the rollers 20, 21, 23, 25 and 26. The rollers 22 and 24 are located at a higher elevation than the remaining rollers, and therefore are disposed well within the housing 46.

Although the upper end of the housing 46 is normally closed, suitable access and ventilating doors 48 are provided. These doors are hingedly secured to the housing 46 by means of butt hinges 49 and may be opened to dotted line position as shown in Figure 2 when it is desired to gain access to the interior of the housing. Also these doors can be propped in partially opened position for allowing air currents to escape, by any suitable means such as struts 47 (see upper central portion of Figure 2).

The sides of the housing, which are adjacent the ends of the rollers, have sliding access doors 50, said doors being supported by suitable guideways 51. An opening 52 is provided adjacent each sliding door 50, which opening may be employed as an access port. For illustration purposes (Figures 2 and 3) the openings 52 are shown partially closed by sliding doors 50. During normal operation, however, it is usually desirable to completely close these openings so as to secure a more effective drying action.

In order to provide an opening whereby the yarn 18 can pass into, and out of, the housing 46, the end portions of the housing 46 are cut away as at 53 and 54 (Figure 3). These cutaway portions will permit the yarn 18 to pass onto the rollers within the housing, as well as permit this same yarn to pass from the rollers and out of the housing. Also when the housing 46 becomes filled with heated air to a point of overflowing, the passageways 53 and 54 permit the rebounding currents of air to escape.

Associated with the rollers 20 to 26 inclusive and disposed on the opposite side of the yarn 18 from the housing 46, is an inverted frustro-pyramidal housing 55. The upper end of this housing is open. This upper open end has a shape similar to the lower open end of the housing 46; however, the open end of housing 55 is smaller in size, and therefore when properly positioned the perimeter of this opening is disposed inwardly in spaced relation to the perimeter of the opening in housing 46.

Figure 4 clearly shows the relation of the open ends of housing 46 and 55. This space between the openings is indicated by the reference character 57, said space being provided to permit the rebounding currents of air which flow upwardly into the housing 46 to escape in the same manner as the currents escape through openings 53 and 54 previously described. The yarn is therefore subjected to hot air as the air passes upwardly therethrough, and is again subjected to this same hot air as it rebounds from the ceiling of housing 46 and passes downwardly on its travel to outlet openings 53, 54 and 57.

As an additional drying means the rollers 20 to 26 inclusive are effective. In other words, these rollers, are preferably made of copper and become heated by the air which passes thereabout and the heat from these rollers serves to dry the yarn when the same is contacted. The rollers 20 to 26 are not internally heated and therefore do not parch the yarn.

Leading from opposed sides of the lower housing 55 are ducts 62 and 63. The outer end of each of these ducts has a heating unit 64 associated therewith, each of said heating units comprising a plurality of pipes 65 through which steam or other heating fluid is adapted to be circulated. A motor fan unit 66 is provided for directing air over these pipes. Vanes 67 may also be employed for directing and regulating the currents of air after leaving the pipes 65.

The hot air is directed into ducts 62 and 63 and into the lower portion of housing 55. As a means for directing these currents of air upwardly onto the rollers 20 to 26 inclusive and onto the yarn 18, a suitable arcuate baffle plate 58 is provided for each heating unit, each plate being located in the lower central portion of housing 55 (Figure 3). Baffle plates 68 extend upwardly to approximately the same level as the upper portions of ducts 62 and 63 and thereby prevent the currents of air from the oppositely disposed ducts 62 and 63 from mixing with each other until the same are moving upwardly in the same direction.

The heat units 64 are supplied with heat such as steam which is conducted thereto by way of pipes 69.

As heretofore stated the momentum of the let-off beam 11 must be controlled during the normal operation of the drying apparatus on account of the swift movement of yarn 18. If for any reason a thread becomes broken and the warper 27 automatically stops, it is then necessary that the let-off beam 11 stop as quickly as possible to prevent an excess slack in the warp 18. In order to accomplish this result, a suitable braking mechanism is employed which is adapted to be actuated by the stop motion mechanism of the warper 27.

This braking mechanism, in part, comprises a shoe 72 which is normally disposed in spaced relation to the periphery of beam head 12. The shoe is rockably mounted on the free end of a beam or lever 73, which beam has a collar 74 on its other end, said collar being slidably mounted upon the intermediate portion of another beam 75.

The two beams 73 and 75 overlap and remain in substantially parallel position; however, it is necessary to adjust the distance between the free ends of the two beams in order that the brake shoe 72 will be disposed the proper distance from the periphery of beam head 12. This adjustment is effected by means of a bolt 76 which has one end secured to the beam 73 and its other end penetrating the end of the beam 75. A nut 77 is disposed on the upper end of bolt 76 and may be manipulated to vary the position of the free end of beam 73 as well as to vary the position of shoe 72 relative to the periphery of the beam head 12.

The intermediate portion of the beam 75 (Figure 2) is pivotally secured as at 78 to a bracket 79, whereas the right-hand end of the beam has a socket or cup 80 on the upper side thereof for reception of a stop motion arm 81 of

the warper 27. This stop motion arm has its outer end weighted, and therefore when the arm falls the weight will depress the right-hand end of beam 75 and cause the left-hand end thereof, together with the associated beam 73 and brake shoe 72, to rise upwardly to effect a braking action upon left-off beam 11.

Lateral movement of the right-hand end of beam 75 is prevented (see Figures 2 and 3) by the provision of a forked bracket 82.

When the warper stop motion is operated, the driven beam 36 is also stopped by conventional means, not shown.

It is therefore seen that immediately upon the actuation of the conventional warper stop motion, the brake shoe 72 is thrown into engagement with the let-off beam head 12 to cause the braking action to be applied. This braking action supplements the normal braking action provided by chords 15 and weights 17.

In the drawings and specification, there has been set forth a preferred embodiment of the invention, and although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation, the scope of the invention being defined in the claims.

I claim:

1. Drying apparatus comprising a plurality of rollers over which yarn and the like is adapted to be passed, an inverted pyramidal shaped housing disposed below said rollers, said housing having an open upper side disposed in close proximity to the lower periphery of said rollers, a second imperforate housing disposed over said rollers and over the open upper end of said first housing, said second housing having an open lower side of larger size and similar shape to said first named opening, and means for directing currents of air upwardly through said first housing, over said yarn and into said second housing and fanning outwardly in all directions through the space between the edges of the upper and lower housing and into the atmosphere in the order named.

2. Yarn drying apparatus comprising a housing having an open upper side over which yarn is adapted to pass, means for movably supporting yarn over the open upper side of the housing, a second imperforate housing disposed on the opposite side of said yarn from said first housing, said second housing having a lower open side of larger size and similar shape to the first open side, the horizontal projection of said lower open side extending laterally beyond the edges of said upper open side, whereby an outlet will be provided between said open sides, a pair of oppositely disposed heating units in the lower sidewalls of said first housing, a concave baffle plate for each of said units, the concave side of each baffle facing its associated heating unit and having its upper end lying in a substantially vertical plane, and means for directing currents of air over said heating units, whereby the heated air will be directed upwardly by said baffles, through said yarn against the ceiling of the second housing and then rebound through the yarn and pass outwardly into the room atmosphere through the opening between the open sides of the housings.

3. In yarn drying apparatus, a framework, a plurality of lower rollers mounted in spaced parallel relation in the framework, a plurality of upper rollers mounted in spaced parallel relation and being disposed above the spaces between the lower rollers, so that yarn can be passed beneath the lower rollers and above the upper rollers successively through the apparatus, the rollers being made of a metal which has high heat absorbing qualities, an upper imperforate hood covering the upper rollers, and having its lower side open, an open-topped lower hood disposed below the lower rollers and having upwardly and outwardly inclined endwalls and sidewalls, providing an opening similar in shape but lesser in size than the open lower side of the upper hood, a baffle plate in the lower central portion of the lower hood for directing blasts of air upwardly, a duct leading from each end wall of the lower hood, a heating and blowing mechanism in each duct for forcing air into the lower portion of the lower hood, up into the upper hood and causing it to spill into the atmosphere by passing through the openings between the edges of the upper and lower hoods.

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