May 9, 1933. D. GESSNER 1,907,786

CLOTH DRYING APPARATUS

Filed Dec. 5, 1930 3 Sheets-Sheet 1

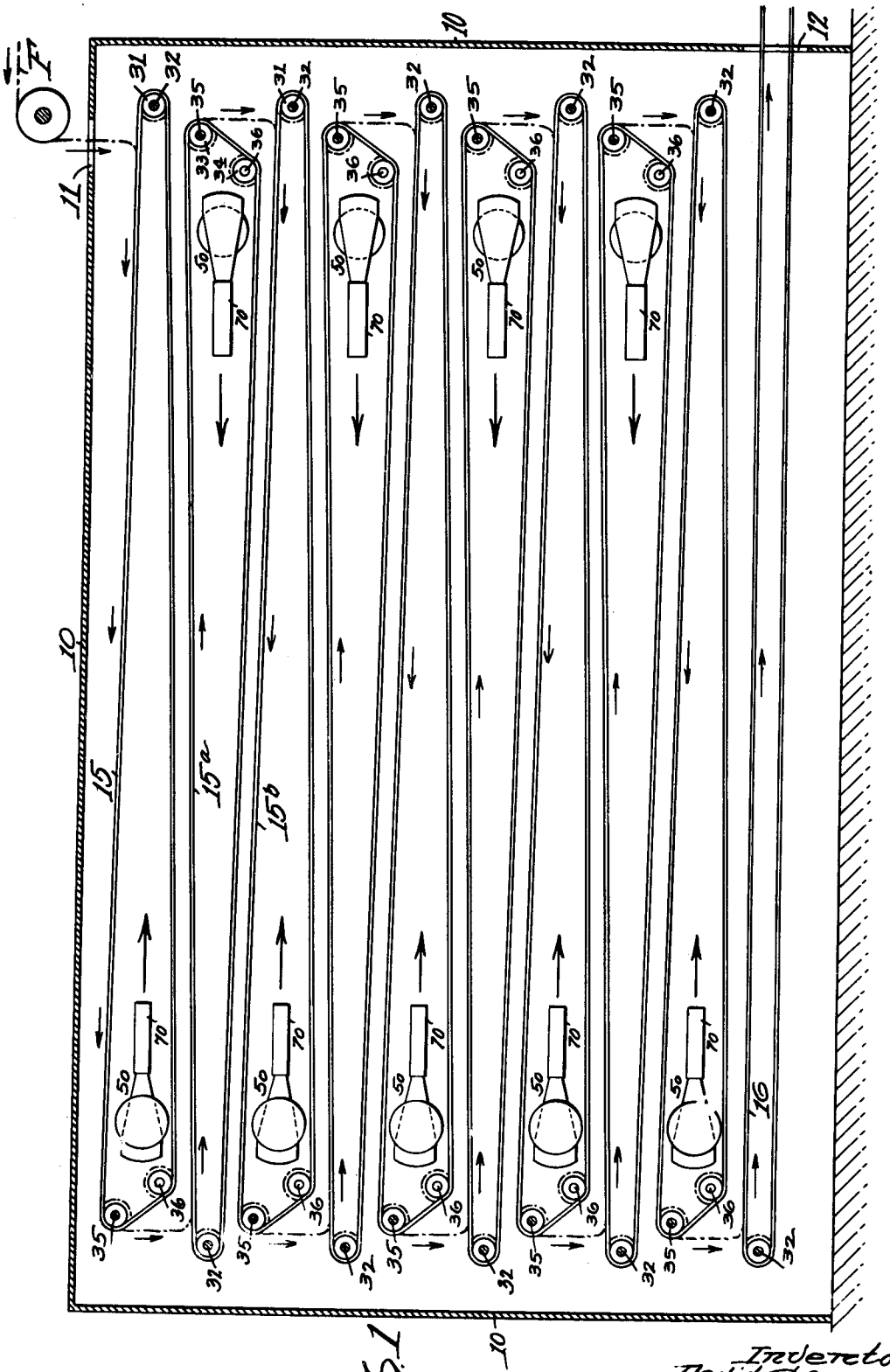

Fig. 1

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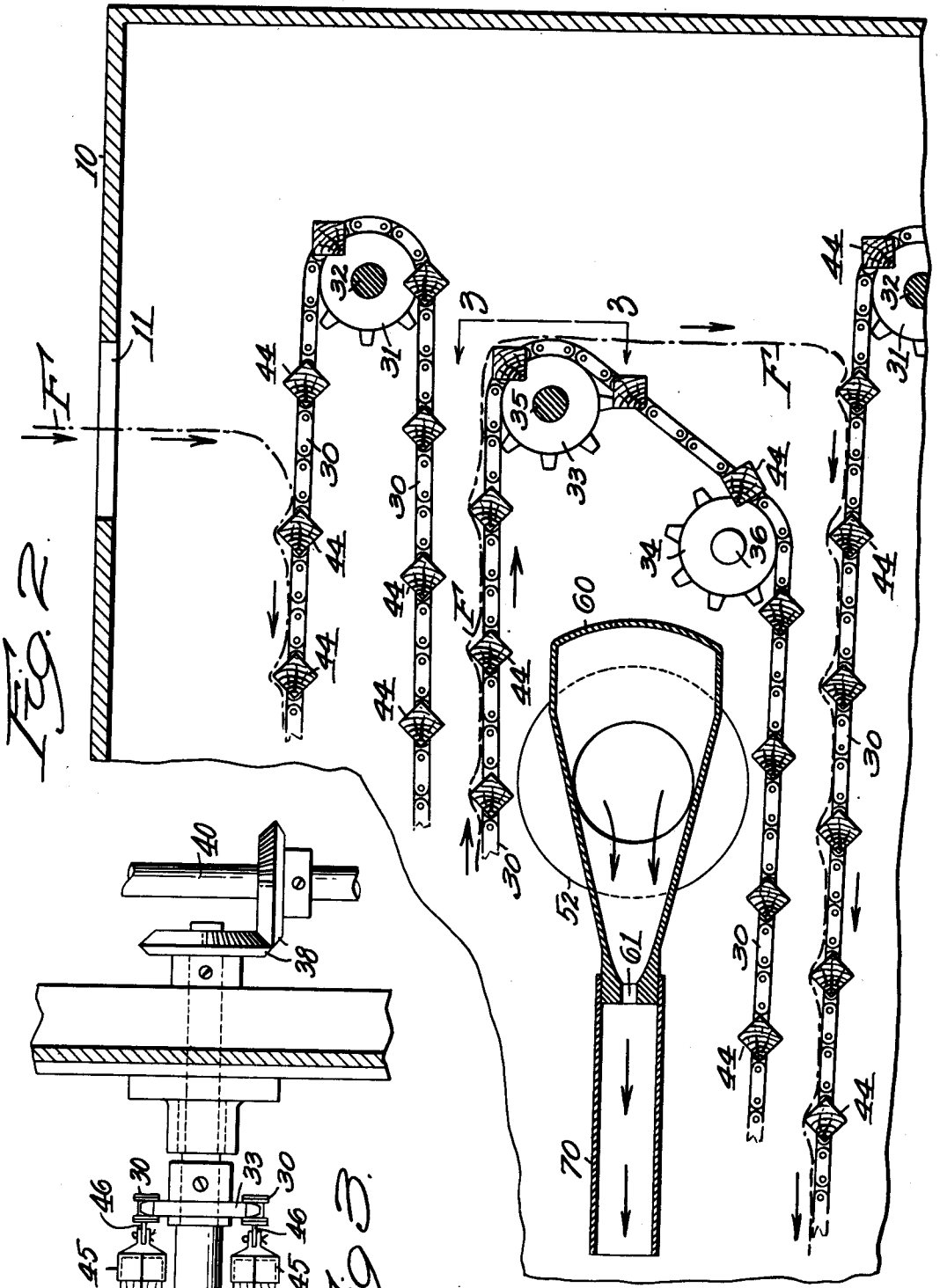

Fig. 2.

Fig. 3.

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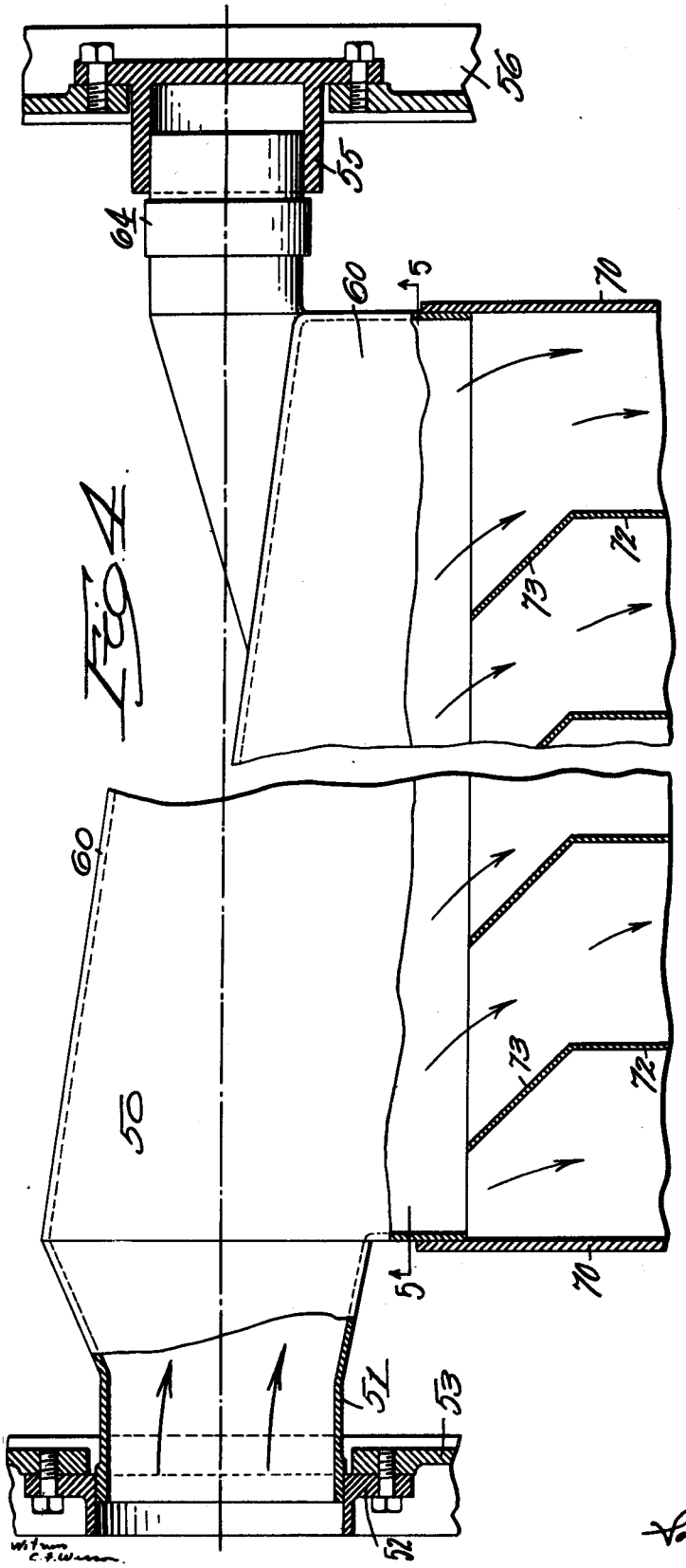

Fig. 4.

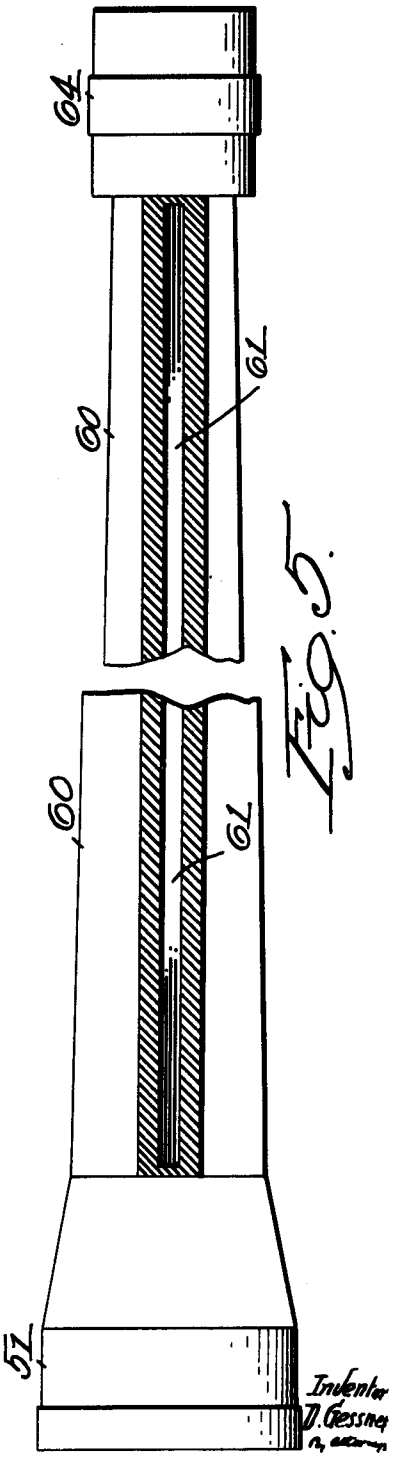

Fig. 5.

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UNITED STATES PATENT OFFICE

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CLOTH DRYING APPARATUS

Application filed December 5, 1930. Serial No. 500,333.

This invention relates to apparatus for use in drying cloth or other fibrous materials. For effective drying and complete shrinkage of a fabric, both longitudinally and transversely, it is necessary that the fabric be conveyed through the drying apparatus substantially without tension and to this end it is customary to deposit the fabric loosely on a conveying apron or on a series of such aprons successively.

Difficulty has been encountered in the operation of such machines, due to the fact that the current of warm air used for drying purposes sometimes lifts a light weight fabric from the conveying apron and causes it to shake or flutter in the machine. When such a piece of cloth falls back on the apron, it is frequently disarranged and folded under along the edges or in other parts. As this folded or disarranged fabric is then deposited on successive conveying aprons, the folding or tangling of the cloth increases and the cloth is sometimes delivered from the drying machine almost in rope form and with many folds and wrinkles.

It is the general object of my invention to provide a machine in which such light weight fabric may be effectively dried and shrunken in a flat condition and without lifting from the conveying apron or fluttering to an extent by which folds or wrinkles may be formed in the fabric.

Further objects of my invention are to provide an improved means for supplying air to such a machine and an improved construction of conveying apron.

My invention further relates to arrangements and combinations of parts which will be hereinafter described and more particularly pointed out in the appended claims.

A preferred form of the invention is shown in the drawings, in which

Figure 1 is a sectional side elevation of a drying apparatus embodying my improvements;

Fig. 2 is an enlarged sectional side elevation of a portion of the drying apparatus;

Fig. 3 is a sectional end elevation of certain driving mechanism, taken along the line 3—3 in Fig. 2;

Fig. 4 is a plan view, partly in section, of the air-supplying connections; and

Fig. 5 is a sectional side elevation, taken along the line 5—5 in Fig. 4.

Referring to Fig. 1, my improved drying apparatus comprises a casing 10 having an elongated feed opening 11 in the top of the casing and extending crosswise thereof. A similar delivery opening 12 is provided near the bottom of one end wall of the casing. A series of conveying aprons 15 are mounted in superposed series in the casing 10, the direction of movement of alternate aprons being reversed, as indicated by the arrows.

The fabric F enters the apparatus through the feed opening 11 and is deposited loosely and at full width on the upper run of the conveyor 15. The fabric F travels to the left in Fig. 1 on the conveyor 15 until it reaches the left hand end thereof, at which point it drops freely and loosely on to the upper run of the second conveyor 15^a, which, as previously stated, travels in the opposite direction and carries the fabric to the right in Fig. 1 to the end of the conveyor, where it is deposited upon a third conveyor 15^b by which it is again carried to the left.

The cloth is thus conveyed back and forth through the apparatus by the nine drying conveyors shown in the drawings and is finally deposited upon a delivery conveyor 16 by which it is carried out of the apparatus through the delivery opening 12.

It will be noted that the driving of adjacent conveyors in opposite directions produces the result that the adjacent runs of the conveyors are in the same direction, that is—the lower run of the first conveyor 15 and the upper run of the second conveyor 15^a both travel to the right, while the lower run of the conveyor 15^a and the upper run of the conveyor 15^b both travel to the left.

With this construction, the fabric is at all times carried between parallel conveyor surfaces which are both moving in the same direction with the fabric and which are so closely adjacent that the fabric cannot lift far enough from the supporting conveyor surface to become folded, entangled or disarranged. If the fabric is of such light weight that it has

a tendency to lift or flutter, it simply falls back into place after such slight lifting as can occur, and no undesirable effects are produced.

It will be noted that the receiving end of each conveyor projects beyond the delivery end of the conveyor above, so that the cloth is always deposited on the upper run of the receiving conveyor.

The detailed construction of the conveyors is clearly shown in Figs. 2 and 3, in which it appears that each conveyor comprises side chains 30 passing over sprockets 31 on a shaft 32 at the receiving end of the conveyor and passing over sprockets 33 and 34 on shafts 35 and 36 at the delivery end of each conveyor. Each driving shaft 35 is connected by bevel gears 38 (Fig. 3) to an upright driving shaft 40. The sprockets 31 and 34 are merely guide-sprockets and not driven but turn idly on their supports.

The apron surface in my improved apparatus is formed of a succession of cross rods or sticks 44, the ends of which are received in sockets or caps 45 (Fig. 3) pivotally connected to lugs 46 projecting laterally from certain of the links forming the side chains 30. In the construction shown in the drawings, a cross bar or stick 44 is provided for every third link of the chain.

The chains and their driving connections are so disposed and adjusted that a cross bar or stick 44 in each upper run of a conveyor will be disposed substantially under the space between two adjacent sticks 44 in the lower run of the conveyor immediately above, as clearly shown in Fig. 2. Consequently if the fabric F tends to rise or flutter on the conveyor, it immediately encounters a cross bar or stick 44 on the overlying conveyor and is prevented from rising far enough to do any harm.

It will be noted that the fabric in its passage through the machine is at all times loosely disposed at full width and without tension, lying in a series of loops or scallops between adjacent cross bars 44.

The guide sprockets 34 are spaced downward and rearward from the driving sprockets 33, as indicated in Fig. 2, thus providing clearance for the cloth as it falls to the next conveyor and also providing an increased distance between the upper and lower conveyor runs, forming a space in which the air-admitting devices 50 may be installed.

Each such device 50 comprises an entrance member 51 (Fig. 4) having a flanged end portion 52 mounted for angular adjustment on the side wall 53 forming part of a system for supplying heated air under more or less pressure.

The device 50 also includes a spout or delivery portion 60 which is provided with an elongated narrow slot or discharge opening 61 extending substantially throughout the width of the cloth conveyor. The portion 60 is decreased in section both vertically and horizontally from left to right, as viewed in Figs. 4 and 5, being of larger cross section at the end to which the supply of air is delivered. The decrease in section is substantially in proportion to the distance from the supply member 51.

The delivery member 60 is provided with a bearing portion 64 fitting in a flanged cap 55 mounted on a suitable support 56 in alignment with the member 51 and also adjustable angularly on its support.

A distributing member or nozzle 70 fits snugly over the discharge end of the spout 60 and delivers the air to the space between the conveyor runs. The nozzle 70 is provided with partitions or baffle plates 72, spaced throughout its width and having portions 73 thereof inclined toward the supply member 51, as clearly shown in Fig. 4.

The gradual reduction in section of the spout 60, together with the provision of the baffle plates 72—73 in the nozzle 70, accomplishes a substantially even distribution of warm air to all portions of the conveyor and the cloth supported thereon.

By turning the air admitting device 50 angularly about the axis of the flange 52 and cap 55, the spacing of the nozzle from the operative upper run of the conveyor may be adjusted.

Having described the details of construction of my improved drying apparatus, it will be seen that I have provided a series of superposed conveyors so positioned relatively to each other that the cloth is at all times carried between upper and lower conveyor runs both moving in the same direction and spaced so closely together that objectionable lifting of the cloth from the conveyor is rendered impossible.

The air-admitting device or spout 50 with its long nozzle 70 must of necessity be of liberal proportions because it has forced through it a very large amount of moderately warm air which must be distributed over the entire length of the cloth resting upon the slat apron within the loop of which the spout 50 is located. The warm air must reach to the further end of the apron where the cloth falls upon it when it leaves the apron immediately above it.

By causing the apron to travel a triangular course, I make room at the base of the triangle for the commodious air spout and bring the return run of the apron into parallelism with and close proximity to the upper or onward run of the apron immediately below it, leaving only a narrow air space between the runs. As the slats of the apron are staggered, as previously described, the current of air racing in full width along the surface of the oncoming cloth can never lift

it enough to flop it over and disarrange it seriously.

I have also provided means for driving all of the conveyors at the same uniform speed and for introducing warm air under pressure in such a manner that it is evenly distributed throughout the width of the fabric to be dried and at numerous points in the travel of the fabric through the machine,

I am thus able to dry a fabric quickly and uniformly, at the same time shrinking the fabric to the fullest extent and effectively preventing folding or wrinkling of the fabric in its passage through the machine.

Having thus described my invention and the advantages thereof, I do not wish to be limited to the details herein disclosed, otherwise than as set forth in the claims, but what I claim is:—

1. A drying apparatus comprising a plurality of superposed conveyors positioned to successively receive the material to be dried, each conveyor forming a closed loop and traveling in a substantially triangular path, with the upper and lower runs more widely separated at one end, the lower run of each conveyor being substantially parallel to and closely adjacent to the upper run of the next lower conveyor and forming an operative couple therewith, means to drive said conveyors so that the two adjacent runs of each couple move in the same direction and at substantially the same speed, and means interposed between the upper and lower runs of each conveyor and at the larger end of the triangular path thereof through which warm air is admitted to each conveyor and is directed lengthwise of the conveyor runs.

2. The combination in a drying apparatus as set forth in claim 1, in which a single guide roll is provided for each conveyor at the small end of its triangular path and a pair of vertically spaced guide rolls at the opposite end of said path.

3. The combination in a drying apparatus as set forth in claim 1, in which a single guide roll is provided for each conveyor at the small end of its triangular path and a pair of vertically spaced guide rolls at the opposite end of said path and in which the lower of said pair of guide rolls is offset toward the center of length of the conveyor.

4. The combination in a drying apparatus as set forth in claim 1, in which the triangular paths of adjacent conveyors are oppositely disposed in said apparatus.

5. A drying apparatus comprising a plurality of superposed conveyors positioned to successively receive the material to be dried, each conveyor forming a closed loop and traveling in a substantially triangular path, with the upper and lower runs more widely separated at one end, the lower run of each conveyor being substantially parallel to and closely adjacent to the upper run of the next lower conveyor and forming an operative couple therewith, means to drive said conveyors so that the two adjacent runs of each couple move in the same direction and at substantially the same speed, and means interposed between the upper and lower runs of each conveyer and at the larger end of the triangular path thereof through which warm air is admitted to each conveyor and is directed lengthwise of the conveyor runs, said air admitting means being of greater height than the distance between the runs of the conveyor at the small end of its triangular path.

6. In a drier having a plurality of superposed conveyors positioned to successively receive material to be dried and each traveling in a closed path, an air-distributing device positioned between the runs of a conveyor and comprising a spout gradually reduced in cross section from its inlet end and having a relatively narrow opening extending along one side of said spout, and a nozzle sleeve mounted on said spout and extending a substantial distance in the direction of air flow therefrom.

7. In a drier having a plurality of superposed conveyors positioned to successively receive material to be dried and each traveling in a closed path, an air-distributing device positioned between the runs of a conveyor and comprising a spout gradually reduced in cross section from its inlet end and having a relatively narrow opening extending along one side of said spout, and a nozzle sleeve mounted on said spout and extending a substantial distance in the direction of air flow therefrom, said sleeve being of substantially greater interior cross section than said nozzle opening.

8. A drying apparatus comprising a plurality of superposed conveyors positioned to successively receive web material to be dried, each conveyor having an upper and a lower run, the lower run of each conveyor being substantially parallel to and closely adjacent to the upper run of the next lower conveyor, each conveyor being formed of a pair of side members and a plurality of spaced cross bars carried thereby, and means to drive said conveyors at substantially the same speed and with the cross bars in adjacent runs of adjacent conveyors maintained in staggered relation to each other, whereby the web will be restrained against serious disarrangement by air currents passing thereover.

In testimony whereof I have hereunto affixed my signature.

DAVID GESSNER.