

No. 675,070.

Patented May 28, 1901.

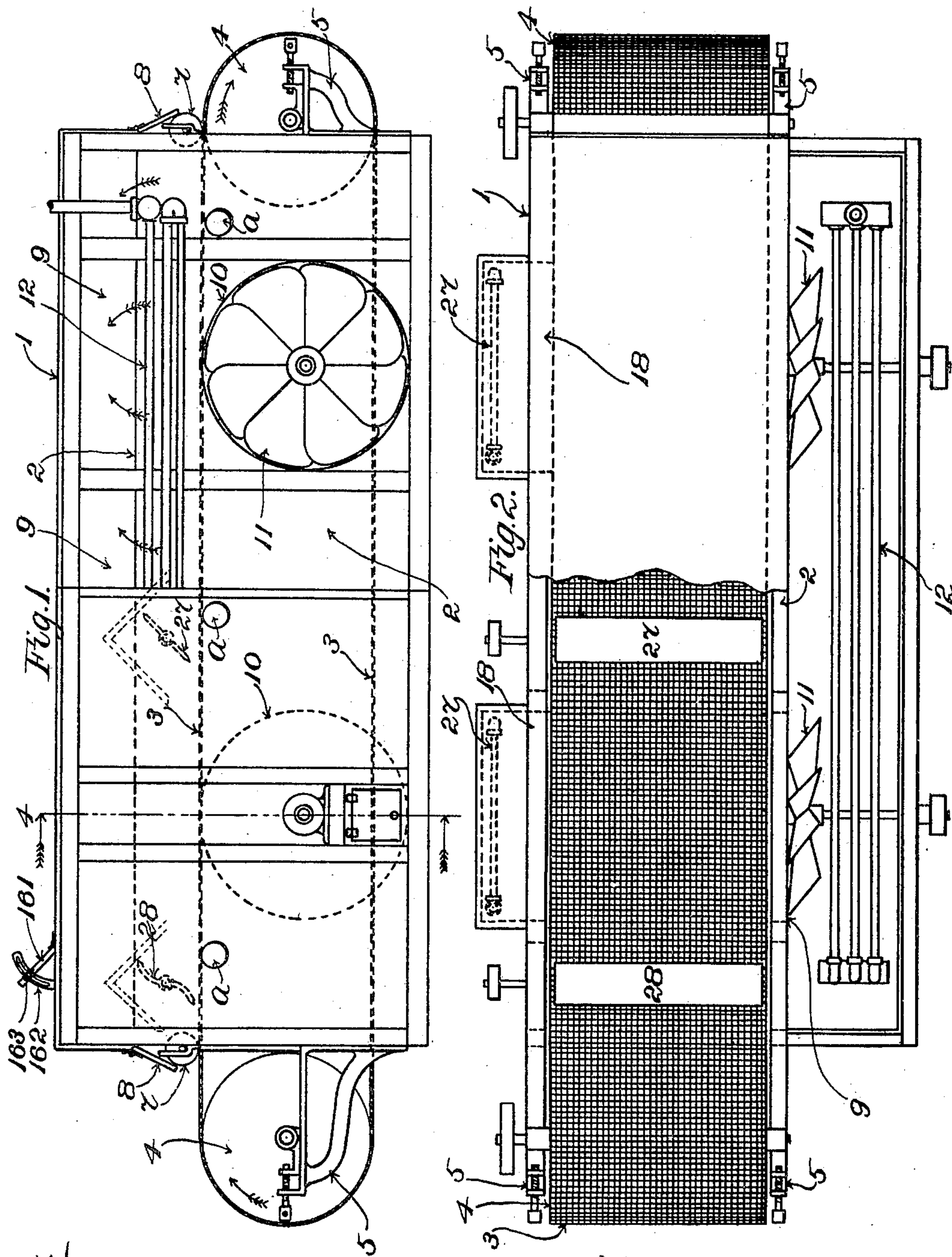
F. G. SARGENT.

DRIER.

(Application filed May 15, 1899.)

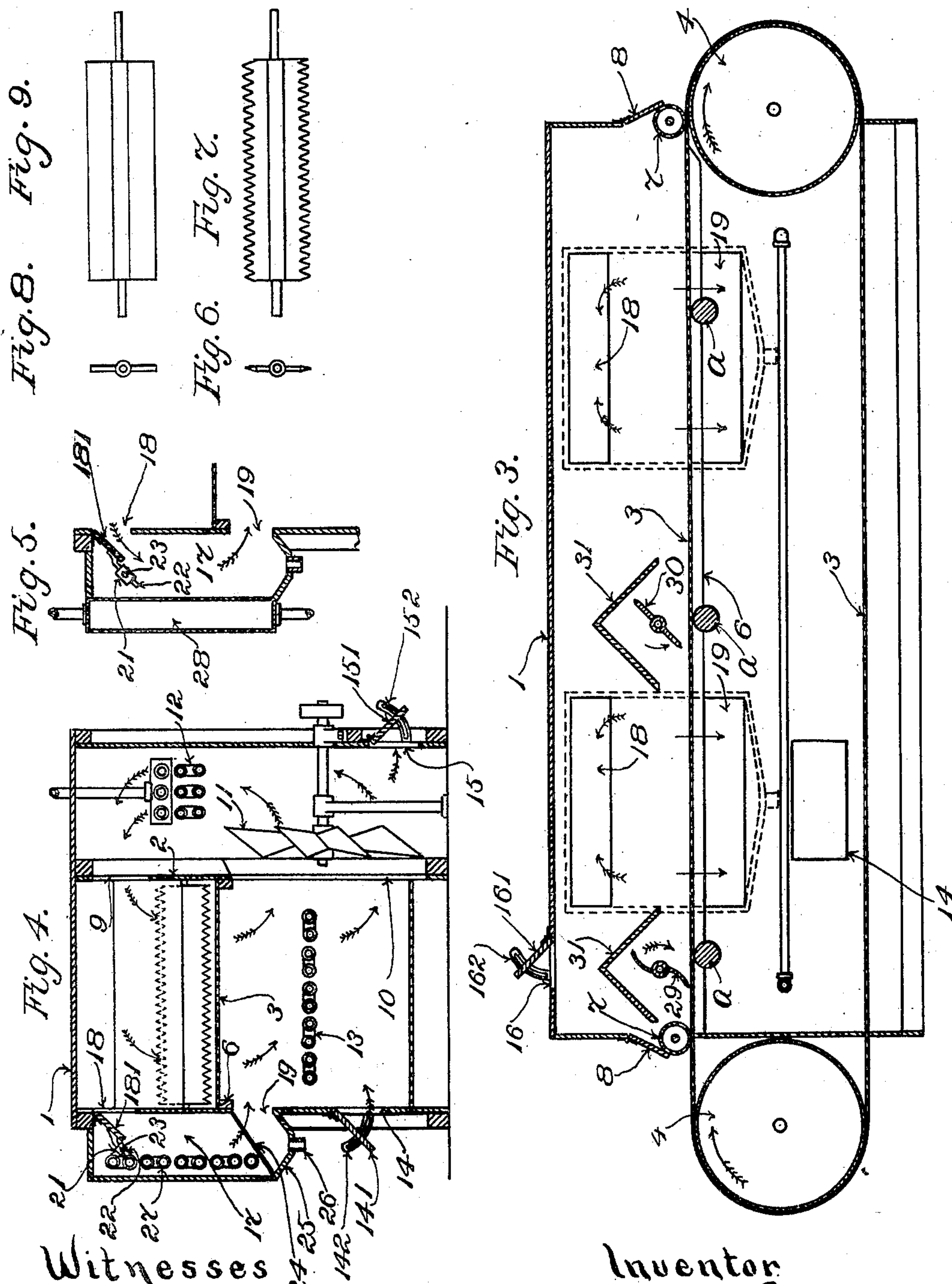
(No Model.)

2 Sheets—Sheet 1.



Witnesses
Oscar F. Keill
Levin Hall Rice

Inventor
Frederick G. Sargent
by Macleod Calver & Russell
his Attorneys



Witnesses
Oscar F. Hill
Lepine Hall Rice

Inventor
Frederick G. Sargent
by Mueloed Calver & Randall
his Attorneys

UNITED STATES PATENT OFFICE.

FREDERICK G. SARGENT, OF GRANITEVILLE, MASSACHUSETTS.

DRIER.

SPECIFICATION forming part of Letters Patent No. 675,070, dated May 28, 1901.

Application filed May 15, 1899. Serial No. 716,844. (No model.)

To all whom it may concern.

Be it known that I, FREDERICK G. SARGENT, a citizen of the United States, residing at Graniteville, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Driers, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to machines for drying wool, cotton, and other fibrous substances, and more especially to driers in which the construction comprises, essentially, a chamber or closed compartment through which currents of air are circulated by suitable means and in which chamber or compartment the material to be dried is supported on an open-work screen, so as to be exposed as much as possible to the evaporating power of such currents.

The particular species of drier to which some of my improvements are especially applicable and in connection with which my invention is herein presented is that wherein the screen moves through the drying-chamber, the material that requires to be dried being deposited upon such traveling screen at one portion of the machine and being removed or delivered therefrom at another portion of the machine. The form of traveling screen that is shown and described herein is that usually employed—namely, it consists in an endless reticulated belt or apron running over drums that are located at or near the opposite ends of the drying-compartment. Upon this apron is delivered automatically or by hand a bat or layer of fibrous or other material impregnated with moisture, and the same is submitted during its progress through the machine to the currents of air aforesaid.

My invention comprises various features of improvement, as presently will be disclosed, and first will be described with reference to the accompanying drawings, in which latter I have represented the same practically embodied, after which the said features will be particularly pointed out and distinctly defined in the claims at the close of this specification.

In the drawings, Figure 1 is a side elevation of a drier embodying my improvements, a portion of the casing being removed. Fig.

2 is a plan of the drier with certain portions removed. Fig. 3 is a vertical longitudinal section of the said drier. Fig. 4 is a view mainly in vertical cross-section on the line 4 4 of Fig. 1 looking in the direction indicated by the arrows near the ends of such line. Fig. 5 is a sectional detail view showing a modification. Figs. 6 and 7 are respectively end and side elevations of one form of beater or revolving tedder. Figs. 8 and 9 are respectively end and side elevations of another form of beater or revolving tedder.

The casing 1 of the machine forms two main compartments which are separated from each other by a partition 2, extending lengthwise of the machine. The compartment that is at the left-hand side in Fig. 4 is the drying-chamber and contains the traveling apron 3. The latter extends from end to end of the chamber and runs over large drums 4 4. These may be mounted on brackets 5 5, extending from the ends of the machine in the customary manner. The upper or loaded run of the apron may be sustained by sliding at its edges on cleats 6 6, and supporting-rolls *a* may be employed, if desired. Where the apron enters and leaves the drying-chamber are shown the usual sliding rolls 7 7, which, in conjunction with the usual hinged flaps 8 8, allow of the entrance and exit of the stock on the apron, while confining the air within the chamber from escape. The direction of travel of the apron is indicated by arrows within the drums 4 4 in Figs. 1 and 3. Above and below the apron—*i. e.*, the upper run thereof—there are openings in the partitions 2, affording communication between the compartments which are located on the opposite sides of the said partition. Those openings which are located above the apron are designated 9 9, while those which are located below the said upper run of the apron are designated 10 10. These openings 9 and 10 afford an opportunity for the air contained in the drier and set in motion by means such as presently will be described to follow a circular course, as by passing from the outer or right-hand chamber or compartment in Fig. 4 into the drying-chamber through one set of openings and out again into said right-hand compartment through the other set. In the openings 10 10 (or it may be at any other

point in the course of the air-current) are set fans 11 11, whereby the continuous circulation of the air is maintained. These fans may in practice be rotated in either direction, according to the direction in which it is required to cause the air to circulate. Thus according to the direction in which the fan is rotated the air will be caused to pass upwardly through the material under treatment or the air will be caused to travel in the reverse direction, so as to pass downward through the said material. With some kinds of stock the best results are attained by causing the air to be drawn downward through the same, as in the drawings, wherein the courses of the air-currents are indicated by arrows. The said arrows indicate the said currents as passing out of the drying-chamber through the openings 10 10 below the upper run of the apron 3 and as entering the said chamber again through the upper openings 9 9. Coils of steam-pipes 12 or other heating arrangements may be located at any convenient point or points in the circulatory current of air—usually in the outer chamber or compartment, where shown—for the purpose of producing the proper temperature of the said current.

In the sides and top of the casing are formed openings to permit of the admission and exit of air when desired, those in the opposite sides of the casing being designated 14 and 15, while that in the top is designated 16. The respective openings 14 and 15 serve to permit the entrance or escape of the air, according to the directions in which the fans are rotated and in which the air circulates. The said openings 14, 15, and 16 have combined therewith hinged doors or dampers 141, 151, and 161, by adjustment of which the amount of air which is permitted to enter or escape may be regulated. For convenience in effecting adjustment of the said doors or dampers slotted quadrants are provided, as at 142, 152, and 162, the doors or dampers having clamping-bolts working in the slots of the said quadrants, as illustrated at 163 in Fig. 1, whereby the doors or dampers may be secured in any required position.

In practice when the air-currents are caused to blow downward upon the stock in the upper run of the apron 3 they have a tendency to mat the said stock. For the purpose of obviating this tendency by relieving any excessive pressure upon the said stock, as well as in order to enhance the drying capacity of the machine, I provide an opening 18 opposite each opening 9, the said opening communicating with a by-passage 17, which leads to a lower opening 19, this last communicating with the drying-chamber below the upper run of the apron 3. The opening 18, by-passage 17, and opening 19 afford an opportunity for a portion of the air entering the drying-chamber through opening 9 to escape from the upper portion of the drying-chamber through the said by-passage and to re-

enter the drying-chamber again below the said upper run of the apron, as indicated by arrows in Fig. 4. The effect is to divide the air that is forced into the drying-chamber at each opening 9 into two currents, the one passing directly through the material that is spread upon the upper run of the apron, while the other traverses the by-passage and reenters the drying-chamber on the opposite side of the said material. Thereby the downward pressure upon the material carried by the apron and tendency to mat such material are reduced, and at the same time the material upon the apron is partially dried from beneath in consequence of the circulation below the upper run of the apron of the current which has traversed the by-passage and found its way back into the drying-chamber through the opening 19. For the purpose of regulating the proportion of air which passes through the by-passage 17 and insuring that the air shall penetrate the material resting on the apron 3 I provide the opening 18 with a movable damper 181 in the form of a hinged door. Preferably I render this damper automatically adjustable by applying to an arm 22 thereof a weight 21, which is held at the desired point on the said arm by a clamping-screw 23. This weight tends to move the damper 181 in a direction to close the opening 18 against the outward pressure of the air that is being forced into the drying-chamber. As such pressure decreases the damper closes, so as to insure that a proper proportion of the air shall pass through the material resting on the apron. As such pressure increases the damper yields and permits an increased proportion to find its way through the by-passage. This automatic damper therefore insures that the air shall penetrate properly through the mass of material to be dried, while relieving any excess of pressure. By adjustment of the weight 21 along arm 22 the damper may be regulated to swing under any predetermined pressure.

In connection with the by-passage I provide means of condensing from the air traveling through the same a portion of the moisture which is in suspension therein. Thus Fig. 4 shows a coil of pipes 27. Fig. 5 shows a water-back 28. Both of these will be cooled by means of running water caused to pass there-through. 25 designates a trough for collecting the condensed moisture, and 26 a drip-pipe for permitting the discharge thereof. With the same end in view—namely, that of condensing a portion of the moisture from the air which finds its way through the by-passage—I employ in the said by-passage, either alone or in conjunction with the coil of pipes 27 or the water-back 28, the perforated, foraminated, or reticulated metallic condensing-screen 24, Fig. 4. This screen preferably is formed of woven-wire cloth. It extends across the by-passage below the coil of pipes 27 in Fig. 4. It occupies an inclined position, as shown, in order to enable the

drops of water condensing thereon to run off readily.

For the purpose of opening up the material which is being transported through the drying-chamber on the apron 3 I employ one or more revolving beaters or tedders 29 and 30. These are driven in any suitable manner. The blades of these beaters may be either curved or flat in cross-section, and the edges thereof may be either serrated, as in Figs. 4, 6, and 7, or plain, as in Figs. 8 and 9. I designate hoods above the said revolving beaters or tedders for the purpose of preventing the stock from flying too far under the action of the beaters or tedders

For use in connection with cotton the blades of the tedders are made of a non-metallic material in order to guard against danger of fire resulting from the striking of such blades against hard substances in the cotton.

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

1. In a drier, the combination of a drying-chamber, a screen therein for supporting a layer of the material to be dried, means for causing air to circulate through the said drying-chamber, and pass through the stock on the screen, an outlet from the said chamber, and a conduit opening into the said chamber on the same side of the screen as the said outlet, whereby a current of fresh air may be caused to flow across the surface of the material on the screen.

2. In a drier, the combination of a drying-chamber, a screen therein for supporting a layer of the material to be dried, means for causing air to circulate through the said drying-chamber and pass downward through the stock on the screen, an outlet from the said chamber below the said screen, and a conduit opening into the said chamber below the said screen, whereby a current of fresh air may be caused to flow across the lower surface of the material on the screen.

3. The improved drier comprising essentially the drying-chamber, the screen therein, means for causing air to circulate through the said drying-chamber and pass through the stock on the screen, and a by-passage leading from the upper side of the screen to the lower side thereof, whereby a portion of the air entering the drying-chamber above the screen is permitted to traverse the said by-passage, reënter the drying-chamber below the screen, and circulate across the under side of the latter, substantially as described.

4. The improved drier comprising essentially the drying-chamber, the screen therein, means for causing air to circulate through the said drying-chamber and pass through the stock on the screen, a by-passage leading from the upper side of the screen to the lower side thereof, whereby a portion of the air entering the drying-chamber above the screen is permitted to traverse the said by-passage, reënter the drying-chamber below the screen, and

circulate across the under side of the latter, and a pressure-regulating damper acting to maintain the desired pressure in the drying-chamber above the screen, substantially as described.

5. The improved drier comprising essentially the drying-chamber, the screen therein, means for causing air to circulate through the said drying-chamber and screen, a by-passage leading from the upper side of the screen to the lower side thereof, whereby a portion of the air entering the drying-chamber above the screen is permitted to traverse the said by-passage and reënter the drying-chamber below the screen, and the weighted damper acting to maintain the desired pressure in the drying-chamber above the screen, substantially as described.

6. The improved drier comprising essentially the drying-chamber, the screen therein, means for causing air to circulate through the said drying-chamber and screen, a by-passage leading from the upper side of the screen to the lower side thereof, whereby a portion of the air entering the drying-chamber above the screen is permitted to traverse the said by-passage and reënter the drying-chamber below the screen, and means combined with the said by-passage for condensing the moisture from the air on its way through the same, substantially as described.

7. The improved drier comprising essentially the drying-chamber, the screen therein, means for causing air to circulate through the said drying-chamber and screen, a by-passage leading from the upper side of the screen to the lower side thereof, whereby a portion of the air entering the drying-chamber above the screen is permitted to traverse the said by-passage and reënter the drying-chamber below the screen, and the perforated condensing-screen 24 extending across the said by-passage, substantially as described.

8. The improved drier comprising essentially the drying-chamber, the screen therein, means for causing air to circulate through the said drying-chamber and screen, a by-passage leading from the upper side of the screen to the lower side thereof, whereby a portion of the air entering the drying-chamber above the screen is permitted to traverse the said by-passage and reënter the drying-chamber below the screen, the condensing-coil applied to the said by-passage, and the perforated condensing-screen 24 extending across the said by-passage, substantially as described.

9. In a drier, the combination with the screen upon which the stock is spread, and means for supporting and moving the said screen, of the tedders working in the path of the stock carried by the said screen and operating to open up the said stock as it passes along, and the hoods in connection with the said tedders to confine the stock, substantially as described.

10. In a drier, the combination with the screen upon which the stock is spread, and

means for supporting and moving the said screen, of the revolving tedders working in the path of the stock carried by the said screen and operating to open up the said stock as it passes along, and the hoods in connection with the said tedders to confine the stock, substantially as described.

11. In a drier, the combination with the screen upon which the stock is spread, and means for supporting and moving the said screen, of the revolving tedders having serrated blades and working in the path of the stock carried by the said screen and operating to open up the said stock as it passes along, and the hoods in connection with the said tedders to confine the stock, substantially as described.

12. In a drier, the combination with the casing having within the same the drying-compartment and the fan adapted to be rotated in either direction, the said casing also

having openings communicating with the exterior at the opposite sides of the said fan and adapted to serve as inlets or outlets according to the direction in which the air is caused to circulate for the time being, an opening in the upper portion thereof to afford communication between the interior spaces and the exterior air, and dampers applied to the said openings, of the moving screen within the drying-compartment, and means for causing a circulation of air within the said casing, the said openings affording opportunity for the escape and entrance of predetermined quantities of air as regulated by the dampers, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

FREDERICK G. SARGENT.

Witnesses:

THOS. E. SYMMES,
ARTHUR E. DAY.