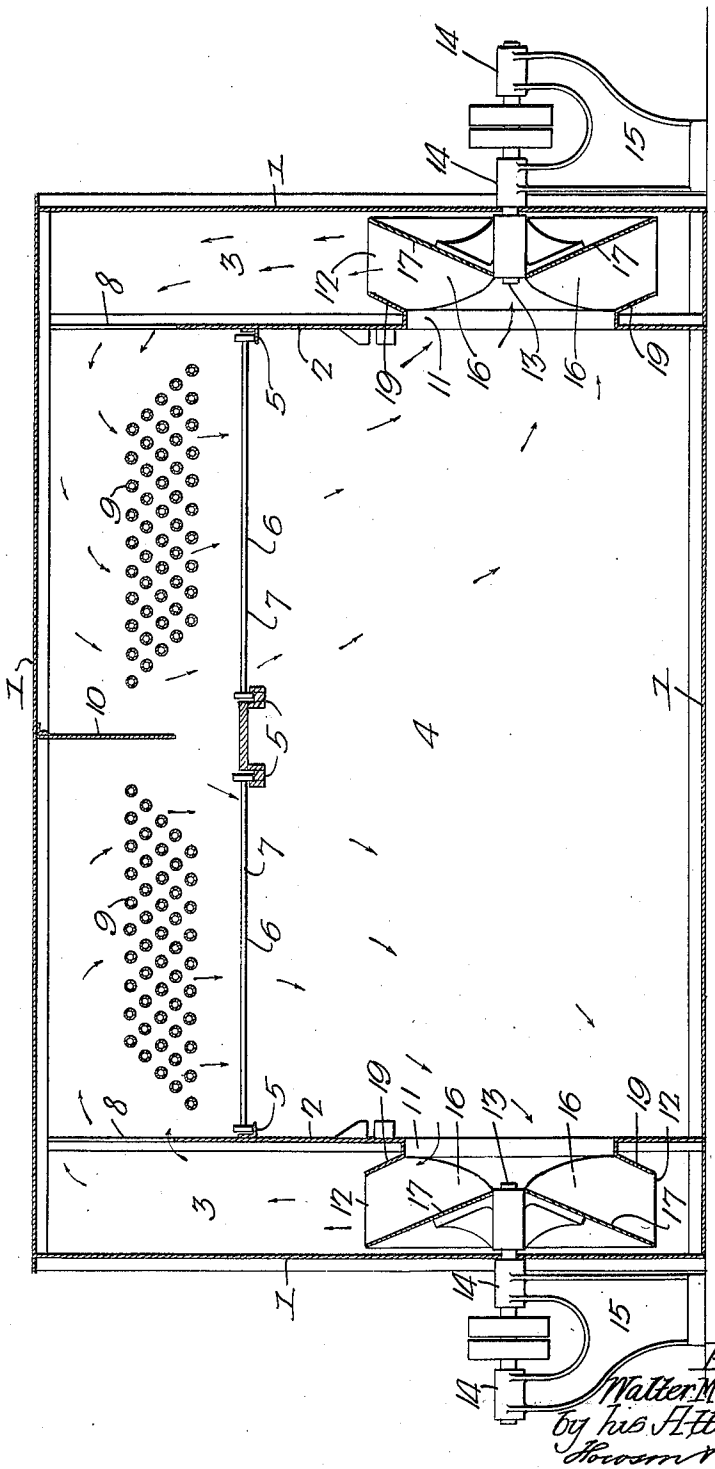
Oct. 28, 1924. 1,513,639

W. M. SCHWARTZ

DRIER

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Fig. 1.



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Fig. 2

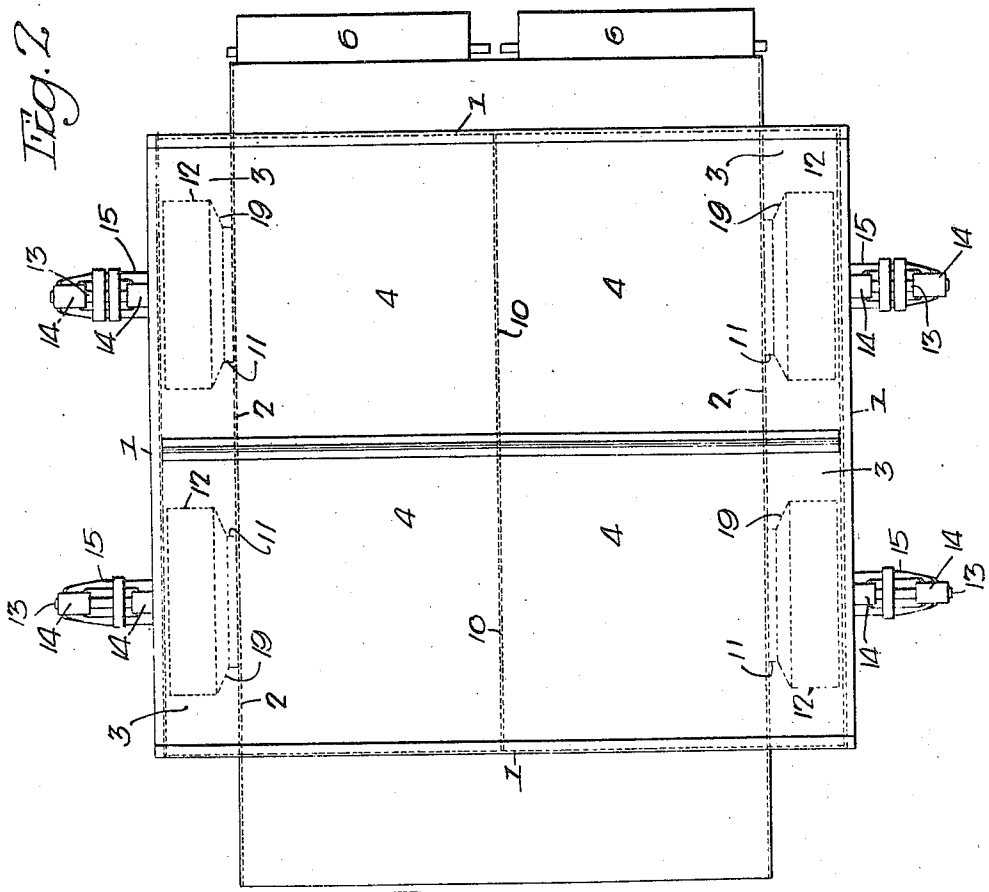
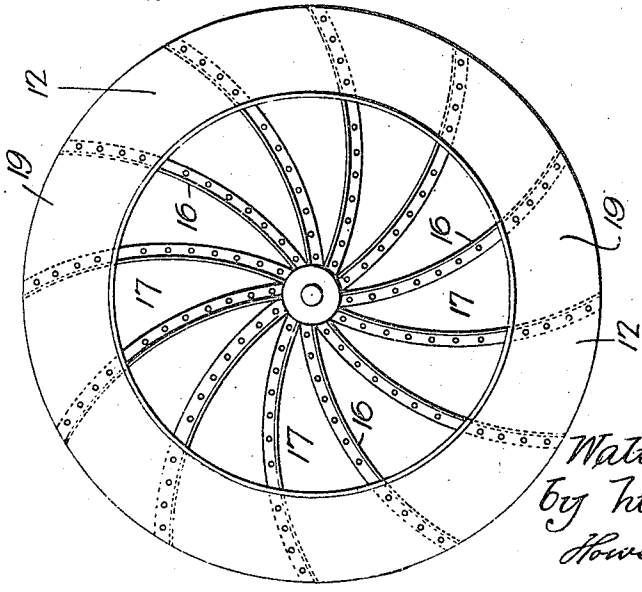


Fig. 5



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Fig. 3

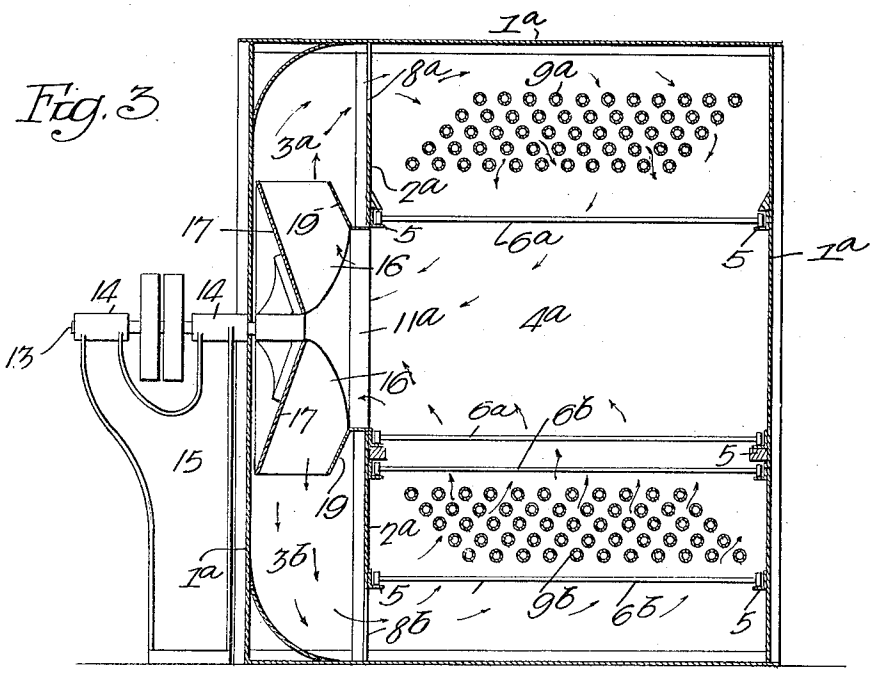
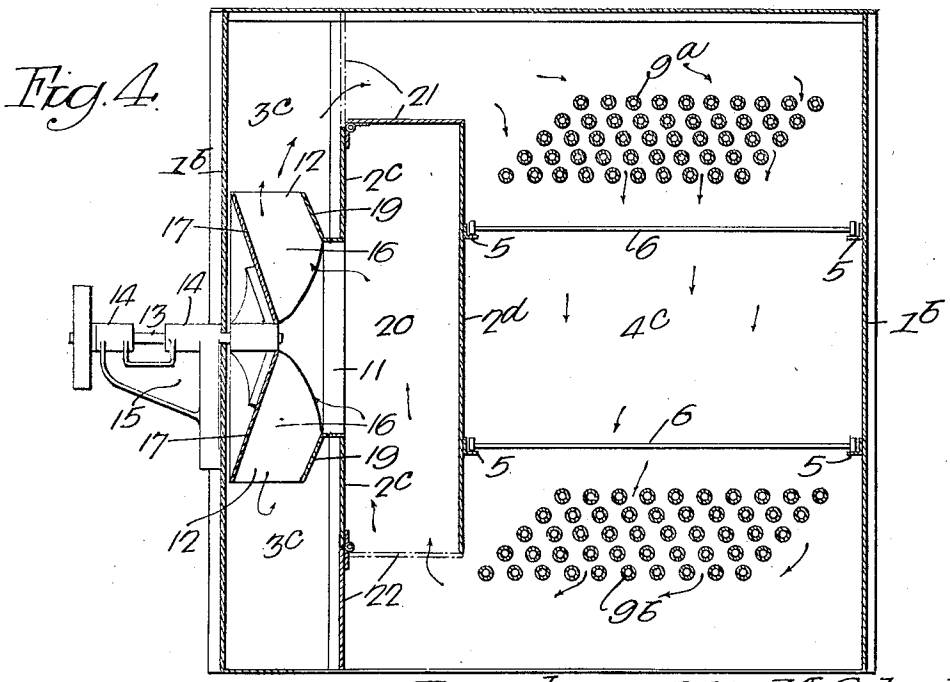


Fig. 4



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Patented Oct. 28, 1924. 1,513,639

UNITED STATES PATENT OFFICE.

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DRIER.

Application filed November 26, 1920. Serial No. 426,524.

To all whom it may concern:

Be it known that I, WALTER M. SCHWARTZ, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Driers, of which the following is a specification.

My invention relates to certain improvements in driers of the type in which material to be dried is located in a drying chamber and in which heated air is circulated through, or past, the material.

One object of my invention is to provide a drier with a certain type of fan which will properly circulate the air through the drying chamber and which will allow for the material reduction of the circulating passage which connects with the drying chamber.

A further object of the invention is to provide a fan on which the bearings can be located entirely outside of the casing and, consequently, can be kept cool even when the air in circulation is brought to a comparatively high temperature.

These objects I attain in the following manner, reference being had to the accompanying drawings, in which:

Fig. 1 is a transverse sectional view through a drier illustrating my invention;

Fig. 2 is a plan view of one type of drier with which my invention can be used;

Fig. 3 is a sectional view illustrating a form of drier in which the circulation is from top and bottom towards the center of the drier;

Fig. 4 is a view illustrating a modification in which the direction of circulation of air in the drying chamber may be reversed; and

Fig. 5 is a face view of the fan.

Referring to the drawings, 1 is the casing. 2, 2 are longitudinal partitions spaced from each side of the casing forming narrow circulating compartments 3. Between the two compartments is the drying chamber 4. In this drying chamber are rails 5 for the conveyers 6 carrying sticks 7 from which the material is hung, or trays—on which the material is supported—depending upon the character of the material to be dried.

The partitions extend short of the top of the casing so as to provide openings 8 for the circulation of air from the circulating chamber 3 to the upper portion of the drying chamber 4. In the upper portion of this chamber are heating pipes 9, preferably arranged comparatively close together and made so as to break up the currents of air as they pass down through the drying chamber and before the air reaches the material to be dried. At the center of the upper portion of the drying chamber is a short partition 10 extending from the roof of the drier to a point below the upper drying pipes 9 so that the air, circulating from each side of the drier, will be deflected and will be kept within a certain zone.

In each partition 2 are one or more openings 11 through which the air in circulation passes to the fans 12. These fans are mounted on shafts 13 adapted to bearings 14 carried by supports 15 mounted on the outside of the casing and preferably extending to the floor on which the drier is mounted. These fans are centrifugal fans having blades 16 and a conical deflecting disk 17, each fan having any number of blades 16, which are preferably curved and extend to a point near the opening 11, terminating at the periphery of the fan construction. A conical casing 19 forms, with the conical disk 17, a passage in the fan structure for the air.

By this arrangement, it will be seen that the air is drawn into the fan from the drying chamber through the opening 11 and the fan throws the air out at its periphery, as it rotates. The air passes up the circulating chamber 3 and through the openings 8 into the upper portion of the drying chamber, passing through the spaces between the heating tubes, where it is reheated and divided so as to break up the currents of air, and then flows through the material carried by the conveyers and again enters the fan.

A fan constructed in the manner hereinbefore described can be located in a comparatively narrow space, as the air is taken in at the front of the fan and escapes at the periphery. Furthermore, the shaft for the fans can be made comparatively short and the bearings can be located on the outside of the casing where they can be lubricated at all times, and, being on the outside of the casing, will remain cool even while the air in circulation is comparatively hot.

In Fig. 3, I have shown a modification,

the fan being of the type illustrated in Fig. 1. In this instance, the fan is located midway between the top and bottom of the drier casing 1^a and there are openings 8^a and 8^b in the partition 2^a.

As the air escapes at all points from the periphery of the fan, part of the air passes up in the circulating chamber 3^a through the openings 8^a into the upper portion of the drying chamber 4^a and between the series of heating pipes 9^a down through the material on the conveyer 6^a, returning to the fan through the opening 11^a, while another current of air passes through the circulating chamber 3^b through the opening 8^b at the bottom of the drier, up between the heating pipes 9^b and through the material carried by the conveyer 6^b. This conveyer can be made double, as shown in Fig. 3, so as to prevent the material being carried with the air to the fan, the conveyers being spaced a sufficient distance apart to allow the material to have a limited amount of movement as the air passes through it.

The drier shown in Fig. 3 is a single drier, while that illustrated in Fig. 1 is a double drier. The construction shown in Fig. 1 may be made as a single drier without departing from the essential features of the invention.

Fig. 4 is a view of a modification, showing the means for changing the direction of circulation of air in the drying chamber. This figure represents a single drier having one or more fans on one side only of the casing. 1^b is the casing. 2^c and 2^d are vertical partitions spaced apart and from the side walls of the casing, separating the circulating chamber 3^c from the drying chamber 4^c.

In the circulating chamber 3^c is the circulating fan. In the upper and lower portions of the drying chamber are heating pipes for heating the air in circulation. While two sets are shown, one set may be used in some instances.

The partitions 2^c and 2^d stop short of the top and bottom of the casing so that the circulating chamber and the intermediate chamber 20 communicate with the drying chamber.

In order to direct the air in circulating properly, I provide a pivoted damper 21, adapted to close either the intermediate passage 20 or the passage 3^c. At the bottom is a damper 22 adapted to close the passage 3^c or the intermediate passage 20.

As shown in Fig. 4, the dampers 21 and 22 close the upper portion of the intermediate passage 20, and the lower portion of the passage 3^c, so that the air circulates as indicated by the arrows. When the damper 21 is turned up, as shown by dotted lines in Fig. 4, it closes the passage 3^c and opens the intermediate passage 20 to the upper end of the drying chamber 4^a, while the damper 22, if moved as shown by dotted lines in said figure, closes the lower portion of the passage 20 and opens the lower portion of the passage 3^c so that the direction of circulation is reversed.

I claim:

1. The combination in a drier, of a casing a vertical partition therein separating a drying chamber from a narrow circulating chamber, said partition having two openings therein; a centrifugal fan located in the narrow circulating chamber opposite one of said openings; means for driving the fan so that air in circulation will be drawn from the drying chamber by the fan, the fan discharging the air from its periphery into the circulating chamber; means for heating the air; and means for supporting material to be dried in the drying chamber between the two openings.

2. The combination in a drier, of a casing; a vertical partition extending throughout the length of the drier, said partition having two openings, one above the other; means, for supporting material to be dried, located in the drying chamber between the two openings; a centrifugal fan located in the circulating chamber opposite one of said openings and arranged to draw air from the drying chamber and to discharge the air into the circulating chamber; means for heating the air; and bearings for the fan located outside of the casing.

3. The combination in a drier, of a casing; two vertical partitions in the casing a given distance from each side thereof, which separate narrow side, circulating chambers from a drying chamber, each of said partitions having two openings therein; a centrifugal fan located in each circulating chamber opposite one of said openings; a series of heating pipes located in the upper portion of the casing; and means for conveying material to be dried, said means being located below the heating pipes and above the openings in the partitions at the centrifugal fans.

4. The combination in a drier, of a casing; two longitudinal partitions located in the casing and spaced from the sides thereof to form two circulating passages and a central drying chamber; each partition having upper passages and a fan opening; a centrifugal fan located in each circulating passage and communicating with the drying chamber through the fan openings in the partitions; a central, short partition depending from the roof of the drier; a series of heating pipes in the drying chamber on each side of said partition; and two conveyers arranged side by side in the drying chamber below the heating pipes and above the fan openings so that the air in circulation will pass between the pipes through the material to be dried into the fan and through the cir-

culating passage to the upper portion of the drying chamber.

5. The combination in a drier, of a casing; a vertical partition within the casing separating a drying chamber from a circulating chamber; means for heating the air in circulation; means, in the drying chamber, for supporting the material to be dried; a centrifugal fan located in the circulating chamber and communicating with the drying chamber so as to draw air from the drying chamber and discharge it into the circulating chamber, said fan having a series of radial blades and a conical deflecting disk; a casing forming, with the disk, a contracted passage for the air; a shaft on which the fan is mounted; and bearings for the shaft on the outside of the casing.

6. The combination in a drier, of a casing enclosing a drying chamber, said casing having two openings; a centrifugal fan having its suction side opposite one of said openings; means for driving the fan so that air in circulation will be drawn from the drying chamber by the fan, the fan discharging the air from its periphery into the other opening; means for heating the air; and means for supporting material to be dried in the drying chamber between the two openings.

WALTER M. SCHWARTZ.