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EXHAUST FAN CONTROL FOR DRYING MACHINES

Filed Aug. 18, 1926

2 Sheets-Sheet 1

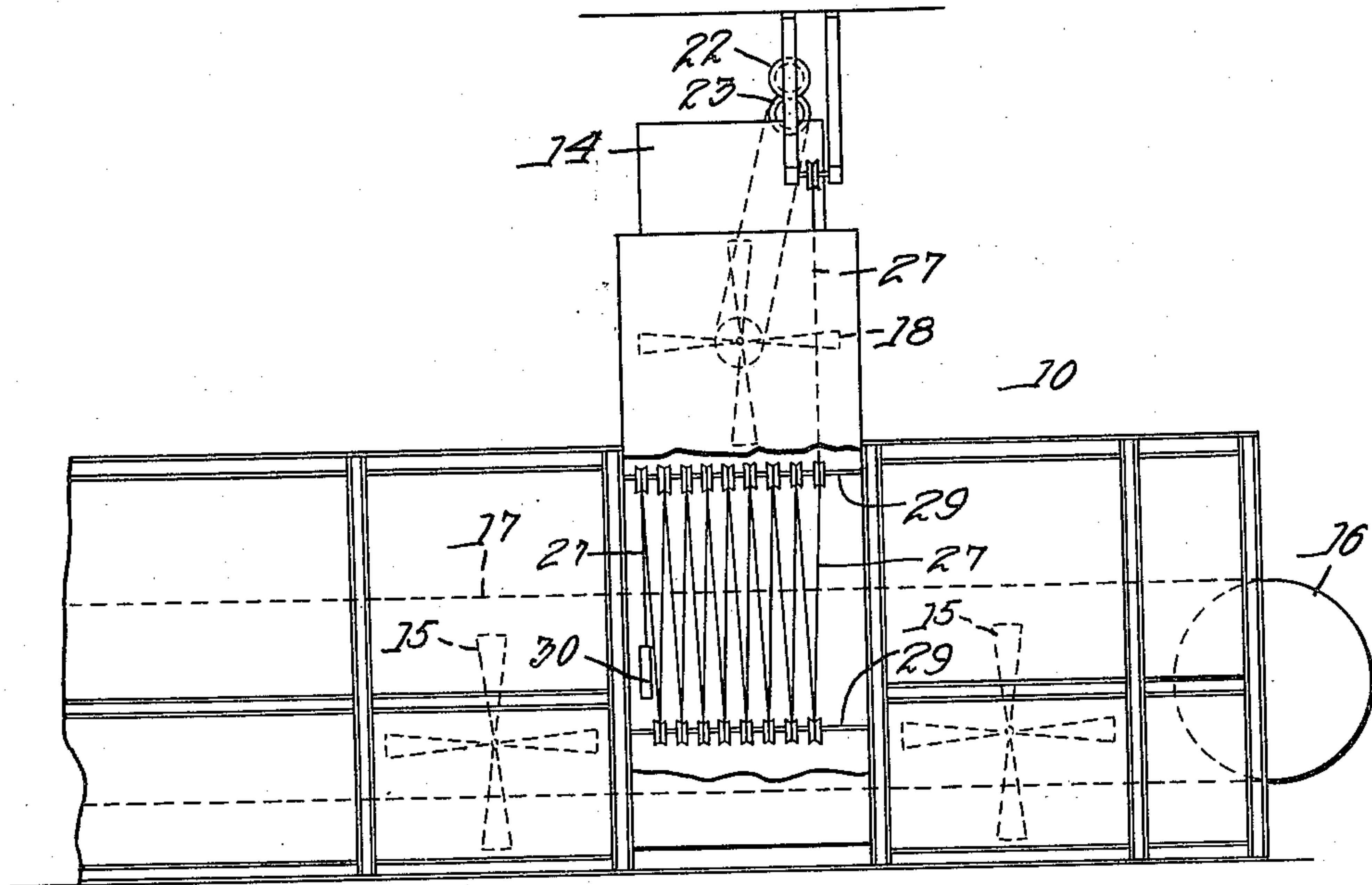


Fig. 1.

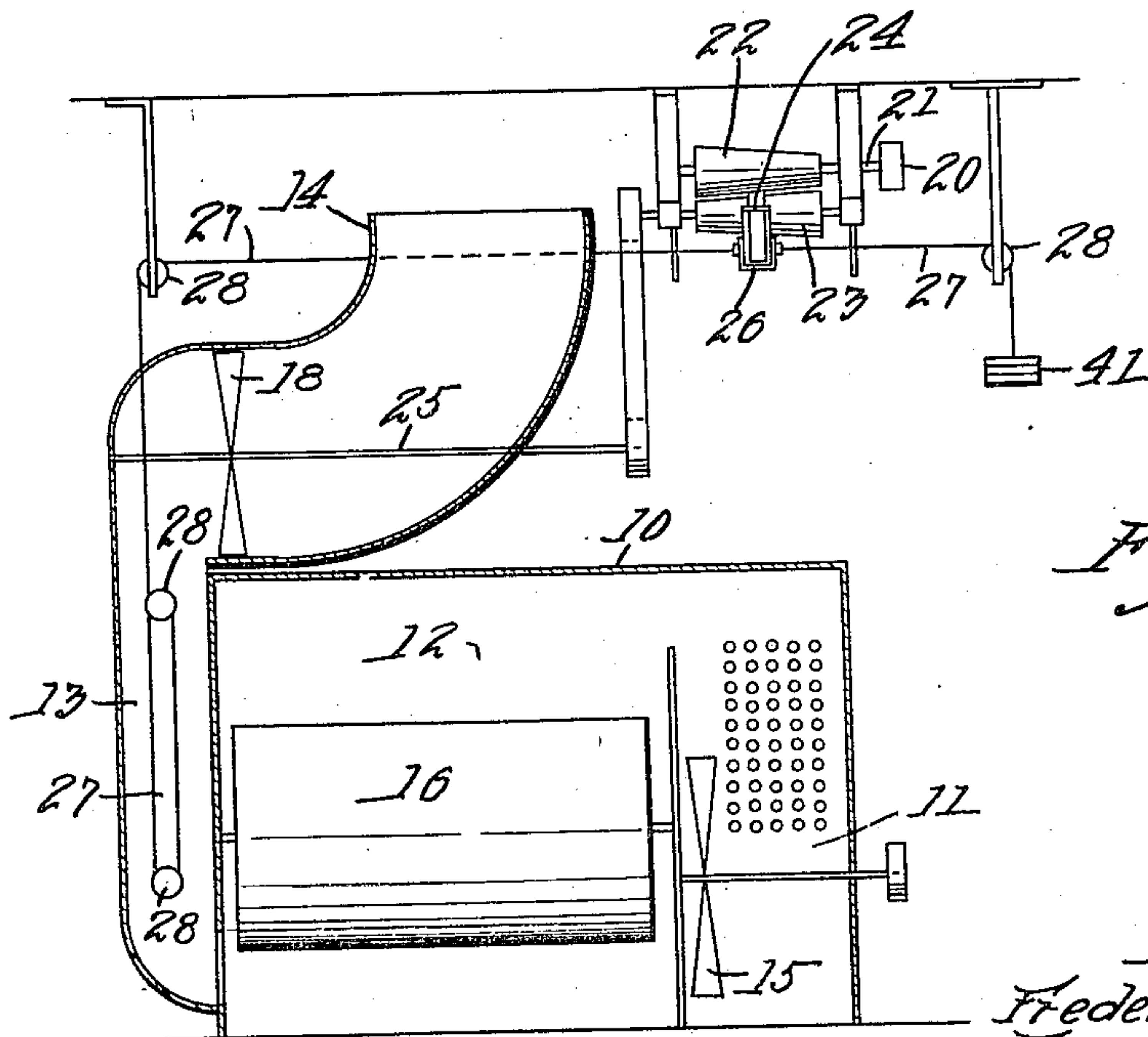


Fig. 2.

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2 Sheets-Sheet 2

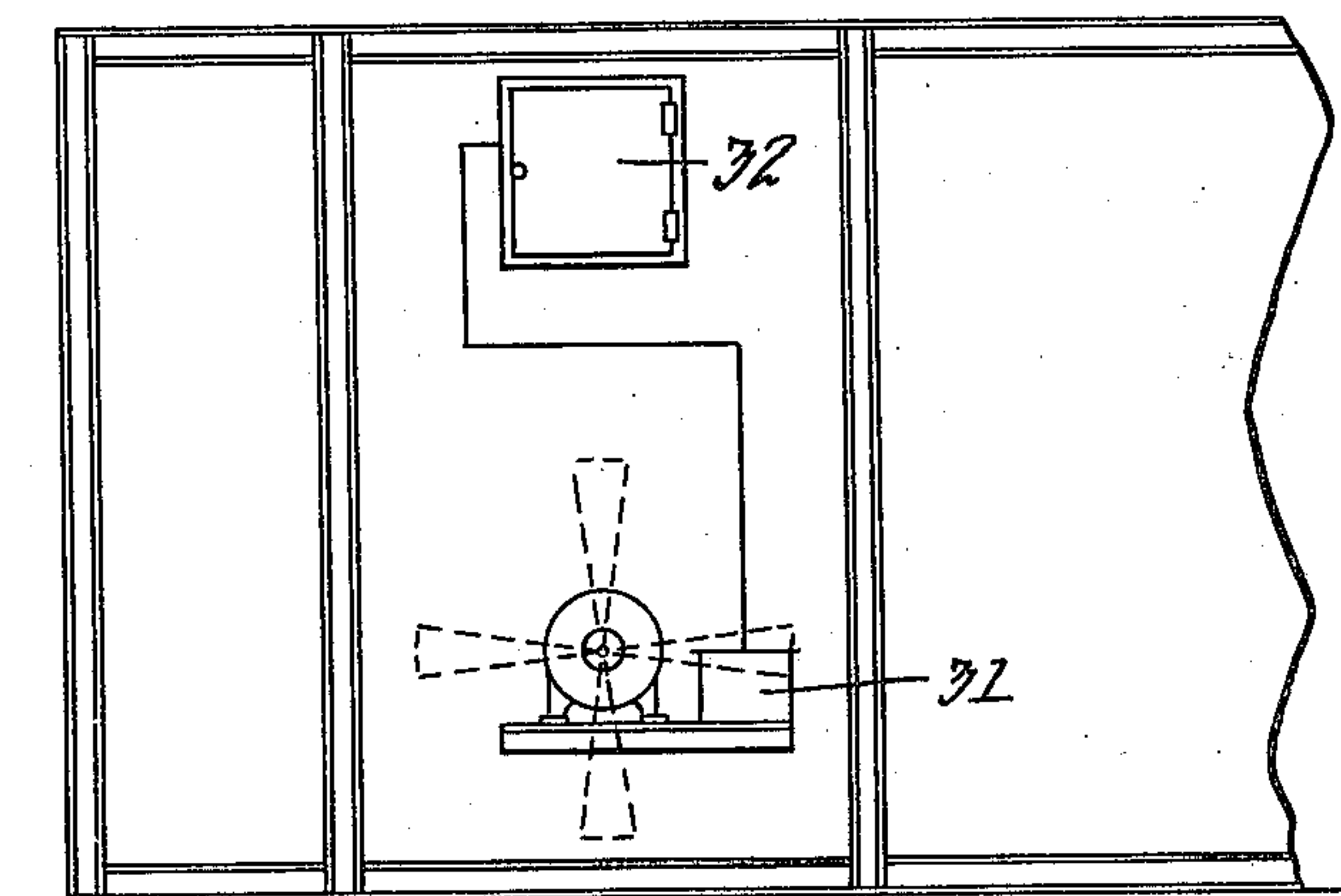


Fig. 3.

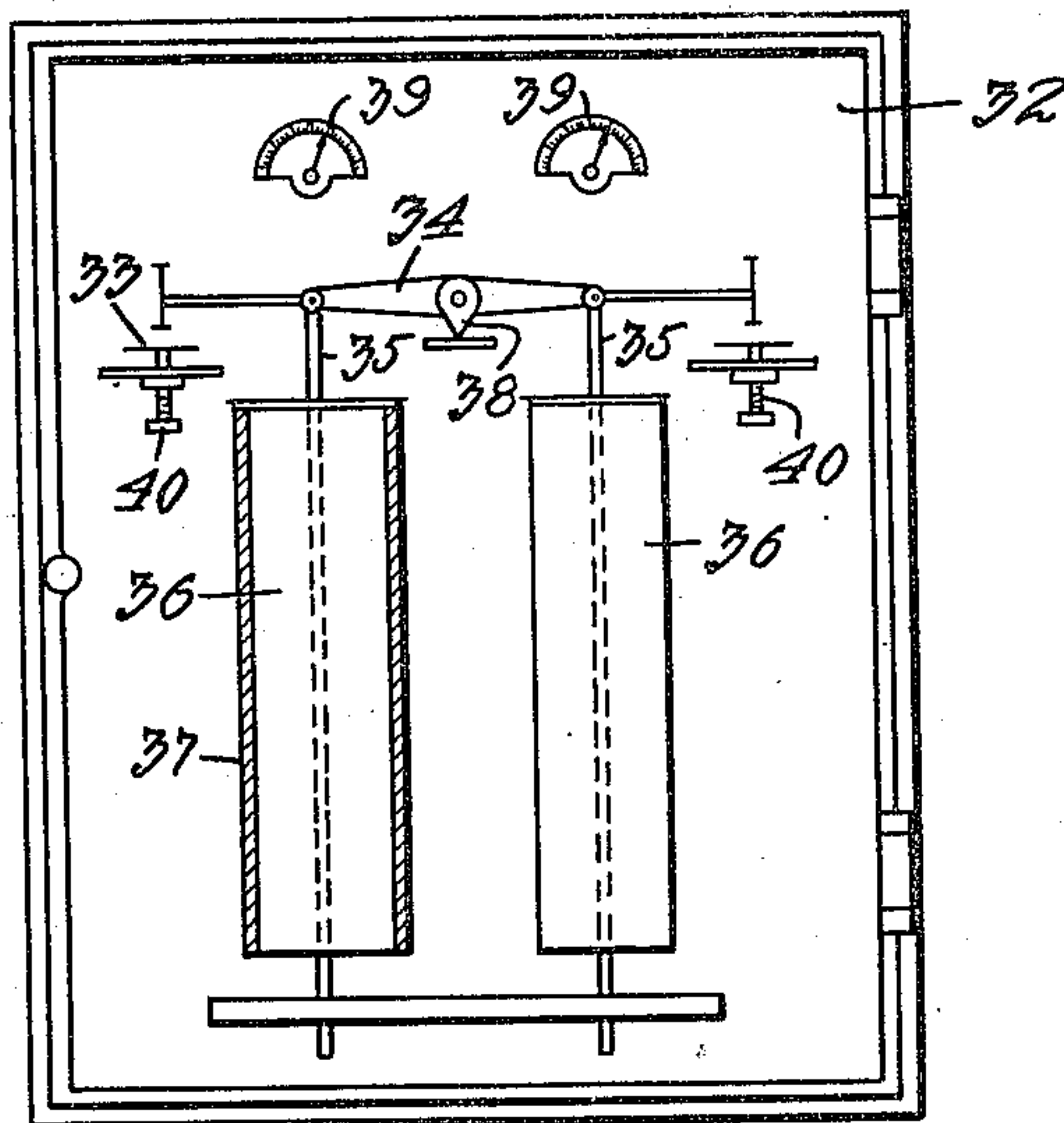


Fig. 4.

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UNITED STATES PATENT OFFICE.

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EXHAUST-FAN CONTROL FOR DRYING MACHINES.

Application filed August 18, 1926. Serial No. 130,058.

This invention relates to a method of controlling the operation of the exhaust fan to take the moist air out of the exhaust air duct of a drying machine.

5 The principal objects of the invention are to provide means for driving the exhaust fan controlled by the humidity of the air in the exhaust air duct or other part of the drier; to provide a simple means for controlling
10 the speed or action of the fan for the above named purpose; and to provide improvements in other features of the drive and control as will appear.

Reference is to be had to the accompanying
15 drawings in which

Fig. 1 is a side view of part of a drier with parts broken away to show interior construction and showing a preferred embodiment of this invention.

20 Fig. 2 is an end view of the same.

Fig. 3 is a side view of the end of a washing machine showing an electrical regulating device and constituting a modification of the invention; and

25 Fig. 4 is an enlarged sectional view through the controlling device.

We have shown the invention in Figs. 1 and 2 as applied to a drier 10 having a coil box 11 for the steam pipes, a drying chamber 12 and an exhaust air duct 13 for taking the air out of the drying chamber and discharging it through an outlet 14. We have shown the usual circulation fan 15 and a drum 16 over which an endless apron 17
35 passes to move the material along in the drying chamber to be dried.

The moist air accumulates in the exhaust air duct and is drawn out from it by an exhaust fan 18 which directs it out of the
40 outlet 14. The exhaust fan is driven from a pulley or the like 20 on a shaft 21. On this shaft is a driving cone 22 driving a cone 23 by means of a belt 24. The cone 23 is on a shaft which by pulleys and belt
45 drives a shaft 25 on which is located the exhaust fan 18. Obviously by shifting the belt 24 across the variable speed cones the speed of the shaft 25, and consequently the exhaust fan 18, can be varied as desired.

50 For the purpose of shifting this belt, we provide a movable belt shifter 26 for moving the belt 24 along the cones. With this shifter supported in any desired way we connect a cord 27 of cotton, hemp or some other

material which is sufficiently hygroscopic to
55 take up moisture readily. This cord passes over pulleys 28. These pulleys are located loosely on two shafts 29 within the air duct 13. It goes back and forth over the pulleys and at its end can be fixed to the wall of
60 the air duct or any other stationary position. But, in order to avoid exact calculations as to the length of the cord and the variations which would be present ordinarily in different cords as to their absorbing powers, we
65 prefer to hang a counterweight 30 on the end of the cord. Then if the cord shrinks more than the travel of the shifter this counterweight takes care of it. At the other
70 end the cord is provided with a counterweight 41 which is the operative element at this end.

It will be obvious that as the cord takes up moisture throughout its length, it will decrease in length as the air grows moister in
75 the air duct. The end at 30 being substantially stationary, this decrease will pull the belt shifter along to increase the speed of the exhaust fan. The fan then forces the moist air out and the air in the exhaust air
80 duct gradually becomes drier. When the cord dries out and assumes its natural length, the weight 41 will pull the belt shifter back to its normal position and decrease the speed of the exhaust fan. 85

It will be seen that the speed of the exhaust fan depends entirely upon the moisture present in the air duct and that the fan will run faster or slower according to requirements. It will not exhaust the air so
90 rapidly when it is dry and if it gets too moist it will speed up and throw it out rapidly. By this means the material being dried is more uniform in its moisture content and is improved for the further processes to which it is to be subjected. The use
95 of more heated air than is necessary is avoided.

In Figs. 3 and 4 we have shown a modified form of the invention in which both the
100 hygroscopic regulating element and the means for controlling the fan are modified. In this case the exhaust fan is operated by a motor directly connected to it. The motor is connected with the line through a switch
105 box 31 and regulator 32. This regulator is in the form of a chamber in the interior of the drier communicating with the air inside

and obviously having the same amount of moisture therein. In this case the electrical connections are made through contacts 33 and lever 34 adapted to come into contact
5 for conducting the current to the motor or interrupting it.

The lever is pivoted on a knife point 38 at the center and operated by rods 35 connected with tubular members 36, one of
10 which is covered with absorbent material 37 such as hemp or the like.

When this material is saturated with moisture, its weight pulls that rod 35 down, depresses the end of the lever to make the
15 contact to start the motor and thus exhaust the air. When the moist air is exhausted the new air coming into the drier will be dry and the covering 37 will lose weight so that the lever will swing in the other direction
20 and that contact will be broken. A couple of dials 39 are shown for indicating the degree of moisture but these are not connected with the operating parts of the machine. It will be obvious adjustments can be pro-
25 vided and one form is shown as adjusting screws 40 which control the distance which the levers have to travel in order to close the contacts.

This constitutes another very simple way
30 of providing for the exhaust of the moist air controlled by the moisture of the air itself and operating the exhaust fan only when the degree of humidity reaches a predetermined point.

Although we have illustrated and de-
35 scribed only two forms of the invention we are aware of the fact that other modifications can be made therein by any person skilled in the art without departing from the scope of the invention as expressed in the claims.
40 Therefore, we do not wish to be limited to all the details of construction herein shown and described, but what we do claim is:—

1. The combination with a drying cham-
45 ber, an exhaust air duct and an exhaust fan for drawing the air out of the air duct, of a variable speed drive for the exhaust fan comprising a belt, a mechanical belt shifter for controlling the position of the belt along
50 the variable speed drive, and a moisture absorbing cord connected directly with the belt shifter for allowing it to move along in one direction with the cord when the cord ex-
pands and positively moving it in the other
55 direction when the cord contracts.

2. In a drying device, the combination with a drying chamber and an exhaust fan, of a variable speed cone drive for the ex-

haust fan comprising a belt, a belt shifter
60 for controlling the position of the belt on the cone drive and therefore controlling the speed of the exhaust fan, an absorbent flexible member passing several times through the air duct connected with the shifter, and means for pulling the flexible connection
65 tight at all times so as to move the belt shifter back and forth in accordance with the moisture content of the air in which said flexible connection is located.

3. The combination with a drying cham-
70 ber, an exhaust air duct and an exhaust fan for drawing the air out of the air duct, of a variable speed drive for the exhaust fan comprising a belt, a belt shifter for controlling the position of the belt along the
75 variable speed drive, a moisture absorbing cord connected with the belt shifter for moving it along in one direction with the cord when the cord expands and moving it in the other direction when the cord contracts, and
80 a counterweight hung from the free end of the cord for taking up the slack.

4. The combination with a drying cham-
85 ber, an exhaust air duct and an exhaust fan for drawing the air out of the air duct, of a variable speed drive for the exhaust fan comprising a belt, a belt shifter for controlling the position of the belt along the
90 variable speed drive, a moisture absorbing cord connected with the belt shifter for moving it along, a series of loose pulleys in the air duct, said cord passing around said pulleys several times so as to be free to come and go as it expands and contracts, one end of the cord having a counterweight thereon
95 for holding that end normally in constant position but capable of moving up and down if the shrinkage of the cord is greater than the traverse of the belt shifter.

5. The combination with a drying cham-
100 ber, an exhaust air duct and an exhaust fan for drawing the air out of the air duct, of a variable speed drive for the exhaust fan, a moisture absorbing cord connected with said drive, a series of loose pulleys in the
105 air duct, said cord passing around said pulleys several times so as to be free to come and go as it expands and contracts, one end of the cord having a counterweight thereon for holding that end normally in constant
110 position but capable of moving up and down if the shrinkage of the cord is too great.

In testimony whereof we have hereunto affixed our signatures.

FREDERICK G. SARGENT.
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