

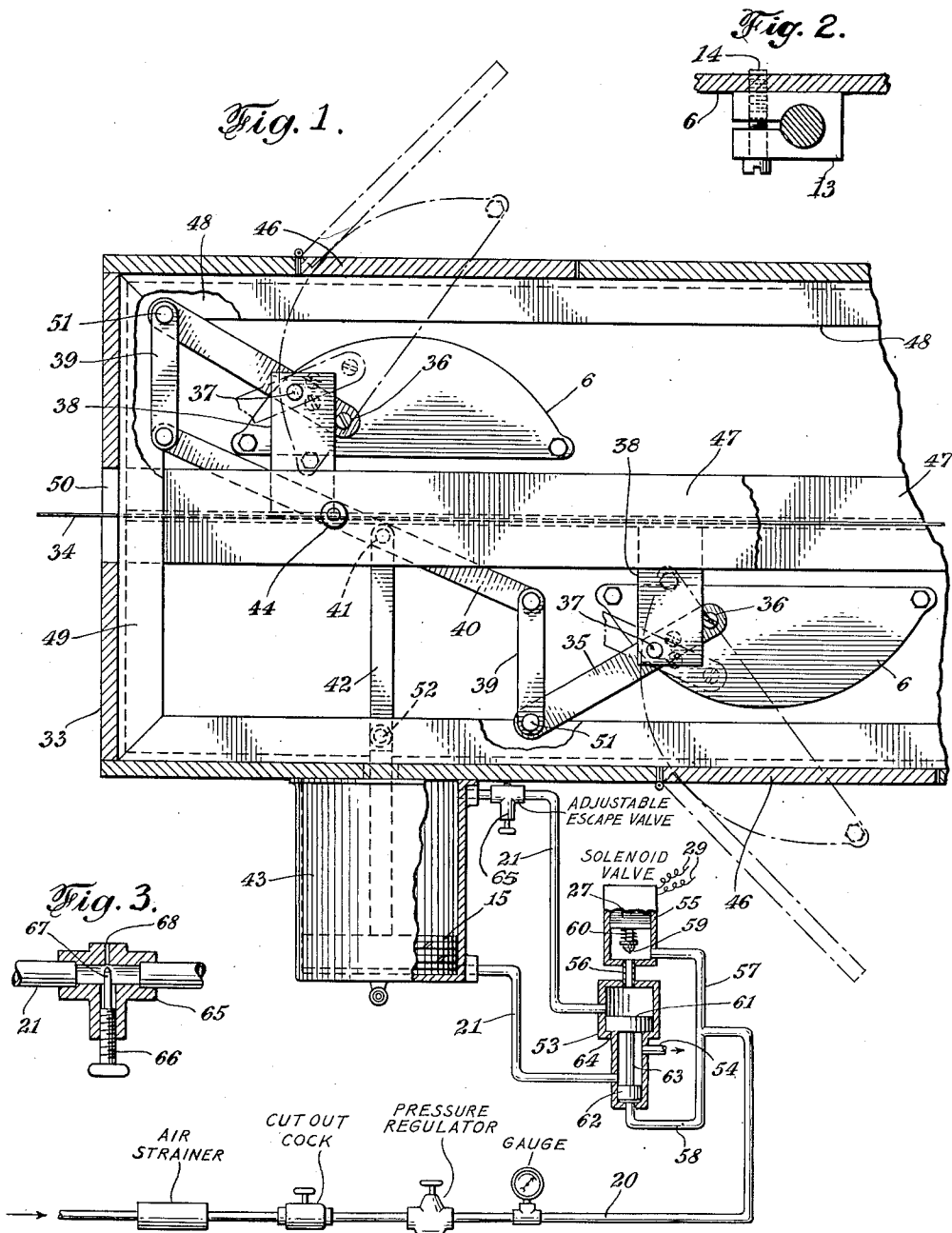
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DRYING APPARATUS

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DRYING APPARATUS

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This invention is an improvement in drying apparatus for thus treating fibrous or other material of more or less length by subjecting it continuously in successive sections to a drying action.

An important object of this invention is to provide drying apparatus to be so used with transmitting mechanism for keeping the material in motion that the drying commences as soon as the transmitting apparatus is set into operation; and continues as long as such operation is not interrupted, but automatically ceases as soon as such operation is suspended or stops.

Another object is to provide drying apparatus comprising a member so disposed and controlled that it is automatically swung into proper position to treat the material when the transmission mechanism begins working and is kept in such relation to the material while the operation of the transmission mechanism is maintained; and automatically shifted out of position when the operation of the transmission mechanism terminates.

A further object is to provide drying apparatus of this character which is relatively simple in design, inexpensive to produce and install and certain at all times to give the desired results.

The nature and advantages of the invention are fully explained in the ensuing description, and the novel features are defined in the claims. On the drawings the preferred embodiments of the apparatus are illustrated, but alteration in structure can be made in various minor respects without deviation from the essential design in which the invention resides.

On the drawings:

Figure 1 shows in section a construction embodying the invention; and

Figures 2 and 3 are sectional views showing details.

Figure 1 shows the web 34 in transmission through a casing or oven 33, with hoods 6 containing heaters above and below the web. The hoods have arms 35 fixed to their ends by screws 36 and each arm is mounted on a pivot 37 attached to a bracket 38. The outer ends of these arms are pinned, each to a link 39, which are in turn pinned each to one end of a rock bar 40, that is pinned at 41 to the connecting rod 42 of the piston 15 in the power cylinder 43. The rod of the piston extends through a leakproof bearing in the bottom of the casing 33. Between the pin 41 and the link 39 of the upper heater, the lever 40 is supported on a fixed pivot 44 mounted inside the casing 33. The cylinder 43 is on the outside of the casing. Adjacent each hood are doors 46

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with spring hinges to keep them shut. When the hoods swing to the dot-and-dash line positions, they engage these doors and open them. When the piston 15 is in lowermost position the heaters are held close to the web 34 but when the piston is impelled towards the casing 33, the lever 40 is swung counterclockwise on the pivot 44, and both hoods 6 are then shifted away from the web 1 and the doors 46 are forced open to liberate the heat in the oven 33.

In the oven are longitudinal bars 47, T-shaped in cross-section, at the middle of the height of the oven, and adjacent both front and rear vertical faces. At the top and bottom are longitudinal angle bars 48, and the bars 47 and 48 are joined at the ends by vertical angle bars 49. In the ends of the oven 33 are apertures 50 at the level of the bars 47 and the web 34 enters and leaves the oven through these apertures. The walls of the oven appear in section on Figure 2, but the bars 47, 48, and 49 are all illustrated; those on the side of the oven towards the observer and those behind them. The web thus runs between the T bars 47, and the pivot 44 is affixed to one of the bars 47. The hoods 6 can have arms 35 and brackets 38 at both ends, and the arms 35 of each hood 6 can be rigidly connected to each other with the link 39 pinned to one of the arms 35. Each pair of bars 47 and 48 can be joined by horizontal bars, not shown, at right angles to these bars. The rod 42 is pinned to the rod of the piston 15 as shown at 52. Other connections between the power cylinder and the heaters, arranged to give the same result, can be employed.

The power unit 43 is supplied with pressure fluid through a conduit 20, and branch pipes 21 leading each to one end of the cylinder 43. At the junction of these pipes is a casing 53 containing a valve controlled by the solenoid 27 in the electrical circuit 29 of an electric motor, not shown. The pipe 20 contains the usual strainer, shut-off valve, pressure regulator and gauge or pressure indicator.

The casing 53 has an exhaust pipe 54, and the solenoid 27 is enclosed in a casing 55 in communication with one end of the valve casing 53 through a pipe 56. The supply pipe 20 is connected to the casing 55 under the solenoid by a branch pipe 57 and to the other end of the casing 53 by another branch pipe 58. The pipe 56 is controlled by a valve 59 in the casing 55, the stem of this valve being the plunger of the solenoid, and a spring 60 encircling said stem normally holds the valve 59 shut.

The casing 53 contains a large piston valve 61

in the end connected to the casing 55, and a small piston valve 62 in the opposite end. These two valves are rigidly united by a rod 63. The bore in the part of the casing occupied by the valve 61 is larger than the bore of the remainder of the casing, the two bores forming a shoulder 64 in the casing which acts as a stop for the large valve 61. The exhaust pipe 54 connects with the smaller bore adjacent the shoulder 64; the pipe 21 leading to the upper end of the cylinder 43 connects with the larger bore of the casing 53; and the other pipe 21 joined to the lower end of the cylinder 43 communicates with the smaller bore of the casing near the closed end thereof. In the pipe 21 leading to the upper part of the cylinder 43 is a valve casing 65 containing a threaded valve stem 66 with outside hand knob, and inside thinned end 67 to control a vent or bleeder opening 68.

When the electric motor is running and the electrical circuit is closed, the solenoid 27 holds the valve 60 open and the power fluid flows through the pipe 57, casing 55, pipe 56 and upper conduit 21 to depress the piston 15. When the motor is idle, the piston 15 is up in the cylinder 43 and bar 40 is held inclined in the opposite direction. The downward movement of the piston pulls on the lever 40 and pushes the arm 25 of the lower hood 6 down to raise this hood, and the upper hood 6 is lowered by the other bar 35 and link 38, which are pushed up by the piston 15. At this time air in the lower end of the cylinder escapes through the pipe 54. The valves 61 and 62 are depressed by the heavier pressure on the large valve 61, and both ports of the pipes 21 in the cylinder 43 are open. The bar 40 and piston rods of course clear the ends of the hoods 6. Some air may escape at the vent 68, and the valve 65 regulates the pressure in the upper part of the cylinder, and in fact only a little pressure is needed; for the weights of the two hoods 6 and their connections about the balance each when the hoods are close to the web 33.

When the motor stops and the circuit is open, the solenoid 27 is de-energized and the valve 59 closes. The pressure of the air through the pipe 53 on the valve 62 now lifts both valves, because the bleeder opening 68 in the escape valve casing relieves the pressure in the valve casing 53 over the valve 61. The lower pipe 21 is thus put into communication with the valve casing 53 and the upper pipe 21 into communication with the exhaust pipe 54. The piston 15 is thus forced upward, and the bar 40 rotated counterclockwise to swing both hoods to the dot-and-dash line position away from the web 33.

The apparatus can also be utilized to dry sheets as well as rolls, when the sheets are supported to and actuated by transmission mechanism follow one another in succession past the heaters 6. The drying will proceed as long as the electric motor revolves, and the heaters will be swung away from the material as before whenever the motor stops.

Having described my invention, what I believe to be new is:

1. Apparatus comprising a member for drying sheet material, to be moved by transmitting means past said member and in proximity thereto, a power unit having connections to said mem-

ber, a casing, a valve therein, a conduit to supply a power medium to said valve casing, conduits connecting the valve casing to said unit, said valve casing having an exhaust port, and a solenoid in said circuit controlling said valve, said casing having bores of unequal size, said valve having heads united to each other and fitting said bores, said exhaust port being between said heads, the solenoid having a casing enclosing it and a pipe connecting the casing for the solenoid to the large bore at one end of the valve casing, a valve in the solenoid casing for said pipe, the supply conduit having a branch connecting it to the solenoid casing and another branch connecting it to the opposite end of the valve casing, one of the conduits between said unit and said valve casing having an escape valve controlling a bleeder opening therein.

2. Drying apparatus for an oven having openings in its opposite ends for the entrance and exit of a web of sheet material, to be moved by operating means through said oven, a drying member in said oven above said web, a second drying member in said oven under said web, means for pivotally mounting said members to swing towards and away from said web, a pneumatic power unit, connections between said unit and said members and a device dependent upon said operating means to control said unit, so that said unit swings said members towards the web when the material is in motion, and away from said material when the motion thereof ceases, said oven having normally closed spring hinged doors adjacent said members actuated thereby to be opened by said members when they are moved away from the web.

3. Drying apparatus for an oven having openings in its opposite ends for the entrance and exit of a web of sheet material to be moved by operating means through said oven, a drying member in said oven above said web, a second drying member in said oven under said web, means for pivotally mounting said members to swing towards and away from said web, a pneumatic power unit, connections between said unit and said members and a device dependent upon said operating means to control said unit, so that said unit swings said members towards the web when the material is in motion, and away from said material when the motion thereof ceases, said connections comprising a rock bar having a pivot mounting it on said oven, the power unit being joined to said bar, each member having a fixed arm thereon, and links connecting each fixed arm to said bar at its opposite ends.

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