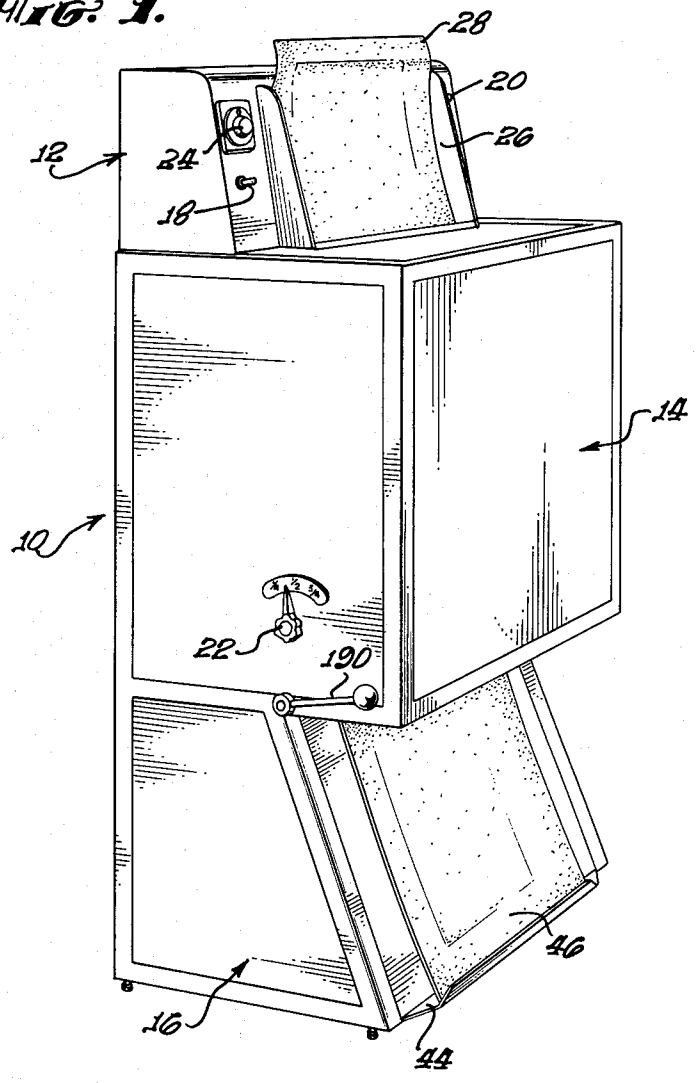
Aug. 31, 1965 S. ODERMAN 3,203,106

APPARATUS FOR DRYING STEREOTYPE MATS

Filed April 24, 1961 5 Sheets-Sheet 1

FIG. 1.



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APPARATUS FOR DRYING STEREOTYPE MATS

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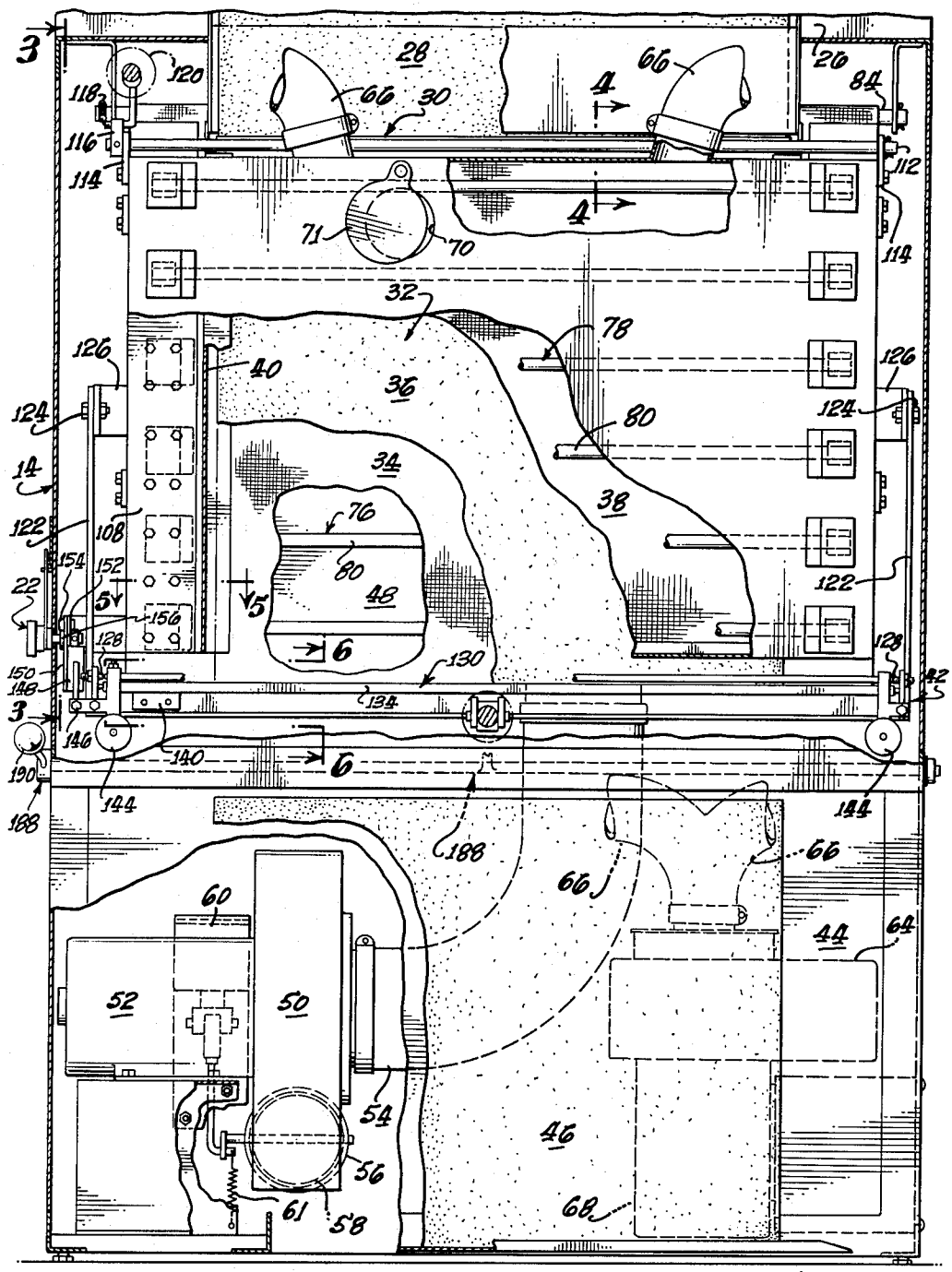


FIG. 2.

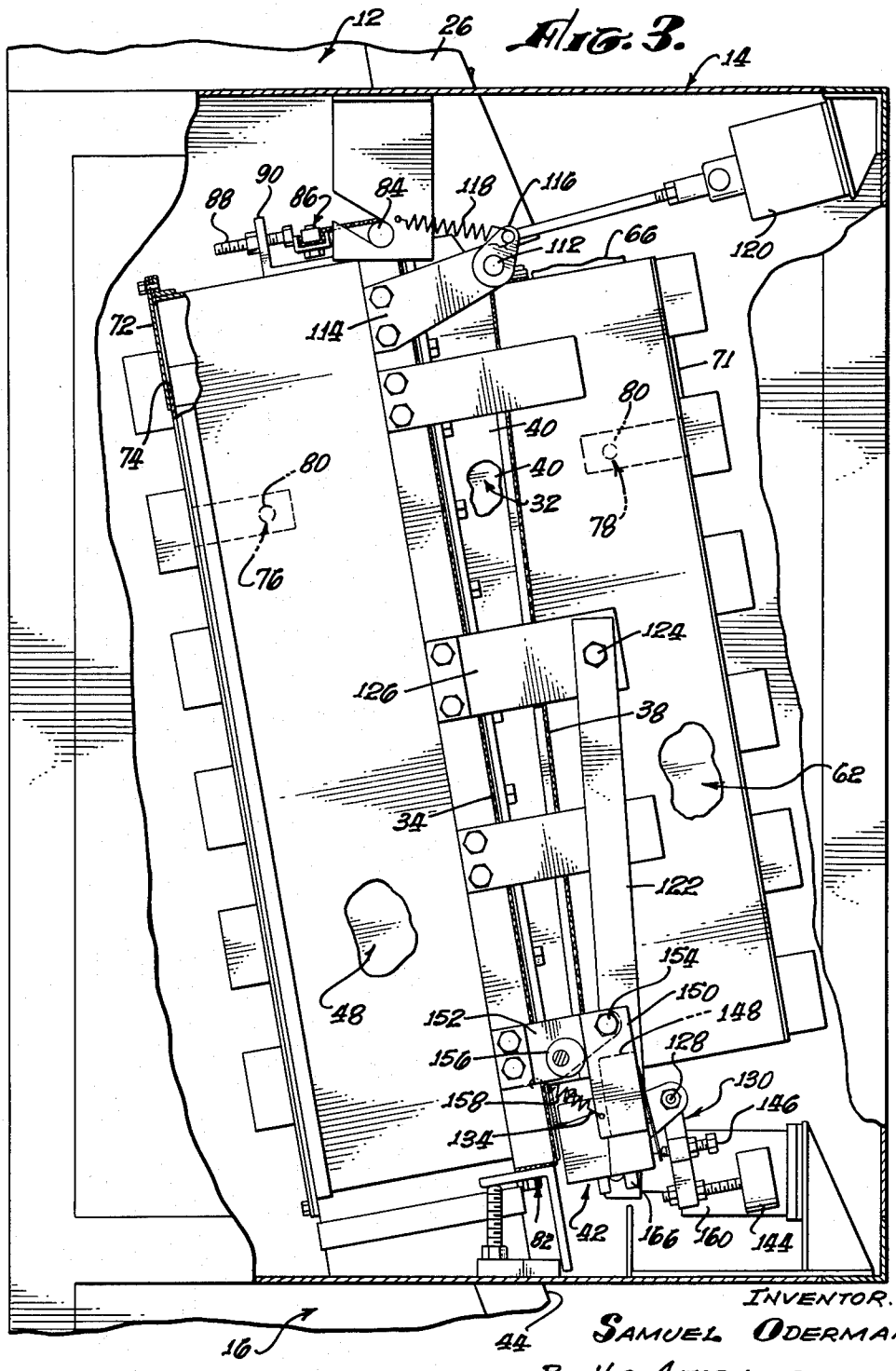
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APPARATUS FOR DRYING STEREOTYPE MATS

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FIG. 3.



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APPARATUS FOR DRYING STEREOTYPE MATS

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FIG. 4.

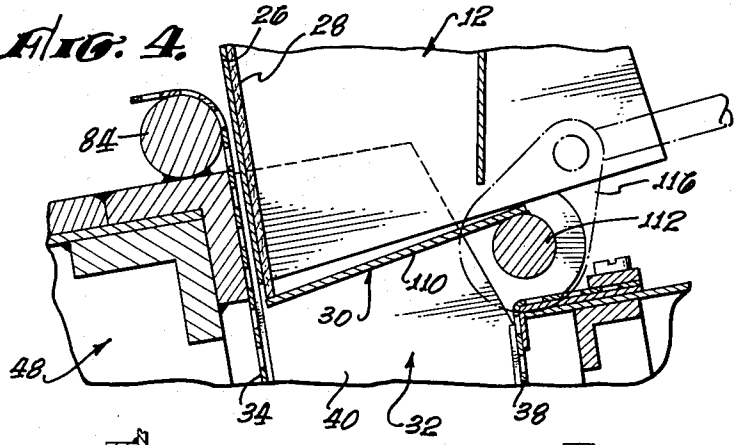


FIG. 5.

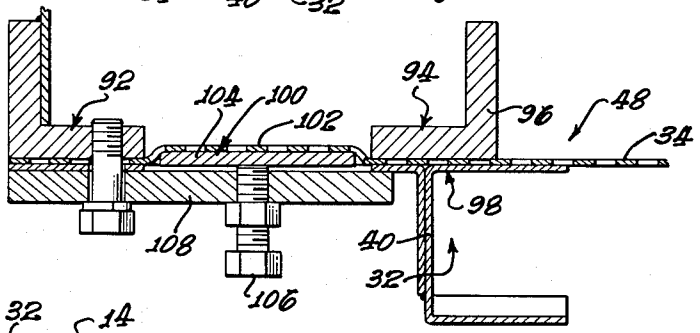
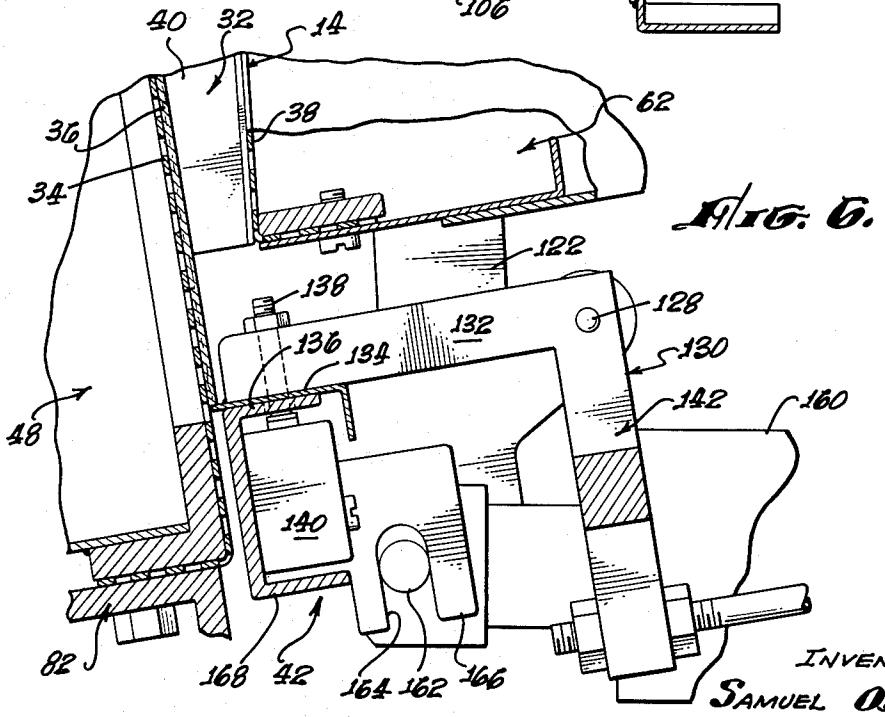


FIG. 6.



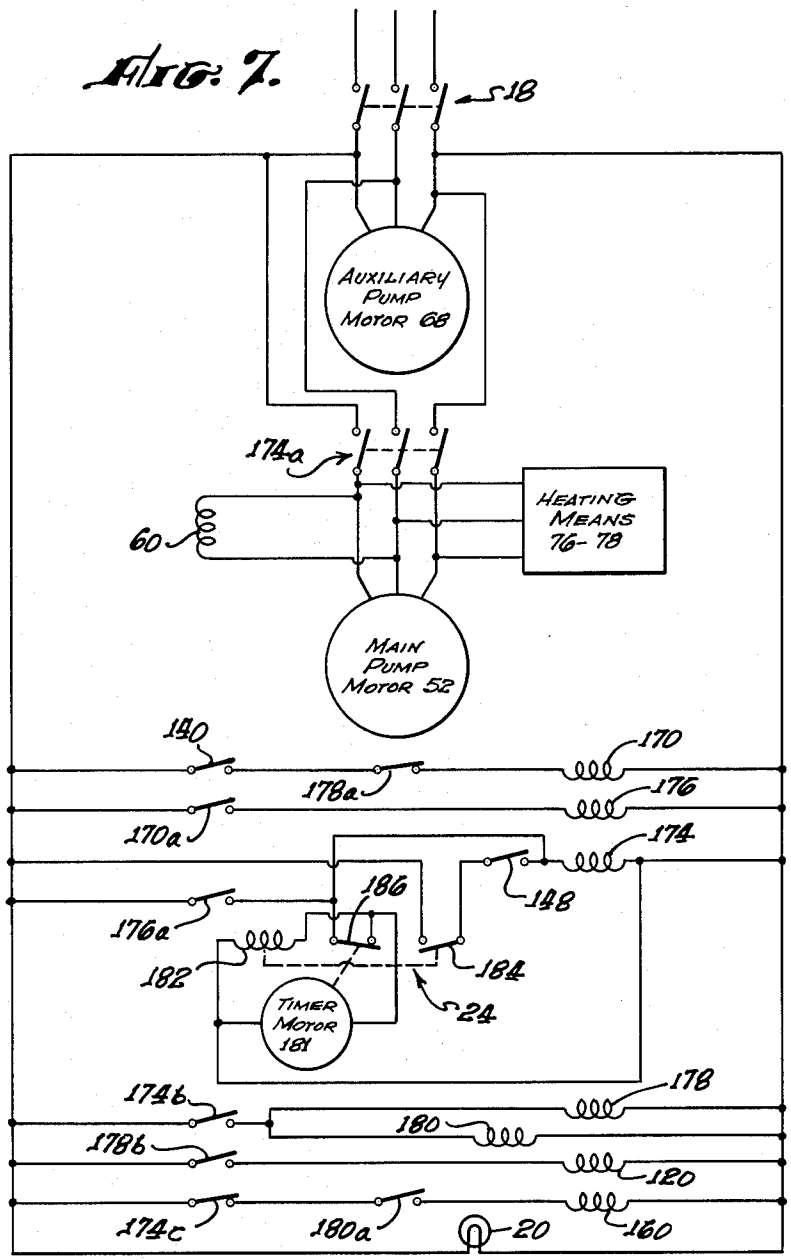
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APPARATUS FOR DRYING STEREOTYPE MATS

Filed April 24, 1961 5 Sheets-Sheet 5

FIG. 7.



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United States Patent Office 3,203,106 Patented Aug. 31, 1965

3,203,106

APPARATUS FOR DRYING STEREOTYPE MATS

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Filed Apr. 24, 1961, Ser. No. 105,170
4 Claims. (Cl. 34—48)

The present invention relates in general to an apparatue for processing stereotype mats prior to casting printing plates therefrom and, more particularly, to an apparatus for drying and shrinking such mats. Since the invention was originally embodied in and is particularly applicable to a so-called pre-dryer, wherein stereotype mats are preliminarily dried and shrunk prior to the final forming, drying and shrinking operations preceding casting, it will be considered in such connection herein for convenience of disclosure. However, it will be understood that the invention is not limited to a pre-dryer in all of its aspects.

In general, the invention contemplates a drying apparatus which includes a drying chamber having a foraminous wall one side of which is engageable by a mat to be dried, a vacuum chamber adjacent the drying chamber on the opposite side of the foraminous wall from the mat, and a vacuum pump having its inlet connected to the vacuum chamber so as to produce a pressure differential across a mat in the drying chamber to maintain the mat in engagement with the foraminous wall. The drying apparatus further includes means for heating the mat while it is held in engagement with the foraminous wall of the drying chamber by this pressure differential, the heating means preferably comprising radiant heating means on both sides of the foraminous wall for radiantly heating both sides of the mat simultaneously.

An important object of the invention is to provide a drying apparatus of the foregoing nature wherein the mat moves downwardly, under the influence of gravity, along a continuous, inclined path from a position above the drying chamber through a drying position within the drying chamber to a discharge position in a delivery chute or rack below and communicating with the lower end of the drying chamber. A related object is to provide a drying apparatus which includes an upright or generally vertical loading chute or rack, above and communicating with the upper end of the drying chamber, for supporting a mat to be dried in a ready position while another mat is in the drying position within the drying chamber.

Another important object is to provide a system of gates or gate means operating in timed relation for controlling the downward movement of the mats along the processing path in such a manner that only one mat can occupy the drying position at any one time.

More particularly, an object of the invention is to provide a lower gate or gate means at the lower end of the drying chamber, an upper gate or gate means at the lower end of the loading rack, and means for operating the lower and upper gates in timed relation in such a manner that the upper gate does not release a mat from the loading rack until the lower gate has released any mat which may be in the drying chamber and has returned to its closed position to intercept a mat released from the loading rack by the upper gate. A related object is to provide a drying apparatus wherein the upper gate remains in its open position if there is no mat in the drying chamber. With the foregoing construction, a mat placed in the loading rack is prevented from entering the drying chamber if another mat is already in the drying position, but permits a mat placed in the loading rack to move directly into the drying chamber if there is no mat therein, which is an importtnt feature.

Still another object of the invention is to provide means incorporated in the lower gate or gate means for sensing the presence of a mat on the lower gate and for closing the upper gate in response to such presence. A related object is to provide a drying apparatus wherein the means responsive to the presence of a mat on the lower gate includes means for automatically energizing the vacuum pump and the heating means to initiate the drying operation. Thus, when a mat enters the drying chamber, either directly from the loading rack, or as the result of having been released from the loading rack by the upper gate, the vacuum pump and the heating means are automatically energized to initiate drying of such mat, and the upper gate is automatically closed to prevent the entry of a second mat into the drying chamber.

A further object is to provide a drying apparatus which, upon completion of each drying operation, will de-energize the vacuum pump and the heating means, open the lower gate to discharge the dried mat into the delivery chute or rack, subsequently close the lower gate, and thereafter open the upper gate to release the next mat from the loading rack, or, in the alternative, to permit a mat subsequently placed in the loading rack to move directly into the drying chamber.

While the end of the drying operation may be determined by a timer, an important object of the invention is to incorporate in the lower gate or gate means a means for sensing shrinkage of a mat being dried and for terminating the drying operation in the manner outlined when the shrinkage of such mat has reached a predetermined value. In this connection, an object of the invention is to provide a gate means which is bodily movable between open and closed positions and which includes a movable gate element biased to follow the lower edge of the mat as it shrinks upon drying, and to actuate means for terminating the drying operation when such shrinkage reaches a predetermined value.

More specific objects of the invention are to provide a gate system for controlling mat movement through the drying apparatus wherein the upper gate is normally open and is powered closed and wherein the lower gate is normally closed and is powered open, the upper and lower gates being suitably biased toward their open and closed positions, respectively, and being moved to their closed and open positions, respectively, by suitable power means, such as solenoids.

An important object of the invention is to provide valve means in series with the vacuum pump for blocking flow through the vacuum pump, as well as means for de-energizing the vacuum pump, at the end of each drying operation. Such blocking of the flow through the vacuum pump prevents coasting of the vacuum pump from maintaining a pressure differential across the mat in the drying chamber which would preclude immediate dropping of such mat into the delivery chute. Thus, such valve means insures substantially immediate discharge of the dried mat into the delivery chute upon opening of the lower gate, which is an important feature. When the vacuum pump is energized at the beginning of a drying operation, the blocking valve means mentioned is opened.

Another and important object of the invention is to provide an auxiliary air chamber on the opposite side of the foraminous wall of the drying chamber from the vacuum chamber hereinbefore discussed, and to provide an auxiliary pump for flowing air through such auxiliary chamber so as to remove moist air from the side of the mat which is unsupported by the foraminous wall, as well as from the supported side of the mat. Preferably, the auxiliary chamber is also a vacuum chamber, i.e., the auxiliary pump is a vacuum pump having its inlet connected to the auxiliary chamber. However, the auxil-

iary pump does not produce as high a vacuum as that produced in the main vacuum chamber adjacent the supported side of the mat, whereby the two pumps cooperate to maintain a net pressure differential across the mat which is sufficient to maintain it in engagement with the foraminous wall of the drying chamber.

A further object of the invention is to provide a drying chamber having a flexible foraminous wall formed by a flexible foraminous member which is maintained in tension in two perpendicular directions so as to prevent the pressure differential acting across the mat from deflecting the foraminous member.

The foregoing objects, advantages, features and results of the present invention, together with various other objects, advantages, features and results thereof which will be evident to those skilled in the stereotype mat processing art in the light of this disclosure, may be achieved with the exemplary embodiment of the invention described in detail hereinafter and illustrated in the accompanying drawings, in which:

FIG. 1 is a perspective view of a drying apparatus which embodies the invention;

FIG. 2 is an enlarged, fragmentary front view of the drying apparatus with various parts in section and others broken away to reveal the internal structure of the apparatus;

FIGS. 3, 4, 5 and 6 are enlarged, fragmentary sectional views respectively taken along the arrowed lines 3—3, 4—4, 5—5 and 6—6 of FIG. 2 of the drawings; and

FIG. 7 is a schematic wiring diagram of the drying apparatus.

Referring initially to FIG. 1 of the drawings, the invention is illustrated therein as embodied in a drying apparatus having the form of a pre-dryer 10 which includes an upper, loading section 12, an intermediate, drying section 14 below the loading section, and a lower, delivery section 16 located below the drying section and forming the base of the machine. Mounted on the exterior of the pre-dryer 10 are various controls, including a main switch 18 for turning the machine on and off, a light 20 for indicating that the main switch has been turned on, a control 22 for regulating the amount of mat shrinkage to be produced during each mat drying operation, and a timer 24 which may regulate the duration of each drying operation in lieu of the shrinkage control 22.

The loading section 12 of the pre-dryer 10 includes an upright loading chute or rack 26 in which a mat 28 to be dried may be placed in a ready position. As shown, the loading rack 26 is inclined upwardly and rearwardly so that the mat 28 will lie against the rear wall thereof.

As best shown in FIG. 4 of the drawings, at the lower end or bottom of the loading rack 26 is an upper gate or gate means 30 for supporting the mat 28 in the ready position if a preceding mat is being dried in the drying section 14. The manner in which the upper gate 30 is controlled will be considered hereinafter.

Referring to FIG. 3 of the drawings, the drying section 14 of the pre-dryer 10 includes an upright, but upwardly and rearwardly inclined, drying chamber 32 which forms a downward continuation of the loading rack 26. The drying chamber 32 includes a foraminous rear wall 34 which is upright, but upwardly and rearwardly inclined, so that a mat 36 in the drying chamber 32 will lie against such foraminous wall. The drying chamber 32 may also be provided with a foraminous front wall 38 which is approximately parallel to the foraminous wall 34 and the only function of which is to prevent the mat 36 from tipping forwardly. The foraminous walls 34 and 38 preferably converge downwardly slightly as shown to guide each mat into its proper drying position. The drying chamber 32 is provided with side walls 40.

At the lower end or bottom of the drying chamber 32 is a lower gate or gate means 42 which supports the mat 36 in a drying position within the drying chamber 32, the lower gate 42 stopping the mat 36 as it drops into the drying chamber. The manner in which the lower gate 42 is operated will be considered hereinafter.

Below and forming a downward continuation of the drying chamber 32 is a delivery chute or rack 44 which, as shown in FIG. 1 of the drawings, is adapted to receive a mat 46 that has been pre-dried and pre-shrunk in the apparatus 10. In the particular construction illustrated, the delivery rack 44 is upwardly and rearwardly inclined at about the same angle as, or at a slightly greater angle from the vertical than, the foraminous rear wall 34 of the drying chamber 32. This insures that the mat 46 will lie flat against the rear wall of the delivery rack 44.

Continuing to consider the pre-dryer 10 in a general way, the drying section 14 thereof, as best shown in FIG. 3 of the drawings, is provided rearwardly of the foraminous rear wall 34 of the drying chamber 32 with a main, vacuum chamber 48 in which subatmospheric pressure is developed to hold the mat 36 against the foraminous rear wall 34. As shown in FIG. 2 of the drawings, such subatmospheric pressure in the main chamber 48 is developed by a main, vacuum pump 50, which may be a blower, driven by an electric motor 52. The inlet of the main pump 50 is connected to the main chamber 48 by an inlet line 54. The main pump 50 is provided with an outlet line 56 provided therein with a valve or valve means 58 controlled by a solenoid 60 and a spring 61. When the solenoid 60 is energized, it holds the valve 58 open. De-energization of the solenoid 60 results in closure of the valve 58 by the spring 61 to block air flow through the main pump 50, thereby instantaneously breaking the vacuum in the main chamber 48 despite coasting of the main pump 50 and its driving motor 52 to a stop after de-energization of such motor.

On the opposite side of the drying chamber 32 from the main chamber 48, i.e., forwardly of the front foraminous wall 38 of the drying chamber, is an auxiliary chamber 62, FIGS. 2 and 3, through which air is circulated by an auxiliary pump 64. Preferably, the auxiliary pump 64 is also a vacuum pump or blower having its inlet connected to the auxiliary chamber 62 by a branched inlet line 66, the auxiliary pump being driven by an electric motor 68. Air is admitted into the auxiliary chamber 62 through an inlet 70 controlled by a valve 71 to regulate the vacuum developed.

It will be noted that, with the foregoing construction, air is circulated through both the main and auxiliary chambers 48 and 62 so as to remove evaporated moisture from both sides of the mat 36 being dried, thereby accelerating drying. The vacuum maintained in the auxiliary chamber 62 is small as compared to that maintained in the main chamber 48, whereby the main and auxiliary pumps 50 and 64 cooperate to maintain a pressure differential across the mat 36 sufficient to hold it in place against the rear foraminous wall 34 of the drying chamber 32. Such pressure differential may, for example, be of the order of four inches of water. The pressure differential applied to the mat 36 may be varied readily by varying the extent of opening of a valve 72 controlling an air inlet 74 into the upper end of the main chamber 48. Obviously, by closing the valve 72, the maximum vacuum may be achieved within the main chamber 48.

To further accelerate drying of the mat 36 in the drying chamber 32, both sides of the mat are heated simultaneously by radiant heating means 76 and 78 respectively disposed in the main and auxiliary chambers 48 and 62 and heating the corresponding sides of the mat through the corresponding foraminous walls 34 and 38 of the drying chamber. The heating means 76 and 78 preferably comprise tubular infrared heating elements 80 spanning the drying chamber 32 in spaced, parallel relation on opposite sides of the drying chamber. The heating elements 80 may be quartz infrared lamps, or the like, and are suitably mounted in the main and auxiliary

chambers 48 and 62 in a manner which need not be described in detail.

The foraminous walls 34 and 38 of the drying chamber 32 may take various forms. For example, they may be screens of metal, or other suitable material, perforated plates or sheets of metal, or other suitable material, or the like. In FIGS. 4 to 6 of the drawings, they are shown as thin, perforated, metal sheets. However, in FIGS. 2 and 3 of the drawings, they are shown as screens for convenience of illustration due to the smaller scales utilized for these figures.

The foraminous rear wall 34 is subjected to a considerable load during each drying operation due to the pressure differential acting across the mat 36 in the drying chamber 32. In view of this, and in view of the flexible nature of the foraminous rear wall 34, it is necessary to support it properly to prevent any significant deflection under the influence of the pressure differential applied to the mat 36.

As best shown in FIG. 6 of the drawings, the lower edge of the foraminous wall 34 is anchored by a clamping means designated generally by the numeral 82. As shown in FIG. 4, the upper end of the foraminous wall 34 is trained over a cylindrical rod 84 over which the foraminous wall is slidable. Referring to FIG. 3 of the drawings, the upper edge of the foraminous wall 34 is secured by a clamping means 86 which, in turn, is connected to a threaded adjusting means 88 anchored to a suitable frame member 90. The threaded adjusting means 88 may comprise a series of adjusting bolts, only one of which is visible in FIG. 3, spaced apart along the clamping means 86. As will be apparent, the foraminous wall 34 may be tensioned in the vertical direction by the threaded adjusting means 88 to support the foraminous wall against deflection by the pressure differential acting across the mat 36.

The apparatus 10 of the invention also inculdes means on either or both upright edges of the foraminous wall 34 for tensioning same in a transverse horizontal direction perpendicular to the direction of tensioning produced by the threaded adjusting means 88. Referring to FIG. 5 of the drawings, one upright edge of the foraminous wall 34 is shown as secured by a clamping means 92, the opposite upright edge being secured by a similar clamping means, not shown. Intermediate the upright edges of the foraminous wall 34 is a restraining means 94 comprising frame structures 96 and 98 between which the foraminous wall is threaded. Intermediate and paralleling the clamping means 92 and the restraining means 94 is a displacing means 100 for displacing a portion 102 of the foraminous wall 34 in a direction perpendicular to the plane of such foraminous wall so as to tension the foraminous wall in a transverse horizontal direction perpendicular to the direction of tensioning produced by the threaded adjusting means 88. The displacing means 100 is shown as comprising a bar or strap 104 engaged by and displacable by screws 106 threaded into a frame member 108 of the pre-dryer 10. A similar tensioning means may be provided, if desired, at the opposite upright edge of the foraminous wall 34.

With the foregoing structure, the foraminous wall 34 is tensioned in perpendicular direction so as to prevent any significant deflection thereof under the influence of a pressure differential acting across the mat 36 in the drying chamber 32 during drying thereof.

Since there is no significant load on the front foraminous wall 38, it may merely be secured in place, as by suitable clamping means along the edges thereof, without any adjustable tensioning means.

Considering the upper gate 30 with reference to FIGS. 3 and 4 of the drawings, it includes a gate element 110, which may be a plate adapted to substantially completely close the upper end of the drying chamber 32, carried by a transverse horizontal shaft 112 suitably pivotally mounted on the frame structure of the pre-dryer 10. For example, the ends of the shaft 112 may be carried by brackets 114 one of which is visible in FIG. 3 of the drawings. The shaft 112 carries a crank arm 116 to which is connected a tension spring 118, FIG. 3, for biasing the gate element 110 in the counterclockwise direction toward an open position. Also connected to the crank arm 116 is a solenoid 120 which, when energized, pivots the gate element 110 in the clockwise direction toward a closed position wherein it supports the mat 28 in the ready position in the loading rack 26, as shown in FIG. 4 of the drawings. The manner in which the solenoid 120 is controlled will be considered hereinafter in discussing the operation of the invention.

The lower gate 42 includes a gate supporting structure movable between open and closed positions and shown as comprising depending supporting arms 122 pivotally connected at their upper ends, at 124, to supporting brackets 126 located on opposite sides of the machine. Pivotally mounted on the supporting arms 122 adjacent the lower ends thereof, at 128, is a crank structure 130 which extends horizontally across the pre-dryer 10. The crank structure 130 includes a rearwardly extending arm structure 132 which carries a gate element 134, such as a plate, on which the lower edge of the mat 36 in the drying chamber 32 is adapted to rest. The weight of the mat 36 is adapted to pivot the crank structure 130, about the axis of the pivots 128 to bring the arm structure 132 into engagement with a stop 136 carried by the supporting arms 122. When the arm structure 132 is in engagement with the stop 136, an adjusting screw 138 carried thereby actuates a switch 140 carried by the supporting arms 122. The function of the switch 140 will be discussed hereinafter in considering the operation of the invention.

The crank structure 130 also includes an arm structure 142 carrying adjustable counterweights 144, best shown in FIG. 3 of the drawings. As will be apparent, these counterweights tend to rotate the crank structure 140 in the clockwise direction so as to cause the gate element 134 to follow the lower edge of the mat 36 in the drying chamber 32 upwardly as such lower edge moves upwardly during the drying operation as the result of shrinkage of the mat. As is well known, the lower and upper portions of the mat 36 respectively shrink upwardly and downwardly toward the horizontal centerline of the mat during drying so that the lower and upper edges of the mat move upwardly and downwardly, respectively. When a predetermined amount of shrinkage of the mat 36 has been achieved, and adjusting screw 146 on the arm structure 142 actuates a switch 148 carried by a pivoted member 150 pivotally mounted on a stationary support bracket 142 at 154. The switch 148 performs a function which will be considered hereinafter in describing the operation of the pre-dryer 10.

The amount of shrinkage which occurs before the switch 148 is actuated may be varied by a cam 156 mounted on the support bracket 152 and engaging the pivoted member 150, the pivoted member being maintained in engagement with the cam by a spring 158. The cam 156 is connected to the hereinbefore-mentioned control 22. As will be apparent, the position of the control 22 determines the position of the cam 156 and, in turn, determines the distance that the gate element 134 can follow the lower edge of the shrinking mat 36 before the adjusting screw 146 actuates the switch 148.

The lower gate or gate means 42 just described is shown in its closed position throughout the drawings, and is biased toward such position by the action of gravity. A solenoid 160, FIGS. 3 and 6, pivots the lower gate 42 into an open position, upon energization of the solenoid, wherein the gate element 134 is spaced forwardly of the foraminous wall 34 of the drying chamber 32 sufficiently to permit the mat 36 to drop from the drying chamber 32 into the delivery rack 44. Such pivoting of the entire

lower gate or gate means 42 takes place in the counterclockwise direction about the axis of the pivots 124 for the supporting arms 122. As shown in FIG. 6 of the drawings, the armature of the solenoid 160 carries a pin 162 which is received in a notch 164 in a member 166 mounted on a frame member 168 interconnecting the two supporting arms 122. This frame member 168 also provides the hereinbefore-discussed stop 136.

The various electrical elements hereinbefore identified are interconnected as schematically shown in FIG. 7 of the drawings. Additionally, the electrical circuit of the pre-dryer 10 includes: a relay 170 controlling a normally open contact 170*a*; a magnetic starter 174 having normally open contacts 174*a*, a normally open contact 174*b* and a normally closed contact 174*c*; a time delay relay 176 having a normally open contact 176*a*; a time delay relay 178 having a normally closed contact 178*a* and a normally open contact 178*b*; and a time delay relay 180 having a normally open contact 180*a*. The electrical components just enumerated are connected in the circuit in a manner which will be obvious from FIG. 7 of the drawings. The time delay relay 176 provides a relatively short delay, e.g., one second. The time delay relay 178 provides a relatively long delay, e.g., three seconds. The time delay relay 180 provides an intermediate delay, e.g., two seconds.

Operation

FIG. 7 of the drawings illustrates the positions occupied by the various switches of the pre-dryer 10 prior to initiating the operation thereof, and prior to placing a mat to be dried in the loading rack 26. Under such conditions, the upper gate 30 is open to permit a mat inserted into the loading rack 26 to slide downwardly into the drying chamber 32, and the lower gate 42 is closed to intercept such mat. However, the gate element 134 is pivoted into its upper position by the counterweights 144 to open the switch 148 and to permit the switch 140 to open.

To place the pre-dryer 10 in operation, the first step is to close the main switch 18, which energizes the motor 68 for the auxiliary pump 64, and which also energizes the indicator light 20 to show that the machine is ready for operation. If a mat to be dried is now placed in the loading rack 26, it will drop downwardly into the drying chamber 32 and come to rest on the gate element 134 of the lower gate 42, the weight of the mat thereby pivoting the gate element 134 downwardly to close the switch 140, which is preferably a normally open switch, and permitting closure of the switch 148, which is preferably a normally closed switch that is held open when the gate element 134 is in its upper position. The result is to energize the relay 170, the time delay relay 176 (the latter after a short relay to accommodate any tendency of the mat to bounce when its hits the gate element 134), and the magnetic starter 174, the starter thereby energizing the motor 52 for the main pump 50, energizing the solenoid 60 to open the valve 58 in the outlet line 56 of the main pump, and energizing the heating means 76 and 78. The foregoing action also starts a motor 181 of the timer 24. a solenoid 182 of which establishes a holding circuit through a switch contact 184, and further energizes the time delay relays 178 and 180 to energize the solenoid 120 for closing the upper gate 30 so as to prevent a subsequent mat placed in the loading rack 26 from dropping into the drying chamber 32. Under these conditions, the circuit to the solenoid 160 for opening the lower gate 42 is open.

As the drying of the mat progresses, its lower edge moves upwardly, due to shrinkage, and such upward movement is followed by the gate element 134 in the manner hereinbefore described. This initially results in opening of the switch 140, but the holding circuit mentioned has meanwhile bypassed such switch.

When the shrinkage of the mat being dried reaches the predetermined value for which the shrinkage control 22 is set, the switch 148 is opened. When this occurs, the aforementioned holding circuit is opened, whereby the heating means 76 and 78 are de-energized, the motor 52 for the main pump 50 is de-energized, the solenoid 60 controlling the valve 58 is de-energized so that such valve closes to break the vacuum in the main chamber 48 to release the dried mat from the foraminous wall 34, and the solenoid 160 is energized momentarily to open the gate 42 to permit the dried mat to drop into the delivery chute 44, the time delay of the relay 180 keeping the relay contact 180*a* closed long enough to open the gate 42 sufficiently long for the dried mat to drop into the delivery rack 44. Also, the solenoid 120 for opening the upper gate 30 is energized, but there is a time delay in the relay 178 sufficient that the lower gate 42 opens to permit the previously dried mat to drop, and then closes in readiness to receive the next mat before the upper gate opens. Thereupon, the foregoing operating cycle is repeated.

If the predetermined amount of shrinkage does not occur within the interval for which the timer 24 is set, the timer motor 181 opens a switch 186 to stop the cycle even though the shrinkage sensing switch 148 has not yet been opened. Thus, the timer 24 over-rides the shrinkage sensing apparatus. Also, the pre-dryer 10 can be placed entirely under the control of the timer 24, if desired, by cutting out the switch 148, as by setting the adjusting screw 146 to prevent opening of the switch 148 through the range of travel of the gate element 134.

The pre-dryer 10 also includes an emergency stop mechanism 188, suitably connected to the lower gate 42 in a manner not specifically shown, for opening the lower gate to drop a mat being dried from the drying chamber 32. The mechanism 188 is operated by a handle 190, FIG. 1, and may, when actuated, also open a stop switch, not shown, in series with the timer 24 to interrupt the cycle. (Manual opening of the lower gate 42 also results in opening of the switch 148 by the counterweights 144 to stop the cycle.)

Although an exemplary embodiment of the invention has been disclosed herein for purposes of illustration, it will be understood that various changes, modifications and substitutions may be incorporated in such embodiment without departing from the spirit of the invention as defined by the claims which follow.

I claim:

1. In an apparatus for drying mats, the combination of: means providing an upright mat drying chamber having a foraminous wall one side of which is engageable by a mat to be dried; means providing a vacuum chamber adjacent said drying chamber on the opposite side of said foraminous wall, said foraminous wall being common to said chambers; a vacuum pump connected to said vacuum chamber, said vacuum pump producing a pressure differential across a mat in said drying chamber which maintains the mat in engagement with said one side of said foraminous wall; radiant heating means on both sides of said foraminous wall and within said chambers for heating both sides of a mat in engagement with said one side of said foraminous wall; an upright mat loading rack above said drying chamber and communicating at its lower end with the upper end of said drying chamber; a mat delivery chute below and communicating with the lower end of said drying chamber; an upper gate at the lower end of said loading rack and movable between open and closed positions, said upper gate, when in its closed position, supporting a mat to be dried in said loading rack and, when in its open position, discharging the mat into said drying chamber; a lower gate at the lower end of said drying chamber and movable between open and closed positions, said lower gate, when in its closed position, supporting a mat to be dried within said drying chamber and, when in its open position, discharging the mat into said delivery chute; means responsive to the weight of a mat

on said lower gate for moving said upper gate to its closed position; means for opening and then closing said lower gate to discharge a mat supported thereby into said delivery chute; and means for subsequently opening said upper gate to discharge a mat supported thereby into said drying chamber to be supported therein by said lower gate.

2. In an apparatus for drying mats, the combination of: means providing an upright mat drying chamber having a foraminous wall one side of which is engageable by a mat to be dried; means providing a vacuum chamber adjacent said drying chamber on the opposite side of said foraminous wall, said foraminous wall being common to said chambers; a vacuum pump connected to said vacuum chamber for producing a pressure differential across a mat in said drying chamber which maintains the mat in engagement with said one side of said foraminous wall; radiant heating means on both sides of asid foraminous wall and within said chambers for heating both sides of a mat in engagement with said one side of said foraminous wall; a mat delivery chute below and communicating with the lower end of said drying chamber; gate means at the lower end of said drying chamber and movable between open and closed positions, said gate means, when in its closed position, supporting a mat to be dried within said drying chamber and, when in its open position, discharging the mat into said delivery chute; means for moving said gate means to its closed position; means responsive to the weight of a mat on said gate means for energizing said vacuum pump and said heating means; movable shrinkage sensing means incorporated in said gate means and engageable with a mat supported thereby for sensing shrinkage of the mat as it is dried; and means actuable by said shrinkage sensing means for de-energizing said vacuum pump and said heating means and for opening said gate means.

3. In an apparatus for drying mats, the combination of: gate means for temporarily supporting a mat in a drying position; means for closing said gate means; means for holding a mat temporarily supported by said gate means in said drying position and for drying it in that position; means for energizing said holding and drying means; movable shrinkage sensing means incorporated in said gate means and engageable with a mat supported thereby for sensing shrinkage of the mat as it is dried; and means actuable by said shrinkage sensing means for de-energizing said holding and drying means and for opening said gate means.

4. In an apparatus for drying mats, the combination of: gate means for temporarily supporting a mat in a drying position; means for closing said gate means; means for holding a mat temporarily supported by said gate means in said drying position and for drying it in that position; means responsive to the weight of a mat on said gate means for energizing said holding and drying means; movable shrinkage sensing means incorporated in said gate means and engageable with a mat supported thereby for sensing shrinkage of the mat as it is dried; and means actuable by said shrinkage sensing means for de-energizing said holding and drying means and for opening said gate means.

References Cited by the Examiner

UNITED STATES PATENTS

1,051,640	1/13	Sargent	34—148
1,085,230	1/14	Wild et al.	34—165
1,216,495	2/17	Reese	98—88
1,379,001	5/21	Diven	98—88
1,506,789	9/24	Sutherland	34—143
2,442,407	6/48	Gibbons et al.	34—4
2,492,348	12/49	Baker	34—145
2,501,922	3/50	Sutton	34—143
2,557,621	6/51	Touborg	34—15
2,653,394	9/53	Nelson et al.	34—143
2,713,446	7/55	Vaughan	221—9
2,731,733	1/56	Griner	34—146
2,782,577	2/57	Beall	221—12
2,841,684	7/58	Miskella	34—4
2,950,024	8/60	Adler	221—150

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