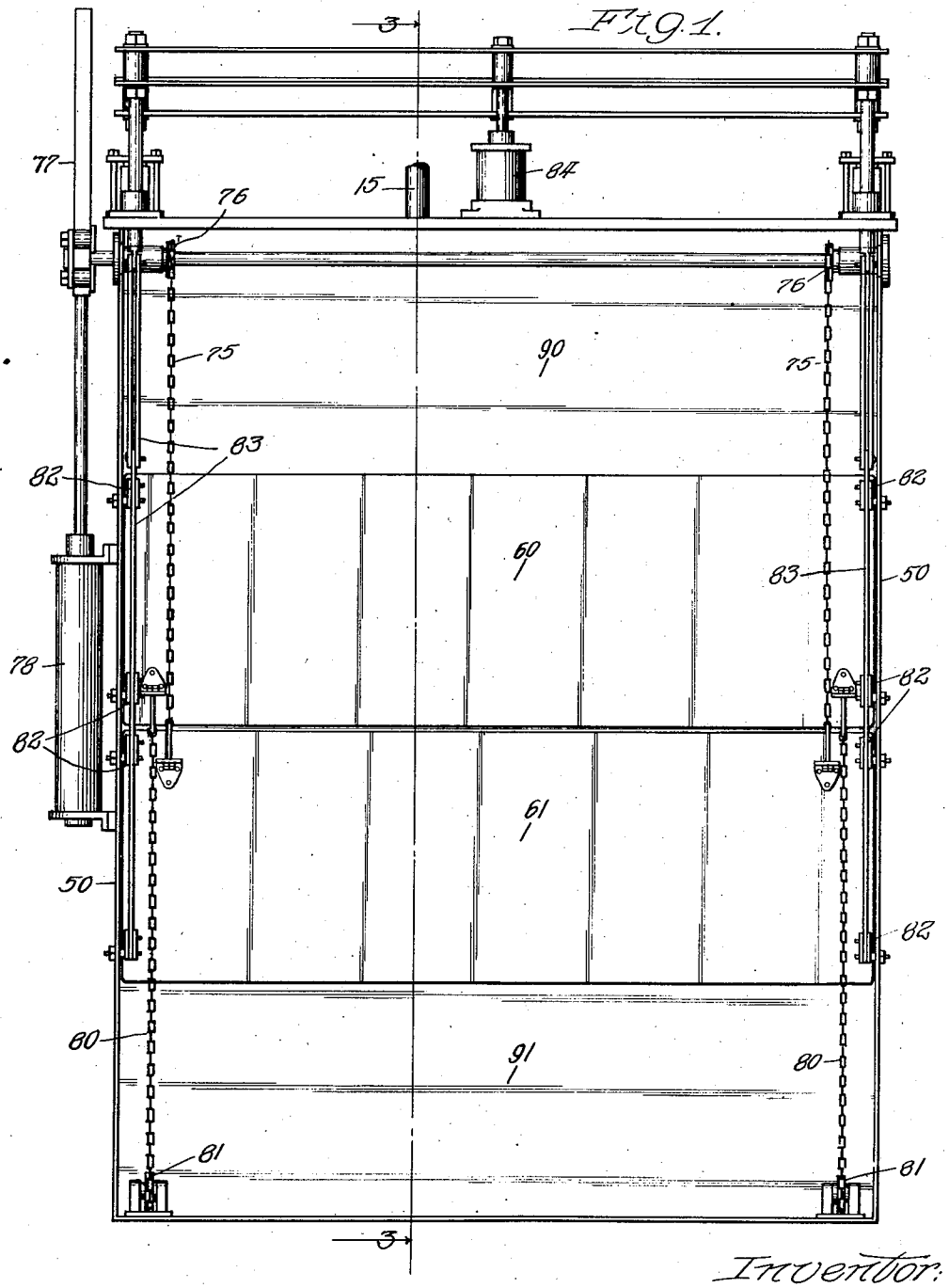
April 17, 1945. A. H. HEINEMAN 2,373,891

CLOSURE SYSTEM FOR VACUUM DRYER

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Fig. 1.



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Fig. 2.

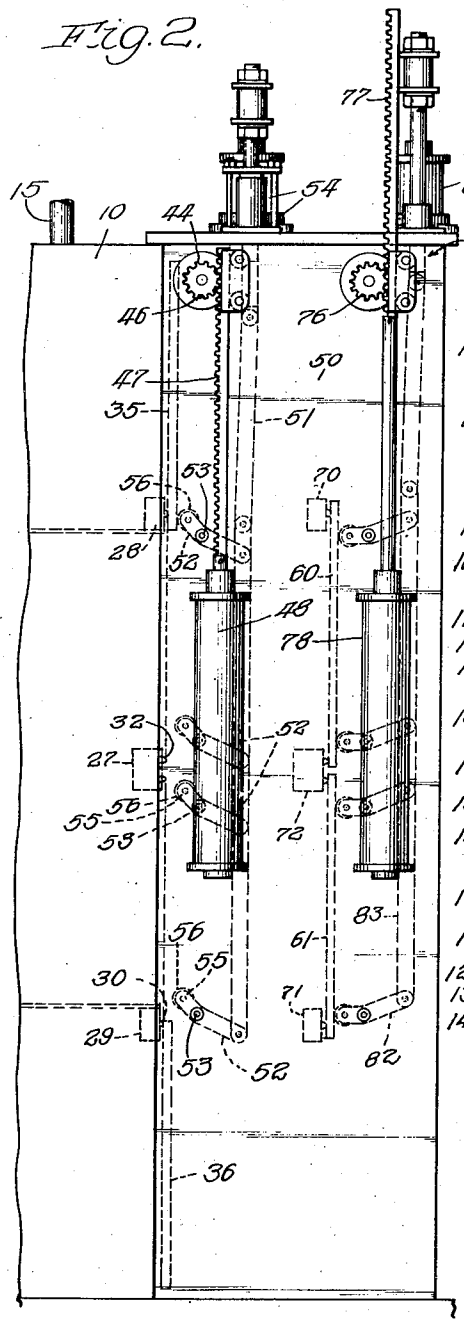
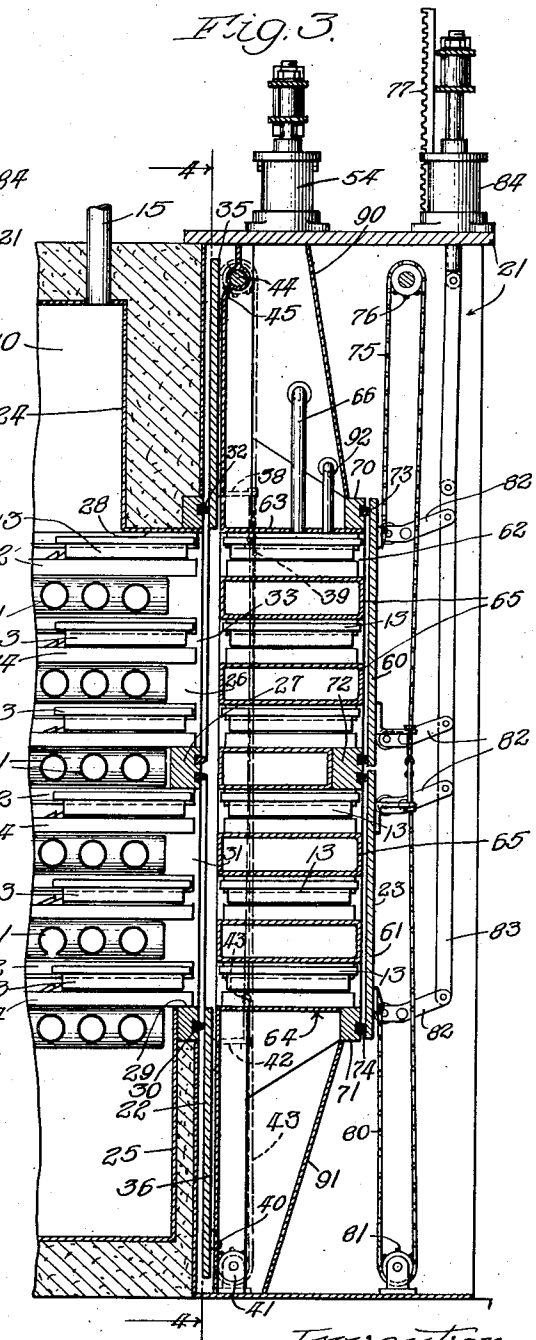


Fig. 3.



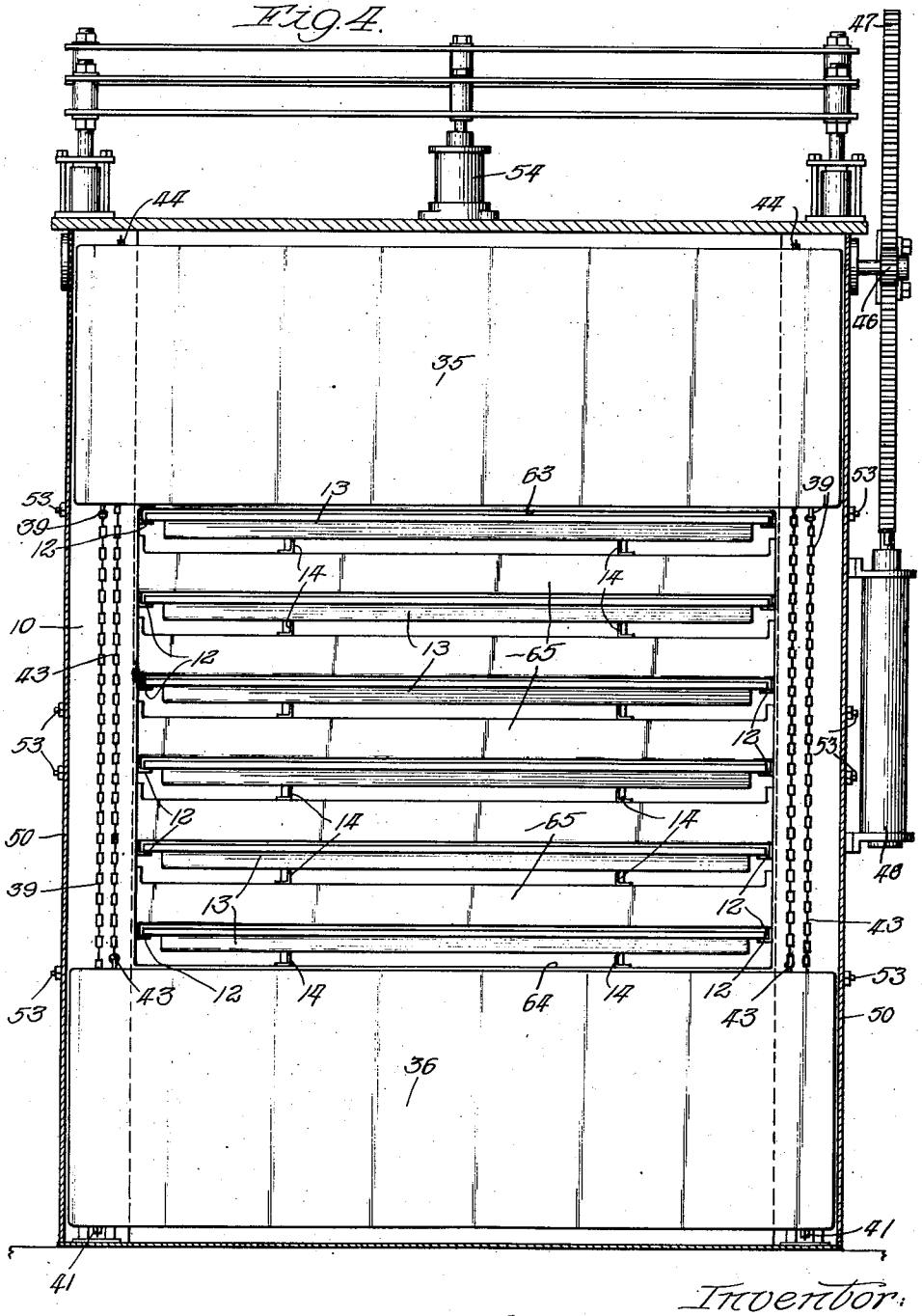
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Fig. 4.



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UNITED STATES PATENT OFFICE

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CLOSURE SYSTEM FOR VACUUM DRIERS

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Application September 6, 1943, Serial No. 501,399

4 Claims. (Cl. 34—92)

This invention relates to a closure system for a vacuum drier and more particularly to a closure system adapted for continuous operation under a steady vacuum while feeding material to be dehydrated through the system.

The invention is illustrated in the drawings, in which Fig. 1 represents an end elevation of the end of the drier; Fig. 2 is a side elevation; Fig. 3 is a sectional elevation taken along the line 3—3 in Fig. 1; and Fig. 4 is a sectional elevation taken along the line 4—4 in Fig. 3.

The present closure system is designed particularly to be used in drying systems of the type described in the application of Arnold H. Heineman, Serial No. 520,773 filed February 2, 1944, in which a continuous stream of material is passed through a vacuum chamber under a constant low absolute pressure. The present invention provides means for opening and closing one end of the vacuum chamber in order to permit removal of dried material without loss of vacuum.

The drying system comprises an elongated chamber 10, one end of which is open. The chamber is provided with a number of vertically spaced tiers of heating coils 11, between which are guides 12 for supporting trays 13, which contain material, preferably either vegetable or meat. The trays are introduced to the vacuum chamber at the opposite end thereof and are propelled through the chamber by a conveyer system which is shown in copending application, Serial No. 520,773, filed February 2, 1944. The details of the conveyer system are no part of the present invention. The conveyers are indicated at 14 and are reciprocally actuated by any suitable means (not shown).

The chamber 10 is maintained at a suitable low absolute pressure, for example, between 50 and 60 millimeters absolute, by any suitable form of evacuating equipment, connection to which is indicated at 15. The system is preferably operated in an atmosphere of steam and free from air.

The open end of the chamber 10 is provided with a lock system 21, which comprises two closure systems 22 and 23. The inner closure system 22 includes a depending plate 24 and a base plate 25. These plates reduce the opening in the end of the chamber 10 to the width and height of the portion of the chamber occupied by trays 13. Approximately midway of the opening 26 thus formed is a frame bar 27. The plate 24 is reinforced at 28 and the plate 25 is reinforced at 29. A rubber gasket 30, of highly compressible nature, encircles the lower half 31 of the opening 26 and a similar gasket 32 encircles the upper half 33 of the opening.

Immediately in front of the gaskets 30 and 32, are the vertically slidable panels 35 and 36. The upper panel 35 is provided with a bracket 38 (shown in dotted lines in Figure 3), to which is attached the chain 39 (see Figure 4). The lower panel 36 is provided with a bracket 40 (see Figure 3), to which the chain 39 is also attached, after being passed over the pulley 41 (see Figure 4 at the bottom and also Figure 3). The lower panel 36 is also provided with a bracket 42 (shown in dotted lines in Figure 3), carrying a chain 43 (see Figure 4), which extends over the pulley 44 and is affixed to the bracket 45 and the upper panel 35. These chains are suitably driven in order to raise and lower the panels. The preferred method of operation is illustrated in Figs. 1 and 2. The pulleys 44 are provided with a gear 46 which engages the rack 47. The rack is supplied with power from the air cylinder 48. When pulleys 44 are driven in one direction the chains 43 are elevated carrying panel 36 to which these chains are attached. The movement of panel 36 actuates chains 39, which are attached to the panel, and these chains being also attached to panel 35 cause it to move synchronously in the opposite direction, that is, downwardly. Movement of the pulleys 44 in the opposite direction conversely lowers the panel 35 and raises the panel 36. Means for forcing the panels 35 and 36 are mounted on the side plates 50 of the chamber. This preferably comprises a pair of link bars 51, to which are pivotally connected a series of bell cranks 52, which are pivotally secured to the plates 50 by the bolts 53. The link bars 51 are moved vertically by the air cylinder 54. When the link bars 51 are in lowered position, the bell cranks are withdrawn from the door as shown in Fig. 2. When the link bars are raised, the outer ends 55 of the bell cranks are pressed against the door panels, thereby bringing the panels into engagement with the gaskets. The bell cranks are preferably provided with rollers 56.

The bell cranks are not relied upon to secure an airtight connection. Once firm contact has been established with the gasket, and a differential in pressure has been established between the drying chamber and the panels, this pressure forces the panels against the gasket to produce a satisfactory seal.

A second pair of panels 60 and 61 are longitudinally spaced from the inner set of panels to form a lock chamber 62 which is bounded at

the top and bottom by plates 63 and 64. Within the lock chamber are a vertically spaced series of tray receiving supports 65. Means for evacuating the lock chamber are indicated at 66.

The outer panels 60 and 61 are mounted and actuated by a system substantially identical with that employed for the inner panels 35 and 36. A frame is formed by the bars 70, 71, and 72, which support the gaskets 73 and 74. The upper panel 60 is connected by the chain 75 to the lower panel 61 and this chain passes over the sprocket pulley 76 which is driven by the rack 77 and the air cylinder 78. The lower panel 61 is connected by the chain 80 to the upper panel 60 and that chain is carried by the sprocket pulley 81. A series of bell cranks 82, operated by the link bars 83, and driven by the air cylinder 84 functions to press the panels against the gaskets 73 and 74.

A plate 90 seals the upper panel 35 from access to the air and a similar plate 91 performs the same function for the lower panel. Those portions of the operating mechanism which extend through the side walls are suitably provided with stuffing boxes to avoid leakage.

The operation of the device may be explained by starting with the panels 35 and 36 in closed position and the panels 60 and 61 in open position. At this stage the pressure within the chamber 10 will be about 57 millimeters absolute. The panels 60 and 61 are then closed by operation of the air cylinder 78, which drives the sprocket wheel 76, lowering the upper panel and raising the lower panel. When the two panels have been drawn into abutment, the link bars 83 are drawn upwardly thereby pressing the panels against the gaskets 73 and 74. Air is then removed from the chamber through the vacuum line 66. Preferably, steam is introduced toward the close of the evacuation through the line 92, in order to wash out all the residual air and replace it with an atmosphere of steam at the same pressure as that in the drying chamber and preferably under superheat.

When this has been accomplished, the panels 35 and 36 are opened by lowering the link bars 51 to release the bell cranks 55 and then actuating the air cylinder 48 to operate the sprocket wheel 46. As soon as the panels are open a series of trays are pushed from the chamber 10 into the lock chamber 65. The inner panels 35 and 36 are then again closed, air is admitted to the chamber, the outer panels are released and then raised. The trays are then removed from the lock chamber and the cycle may then be repeated.

The foregoing detailed description has been given for clearness of understanding only, and no unnecessary limitations should be understood therefrom.

I claim:

1. In a vacuum drier; an elongated chamber having an open end, a pair of slidably mounted panels, each of which is adapted to close approximately one-half of said open end, a framed member centrally located in the opening and dividing it into two parts, a gasket completely encircling each of said parts, means for evacuating the chamber and means for moving said panels in opposite directions.

2. In a vacuum drying system; an elongated vacuum chamber open at one end, a lock system at said end comprising an air tight extension of said vacuum chamber, an inner-closure for the lock, and an outer-closure for the lock, the inner-closure being sealed against air, and each closure comprising a pair of oppositely slidable panels, means for separately actuating each said pair of panels, a frame having a central opening for each of the panels, a gasket completely encircling each of such openings, and means for pressing the panels into firm engagement with their respective frames.

3. A drier as set forth in claim 1, in which means are provided for pressing the panels into initial engagement with the gaskets.

4. A vacuum drier, comprising an elongated, rectangular drying chamber open at each end, means for evacuating the chamber, means for closing the inlet end of the chamber, means for conveying material to be dried through the chamber, a lock system at the outlet end of the chamber comprising an air tight extension of said vacuum chamber and inner and outer closures for the lock, each of said closures comprising a pair of oppositely slidable panels, a frame for each of the panels, there being a central opening in each frame, gasket means completely encircling each of said openings, and means for pressing the panels into engagement with their respective frames.

ARNOLD H. HEINEMAN.