(No Model.)

T. F. ROWLAND.

DOOR FOR DIGESTERS.

No. 357,101. Patented Feb. 1, 1887.

Fig. 1

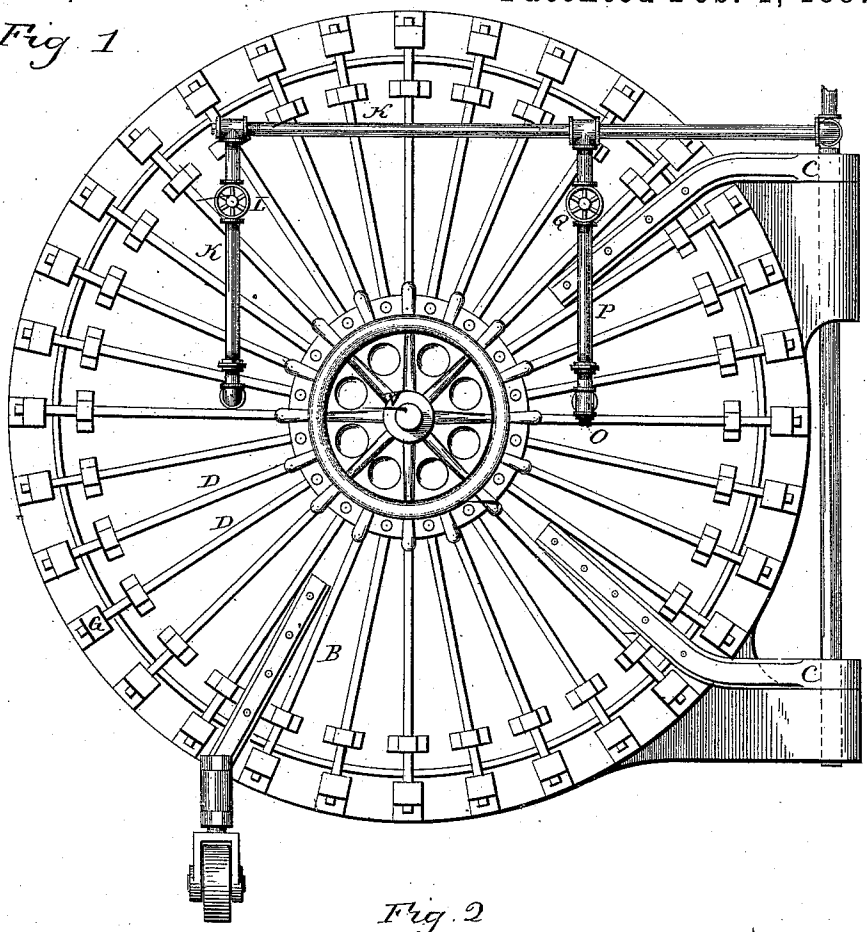
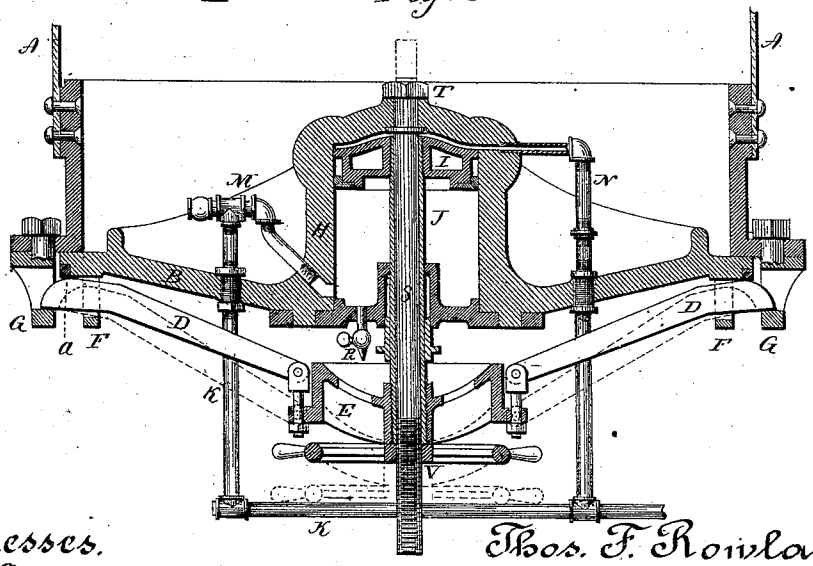


Fig. 2



Witnesses.
J. H. Shumway
Fred. P. Earle

Thos. F. Rowland,
Inventor.
By Atty.
Wm. P. Earle.

N. PETERS. Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

THOMAS F. ROWLAND, OF NEW YORK, N. Y.

DOOR FOR DIGESTERS.

SPECIFICATION forming part of Letters Patent No. 357,101, dated February 1, 1887.

Application filed June 28, 1886. Serial No. 206,564. (No model.)

To all whom it may concern:

Be it known that I, THOMAS F. ROWLAND, of New York, in the county of New York and State of New York, have invented a new Improvement in Doors for Digesters; and I do hereby declare the following, when taken in connection with accompanying drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1, a front elevation of the door and its surrounding frame; Fig. 2, a longitudinal section cutting horizontally through the door and its frame.

This invention relates to an improvement in securing the doors of apparatus in which there is great pressure, and which pressure the securing devices on the door are required to resist, such as certain kinds of kilns, vulcanizers, air or gas receivers or storage chambers, and any of the other various constructions in which gases or fluids are confined or stored under pressure, temporarily or otherwise. More particularly the invention relates to the doors of structures in which material is to be treated under pressure, and which are frequently open for the purpose of charging them with the material to be treated, and which, therefore, require large doors to give ready or unobstructed access to their interiors, and commonly known as "digesters," the present invention being an improvement upon the invention described in Letters Patent No. 320,971, granted to me June 30, 1885; and before proceeding to describe my improvement I will describe the devices shown in my said patent, and which are illustrated in the accompanying drawings, together with my improvements.

A represents the shell or walls of the digester-chamber, and B the door located at one end of the chamber and of an extent corresponding substantially to that end of the chamber, and, like the chamber, the door is circular in form, and is hung upon hinges C C.

To secure the door, a series of radial levers, D, are arranged upon the outer surface of the door, their inner ends hung to a central or concentric cross-head, E, and their outer ends extending loosely through guides F on the door, as indicated in Fig. 2, and so that near their outer end they may bear upon the door, as at *a*, and near its outer edge.

In the frame around the door-opening sockets G are arranged, corresponding to the respective levers D, and arranged so that the outer end of the levers may pass within the sockets. The movement of the cross-head toward the door will impart to the levers an outward radial movement. Drawing the cross-head from the door will impart to the levers a corresponding inward radial movement, and as indicated in broken lines, Fig. 2. In this inward position the noses or outer ends of the levers D are drawn inside of and so as to escape the sockets G. In this condition the door may be opened; but when the door is closed, and the cross-head moved inward, the outer ends of the levers enter within the sockets G, and take a bearing therein as a fulcrum, the lever itself bearing against the outer surface of the door so as to apply the power of the inwardly-moving cross-head directly to the door, and thereby not only close but securely lock the door so long as the cross-head shall be held in its inward position.

In the door a cylinder, H, is formed, substantially as a part of the door and substantially concentric therewith. In this cylinder is a piston, I, arranged to move freely therein, and which may be packed in substantially the usual manner of packing steam-pistons. The piston is fixed to a rod, J, which extends out through a suitable stuffing-box, and to its outer end the cross-head E is fixed.

K is a steam-pipe leading from some source of steam to the outer end of the cylinder—that is, into the cylinder outside the piston. The pipe K is provided at L with a cut-off valve, and on the inside of the door, at M, with a check-valve, which is arranged to establish communication between the cylinder and the interior of the digesting-chamber whenever the pressure within this chamber is greater than that within the cylinder.

N is a waste-pipe running from the inner end of the cylinder upon the reverse side of the piston to a point outside the door, and to a suitable discharge-opening, as at O.

P is a branch pipe connecting the waste-pipe to the steam-pipe, which is provided with a cut-off valve, Q.

R is a pet-cock whereby the cylinder is exhausted.

The operation of the mechanism is as follows: After the drying-chamber has been filled with lumber, or whatever it may be to be acted upon, and the door brought into its closed position, and before admitting steam or other agent into the chamber, steam is led into the cylinder H, the pressure of which will drive the piston inward, taking with it the cross-head and forcing the outer end of the levers into their respective sockets and to a bearing against the door until the door is firmly secured, and as indicated in Fig. 2. The steam, or whatever it may be, is then admitted to the drying-chamber, and the digesting process proceeds in the usual manner. The pressure in the cylinder upon the piston is maintained throughout the operation, or as long as may be desired.

To provide against any possible deficiency in the steam or pressure upon the piston in the cylinder from the direct steam, or if, from any cause, the pressure upon the piston should be reduced below that in the digesting-chamber, I arrange a check-valve, M, which under such increased pressure in the chamber should open to permit the steam from the chamber to pass into the cylinder and increase the pressure upon the piston until it counterbalances the pressure in the chamber.

Various causes are liable to interfere with the pressure upon the piston, and whereby that pressure may be reduced, and from which it will be obvious that should the pressure in the chamber overcome the pressure upon the the piston the door would be thrown open.

To prevent any possible contingency is the object of my present invention; and it consists in arranging a bolt through the cross-head and piston, with a bearing upon the inside of the door independent of the piston or its rod, the said bolt extending outward through the cross-head, and there provided with a suitable locking device, which, when the door is fully closed, may be brought to bear forcibly upon the cross-head, and so as to securely hold it in its locked position independent of the pressure of the piston, and so that should the pressure escape, or from any cause be reduced, the door will still be locked.

In applying my improvement I construct the piston-rod J tubular, it being fixed to the piston and to the cross-head as in my previous patent and as clearly shown in Fig. 2, the piston-rod opening through the cross-head. Through the tubular piston I introduce a bolt, S, and secure it at its inner end to the door independent of the piston, and this is best done by extending it through the cylinder and there applying a suitable nut, T, as shown, to take a bearing against the inner end of the cylinder. The bolt extends out through the cross-head, its outer end being provided with a screw-threaded portion, U, and onto this screw-threaded portion a suitable nut, preferably a hand-wheel, V, is placed, which by rotation around the screw-threaded portion is brought to bear upon the outer side of the cross-head and so as to tend to force it inward.

When the piston and the cross-head have been forced inward and the door properly secured, the nut V is screwed onto the bolt to bring it to a hard bearing against the cross-head, and so as to hold the cross-head with the levers it carries in that locked position, and thus locked, if the pressure in the cylinder be reduced or entirely removed, the parts will be still held and supported in the locked position, from which they cannot be moved until the nut V is unscrewed.

While I prefer to apply the nut or locking device to the outer end of the bolt, it will be evident that the bolt itself may be screw-threaded through the inner end of the cylinder, as seen in broken lines, Fig. 2, and the locking device be, say, a hand-wheel made fast to the bolt, so that in the locking operation the bolt itself will be revolved and screwed inward to bring the locking device on the bolt to a bearing against the cross-head.

I do not claim, broadly, a system of radial levers upon the door as a means of securing the door, or such levers combined with a concentric screw by which they may be operated to bear upon or relieve the door; but

What I do claim as an improvement upon the invention for which Letters Patent No. 320,971 were granted to me June 30, 1885, is—

The combination, in a digester or other similar structure, of a door for closing the same, a central cross-head, a system of radial levers hung to said cross-head, sockets or fulcrum-bearings for the respective levers in the frame surrounding the door, the said levers adapted to take a bearing upon the door between said sockets and the cross-head, a cylinder fixed to or made a part of the door and concentric with cross-head, a piston in said cylinder with a tubular rod extending therefrom outward and with the said cross-head fixed to its outer end, and a bolt through said tubular piston-rod fixed to the cylinder at its inner end, and a locking device at its outer end adapted to bear upon said cross-head, substantially as described, when the door is secured in its closed position.

THOMAS F. ROWLAND.

Witnesses:
GEO. C. BRADLEY,
CHAS. F. HATHAWAY.