(No Model.)

2 Sheets—Sheet 1.

L. SIMPSON.

TANNING APPARATUS.

No. 332,450. Patented Dec. 15, 1885.

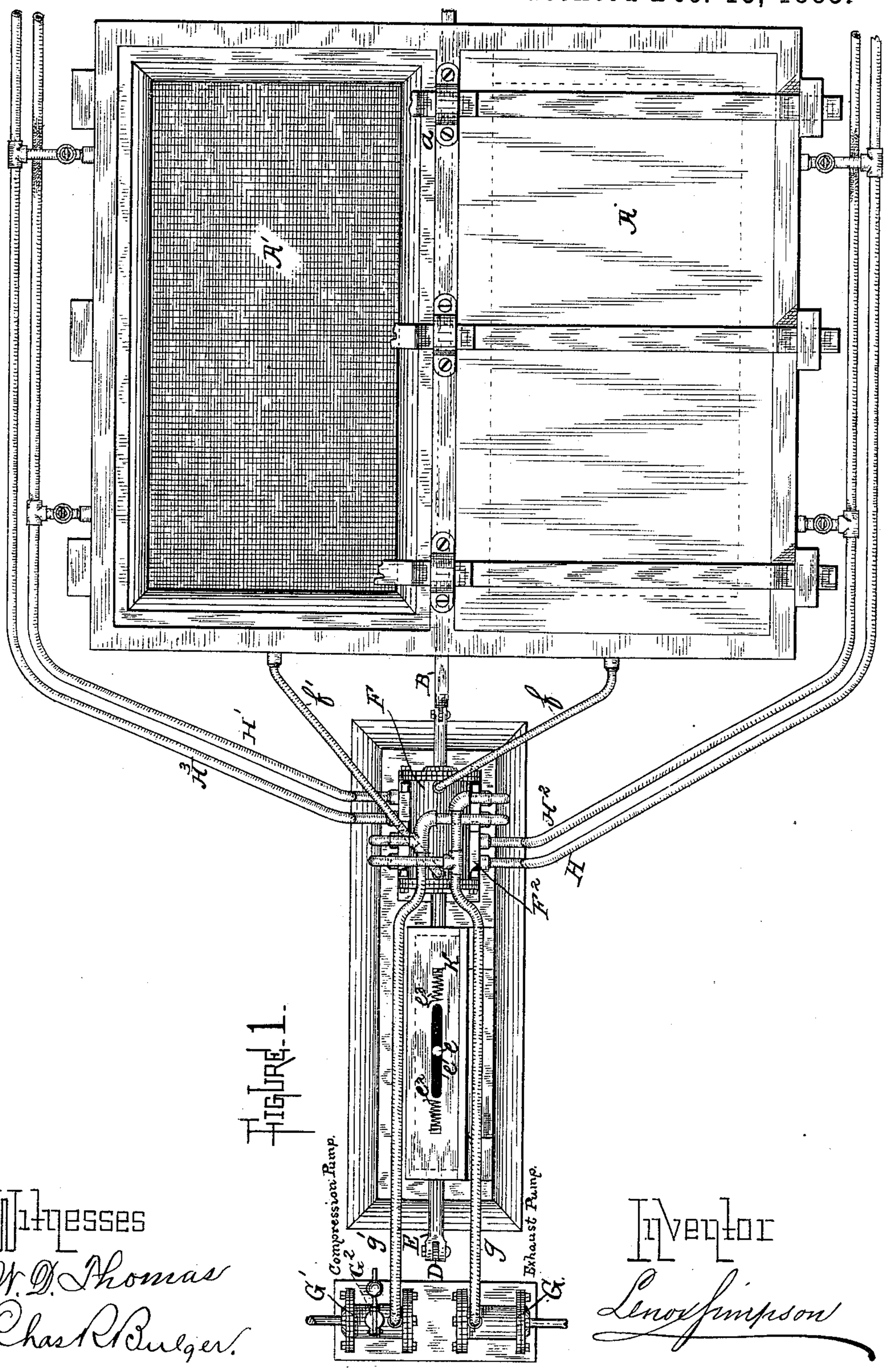

FIGURE 1.

Witnesses
W. D. Thomas
Chas. R. Bulger.

Inventor
Leno Simpson

(No Model.)

2 Sheets—Sheet 2.

L. SIMPSON.

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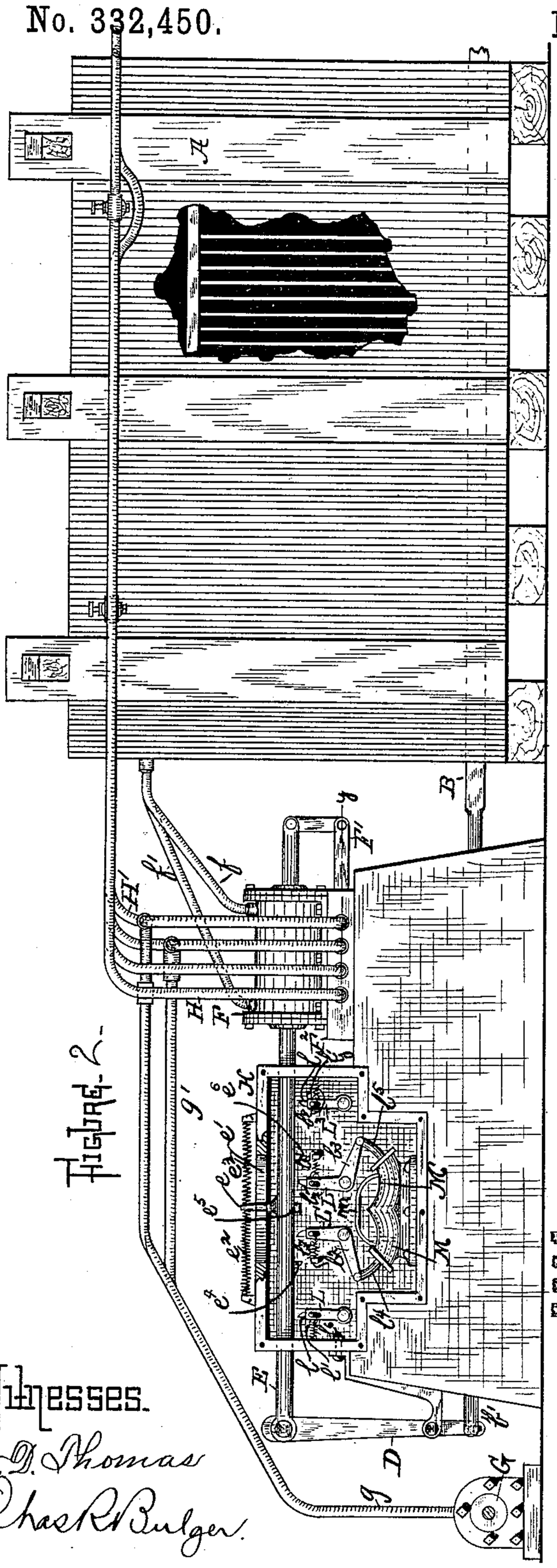

FIGURE 2.

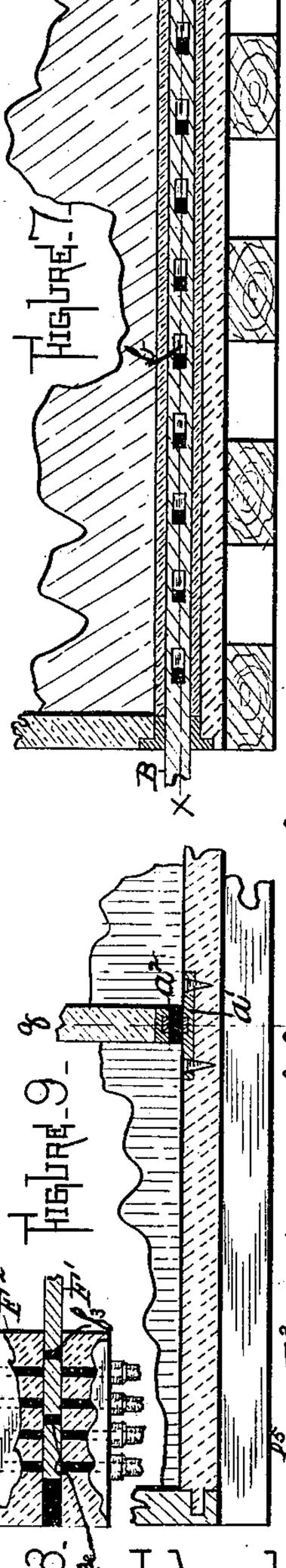

FIGURE 7.

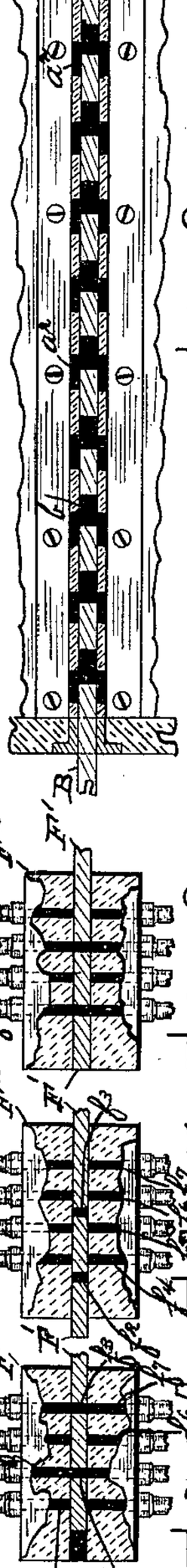

FIGURE 8.

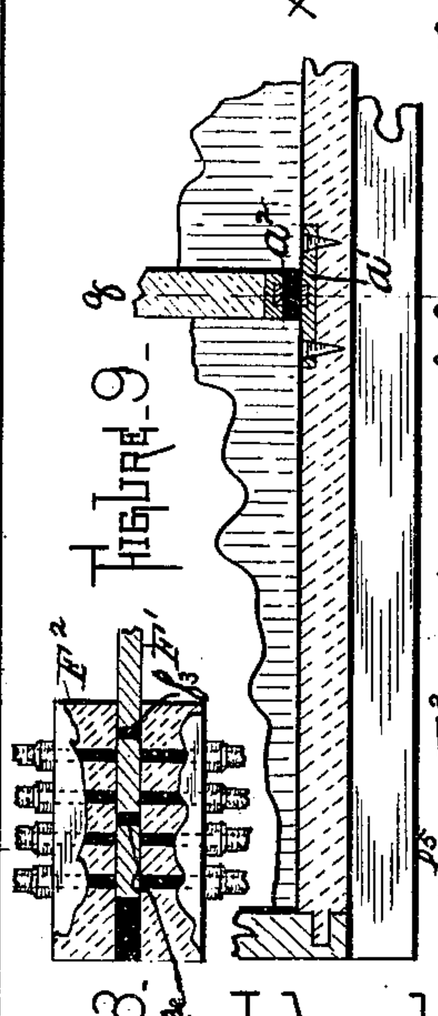

FIGURE 9.

FIGURE 3.

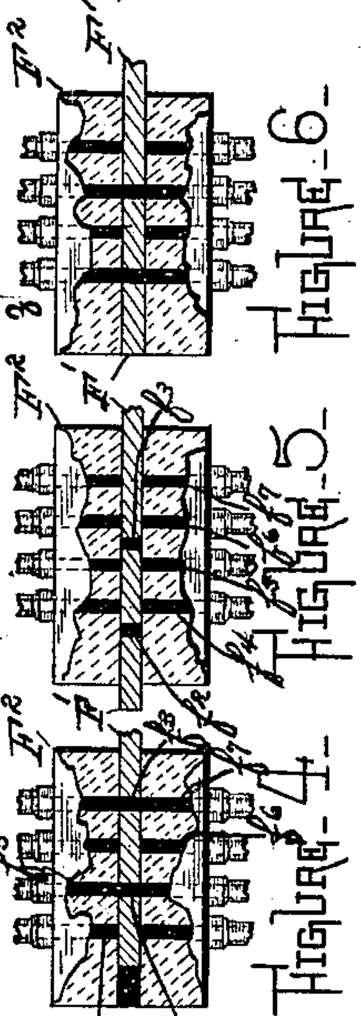

FIGURE 4.

FIGURE 5.

FIGURE 6.

Witnesses.

W. D. Thomas

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Lenox Simpson

UNITED STATES PATENT OFFICE.

LENOX SIMPSON, OF BELLEVUE, ALLEGHENY COUNTY, PENNSYLVANIA.

TANNING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 332,450, dated December 15, 1885.

Application filed April 22, 1885. Serial No. 163,023. (No model.)

To all whom it may concern:

Be it known that I, LENOX SIMPSON, a citizen of the United States, residing at Bellevue borough, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Tanning Apparatus, of which the following is a full, clear, and exact description.

This invention relates to improvements in apparatus for carrying out the process of tanning described and claimed in my application for Letters Patent of the United States filed the 12th day of November, A. D. 1884, and bearing the Serial No. 147,757. In said application a process of tanning is described which consists, essentially, in alternately compressing the tannic liquor into the hide until its acid has chemically combined with the gelatine, and immediately thereafter drawing out of the pores the spent liquid by a vacuum, these steps being alternated in rapid succession until the hide is sufficiently tanned.

The object of the present invention is, first, to immerse the hide in liquor and apply pressure, then remove the liquor and exhaust the air, and alternate these steps rapidly and automatically until the hide is tanned; second, to utilize the tannic liquor during the time when it is removed from the vat; third, to regulate the degree of pressure and evacuation of the air within the vat; and, fourth, to automatically shift the liquor back and forth between two vats.

The invention consists, first, in air-tight twin vats connected at their bases, said connections provided with a valve, by opening which the liquor may be shifted from one vat to the other; second, in a cylinder connected at one end with the interior of one vat and at the other end with the interior of the remaining vat, said cylinder being provided with a piston adapted to work the valve between the vats; third, in a compression-pump and a vacuum-pump, each pump connected by a pipe with both vats, and a device which alternately brings each pump into communication with each vat; fourth, in a valve-chest provided with four ports, one of the aforementioned pump-pipes being connected with each of said ports, a valve adapted to open and close said ports in proper sequence, and means for operating said valve; and, fifth, in various details of construction, all of which will be hereinafter more fully described.

In the drawings, Figure 1 represents a top plan view of my improvement; Fig. 2, a side elevation partly in section, and partly broken away to show the interior of one of the vats; Figs. 3, 4, 5, 6, sectional views of the valve-chest, showing the valve in the four different positions it occupies during the operation; Fig. 7, a longitudinal vertical section of the valve lying between the two vats; Fig. 8, a longitudinal transverse section of same; Fig. 9, a vertical transverse section of same.

Similar letters of reference indicate corresponding parts throughout the different views.

A A′ are two vats, which may be of any size, shape, or material, provided they be sufficiently strong to bear an external pressure of an atmosphere and an internal pressure of upward of thirty pounds to the square inch, and that they be constructed of such material as will not discolor the leather when acted on by tannic acid. I prefer to construct said vats of wood and properly brace them. The vats are beveled on their upper inner edges, and provided with lids or tops, also beveled on their edges. The tops are wedged down, or may be secured in any other convenient manner which will insure a tight joint. A rubber or other gasket may be interposed between said top and vat. The vats may be separate or built together, as shown in the drawings, and separated only by a partition. In case the vats are made entirely separate, I connect them at the bottom by suitable pipes or ducts provided with cocks; but as I prefer to construct them, for reasons of economy and convenience, together, with merely a partition-wall between, I will confine my description to that form of vat.

In the bottom of the partition-wall *a*, I secure a valve-casing, *a′*, provided with a large number of ports, a^2. In this casing works a slide-valve, B, provided with ports *b*, equal in number and size to those in the casing *a′*. It will be seen that by this construction when the valve is forced in either direction from a closed position the interiors of the vats will communicate. A rod, *b′*, connects the extremity of said valve with one end of a slotted lever, D. Said lever is fulcrumed a short distance above its point of connection with the

valve-rod, and has its free extremity slotted and connected with one end of the piston E. Said piston is provided with a head within the cylinder F. The latter has near its ends pipes $f f'$, which connect it with the interior of vats A A', respectively. By this construction it will be seen that whenever the air is compressed in one vat or exhausted in the other, or both, an excess of pressure is brought to bear upon one side of the piston-head, and the latter is moved, thereby forcing piston E in one direction or the other, and through the medium of the lever D and rod b' moving the slide-valve b. The piston E at one extremity is connected with a slide-valve, F', which works in a valve-chest, F^2. Said valve is provided with two ports, f^2 f^3, and said valve-chest has on either side four (4) ports, f^4 f^5 f^6 f^7.

G G' are the exhaust and compression pumps respectively. The pump G' is provided with a safety-valve, G^2, which may be set to any desired number of pounds pressure. From the pump G a pipe, g, extends to the valve-chest F^2, where it is divided into two branches, one of which is connected with port f^4 upon one side of the valve chest, and the other with port f^7 upon the opposite side of the valve-chest. A pipe, H, connects remaining port f^4 with the vat A, and a pipe, H', connects the remaining port f^7 with the vat A'. From the pump G' a pipe, g', extends to the valve-chest F^2, where it is divided into two branches, one of which enters port f^5, upon one side of the chest, and the other enters the port f^6 upon the opposite side of said chest. A pipe, H^2, connects the remaining port f^5 with the vat A, and a similar pipe, H^3, connects the remaining port f^6 with the vat A'. By this construction it will be seen that each of the pumps is connected with both vats and that the position of the valve F determines which vat shall be in communication with a particular pump. Upon the upper side of the piston E is a lug, e, which extends upward through a slot, e', in the casing K. Said slot determines the length of stroke of the piston. To the upper extremity of lug e are secured two counterbalancing-springs, e^2 e^3, whose office is to force the piston-head and slide-valves toward a middle position when the pressure in the cylinder is equal upon each side of the head. Upon the lower side of said piston are three lugs, e^4 e^5 e^6. Beneath the piston-rod are a series of catches, L L' L^2 L^3. Each of said catches is provided with a spring-bolt, l. Stops l' limit the motion of the catches in one direction. The catches L L^3 are intended to catch and hold the piston at the ends of its stroke. The catches L' L^2 may be provided with arms l^2 l^3, set at an obtuse angle, and having their free extremities connected with the curved pistons l^4 l^5. The latter work in cylinders M M', which have their extremities connected by a small pipe, m, and are filled with water or other liquid. Attached to the catches L L' L^2 L^3 are coil-springs l^6 l^7 l^8 l^9. The springs l^6 l^9 have a tension somewhat less than that possessed by the springs e^2 e^3 when the lugs e^4 e^6 are caught over the catches L L^3. The springs l^7 l^8 are set at a tension equal to the pressure upon one side of the piston-head in cylinder F when the desired compression is had in one vat and exhaust in the remaining vat. The function of the catches is to hold the valves in proper relation to the ports in the valve-casings at each step of the operation. The function of the arms l^2 l^3, pistons l^4 l^5, and cylinders M M' is to prevent the lugs e^3 e^4 from dragging over the tops of the catches L' L^2 by virtue of their momentum. Said arms, pistons, and cylinders are optional and may be dispensed with, if so desired.

Instead of springs l^6 l^7 l^8 l^9, cords, pulleys, and weights may be used, and, indeed, the catches L' L^2, with their springs l^6 l^9, may be done away with altogether if the mechanism be constructed to work with delicacy.

The operation of the invention is as follows: The hides are hung in both vats so that about one-third ($\frac{1}{3}$) of the upper part of each vat remains unoccupied. The safety-valve upon pump G' is set to the amount of pressure desired within the vats. The springs b^7 b^8 are set to stand a weight equal to the sum of the pressure upon one side of the piston-head plus the exhaust upon the other side of said head. The piston is then pushed inward until the lug e^5 rests against the outer side of the catch L^2. Sufficient tannic liquor is then introduced into vat A to cover the hides and the lids are wedged upon the tops of the vats. At this time slide-valve B cuts off communication between the two vats. The slide-valve F' is in the position shown in Fig. 4—that is to say, vat A is in communication with the pump G' and vat A' in communication with the pump G. The pumps are then operated and the air within the vat A compressed, while that within the vat A' is exhausted. By this step I drive the tannic liquor into the skins in vat A, while at the same time I expand and open the pores of the skins within vat A'. When the compression in vat A plus the exhaust in vat A' exceeds the pressure which the spring l^8 is set to withstand, the lug e^5 will drag over the catch L^2, and the piston will be forced outward to the end of its stroke, where it is held in place by the lug e^4 and catch L. At the same time the slide-valve B has been pushed farther into the valve-casing of the vats and communication between the vats established. At this step in the operation the slide-valve F' is in the position shown in Fig. 5—that is to say, all communication between the vats and pumps is shut off. The vat A being partially filled with compressed air and the vat A' being exhausted of its air, the liquor within vat A will be forced into vat A' with great rapidity. When all the liquor (and some of the air) has passed into vat A', the pressure in the two vats (and upon the opposite sides of the piston-head within cylinder F) becomes equal. Thereupon the spring e^3 drags the lug e^4 over the catch L and forces

the piston inward until the lug e^5 rests against the catch L′. Communication between the vats is thereby cut off, and the slide-valve F′ is then in the position shown in Fig. 6. The exhaust-pump is then in communication with vat A and the compression-pump with vat A′. When the compression in vat A′ plus the exhaust in vat A exceeds the pressure which the catch L′ is set to withstand, the lug e^5 is dragged over said catch and the piston E is forced inward to the end of its stroke, where it is held by catch L^3. This movement of the piston causes valve B to open communication between the vats and the valve F′ to shut off communication between the vats and pumps, as shown in Fig. 3. The liquor is then shifted from vat A′ to A in the manner already described. The operation thus proceeds: the liquor shifted back and forth between the two vats, compression always brought to bear in the vat containing liquor, and a vacuum always formed in the vat devoid of liquor as long as the pumps continue to work. From time to time the liquor is run off and stronger fresh liquor substituted therefor. I thus dispense with all handling of the hides after being hung in the vat. The constant shifting of the liquor keeps it properly agitated, and the alternate pressing of the liquor into the skin and instantaneous removal of the spent liquor shortens the process of tanning to about thirty-six hours for calfskins and proportionately for heavier hides.

Having thus described my invention, what I claim is—

1. The combination, with the two vats A A′, separated by a partition, of the casing a', having ports a^2, and the slide-valve B, having ports b, as and for the purpose described.

2. The combination, with the vats A A′, casing a', and slide-valve B, of the end-slotted lever D, having a rod-connection with said valve end, the piston E, connected with the slotted end of lever, and the cylinder F, having pipes $f\,f'$ near its ends, as and for the purpose specified.

3. In a tanning apparatus in which air-pumps are employed, the combination, with two air-tight vats provided with valved connections at their bottoms, of a cylinder having one end connected with one of said vats and the other end connected with the remaining vat, a piston working in said cylinder and connected with the valves of the vats, and mechanism for regulating the movement of said piston, whereby the difference in pressure within the two vats operates said valves, substantially as and for the purposes described.

4. The combination, with the two air-tight vats and an exhaust and compression pump, of a cylinder, one end of which is connected with one of said vats and the other end with the remaining vat, a valve-chest provided with four entrance and four exit ports, said ports connected with the pumps and vats, respectively, a valve adapted to open and shut said ports, a piston working in said cylinder and adapted to operate said valve, and mechanism for regulating the movement of said piston, substantially as and for the purposes described.

5. The combination of two air-tight vats provided at their bottoms with valved connections, exhaust and compression pumps, a valve-chest having four entrance and four exit ports connected with the pumps and vats, respectively, and provided with a valve adapted to open and close said ports, a cylinder, one extremity of which is connected with one of the vats and the other extremity with the remaining vat, a piston working in said cylinder and connected with all the valves, and mechanism for regulating the piston, substantially as and for the purposes described.

6. The combination, with two air-tight vats provided at their bottoms with valved connections, exhaust and compression pumps, a valve-chest having four entrance and four exit ports connected with the pumps and vats, respectively, and provided with a valve, and a cylinder, one of whose extremities is in communication with one of the vats and the other extremity with the remaining vat, of a piston working in said cylinder and provided with lugs, and catches adapted to engage with said lugs and regulate the movement of said piston, substantially as and for the purposes set forth.

7. The combination of vats A A′, provided with valve-casing a' and valve B, cylinder F, pipes $f\,f'$, piston E, having lugs $e\ e^4\ e^5\ e^6$, springs $e^2\ e^3$, catches L′ L^2, lever D, and pumps G G′, connected with the vats, substantially as described, whereby, when the difference in pressure within the two vats is sufficient to overcome the resistance of the catches L′ L^2, the valve between the vats will be opened and the liquor shifted into the empty vat, for the purposes set forth.

8. The combination of vats A A′, provided with valve-casing a' and valve B, cylinder F, pipes $f\,f'$, piston E, having lugs $e\ e^4\ e^5\ e^6$, springs $e^2\ e^3$, catches L L′ L^2 L^3, lever D, valve-casing F^2, valve F′, pumps G G′, and pipes g g' H H′ H^2 H^3, substantially as described, whereby the liquor is shifted back and forth between the vats, pressure applied to the vat containing liquor, and the air exhausted from the vat devoid of liquor, for the purposes set forth.

LENOX SIMPSON.

Witnesses:
W. D. THOMAS,
CHAS. R. BULGER.