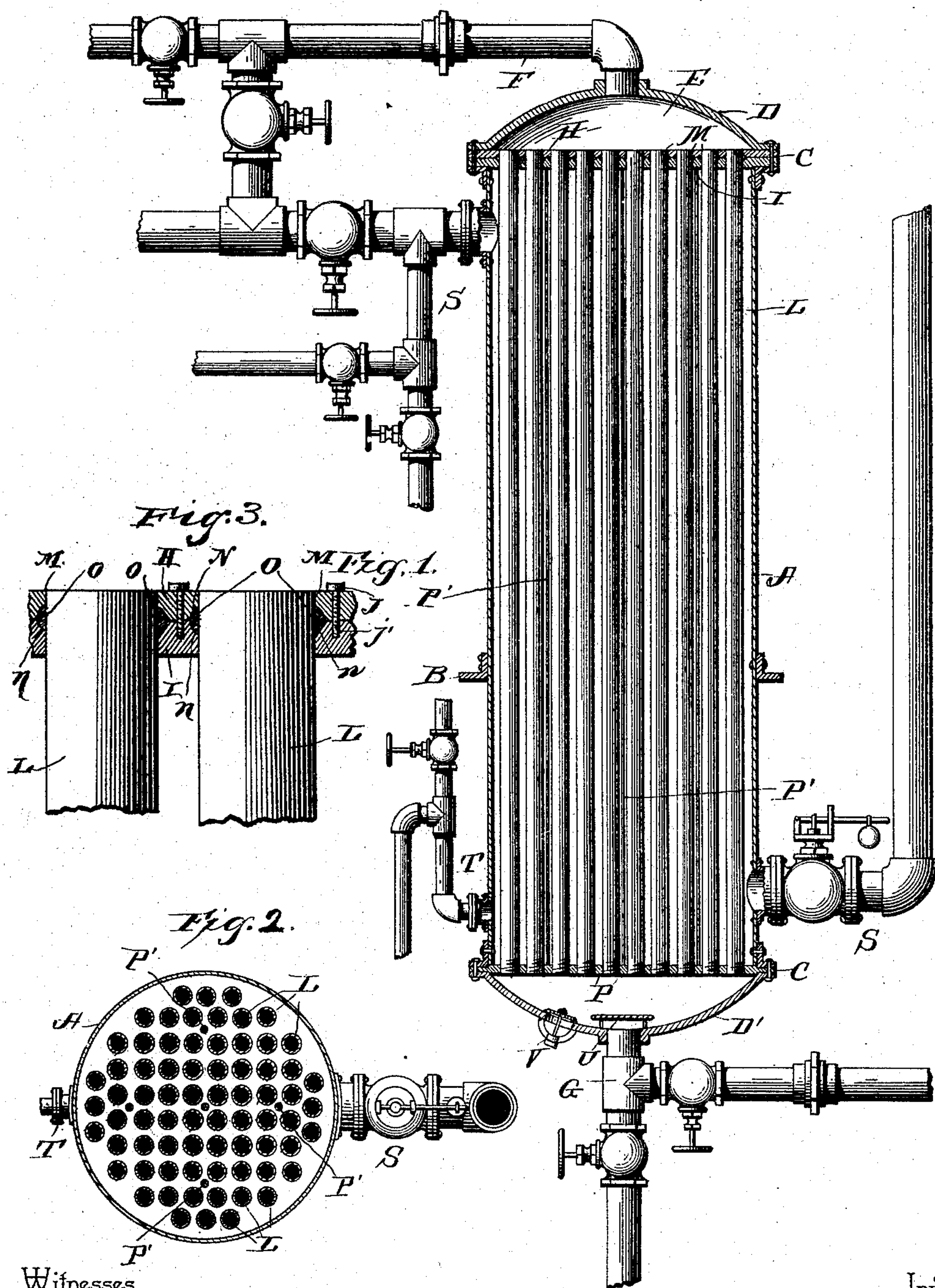


(No Model.)

D. S. ABBOTT & C. G. REDSTONE.
CONDENSER.

No. 500,701.

Patented July 4, 1893.



Witnesses

E. S. Mordeman
D. P. Walhaupter

Inventors

David S. Abbott and
Chas G. Redstone
By their Attorneys,

C. A. Snow & Co.

UNITED STATES PATENT OFFICE.

DAVID S. ABBOTT AND CHARLES G. REDSTONE, OF OLEAN, NEW YORK.

CONDENSER.

SPECIFICATION forming part of Letters Patent No. 500,701, dated July 4, 1893.

Application filed April 15, 1892. Serial No. 429,362. (No model.)

To all whom it may concern:

Be it known that we, DAVID S. ABBOTT and CHARLES G. REDSTONE, citizens of the United States, residing at Olean, in the county of Cattaraugus and State of New York, have invented a new and useful Condenser, of which the following is a specification.

This invention relates to condensers, and particularly those employed for heating and cooling the liquor used in tanning leather; and it has for its object to provide an improved apparatus of this character which is especially adapted for preparing the liquor for use in the leaches for extracting the tan-
nin from the bark and also providing for cooling the liquor to the proper temperature for use in the vats for tanning the leather.

To this end it is the main object of this invention to provide improved means to allow for the construction and expansion of the metal of the apparatus in its various degrees of temperature and thus prevent any undue strain upon any particular part of the device or splitting of the tubes therein.

With these and many other objects in view which will readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination and arrangement of parts hereinafter more fully described, illustrated and claimed.

In the accompanying drawings:—Figure 1 is a vertical sectional view of an apparatus constructed in accordance with our invention. Fig. 2 is a horizontal sectional view of the same. Fig. 3 is an enlarged detail sectional view of the upper tube plates and the fastenings therein.

Referring to the accompanying drawings:—A represents the outer shell or casing of the heater and cooler which may be supported in any suitable manner upon the side flanges B and is provided at its open upper and lower ends with the securing flanges C.

Securely bolted to the flanges C are the rounded heads D and D' the upper head D of which forms a discharging chamber or dome E, from which the liquor after being heated or cooled is discharged through the valved discharge pipe F to its point of use, while to the lower rounded head D' is connected the supply pipe G provided with suitable valves and designed to carry the spent

tan liquor to be treated into the cylinder. It is of course understood, that the acidulated tan liquor coming in contact directly with iron would necessarily eventually eat the same away, and therefore to avoid this all parts of the apparatus which are continually in contact with the liquor are made of brass or other similar material which will not be affected by the liquor and which also will not color the liquor as iron will do, which is an important point to avoid.

Securely clamped between the upper securing flange of the cylinder and the upper head D are the upper tube combined packing and sheets H and I respectively, which are additionally clamped to each other by means of the auxiliary clamping or binding screws J engaging threaded perforations *j* in each of said tube sheets. By reason of having the auxiliary clamping screws J, connecting the tube sheets H and I intermediate of their edges, it will be seen that the spreading of said sheets away from each other is thereby avoided, it being obviously necessary to have such auxiliary clamping devices to supplement the bolts clamping the edges of the sheets together. The upper tube sheet H is constructed of brass so as to form the bottom of the upper discharging chamber or dome E, and therefore avoid the objections to the iron previously noted, while to give the requisite strength and bracing to the upper sheet J and to the upper ends of the circulating tubes L, the under tube sheet I clamped to the sheet H, is made of iron, while both of said sheets are provided with the smooth and aligned perforations M of the same diameter throughout and extending through the sheets and receiving the unthreaded upper ends of the circulating tubes L, which are of the same diameter as said perforations. The contraction and expansion of brass are necessarily of a different degree from the contraction and expansion of the iron, and therefore in order to prevent the upper ends of the tubes L from splitting in the tube sheets by fastening them therein, or to prevent leaking joints, it will now be further apparent that the perforations M, in said tube sheets are always kept in perfect alignment by means of the clamping screws J, which prevent the spreading apart or bulging of the upper tube sheets under

the friction of the tubes L, sliding therein or by reason of the different degrees in temperature. We provide each upper tube sheet with the annular grooves N at their meeting faces, which when the said sheets are clamped together form a semi-circular packing groove *n*, extending around the upper ends of the tubes and receiving the rubber or other suitable packing rings O fitted in said grooves around the ends of said tubes to preserve the joints for the purposes set forth. Now it will be seen that the auxiliary clamping screws J serve another important function. After the tube sheets have been placed in position with the packing therebetween, the said auxiliary clamping screws are introduced into the sheets so that as the same are screwed in position, by reason of the shape of the packing grooves *n*, the packing rings are squeezed onto the tubes L, so as to make a perfectly tight joint. If the packing loosens by wear, the said clamping screws can be still further tightened if the same have not been tightened to their fullest extent in the first instance, and in order to allow for the adjustment of the packing the said screws need not be fully tightened when first placed in position. It will now be seen that from the construction described, the said tubes are connected with the upper tube sheet by a sliding expansion joint, which while providing a perfectly tight joint, at the same time allows the ends of the tubes to slide in the perforations in the tube sheets up and down according to the expansion and contraction of the same under different degrees of temperature, and which expansion and contraction as stated must necessarily differ from that of the iron casing. The lower ends of the tubes L near the bottom of the cylinder are fixedly threaded or expanded into the lower brass tube sheet P, which sheet is clamped between the lower securing flange of the cylinder and the lower head D' so as to inclose a steam and water chamber between the upper expansion joint sheets and said lower sheet. In order to prevent the pressure of the steam in said inclosed chamber from spreading or bulging the tube sheets, we employ a series of tie-rods P' passing through the chamber between the several tubes and securely bolted or clamped thereto, in order to strengthen and brace the same while at the same time allowing the tubes to slide in the upper sheets as they contract and expand.

Steam pipes S are connected with the upper and lower ends of the cylinder between the upper and lower tube sheets, and being provided with the ordinary valves, are designed to control the inlet and escape of the steam from the cylinder. The steam entering one pipe passes around the network of tubes through which the liquor passes, and passing around the same their full length within the cylinder until it finds its escape through the other pipes. It will of course, be observed, that it is immaterial which pipe is

used for the inlet and escape of steam, while at the same time it will be noted that if it is necessary, the said pipes may be employed for circulating water around the liquor tubes, for cooling the liquor if necessary, to place the same in the best condition possible favorable for use. When necessary the water of condensation, or the water used for cooling the liquor may be drawn off through the valved drain pipe T, connected with the cylinder near its lower end and extending above its point of connection therewith, so that a certain amount of water may be left to remain in the chamber inclosed between the tube sheet. A flat circular plate U is suitably arranged and supported over the bottom supply pipe G opening into the lower end of the cylinder, so that the liquor will be spread throughout the entire lower head, so that the same will be forced through, and evenly distributed in all of the tubes L, through which the same passes and is subjected to the action of the steam, or water, as the case may be.

It is well known that all tan liquor is charged with a large quantity of fine tan bark and sediment, which in ordinary heaters or condensers is quite liable to settle and bake hard so as to clog the heater. Now by reason of using the flat plate U, arranged directly over the bottom supply pipe G, in combination with the concaved or rounded head D', the incoming liquor is caused to take currents, after striking the plate U, which follow the curvature of the head D', so as to keep the liquor in motion at all parts of the bottom to prevent the settling of sediment and bark which would otherwise occur.

It will be readily observed that the upper and lower heads may be easily removed for the purpose of cleaning or repair, and to further provide for the cleaning of the tubes and particularly for the removal of sediment from the lower cylinder head, suitably closed cleaning holes V are arranged in said lower head.

It is now thought that the construction and many advantages of the herein described heater and cooler are apparent without further description.

Having thus described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In an apparatus of the class described, the combination of a cylinder, an upper pair of parallel combined packing and tube sheets clamped in the upper end of said cylinder and both of which are provided with smooth aligned tube openings, the same diameter throughout, registering semi-circular packing grooves at the inner meeting edges of said openings to form a wedge packing recess, and threaded perforations arranged between said openings, rounded packing rings arranged in said semi-circular packing grooves, auxiliary clamping screws engaging said threaded perforations to bind the sheets together and wedge the packing onto the said tubes, a lower tube sheet, and the vertical circulating

5 tubes connected to the lower tube sheet and having smooth upper ends adapted to move through the aligned openings of the upper tube sheets and the packing therebetween, substantially as set forth.

10 2. In a tan liquor heater, the combination of the cylinder having an inclosed steam space and a lower concaved or rounded head D', the vertical circulating tubes passing through said steam space and having their lower ends arranged above the lower concaved head, a tan liquor supply pipe connect-

ed centrally to the lower concaved head, and a flat circular deflecting plate arranged over the inner end of said supply pipe, substan- 15 tially as set forth.

In testimony that we claim the foregoing as our own we have hereto affixed our signatures in the presence of two witnesses.

DAVID S. ABBOTT.

CHARLES G. REDSTONE.

Witnesses:

M. B. SPILLER,

WM. V. SMITH.