(No Model.)

F. F. LANDIS.

STEAM BOILER.

No. 271,477. Patented Jan. 30, 1883.

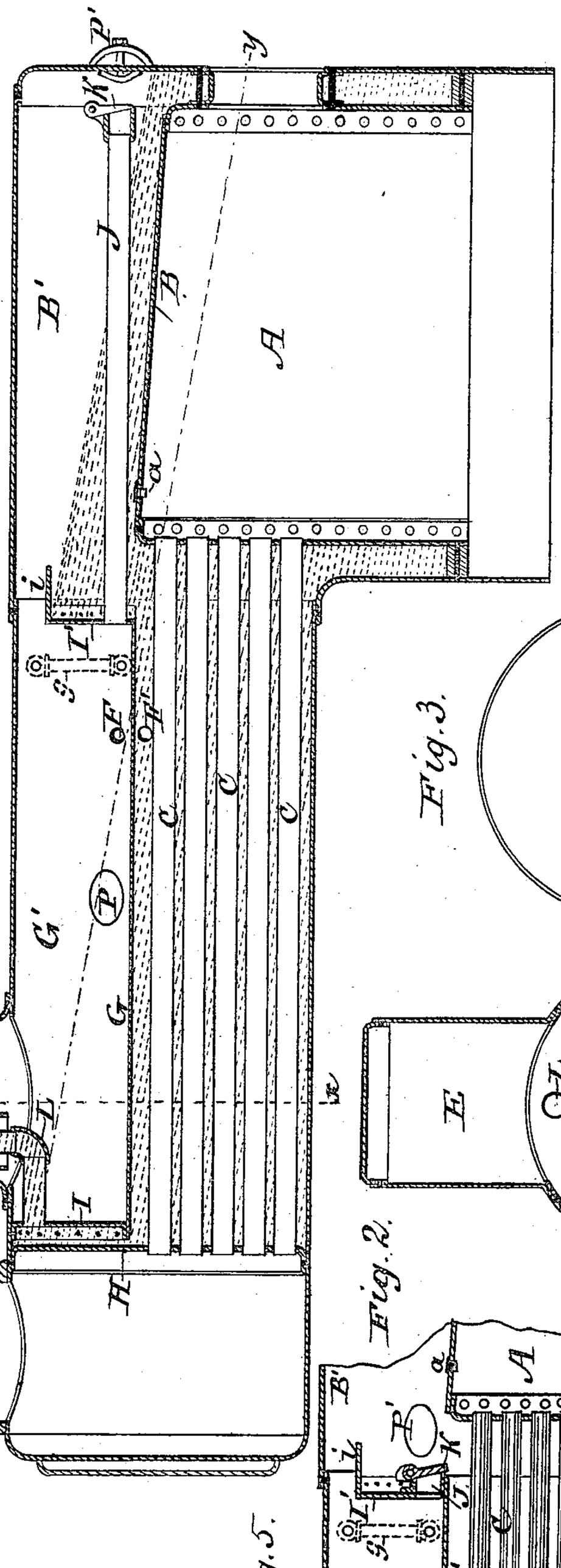

Fig. 1.

Fig. 3.

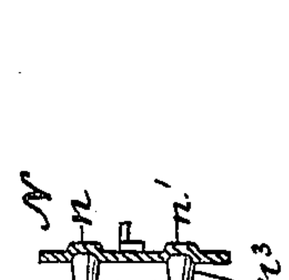

Fig. 4.

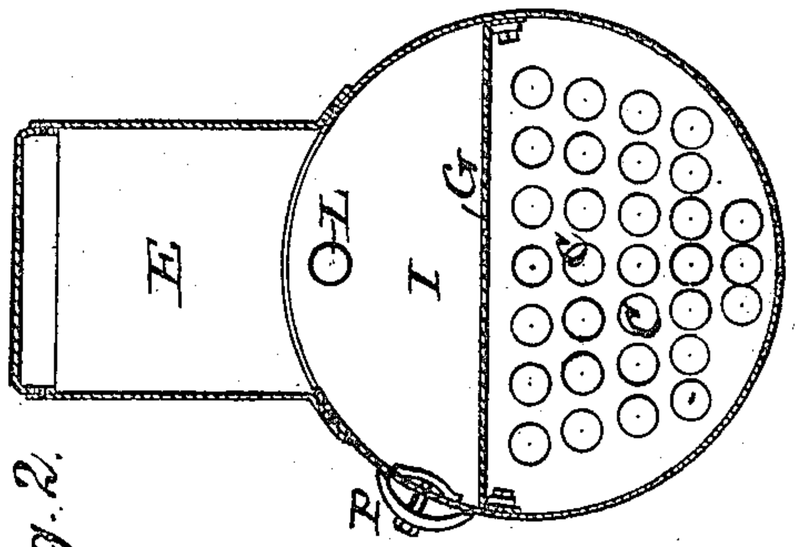

Fig. 2.

Fig. 5.

WITNESSES:

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FRANK F. LANDIS, OF WAYNESBOROUGH, PENNSYLVANIA.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 271,477, dated January 30, 1883.

Application filed December 1, 1882. (No model.)

To all whom it may concern:

Be it known that I, FRANK F. LANDIS, a citizen of the United States of America, residing at Waynesborough, in the county of Franklin and State of Pennsylvania, have invented certain new and useful Improvements in Steam-Boilers, of which the following is a specification.

My invention relates to improvements in steam-boilers for traction-engines, or boilers subjected to motion and changes in their level; and the objects of my improvements are to produce a boiler that can be easily taken care of by inexperienced persons, and at the same time possessing several requisites—viz., lightness and great strength, containing a small quantity of water at a time, but still covering the crown-sheet to a good depth, whatever may be the level of the boiler in descending hills, a fire-box within the boiler, and a malleable-iron door for the fire-box, cast in one piece with its hinges and latch. I attain these objects by the construction illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal vertical section of the boiler, showing the water-level therein much higher at the front end—a position it occupies when the front end of the boiler is lower than the fire-box end while a traction-engine is descending hills. Fig. 2 is a transverse vertical section of the same on line *x x* of Fig. 1. Fig. 3 is a front view of the boiler end, carrying the fire-door. Fig. 4 is a vertical section of the fire-door and the hinge-supporting plate thereof. Fig. 5 shows a modification of the water-circulating pipe.

Like letters indicate like parts in all the figures.

A represents the fire-box, B the crown-sheet, C the flues, D the stationary lower portion of the stack, E the steam-dome, and E′ the steam-supply pipe, all of the usual construction.

G represents a horizontal partition, located somewhat above the center of the boiler and above the flues, and suitably secured to the shell of the boiler proper. The front end of the partition terminates a short distance in rear of the front flue-sheet, H, where a substantially semicircular flanged head, I, is secured to it and to the shell of the boiler. The rear end of the partition extends to the seam uniting the fire-box and flue portions of the boiler, and is partly closed by the head I′, secured thereto and to the shell. The upper edge of the rear head, I′, terminates in a rearwardly-projecting flange, *i*. The horizontal partition and the two heads form, in connection with the shell, a chamber, G′, separate from the flue portion of the boiler, and directly communicating with the steam-dome, and also limiting the forward end of a second compartment, B′, immediately over the crown-sheet B, through which compartment extends a substantially horizontal pipe, J, one end of which is secured in the head I′ and near the bottom of the chamber G′. The opposite end of the pipe J is suitably braced and provided with a flap-valve, K, adapted to open outwardly only and to close by gravity. Near the top of the forward head, I, and secured therein, is a pipe, L, which communicates with the flue-chamber of the boiler, and is extended rearwardly beneath and upwardly into the steam-dome E, and is therein surmounted by a bell, M, supported in position by being suitably connected to the dome or otherwise, as preferred.

P P′ are hand-holes, the former leading into the chamber G to permit any deposits to be removed therefrom, and the latter into the chamber B′ to give easy access to the valve K.

F represents the feed-water pipe, located, as shown, near the bottom of chamber G′.

N represents the door of the fire-box, and it consists of an outer plate of malleable iron cast in one piece, with longitudinal corrugations *n n′*, which serve to strengthen the door proper, and resemble in appearance ordinary strap-hinges, which appearance is further heightened by means of the rivets n^2, which pass through tie-posts or risers n^3, seated in the concavities of the corrugations *n n′*, and supporting the lining N′ of the door. The corrugations *n n′* are merged into or extended to form projections n^4 n^5, respectively, the former being provided with a depending pivot, n^6, and an upwardly-projecting pin, n^7, while the latter is provided with a similar depending pivot, n^6, only.

Q represents a malleable-iron casting, constructed and adapted to serve the functions of one member of a hinge, and is therefore termed a "hinge-plate." It comprises a flat base pro-

vided with an upper socket, q, and a housing, q', for the pivot n^6 and pin n^7 of the upper hinge projection, n^4, and a lower socket, q^2, for the pivot n^6 of the lower hinge projection, n^5. The housing q' is sufficiently large to permit of a movement of the pin n^7 in a plane parallel to the face of the fire-box.

S is a latch cast integral with the door proper; and T is an ordinary catch, secured to the fire-box.

This being the construction of the door, it is readily apparent that not only does it resemble an ordinary wrought-iron door with the usual strap-hinges attached thereto by bolts or rivets, but by reason of its corrugations, conformation, and construction of cast malleable iron it possesses advantages in cheapness, serviceability, readiness of application, and ease of operation not found in ordinary doors. To hang the doors, the pin n^7 is introduced into the housing g', and the pivots n^6 are then brought over the sockets by lowering the door to a horizontal position, it having been inclined to introduce the pin into the housing.

Referring to the construction of the boiler, the operation is as follows: Water being supplied by the feed-pipe F until a requisite quantity is in the boiler, it will, when the boiler stands level, be on a line about coincident with the upper surface of the pipe J, whereby not only the flues C will be covered, but a sufficient depth of water will also be upon the crown-sheet B. Under these circumstances a moderate supply received into the chamber G′ passes through the pipe J and around the fire-box and flues. When fire is applied it is converted into steam, which passes at the front end, between the flue-sheet H and head I, through pipe L and the bell M, and from thence into the dome E. Steam also is quickly produced over the crown-sheet and passes over the partition I′, directly to the dome.

The advantages obtained by the novel features of my boiler become apparent, as when, for instance, in ascending and descending a grade it is easily understood that in ordinary boilers carried on wheels the water-line changes in accord with the steepness of the grade, so that the body of water changes its location by gravity and leaves in going up hill the front ends of the flues uncovered, and in the other instance exposing the crown and top of the flue-sheets to the effects of excessive heat, the surface of the water assuming the positions shown by line $y\ y$, thereby increasing the liability to an injury of these portions and reducing not only the steam-producing capacity of the boiler, but its serviceability. By my improvements the water, which, when the boiler is level, stands about even with the pipe J, as described, is, when the boiler descends a grade, caused to assume a temporary water-line indicated by the dotted shade-lines in the chamber B′ and in the pipe L. By means of the head I and flange i a sufficient quantity of water is retained within the chamber B′. The valve K, closing by gravity, also prevents the escape of water through the pipe J. On the other hand, when ascending a grade the front portion of chamber I′ only is deprived of water; but the front ends of the flues being remote from the fire, no excessive heat is present to injure the exposed parts; but the floor of the chamber G acts advantageously as a dry pipe, making quick steam on the return-flow of the water when the boiler returns to a level or a descending grade. Furthermore, the supply being fed into the chamber G′, the usual sediment is retained therein from collecting on the flues, and is readily removed through the hand-hole P. The bell M prevents the escape of water into the steam-supply pipe, whether occurring from foaming or by direct agitation by reason of sudden changes in grade or the severe jolting to which traction and portable engines are subjected. It is readily apparent that, if a substantially uniform depth of water can be maintained upon the crown-sheet with a guarantee of a full supply about the flues, no probable amount of jolting or agitation and flowing of the water in the upper apartments can depreciate the steam-producing capacity or safety of the boiler, and it therefore follows that but a moderate supply of water is required, and hence compactness and strength are secured. It is evident that the head I′, in conjunction with the horizontal partition G and head I, would prevent the flow of water from the crown-sheet; but by means of the flange i a still larger quantity is retained.

It is evident that the valve K may be located and arranged to open into the chamber B′, as shown in Fig. 5, close to the head I′, so that if the boiler is traveling on a descending grade of considerable length more water will run from the chamber G′ to the chamber B′, and the valve K can also be easily reached by having the hand-hole P′ on the side of the boiler, in close proximity to said valve. The water, being generally pumped into the chamber G′ while the boiler is standing level, will, by gravitation, open the valve K and find the same level in chamber B′, and as said valve will not allow the water to flow back into the chamber G′ while descending hills, therefore the chamber B′ will retain all the water it had; and as but little steam is used while descending grades, therefore the chamber B′ will always contain enough water to cover the crown-sheet a sufficient length of time to descend a very long grade, and as soon as the engine reaches level ground or again ascends a grade a portion of the water in chamber G will flow back past the valve K into the chamber B′. The operation is performed automatically so long as there is sufficient water pumped into chamber G′. Its level is shown in the glass tube of the water-gage g, attached to the side of the chamber G′, preferably in a position about midway between the two extreme ends of the boiler.

For additional safety a soft-metal or fusible plug, a, is inserted in the crown-sheet; and to

permit the boiler to be used with a great expenditure of steam for a considerable length of time with its front end lower than its rear end, the feed-water could, by a suitable arrangement of piping, be pumped through the opening F′ directly into the lower compartment containing the flues C.

Having described my invention and its operation, what I claim as new, and desire to secure by Letters Patent, is—

1. In a steam-boiler constructed with flues, a compartment having a floor located above said flues only, and having a rear partition or head adapted to retain a body of water upon the crown-sheet when descending a grade, substantially as and for the purposes set forth.

2. In a steam-boiler, a front and a rear compartment separated by a chamber under the steam-drum, said compartments communicating with each other and with the steam-dome, substantially as shown and described.

3. In a steam-boiler, a front and a rear compartment separated from each other by a flanged head, I, the latter provided with a supply-pipe, J, having a valve, as K, substantially as shown and described.

4. In a steam-boiler constructed with flues, a chamber, G, located above the flues, provided with a feed-water pipe, F, and its front partition provided with a steam-pipe, as L, leading to the dome, and a rear partition provided with a water-circulating pipe, substantially as shown and described.

5. In a portable or traction engine steam-boiler, the combination of a fire-box, a chamber above the same, having a water-communication with the flue-compartment and a steam-communication with a second chamber located above the flue-compartment, a steam-pipe, L, leading from the latter, and a deflecting-bell, M, substantially as shown and described.

6. In combination with a steam-boiler, a cast malleable-iron door having corrugations, forming hinge-straps, tie-posts seated in said corrugations, and a lining riveted against the tie-posts, substantially as shown and described.

7. In combination with the front plate of a steam-boiler and the door, enlarged, provided with hinge-straps integral therewith, the hinge-plate Q, provided with upper and lower hinge-sockets, substantially as shown and described.

8. The combination of the hinge projections n^4 and n^5, each provided with depending pivots n^6, and the former having a pin, n^7, with the hinge-plate Q, provided with an upper socket, q, a lower socket, q^2, and an upper housing, q', substantially as and for the purpose described.

In testimony whereof I affix my signature, in presence of two witnesses, this 27th day of November, 1882.

FRANK F. LANDIS.

Witnesses:
D. C. UNGER,
C. E. BESORE.