(No Model.)

H. A. LUTTGENS.

LOCOMOTIVE BOILER.

No. 307,480. Patented Nov. 4, 1884.

Fig: 1.

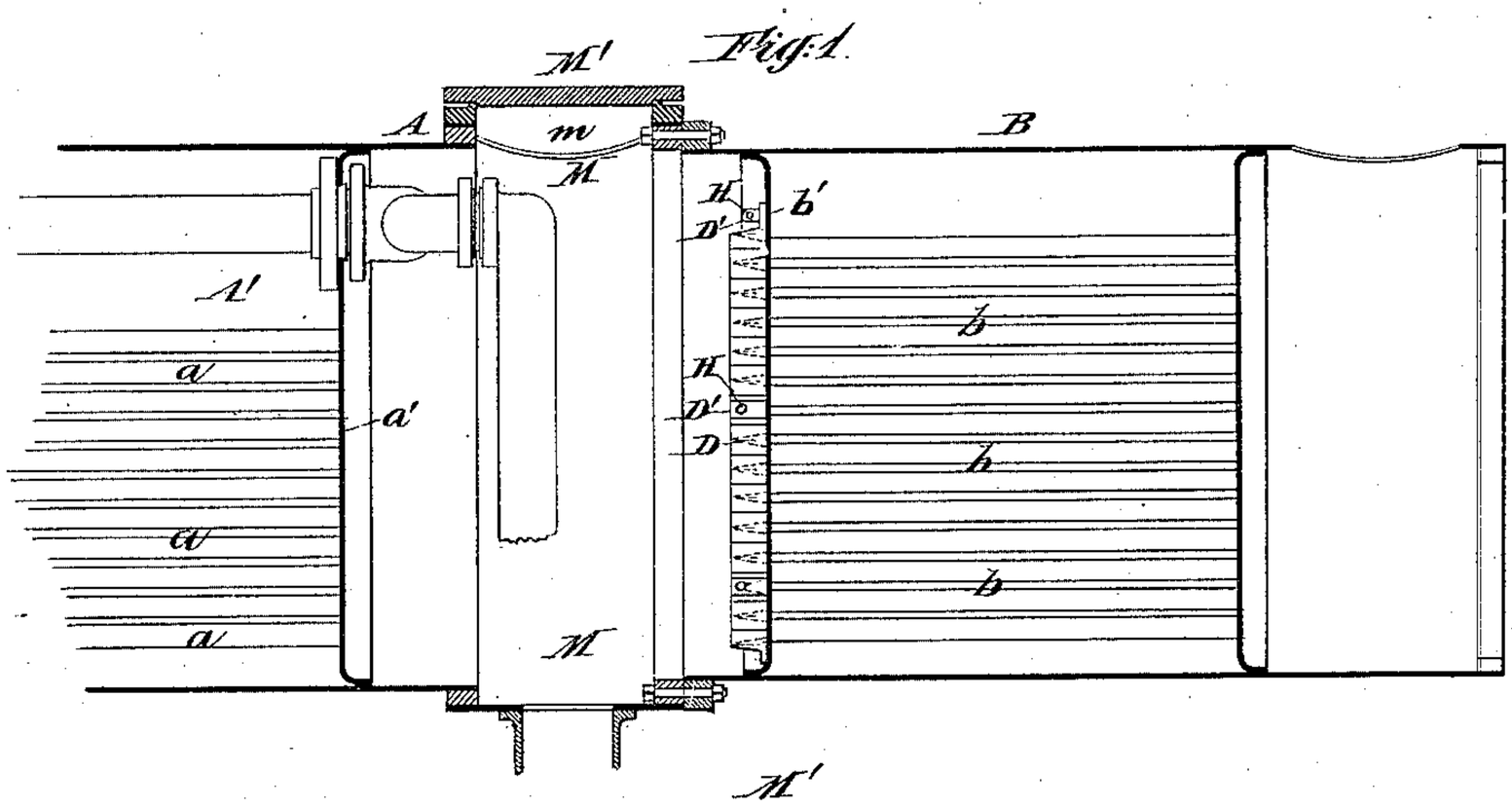


Fig: 2.

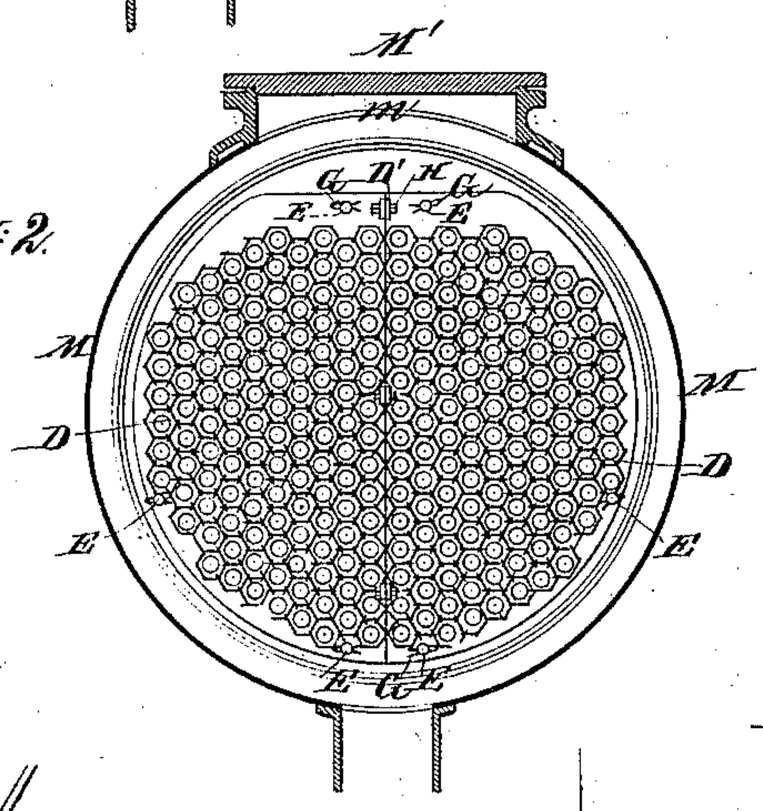


Fig: 3.

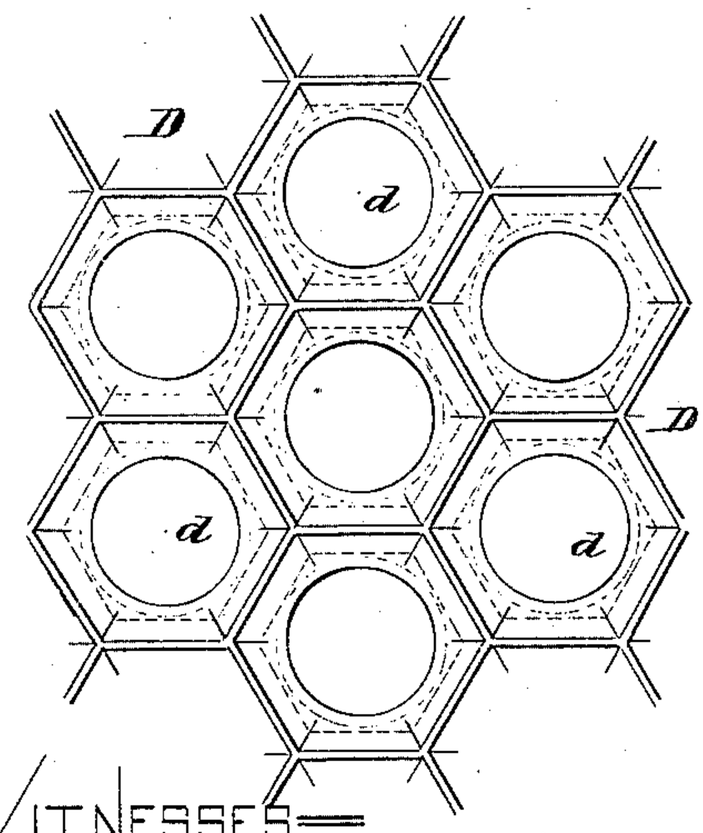
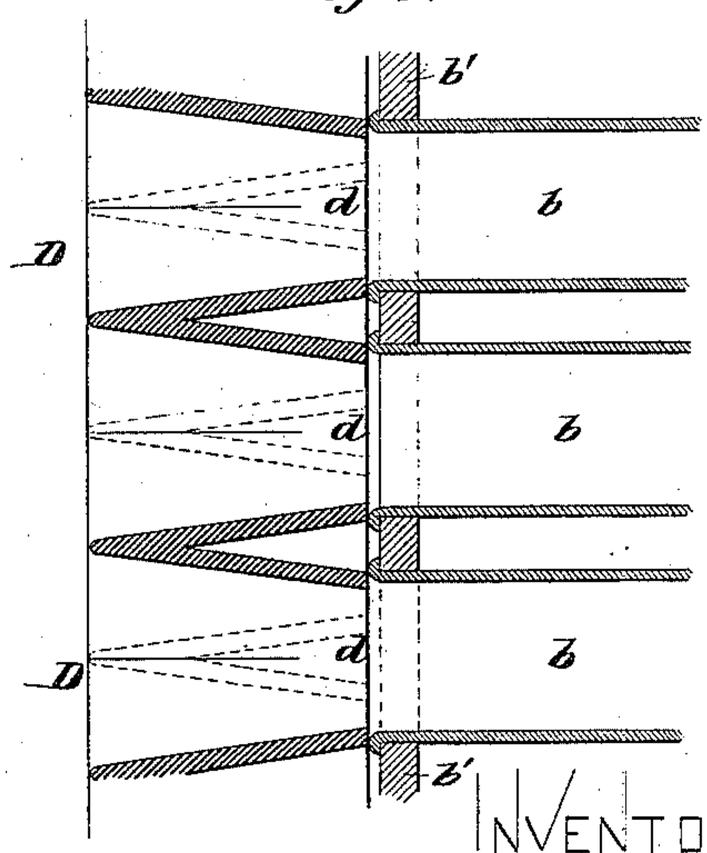


Fig: 4.



WITNESSES=

Charles R. Seaele,
J. E. Rennee.

INVENTOR=

Henry A. Luttgens
by his attorney Thomas D. Stetson.

UNITED STATES PATENT OFFICE.

HENRY A. LUTTGENS, OF PATERSON, NEW JERSEY, ASSIGNOR TO THE ROGERS LOCOMOTIVE AND MACHINE WORKS, OF SAME PLACE.

LOCOMOTIVE-BOILER.

SPECIFICATION forming part of Letters Patent No. 307,480, dated November 4, 1884.

Application filed June 25, 1884. (No model.)

To all whom it may concern:

Be it known that I, HENRY A. LUTTGENS, of Paterson, Passaic county, in the State of New Jersey, have invented certain new and useful Improvements in Locomotive-Boilers, of which the following is a specification.

The invention applies to that class of locomotives in which a feed-water heater is employed having tubes through which are conducted the hot gaseous products of combustion after they have been discharged from the boiler-tubes. Such heaters add materially to the economy of the production of steam; but it is found that they somewhat retard the draft.

One object of my invention is to reduce such retardation. I provide a light and peculiarly-formed plate, which I term a "deflector," made in several sections bolted together, which is applied on the side of the heater which receives the hot gases. It directs them into the several tubes. It is so formed as to present angular ridges instead of the ordinary plane tube sheet surfaces between the mouths of the several tubes. These ridges divide the currents of gases and lead them by gradual deflection into the several tubes.

A difficulty is experienced with heaters as ordinarily used, in the fact that the solid particles of coal and cinders which move with the escaping gases through the boiler-tubes are liable to strike against the flat face of the heater between the tubes and rebound with so much force that they fall to the bottom of the space and accumulate there. It is difficult, even with a very strong draft, to again lift such particles of solid matter after they have become tightly packed in the bottom. My deflector avoids this evil by presenting no flat surfaces against which the sparks or solid matter can strike and thus rebound. The entire spaces between the several tubes are covered by the sharp ridges, and the solid matter, striking either face of a ridge, is led directly into one of the tubes and moves through it. On emerging from the tubes of the heater the solid matter is deflected upward by the ordinary means and moves with the current of gases out through the stack.

The accompanying drawings form a part of this specification, and represent what I consider the best means of carrying out the invention.

Figure 1 is a longitudinal section of a locomotive-boiler with my deflector in place. Fig. 2 is a cross-section. The remaining figures are on a larger scale. Fig. 3 is a face view of a portion. Fig. 4 is a corresponding cross-section.

Similar letters of reference indicate like parts in all the figures.

A is the cylindrical shell or barrel of the boiler.

A′ is a portion of the boiler proper. *a* are the tubes thereof, and *a′* is the tube-sheet.

B is the heater; *b*, the tubes; and *b′*, the tube-sheet thereof, which is presented toward the approaching gases.

M is a connecting-cylinder, formed of one or more pieces of stout sheet metal, shown as having a diameter a little greater than the barrel A′ or the heater B; but this is not material. It is provided with a man-hole, *m*, having a close-fitting cover, M′.

D is my deflector, certain portions being designated, when necessary, by additional marks, as D′ D². It is made in two sections to facilitate its introduction and removal. Each section has lugs D′, which receive bolts H, confining the sections rigidly together to serve as one. It may be made in more than two sections, the parts being rigidly secured together after they are in place.

Holes near the edges of my deflector receive studs E, set in the face of the heater near the edges. Split keys G, inserted in the slots in these studs, hold the deflector firmly in position.

The deflector may be a thin casting of iron, or preferably steel. It is formed with holes *d*, exactly coinciding on one side in size and position with the tubes *b* of the heater. The holes flare toward the other side and become gradually six-sided. They are extended in this form until they merge into each other. The form is such that the partitions between the several holes are ridges thick on the face toward the heater and diminishing to nothing on the other face of the deflector. These ridges are made hollow for lightness. In other words, the spaces between the tubes are ridges of V-sec-

tion presented with their sharp edges toward the incoming gases. The other face of the device presents circular holes matching to the tubes of the heater. Between these holes are cavities of V-section.

Whenever it shall be necessary to examine or repair the tube-sheet *b'* or the adjacent ends of the tubes *b*, the deflector may be taken apart by removing the bolts H and the split keys G, and the several sections being removed through the man-hole *m*, the heater is exposed, as usual.

Modifications may be made in the forms and proportions. The deflector may be swaged from wrought-iron or steel instead of cast. The thickness of the deflector, and consequently the obliquity of the angle formed by the two sides of the several ridges, may be varied within considerable limits.

It will be understood that the exterior of the boiler and heater may be lagged with felt, wood, or sheet metal, like ordinary boilers.

All the ordinary or suitable appliances in general practice—as gages—may be used with my invention.

I claim as my invention—

1. In a locomotive substantially as described, the combination, with the boiler, tubular heater, and connecting-shell having man-hole M, of a guiding-plate made in sections and having surfaces which deflect the gases, &c., to the tubes of the heater, as set forth.

2. In a locomotive, the deflector D, having flaring holes *d*, and made in detachable sections, in combination with fastening means H, the boiler A', tubular heater B, and connecting shell or casing M, having a man-hole, *m*, arranged for joint operation as herein specified.

In testimony whereof I have hereunto set my hand, at Paterson, New Jersey, this 6th day of June, 1884, in the presence of two subscribing witnesses.

HENRY A. LUTTGENS.

Witnesses:
ROBT. S. HUGHES,
A. MORAGA.