

J. GILBERT.
BOILER FURNACE.

No. 494,137.

Patented Mar. 28, 1893.

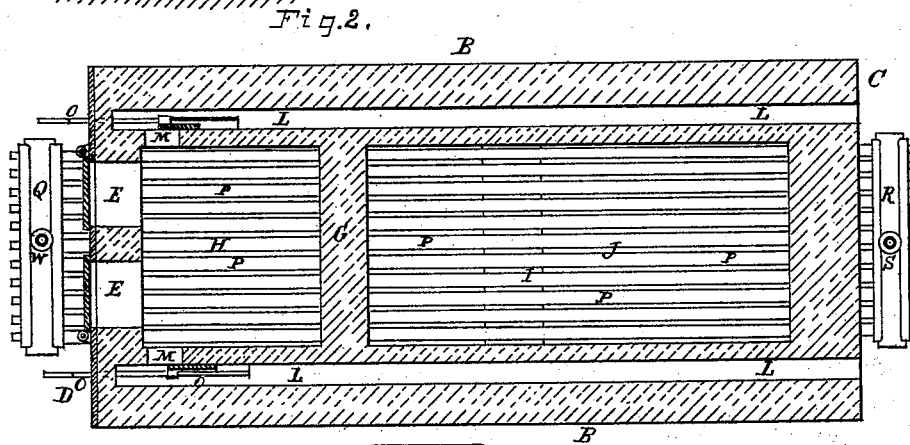
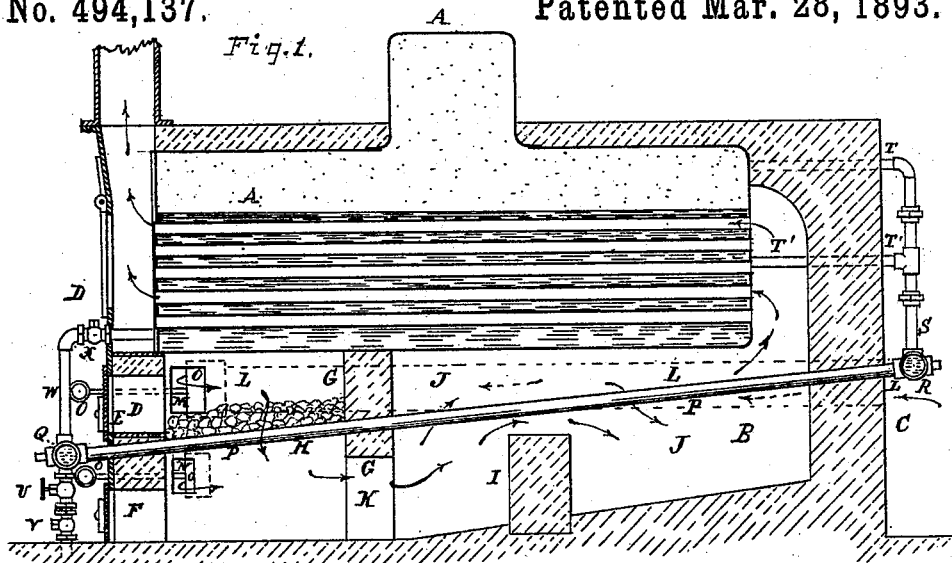
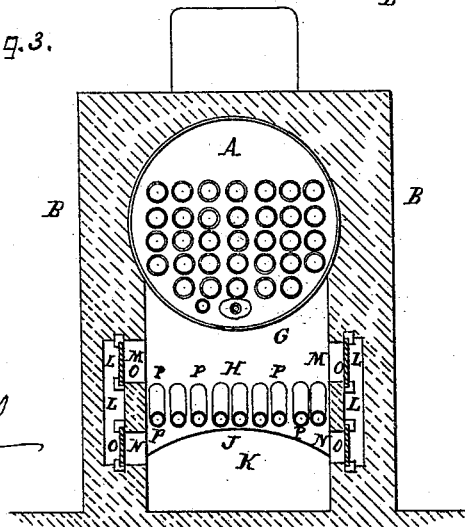


Fig. 3.



WITNESSES:
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No. 494,137 *Fig. 4.*

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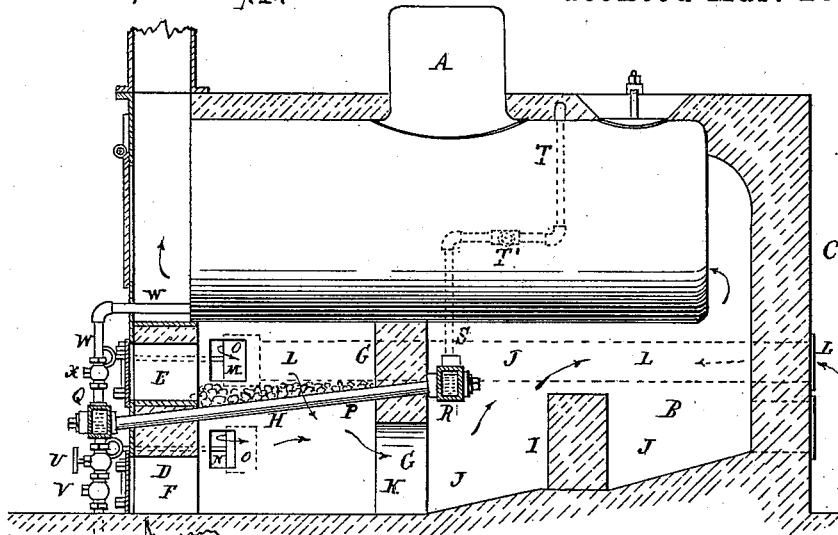


Fig. 5.

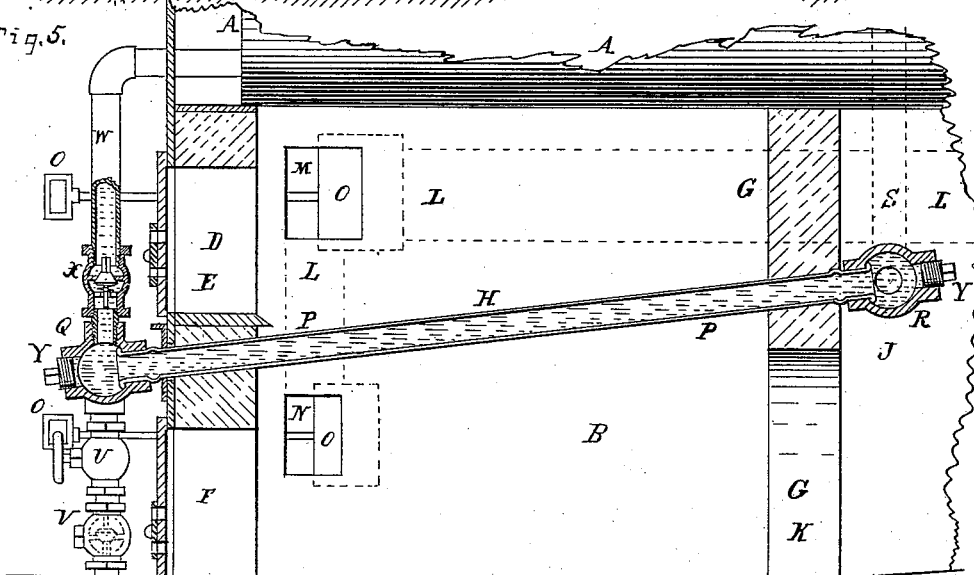
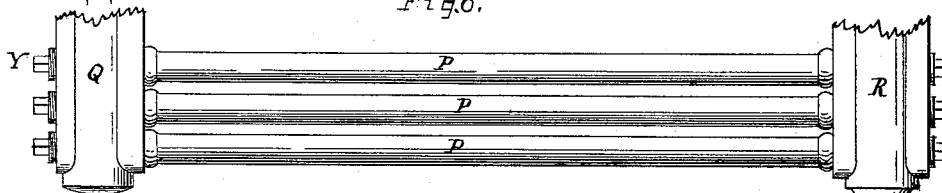


Fig. 6.



WITNESSES:

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JAMES GILBERT, OF OMAHA, NEBRASKA.

BOILER-FURNACE.

SPECIFICATION forming part of Letters Patent No. 494,137, dated March 28, 1893.

Application filed February 13, 1891. Serial No. 381,290. (No model.)

To all whom it may concern:

Be it known that I, JAMES GILBERT, a citizen of the United States, residing at Omaha, in the county of Douglas and State of Nebraska, have invented a new and useful Improvement in Boiler-Furnaces, (which is not patented to my knowledge or with my consent in any foreign country,) of which the following is a specification.

My invention relates to improvements in boiler furnaces in which the grate is constructed of a row of longitudinal water pipes having their forward ends connected in one common lateral head pipe at the front of the furnace and their rear ends connected in one common lateral head pipe in rear of the bridge wall of the furnace. Said lateral head pipe at the front is connected with the boiler feed pipe and has an upward branch to connect with the bottom water space of the boiler; and said latter head pipe beyond the bridge wall has also an upward branch pipe and it connects by one pipe into the top water space and by a secondary opening into the steam space of the boiler. And in connection with these means I construct the furnace with a bridge wall in which said row of water pipes is held and which extends upward above the grate to meet the bottom of the boiler, and below the grate it is arched with a large opening from the ash pit into the combustion chamber at the rear of the bridge wall. And in each longitudinal side wall of the furnace is made a flue with two openings to furnish air, of which one delivers air into the fire box onto the top of the coal and the secondary opening to furnish air into the ash pit. Each of said openings is furnished with a suitable damper for regulating the amount of air supplied. By these means a large heating surface is employed to heat the water during feeding the same and after feeding the water is allowed to circulate and largely promote the generation of the steam. And by the above means, for supplying the air to the fire and to the products of combustion, a very powerful and more complete combustion is obtained than by means heretofore employed.

In the accompanying drawings: Figure 1. represents a longitudinal vertical section of a boiler furnace, constructed according to my invention. Fig. 2. is a horizontal section of

the same, the section taken at a line below the bottom of the boiler and above the grate. Fig. 3. is a vertical lateral section of the same, the section taken through the forward part of the fire box. Fig. 4. is a longitudinal vertical section of a modification of the furnace with my improvement. Fig. 5. is a detached and enlarged longitudinal section of the fire box of the same. Fig. 6. is a detached top view of a portion of the grate of the same.

Similar letters of reference indicate corresponding parts of the several figures.

The letter "A" of reference represents a horizontal tubular steam boiler.

"B B" are the longitudinal side walls and "C" the rear and "D" the front wall of the furnace.

"E E" are the fire or coal doors and "F" the ash pit doors, which are made as usual and are attached to the front of the boiler furnace.

"G" represents the bridge wall and "H" the grate.

A lateral wall "I" is erected in the combustion chamber "J" to direct the flame to the bottom of the boiler. The bridge wall "G" extends upward to join the bottom of the boiler and is arched with a large opening "K" from the ash pit into the combustion chamber "J." In each side wall "B" is built a flue "L" from the rear of the furnace to the forward part of the fire box. And said flue extends also down opposite the ash pit and from said flue is made an opening "M" into the fire box and a secondary opening "N" into the ash pit as shown. For each of these openings is provided a suitable sliding damper "O." Through the fire door "E" the coal is fed upon the grate and through the ash pit door "F" the ashes are removed but at other times said doors are generally kept closed. The air to feed the fire passes through the flues "L" and becomes heated and passes through the openings "M" on the top and through the fuel and the products of combustion passes down through the grate into the ash pit where said products meet a secondary supply of air through the openings "N" and a promoted combustion is obtained. Said productions thereupon pass through the combustion chamber "J" over the wall "I" and finally into

the boiler flues at their rear ends from which flues said products escape into the smoke box and from it into the furnace chimney.

The grate "H" is constructed of a row of
5 water pipes "P P" which lie longitudinally inclined they being elevated toward the rear of the furnace. Said pipes pass through the front wall and all connect water proof in one common lateral horizontal head pipe
10 "Q" at the front of the furnace. The rear ends of said pipes "P P" are also connected water proof in one common lateral head pipe "R." In certain furnaces I prefer said pipes "P P" to extend clear to or
15 through the rear wall "C" of the furnace and have the head pipe beyond the rear wall as shown in Figs. 1 and 2. In certain other furnaces I prefer said pipes "P" not to extend through the combustion chamber and
20 arrange said head pipe "R" in or at the rear of the bridge wall as shown in Figs. 4 and 5. In either case said head pipe "R" is connected with an upward pipe "S" which has two outlet pipes "T" and "T" of which the
25 pipe "T" connects with the steam space of the boiler and the pipe "T" with the top portion of the water space of the same as shown.

The head pipe "Q" at the front of the furnace is connected with the usual water feed
30 pipe with the usual stop valve "U" and check valve "V." And said head pipe "Q" is also connected by means of an upward pipe "W" with the bottom water space at the forward end of the boiler. Said pipe "W" may be
35 provided with a check valve "X" as shown. The ends of the pipe "P" may be connected

by screw threads with the head pipes "S" and "R" but a much more safe and durable water proof joint is made by expanding said pipes "P" into the pipes "S" and "R" 40 as shown in Figs. 5 and 6 and to enter the expanding tool the pipes "S" and "R" are provided with screw plugs "Y" opposite each opening for connecting a pipe "P." Said pipes "S" and "R" are cast pipes and made 45 malleable. By means of the pipe "P" the feed water is highly heated and by means of them and their connection with the boiler a large water heating surface is obtained and during the period of not feeding the water 50 circulates through said pipes and the boiler by which the generation of the steam is greatly promoted.

What I claim as my invention, and desire to secure by Letters Patent, is— 55

The combination of a horizontal tubular steam boiler, a furnace having front and rear walls and doors, a bridge wall solidly joining the bottom of the boiler and provided with an opening from the ash pit into the combustion 60 chamber, a wall across the combustion chamber to direct the flame to the bottom of the boiler, flues communicating with the combustion chamber and ash-pit, openings M N, dampers O and grate bars, all arranged and 65 operating, substantially as described.

In witness whereof I hereunto set my hand this 10th day of February, 1891.

JAMES GILBERT.

Witnesses:

J. C. FARRISH,
A. A. KEYSER.