

(No Model.)

5 Sheets—Sheet 1.

G. J. CARTWRIGHT.
BOILER FURNACE.

No. 460,359.

Patented Sept. 29, 1891.

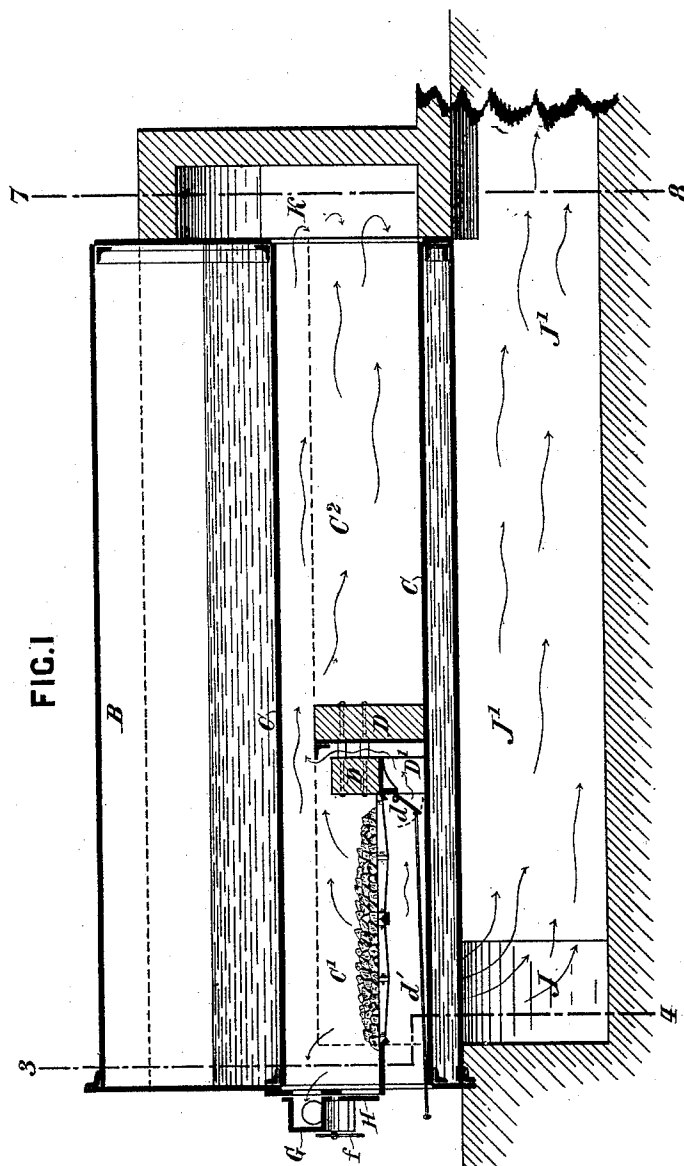


FIG. 1

Witnesses:-

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C. S. Champion.

Inventor:-

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by

Richardson
Attorneys.

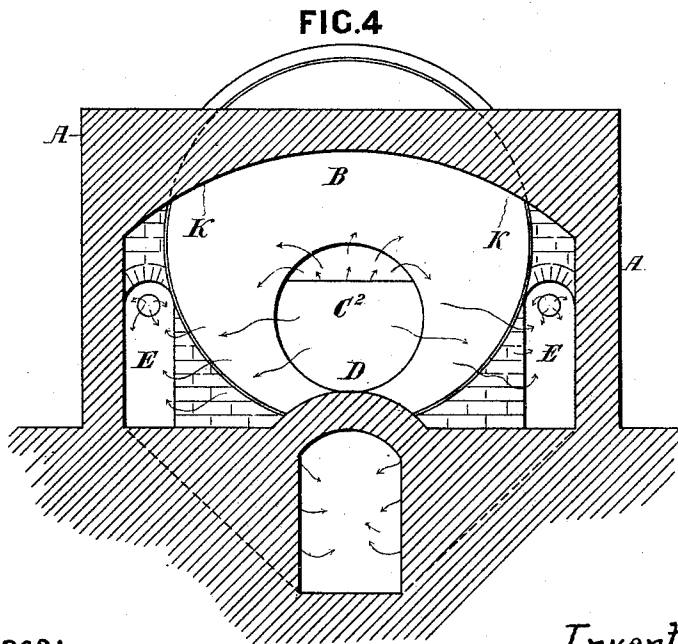
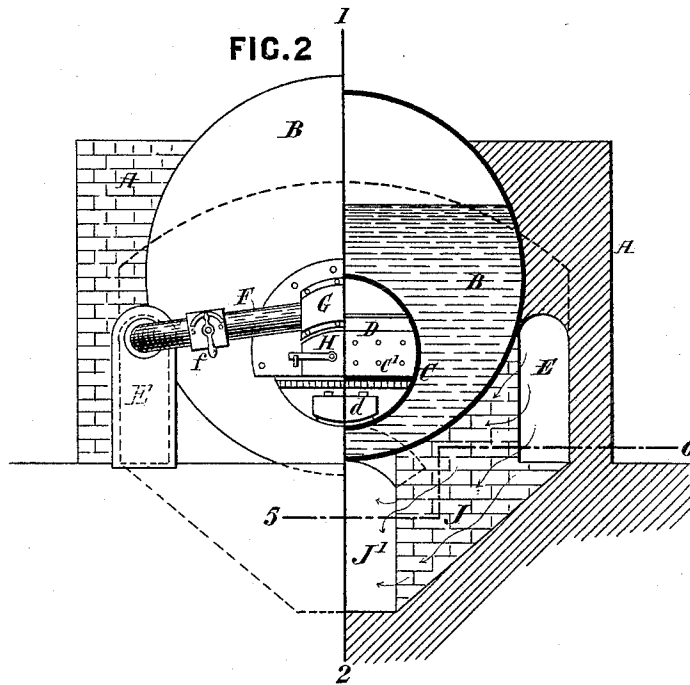
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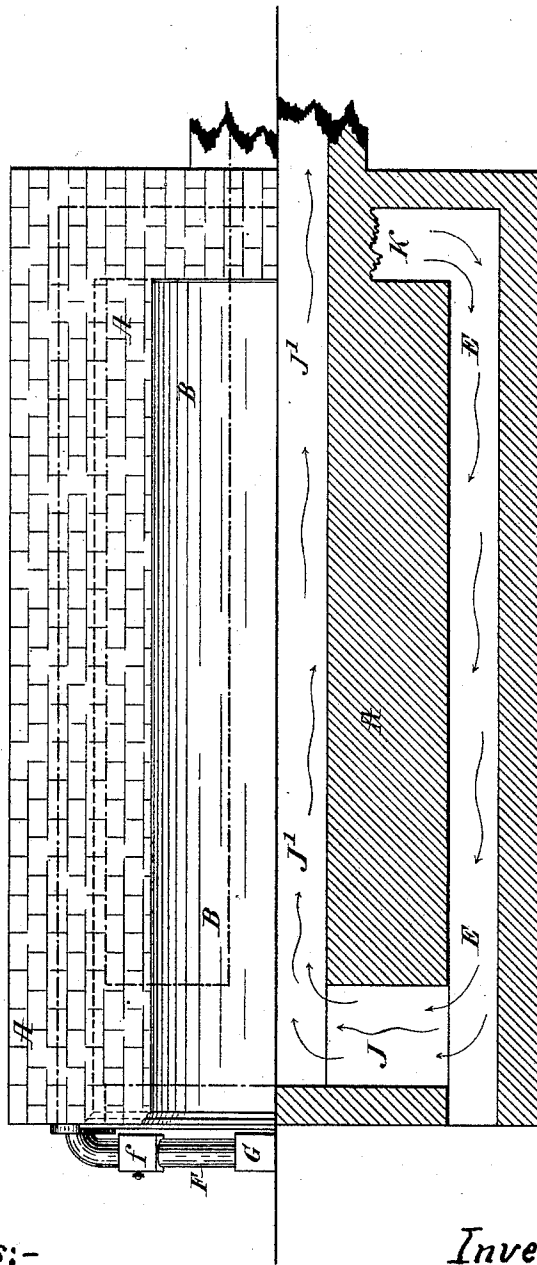
5 Sheets—Sheet 3.

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FIG. 3



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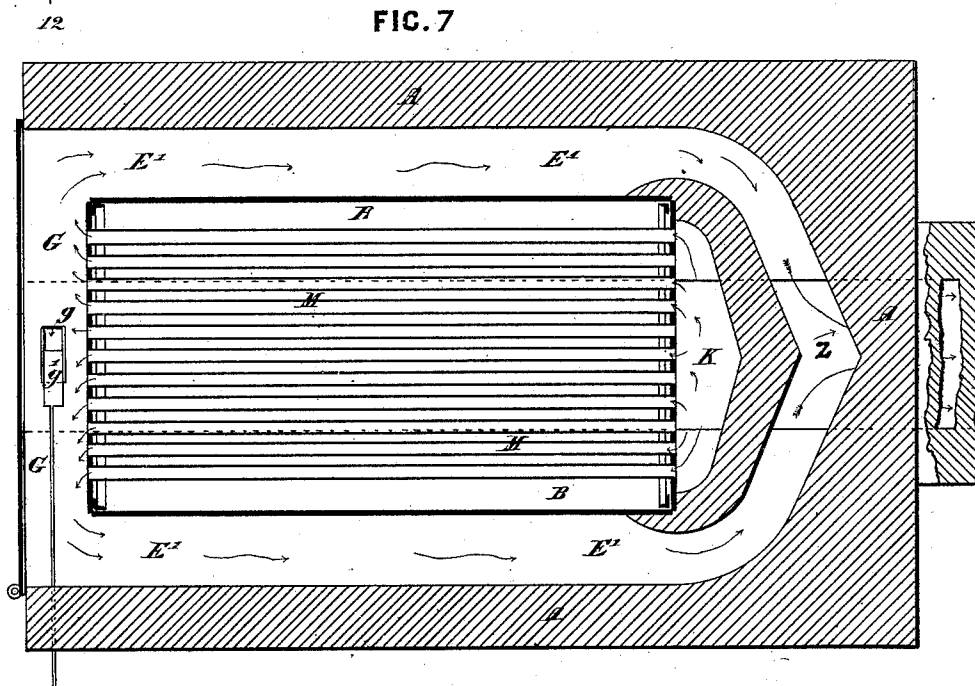
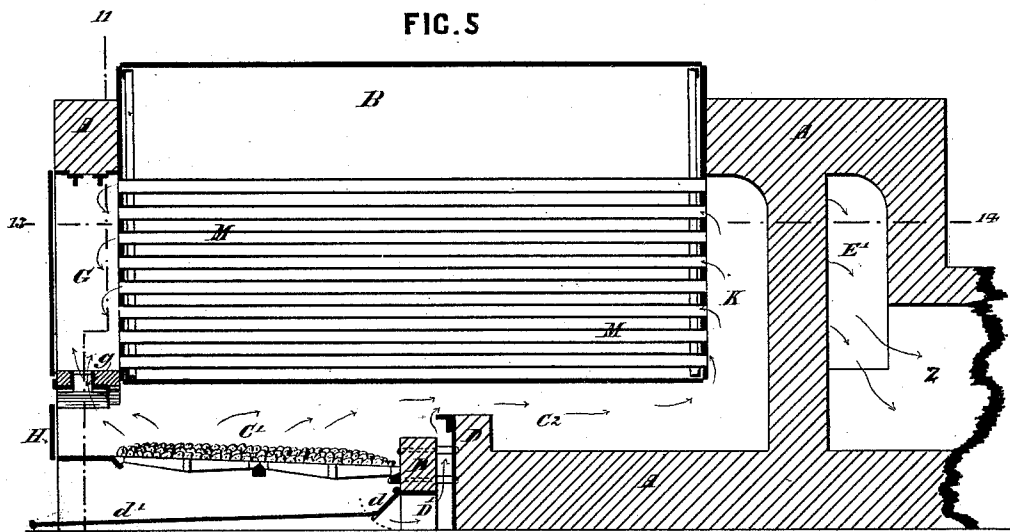
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Patented Sept. 29, 1891.



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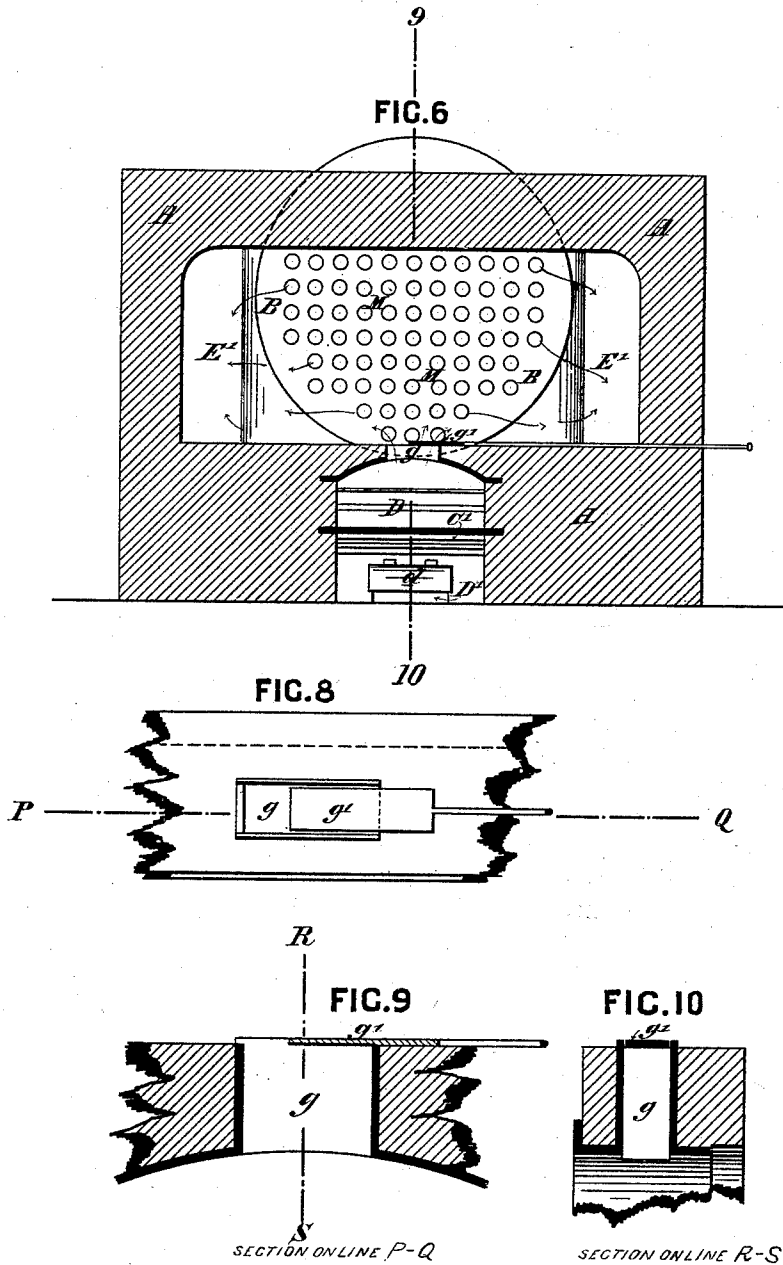
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No. 460,359.

Patented Sept. 29, 1891.



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UNITED STATES PATENT OFFICE.

GEORGE J. CARTWRIGHT, OF SYDNEY, NEW SOUTH WALES.

BOILER-FURNACE.

SPECIFICATION forming part of Letters Patent No. 460,359, dated September 29, 1891.

Application filed July 23, 1890. Serial No. 359,591. (No model.)

To all whom it may concern:

Be it known that I, GEORGE JOSEPH CARTWRIGHT, engineer, a subject of the Queen of Great Britain and Ireland, and a resident of Sydney, in the Colony of New South Wales, Australia, have invented improved appliances to be used in connection with boilers and boiler-furnaces, whereby the fuel in the furnace shall be more effectively consumed, of which the following is a specification.

The more economical combustion of fuel in boiler-furnaces and the consumption or the suppression of the thick volumes of smoke that issue from the smoke-stack when fresh fuel is added to the fire are problems that have long exercised the ingenuity of those most interested; but up to the present time no satisfactory solution of the difficulty has been arrived at. It is with a view to overcome the inherent difficulties hitherto unsatisfactorily encountered that the present arrangement of apparatus or appliances has been devised.

The invention consists, essentially, in a modification of existing appliances in connection with boilers and boiler-furnaces, whereby a direct auxiliary connection is established (through a box or chamber fixed on the front of the boiler) between the combustion-chamber at the rear of the boiler and the mouth of the furnace, in combination with a hollow fire-bridge, through which heated air may be admitted from the ash-pit to the furnace. The number of different classes of boiler is almost legion, and, as it would be manifestly impossible to describe the apparatus as applied to every class, I will confine myself to describing the manner in which the invention is applied to the classes of boiler in most extensive use—viz., an ordinary Cornish or Lancashire boiler, or an externally-fired multitubular boiler.

In the accompanying drawings, Figure 1 is a longitudinal vertical section of an ordinary Cornish boiler, showing one of the side flues in dotted lines and a section of the hollow fire-bridge, the section being taken through the air-passage therein on the line 1 2 of Fig. 2. Fig. 2 is a half front elevation and half cross-section taken on the line 3 4 of Fig. 1, the front elevation showing the connection between the side flue and the front of the fur-

nace, while the sectional part shows one of the side flues, the air-opening into the bridge below the fire-bars, the bottom flue, and its connection with the side flues. Fig. 3 is a half plan and half horizontal section, the section being taken on the line 5 6 of Fig. 2, and shows the disposition of one of the side flues, the passage between the side flue and the bottom flue, and the bottom flue itself. Fig. 4 is a vertical cross-section through the combustion-chamber at the rear of the boiler, taken on the line 7 8 of Fig. 1. Fig. 5 is a longitudinal vertical section of a multitubular externally-fired boiler, taken on the line 9 10 of Fig. 6. Fig. 6 is a cross-section taken on the line 11 12 of Fig. 5. Fig. 7 is a sectional plan taken on the line 13 14 of Fig. 5 and showing the arrangement of the flues and tubes, the direction of travel of the gases, and the opening from the box or chamber in front of the boiler to the mouth of the furnace. Figs. 8, 9, and 10 are details, on an enlarged scale, of the opening leading to the mouth of the furnace from the box or chamber, and the damper by which the passage of the hot gases is controlled.

In Figs. 1 to 4, A is the brick-work setting of the boiler; B, the boiler itself; C, the fire-tube containing the furnace C'; D, the hollow bridge; D', the air-passage through it. E E are the side flues, which terminate in front in pipe connections F F, that lead down from a box or chamber G, that is attached to the front of the boiler above the furnace-door H. J J are passages or flues that lead from the side flues E E into the bottom flue J'. The space C² behind the bridge in the fire-tube C serves as a combustion-chamber and opens into a rear combustion-chamber K, which may be built in the brick-work at the rear end of the boiler. The side flues E E lead back from the combustion-chamber K toward the front of the boiler and are connected with the mouth of the furnace by the pipe connections F F and the box or chamber G, the inner side of which is open, so as to form a direct open connection between the mouth of the furnace and the side flues E E, that lead into the rear combustion-chamber K. On the furnace C' being fired up the smoke and unconsumed products of com-

bustion will generally travel over the fire-
 bridge, where they will meet a supply of fresh
 hot air that will materially assist combustion
 at the bridge and in the chamber C². These
 5 heated gases will then enter the chamber K,
 from whence they will pass along the side
 flues E E toward the front of the boiler, then
 into the passages J J, and from thence into the
 10 bottom flue J'. While in the passages J J the
 gases arriving from the combustion-chamber
 K will meet other hot gases that are sucked by
 the draft from the mouth of the furnace C'
 through the box or chamber G down the
 15 connection-pipes F F. The amalgamation of
 the gases at these points will result in ignition,
 thus causing a great development of heat in
 the bottom flue J' beneath the boiler. The
 admission of the heated gases from the front
 20 of the furnace C' to the passages J J through
 the connection-pipes F F is regulated and
 governed by the valves or dampers *f f*, that
 are preferably placed in the connection-pipes
 F F, so that they may be operated with fa-
 25 cility by the fireman. Fresh hot atmospheric
 air is admitted to the bridge D through the
 air-passage D', the admission of the air being
 regulated and governed by the damper *d*, that
 is operated from the front of the furnace by
 the rod and handle *d'*.
 30 The multitubular externally-fired boiler
 shown in Figs. 5, 6, and 7 exhibits the inven-
 tion applied in a somewhat different manner.
 C' is the furnace. D is the bridge; D', the
 air-passage; *d*, the damper; *d'*, the rod and
 35 handle by which the damper is operated. C²
 and K form a combustion-chamber. The
 heated gases pass from K along the fire-tubes
 M into the box or chamber G, where they di-
 vide and pass along the side flues E' E' into
 40 the rear combustion-chamber Z, and from
 thence to the smoke-stack. The necessary
 connection between the mouth of the furnace

and the box or chamber G is effected by
 means of an opening *g*, leading from the box
 or chamber G into the mouth of the furnace. 45
 The casting in which the opening *g* is pref-
 erably formed is shown in enlarged detached
 views at Figs. 8, 9, and 10, the plan view at
 at Fig. 8 showing the baffle-plate or damper
 50 *g'* half-opened. The passage of the heated
 gases from the mouth of the furnace into the
 box or chamber G (and from thence to the
 side flues E' E') is governed and regulated
 by the damper or baffle-plate *g'*. The amal- 55
 gamation of the heated gases arriving from
 chamber K with the gases from the mouth of
 the furnace will take place at the entrance to
 the side flues E' E', which in this instance
 have the same function as the bottom flue J'
 in Figs. 1 and 2. 60

Having now particularly described and as-
 certained the nature of my said invention and
 in what manner the same is to be performed,
 I declare that what I claim is—

The combination, with the furnace and 65
 boiler, of a combustion-chamber C², the hol-
 low bridge-wall D in said chamber and hav-
 ing the air-passage D', the rear combustion-
 chamber K, connected therewith, passages for
 the products of combustion leading from said 70
 chamber K to the front of the boiler, the box
 G, connected with said passages, an opening
g from the furnace into said box, a valve *g'*
 for said opening to control the supplemental
 combustion in the box, and a passage extend- 75
 ing rearward and external to the boiler from
 the box G to the escape-flue, substantially as
 described.

In witness whereof I have hereunto set my
 hand in presence of two witnesses.

GEORGE J. CARTWRIGHT.

Witnesses:

MANFIELD NEWTON, C. E.,
 WM. D. MASSCUP.