No. 834,734. PATENTED OCT. 30, 1906.

C. J. JOHNSON & J. CARLAW.

FIRE BRIDGE SMOKE CONSUMER AND FUEL ECONOMIZER.

APPLICATION FILED AUG. 7, 1905.

2 SHEETS—SHEET 1.

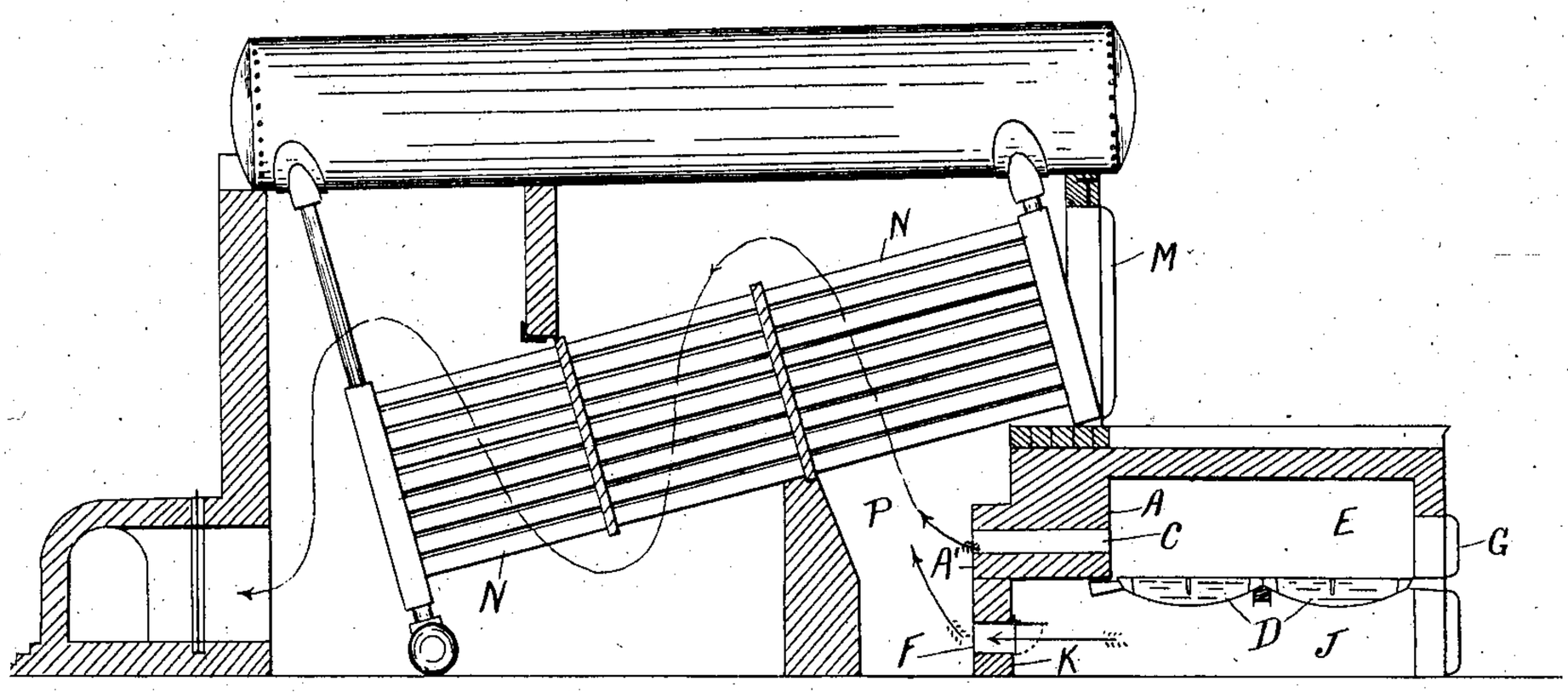

fig. 1.

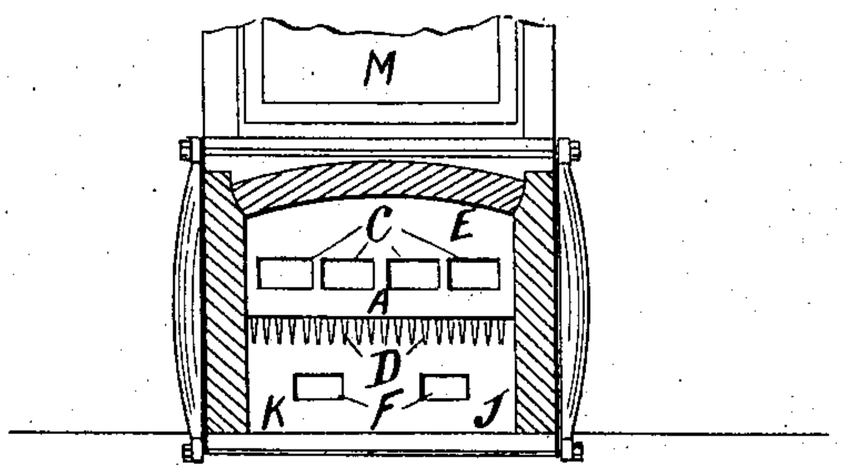

fig. 2.

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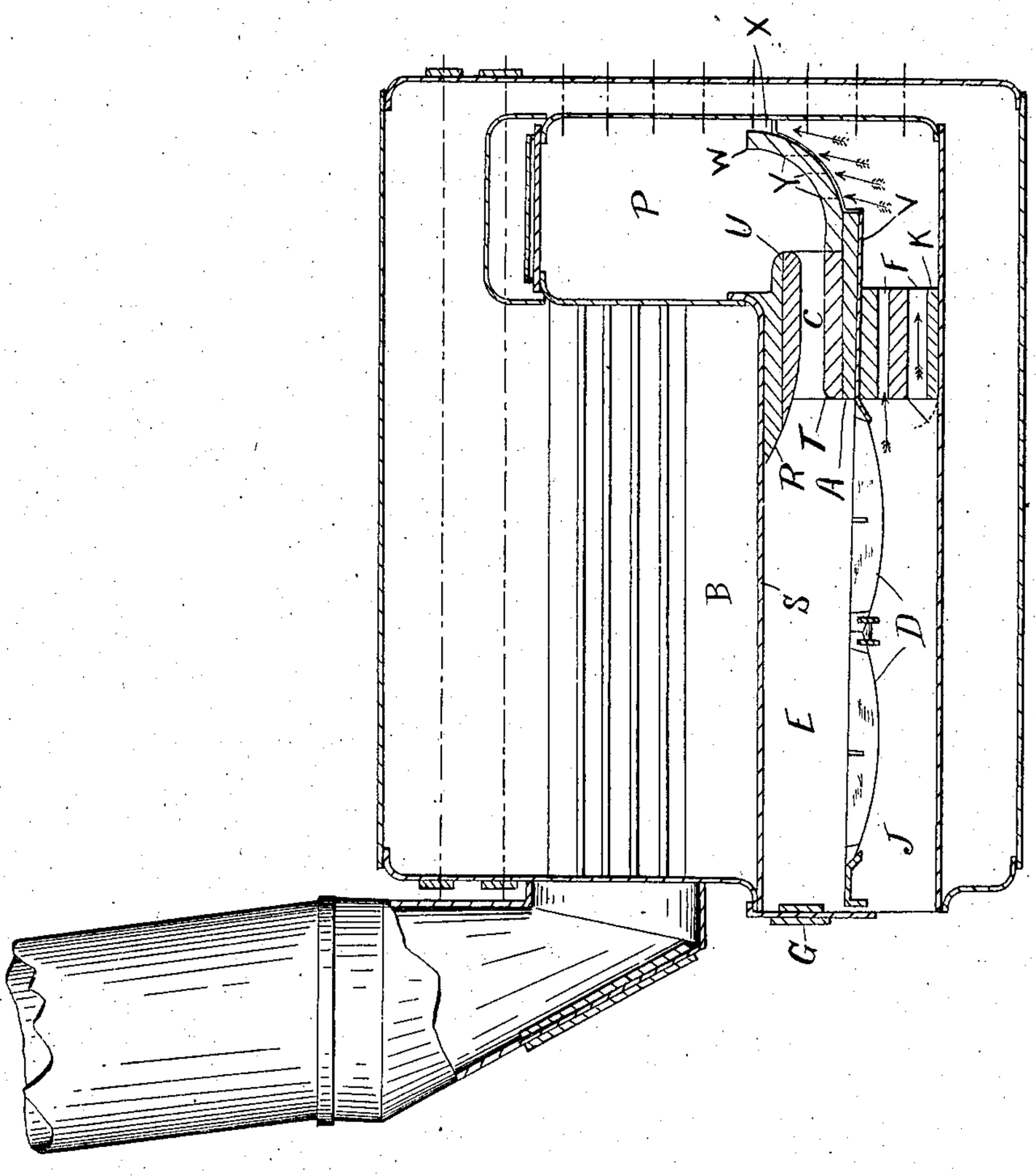

fig. 3.

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UNITED STATES PATENT OFFICE.

CLIFFORD JOHN JOHNSON, OF POINT CHEVALIER, AND JAMES CARLAW, OF AUCKLAND, NEW ZEALAND.

FIRE-BRIDGE SMOKE-CONSUMER AND FUEL-ECONOMIZER.

No. 834,734. Specification of Letters Patent. Patented Oct. 30, 1906.

Application filed August 7, 1905. Serial No. 273,192.

To all whom it may concern.

Be it known that we, CLIFFORD JOHN JOHNSON, engineer, of Point Chevalier, near the city of Auckland, in the Provincial District of Auckland and Colony of New Zealand, and JAMES CARLAW, waterworks engineer, of the said city of Auckland, subjects of His Majesty the King of the United Kingdom of Great Britain and Ireland, have invented an Improved Fire-Bridge Smoke-Consumer and Fuel-Economizer, of which the following is a specification.

This invention relates to what may be termed a "fire-bridge smoke-consumer and fuel-economizer," particularly adapted for use in connection with water-tube boilers, and, furthermore, for any purposes for which it may be found applicable.

With the foregoing and other objects in view the invention consists of the novel construction, combination, and arrangement of parts hereinafter more specifically described, and illustrated in the accompanying drawings, wherein is shown the preferred embodiment of the invention; but it is to be understood that changes, variations, and modifications can be resorted to which come within the scope of the claims hereunto appended.

In describing the invention in detail reference is had to the accompanying drawings, wherein like reference characters denote corresponding parts throughout the several views, and in which—

Figure 1 is a sectional side elevation showing the application of the invention to water-tube boilers. Fig. 2 is a front elevation of the structure shown in Fig. 1, and Fig. 3 is a side elevation of a modification.

The fire-bridge A is built up solid to the crown of the furnace and in touch with or in close proximity to the boiler B, except for one or more holes C therethrough. The fire-bars D are fitted in the furnace E in the ordinary way, so that they will be close up to the bridge A, but below the holes C, and an air or draft hole F is made through the bearer K beneath the bridge A below the level of the fire-bars D. The door G of the furnace E is made in the usual way. It will be apparent that the bridge A at its rearmost portion projects inwardly within the combustion-chamber, as at A′, so that the smoke passing through the hole C in said bridge will be directed into the box P and pass beneath the water-tubes N, thus giving forth effective results. The effect of thus building up the bridge A and providing therethrough one or more holes C is that after the fire is lighted in the furnace E and the bridge A becomes heated the smoke striking the bridge A at the crown of the furnace is deflected downward and passes through the holes C, there coming in contact with the oxygen which has passed through under hole F and ignites, so that the by-product of the combustion of the oxygen and the smoke passes through the smoke-stack in a more or less invisible form into the atmosphere.

In the drawings the holes C are shown square; but they may be made of a round, square, or other formation to suit requirements or tastes, and they may be temporarily reduced in size by placing some obstacle, such as a brick, in one or all of them. One hole C only may be provided, or more may be used; but preferably three will be the number chosen as the most convenient and suitable, and they may be placed as shown.

The bridge A may be built of the ordinary clay burned brick, fire-brick, or of any material that will withstand the heat to which it will be subjected and in any shape that will answer the purpose for which it is used. In some furnaces bridge-walls are not provided, and in such cases this improved fire-bridge A will be built in the furnace as required at the most suitable part thereof. The air-hole F is provided through the bearer K for the admission of the oxygen contained in the atmosphere which is necessary to create combustion when coming in contact with the carbon and other gases issuing from the hole C. The usual ash-pit J is provided, as shown.

Fig. 1 shows the invention as a whole built out before the front or face M of a water-tube boiler N in such a way that the holes or ports C will lead into the combustion chamber or box P beneath the forward portion of the water-tubes N, whereby the superheated product of the combustion and hot gases will pass up through and between the water-tubes N and give the result as is hereinbefore described. The building, the furnace, and its different parts already described, as well as all necessary doors and dampers out before the front or face M, can be done in any way

that will produce the effect required; but probably the particular form shown in Fig. 1 will be quite suitable.

Fig. 3 shows a modification, and R designates where the upper front of the built-up fire-bridge A is sloped upwardly and outwardly toward the crown S, and the roof of the port or hole C is slightly upwardly rounded or sloped at its inner end U, and the other outer under lip of the port-hole C is slightly rounded, as shown at T. The lower part V of the fire-bridge A extends into the combustion chamber or box P, and the upper layer forms the floor of the port or hole C, and the same extends into the combustion chamber or box P in the form of the upwardly-curved projection W, as shown. This curved projection W is so produced that a passageway X is left between it and the back of the box P, through which the oxygen coming up from and through the air-port F passes to and mixes with the gases and smoke coming through the ports or holes C and assists and effects the combustion hereinbefore referred to. This action is further assisted by the air-holes Y, provided through the curved projection W. Though provision is thus made for the addition of the curved projection W, it need not necessarily be used, as with some furnaces it will not be required, while with others it gives the best results, or it may be modified and shortened in length and curve.

The modifications R and S have been found to considerably assist and improve the combustion of the gases and smoke with the best results. The lower of the under ports F is shown fitted with a damper, as it will ordinarily be kept more closed than the upper port F.

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

In a steam-boiler furnace, a fire-bridge positioned at the rear of the fire-box and extending to the crown of the furnace and having a projection extended within the combustion-chamber of the furnace, said bridge provided with a passage extending through said projection and arranged at a point above the fire-bars of the furnace, said passage opening into said combustion-chamber, and a bearer situated below the bridge and having a passage arranged at a point below the fire-bars of the furnace and opening into the combustion-chamber.

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