A. COOPER.

Utilizing Heat from Bessemer Converters.

No. 204,886. **Patented June 18, 1878.**

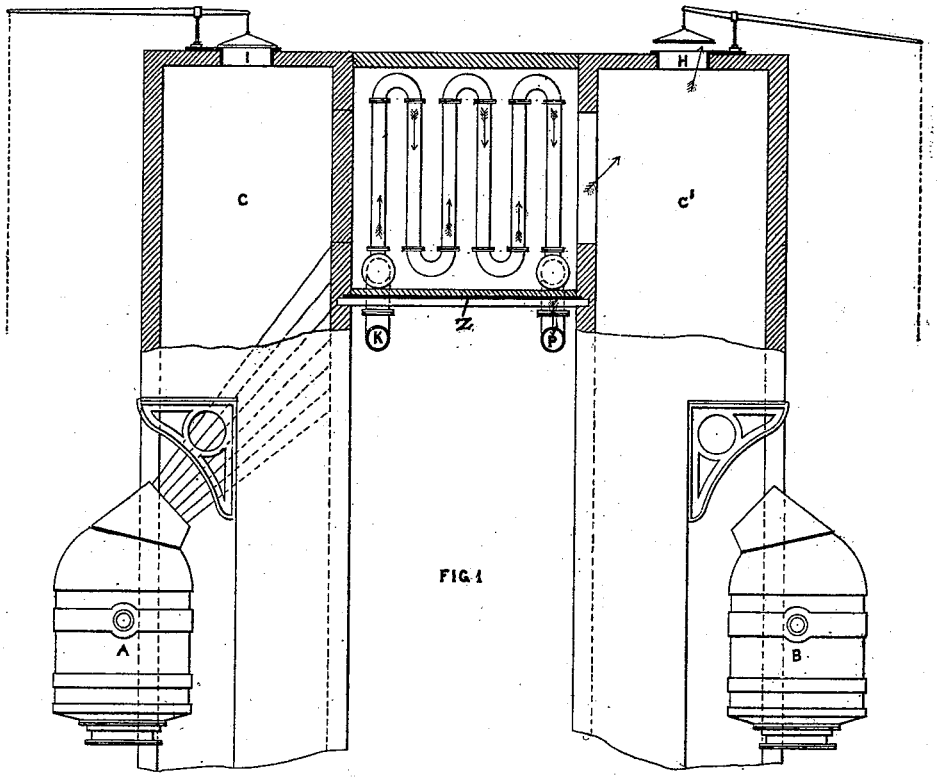

FIG. 1

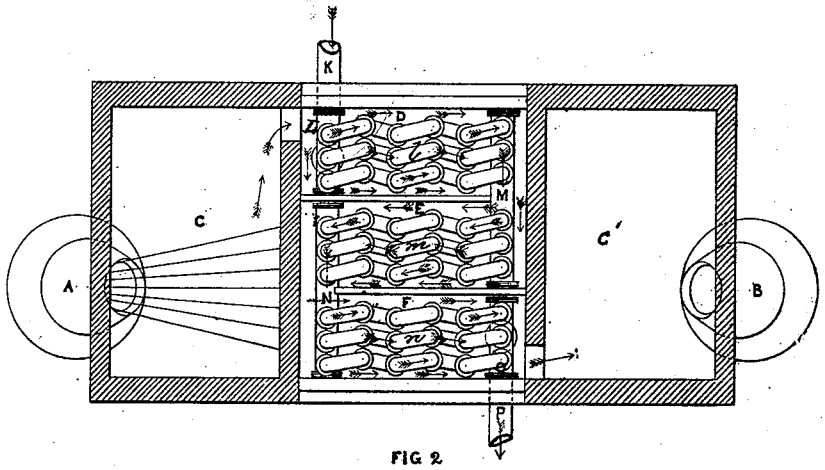

FIG. 2

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ARTHUR COOPER, OF DARNALL, ENGLAND.

IMPROVEMENT IN UTILIZING HEAT FROM BESSEMER CONVERTERS.

Specification forming part of Letters Patent No. **204,886,** dated June 18, 1878; application filed December 22, 1877; patented in England, January 25, 1877.

To all whom it may concern:

Be it known that I, ARTHUR COOPER, of Darnall, in the county of York, England, have invented a certain new and Improved Mode and Apparatus for Utilizing the Heat Generated in Bessemer Converters, of which the following is a specification:

This invention relates to the utilizing of the heat generated in the Bessemer-steel converters.

The object of the invention is the economizing of fuel; and it consists in combining with one or more Bessemer converters a stove for heating air, steam, water, or other fluid, and a pair of stacks, arranged substantially as hereinafter described, so that the heat evolved from the converter or converters can be carried through the heating-stove or discharged directly through the stack.

Air heated in the manner and by the apparatus hereinafter described is or can be used for promoting the combustion of fuel in cupola or other furnaces for melting metals, or in furnaces for heating metals, or for promoting the combustion of fuel in the furnaces or steam-boilers, and for similar and other purposes.

Water heated in the manner and by the apparatus hereinafter described is or can be used for feeding or supplying steam-boilers, or for similar or other purposes.

Steam superheated in the manner and by the apparatus hereinafter described is or can be used for driving steam-engines, steam-hammers, &c., or for heating, or for similar or other purposes.

This invention can be carried into effect by constructing a suitable apparatus in a convenient position, either outside or inside the stack-flue or hood usually employed to direct the flame or heat (or hot gases) from the converter into the atmosphere, through which said apparatus the air, water, steam, or other fluid will be forced, drawn, or passed, to be heated by the flame or heat (or hot gases) impinging on the said apparatus.

In the accompanying drawings, Figure 1 is an elevation, partly in section, illustrating an apparatus adapted to utilize the heat from two converters. Fig. 2 is a horizontal section of the same, showing the converters and the heating-coils in plan or top view.

Fig. 1 shows an elevation and Fig. 2 a plan, both partly in section, of my apparatus fixed outside the stack, flue, or hood, and so arranged as to receive or intercept the heat evolved from the mouths or throats of the two Bessemer-steel converters marked A and B, the said converters being shown in the position which they usually occupy when charged with metal that is being "blown" or "converted." The converter A is shown as being in use and the converter B as being at rest.

The flame or heat from the converter A rises and diffuses itself in the stack C, Figs. 1 and 2, which stack should be covered over, or partly covered over, to prevent the escape of the heat upward to the atmosphere, and enters the chamber D, whence it passes into the chamber E, then into the chamber F, all shown in Fig. 2, and finally into the stack C C′, Figs. 1 and 2, whence it may pass off into the atmosphere through the damper-hole H, Fig. 1.

When the converter B is at work the direction of the flame or heat evolved therefrom is reversed, so that it enters in succession the said chambers F E D, passes into the stack C, and may pass off into the atmosphere through the damper-hole I. When the converter A is at work the damper-hole I should be closed, and when the converter B is at work the damper-hole H should be closed.

After the apparatus herein specified has been used in connection with either of the said converters the dampers I and H can be, or should be, closed to prevent the cooling of the apparatus by the entry or passage of cold air.

If the stove D E F is not required to be used in connection with the converters, the dampers at I and H can be opened, and the flame or heat allowed to pass off from the said converters direct into the atmosphere without entering the stove D E F.

The chambers D E F are constructed of fire-brick, or some other refractory material, incased in iron plates or red bricks, or otherwise so built as to retain and resist the heat, and so made as to contain the ranges of pipes hereinafter specified, and are supported on girders, as shown at **Z**, Fig. 1.

The air, water, steam, or other fluid may enter the apparatus (for the purpose of being heated) through the pipe K, Fig. 2, into the distributing-pipe L, Fig. 2, and through a range of pipes, *l*, as shown in elevation in Fig.

1, and shown in plan in chamber D, Fig. 2, through the distributing-pipe M, which connects the ranges of pipes in the chambers D and E, through the range of pipes *m* in the chamber E to the distributing-pipe N, which connects the ranges of pipes in chambers E and F, and through the range of pipes *n* in the chamber F into the pipe O, and finally through the pipe P, all shown in Fig. 2, to the place where they are required to be used. The air, water, steam, or other fluid may be forced, drawn, or passed through the ranges of pipes above specified, and may be made to enter at the pipe K and pass out at the pipe P, or enter at the pipe P and pass out at the pipe K; and when so passed through, and either the converter A or the converter B is at work, the heat evolved from the mouth or throat of the said converter will, by passing through the chambers D, E, and F either in one direction or the reverse direction, impinge on the ranges of pipes, and in this manner heat the pipes and the said air, water, steam, or other fluid which is being passed through them.

The ranges of pipes above specified I make, by preference, of cast-iron; but they can be made of steel, wrought-iron, copper, brass, or of a combination of two or more of them, or of any other suitable material or combination of materials; and I fix at one or both ends of the said range of pipes a valve to govern the inlet or outlet of the fluids which are to be or have been heated; and, if necessary, the inlet or outlet pipes, or both, may be fitted with relief-valves, to liberate any excess of pressure. The range or ranges of pipes can be fixed in a horizontal, oblique, or other convenient position, and the division-walls of the heating-chambers and the heating-chambers can be arranged to suit those modifications.

Or, instead of a range or ranges of pipes, as specified and drawn, a coil or coils of pipes can be used, arranged in the flue or stack, or in a chamber or chambers, as shown in Figs. 1 and 2 in the drawings, or in any suitable chamber; and, instead of the fluid being passed through the range or ranges, coil or coils, of pipes, they can be made to impinge on the said range or ranges, coil or coils, of pipes, and the flame or heat evolved from the mouth of the converter be passed through the said range or ranges, coil or coils, of pipes for the purpose of imparting heat to the said fluids.

Or, instead of a range or ranges, coil or coils, of pipes, chambers or flues may be substituted, constructed of cast-iron, wrought-iron, steel, brass, copper, fire-clay, fire-bricks, ganister, or any fire-resisting material, or a combination of any two or more of them, and arranged in such a manner as to intercept the flame or heat from the converter, either by passing it through the said chambers or flues, or by allowing it to impinge on the said chambers or flues, and so heat the said fluids, &c., which would be made to impinge on or pass through the said chambers or flues. The said chambers or flues would be built within or incased by a suitable casing, which would retain and resist the heat.

Or, instead of the flame or heat and the fluids, &c., to be heated passing through and impinging upon the range or coil of pipes, or passing through and impinging upon the chambers or flues simultaneously, the inlet of the flame or heat and the fluids to be heated may be so regulated as that the heat or flame shall be first passed through the apparatus for the purpose of heating it, and afterward the fluids, &c., be passed through the said apparatus for the purpose of taking up the heat previously imparted to the said apparatus.

Or, instead of apparatus to receive or intercept the heat from one or two converters, as herein described and drawn, a similar apparatus, or a modification of the apparatus, can be constructed and used, which would receive or intercept the heat from three or more converters.

By the use of stacks in pairs with suitable dampers, and a stove between them, I provide ready means for diverting the heat from the stove, when desired. Important practical advantages result from the use of converters in pairs with a stove or heater common to both. By the manipulation of the dampers the converter A may be made to throw the gas up through the stack C and directly into the atmosphere through the exit I, or through the stove D E F and out through the stack C′ and exit H. The other converter, B, may be used in the same way; or they may be used in alternation with the best advantage, owing to the necessarily intermittent character of the operation of the converters. One stove common to both converters is thus ready for instant use by either; or it may be thrown out of use by simply opening the damper above the converter which is in use and closing the damper over that which is at rest.

My invention is protected by British Letters Patent dated the 25th of January, 1877, and numbered 321 of said year.

Having thus described my invention, the following is what I claim as new and desire to secure by Letters Patent:

1. The combination, with one or more Bessemer converters, of a pair of stacks and a heater between them, the said stacks being provided with dampers, the whole operating substantially as described, whereby the hot gases from the converters are made to pass to the heater or to the atmosphere at will, substantially as set forth.

2. The combination of a pair of converters, A B, a pair of stacks, C C′, and a stove or heater, D E F, common to both, substantially as and for the purpose set forth.

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Witnesses:
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