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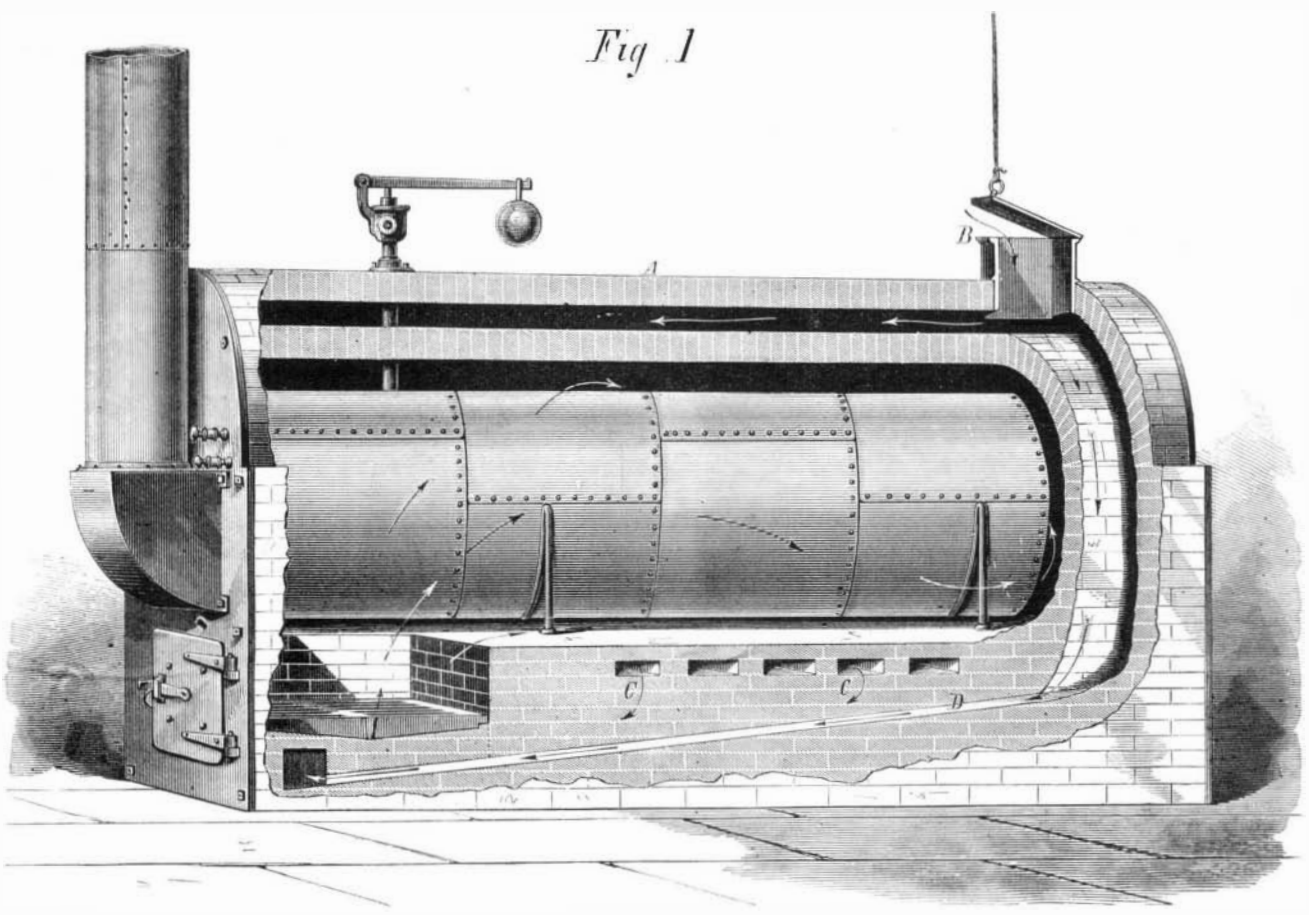
HOT DRAFTS FOR STEAM BOILER FURNACES.

If cold air be injected into a furnace, it absorbs a large quantity of heat by its great increase of volume by the heat of the furnace; but if the draft be admitted hot, then it is already expanded to a degree corresponding to its increased temperature, and consequently it abstracts a less quantity of heat from the ignited fuel. A saving of fuel, it is evident, may thus be effected in proportion as the temperature of the air is the complement of that in the furnace, provided such air be warmed by the waste heat of the furnace itself. The percentage of fuel gained in each case depends on the degree of temperature of the draft as compared with that of the furnace; in other words, for example. if the heat in the fire box be 2,000°, and that of the alimentary air 300°, then a saving of 25 per cent will be realized. These facts underlie the widespread employment of the hot blast in metallurgical operations. It is the object of the inventor, in the device herewith illustrated, to apply the same, by simple arrangements, to the steam boiler (and in so doing to utilize the heat which is radiated, from the generators as ordinarily set, and so lost, or serves only to render the fire room uncomfortable) to heat the incoming draft. This he does by conducting the air, through suitable compartments, to the boiler setting, and ultimately through orifices under the grate. No modifications of the boiler itself or of the fire box are required, and the system is applicable to any type of generator.

Fig. 1



A is the bonnet or outer shell, in the rear upper portion of which is the opening, B, into which the air enters to the chamber formed between said shell and the upper part of the boiler, or the brickwork covering the latter, if the top be arched over. Directly beneath the boiler, in rear of the fire box and in the masonry, are formed transverse flues, C, which open at each end into longitudinal flues, D. These last are simply passages in the bed brickwork at each side, the bottoms of which shelve downward until their outer ends are nearly on a level with the ash pit floor, and finally communicating with the ash pit, as above stated, by suitable orifices a little below the grate.

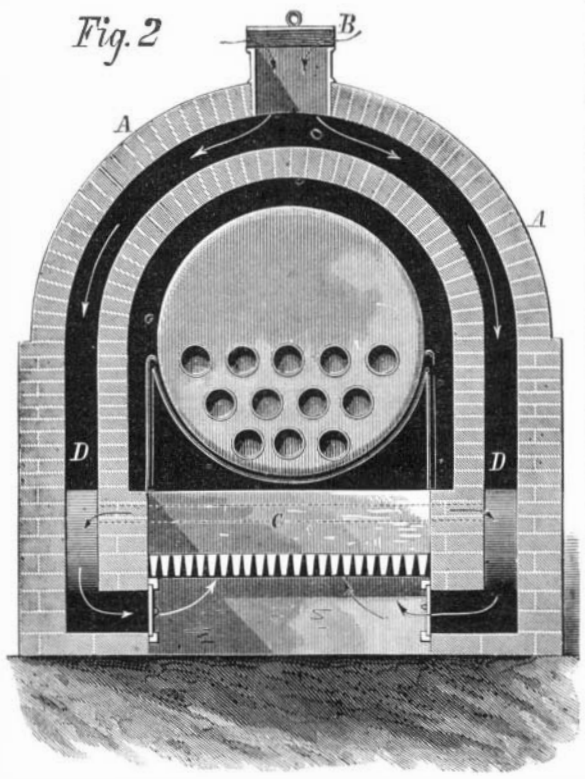
It will be seen that the chamber, B, and the flues, C and D, are practically one compartment, in which the heat radiated from the boiler, from all sides, is confined by the shell, A. As the air which passes up through the grate traverses the boiler and makes its exit from the chimney in the ordinary way, it is obvious that there will be a constant current entering at B, and having its course as already described, and that said current, through its contact with a large area of hot surface, must become heated to a considerable degree. It may be further noted that this modification of the setting necessitates no change in the ordinary practice of starting fires, as, while the single door which closes both fire box and ash pit is open, the draft will be taken from the outside as usual. The moment, however, the door is closed, the hot draft is established, and, save for supplying fuel or cleaning, there is no need of opening the door while steam is up, as the fire can be easily governed by a damper on the air supply orifice, B. The immediate result is a cool fire room, since but little heat can be radiated into the apartment.

We are informed that thirty boilers have already been set after the plan of this invention, and the testimonials of several well known concerns using them indicate a saving of one third the fuel previously employed. One firm asserts that it uses 4,000 lbs. less of coal per week in a boiler thus set than in a precisely similar generator, placed directly beside the former, but set in the ordinary manner. Other writers bear witness to a similarly large economy. Judging from the general construction of the invention, its application to the boiler need not be costly, since it consists principally of simple changes in the masonry; while its value to all steam users, if the testimonials above mentioned may be credited, must necessarily be great. The advantage offered of a cool fire room is likewise of especial importance on sea-going steamers, and particularly so upon ironclads of the Monitor type, where the heat is often extremely oppressive and the ventilation inadequate. The invention, we are informed, may be adapted to locomotives, thus utilizing the large amount of heat which is radiated from the boilers, however well they may be felted and lagged.

Patented November 11, 1873. Reissue now pending through the Scientific American Patent Agency. For further particulars, address the patentee, Mr. Samuel Keyes, Bennington, Vt.

KEYES' IMPROVEMENT IN STEAM BOILER SETTING.

Fig. 2



Copper Alloy that will Adhere to Glass.

The following alloy of copper will attach itself firmly to surfaces of metal, glass, or porcelain: Twenty to thirty parts of finely blended copper (made by reduction of oxide of copper with hydrogen or precipitation from solution of its sulphate with zinc) are made into a paste with oil of vitriol. To this seventy parts of mercury are added and well triturated. The acid is then washed out with boiling water and the compound allowed to cool. In ten or twelve hours, it becomes sufficiently hard to receive a brilliant polish and to scratch the surface of tin or gold. When heated it is plastic, but does not contract on cooling.

A New Use of the Sand Blast.

The producing, upon plated ware or silver, of a lusterless very finely grained surface, termed by the trade satin finish, has heretofore been accomplished by the use of swiftly rotating brushes made of fine wire. Messrs. Simpson, Hull, & Co., of Wallingford, Conn, have recently found that the sand blast performs this stippling work much more rapidly and effectually, and have introduced the necessary apparatus for its employment in their large silver-plate manufacturing establishment. From Mr. W. E. Hawkins, a gentleman connected with the above concern, we learn that air is compressed by the driving engine of the works into an ordinary reservoir, and thence distributed through pipes which extend along the front of the workmen's tables; and above the latter is a sand receptacle, V-shaped, from which a stream of sand falls, and is met by a downward blast from the pipe, which current drives the material in a stream through a small hole in the table, beneath which a receptacle to receive the sand is placed. The workman, whose fingers are covered with rubber to protect them, holds the article in the jet and under the table, watching it through a pane of glass let into the top of the latter. The operation is necessarily very rapid, as the article has only to be turned so that the blast strikes the required portions, when the work is completed.

The exposure to the jet, even for an instant, would cut through the Britannia, upon which the plating is afterward deposited. By the interposition of rubber screens of suitable shape, against which the sand has no abrading effect, any fancy patterns or letters are easily imprinted on the surface, the latter of course being satin-finished, while the spaces protected by the screens are afterwards burnished. The screens or patterns are cut out by girls, of whom numbers are employed for that purpose.

Twisting Iron by Electricity.

The remarkable phenomenon, first observed by Professor Gore, which consists in the very perceptible twisting of a bar of iron by the joint effects of currents of electricity passing longitudinally through and also around such a bar by means of the insulated wire of an enveloping helix, has been further investigated. Subsequent experiments have shown that such twisting may be made to reach fully one quarter of a revolution. It has also been ascertained that both currents are necessary to the development of the phenomena. Either current, when applied separately, simply produces the effects of magnetizing the bar. The direction of the twist is definitely related to the direction of the current in the helix. In order to produce the fullest effect, the currents must be simultaneous. When they are successive, a perceptible twist results in a lesser degree.

BENDING HEAVY IRON.—It is now possible, by the aid of hydraulic machinery, to bend iron shafts of 12 inches in diameter to any desired shape. Incredible as this statement may seem to some, crank shafts are now so made, instead of by the slow, laborious, and expensive method of forging. The bent shafts are also said to be much better than forged ones, from the fact that the fiber of the metal runs in one direction continuously, whereas in forged one it is often across the line strain.

IRON IN THE CENTENNIAL BUILDINGS.—The quantity of iron to be used in the construction of the Centennial buildings will aggregate about 6,000 tuns, of which more than five sixths will be wrought