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Improved Hot-air Furnace.

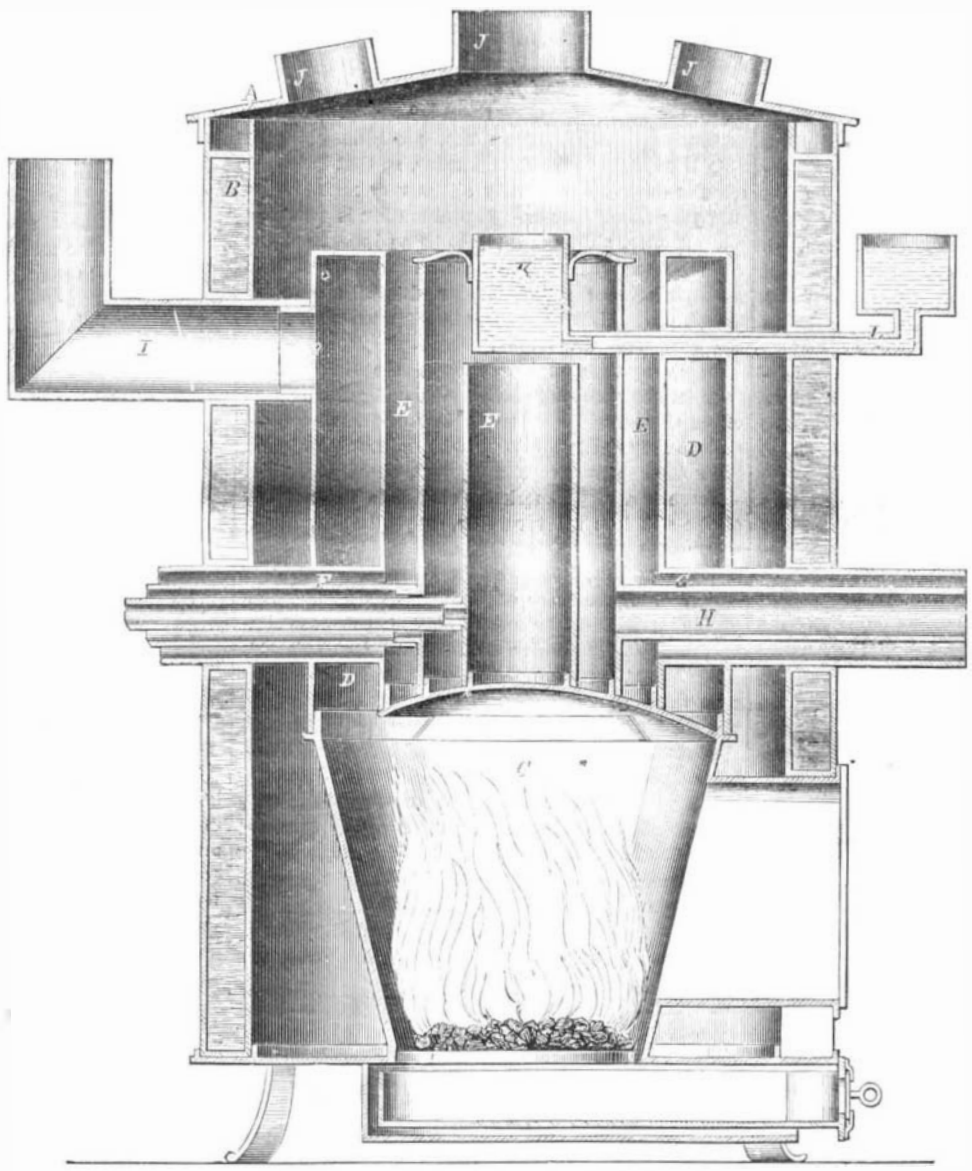
It is a well known fact to all who have given attention to economy in burning fuel that it is used to great disadvantage in ordinary stoves and ranges. In cooking stoves particularly the spaces are so cramped and the passages so contracted that the products of combustion, smoke and gas, completely choke them, so that all the draft that can be obtained is required to have an energetic fire.

A great deal of attention can be profitably bestowed on the common cooking stoves, for they are by no means economical, or so efficient, as they should be for the coal consumed.

The furnace here shown is intended for heating purposes. It is a moist hot-air furnace; so arranged that the air is charged with steam or moisture, as it passes into the apartments to be warmed, and deprived of the dryness which is so distressing to many and so apt to induce diseases of the throat.

In construction this furnace is simple. It is easily cleaned when foul, and requires no complicated array of dampers to render it effective. It is only necessary to build the fire and keep it burning, and the rest of the duty is done by the furnace itself.

In detail it is a structure, A, filled in with non-conducting material, B, so as to confine the heat in the center and prevent it from radiating. At the bottom of the furnace is the fire-pot, C, communicating with the combustion chamber, D, by segmental openings in its upper part. Above this fire-pot are the hot-air passages, E, surrounding one another and fitted with pipes, F G H, to convey cold air as fast as that already heated escapes.



DAYTON'S MOIST HOT-AIR FURNACE

The smoke-pipe is at I, and the hot air is distributed about the building from the openings, J.

A supply of water is maintained in the central vessel, K, through the tank and pipe, L. This being kept full continually insures the proper degree of moisture in the heated air. These are the principal parts.

This furnace seems to be very well designed for its purpose. The chamber wherein the products of combustion unite is large and roomy and is directly exposed to a high heat from the fire-pot crown. It is necessary that this should be so to insure ignition, or at least combustion of the smoke and gas. It should prove economical and efficient. A patent pending through the Scientific American Patent Agency. For further information address H. G. Dayton, Spencer House, Cincinnati, Ohio.

DEVIATION OF THE COMPASS IN IRON SHIPS

At a meeting of the Royal Institution of Great Britain on the 9th of February a paper, by Archibald Smith, Esq., M.A., F.R.S., was read, "On the Deviation of the Compass in Iron Ships."

The deviation of the compass is a subject of great and increasing importance, owing to the great and increasing amount of iron used in the construction of vessels, and the consequent increase in the amount of the deviation and in the apparent irregularity of its laws.

On the present occasion it will be necessary for me to omit altogether some of the most important and most interesting parts of the subject, viz., first, the mathematical part, including algebraical formulæ, arithmetical processes, and graphic constructions of great interest and utility; and secondly, the numerical results for different ships and classes of ships which have been obtained from the reduction and discussion of observations made in a large number of ships in the Royal Navy. I must confine myself to an attempt to explain the principles on which the forces which cause the deviation act, and the principles on which the deviations produced can be reduced to law, and to stating generally what has been accomplished, and what remains to be accomplished.

General Considerations.—1. A magnet is a bar of steel, the ends of which have opposite properties; they are generally marked N. and S. (north and south), but to avoid the confusion which would be occasioned by speaking of the magnetism of the north end of the needle or of the north end of the earth as south magnetism, it is convenient to distinguish them as red and blue (which may be remembered from R occurring in north and U occurring in south.)

The property is that the red end of one magnet attracts the blue end, and repels the red end of another magnet, and *vice versa*.

If we lay two magnets at a little distance in the same line with unlike poles turned to each other, and lay a soft iron rod in the interval between them, the soft iron rod will be magnetized by induction; the end next the blue pole of one magnet will become red, the end next the red end of the other magnet will become blue. If we turn the rod about its center, it will gradually lose its magnetism, till, when at right angles to the line of magnetization, it will be neutral, and if we turn it further, it will become magnetized in the opposite way.

The earth is a magnet, having a blue pole in latitude 70° N., long. 96° W., and a red pole in lat. 75° S., and long. 154° E. The direction of the magnetic force in London at present is the same as if there were a blue pole 20½° to the west of north, and 68° below the horizon, and a red pole 20½° to the east of south, and 68° above the horizon. This direction is called the line of force, or the line of "dip." If we hold a soft iron rod in the line of dip, it becomes instantly magnetized, the north or lower end becoming red, the south or upper end becoming blue. It we hold the rod vertically, the lower end will still be red, but of less intensity, the upper end blue, also of less intensity. If we hold the rod horizontally north and south, the north end will be red, but of still lower intensity. If we now turn the rod in the same horizontal plane, its magnetism will diminish till it becomes east and west, when it will be neutral, and if we turn it still further, the magnetism will be reversed; the amount