MARSHBANK'S PATENT FOUNDRY CUPOLA.

We illustrate, on the preceding page, what we consider to be a valuable improvement in Cupolas for melting iron. The improvement consists in a peculiar construction and arrangement of the interior lining. This construction will be understood by reference to the engraving, in which Fig. 1 is a front view of the Cupola, Fig. 2, a longitudinal section; Fig. 3, a plan view, showing the interior lining, and Fig. 4, a horizontal section, taken through the line *x*, *x*, of Fig. 2.

A, represents the outer shell of the Cupola, and B, the interior lining, whichlatter is made in oval oblong form, as shown, which form is carried up or continued to just below the charge-door C. This is done for the purpose of shortening the distance from the discharge of the tuyeres to the centre, requiring less pressure of the blast to carry it to that point than is required in other forms of Cupolas. D, D, represent the tuyeres, which are arranged on opposite sides of the Cupola, so as to alternate, or, in other words, the blast from each tuyere comes directly opposite the space between tuyeres on the other side. By this arrangement of the tuyeres, the blasts from them do not interfere with each other; but a limited pressure will carry them into the centre of the charge on the coal-bed, thereby obtaining an uniform combustion of the fuel, and preventing the formation of a central core, which, in heavy heats, causes the rolling of the charges over on the tuyeres, and clogging of the same. Above the tuyeres, the oval oblong lining B, is thrown back, making it of egg shape, which accomplishes the following important results. First, it increases the area of melting surface at the best melting point over the tuyeres, and where the blast is most efficient, second, by this form of lining it prevents the blast from cutting it away, as is the case where the lining is straight, and, third, it prevents the possibility of the stock lodging or bridging, which is often a source of annoyance and expense, as a general thing, in other Cupolas, where they are worked up to their capacity, the only remedy for this, being, heretofore, to drop the bottom, and do the balance of the melting some other time. The lining B, is contracted at the top, at the charge door C, for the purpose of preventing the escape of the gases, and a too rapid ignition of the coal between the charges before it reaches the real melting point above the tuyeres, thereby economizing fuel. E, E, represent the openings to the tuyeres, and to the inside of the air-chamber G, constructed in such a manner than any obstructions to the tuyeres can be readily removed at any time.

It is claimed that by the use of this Cupola, a given quantity of iron can be melted in a shorter space of time, with less fuel and less pressure of blast, than in any other cupola; and, at the same time, that a softer iron will be produced.—*American Artisan.*

LIGHT-HOUSES FOR TRINITY SHOALS AND TIMBALIER, GULF OF MEXICO.

On Nov. 15th, 1871, the U. S. Treasury Department issued a circular to iron manufacturers, informing them that sealed proposals would be received at the office of the Light House Board, until the 4th of January, 1872, for furnishing the material, apparatus, tools, and labor, of all kinds necessary to construct first order Iron Light-Houses for Trinity Shoals and Timbalier, Gulf of Mexico, in accordance with specifications and drawings which accompanied the circular. The Light House Board, were, themselves, to furnish the glass for the lantern, the lenses, lamps and furniture. Upon receipt of the sealed proposals, the bidding of the Architectural Iron Works of New York, was accepted. The proprietors at once proceeded to the construction of the light-houses, one of which is now completed, and the other is in process of completion. Both are alike, and the accompanying engraving for which we are indebted to the columns of the *American Artisan*, is an excellent representation of the one the firm has recently built. (Prepared by their special artists.)

The light-house is supported upon nine wrought-iron piles, eight of which are disposed at equal distances around the ninth or central pile, from the axis of which the others measure each twenty feet. The structure has thus an octagonal plan, each side of the octagon measuring a little less than fifteen feet three and eight-tenth inches. The piles penetrate fifteen feet into the shoal, each being furnished at its lower end with a cast-iron screw. The piles are held in position at the ground by adjustable chord links of wrought-iron.

Above the heads of the piles, the superstructure rises in the form of the frustum of an octagonal pyramid, measuring vertically, ninety-three feet from the axes of the pile head ties, to a horizontal plane, three and three-quarter inches below the upper surface of the watch room floor, in which plane the axes of the inclined columns at their extreme upper ends measure four feet six inches, horizontally, from the axis of the tower. At the base of the pyramid, the radius of the circumscribed circle is twenty feet, being the distance from the axis of the tower to the axes of the inclined columns. The inclination of the corner columns, is therefore, twelve inches in six feet, vertical measure. The six sections which comprise the frustum of the pyramid, have their heights as follows: The foundation series is twenty feet from the under side of the lower collars of the piles to the axes of the horizontal ties at the pile heads. The first series above the foundation has a height of fifteen feet from the axes of the pile head ties, to the top of the floor of the dwelling, or base of the second series. The second series has a height of eighteen feet from the surface of the first floor of the dwelling, to the under side of the cornice, frieze and roof girders.

The third series has a height of eighteen feet, measuring from the under side of roof girders, to the axes of the ties at the base of the fourth series. The fourth series has a height of fifteen feet six inches, measuring vertically between the axes of the horizontal ties The fifth series has a height of fourteen feet. The sixth series has a height of twelve feet six inches, from the axes of the horizontal ties at the base of this series, to the top of the frustrum of the pyramid. The columns of the first series, are of wrought-iron, forged tapering. The columns of the other series are of hollow cast-iron, decreasing in diameter as they ascend with the successive series.

SOUTHBY'S ECONOMIC GAS RANGES.

The principle of those economic gas ranges and roaster, as shown in the above illustration, differs from that of all other gas cooking apparatus, in that the gas is burnt in a chimney, the lower end of which is left freely open, while its upper end delivers a highly-heated current of air into the upper part of the vessel in which the articles to be cooked are placed; this vessel having no escape for the heated air except below the level of the articles to be cooked. Many advantages are claimed for this arrangement. 1st. The gas being burnt in a strong current of fresh air, the combustion is perfect. 2nd. The heated air escaping only at the bottom of the vessel instead of, as in other apparatus, at the top, it is that portion which has given out its heat to the articles in process of cooking that escapes instead of the hottest and unused portion, thus producing a much greater economy of gas. 3rd. The meat always being cooler than the air by which it is cooked it is surrounded by a descending current which, the exit being at the bottom, escapes freely; whereas if the exit was at the top it could only eddy round and round. This secures that the great bulk of the air admitted into the apparatus shall pass immediately over the surface of the meat, carrying away with it all the vapours given off as fast as they are produced, thus insuring the same perfect ventilation as before an open fire, and preventing any possibility of the disagreeable flavour of oven-cooked meat. An incidental advantage of the even temperature secured by having only a bottom exit for the air, is that all the space in the apparatus is available for cooking, and also makes it an unrivalled oven for baking pastry.

Much surprise has been expressed at the makers of this gas cooking apparatus chosing illuminating jets in preference to the atmospheric burners, for which greater economy is usually claimed; but they maintain that the former have great advantages; at the same time for cooking purposes they are equally economical when properly used. Atmospheric burners of all kinds are liable to be lighted inside the mixing chamber, producing aeroline smoke and various other noxious products of imperfect combustion. The simple union jet is free from this objection; and, as they contend for the economy, a given amount of gas burnt freely in air must produce exactly the same amount of heat, for as long as the ultimate products are water and carbonic acid, only the same amount of oxygen can have been used, and the