SCIENTIFIC AMERICAN

A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES.

Vol. XXX.—No 21. [NEW SERIES.] NEW YORK, MAY 23, 1874. [$3 Per Annum. IN ADVANCE.

THE ALBION BOILER.

This boiler consists of a shell, fifteen feet high and fifty-four inches in diameter, suspended vertically by four wrought iron brackets, placed equidistant near the top of the shell, and sting on the brick casing, inclosing the shell in a complete oven. The shell is invested on five eighths of its circumference with three lengths of outside circulating tubes of two inches diameter, the outer and inner rows of which run at an angle of about five degrees from the vertical line in one direction, while the tubes of the middle row cross them at the same angle in the opposite direction; these three systems of circulating tubes are respectively 13 feet 10 inches, 12 feet 10 inches, and 11 feet 10 inches in length, having 23 tubes in each set. In addition to these sixty-nine outside tubes, carrying the heated water from the bottom to the top of the boiler, there are seventy-five inside flues, of two and a half inches diameter, and of an average length of ten feet, running from the top of the boiler into a sheet which forms the top of the smoke box chamber, and carrying the products of combustion from the top of the oven, through the boiler, into the chimney, about five feet above the fire place.

Directly under the head of the boiler and top flue sheet are placed three inside tubes running across, and each connecting with two of the outside circulating tubes, which are perforated with small holes on the upper surface, so as to throw water against the underside of the head or top flue sheet, and upon the flues inside the boiler.

This construction will be readily followed in the annexed engravings, Figs. 1 and 2 showing the interior of the boiler in perspective and section, and Fig. 3, in plan.

The products of combustion rise up the outside of the shell, around the circulating tubes, then from the top of the oven descend through the flues inside the boiler, to the smoke box chamber, and thence rise up along one fourth of the outside of the shell to the stack immediately above it, the draft in which is regulated by a self-acting damper.

The water is carried about four and a half feet below the top of the boiler, and the interposition of the smoke box chamber compels the rapid circulation of the heated water through the outside tubes, which inject it against the head of the boiler and the flues inside, which, to some extent, superheat the steam, as the products of combustion are practically exhausted before entering the chimney. The total amount of heating surface is 1,150 square feet.

On May 29, 1873, Mr. H. Robinson, steam engineer, of Boston, made a careful trial at the Albion Print Works, Conshohocken, Pa., of twelve hours evaporation with this boiler, which, with feed water at 75° Fah. and steam at 53 pounds pressure, we are informed, resulted in the actual evaporation of 10·231 pounds of water for each pound of combustible. Compared with other experiments, where the water is taken at 212° Fah. and evaporated at 212°, the result of the Albion boiler is equal to 11·937 pounds of water from and at 212° Fah. for each pound of combustible consumed. This trial was made with a clean grate, the fire having been extinguished several hours, and a fresh fire started.

On the 17th June, 1873, a second trial was made by Mr. W. Barnet Le Van, of Philadelphia, assisted by Mr. H. S. Robinson; this was the trial of the Albion boiler in actual practical work, and was continued for eight hours, including the dinner hour, when the works were stopped. The fire was taken at a certain thickness, and at the termination of the trial was left in the same condition as at the commencement This second trial showed as an actual working result the evaporation of 9·585 pounds of water, at 78° Fah., by one pound of coal consumed, being equal to the evaporation of 11·195 pounds of water from and at 212° Fah., for each pound of combustible consumed, being about six per cent less than on the former occasion, no doubt due to the fact that the interruption of the dinner hour occasioned a very material loss, as the works were stopped and much heat was lost up the chimney; and this test being intended for practical daily work, the flues had not been specially cleaned out. It shows nevertheless a very large evaporation per square foot of heating surface and per pound of fuel consumed.

This boiler, we learn, has been in satisfactory operation at the Albion Print Works for upwards of three years. Four boilers are in use at that establishment. The circulation is claimed to be as nearly perfect as possible while the space occupied is small, and the method of exhausting the heat compact and complete. The boilers, it is also stated, have always been entirely free from scale, and kept in order without expense.

For further information as to terms and price, apply to J. Eberhardt, agent, Albion Print Works, Conshohocken, Montgomery county, Pa.

Fig. 1.

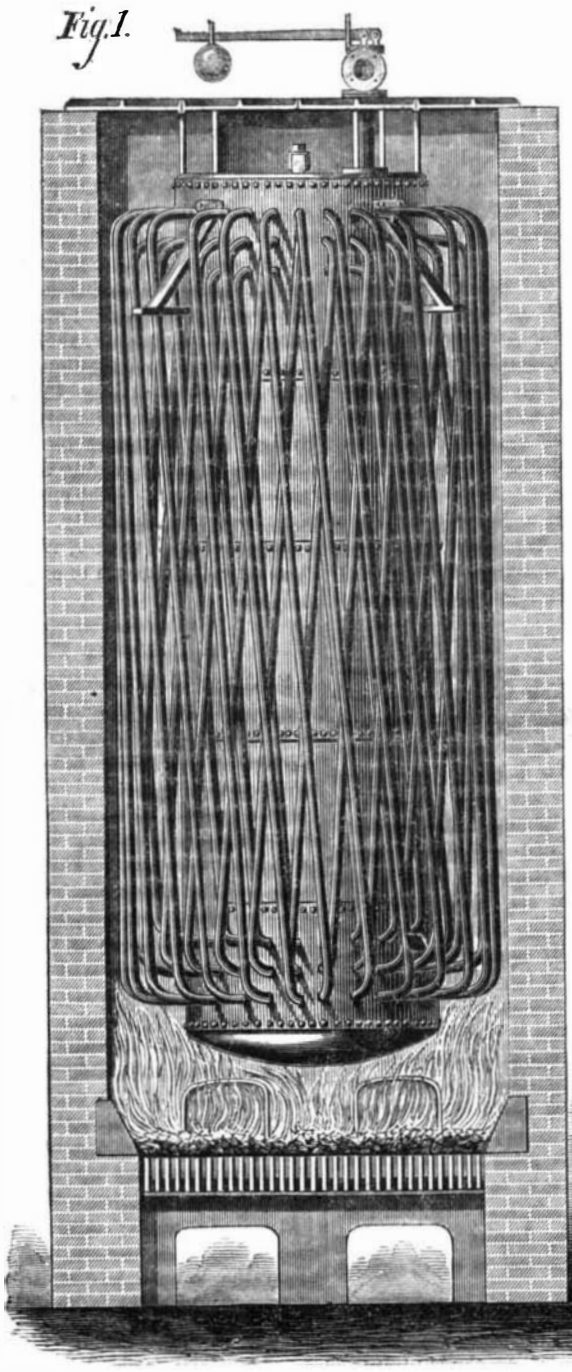
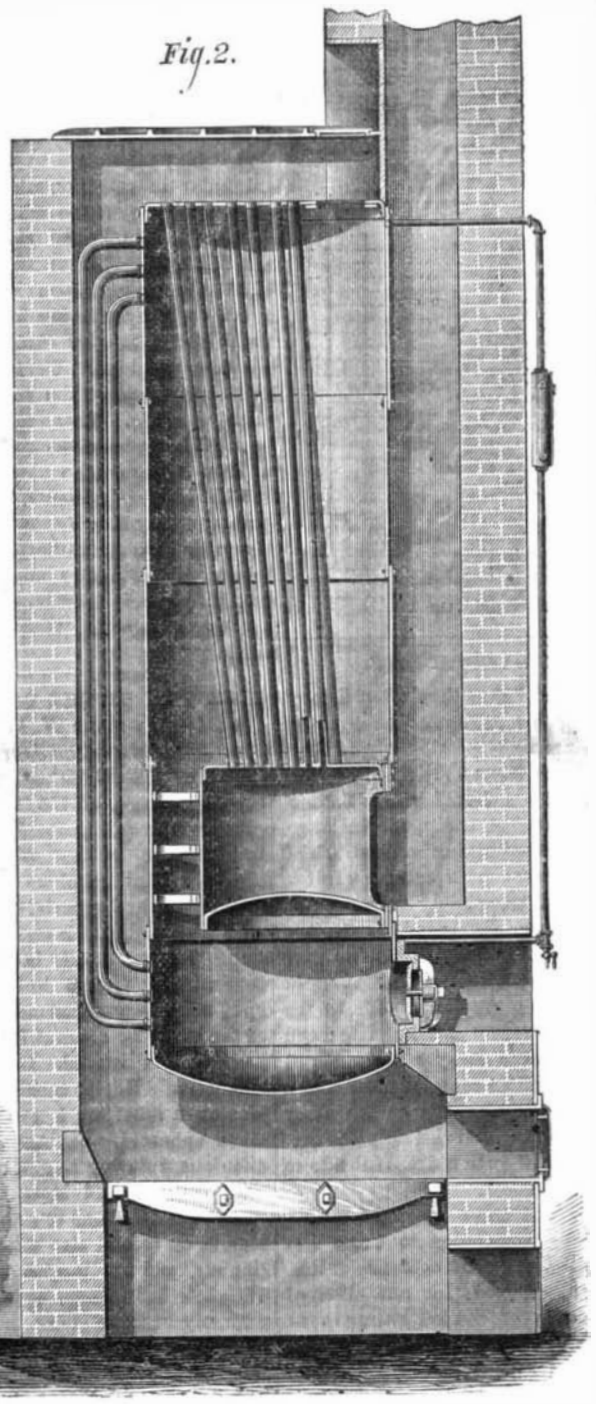
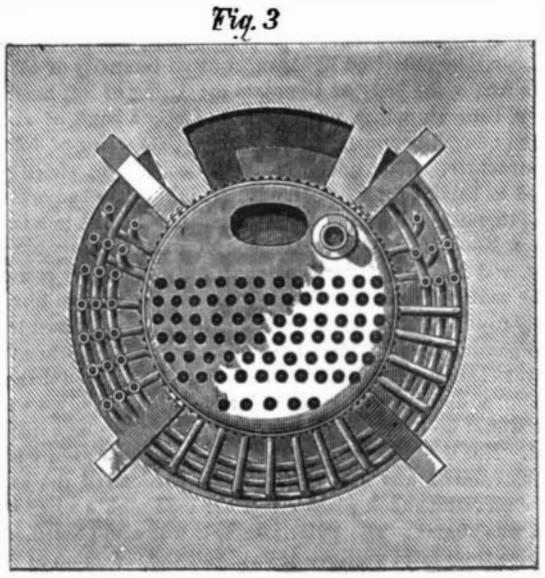


Fig. 2.



THE ALBION BOILER.

Fig. 3



Development of Heat by Friction of Liquids against Solids.

The energetic absorption of a liquid by a porous body is accompanied by an elevation of temperature, probably resulting from the friction of the liquid against the interior of the capillary canals against which it passes. M. Maschke gives, in *Les Mondes*, numerous measures of this increased temperature, obtained by causing amorphous silica to absorb various liquids. Among the cases considered were: Amorphous silica first wet and then dried at a moderate temperature so as to contain no more than 29·8 per cent of water, treated with water; silica at 18 per cent water, with water; silica dried, with water; silica calcined, then exposed to moist air (22.68 per cent H_2O), with water; silica calcined, then exposed to very humid air (28·24 per cent H_2O), with water; silica calcined and cooled with sulphuric acid, treated sometimes with water, or benzine, almond oil, concentrated sulphuric caid, or alcohol. The experiments lasted each from 10 to 45 minutes, the thermometers, suitably arranged, showing the increase of temperature at their close. The investigator operated at a normal temperature of about 60° Fah. The elevation observed varied in the majority of cases from 1·8° to 14·4° Fah. In calcined and dry silica, treated with concentrated sulphuric acid, the thermometer rose from 63° to 92·6°. In one part of calcined silica mixed with 3·2 parts of alcohol, the increase was from 55·4° to 78·8°. Quartz or powdered glass, treated in the same manner as the silica, gave no appreciable increase of heat.

A MASS CONVENTION OF MILLERS.—The first annual meeting of the Millers' National Association is to be held at St. Louis, Mo., on June 3rd. All persons interested in the milling business are invited to attend. A large attendance is expected; and by the interchange of opinions, addresses, etc., much valuable practical information will doubtless be elicited.

PRESERVING WOODEN TAPS FOR CASKS.—The articles should be plunged in paraffin heated to about 248° Fah. until no air bubbles rise to the surface of the melted material. They are then allowed to cool, and the paraffin is removed from the surface, when nearly congealed, by thorough rubbing. Taps thus treated, it is said, will never split or become impregnated with the liquid, and may be used in casks containing alcoholic liquors.