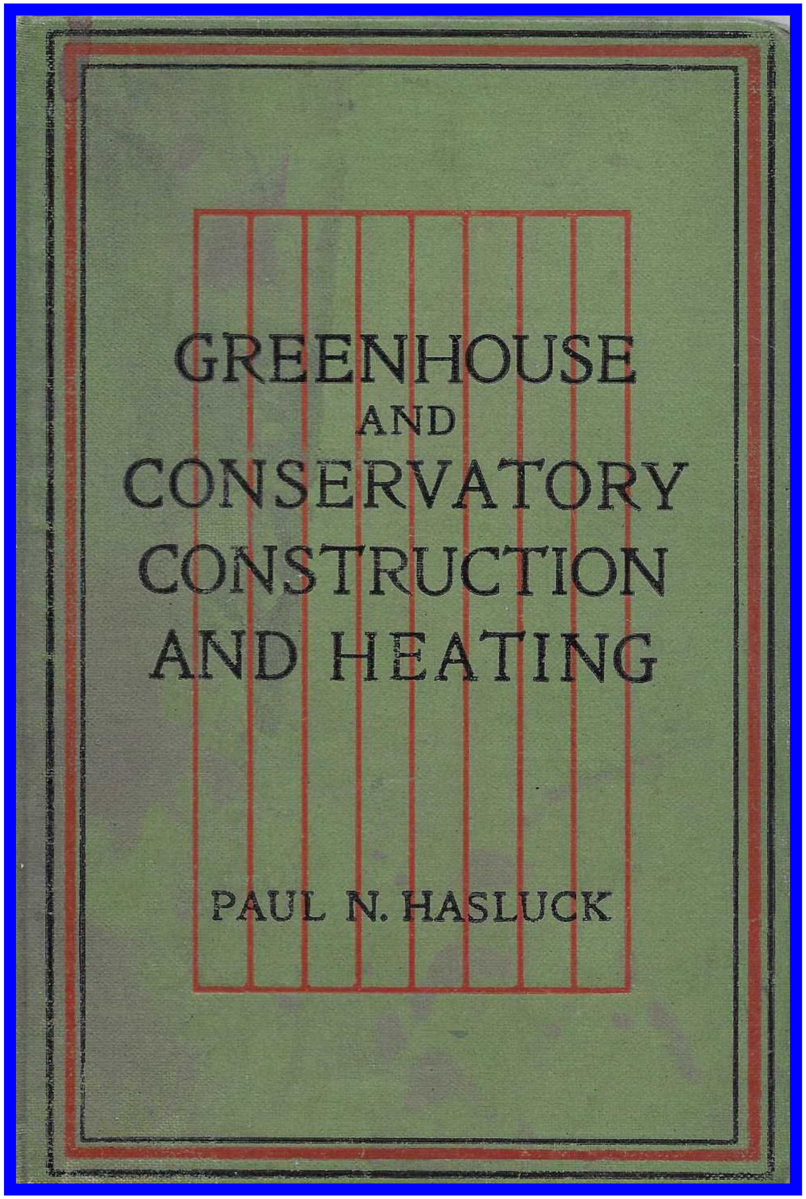
STEAM & HOT WATER BOILERS 1840-1930



TEXT AND ILLUSTRATIONS FROM 1907

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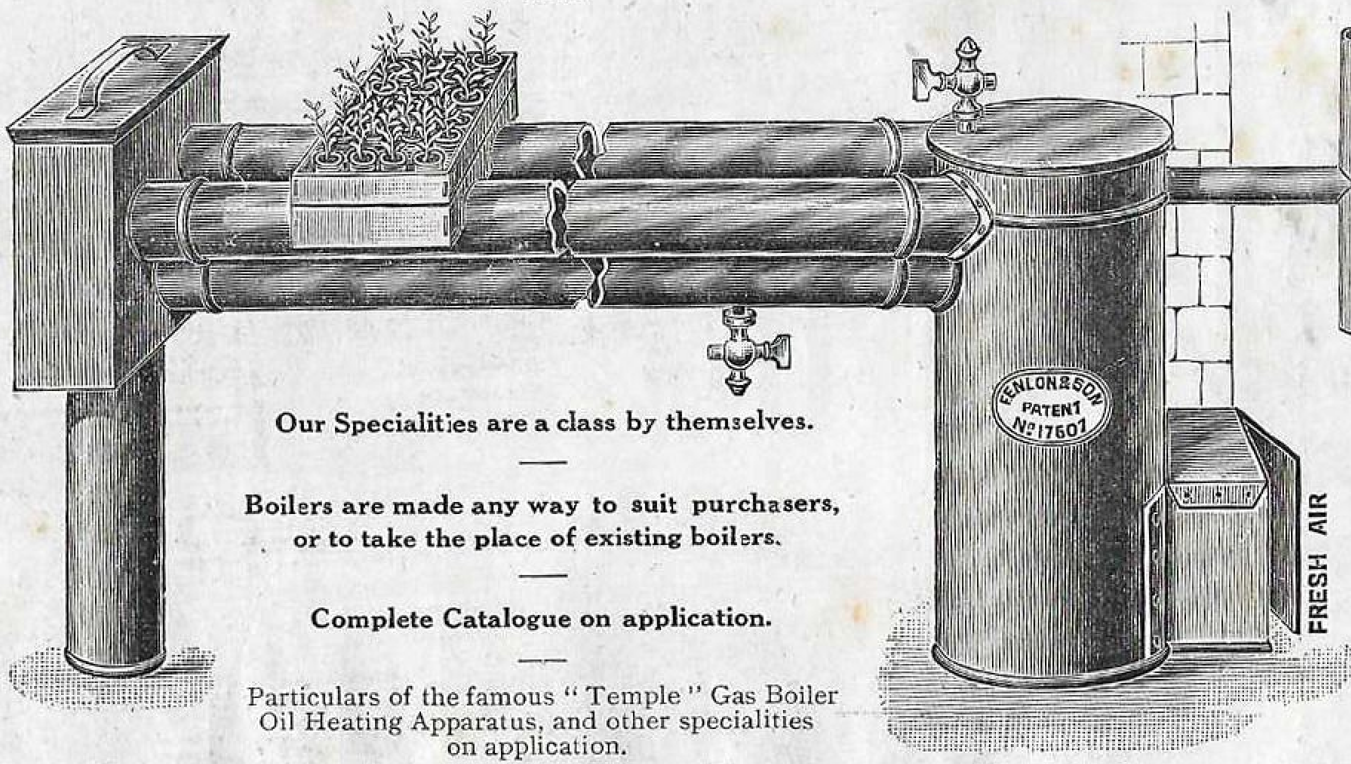

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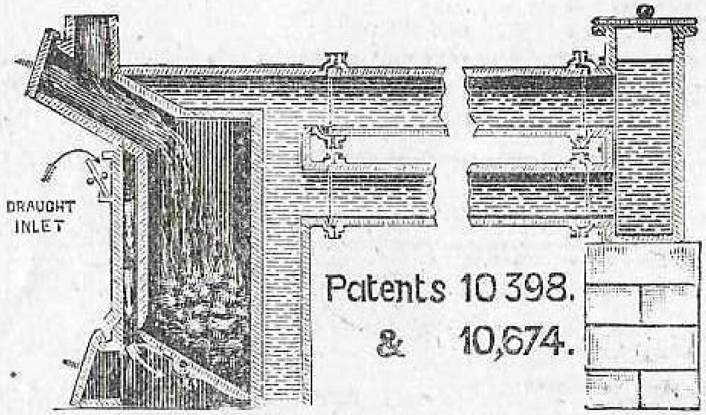

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CHAPTER IX.

HEATING GREENHOUSES.

Perhaps in many cases the first consideration in determining the proper type of apparatus for heating a particular greenhouse will be the choice of the fuel to be used. Gas undoubtedly gives the most regular temperature with the least attention, but is not so economical as coke. Coal is not a good fuel, one reason being that it burns out comparatively quickly, whereas a greenhouse boiler must be capable of being left unattended for many hours at a time. Coal is liable to cake up and form a bridge in certain types of boilers. Oil heating is satisfactory only for quite small houses and for frames, etc.

It is seldom that the heating engineer has to arrange the runs of the pipe—that is, the scheme of piping; he is told what temperatures are required, and he must figure out the quantity of pipe required to give the heat specified, but the disposal of the pipes will be arranged by the gardener or grower according to what he intends putting in the houses.

Radiators are not used in glasshouse work. Occasionally they may be seen in conservatories and winter gardens, but not in buildings devoted to growing, or to the protection of plants which cannot bear low temperatures. A radiator is designed to hold the least quantity of water that will effectively heat a given area of radiating surface, as by this means it is made quick in heating up after the fire is lighted, and quick to respond when the damper is opened or closed, either way. In other words, it is a quick heater and a quick cooler. Both these qualities are bad in glasshouses, as every effort has to be made to get a uniform heat, day and night, with ordinary and the least frequent attention, and perhaps a little carelessness. It is impossible to keep a man at the boiler watching a thermometer; therefore recourse is had to the next best arrangement for getting fairly regular results with irregular stoking. This consists in having in the apparatus a large bulk of water, which, if slow to heat up at first, is slow to get either hotter or colder, once it has all become hot.

For generally good results, the 4-in. pipe is used more than any other size. It holds nearly three times as much water as a radiator for a given surface, and is about three times as long in heating up. Once it has become of the desired heat, however, it is about three times as

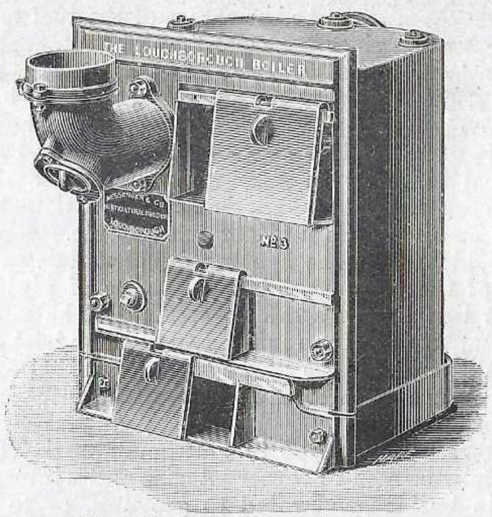

Fig. 165.—Loughborough Boiler.

long in getting either hotter or colder should the fire be carelessly tended or neglected; and when the fire gets low in the early morning, the water is slow enough in cooling to defy the frost. Probably this latter quality is the one most appreciated; but it is also a good quality that a fire allowed to get into a fierce heat for a little time does not affect the large bulk of water to the extent of seriously overheating the house. Perhaps it is only those who have had the labours of months almost all destroyed by one night's severe frost, who can properly appreciate an apparatus that does not too readily become cold if the fire gets low or goes out.

Another advantage of the large heating pipes in glass-house work is that they favour a much freer circulation than do the radiators and smaller pipes. The need of a free circulation lies in the fact that nearly all the piping is horizontal. The difference in height between the top of the boiler and the highest point of the piping may be only 2 ft., and this has to induce a circulation in hundreds

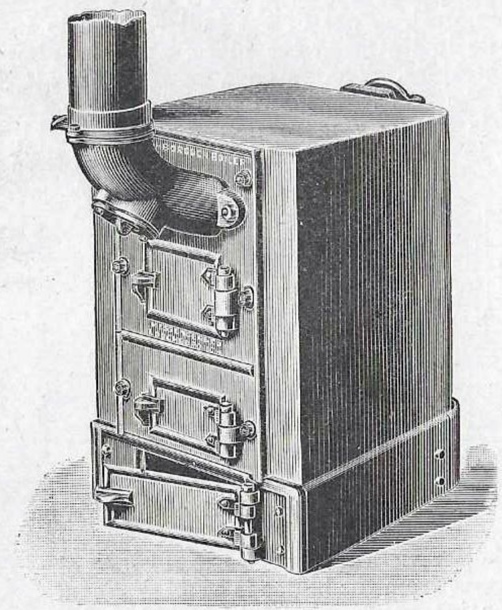

Fig. 166.—Loughborough Boiler with Waterway Front Welded in one Piece with Boiler.

of feet of horizontal pipe. It does it quite well when the piping is of 4-in. diameter.

In greenhouse work it is distinctly better to connect the branch services from the mains out of the flow into the return than to take both connections from the flow. That is, the branches that do the heating should be taken from both pipes of the mains. It is the universal practice, and always works well in this horizontal work. Of course, the one-pipe system of connecting branches wholly from the flow answers excellently with works in brick buildings when radiators are used instead of large pipes for the heating.

The most simple form of apparatus made, yet fulfilling a most useful purpose, is the "Loughborough" boiler, introduced by Messenger & Co., Loughborough, Leicestershire (see Figs. 165 to 167). It requires no pit nor house, for, as Fig. 167 shows, it is fixed in the thickness of the greenhouse wall. Part of the boiler projects inside, and thus assists in warming the place, and also simplifies the pipe connections. The stoking, however, is all done outside, and the flue connection and the damper are outside also. It is not any more necessary, therefore, to enter the house in order to attend to the fire, etc., than it would

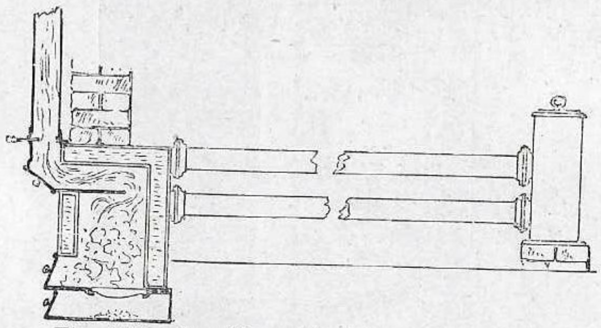

Fig. 167.—Loughborough Heating Apparatus.

be if the boiler were in a pit as usual. At the end of the pipes farthest from the boiler is another useful appliance—a combination pipe support, supply cistern, syphon end, and air vent. It is simply a vertical box end with a loose lid at top, and having suitable connections for the pipes.

The above style of apparatus is sold complete by all boiler makers. It can be fitted up without much mechanical knowledge, the jointing of the pipes being exceedingly simple. No caulking is necessary, a screw-wrench being the only tool required. The jointing material consists of rubber rings, which are sent by the makers. Fig. 168 shows this joint in section. It is known as Jones & Attwood's expansion joint, and is used extensively everywhere for

low-pressure work. The pipe is quite plain-ended, so that any odd length may be cut on the job. In making the joint, the outer rings are slipped on the pipe ends first; next, the rubber rings, and then the pipe ends are brought

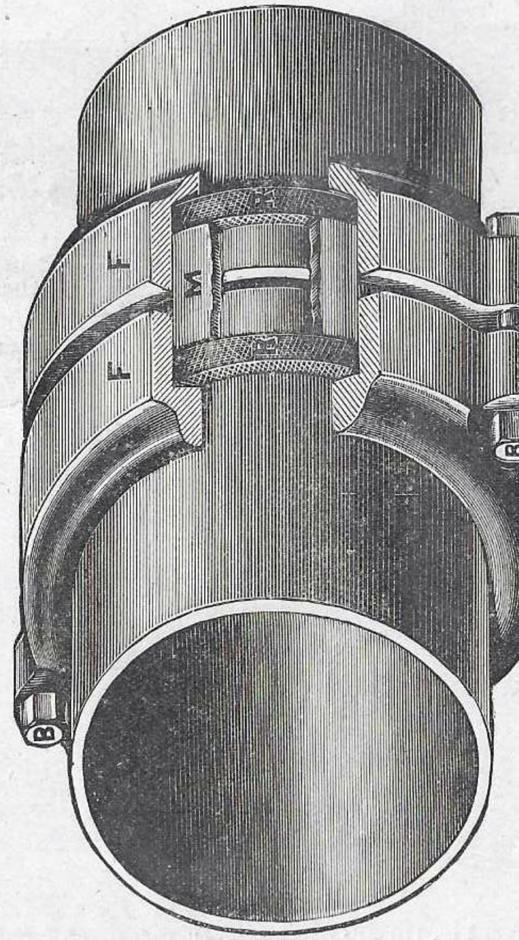

Fig. 168.—Jones and Attwood's Expansion Joint.

together, with the middle collar in position. The bolts are put through the eyes of the outer rings, and as they are screwed up the rubbers are compressed, and thus caused to press tightly round the pipes. In Fig. 168 F indicates two loose flanges, M a middle ring, R two india-rubber rings, and B two bolts and nuts. A similar joint is made by Messenger & Co. (see Fig. 169).

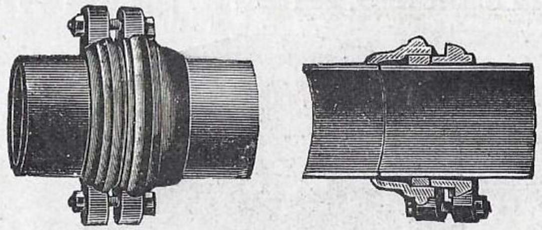

Fig. 169.—Messenger's Elastic Joint.

It is desirable to illustrate here a number of the better-known boilers constructed more or less on the principle of Messenger's "Loughborough" boiler. Those mentioned are but a small selection from the many scores now on the market.

"Desideratum" and "Very" boilers, made by Jones &

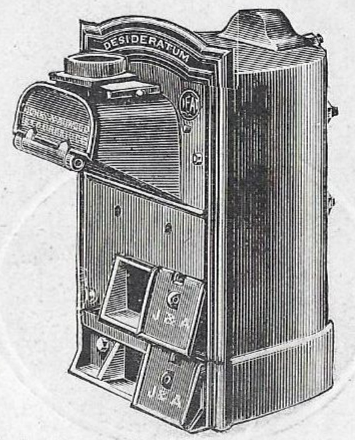

Fig. 170.—"Desideratum" Boiler.

Attwood, closely resemble one another (see Fig. 170), and both of them have attained to considerable repute. They are suitable for small houses requiring anything up to

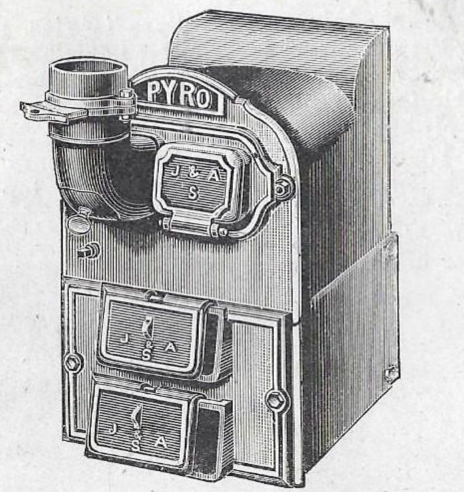

Fig. 171.—"Pyro" Boiler.

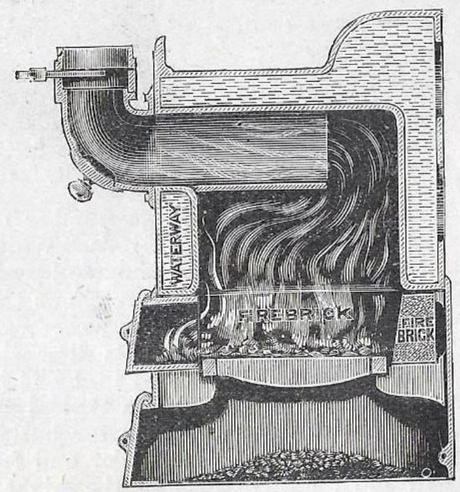

Fig. 172.—Section of "Pyro" Boiler.

200 ft. of 4-in. piping. The "Pyro" (Figs. 171 and 172), made by the same firm, is a similar affair and has a water-way front, back, sides, and crown, and a large fuel space for banking up at night. It is suitable for heating 80 ft. of 4-in. piping.

Figs. 173 and 174 illustrate the "Finsbury" slow combustion boiler, this having a water-way top and front, and being well suited to small houses. It is supplied by Robert Jenkins & Co., Boulton & Paul, Jones & Attwood, and other firms.

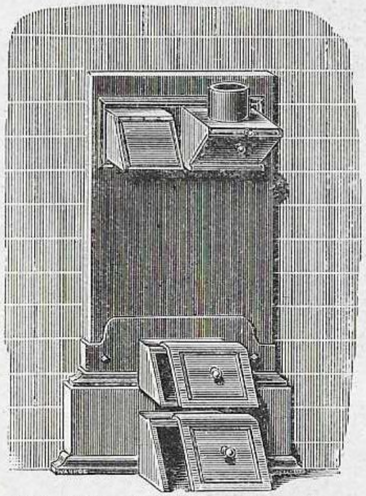

Fig. 173.—"Finsbury" Boiler.

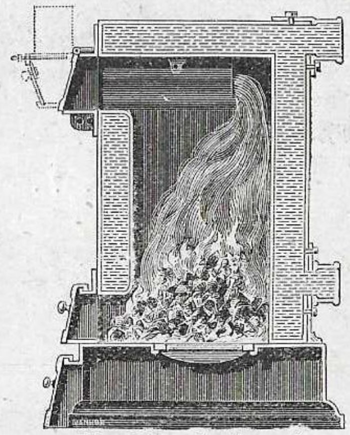

Fig. 174.—Section of "Finsbury" Boiler.

Hartley & Sugden supply a large number of boilers adapted for greenhouse use. This firm's "White Rose" cast-iron sectional boiler (Fig. 175) is made up of sections resembling Fig. 176, which latter figure shows the special formation of the side flues. Its heating power varies from 500 ft. to 2,200 ft. of 4-in. pipes, and its dimensions from 40 in. by 21 in. by 48 in. to 82 in. by 31 in. by 48 in.

The "Handy" boiler (Fig. 177) is a typical apparatus of its class, and obviously is designed for building into the greenhouse wall; it has a large feeder and fuel space, so that it will burn easily through the night without attention; it is fitted with a baffler plate, which forms a

flue at the top. The smallest size (14 in. by 14 in. by 18 in.) will heat 140 ft. of 4-in. piping, and the largest size

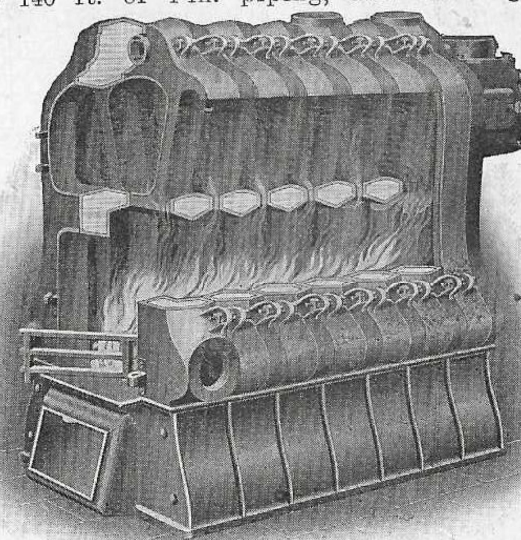

Fig. 175.—Sectional Elevation of "White Rose" Boiler.

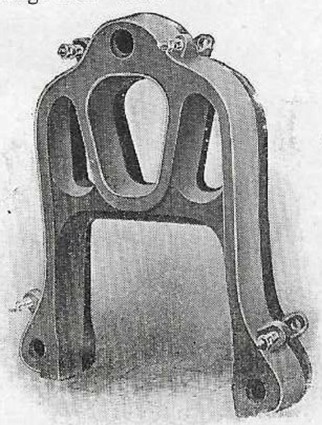

Fig. 176.—Middle Section of "White Rose" Boiler.

(26 in. by 14 in. by 18 in.) will heat 260 ft.

Kinnell's "Horse Shoe" boiler (Fig. 177) and "Rochford" horizontal tubular boiler (Fig. 178) are respectively for amateur and expert employment, and differ wholly in construction from each other, as the illustrations clearly show. Both of them have points of merit, and may be recommended.

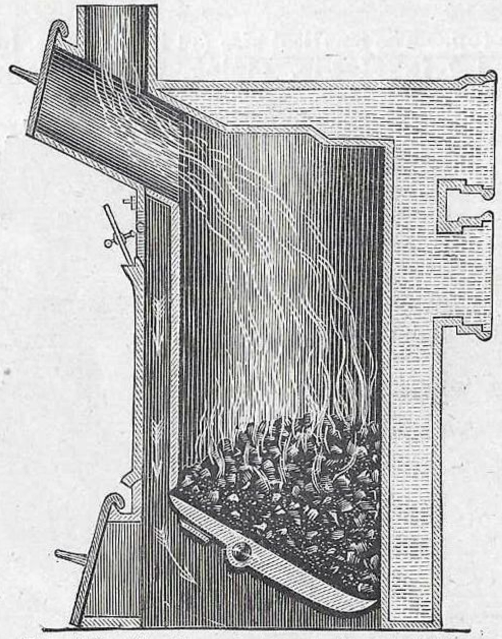

Fig. 177.—Section of "Horse Shoe" Boiler.

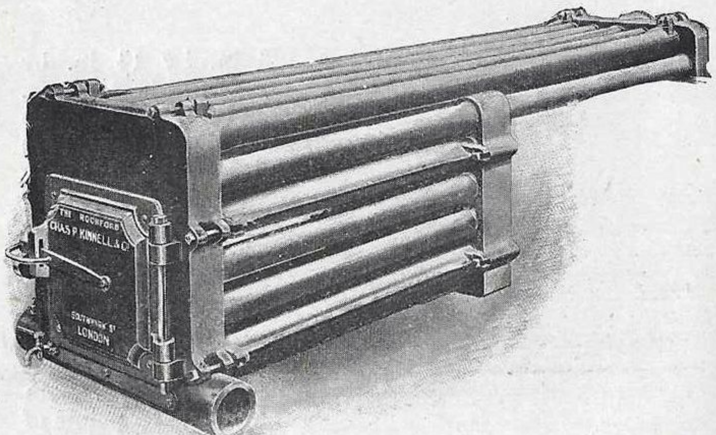

Fig. 178.—"Rochford" Horizontal Tubular Boiler.

The "Ivanhoe" boiler (Figs. 178 and 179), manufactured by Robert Jenkins & Co., is made in six sizes, the

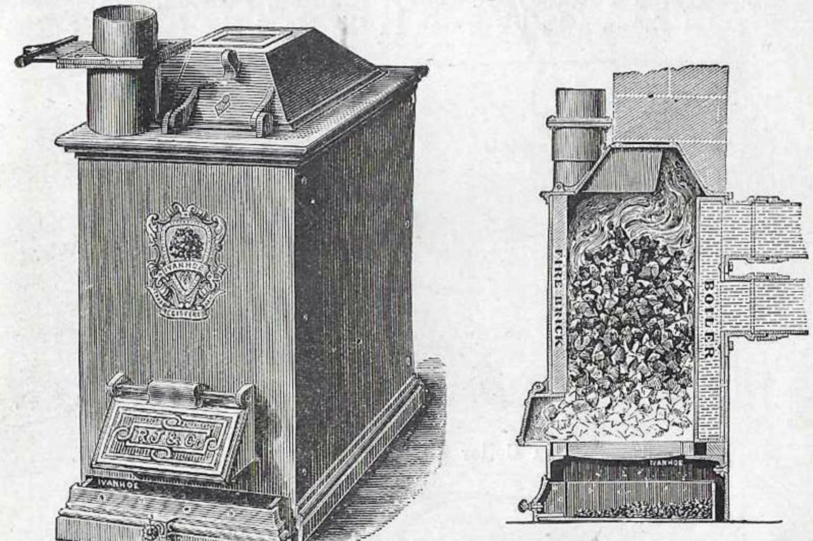

Fig. 179.—"Ivanhoe" Boiler.

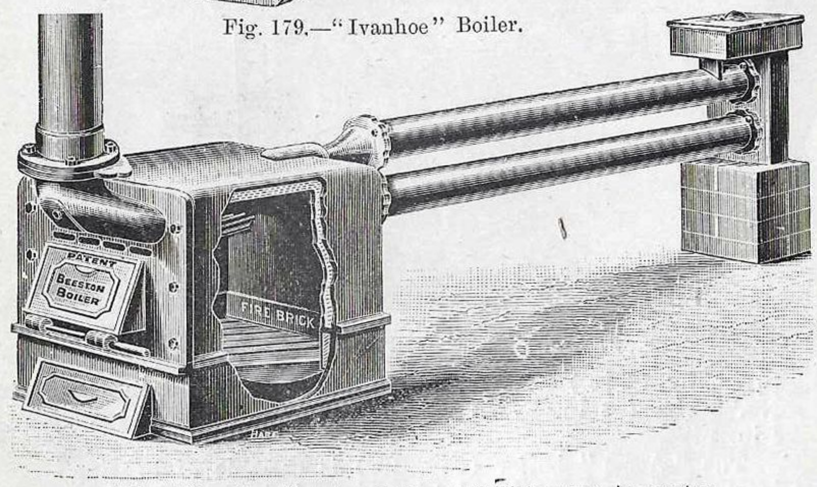

Fig. 180.—Cast Beeston Boiler and Hot-water Apparatus.

heating power ranging from 36 ft. to 100 ft. of 4-in. pipe.

The "Beeston" boiler (Figs. 180 and 181) is made by the Beeston Foundry Company, Limited, Beeston, Notts. Fig. 181 shows a boiler which in the No. 1 size (18 in. by

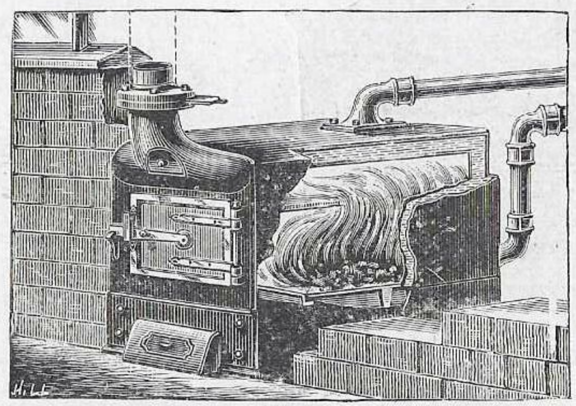

Fig. 181.—Beeston Boiler Fitted with Smoke Consumer.

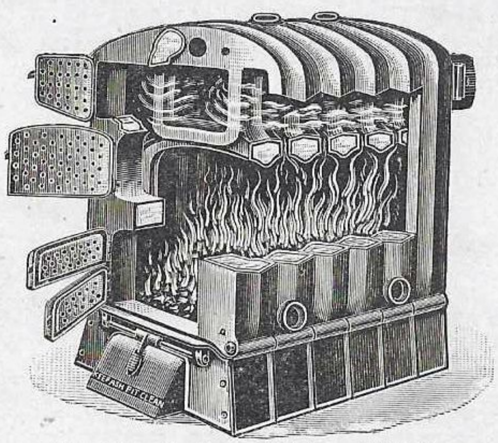

Fig. 182.—Section of "Acme" Boiler.

16 in. by 16 in.) heats 50 ft. of 4-in. pipe, and in the No. 5 size (36 in. by 16 in. by 16 in.) heats 275 ft. of 4-in. pipe.

The "Acme" boiler (Fig. 182) is capable of heating from 500 ft. to 1,800 ft. of 4-in. pipe; it is made in eight

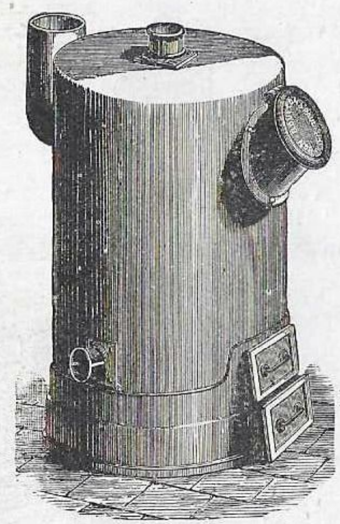

Fig. 183.

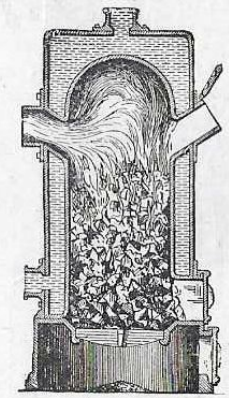

Fig. 184.

Figs. 183 and 184.—Independent Slow Combustion Boiler.

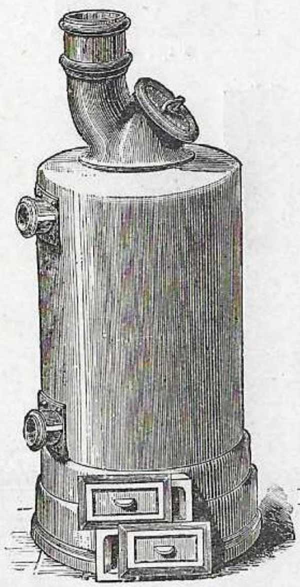

Fig. 185.

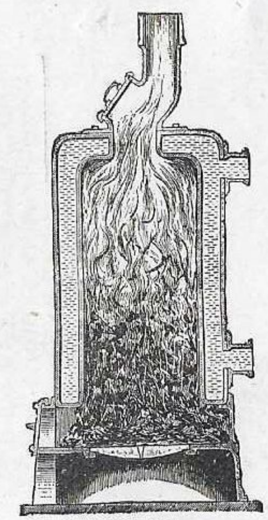

Fig. 186.

Figs. 185 and 186.—"Phœnix" Independent Slow Combustion Boiler.

Figs. 188 and 189.—Elevation and Vertical Section of "All-night" Boiler.

Fig. 188.

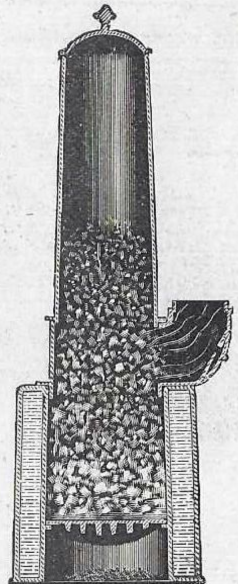

Fig. 189.

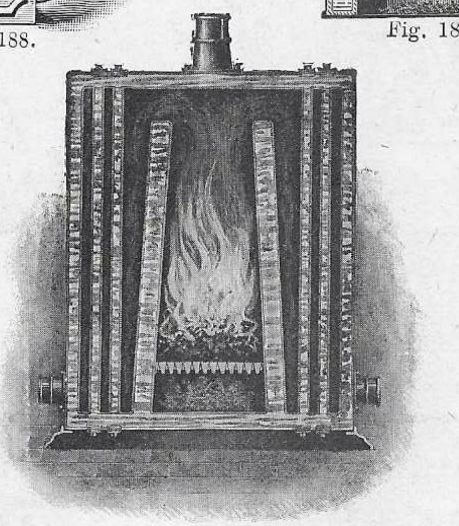

Fig. 187.—Vertical Section of Alton Boiler.

different sizes, varying from a four-section boiler measuring 22 in. long, 24 in. wide, and 48 in. high to an eleven-section boiler 57 in. long, 24 in. wide, and 48 in. high.

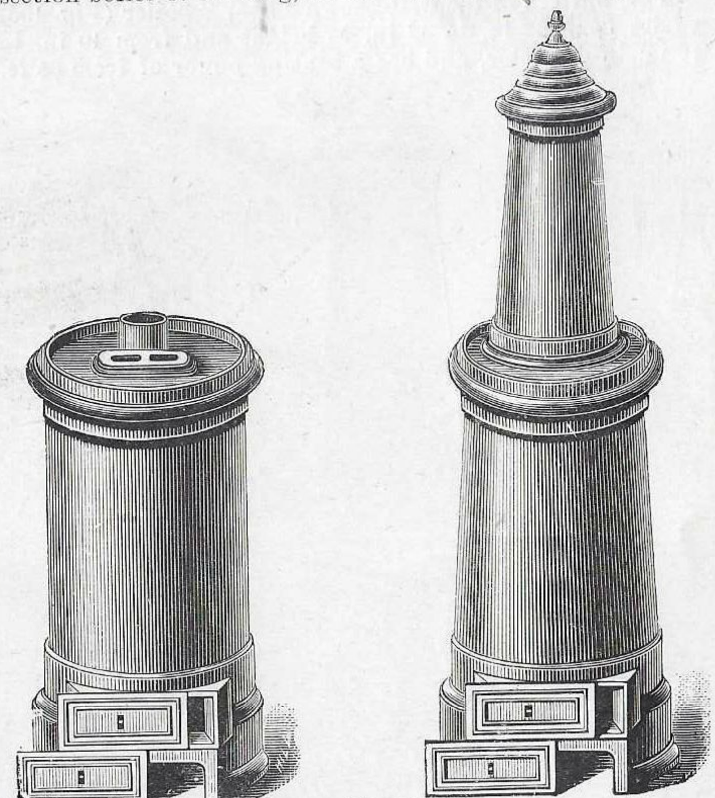

Fig. 190.—"Star" Boilers.

Independent slow combustion boilers are used for heating conservatories, etc., attached to buildings in which the boiler can be conveniently placed. Typical boilers are the Boulton & Paul Nos. 8 and 10 (Figs. 183 to 186).

The "Alton" boiler (Fig. 187) is an independent boiler made by Hartley & Sugden; heating power ranges from 800 ft. to 5,100 ft. of 4-in. piping and dimensions from 45 in. by 36 in. by 27 in. to 84 in. by 60 in. by 42 in.

The "All-night" boiler (Figs. 188 and 189) will heat from 12 ft. to 40 ft. of 4-in. pipes, and can be banked to last from 12 to 24 hours.

One pattern of the well-known "Star" boiler (Fig. 190) varies from 24 in. to 42 in. in height and from 10 in. to 16 in. in diameter, and has a heating power of from 65 ft.

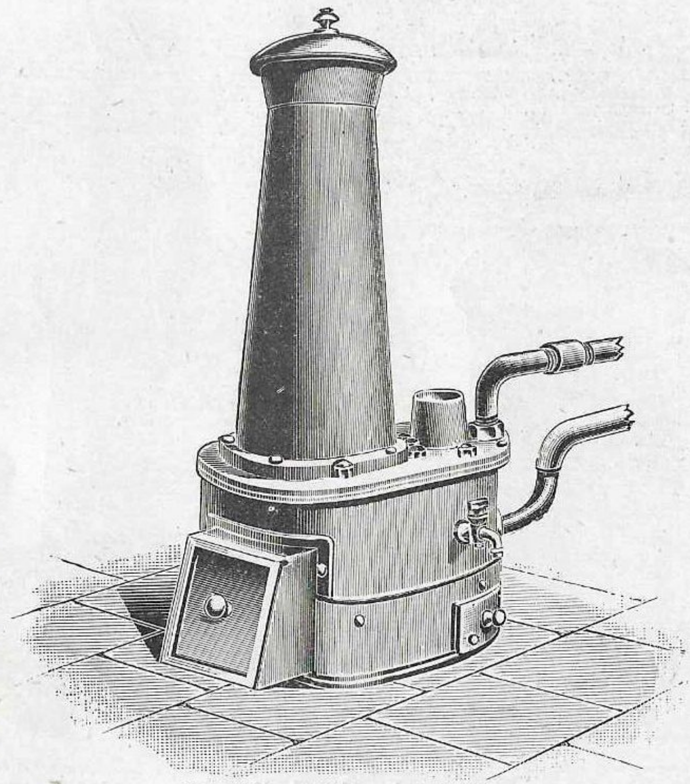

Fig. 191.—"12-hours" Boiler.

to 220 ft. of 4-in. piping. Another pattern ranges from 40 in. high and 10 in. in diameter, to 68 in. high and 16 in. in diameter, the heating power being the same as that of the G-pattern.

The "12-Hours" boiler (Figs. 191 and 192) is made by the Twelve Hours Stove Syndicate, Ltd., in three

sizes, the heating power varying from 75 ft. to 350 ft. of 4-in. piping.

The gardener's or grower's apparatus is quite different from those above mentioned, as it consists of long runs of pipes, with branches, and the boiler is situated in a pit somewhere convenient to the work. Should the ground be sloping or uneven, every effort is made to place the boiler at the lowest point, to ensure getting the rise of, at least, 1 in. in 10 ft. to the runs of pipe from the boiler. The rise can be got quite well when the houses are on the

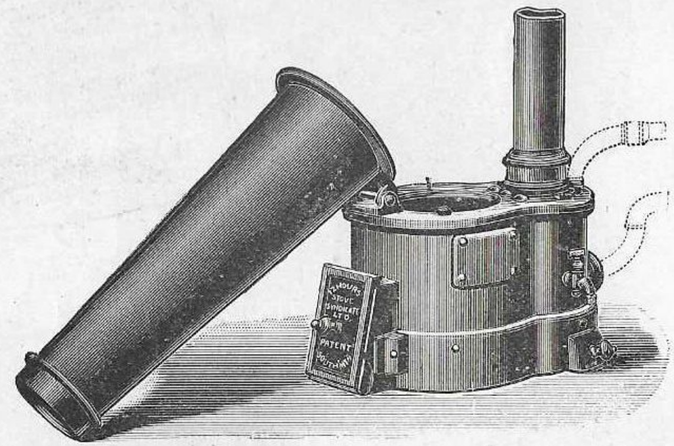

Fig. 192.—"12-hours" Boiler with Conical Top Hinged Over.

level; but with houses on ground sloping down from the boiler the rise is not possible.

The familiar saddle boiler is the form most generally used by the gardener or grower. A terminal end saddle is a very effective and fairly economical boiler, and most gardeners and their assistants know how to get the best work out of it. A gardener is reasonably afraid of trying experiments with different boilers, lest injury should happen to his plants. An expert would almost certainly get much better results from a modern upright boiler; but this brings to notice another detail relating to choice of boilers.

In most cases, when the boiler pit is being dug, water is reached and digging ceases before the pit is quite deep enough. No good and cheap means has been discovered of making a boiler pit water-tight against ground water or spring water. Probably concrete backed up with well puddled clay would do, and so would a lining consisting of a strong galvanised iron open cistern sunk in the ground;

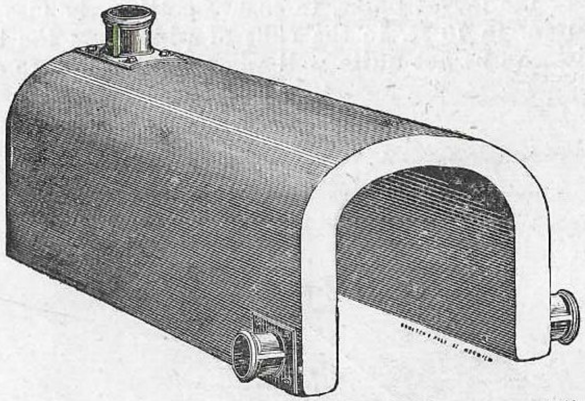

Fig. 193.—Plain Saddle Boiler.

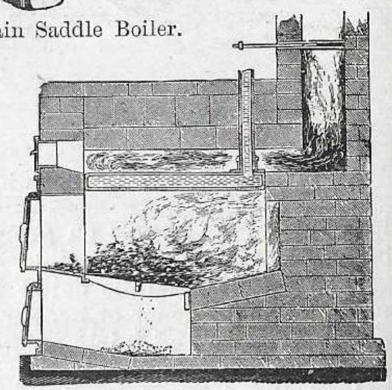

Fig. 194.—Section of Plain Saddle Boiler set in Brickwork.

but both methods are expensive. Shallow boiler pits are therefore rather the rule than the exception, and they call for the use of shallow boilers. The upright boiler just referred to could seldom be used, while the shallow saddle more readily suits the conditions. There are also modifications of the saddle boiler, made of still less height,

expressly for what is called "shallow drainage." The necessary shallowness of the pit accounts for horticultural boilers being practically always horizontal, while house-heating boilers are usually upright. No doubt upright boilers would be used for the other purpose but for the conditions indicated.

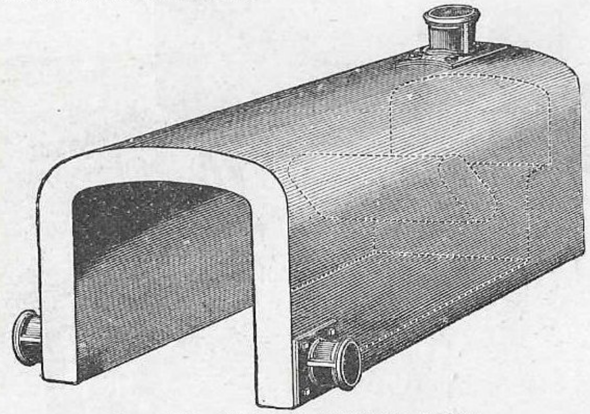

Fig. 195.—Check-end Saddle Boiler.

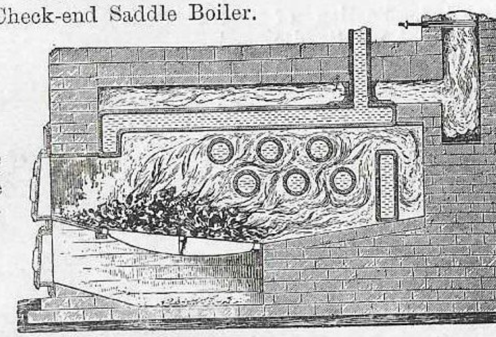

Fig. 196.—Section of Check-end Saddle Boiler Set in Brickwork.

Typical saddle boilers may now be illustrated. Figs. 193 and 194 show the plain boiler suitable for heating from 100 ft. to 300 ft. of 4-in. piping, according to the size, which ranges from 18 in. long, 12 in. wide, and 10 in. high to 36 in. long, 16 in. wide, and 16 in. high. The check-end saddle boiler (Figs. 195 and 196) heats from 300 ft. to 3,000 ft. of 4-in. piping, it being made in sizes ranging from 30 in. long, 21 in. wide, and 18 in. high to

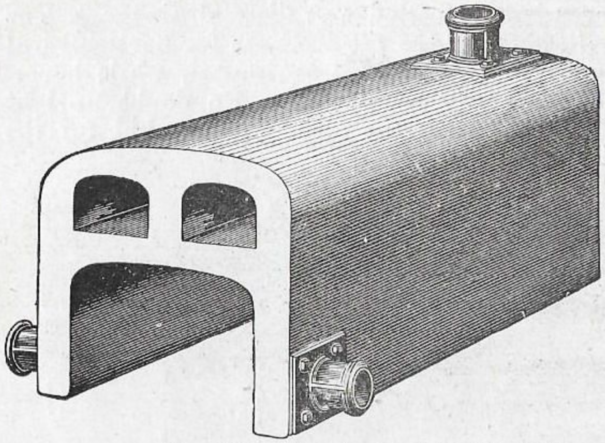

Fig. 197.—Terminal end Saddle Boiler.

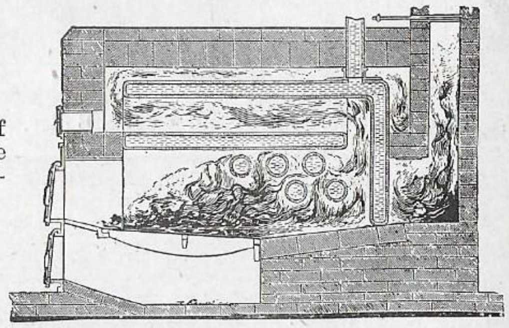

Fig. 198.—Section of Terminal-end Saddle Boiler Set in Brick-work.

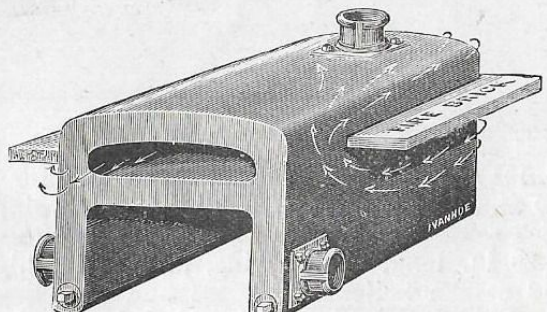

Fig. 199.—Elevation of Chatsworth or Terminal-end Saddle Boiler.

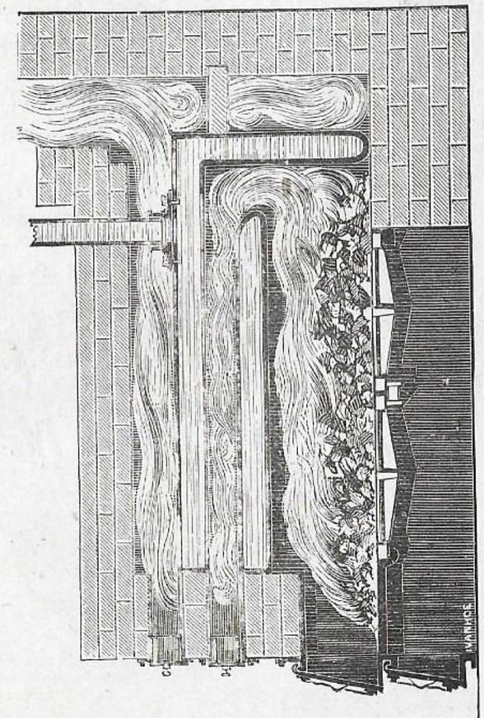

Fig. 201.

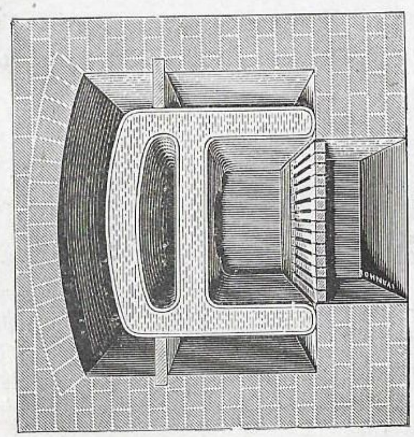

Fig. 200.

Figs. 200 and 201.—Cross-section and Longitudinal Section of Chatsworth Boiler Set in Brickwork.