for the entrance of the pipe from it, is immediately before the water returns to the boiler: it is therefore generally connected with the return pipe just before it pierces the boiler.

It is well known that the expansion of iron by increase of temperature is considerable. The pipes must therefore be allowed free movement, so as to admit of expansion, other­wise they will give way. It is also necessary to have some contrivance for securing the escape of the air from the pipes, because, if left in, it impedes, nay sometimes prevents altogether, the current of the water ; and hence the neces­sity of having an opening in the highest part of the tube, by which not only the air in them, but also that disengaged from the water when heated, will be expelled. The part at which this aperture must be placed will depend entirely on the form of the apparatus. In some, one opening will be sufficient, but in others two or more will be required ; for though the air has a tendency to pass to the highest points, yet, from the difference in the levels, it may accu­mulate at different places. Thus, in fig. 4, it will be found at *b* and *e*, and hence at these points small tubes of a few inches in length, open at top, ought to be placed.

In addition to the forms of apparatus now described, there is still another now much in use, called the *High Pressure* apparatus. It consists of a coil of tubes, fig. 5, *a b,* about an inch external, and half an inch internal diameter, which is the part of the apparatus that is surrounded by the fire, and of course acts in­stead of the boiler. From the upper part of this the ascending tube *b c* pro­ceeds, and from it the others to the different parts of the building, and is then conveyed to the bottom of the coil at *a,* thus making a continued circuit. In this form of apparatus, al­lowance must be made for the expansion, not only of the tubes, but also for that of the water ; a larger pipe is therefore attached to the highest point, which is generally vertical, as *ef.* This tube being at first open, is employed for filling the apparatus ; the water being poured in till it rises a little way in it, as, for instance, to the dotted line *i k,* after which the aperture is secured by a cap and screw. Instead of filling the ap­paratus through the expansion tube, a small one is some­times attached to the highest part, as *n o,* after which the screw on it and on the safety-pipe are put on. By using this smaller tube, there is no risk of making the water too high, as it cannot rise above the dotted line *i* *k.*

In an apparatus of this kind, due attention must be paid to the strength of the tubes ; because, as a strong heat is ap­plied to the coil to raise the water beyond 212, were the tubes not of sufficient strength, they would be burst by the tendency to form steam of high clastic force. Thus the temperature of the coil is sometimes 500, at which the pressure on the inside of the pipes is upwards of 1000 lb. on the square inch ; hence the necessity of having the pipes to be used proved to a pressure beyond this. Those employed are generally warranted to upwards of 2000 lbs. When an accident does occur, it is usually owing to the coil giving way, partly from its resisting force being weakened by the high temperature ; partly from the ac­tion of the water on the iron, by which its properties are altered.

This high-pressure apparatus, though it has many advan­tages over the other forms, has also some disadvantages. The water in the coil can be heated to a greater degree than in a boiler, consequently more heat can be taken from the fire and conveyed to the apartments ; but this, it is generally allowed, is done at a comparatively greater cost of fuel.

The system of heating by the transport of water from one place to another, as now described, has advantages which it is supposed recommend it above all others. It is well adapted for warming the air in large and extensive buildings, such as manufactories ; and also for creating a requisite degree of heat for particular purposes, as in paper-making, drying of gunpowder, and many others. As yet, however, it remains to be proved whether it is equally eco­nomical with the more easy method of throwing into the apartment a large supply of air, moderately warmed, as is done by the means already described under the article Stove. The apparatus itself is costly, and is more troublesome to fit up. At the same time, however, it must be admitted that a uniform temperature can be more easily and more permanently maintained by it than when air or steam is used as the heating medium, owing to the quan­tity of heat in water being great compared to that in the others. When the water is once warmed, it retains its heat for a long time. When uniformity of temperature is a great desideratum, the water system has therefore its advantages ; such as in hot-houses, where it is of the ut­most importance that, after the temperature is once raised, it should not be allowed again to sink, or to sink rapidly, which may be the case when an irregularity occurs in the fire of a hot-air or steam apparatus. With regard to the expense, we may state, that the cost of erecting a high- pressure apparatus used for heating a large wareroom amounted to L.70. The furnace is placed in a room be­low ; and from the coil the ascending tube proceeds directly to the apartment above, and from it two tubes pass hori­zontally in different directions, and after traversing the room, return in the same direction, and join near where they took their origin, and then descend to the coil. The apartment is ninety-four feet in length, twenty-five in breadth at one place and forty-four at another, and varies in height at different places from fourteen to twenty-five feet. The cubic contents are in all very nearly 50,000 feet. The door opens directly to the street. Small coal is used, at five shillings and sixpence per ton, which lasts for two weeks, say for twelve days, at an expense therefore of about sixpence per day, by which the temperature is kept easily at 57°. Though this is a trifling expense, yet it is not less than would be required for a hot-air stove for the same apartment, while the original cost of the apparatus is much greater. (D. H.)

WARMINSTER, a market-town of the county of Wilts, in the hundred of its own name, ninety-seven miles from London and twenty-two from Salisbury. The river Willy runs through the town, and falls into the Avon. Warminster has a market on Saturday, at which the great­est quantity of corn is sold of any place in the county. It has some employment in making fine cloths, but of late years that trade has much diminished. It is considered one of the healthiest towns in England. There is a spacious parish church with a square lofty tower, and a chapel of ease, be­sides several places of worship for dissenting sects. The po­pulation amounted in 1821 to 5612, and in 1831 to 6115.

WARNAWIN, a circle of the Russian government of Kostroma, extending in north latitude from 56° 48' to 57° 33', and in east longitude from 43° 59' to 46° 12'. It is a poor and barren district, thinly inhabited, and scarcely yielding