

A NEW HOT WATER HEATER.

The relative amount of cold weather in Canada, as compared with the whole year, being so great, the method of heating places of residence is one of the prime factors of life, and new devices, having in view the economical and healthy adjustment of the interior temperature to exterior conditions, is a matter of the greatest interest to every one. Perhaps no greater mistake could be made than in giving undue consideration to the first cost in providing apparatus for heating dwellings.

Hot water is claimed by scientific students to be an unequalled medium for this purpose; and they point to the fact that in both the United States and England it is being almost universally used for heating hospitals and other sanitary institutions; and in view of this fact the important declaration is made that Canada is well in advance of the countries named, and of the world, in this branch of art.

The CANADIAN MANUFACTURER takes pleasure in directing attention to the very interesting invention of Mr. Edward Gurney, of this city, which is now about to be placed on the market by the E. & C. Gurney Company. During the past four years this company have been manufacturing a hot water heater which has been received with a great deal of favour and approbation; but concurrently with its manufacture they have been experimenting extensively and

most thoroughly to ascertain the value of certain improvements which they have embodied in their new apparatus, and which we here describe.

The success of hot water heating apparatus depends almost entirely on the well known laws of gravitation to effect the circulation. Cold water is much denser and heavier—probably to the extent of about five per cent.—than hot water. In the Gurney system the heater here alluded to is placed at the lowest convenient point in the building to be heated, and suitable outflow and return pipes are connected with radiators wherever the heat

is to be delivered, even on to the highest floors. The heater and all the pipes and radiators having been filled with water, when fire is kindled in the heater, circulation of the water begins; and this is caused by the heavier cold water in the return pipes descending, replacing the lighter hot water, which goes up through the outflow pipes. Of course it is of great importance that throughout the entire system there should exist but the minimum of friction to retard or obstruct the circulation, and Mr. Gurney has given this feature a great deal of careful consideration. In the arrangement of this system the return pipes are introduced into the heater very close to the lowest level, and at a point where there is the least chance of repulsion. In other heaters the water is returned at the level of the fire pot and thrown against the most highly heated surfaces. In this heater the water rises from the inlet in the base on perpendicular lines directly to the fire pot section, and is passed very quickly over the hottest surfaces. Another advantage is that the heat from the bottom of the fire pot is completely economized, being radiated against the sides and bottom of the ash pit section; and the fact that this section is constantly supplied with the inflow of cold water admits of the heater being placed immediately upon a wood floor without the least possible danger of its taking fire. Great care has been taken in ascertaining the correct size and capacity of the combustion chamber of the heater, and the experiments in this direction

have extended over a year of actual trials, the memoranda of results filling many pages of manuscript. In its construction this combustion chamber is entirely unique. Curves are substituted for angles, thus avoiding unnecessary friction. It will be recognized that the surface immediately surrounding the fire is the most valuable in economizing the heat, and it is desirable that the water in the heater should closely surround the fire; but it has been found that the rapid passage of water over the heated surfaces of the combustion chamber causes imperfect combustion, the heat necessary for the perfect combustion of the fuel lying in the outer edge of the fire pot being absorbed by the circulating water. This being the case, it was found necessary to interpose fire brick non-conducting lining between the fire and the water surfaces; and this is now done by the best makers everywhere.

A great disadvantage arising in this practice, however, is that in a short time the expansion and contraction of the fire brick, from the action of the heat, and the inevitable accumulation of clinker upon them, caused by fusion, causes them to become broken and disintegrated, so that sooner or later it becomes necessary to reline the furnace. By a very simple and ingenious device in this heater the water is projected between the several fire brick composing the lining, so that each individual brick is surrounded on three sides by water, thus presenting alternate surfaces of brick and iron to the

fire, the maximum of surface being thus preserved. The arrangement renders the fire brick practically indestructible, the surrounding water maintaining the temperature at so low a standard that it is impossible for fusion to occur. This arrangement has been observed for the past four years in heaters manufactured by this company, and in no instance have they ever learned that the fire bricks had become destroyed, or that it was necessary to replace them. Standing in front of this heater one cannot but be impressed with the fact that the fire is almost en-

tirely surrounded by water, the only exception being the furnace and ashpit doors, and the openings through which the scoria of the fire is removed from the grate, and in which the shaker bar is operated.

In a general way the design of this heater embraces every feature necessary to efficiency and economy. The details are grouped and combined in a graceful and mechanical manner, giving the entire structure a pleasing exterior; notwithstanding which, no artistic consideration in the direction of external effect has been allowed any weight when opposed to the attainment of all that the apparatus was intended to accomplish. The curves on the top and sides are in accord with the best hydrostatic and hydraulic practice. Every part is well guarded, and the multiplication of dissimilar parts has been avoided. The construction of the sections composing the heater is such that each section has a projection on its under side, and on which it stands, not very unlike the legs of a marine boiler. The discs forming the upper and lower surfaces of the sections are out of plane,—dished by being made concave, or depressed in the middle, somewhat after the style of the head of a cylinder boiler, the depressions approaching each other, a device which provides for the expansion and contraction of the metal, guaranteeing almost perfect immunity from injury by the application of heat or internal pressure. At proper distances apart on the periphery of the sections, suitable

