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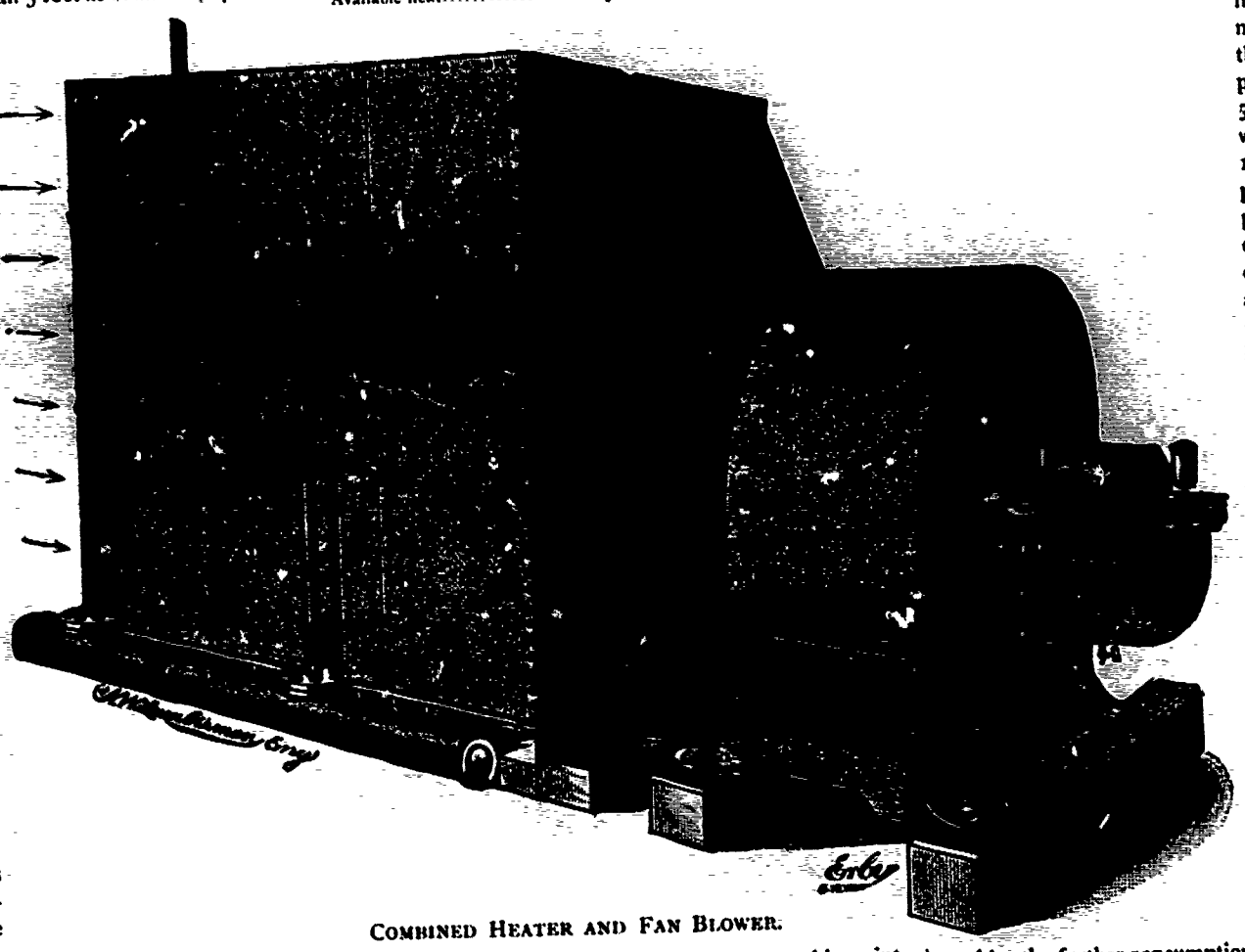
FACTORY HEATING, VENTILATING, DRYING.

THE apparatus illustrated herewith contains special features which commend it to the consideration of all manufacturers. First, it is an exhaust fan which creates a vacuum at one side of the heater. The vacuum thus made is compensated by atmospheric pressure, forcing the air alike across the radiating surface in the heater, entering at open end as indicated by the arrows. The heater, as shown, is for "live steam" only, and can be used as 6 sections, 10 sections, or 16 sections, simply by opening or closing the valves in the supply pipes. The peculiar construction of the apparatus is such that the manufacturers claim one foot of steam pipe will do more work than 3 feet as ordinarily placed. The pipes are all vertical, and are self-draining, consequently cannot freeze in extremes of winter weather. The pipes being encased in a jacket of sheet iron, makes them absolutely safe as a fire risk. As applied to heating or to drying rooms, no steam pipe whatever is used in the rooms. With the apparatus shown, a temperature of 220° Fahrenheit was secured. That the apparatus is a complete success is attested by many well-known firms in the United States. It is understood that an application is now being made to one of the largest churches in Chicago for heating and ventilating. The building referred to has had 7 large anthracite furnaces, but could not warm the rooms in 12 hours. It is claimed that with this apparatus it can be heated comfortably in less than one hour.



COMBINED HEATER AND FAN BLOWER.

The heater is radically different in effectiveness, as it can be placed above or below or 100 feet distant, and heat rooms different in size and distance with like certainty.

Mr. A. R. Williams, of Toronto, has made arrangements for the sale of these goods, and to him inquiries should be addressed.

GAS FUEL AND THE MANUFACTURES.

Manufacturers and scientists, says the *Iron Industry Gazette*, are devoting a good degree of attention to the question of gas-fuel. The discovery and utilization of "natural gas" have resulted in a practical revolutionizing of certain industries, and the probability that the supply of the natural gas is only limited has suggested the question whether, when the supply shall be exhausted, it will not be possible to convert solid fuel into a gaseous form and thus to continue to enjoy all the benefits now derived from the use of the natural gas-fuel. Solid fuel, as it is ordinarily consumed, is accompanied by a wastage of from 70 to 90 per cent., as estimated by Grouven, Rankin, Siemens, Galloway and others. On the other hand gas-fuel reduces the wastage to a minimum, and the great problem now is to provide for the transformation of the solid fuel into gas-fuel. The ordinary furnace is nothing more than a gas-producer, crude, costly and wasteful, and the need of the manufacturing world to-day is a satisfactory system for the conversion of carbon into carbonic oxide and water into hydrogen and oxygen, to take the place of the rough and uncouth furnace. The appended table shows the advantages, in an economical point of view, to be derived in using fuel in the gaseous form :

	ONE LB. COAL.	GAS FROM ONE LB. COAL.
Per cent. of heat utilized	Crucible Furnace. 16	Crucible Furnace. 90
Per cent. of heat utilized	Large Blast Furnace. 36	Large Blast Furnace. 90
Per cent. of heat utilized	Domestic Use. 10	Domestic Use. 90
Available heat	Crucible Furnace 455	Crucible Furnace. 7246
Available heat	Large Blast Furnace. 4680	Large Blast Furnace. 7246
Available heat	Domestic Use. 1300	Domestic Use. 7246

American scientists are experimenting on this point, and in France, England and Germany the same important question is uppermost. The aim is to utilize products that are now wasted, to simplify complex processes and to decrease the cost of production in many important lines. In the report of the judges of the "Novelties Exhibition," held some time ago in the city of Philadelphia, on the subject of gaseous fuel, occurred this passage : "On the general question of the desirability of gaseous fuel, there can be but one opinion. It dispenses with the trouble and annoyance of hauling and carrying coal and with the removal of dirt and ashes ; it is at all times under perfect control ; when not wanted it can be instantly extinguished and can be instantly made to give its maximum effect, so that, other things being equal, gaseous fuel possesses incontestable advantages over solid fuel."

Professor T. S. C. Lowe, who in May, 1886, was awarded the "Grand Medal of Honor for his substantial improvements in the manufacture of water-gas as a fuel for domestic and industrial purposes," by the board of judges of the Franklin Institute, Philadelphia, demonstrates the economy of the transformation of coal into gas in his assertion that from 50,000 to 100,000 cubic feet of water-gas may be produced from one ton of coal. Taking the average at 80,000 cubic feet and making full allowance for plant, coal and labor, the cost of the gas would be about nine cents per thousand feet. Professor Lowe says : "In large works and when large quantities of gas are being continuously supplied this product can be delivered through pipes to consumers as cheaply as a ton of coal can be delivered by horse and cart and put into the cellar. The advantages of the gas over the coal would enable the consumer to pay an average of forty cents per 1,000 cubic feet for the gas, which would then be as cheap as other fuels. At this price it would be equal to selling coal at $32 per ton, and at thirty cents per 1,000, $24 per ton ; surely margin of profit enough to pay satisfactory dividends on all the investments necessary to supply any good sized town or city. One thousand cubic feet of gas per day to each ten inhabitants, for manufacturing, domestic heating, cooking and lighting, is a low estimate ; nevertheless, at this rate a city of 50,000 people would consume 5,000,000 cubic feet daily, which, at forty cents per 1,000, would be $2,000 per day gross income, to produce which would require sixty-three tons of coal and the labor of about ten (10) men, besides book-keepers, collectors and officers, the expense of which is easily figured."

The process of generating "water-gas" may be briefly described. Any ordinary furnace is charged with fuel and by draft or blast forced to high temperature. A quantity of highly-heated carbonic acid, hydrogen and carbonic oxide is given off and discharged into a chamber or generator filled with a checker-work of fire-brick or other refractory material. The regenerator is heated to a high temperature by absorbing a part of the heat and by the further consumption of the combustible gases. At a certain point the air-blast is cut off and the combustion of the fuel-chamber practically ceases. Then a jet of steam is turned into the regenerator and sometimes beyond it into the fuel-chamber. The steam passing in contact with the highly-heated material or through the incandescent fuel in the furnace to the regenerator, is decomposed into hydrogen and oxygen. The oxygen readily combines with the carbon and introduces into the elements a certain amount of carbon, effecting the actual result of the combined gas, which is composed of hydrogen and carbonic oxide, the two most effective heat-producing elements in nature excepting electricity. The addition of the carbon prevents the hydrogen and the oxygen, which are dissociated at 1,000° F. and upwards, from re-uniting chemically and becoming water as soon as the temperature of the gaseous product again fell below 1,000° F. This process gives about two equivalents of hydrogen and two of carbonic oxide. The energy required to produce the decomposition of the water is considerable and is a loss. As soon as the original energy is spent the furnace must be again fired by the draft or blast, until the incandescence of the fire and the stored heat of the refractory brick chamber are restored ; then the process is repeated. By the perfection of devices and the introduction of additional furnaces in which fuel in a state of incandescence is maintained, the