

Furnace Heating.

Mr. F. Siemens has for the past few weeks been conducting, in the pages of *Engineering*, a correspondence with Mr. Crowe, Mr. B. H. Thwaite, and others, upon dissociation in furnaces and the advantages of heating by radiation from flame, or toasting, as compared with heating by direct flame contact, or burning. The point which seems to be at issue in this controversy is the temperature at which dissociation of carbon gases begins to make itself evident by affecting practical results. Mr. Siemens holds that if flames are prevented from contact with the surfaces which inclose or direct their course, dissociation will not appear below an extraordinarily high temperature, which has not been accurately determined; and that all experiments tending to show an effect similar to what may be expected from genuine dissociation at comparatively low temperatures are vitiated by the action of the surfaces—an effect which has only been recognized during recent years.

With regard to heating by radiation, Mr. Siemens declares that in all cases where large furnace chambers are required to be intensely heated, a highly luminous flame, without contact, is necessary. Under such conditions of heating, the furnace will work economically at a high temperature, and will last a long time without repairs. Mr. Siemens cites an instance of open-hearth steel furnaces which have not been stopped for repairs for upward of twelve months.

In another communication, Mr. Siemens admits that it is difficult for persons accustomed to heat by contact to realize that their operations can be carried out quite as well, and even better, by radiation. He states that the development of this new method of heating was the result of much time and consideration given to the subject; and he does not expect that others will readily accept his views. It is an interesting development of this principle of heating that by it creosote and other kinds of liquid fuel, as well as gas, can be used for purposes for which, according to the ordinary plan, they are altogether unsuited. Only by preserving the flames of these fuels from contact with any surface until the operation of combustion is accomplished can they be made to give all their useful effect without smoking or cutting the materials of the furnace.—*Journal of Gas Lighting*.

SUBURBAN HOUSE OF A NEW YORK ARTIST.

Many New Yorkers have built for themselves beautiful summer residences on the Orange Hills of New Jersey, whose eastern slopes afford the first rise in ground met with on leaving the city in a southwesterly direction. The city is still within the horizon of view, the Bartholdi beacon at night, and the main physical features by day, being plainly discernible, but the distance is sufficiently great from the din and moil of the metropolis to give one a sense of rest, while renewing the tone and elasticity of the system as only the pure air of the country can effectually do.

Among those who have built for themselves homes

speciation of the ground plan shows that this beauty of outward appearance is attained without any sacrifice of economy and convenience in the internal arrangement, such happy disposition being made of the space that all of the room is available, and the best views are obtained from every side. The principal entrance is by the porch, whose roof makes one continued curve with the gable which crowns the projection containing the stairs, with which it communicates, and from the vestibule is an entrance to a large square hall, shown in one of the views, which gives immediate entrance to parlor and dining-room, piazza and staircase, and forms the central portion of the ground plan. The roof above the hall rises higher than that of any other portion of the building, and the turret-like cap of the two-storied piazza is an adjunct of it, the attic under the roof being used by the artist as a studio.

Exteriorly, the woodwork of the cottage is painted a dark brown, but this, and the gray plaster of the basement, will eventually be much changed in appearance by the growth of vines and plants, the green of which will make an agreeable contrast with the brown and gray of the building. For the interior, the wainscoting of the hall, its ceiling, and the woodwork of the stairs, are of Georgia pine, varnished to a golden hue. The wall above the wainscoting is a cream tint, with paneling of yellowish matting, but in the dining-room the wall above the wainscoting is painted a light salmon color. The parlor is in warm grays, and the upper rooms are all in light golden yellow tones, each having particular individual effects, but all harmonizing with one general idea, after the plan of the architect, Mr. Ficken, to which Mr. Fenn has contributed by his arrangements of brie-a-brac, draperies of doors and windows, etc.

The entablature bearing the date of building, with its conventional hour glass and wings, is but one of many evidences everywhere seen about the house, in

two of crushed limestone of a hard nature, and one of crushed grit, the whole intimately mixed and ground. Ocher in suitable proportions is added as a coloring matter.

The Liquid.—A saturated solution of zinc in commercial hydrochloric acid, to which is added a part, by weight, of hydrochlorate of ammonia equal to one-



MR. HARRY FENN'S COTTAGE, MONTCLAIR, N. J.

sixth that of the dissolved zinc. This liquid is diluted with two-thirds of its bulk of water.

To use the cement, one pound of the powder is to be mixed with two and one-half pints of the liquid.

The cement hardens very quickly and is very strong.

How to Make Money.

Mr. L. P. Tibbals, of 820 Broadway, is pretty generally known by a great many children in this city. He has sold toys and taught Sunday-school a good many years, and he is still a vigorous young man, full of good works. Mr. Tibbals has formulated a very ingenious rule, showing the profit a family may derive from a single whisky-drinking member, as follows:

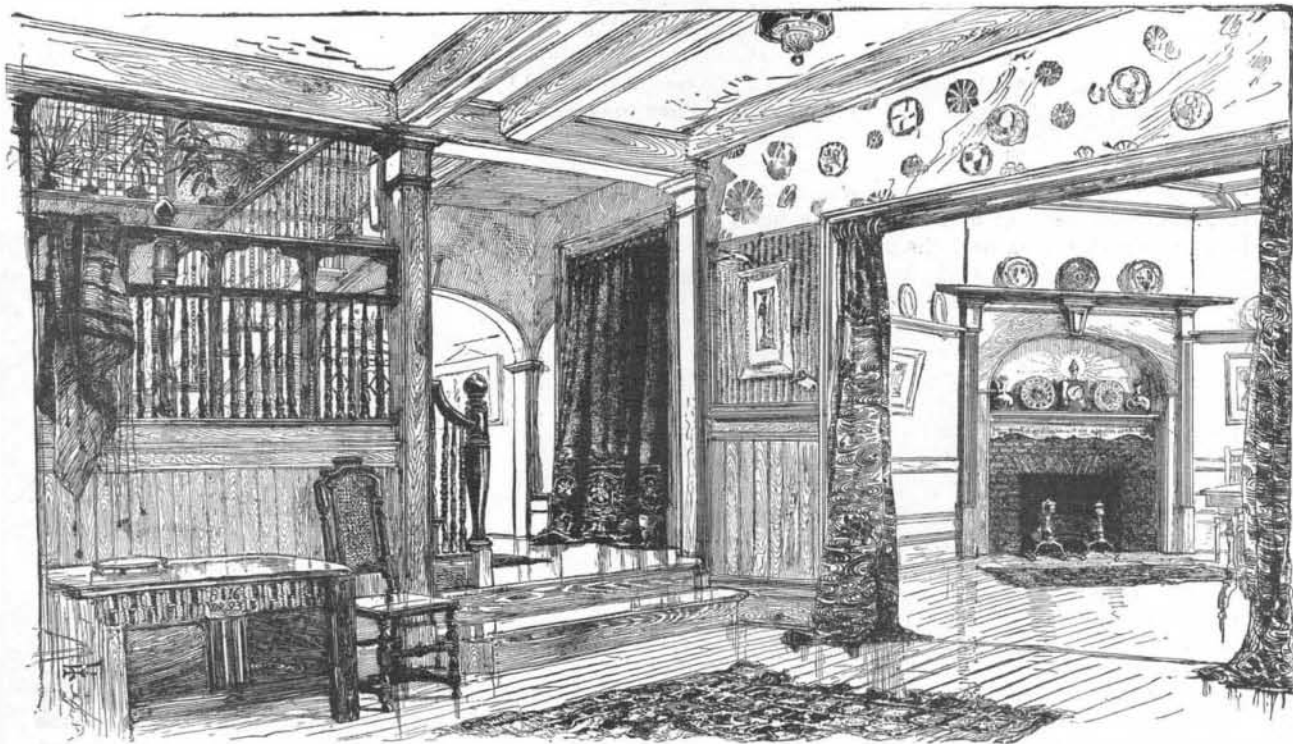
One gallon of whisky costs about \$3, and contains on the average 65 ten cent drinks. Now, if you must drink whisky, buy a gallon and make your wife the barkeeper; then, when you are dry, give her ten cents for a drink. When the whisky is gone, she will have, after paying for it, \$3.50 left, and every gallon thereafter will yield the same profit. This money she should put away in the savings bank, so that when you have become an inebriate, unable to support yourself, and shunned and despised by every respectable person, your wife may have money enough to keep you until your time comes to fill a drunkard's grave.

A Strong Man.

There is a man on the Darson River, below Dayton, named Angela Cordella, who claims to be the strongest man in the world. He is an Italian, aged twenty-eight, and stands 5 feet 10 inches, weighing 198 pounds. His strength was born with him, for he had no athletic training. He differs from other men chiefly in the osseous structure. Although not of unusual size, his spinal column is much beyond the ordinary width, and his bones and joints are made on a similarly large and generous scale. He has lifted a man of 200 pounds with the middle finger of his right hand. The man stood with one foot on the floor, his arms outstretched, his hands grasped by two persons to balance his body. Cordella then stooped and placed the third finger of his right hand under the man's foot, and, with scarcely any perceptible effort, raised him to the height of four feet and deposited him on a table near at hand. Once two powerful men waylaid Cordella, with intent to thrash him, but he seized one in each hand and hammered them together until life was nearly knocked out of them.—*Va. Footlight*.

Sensitive Reagent for Albumen.

M. Simon.—The most sensitive reagent is that of Mehu, a mixture of 1 part crystalline phenic acid with 1 part acetic acid and 2 parts water.



MR. HARRY FENN'S COTTAGE—HALL, LOOKING INTO DINING ROOM

which add to the naturally tranquil beauty of this locality, which is year by year becoming more desirable as the city grows, is Mr. Harry Fenn, the well-known artist, whose drawings are seen in some of the best work which has appeared in our illustrated magazines, and whose cottage at Montclair is represented in the accompanying illustrations.

The building is of wood, having, as will be seen, two main stories and a roomy attic, and the two views given show a picturesque effect, which well fits into and harmonizes with the immediate surroundings, while an in-

design, decoration, and furnishing, of the cultivated taste of the artist who has here made his home.

Metallic Cement.

The following recipe for a metallic cement for repairing broken stone is given by Prof. Brune of the School of Fine Arts. It was used in the restoration of the colonnade of the Louvre, of the Pont Neuf, and of the Conservatoire des Arts et Metiers. It consists of a powder and a liquid.

The Powder.—Two parts by weight of oxide of zinc,

Tunnel under the St. Clair River.

Work is actively in progress on the preliminary excavations for the tunnel under the St. Clair river, which is intended to connect the Grand Trunk and Chicago & Grand Trunk Railway systems at Port Huron and Sarnia. It will be built by a company independent of the corporations owning and controlling these railways, but in their interest. At present the connection between the lines east and west of the river is maintained by a ferry, which transfers the trains between Point Edward, in Canada, and Fort Gratiot, in Michigan. This ferry is about three miles north of the proposed tunnel.

The location of the tunnel was determined by the following considerations, among others: (1) The comparatively small depth of water at the proposed crossing; (2) the tunnel and its approaches can be constructed on the same straight line; (3) the short length of new railway that will be required, the tunnel approaches connecting immediately with the main lines of both the Grand Trunk and Chicago & Grand Trunk Railways; (4) the distance to be run by all through trains to and from the Great Western division of the Grand Trunk will be reduced six miles, while it will not be increased for those to and from the Grand Trunk proper; (5) the favorable material in the bed of the river for tunneling, the borings showing that the rock is from ninety to ninety-five feet below the surface of the water, and that strong clay, in which not a trace of quicksand was discovered, overlies it; (6) the necessary land and right of way for the tunnel and its approaches will cost less than upon any other line within the limits available for selection.

The advantages to be gained by the construction of the tunnel are a reduction in the cost and time of transferring trains and a degree of regularity in the service not always attainable by the ferry, in consequence of the river being occasionally obstructed by ice in the winter and by vessels during the season of navigation.

The length of the tunnel will be 1 mile, of which 2,310 feet will be under the river, 1,160 feet under dry ground on the Canadian side, and 1,810 feet under dry ground on the American side. Of the portion under the river, 1,500 feet will be nearly level, having merely enough of fall toward the east to cause any water finding its way into the tunnel to flow in that direction. At either end of this part of the tunnel there will be a gradient rising 1 in 50, or at the rate of 105 $\frac{1}{2}$ feet per mile, which will be continued through the open cuttings forming the approaches. The total length of the ascent on the Canadian side will be 4,970 feet, and on the American side 4,900 feet. The length of the open cutting at the east end of the tunnel will be 3,270 feet, and at the west end 2,820 feet.

The depth of the lowest part of the tunnel below the surface of the water will be 80 $\frac{1}{2}$ feet; the minimum depth of the top of it below the bed of the river will be 15 feet. The tunnel will be for a single track only. In cross sections it will be circular, with a clear internal diameter of 20 feet.

The work which is now in progress is the construction of a trial heading or small cylindrical tunnel, with a clear diameter of six feet, under the river. This is being driven for the purpose of thoroughly testing the material. Although the borings were of a satisfactory character, there is of course a chance of pockets of quicksand being found between them. This heading, if successfully completed, will be of material assistance in the construction of the permanent work. It will be finished probably in about six or seven months. If the present operations are carried out satisfactorily, then the larger work of making the full sized tunnel will be proceeded with. The shafts at each end have been sunk to the bottom line of the tunnel without meeting with any difficulties, and so far the experience is all favorable.

Bradstreet's says the completion of this work must obviously have an important effect on transportation between the Eastern and Western States, and between Canada and the West. The route by way of the tunnel between Detroit and Buffalo or Toronto will be only eight miles longer than the direct route across the river at Detroit.

Progress of Electric Street Railways.

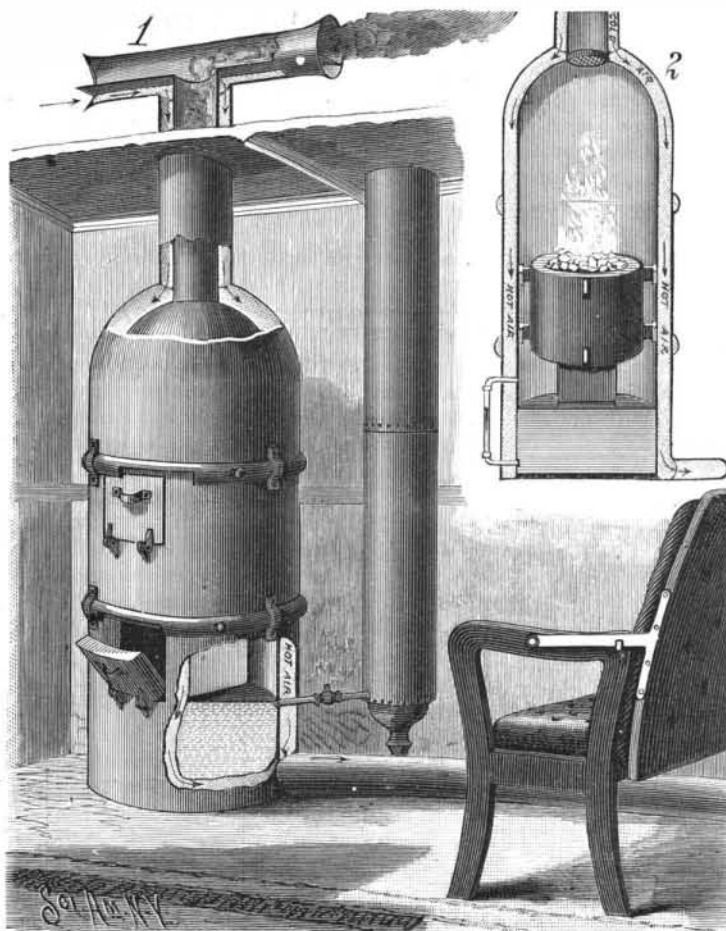
The Van Depoele electric street railways seem to be taking the lead in this country, being now in operation, with much success, in the following places: Minneapolis, Minn., Montgomery, Ala., Detroit, Mich., Appleton, Mich., Port Huron, Mich., Scranton, Pa.; also in Toronto and Windsor, Canada. In a short time the company will have electric cars running in Lima, O., and Binghamton, N. Y. More miles of electric railways on this system are now at work than all other systems put together.

SELF-EXTINGUISHING STOVE FOR RAILWAY CARS.

The accompanying engraving represents a car heater—the invention of Mr. James A. Faust, of Salt Lake City, Utah. It is most simple in construction, and is provided with a water reservoir, from which the water will flow to extinguish the fire should the heater be overturned or demolished by an accident. The outer shell or jacket is made watertight in the lower portion to form a water chamber. Within the shell are placed the firebox and ash pan, which are constructed with radial wings or ribs extending lengthwise, and by means of which they are connected with and suspended in the casing. An annular space is thus formed between the firebox and shell, as shown in the sectional view, Fig. 2, through which the water is free to pass should the stove be overturned. The doors of the stove are hinged at the bottom, while the opposite edge of each is overlapped by a band which encircles the stove and has a gap or recess, which, by turning the band, may be brought to a position coinciding with the door, to permit of its being opened. But by shifting this ring circumferentially, so that it will overlap and confine the closed door, the latter will be most securely held.

The air enters the top of the chimney, passes down and around the smokepipe and casing, by which it is heated, and then passes through pipes leading along the side of the car in the usual way. The course of the air is clearly indicated by the arrows.

It is evident that when the stove is overturned, the live coals will not be able to escape from the casing,



FAUST'S STOVE FOR RAILWAY CARS.

and the water in the reservoir will flow through the annular space and extinguish the fire. In order to prevent the coal and dirt from falling into the bottom of the casing, the annular space is covered by a guard plate, which is not fastened down, and will be at once displaced should the stove be overturned, so that it will not, therefore, obstruct the passage of the water. As the casing is made of heavy sheet metal, the danger of its being ruptured is greatly reduced. If considered desirable, a coil of pipe may be placed in the upper part of the casing for heating by steam instead of air.

Further particulars concerning this invention may be obtained, until April 1, from Mr. H. J. Faust, Grand Central Hotel, New York City.

Contagion in Barrels.

Health Commissioner De Wolf recently addressed a communication to the sanitary committees of the Legislature on a highly important subject. Dr. De Wolf states that it is the practice of families purchasing flour, lard, butter, etc., in quantities to sell their flour barrels, butter firkins, and lard tierces to persons who regularly call for them. These barrels, etc., are again sold to dealers, and they are repacked with similar articles. In very many cases, the Doctor says, these receptacles are kept in mouldy places, and frequently are purchased from families in whose houses infectious diseases have existed, and he considers the practice of refilling these receptacles as highly injurious to public health. A bill is now pending before the Legislature preventing the sale of these second-hand barrels, and the Health Commissioner will urge its passage and strict enforcement.—Chicago Journal.

Manganate of Baryta for Bleaching.

Manganate of baryta is a green crystalline powder, which is insoluble in water. Schad, in 1865, proposed to use it as a color in place of arsenic green; but so far it does not seem to have been applied in the printing trade. It is now proposed to use it for bleaching, and it is claimed that it acts equally as well as hydrogen peroxide, that it is cheaper and will keep better, that it acts on solutions, be they neutral, alkaline, or acid, and that it can be easily applied. The liquid which is to be bleached is heated, and the manganate of baryta, which has been previously ground together with water, is added until the liquid has been sufficiently discolored. The manganate of baryta becomes in this reaction decomposed into manganite of baryta, a brown insoluble substance which settles out, and can be separated by means of a filter press or by decantation, and into oxygen, which is in this case the bleaching agent. This material can, naturally, only be used in a limited number of cases; but in the preparation of certain fine chemicals it might be found useful. It is proposed to use it for discoloring glue, extracts, and other substances, and it is claimed that it does not decompose glue or tannin.

The Annual Attempt.

We are pleased to see that the annual attempt made by some member of Congress to nullify or irreparably injure our patent law system has been laid to rest for this year, at least; the bill introduced to render suit for infringement impossible where damages do not exceed \$200, or where the purchaser of an infringing device bought it in *bona fides*, has been defeated.

This is proper. There are many among the vast number of patents recorded at Washington that cover, apparently, worthless devices, or such as are at least of insignificant value. Yet careful investigation and a knowledge of what has been accomplished in the mechanical world will show that nearly all have found employment, in some form or other, in some valuable invention that more than counterbalances in its widespread utility the insignificance of many of the members or parts of which it is composed.

Inventors are entitled not alone to protection, but respect; for while it is true that some "cranks" may be found among them, and though many of the patent devices are crude and impracticable, yet each one represents an original idea, which, combined with the original ideas represented in other devices, have made our people the foremost on the earth. It is not one inventor to whose genius is due the perfect machine of to-day, but it may be that the ideas of a thousand have been combined to produce that result, many of whom are dead, nearly all of whom are forgotten, and their names unknown, save as they are written upon the musty records of the Patent Office.

Without the encouragement to inventive genius the protection afforded by the patent laws provides, would any of the trades that are to-day in a prosperous and advanced condition have attained their standing? Some of the mightiest interests in the world would certainly have been far behind their present condition.

Unaided by the genius of humble, and sometimes cranky, inventors, the world with its billions of capital and its millions of strong and willing arms would have made but poor progress in bringing railroading up to its present state of perfection. The modern housewife is spared half her drudgery by the ingenuity of the inventor we dub a crank, and the workman finds his labors lightened and his wages increased by the tools and machines and many manufactured articles this same inventor has brought into practical shape.

We need not go outside of the plumbing trade in order to find evidence of what the inventor has accomplished for the good of the community. How many of the best appliances we use are protected by patents, while the materials we employ in all our work are cheapened directly or indirectly by improved and usually patented methods of production!

Under these circumstances we have a right to honor the inventor, and give him such protection for the smallest of his devices as will encourage him to improve on them and extend his efforts on behalf of society, already so deeply in his debt; and every effort, open or disguised, to impair the efficiency of our patent laws should meet with unflinching opposition from all interested in our mercantile and industrial progress.—Sanitary Plumber.

THE removal of superfluous hair from the skin is possible both by means of depilatories and by electricity. The former are mostly preparations of staphide of barium or sulphide of calcium, and the process by electricity is very slow, each hair root having to be killed separately.