The Future of Heating

Engineering

ERNEST GREENWOOD, in *Prometheus, U. S. A.* (Harper's):

It is only yesterday that our mothers and grandmothers were toiling with the coal range in the kitchen, and the astonishing thing about it is that it took man so long to question its perfection and to say to himself: "There must be something better." The housewife of those days had to be a competent heating engineer if she was to be a good cook. Her knowledge of how to build and keep the fire played quite as important a part in the production of the good things which came on the table as her knowledge of how to prepare and mix the ingredients. Water had to be heated on this range, and the Saturday-night bath was taken in tin or wooden tubs in the kitchen beside it. The only artificial light came from candles or, at best, the kerosene lamp. Refrigerators, electric lights, running water, the gas range, and a host of other conveniences which are commonplace today were unknown.

Then came the gas company with its gas ranges to relieve the housewife from untold drudgery. Kitchens are thought of today in terms of gas ranges. Here was a device by means of which heat for cooking could be had at a moment's notice just when it was wanted, and turned off completely the moment it was no longer needed. No longer was it necessary for the housewife to be a heating engineer—the gas company had relieved her of that obligation. No longer did the kitchen resemble a Turkish bath in summer. This was followed by the gas hot-water heater to take the place of the old coal-range boiler, and coal in the kitchen as direct fuel was gone forever.

In the meantime man was busy with the creation of devices to take the place of the coal range in those districts where gas was not obtainable. Oil ranges and portable oil stoves for heating began to appear on the market, and their manufacture soon became a great industry. Even today this is a thriving industry and literally hundreds of thousands of oil ranges and portable oil heaters are manufactured and sold all over the world every year.

Then man began to turn his attention to house heating. With the constant improvement in coal-burning central plants in the cellar it seemed as though little more could be done. But he resented having thrust upon him continually the machinery by means of which he kept warm—the drudgery of the coal furnace made him say once more to himself: "There must be something" even better, and turned his thoughts to something which would relieve him of it. Experiments in oil-burning devices had been going on for a long time and the gas companies were searching for a type of burner which would enable them to heat the home at a cost which would be within range of the man of moderate means.

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Edison's Lamp—*Continued*

have a small resistance compared to the burner, and hence will not heat and crack the sealed vacuum bulb. Platina can only be used, as its expansion is nearly the same as that of glass.

By using a considerable length of carbon wire and coiling it the exterior, which is only a small portion of its entire surface, will form the principal radiating surface; hence I am able to raise the specific heat of the whole of the carbon, and thus prevent the rapid reception and disappearance of the light, which on a plain wire is prejudicial, as it shows the least unsteadiness of the current by the flickering of the light; but if the current is steady the defect does not show.

I have carbonized and used cotton and linen thread, wood splints, papers coiled in various ways, also lamp-black, plumbago, and carbon in various forms, mixed with tar and kneaded so that the same may be rolled out into wires of various lengths and diameters. Each wire, however, is to be uniform in size throughout.

If the carbon thread is liable to be distorted during carbonization it is to be coiled between a helix of copper wire. The ends of the carbon or filament are secured to the platina leading wires by plastic carbonizable material, and the whole placed in the carbonizing chamber. The copper, which has served to prevent distortion of the carbon thread, is afterward eaten away by nitric acid, and the spiral soaked in water, and then dried and placed on the glass holder, and a glass bulb blown over the whole, with a leading tube for exhaustion by a mercury pump. This tube, when a high vacuum has been reached, is hermetically sealed.

With substances which are not greatly distorted in carbonizing, they may be coated with a non-conducting non-carbonizable substance, which allows one coil or turn of the carbon to rest upon and be supported by the other.

In the drawings, Figure 1 shows the lamp sectionally. *a* is the carbon spiral or thread. *c c'* are the thickened ends of the spiral, formed of the plastic compound of lamp-black and tar. *d d'* are the platina wires. *h h* are the clamps, which serve to connect the platina wires, cemented in the carbon, with the leading-wires *x x*, sealed in the glass vacuum-bulb. *e e* are copper wires, connected just outside the bulb to the wires *x x*. *m* is the tube (shown by dotted lines) leading to the vacuum pump, which, after exhaustion, is hermetically sealed and the surplus removed.

Fig. 2 represents the plastic material before being wound into a spiral.

Fig. 3 shows the spiral after carbonization, ready to have a bulb blown over it.

I claim as my invention—

1. An electric lamp for giving light by incandescence, consisting of a filament of carbon of high resistance, made as described, and secured to metallic wires, as set forth.

2. The combination of carbon filaments with a receiver made entirely of glass and conductors passing through the glass, and from which receiver the air is exhausted, for the purposes set forth.

3. A carbon filament or strip coiled and connected to electric conductors so that only a portion of the surface of such carbon conductors shall be exposed for radiating light, as set forth.

4. The method herein described of securing the platina contact-wires to the carbon filament and carbonizing of the whole in a closed chamber, substantially as set forth.

Signed by me this 1st day of November, A. D. 1879.

THOMAS A. EDISON.

Witnesses:

S. L. GRIFFIN,

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