A METHOD OF BURNING SLACK COAL IN A COMMON SOFT-COAL FURNACE.

BY THALEON BLAKE, C.E.

Several years ago I began a series of experiments to determine the value, if any, of water added to coal previous to burning in stationary engines. Shortly afterward I met the owner of several bituminous coal mines, who directed my attention to the desirability of a practical method of burning slack coal in stoves. Such coal being cheaper would appeal to the householder, provided he could burn it in the common style of soft-coal stove known as the "oak"; while a wider market for such coal would be welcomed by miners. Acting on this hint, I made numerous experiments, and have found that with care in firing, slack coal may be easily and completely consumed in the oak coal stove.

The data are as follows: Slack coal, being the waste of lump, and formed in the process of mining, by attrition in handling, shipping, and delivering, is largely composed of "dust" with an intermingling of small pieces, ranging from the size of a pea to a hickory-nut or walnut, according to the size of the meshes of the screen used to separate the more salable and higher-priced lumps. The dust, of great fineness, makes it difficult to consume under the conditions which usually obtain for burning large lumps. A stove which will burn a lump the size of a man's head, with closed damper, will not retain fire long when charged with slack coal thrown in haphazard fashion, even though the drafts are open. The dust-coal extinguishes fire almost as well as water, if dumped onto the ignited coals, because it excludes air.

The successful burning of slack coal, therefore, depends wholly on building up the fire until it forms an arched crust at some elevation above the bottom of the firepot. This crust, composed of incandescent coal, prevents the firepot holes from getting choked up, and supports the fresh coal, admits air beneath the fire, and, as it cracks and consumes, opens air channels to the coal above. It glows and throws off carbon monoxide, which burns above to carbon dioxide, as does anthracite coal. Damp, not wet, coal, if the draft is strong, makes a porous crust, as the particles stand off from each other, whereas very dry slack has a tendency to condense to a mass impenetrable by air. The method of building this crust is illustrated in Fig. 3. Care must be exercised, first, to remove all ashes from the firepot of the stove; second, to lay several sheets of paper on the bottom; third, to place on the paper two to four inches of shavings, or mixed paper scraps and kindling wood; fourth, to sprinkle a very thin layer of slack coal over the whole. The mass is now ready to be lighted. As it burns, add, little by little, small quantities of coal, dropping it mostly in the center. As soon as the charge burns out, the shavings and paper gone, the few pieces of blazing coal will be seen in the bottom. If fresh slack were put in now in any except the smallest amount, the fire would be extinguished immediately. It is better to add several more inches of shavings or more sheets of paper before the coal, which as before should be mostly deposited in the center. It takes from fifteen to thirty minutes to get a crust formation strong enough to support an ordinary stove shovel full of coal.

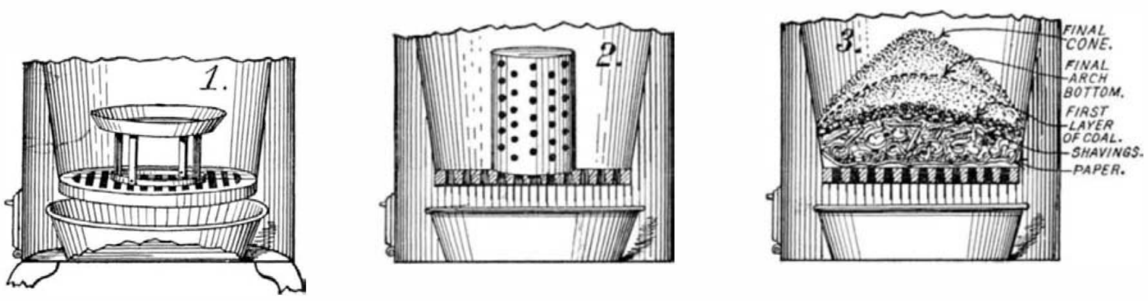

Fig. 1 shows a pan, such as used in baking, supported by four legs. This upholds the coal. A band around the bottom of the legs keeps them from slipping into the firepot holes. Fig. 2 illustrates a cylinder, perforated and with open bottom. This lets air pass into the surrounding coal. Fig. 3 shows method of building fire on common grate.

DIAGRAMS SHOWING METHOD OF BURNING SLACK COAL IN A COMMON SOFT-COAL FURNACE.

The reason for depositing the coal in the center is that a cone is built up which, when it gets afire and burns on its under side, retains the arch shape, and supports itself and load of fresh coal as it is added; besides, when the coal is slowly slid onto the top of the cone from the shovel, the larger pieces of little lumps roll to the base, where the coal should never be allowed to cover up the bottom holes, so as to obstruct the free passage of air. Burning on the sides, in a ring, they greatly assist to create and maintain the crust. The larger the space between the bottom of the firepot and the under side of the fire, the more apt is the fire to burn well and hot. The drafts must be open, mostly, or the fire dies quickly away. Poking the ashes from the bottom with poker is preferable to shaking down the ashes, as the latter sometimes breaks down the crust.

As aids to burning slack, two contrivances may be applied to any oak stove.

Slack may be obtained at much reduced prices, varying in locality, of course, but always for one-fourth to one-half the price of the same kind of coal in large lumps. It burns with an intense heat, and its fire is not troublesome either to build or tend.

The Japanese cruiser "Tsukuba" failed to leave the slip on the day of her launch.

A Chinatown in China.

A journey was recently made to the interior of Kiangsi by Mr. Walter Clennell, the British consul at Kiu Kiang, an interesting report of which has been published by the government. In the course of this expedition the consul visited the Chinese manufacturing town of Ching-te Chen, the staple industry of which is pottery. According to the consul everything in Ching-te Chen either belongs, or is subordinate, to the porcelain and earthenware industry. The houses are for the most part built of fragments of fire-clay known as lop'ing-t'u that were at one time part either of old kilns or of the fire-clay covers in which the porcelain is stacked during firing. The river bank is for miles covered with a deep stratum of broken chinaware and chips of fire-clay, and as far as could be judged, the greater part of the town and several square miles of the surrounding country are built over, or composed of, a similar deposit. A great industry employing hundreds of thousands of hands does not remain localized in a single spot for 900 years without giving to that spot a character of its own.

The consul states that this town is unlike anything else in China. The forms, the color, the materials used in the buildings, the atmosphere, are somewhat reminiscent of the poorer parts of a civilized industrial center. At present there are 104 large pottery kilns in the town. The greater part only work for a short season in the summer. During this busy season, when every kiln is employing on the average from 100 to 200 men, the population of Ching-te Chen rises to about 400,000 souls, but of this total nearly, if not quite, half are laborers drawn from a wide area of country—chiefly from Tuch-ang district—who only come for the season, live in rows of barrack-like sheds, and do not bring their families with them.

But apart from the kilns one passes along street after street where every shop is occupied by men, women, and children all engaged in the designing, molding, painting, or distributing of pottery. Potters' sheds, where the clay is mixed and molded on the wheel, are innumerable. The river bank is crowded for three miles by junks either landing material and fuel, or shipping the finished product. Shops for the retail of the ware, though numerous, are less in evidence than might be expected, and the wholesale trade, which is in the hands of the guilds, makes very little display. Apart from the meeting halls of these guilds there are scarcely any buildings with any architectural pretensions, but the guild halls are elaborate structures.

Plating on Paper.

A new electric process for covering paper with a metallic surface is given by Paper and Pulp. It consists in placing the bath in a porcelain tank in which are immersed two metal plates. One of the plates is formed of the metal which is used to cover the paper. A rather weak current is used for the bath. A thin layer of metal is deposited on the second plate, as is usual in the galvanoplastic process. When the deposit has reached a thickness of about 1-250 inch, the plate is placed against a sheet of paper which is previously coated with the proper kind of glue. After drying, the metallic layer adheres to the paper so strongly that it remains upon the latter when it is pulled off the metal plate. A variation of the process consists in ornamenting the foundation plate with any kind of designs or letters, and these are reproduced on the metallic deposit. The solutions which are recommended in the above process are as follows: For silver paper, a bath is made of cyanide of silver 210 parts, cyanide of potassium 13 parts, water 980 parts. For gold paper, cyanide of gold 4 parts, cyanide of potassium 9 parts, water 900 parts. For copper, sulphate of copper 18 parts, sulphuric acid 6 parts, water 40 parts.

Erratum.

In last week's SCIENTIFIC AMERICAN we published a picture entitled "A Turnout on the Mürren Alpine Railway." We have been informed by a correspondent that the picture really represents the railway up the Saleve between Veyrier and Monnetier, near Geneva, Switzerland.

Air Surface Hydroplanes for Motor Boats.

Apropos of the description of hydroplane motor boats published in our last issue, it may be of interest to our readers to know that a French inventor, M. Ader, has drawn up a scheme for fitting a motor boat with wings, or air hydroplanes, for the purpose of causing it to glide over the surface of the water.

M. Ader's proposed boat has a hull very similar to that of the usual motor-boat hull, save that the bottom is absolutely flat. The hull contains a gasoline motor, and has a propeller placed some distance below it. At its forward part there are two large lateral wings, which are much longer than they are wide, and a horizontal tail formed in two movable parts arranged in the shape of a cross, and which is much wider than it is long. The wings can be folded up against the side of the boat when not in use, and the tail can be folded upon the stern.

The wings and tail are stretched over the water as described below. The under side of the wing is hollow, and the concavity of the upper part forms a water-sealed air chamber for its entire area. Air compressed by a motor-driven pump within the boat is forced under the wings, it being led to their under surface through a flexible pipe. A regulator regulates at will the flow of the compressed air, and a safety valve regulates the maximum pressure. When the boat is at rest, and the compressed air is forced under the wings, after they have been fully extended, the air bubbles around their edges, both front and back, and escapes into the atmosphere. When the boat is under way, the air is compressed sufficiently strongly to be capable of supporting the entire weight of the boat and its contents; any excess of air escapes at the rear of the wings. The compression necessary is not very great. This may reach the twentieth of an atmosphere, or perhaps a little less, according to the load and the surface of the wings. It should be understood that the metallic edge of the wing should contact but slightly with the surface of the water, and that as the elastic layer of compressed air serves as the supporting medium, the effects of cohesion will consequently disappear. The tail has an arrangement similar to the wings, which separates it as much as possible from the water.

The motor is placed horizontally inside of the boat. It has steel cylinders with cast jackets. It drives the air pump, and is connected to the propeller shaft through a suitable change-speed and reverse gear. The propeller has blades which can be varied in pitch and in diameter, so as to make it sufficiently responsive to the changes of power and of speed. When the wings and tail are folded up, the boat will move as does an ordinary one; but for the purpose of gliding over the water, the wings and tail are extended, and the motor is set driving the boat on low speed. Under the impulse of the propeller, the inclination of the wings tends to cause the boat to rise toward the surface. The second speed is then thrown in, and the inclination of the wings is diminished. Finally, the motor and propeller are run at their highest speed, and the wings are given their normal inclination. The body of the boat will at this moment be completely raised out of the water and supported by its three elastic, pneumatic pads. The effects of cohesion will disappear to a great extent and, according to the inventor, on calm water very great speed can be obtained. Although it is only possible to use this arrangement on still water, it is interesting to note that it is one of the most original propositions for a gliding boat which has thus far been advanced.

Official Meteorological Summary, New York, N. Y., February, 1906.

Atmospheric pressure: Mean, 30.20; highest, 30.92; lowest, 29.62. Temperature: Highest, 59; date, 21st; lowest, 5; date, 6th; mean of warmest day, 52; date, 21st; coldest day, 12; date, 6th; mean of maximum for the month, 38.4; mean of minimum, 24.1; absolute mean 31.2; normal, 30.8; average daily excess compared with mean of 36 years, +0.4. Warmest mean temperature for February, 40, in 1890; coldest mean, 23, in 1875 and 1885. Absolute maximum and minimum for this month for 36 years, 69, and —6. Precipitation: 2.57; greatest in 24 hours, 1.22; date, 8th and 9th; average for this month for 36 years, 3.78; deficiency, —1.21; greatest precipitation 7.81, in 1893; least, 0.82, in 1895. Snow: 5.0. Wind: Prevailing direction, northwest; total movement, 9,664 miles; average hourly velocity, 14.4 miles; maximum velocity, 59 miles per hour. Weather: Clear days, 14; partly cloudy, 3; cloudy, 11. Sleet: 9th.