

# SCIENCE

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## CRUDE PETROLEUM AS A FUEL.

THE substitution of crude petroleum for coal as fuel in many branches of metal-working, the heating of steam-boilers, etc., has received much attention in recent years. Many devices for feeding the oil to the furnace, controlling the size of the flame, and insuring safety from accident, have been tried, only to be condemned in

sufficient length of time to test it thoroughly in welding, tempering, annealing, enamelling, brazing, japanning, and all kinds of forging and melting of metals; and that the results are satisfactory is shown by the hearty indorsement and commendation given it by those who have it in use.

In this system compressed air is used to atomize the oil, the air-pressure being so regulated as to insure the complete combustion

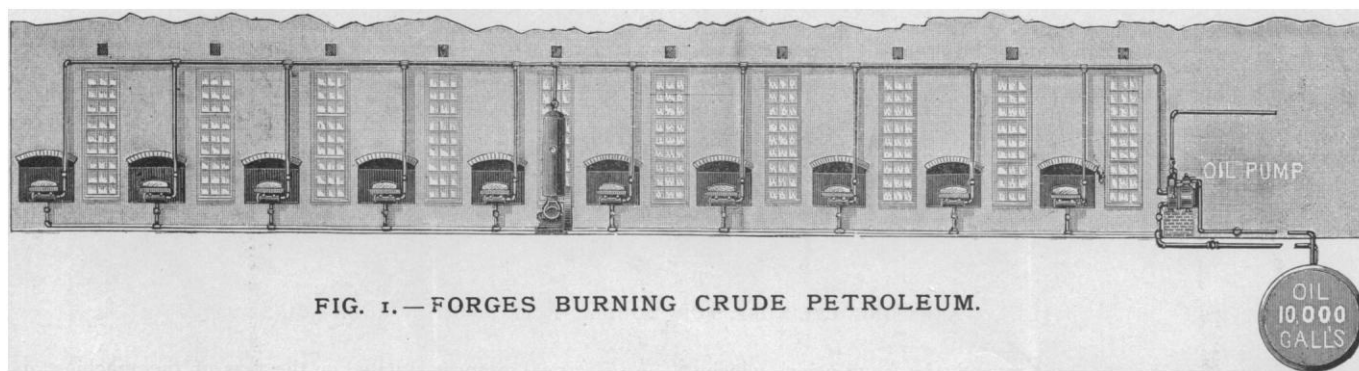


FIG. 1.—FORGES BURNING CRUDE PETROLEUM.

most cases. These devices depended upon either a steam jet to atomize the oil at the point of ignition, or a system of retorts to heat the oil and convert it into gas before being burned. These systems compel the use of more or less apparatus in the fire-box or furnace; in some cases the retort being placed therein, and in others the fire-box being partly filled with fire-brick or other re-

of the oil, and to preserve a uniform degree of heat of any intensity desired. There are no obstructions placed in the fire-box; so that it is at all times ready to receive coal or other fuel, should the oil-supply fail or a change of fuel be desired. Other good points about this system are its cleanliness and freedom from odor, which are vouched for by those who use it.

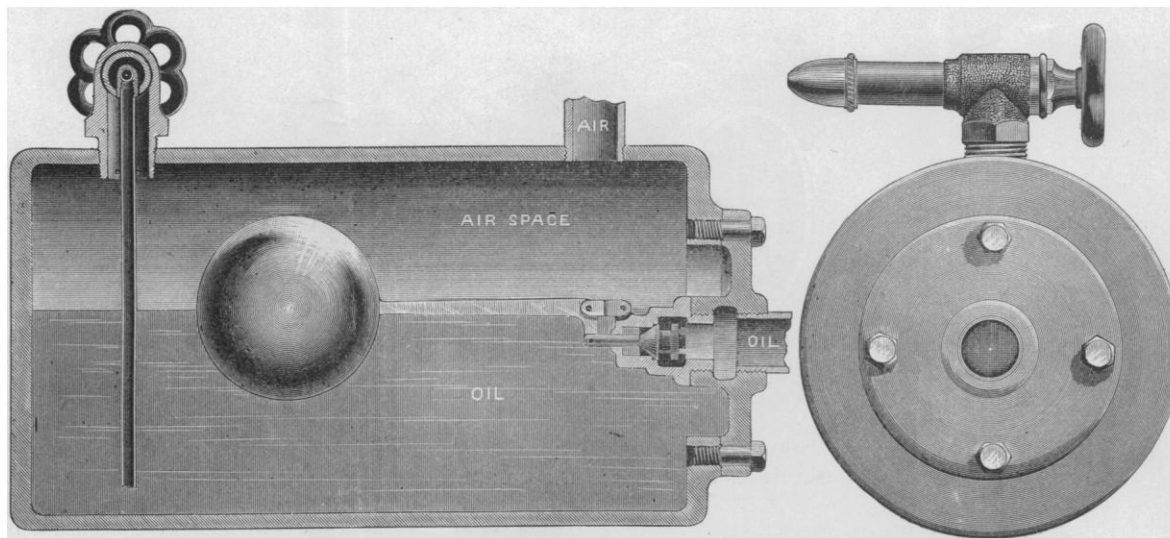


FIG. 2.—AERATING CYLINDER FOR PETROLEUM BURNER.

fractory material, to be heated, and then used as a means to ignite the fuel, distribute the flame, and equalize the heat.

A new method of utilizing crude petroleum for the purposes mentioned is being introduced to public notice by the Aerated Fuel Company of Springfield, Mass. This method has been in use a

The application of this system to forge-fires is shown in Fig. 1, which is a picture of one side of a plant for the forging of nuts and bolts in the works of the Upson Nut Company at Cleveland, O. It is claimed that in works of this kind, the cost of oil for fuel is much less than that of coal; while the dies with which the forging is

done wear longer, as there is less scale on the work. Moreover, the heat is uniform, and can be maintained from morning till night without cessation, enabling the workmen to do more and better work; and there is no smoke, dust, or ashes.

Fig. 2 shows the interior of a burner cylinder with oil inlet at the end. The supply of oil is maintained at a constant level by means of the float, which controls the oil-valve. An end view of the cylinder

#### THE ELECTRIC COAL-DIGGER.

THIS is the name applied to a new mining-machine, designed and constructed by Elmer A. Sperry of Chicago, and shown in operation at the electrical exhibit of the National Electric Light Association, during its convention in Chicago recently. For five years Mr. A. L. Sweet has experimented on this project, until, with the assistance of Mr. Sperry, success has crowned their efforts.

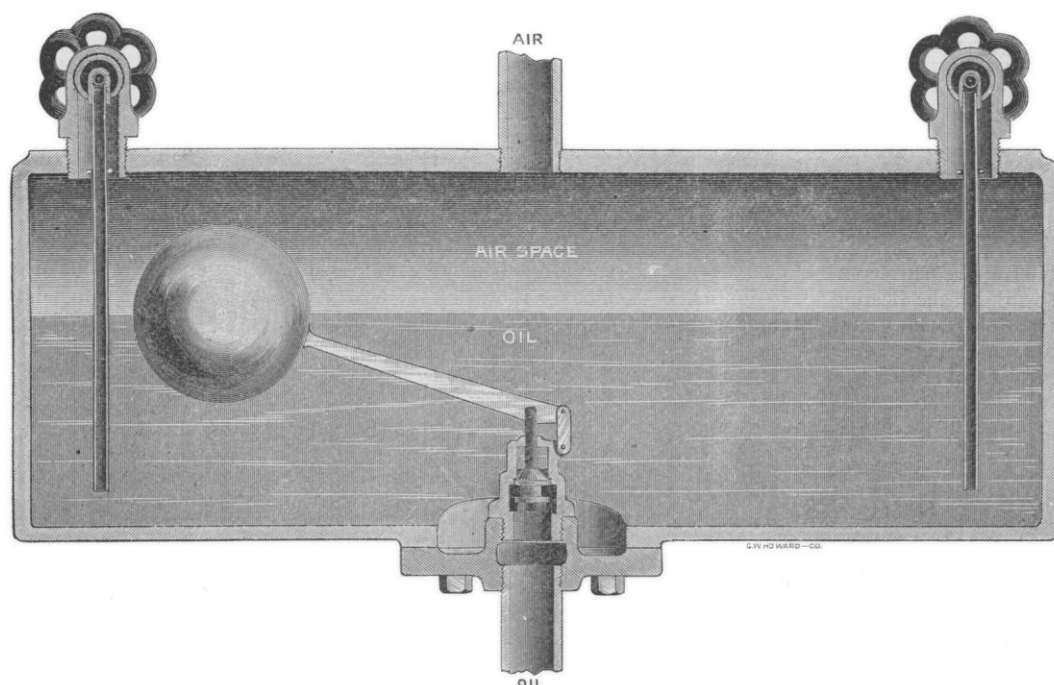
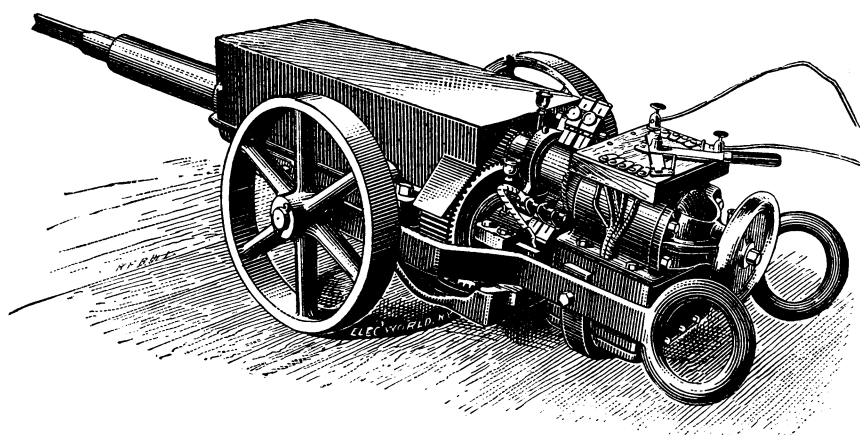


FIG. 3.—AERATING CYLINDER FOR DOUBLE PETROLEUM BURNER.

is also given, showing the burner, and the hand-wheel which regulates or cuts off the supply of air and oil. The operation of the mechanism is as follows: Oil is forced into the cylinder at any desired pressure until checked by the float and valve. At the same time a constant air-pressure is maintained in the cylinder by means of an air-compressor, the air being admitted through the pipe at

An electrical motor is situated on the rear of the machine, and substantial gear-work transmits the power to the mechanism which operates the projectile carrying the pick.

The projectile, including the "bit," "pick," or other colter, weighs from sixty pounds up, depending upon the kind of work. The stroke is from six to eight inches, delivered with a force of



THE SPERRY ELECTRIC COAL-DIGGER.

the top of the cylinder. The hand-wheel being turned, the oil is forced up through the small pipe by the air, while a certain amount of air, proportioned to the oil, passes through the large pipe surrounding the oil-pipe. At the nozzle of the burner, where ignition takes place, the oil and air are commingled, the oil being thoroughly atomized and aerated,—circumstances most favorable to complete combustion. A two-burner cylinder is shown in Fig. 3, in which the oil inlet is at the bottom of the cylinder.

many hundred pounds, and varying from one hundred and fifty to three hundred blows per minute, according to conditions, yet always under control of the operator.

The unique feature of the machine consists in the fact, that, no matter where or at what point in the working stroke the projectile is arrested by the work or face, it is instantly picked up at that point, and returned backward to deliver another blow. For instance: if the normal stroke is six inches, and the pick strikes the