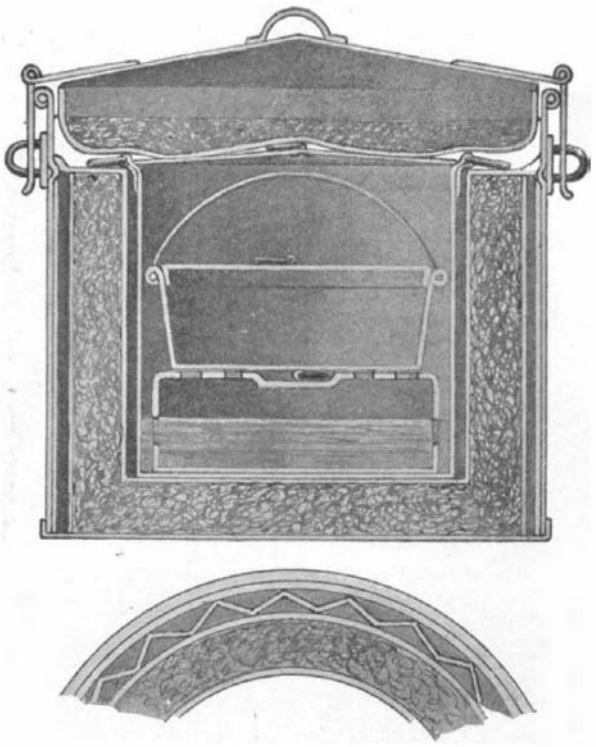
A FIRELESS COOKER.

A new method for cooking by retained heat has been invented by Mr. Felix Kahn, of New York city, who has assigned the patents covering his invention to Mr. James S. MacCoy, of 1122 Broadway, New York city. In the cooking of foods as ordinarily practised there is a great waste of heat, care, and attention, an unnecessary amount of wear and tear on the cooking utensils, a large loss of food material, and too frequently an inferior quality of food, due to the drying and burning and the loss of the juices which give wholesome, nutritious, and palatable qualities to the food. This is due to the fact that the cooking is usually done by continuous application of the heat, which wastes 70 to 80 per cent of the heat, occupies the stove with utensils for a needless length of time, and subjects the utensils to just that much more wear and destructive influence of the heat, as well as consuming an unnecessarily large amount of fuel.

The invention is an improvement over a former one, wherein the food which had been previously stewed or boiled was kept in a hot condition. By subsequent experiment it was found that after having first permeated food with heat at a cooking temperature, it was possible to stew or boil the same to perfection by the heat as conserved against loss by radiation, but that it was physically impossible to steam or dry-cook in that device by heat without the addition of a body of water. In the improved form of the device this is accomplished by placing a body of water in the bottom of the cooking receptacle, and providing a perforated rest which is placed over the water and which supports the pan or secondary cooking receptacle containing food. Substantially, the apparatus consists of an outer casing of metal and an inner casing of heavy tin. Between these are the non-conductors—paper, cylinders of dead air, and a body of fibrous material. The tight-fitting lid is similarly constructed. This effects a perfect retention of heat. As said above, in the bottom of the cooking receptacle is placed a quantity of water and a perforated support for the vessel containing the food. The manner of using the apparatus is very simple. An article of food prepared in the usual manner, and placed in the granite-ware cooking receptacle, is put on the fire until the contents are thoroughly permeated with the heat at a cooking temperature. The receptacle is then set into the heat-retaining part of the fireless cooker. This is closed and set aside for a period of time depending on the character of the food, and the same will then be found to be cooked to perfection. The fireless cooker has been exhaustively tested, about one hundred recipes having been put through this method by the Greater New York Cooking School with highly satisfactory results. For two summers it has been used practically with great success by Mrs. Lemcke, proprietress of said school, at her summer hotel.

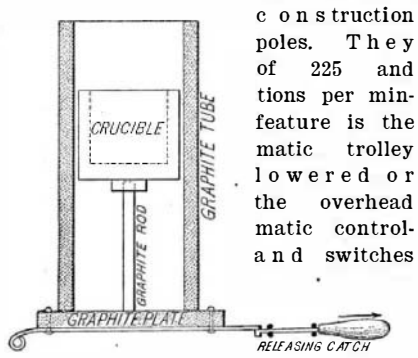
The War Department made recently at the Army Building in this city an exhaustive test of the merits of the apparatus for army use. There were present Commissary-General Weston, Capt. Murray, the cooking expert of the army from Fort Riley, Kan., Capt. Franklin, commissary at West Point, Col. Brainard and Capt. Cole, commissaries at New York, and others. The test was so satisfactory that initial orders have already been placed for its use at West Point and Fort Riley. Capt. Murray designed a case to contain six cookers of special shape, adequate to feed a troop. This case is to be carried in the transport wagon.

The cooker is adapted for general domestic use, also for use in buffet and dining cars, steamships, yachts, automobiles, etc. One of its most interesting forms is the workman's dinner pail. It cooks while he works; he can have a hot meal wherever required.

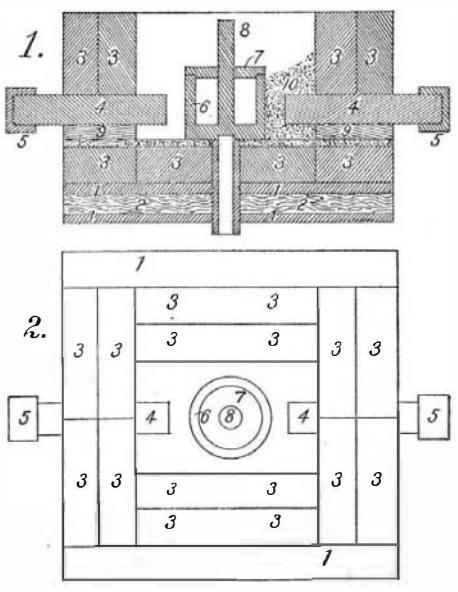


A FIRELESS COOKER.

The new electric locomotives which Ganz & Company recently built for the Valtelline system of electric railroads in the north of Italy, show a number of novel points. They employ high-tension three-phase current at 3,000 volts directly upon the motors. The main feature to be remarked is the disposition of the motors. The locomotive carries three driving wheels, and the two motors are placed in the spaces between the wheels and somewhat above the centers. The two motors are coupled across by a crank-bar which is connected to a crank on each of the motors, so that the bar takes a to-and-fro movement. The crank-bar is coupled to the middle driving wheel and thus operates it. From the middle wheel there is a horizontal driving bar which runs to each of the other driving wheels on the sides. Counterweights on the motor shafts balance the system. The inclosed motors are of a special double construction and have eight poles. They run at speeds of 225 and 112.5 revolutions per minute. A new feature is the use of a pneumatic trolley which can be lowered or raised against the overhead line. Pneumatic control-apparatus and switches are among the points to be noticed, and the motorman operates all the devices on the car by working a few valve handles which are placed together in the end cabin. The new locomotives are able to take a 250-ton load up a twenty per cent grade. They can draw a 400-ton load on a one-per cent grade and bring the speed in 55 seconds from zero up to twenty miles an hour.



Trap for Dropping Crucible.



Section and Top Elevation of Electric Furnace.

ARTIFICIAL PRODUCTION OF REAL DIAMONDS.

BY A. FREDERICK COLLINS.

Diamonds as beautiful as those found in the celebrated Kimberly Mines, in South Africa, are now made in the electric furnace; and the only difference between those taken from the extinct craters of volcanoes abroad and those formed by applying heat and pressure at home is the consequential one of size.

Many have been the attempts to produce artificial diamonds that could not be detected from those of genuine origin, but there is not an instance on record where such imitations approximated anywhere nearly the hardness, the specific gravity, and refractive powers of the real gems and which gives to them their extraordinary brilliancy.

It has been a matter of common knowledge for a very long time that diamonds were nothing more nor less than a form of carbon, and that Nature in her workshop produced these precious stones by a subtle process from another form of carbon called graphite, but while the latter is a widely-distributed element there are very few places indeed where the crystallized forms are found, and the output from all the mines in the world is effectually controlled by what the broker in gems calls the "Diamond Trust."

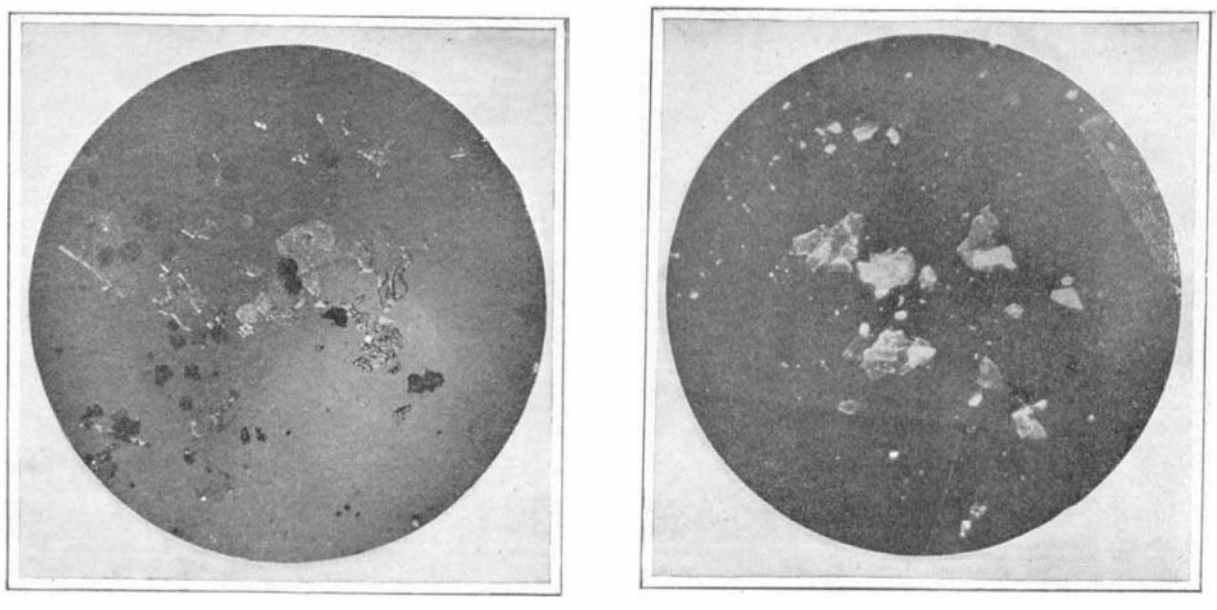
To produce real diamonds by artificial means seemed theoretically possible to those who had studied the subject profoundly, for the chief requirements were first, an intense heat, and second, an exceeding pressure directed on the material to be converted into crystals. To work out these conditions so that they might adequately prevail in practice was a vastly different phase of the problem, and for this reason, if none other, the results obtained are highly interesting and even encouraging.

The deductions relating to the formation of diamonds under natural circumstances have been based largely upon observation; of course analysis shows what the stone consists of, but of its manufacture nothing. When a gem is recovered from the "blue-stuff" or diamond-bearing clay it is found incased in an opaque layer or matrix and isolated from others of its kind.

This being the case, mineralogists concluded that ordinary carbon had been treated to a degree where it was fused and then suddenly cooled, when it crystallized, for when the matrix is removed the diamond in its rough state is found inside. In order to bring out its beautiful iridescent properties that make it so well beloved, the rough gem must be carefully cut and polished.

Occasionally diamonds have been discovered in meteorites formed of masses of iron that have fallen from space to the earth and in which the heat generated by the aerial passage and pressure due to the change of temperature were sufficient to crystallize the graphite and thus form the diamond. It is from these limits that men came to believe in the possibility of imitating the process and so to legitimately produce real diamonds.

The electric furnace offers the means for obtaining heat at an exceedingly high temperature, and several different methods have been evolved for procuring the requisite pressure. In the earlier experiments of Prof. Henri Moissan in the art of diamond making he employed the following methods: His electric furnace comprised an iron casing having a lower block of carbonate of lime for the body. A cavity was formed in the lower block for a crucible made of molded carbon. The carbon electrodes between which the electric arc was formed, were placed horizontally through the furnace over the mouth of the crucible. Into the crucible a fourth of a pound of Swedish iron was placed together with the graphite which was to be converted into diamonds, and the mixture was then covered carefully with powdered charcoal. The arc was produced by a current of 1,000 amperes at 500 volts, and when the heat became intense enough the graphite was practically fused with the iron. The next step was to subject the fluid mass to great pressure, and this was done by grasp-



Artificial Diamonds Viewed by Reflected and Transmitted Light.

MAKING DIAMONDS BY ELECTRICITY.