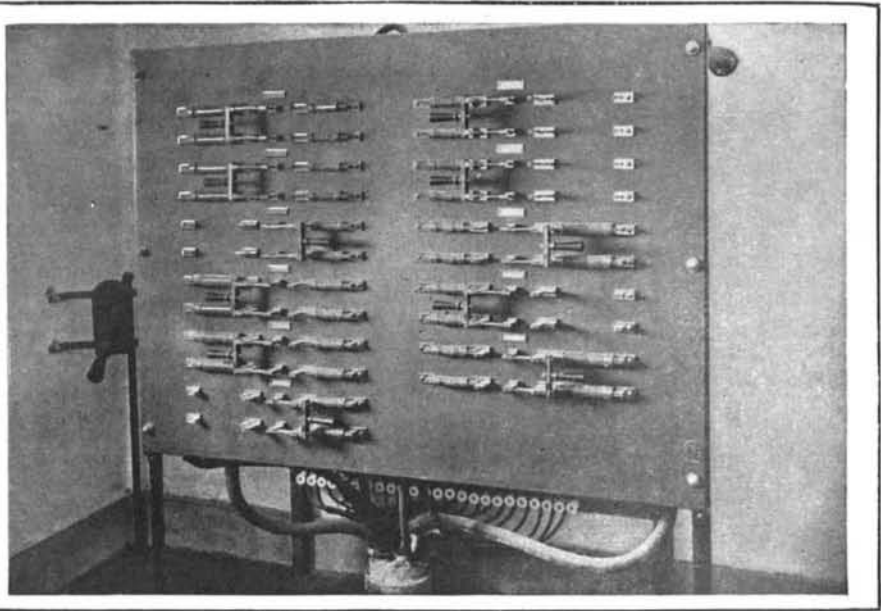


Electric heating units in the furnace room.



Switchboard in the principal's office.

The Electric High School

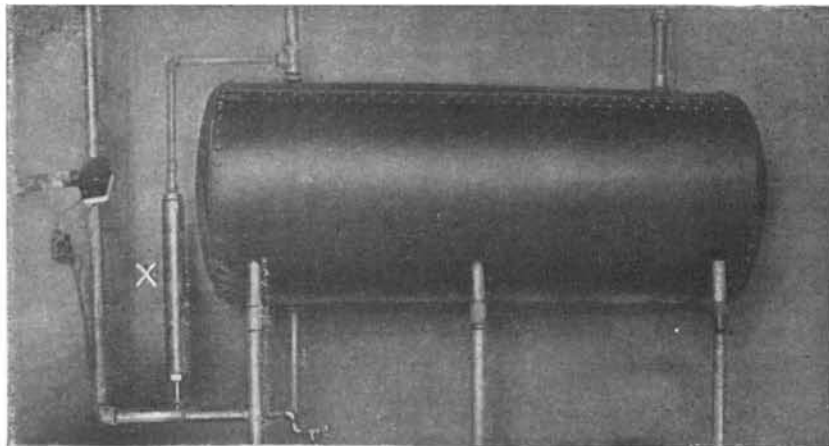
A Building Heated by Electricity

By G. L. Dilworth

TO the high school of Rupert, Idaho, belongs the distinction of being the first large building in the world to be exclusively run by electricity. In this building electricity is also used for a wide variety of other uses, and hence it has come to be called the "Electric High School."

Rupert is the metropolis of the Government Minidoka Irrigation Project on the Snake River, a region which eight years ago was a sage brush desert, but which now is a densely settled farming community, forming the new county of Minidoka with Rupert as its county seat. The settlers on this project are intensely progressive and are determined to have for themselves and their children advantages, especially educational advantages, that will equal those of the best and most progressive cities of the country. For this reason they have provided buildings, equipment, courses of study, and teachers equal to the best. Special instructors are provided for cooking, sewing, manual training, music, drawing, athletics, etc., and all courses are designed to meet the modern idea that they must be practical and of practical benefit.

"The Electric High School" is a three-story building built of mottled-buff pressed brick. On the ground floor there are manual training rooms, equipped with a 10 horse-power motor for driving the ventilating fan and providing power for the lathes, saws, and other machinery necessary in this department, and benches with all tools and equipment necessary for a class of twenty at a time; a sewing room; a cooking room with electric disk stoves



Hot-water tank in the plenum chamber.



A corner of the manual training room.

and cooking utensils for a class of twenty girls at a time; a cafeteria lunch room; a large gymnasium with galleries for spectators the full length on each side and the open corridor across one end; janitor's supply rooms; transformer room; electric furnace room; plenum chamber; agriculture room; and on opposite sides of the gymnasium dressing rooms, shower baths, and sanitariums for boys and for girls.

On the first floor are library; class rooms; principal's office; ladies' rest room; cloak rooms; and auditorium and stage and dressing rooms.

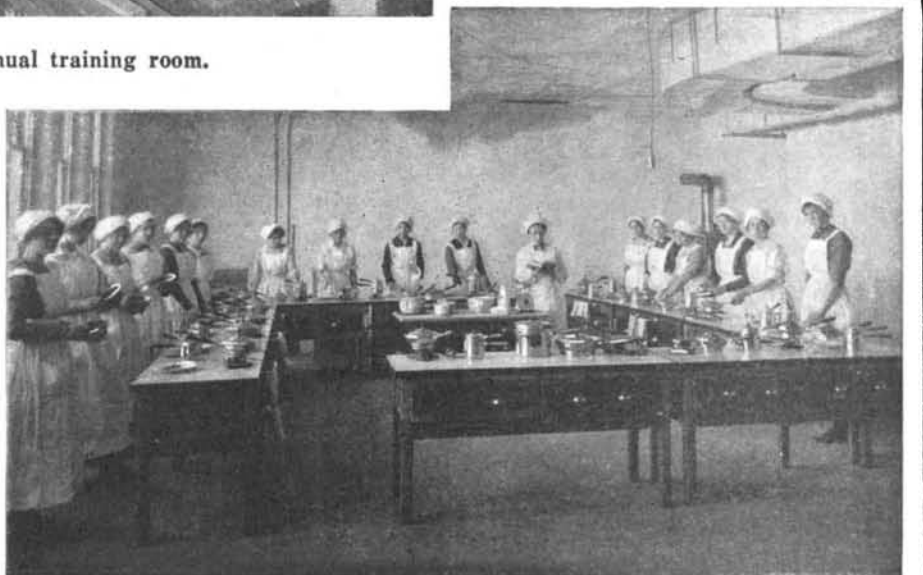
On the second floor are two class rooms, five recitation rooms, and laboratories, cloak rooms, boys' and girls' sanitariums, and janitor's supply room. The science rooms on this floor are exceptionally fine, consisting of a lecture room with raised seats and, on one side, a chemical laboratory with hydrants and locker space for a class of twenty performing individual experiments at a time, and on the other side a laboratory for physics and botany with dark room adjoining for photography. Glass and paneled partitions separate the laboratories from the lecture room.

The auditorium is seated with 380 opera chairs, and has a large stage for theatricals. The electric lighting for the stage is especially fine, being said to be equal to the best theaters. An outlet at the back of the rooms is provided for the use of stereopticon or moving picture machine. The science lecture room is also equipped for the use of the stereopticon and for obtaining current for electrical experiments.

(Concluded on page 325.)



Chemistry room, where electricity is largely used.



Cooking room, fitted with electric stoves.

The Electric High School

(Concluded from page 320.)

The gymnasium is equipped with various sizes of apparatus so that all children from the chief grade building across the street from the high school may have the use of the gymnasium in their turn.

It might seem that the use of electricity for heating a building of this size might be a complicated and intricate affair, but this is not the case, and one wonders that the world has waited so long to make this use of electricity, which is feasible in any part of the country where cheap hydro-electric power is available, and especially if it could be used in competition with high-priced coal as is the case at Rupert.

Use is made of the usual system of hot-air flues, pipes, plenum chamber and ventilating fan, but the steam coils or coal furnace usually employed for heating the air to be driven into the various rooms is replaced by a battery of electric heating elements similar to those used in electric baking ovens. This heating equipment is installed below the front entrance to the building and consists of twenty-two 18-kilowatt units connected up in pairs, each pair with separate switch control from the switchboard in the principal's office. The transformer room adjoins the furnace room, and is of absolutely fireproof construction ventilated by outside windows with steel casings and frames. The transformer is fed from the 4,000-volt, four-wire distributing system of the Rupert Electric Company by underground cable. It is a 400-kilowatt capacity, three-phase, self-cooling type filled with oil. Low-tension leads are brought out for full capacity at either 440 or 220 volts. An emergency switch in the principal's office may be used to open the 4,000-volt circuit and cut the power entirely out of the building. The switchboard in this office, with its eleven switches, anyone of which may be used to throw its unit on either 440 or 220 volts, and thus use either 9 or 36 kilowatts, gives opportunity to use any amount of current from nothing to about 400 kilowatts in steps of 9 or any multiple thereof. While dampers are provided in the pipes leading to each room, the amount of air provided for each room has been so accurately determined that it is seldom necessary to use them, the temperature throughout the building being practically uniform and under the control of the switchboard. The fresh air is drawn down the cold air shafts from the top of the front entrance, heated by being drawn through the electrically heated units, and forced into the plenum chamber where it is moistened and forced out to the various rooms through the usual pipes and flues. The heated air enters the rooms near the top and the foul air is removed from each room through brick flues to the roof of the building.

The building has a cubical content of 300,000 cubic feet. The fan supplies 20,000 cubic feet per minute and can, therefore, replace all the air in the building in fifteen minutes. At night the building is kept warm without the fan by switching the heaters to low voltage, cutting off the supply of cold air, and opening the doors of the rooms into the corridors. In the morning the fan is started to equalize the temperature, and when up to 70 degrees the fresh air damper is again opened.

The system was put to work in January, with a new, incomplete, and thoroughly cold building, with bitterly cold and windy weather, and yet proved that it could heat and ventilate the building with less than two thirds of the maximum capacity of the plant. Current for heating purposes is furnished at a flat rate of \$1 per kilowatt per month, maximum amount used during the winter months to be paid for at least four months, making a minimum charge of \$4 per kilowatt for the season. On this basis it was figured that the use of current for heating purposes would cost \$1,760 per year, but experiment proves that this may be cut to \$1,500 or less. Coal alone would have cost \$1,000 per year, and would have required the services of a fireman, whose wages are saved by the use of electricity. As the cost of installation was less than

of any other system of heat it will be seen that the use of electricity is proven to be an actual economy in the Rupert building, to say nothing of the saving of space and the saving from the annoyance of smoke, dust, and other disadvantages of any system using coal as a fuel. Under this system the heating of the building for use at night may be accomplished with no extra expense except current used for driving the fan. As the building is to be a community center and used to the fullest extent this is an important matter.

The building is electrically lighted throughout, so that any or all rooms may be used at night, the lighting of auditorium, stage, gymnasium, lecture and other science rooms being exceptionally fine. Electricity is used for cooking; for heating water for the cooking rooms, the shower baths, the various lavatories throughout the building, and for the science rooms, for ironing, for power, for evaporation purposes in the science rooms, for distilling water, for the stereopticon in the auditorium and lecture room, for experimental purposes, and if the odors from cooking ever become offensive an electric ozonator will be used to destroy the odors. Current for all these purposes are on a graduated metered basis and vary with the use to which the current is put.

Radio-telegraphy at the Eiffel Tower

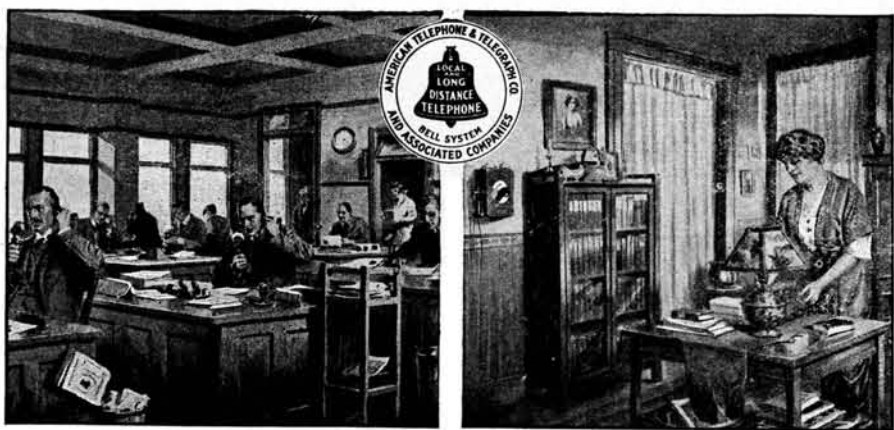
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in itself makes this station one of great importance.

As is to be expected in an experimental plant, several distinct transmitters and a variety of receiving instruments are installed. The largest transmitter is one of 1,000 cycles, 150 kilowatts power, which has only recently been put in place, and which operates according to the plan developed by Bethenod and the Société Française Radio-electrique for developing a single frequency of radiation. By such purity of emission, in combination with the high musical spark tone given by the 1,000 cycle alternator, it is possible to take advantage of sharp tuning for selection of desired messages, and, by the ear alone, to distinguish the singing spark signals through the rumbling noises of atmospheric disturbances which would prevent reception from a lower-toned spark transmitter. The spark frequency can be made as high as 2,000 per second, but is usually about one third this, so as to allow the sending condensers to charge at a higher pressure by making use of resonance in the power circuits. Fig. 1 shows the motor, generator, and controlling switchboard for the large outfit, and Fig. 2 gives a view of the operating keys which are used for making the dots and dashes of Morse signals on the various transmitters. In this photograph there can also be seen portions of the switchboards and auxiliary apparatus which are used to make the adjustments necessary in sending.

The old high power transmitter is one of from 60 to 80 kilowatts power, which draws its 220-volt energy from the public mains at 42 cycles. By variable iron-core coils the power circuit is made resonant, and the spark is ordinarily allowed to pass at only each third alternation, or about twenty-eight times per second. In marked contrast to the 1,000-cycle sender, this outfit does not emit signals in musical tones, but in a sort of rattling sound which it has been found almost impossible to interpret when the similar noises from atmospheric electrical discharges are at all loud.

A tremendous battery of glass jar condensers is used with the low-frequency transmitter, giving a total effective capacity quoted as about seven tenths of one microfarad. The spark takes place between the end of a brass tube (through which the air is forced by a blower) and a flat copper plate, as shown in Fig. 4, a type of spark gap which has shown extended use in France. The large condenser makes necessary special provisions for handling high values of high-frequency current, and so the inductance coil of the large transmitter is bent from copper tubing about ten centimeters (nearly four inches) in diameter. Likewise, the large



Fair Play in Telephone Rates

IT is human nature to resent paying more than any one else and to demand cheap telephone service regardless of the cost of providing it.

But service at a uniform rate wouldn't be cheap.

It would simply mean that those making a few calls a day were paying for the service of the merchant or corporation handling hundreds of calls.

That wouldn't be fair, would it? No more so than that you should pay the same charge for a quart of milk as another pays for a gallon.

To be of the greatest usefulness, the telephone should reach every home, office and business place. To put it there, rates must be so graded that every person may have the kind of service he requires, at a rate he can easily afford.

Abroad, uniform rates have

been tried by the government-owned systems and have so restricted the use of the telephone that it is of small value.

The great majority of Bell subscribers actually pay less than the average rate. There are a few who use the telephone in their business for their profit who pay according to their use, establishing an average rate higher than that paid by the majority of the subscribers.

To make a uniform rate would be increasing the price to the many for the benefit of the few.

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