

Electricity:

Its use in the home.

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The word electricity is derived from the Greek word—electron, the name for amber, which when rubbed with a dry woollen cloth, attracted light bodies of every kind, such as a small piece of paper, gold leaf, etc.

It is strange that a power so rich in its resources, so universal in its application, and so readily controlled as electricity was not earlier introduced into the home.

Although electricity is sometimes an enemy greatly to be feared, because of its being pregnant with danger, it is most frequently man's obedient servant easily controlled by the will, and a powerful auxiliary in the noblest enterprises that aid most in civilization.

It carries messages by means of telegraphic wires from the cities in each state and country to the most distant limits of the globe. It promises to lessen the toil of workman by lending an inexhaustible mechanical power. We find, in fact, that the adoption of electrical apparatus in house-keeping, is gradually becoming more wide spread, making somethings more useful and others more ornamental, until ⁱⁿ the near future we may anticipate its presence in the home will be indispensable.

The first application of electricity to household purposes was presented by the electric bell early in the century. For many years this was the only convenience it afforded, but the discoveries of the telephone, the electric light, and the electric transmission of power within the last thirteen years has given it a tremendous force whose consequences are as yet unknown. Many years may elapse before the full use of electricity can be reached, just as in the case of the piano, which took more than a hundred years, from its first invention to become the common guest as we find it in the homes today. In the electric bell, the pressure of the finger on a button brings two strips of metal into contact and completes a circuit, forming as it were an electrical endless chain from the battery through the wires, bell, and annunciator. The whole circuit instantly gives passage to a current of electricity and in consequence becomes endowed with magnetic properties throughout. By means of an accumulation of wire as a coil round a horse-shoe bar of iron, the magnetism is locally in-

tensified to an extent necessary for the attraction of the iron bar, aided by a single automatic device, the blow on the bell is doubled. A similar electro-magnet in the annunciator is released by pulling a shutter which indicates the room from where the call has come.

All annunciators are based on the same principle with its modifications. Even those complex looking annunciators that we find in large hotels, which by means of a dial in every chamber enables its guests to call for almost anything from a newspaper to a glass of water, differ from the general plan only in their power to signify a particular summons by the aid of a definite number of successive contacts and corresponding electro-mechanical impulses. A good example is afforded by the burglar alarm apparatus. Every door and window through which entrance could be forced is fitted with a simple clip adjusted to make at the least opening a metallic contact which sets an alarm bell in operation and at

the same time indicates the room where the invasion is being made. By means of a switch the battery is cut off during the day. Such a system adds greatly to the security of a home and only needs occasional repair, since all the contacts are somewhat exposed to dust and moisture. It has been said that a burglar can tell, whether a house is so guarded, by removing a window pane, and find means to cut the electric wire connected with the sash. The objection is a poor one since the system can be easily arranged to give the alarm equally well for any disconnection so made.

An exceedingly useful application of electricity is that of regulating temperature. No one can tell how much comfort and ill health would be saved in many homes if the temperature could be constantly regulated, both in summer and winter, independent of irregularities of the season.

In winter the temperature can be regulated at will, while in summer it can be modified if not made

constantly uniform, by utilizing the controlling power of electricity. When a house is heated in winter either by water, hot air, or steam, it is only necessary to place in each room an automatic thermometer which makes a contact as soon as the temperature reaches the desired point. Then to arrange so that the contact just made shall electromagnetically cut off the supply of heat from that chamber. Such a thermometer, generally called a thermostat is made by riveting side by side two strips of different materials, generally brass and rubber, which expand differently in the same degree of heat. The composite strip so formed is warped by changes of temperature which usually effect the lengths of the components, and being at one extremity while firmly fixed at the other, the effect of this warping is magnified into an appreciable range of movements at the free end. This enables a contact to be made at any point within that range, while a screw adjustment and dial arrange for

the contact to take place at any temperature within desirable limits. The parlor thermostat can therefore be set at 70° while that in the hall is fixed for 60° . It is generally claimed by those who have adopted this system that it is a decided saver of fuel and also that there is great comfort in knowing that the whole house has a uniform temperature. The thermostats are so sensitive as to correspond to any change of a single degree in temperature.

Regularity in temperature depends on the supply of heat and the ease with which it is distributed through each room.

In the same way during the summer months this thermostat can by additional contact control the supply of fresh air so as to maintain a pleasant temperature in the various rooms. Such a system has for two years been in successful operation at a large country house near Greenwich, Connecticut. In the winter it is warmed by fresh air drawn through an underground pipe and heated by passing through a

reservoir in which a long steam pipe circulates. From this it is fanned into the different rooms through dampers, each controlled electro-magnetically by a separate thermostat. In summer the water supply of the house, as it comes from deep wells, takes the place of the stream in the circulating pipe of the reservoir, and cools the incoming air the same thermostat adjusting the distribution. In this way the temperature is maintained throughout the house at 70° in winter and does not exceed 75° in summer while the ventilation is controlled by the same apparatus.

When electricity is flowing through a wire part of its energy can be transformed to heat. Suppose we are in a cold room in which there is an iron wire two ohms resistance, we turn the tap and the wire gets a supply of energy which it converts into heat, Mr Andrews tells us that there is now a current of twenty webers flowing through the wire and hence the wire the wire is giving out more than one horse power in the shape

of heat. When the current has been flowing for a short time the neighborhood of this wire will be found unpleasantly warm. The temperature can be made pretty much what we please. Can be made hot enough to boil water. We can turn the tap and the current will pass among all these little bits of carbon, at first we have spots of light here and there stealing from joint to joint, then these lights fix themselves in definite places and round them the carbon gets red hot until in twenty minutes we get the most perfect form of fire for heating a room or boiling a kettle.

The fire alarm depends upon a thermostat set for higher temperature, usually from 120° to 160°, as soon as contact is made an alarm bell rings and in this way they can tell the room in which there is danger. It is hardly possible to overestimate the usefulness of a well arranged fire alarm in the home, which makes it possible to extinguish a fire at its beginning. Statistics show a marked decrease, by the use of

electrical fire-alarm systems, upon the number of serious fires in towns, but the "Big Fires" that have been saved by this useful article in the home can never be estimated.

By means of electric telephones, persons are enabled to communicate to laborers in the out buildings on a large farm. It is a great advantage when several houses are connected since arrangements can be made for two to communicate on the same wire without calling the attention of the rest, and since it saves much time and trouble. As many as eight telephones are sometimes worked in this way on the same wire, - and although only two can employ the line at any one time, the calling of any particular person is not heard by the others.

A very interesting and useful machine in the home is the electric time-piece, in which electro-magnets are substituted for weights and springs. Appreciation of time and its value is said to be the test of the nation's

activity, and it is usually a luxury to see all the clocks in a house keeping on an even face. There are several methods in use for this purpose and they form two distinct classes. In the first a single clock as a standard drives all the others electromagnetically, their operation depending entirely on the electricity supplied during its periodic contacts. In the second each clock is free and independent time keeper, whose rate is under regular electrical control from the standard. Each clock is mechanically corrected every hour, as the arms sweep over three minutes face on each side of the true vertical, and the clock that fails to keep time by three minutes in the hour may well be submitted to examination.

Perhaps the greatest gift electricity can give any home is the incandescent electric light. Although it has been before the public only about fourteen years, there can be no doubt that after time has allowed its many excellencies to be worked out and its peculiar advantages are better known, the interest which it awakens in the minds of the people

will demand its use in every home perhaps before the arrival of the twentieth century. The electric lamp produces light without flame and very little heat, with no consumption of oxygen, and without smoke and gas as we so often find in oil and gas lamps. The sixteen candle power gas-burner is said to injure the atmosphere with its products of combustion to the same extent as the respiration of five persons. Besides those products which ultimately injure books, paintings, and ceiling and produce fifteen times as much heat as the electric lamp of equivalent power. The electric lamp is of particular value because it requires no matches, cannot set fire to anything even if broken while lighted. In addition to this it is everywhere adapted to the purposes of adornment because of its charming effect produced by arrangement in appropriate surroundings.

The following are some of the methods of decorating by electric lamps—In the parlor an illuminated painted vase lighted from within may be

superior in attractiveness with pictures on the walls, whose colors are almost as readily appreciated by incandescent as by day light. While opalescent globes of varied shade tone the brightness everywhere into subdued harmony. A pretty effect can be produced in conservatories, by suspended lamps of different colors half hidden in the foliage. The electric light can be made to give a beautiful effect in illuminating garden fountains. The color of the illumination is varied by means of tinted slides passed horizontally beneath the glass plate in the roof of the vault.

An incandescent lamp is simply an apparatus for converting electricity into light. The laws which govern the lamp are the well known laws of heat, light, and electricity. Edison was the first to make these laws plain. He did this by making his lamp of high resistance and small radiating surface, and therefore it was a commercial success. Long usage and familiarity with the light has proved it less hurtful to the eye sight

than gas or oil. These lamps may be lighted by simply turning on a switch which corresponds to the tap in gas lighting. Nor is there any danger of ignition or explosion which happens so frequently in the case of gas or oil lamps. The lifetime of electric lights depends on the incandescence they have to produce and their treatment. They will last from a few hours to many years sometimes twenty five hundred years. In fitting a house with electric light, consideration is required to obtain the greatest convenience. The switches by which the lamps are turned off and on should usually be placed just inside the door, where they can be reached. In the bed-rooms, they should be suspended from the ceiling in such a manner as to be accessible on first entry and then movable to within easy reach of the bedside, or better still there should be two alternatives - one at the door and the other by the bed side. We know the system is well arranged if the lady of the house is able to visit the entire house, commencing with the hall door and to go from attic to cellar without being left in the dark or leaving lamps

burning on any floor behind her as she makes her journey. A good plan that has been tried is to have a spare lamp in each room under control of the burglar and fire alarm system, in such a way that the forcing of any window or any dangerous excess of temperature, may not only ring the alarm bell but also light the whole house. Ere many years pass, we shall have wires laid along every street in the cities, tapped into every house, as gas pipes are at present.

The following will prove how helpful electric light has been to plants—Hon. W. W. Ranson of Arlington, Mass. claims that by the use of electric light he makes a gain of five days on each of his three crops of lettuce—that is two weeks in a season—that the gain on one crop pays for all the expenses of the electric lighting from the season, thus giving him the gain on the other two for extra profit. His attention was first called to the usefulness of the light by the advance made on the growth at the ends of his greenhouse next the street and in the glare of electric light. Dr. Parley of Cornell

University says that the influence of the light is greatly modified by the interposition of a glass roof. Plants injured by a naked light were benefited by the protected light. Five hours light per night at a distance of twelve feet hastened maturity a week or ten days but proved injurious to young plants and those newly transplanted. There is no doubt that roses and other flowers can be made to bloom more beautifully and more profitably by the assistance of the electric light. The influence of electricity upon color has been shown to be extraordinary. Tulips exposed to its light have deeper and richer tint, flowers more fully and develop longer stems and larger leaves. Fuchsias bloom earlier under like conditions. Petunias bloom earlier and more profusely. This being so we shall expect the electric light to be very profitably used in the future as a means of assisting and developing the growth of flowers and vegetables.

One of the latest and most important uses of the heating power of the electric current is its application to cooking and heating.

Attempts have been made for many years to make the electric current useful in these lines of work - and after considerable experimenting the final form which has been given to the apparatus for such use as hot plates, boilers, and water heaters, is that of a wire unbedded in enamel such as at present used upon cooking utensils. The wire most commonly employed is German silver though in some cases platinum has been used not very extensively however it is very expensive. In apply this construction to a flat-iron, for instance, the base of the iron is made in the form of a shallow tray into which the enamel is poured. The wire is in the shape of a zigzag and forms a flat coil completely surrounded by this insulating compound. A hot plate suitable for heating a kettle of water or baking a griddle cake is made in the same way. A frame with gutter shape bars filled with enamel serves as an oven heater, a sufficient number of these frames being disposed at various parts of the oven. Operations such as boiling of steak are performed on a modified form of boiling in which the ordinary wires give place to newly

invented U shaped bars. The heating wires are carried through the hollow space of these bars and imbedded in enamel. For the heating of water in special vessels such as the ordinary tea-kettle, the vessel is made with a bottom in the form of a hot plate. The enamel used is of the ordinary gray material which requires firing but an enamel for this purpose has been introduced in England, which needs no baking. Heaters designed to take the place of the hot air furnaces have been constructed. The plan is to place a larger primary heater in the cold air box of the ordinary furnace and smaller heaters and placed inside the grating of the registers and by this means additional heat can be produced.

There can be no doubt that as the cost of current is reduced the electric cooking appliances will be brought into general use, seeing the many advantages such as cleanliness, more haste, and economy in its favor, and the absence of disagreeable odors inseparable from cooking of coal or gas. Although the cost of cooking by the aid of electricity seems at present more expensive

than that of gas, yet in practice it is not true when we remember that less heat is required owing to its being more readily localized and directly applied to the surface when actually required. It should also be remembered that it is more conveniently turned off and on as occasion demands. It will certainly be a very interesting and delightful condition of things when the girls of this generation shall be able to fry, boil, and bake without fire or smoke.

Price list of necessities for a private house.

1 Oven 14 X 20 X 16	\$17.50
1 Broiler	6.00
1 Griddle	7.50
1 Stew Pan	7.00
1 Disc Heater and Switch	4.00
1 Sad iron 6½, 7½ and 9 pounds	3.00
1 Tea Kettle	8.00
1 Switch Board	3.00

Total \$60.00

There are several small matters in household economy which might be conveniently and profitably carried on by the aid of electricity for instance, ironing, heating of foot warmer tea and coffee pots, and also the necessary

Preparations for toilet, the curling-iron. These heaters can be raised to a proper temperature and maintained at a cost of one d. per hour. In every house supplied with electric means like the lamp, turning the switch sets the sewing machine at work, thus saving the usual amount of energy needed to drive it by treadle.

Art and Science bend the means while electricity supplies the power. Motors have been applied to lawn mowers, to carpet sweepers, to shoe polishers, in fact there is no house duty capable of being mechanically performed in which electricity is not the willing slave to do the drudgery. It has been applied to serving at table and dining table. A miniature railroad track runs round the table within easy reach of the guest and thence by ornamental trestle work, to the wall disappearing through the shutters. The dishes are laid on little trucks fitted with tiny motors and are started from the Lantry to the dinner table. They stop before each guest who after assisting himself, presses the button and gives the car the right of way to his next neighbor. The whole journey having taken place the cars return silently to the place from

which they started

Although modern scientific investigators have devoted much attention to electricity, we are probably as far as ever from knowing what this mysterious power really is. All that has been obtained is a fairly good knowledge of the ways in which it works, and with this knowledge has come a rapid application to home industry, since it has been found to be a natural force and easily controlled. Great improvements may be looked for in the near future, especially in the cheapness with which it is produced. Even now electricity is being used in a great variety of minor ways besides its more prominent uses in telegraph and telephone offices and for lighting the home, have hardly got beyond the experimental stages save that of lighting, but enough has been done to show what a wonderful transformation may take place by its aid to home heating in the near future. By turning the switch the current will pass through a heater, which may be as ornamental as taste permits or entirely concealed. Thus superseding fires with all their noxious smoke and dirt. With regard

to cooking there are numerous appliances which are only waiting for the cheapening of the current. Each cooking utensil being constructed with the heating coil as its stove and the whole swayed of Gals and fans need only to have the connection made and the cooking can go on under most perfect control. Some of the arrangements appear to put a premium on laziness for with the food put in the cooking utensils at night and the necessary connections made the tinnery of a switch in the morning in the bed-rooms starts the cooking of the breakfast. A New York lady is said to have so contrived matters that she can, before getting out of bed, start a fire in the kitchen by turning on the current and when she comes down stairs finds the kettle boiling and the room comfortably warmed.

Considering the home itself the condensed history of the use of electricity in our nation during the past; the centre of its present; and the possibility of its future, it is doubtful whether any other scientific work can claim a more rapid progress in the adaptation to the

needs and decorations of the home.