The Equitable Building was of the "cage" formation, the columns being of cast-iron bolted together with cast-iron lugs to receive the girders, which were of 20-inch steel. The beams used in the framework were of light 9-inch steel bolted to the girders at right angles with spaces of about 8 feet apart. The framework formed a structure by itself independent of the walls, while the walls of the outside area and rear were also independent, resting on their own foundations. The three lower stories of the building were faced with granite, pressed brick being used above the third story with terra-cotta trimmings and granite sills. The rear and area walls were faced with the enameled brick with granite sills. The cornices were also terra cotta and covered with a marble coping. The four arches were of 6-inch hollow tile and the partitions were made of what is known as limeotile, as well as the ceiling under the roof. The experts are of the opinion that the percentage of masonry loss was caused largely by the facing of glazed brick used in the area and light shaft. The damage to the granite was partly due to the construction of a number of bay windows of wood on the lower portion of the exterior. All of the so-called fireproof material was a total loss where reached by the heat. Office vaults were also set into the walls of this building. The total damage to these is estimated at 73 per cent, many of them being wrecked because the floors were too weak to support their weight after the building had been fire-swept, and they fell through to the cellar, causing considerable damage to the structural steel.

The Equitable Building was one of the first supposed fireproof structures to be erected in Baltimore, and the Calvert, which adjoined it, among the last. The steel framework of the latter building was faced on the outside with common brick, and it is due to this fact that the percentage of damage to the steel erection was but 1 1-3 per cent. The loss on ornamental ironwork was 37 per cent, common brick 5½ per cent, enameled brick 7 per cent, and terra cotta 74 per cent. Here, as in the Equitable Building, the partitions were a total loss. The damage to the terra cotta was largely due to the manner in which it was set, according to the appraisers.

As a result of the examination of the Equitable Building, the conclusion was reached that the total loss upon it would have been but 50 per cent had more care been taken in its construction. The principal criticisms were that the floor beams were too light and spaced too far apart considering the weight they had to sustain. The fireproofing was not properly cemented. In the case of the Continental Building much of the loss is also attributed to faulty construction of the same character. The reports relative to the Continental and Equitable buildings are cited because the statements they contain apply to nearly all of the other structures which were appraised. In determining the heat-resisting qualities of the various materials, the experts placed brick first, then terra cotta, with porous tile third. The material known as limeotile was a total loss. Granite and marble were most seriously affected by the contact with heat, while structural steel, where properly fireproofed, demonstrated its thorough efficiency.

The examiners claim that much damage had been caused in many instances by the work of the gas fitter, the plumber, and the electrician. In nearly every building fireproof material had been removed to place wires and pipes and had been replaced so loosely that openings were left where the structural metal was exposed. With the temperature ranging from 1,900 to 2,500 deg., every part of the exposed metal was affected, while many instances were found where the heat had apparently separated the covering from the iron and steel by causing the metal to expand where it reached its surface. A number of the buildings had been erected by dividing the contracts among several builders in order to save time. For example, one company would complete the stone and brick work, another the woodwork, and another the electrical work and plumbing. Consequently after the framework had been finished and fireproofed it was often damaged by the carelessness of employees of other contractors who removed portions which had been done without replacing it properly.

It is only reasonable to suppose that the Baltimore office structures contained as good material and were built with as much care as the average buildings intended for the same purpose in other cities. Consequently the criticism which applies to them will apply to many of those in the metropolis and elsewhere, and in case of being fireswept under similar conditions the percentage of loss would probably average as much. Therefore it is interesting to note the total loss percentage on the "fireproof" group, estimated on their value just prior to the fire and as the appraisers found each. The percentages follow: Continental, 65; Equitable, 74; Merchants' Bank, 54; Calvert, 58; Union Trust, 61; Herald, 59; Maryland Trust, 60.

It will be noted that in every instance over 50 per cent of the original value was destroyed, the average loss per cent for the entire number being 61 4-7. The Equitable, which sustained the greatest damage, was, as already stated, framed partly of cast iron, which accounts for a large part of the percentage. The Continental suffered by reason of its location as well as light construction. The Merchants' Bank, which has the smallest percentage, was one of the lowest structures, had buildings directly adjoining it in the direction from which the fire came, and had very thick exterior walls, faced entirely with granite, but which was heavily reinforced with brick.

## ELECTRICITY IN AGRICULTURE.

At a recent meeting of the Belgian Society of Engineers and Manufacturers, E. Guarini delivered a lecture upon the present state of the agricultural applications of electricity. After recalling the fact that certain applications of this kind are now old, he said that it was a pleasure to note that a return was now in progress, a return proved by the number of installations that have recently been made in different countries. This is due to the increasing needs of our civilization and to the incontrovertible fact that savings and other advantages have been realized in the industries into which electricity has entered. What will most contribute toward a still further extension of the applications of electricity will be the creation of great central stations for the cheap distribution of energy to farms. Countries which have extensive deposits of coal are well situated for the distribution of electricity and have no reason to envy countries such as Sweden and Italy that are rich in water power. After asserting that the energy of coal mines really costs half as much when it is transmitted electrically, the lecturer set forth the great advantage that would result to central stations that should find a sufficient daily demand for agricultural applications. Electricity may, on the other hand, be produced upon the farm itself for a single exploitation or for a group. For this purpose, steam engines, gas, gasoline, wind, or sun motors may be employed, according to circumstances.

The current best adapted for the farm is the continuous one, because it permits of certain applications for which the alternating current is not adapted. When the current is produced at a great distance, the best thing to do is to transmit it in a high tension alternating form and convert it into a low tension continuous current on the farm itself.

The applications to the farm, in order to permit of a greater efficiency being attained by the central station and a larger revenue being obtained from the capital invested in it, should be numerous.

For tilling, the plow is placed by preference on the two opposite sides of the field and is drawn first in one direction and then in the other. The motors for the machines are by preference portable, so that they can be placed alongside of the one to be actuated, such for example as a thresher, straw cutter, carrot or beet chopper, pump, mill, shearing machine, churn, skimmer, separator, etc. Dr. Oldenbourg has found that electric churning permits of effecting a saving of 70 centimes (14 cents) per quintal (220 pounds) in comparison with the cost of the work done by hand.

Purification of water by electrolysis with an iron positive (the organic matters being precipitated by oxide of iron); bleaching of oils and fats by electrolysis after the addition of salt water; purification of saccharine juices by electrolysis, more or less complicated, or by ozonization, are a few of the chemical applications.

Luminous applications are electric lighting of the farm and electric lighting of the fields for night work.

Among the calorific applications may be mentioned the De Mare hot-air fan; electric culinary apparatus and incubators; carbonization of peat by electricity in order to convert it into a full equivalent to 50 per cent of coal, in 10 or 20 minutes instead of several hours; the Herrgott electric coverings and clothing representing the most economical electric heating.

Thirty thousandths of an ampere at 500 volts would kill a man. Insects may be killed in the ground or upon trees by electrifying the surroundings if the current that passes through the insect is sufficient. By this process it is possible to sterilize water and milk. M. Guarini stated that in collaboration with Dr. Samarini, he had succeeded, after numerous experiments, in practically sterilizing milk, and explained why the experiments made in the same direction by his predecessors had failed.

The telegraphic connection of farms with one another and the market is rendered possible. The district of Oceana embraces villages that are connected with the market of Hart by a telephone line 40 miles in length. The telephone and wireless telegraphy present many advantages for the country. Wireless telegraphy is already employed for the simultaneous firing of cannons for breaking up hail storms and also for producing artificial clouds.

It is important for the farmer to consult meteorological apparatus in order that he may know how to conduct his agricultural operations. The Luncotta pluviometer informs him as to the frequency, importance and nature of rains, and the various electrographs allow him to keep himself posted as to the movement, approach, and extent of storms, and to take precautions in consequence.

## A PLEA FOR THE ENDOWMENT OF ASTRONOMICAL RESEARCH.

In April, 1903, Prof. Edward C. Pickering, of Harvard University, published a pamphlet showing how a large sum of money could be expended each year for extending astronomical research. It was stated that much better results could be obtained by co-operation and in general by improving the present quality and quantity of work done. It was further proposed that the fund should be administered by a committee of astronomers and that Harvard should act as a trustee of the fund. At the same time a circular of inquiry was sent to the members of the various astronomical and scientific societies. It is believed that few astronomers widely interested in the progress of science, whose opinion would be of much value were thus omitted. Five questions bearing on the subject were contained in the circular. In a second pamphlet, published last month and intended to supplement the first, Dr. Pickering gives a resumé of the first publication and comments on the replies to the five questions contained in the circular. He does not discuss the replies to the first three as it is believed that the writers would prefer a postponement of such action, until the establishment of a fund would enable a part at least of the proposed work to be undertaken. These questions are: How do you think money could be spent most advantageously on astronomy at the present time? Can you recommend any definite plan, in form for presentation to a possible donor? In what way could money be most usefully expended at your Observatory or under your direction? Few definite answers to the second were given, but, doubtless, if a large sum of money were already available many plans would have been presented.

But few answers were given to the request for the names of possible donors. Few improvements or criticisms of the plan were suggested by foreign astronomers, in answer to the fifth question, a request for such suggestions. One or two advised that the committee should be international, but probably the general feeling was that, as it was hoped to collect the funds in the United States, it was only fair that they should be controlled by Americans. Among American astronomers, however, there were some objections for various reasons to the part it was proposed that Harvard should take in the plan.

Dr. Pickering begins the second pamphlet by stating that in order to attain as great an advance in astronomical research during the twentieth century as in the nineteenth, careful plans must be made for its endowment. The same skill in organization, combination of existing appliances and methodical study of detail, which in recent years has revolutionized many commercial industries, should produce as great an advance in the physical sciences. He considers seven methods by which astronomy can be aided. First, fellowships for astronomical students; second, astronomical expeditions; third, new observatories; fourth, publication of investigations and memoirs; fifth, aid to working astronomers; sixth, aid to existing observatories; and seventh, international co-operation.

While a large sum of money would be needed to carry out this plan in full it would seem that a moderate amount would permit a portion of it to be tested. Very different ends would be attained by the different methods. Thus, the first is educational and insures the efficiency of the astronomer of the future, the fifth aids the individual man of genius, while the sixth and especially the seventh undertake to solve the great problems now before us, and to advance the science to a new and higher plane. The seventh method stands on a wholly different basis from the others. Here the work must be done by experts, the greatest specialists in their departments. Many important investigations have been undertaken by international societies, and such work could be greatly increased if large sums of money were at their disposal for this purpose.

Dr. Pickering suggests the appointment of a local committee consisting of men interested in astronomy but not necessarily familiar with its technical details, with proper facilities for collecting the views of experts. The duties of this committee would be, first, absolute fairness. They should spend the income so as to secure the greatest scientific return, and should be wholly independent of all personal considerations and of all local conditions. Secondly, their work should be active, not passive; they should try to spend the income, not to preserve it.

The project of building a ship canal across Florida has again come to the fore, and there is a strong probability of its being carried out. A canal, known as the Florida Coastline Canal, is rapidly nearing completion, and now extends from St. Augustine on the north to Key West on the south, a complete inland way of over 380 miles.