was publicly demonstrated by breaking the glowing lamp in the midst of highly inflammable stuffs. Yet, in the case just referred to, a defective lamp came very near starting a serious fire. The lamp was in use in a cellar, and except for the fortunate entrance of an employe, the fire might never have been explained. He found the wires of the lamp—a Maxim lamp—white hot, with their paraffin coating blazing up against the beam and floor above. A well-directed hatchet stroke severed the wires, and the fire was stopped. An examination showed, according to the statement of Mr. McDevitt, Superintendent of the Insurance Patrol, that of the two wires, the one that enters the side of the brass shell below the glass globe in one of the lamps, and which is supposed to be firmly held in place there by a drop of solder, was not in fact so held, but seemed to have been loosely tied to the shell with a bit of copper wire, and to have dropped down from that imperfect fastening, crossing the other wires and establishing electrical connection with it. Both wires were, of course, white hot instantly. They were covered with a heavy insulating coating, mainly composed of paraffine, and that substance burned at once. But for the timely discovery of the accident the entire establishment might have been destroyed. Upon a careful inspection being made of the other lamps on the premises, one or more was found in which the wire was simply tied on, and two others from which the drop of solder had been melted away, or else had never been there, so that the wire was loose and liable to fall at any moment.

Thus we see in one city, and within a few months, each of the types of electric lamps has been the cause of a fire. However safe, as compared with kerosene, the electric lamp will bear watching.

THE ABSORPTION OF METALLIC OXIDES BY PLANTS.

The *Journal of the Franklin Institute* for July contains a detailed report by Mr. Francis C. Phillips of a series of experiments undertaken by him to determine whether any injurious effects are produced upon plants by the presence of certain metallic oxides in the soil, and whether healthy plants will absorb such oxides through their roots.

The experiments of Dr. Freytag, at Bonn, quite positively indicated that growing plants would take up mineral poisons, and that without injury until a limit of poisonous concentration was reached, when they rapidly withered and died. The plants showed no discriminating or selective faculty, but took up any matter in a suitable condition. Other experiments in Germany have since contradicted the results arrived at by Freytag, and so have certain tests with Paris green reported by our own Commissioner of Agriculture.

Mr. Phillips experimented with carbonates of zinc, copper, and lead, and the arsenate of lime, compounds which are almost absolutely insoluble in water. The plants were geraniums, coleas, ageratums, achyranthes, and pansies, which were selected not with reference to any special peculiarities of the plants, but for the reason that there were thousands of other plants of the same kind, and all equally advanced in growth, on the tables of the greenhouse, which afforded an opportunity for a close comparison of those grown upon poisoned soil with others grown under normal conditions.

The conclusions arrived at by Mr. Phillips are:

1. That healthy plants grown under favorable conditions may absorb through their roots small quantities of lead, zinc, copper, and arsenic.

2. That lead and zinc may enter the tissues in this way without causing any disturbance in the growth, nutrition, and functions of the plant.

3. That the compounds of copper and arsenic exert a distinctly poisonous influence, tending, when present in larger quantity, to check the formation of roots, and either killing the plant or so far reducing its vitality as to interfere with nutrition and growth.

In the case of the heavy metals, copper, zinc, arsenic, and lead, it seems to be probable that their oxides may under certain circumstances become deposited in the tissues of the plant.

These results have a direct bearing upon the conduct of many industrial operations involving these metals. If crops may become hurtful through the absorption of poisonous elements in the soil, the greatest care should be exercised to prevent the dissemination of these metals by the vapors of smelting establishments and the like.

ACCURACY IN TELEGRAPHING.

When the telegraph was first established, with a new system of representing words, and of necessity employing operators new to the business, there was reason enough in supposing that a large allowance should be made for operative errors. Under the conditions then existing the stipulation of the telegraph companies that they would not be responsible for mistakes unless the message be repeated was not altogether unreasonable. That the public should submit to the same one-sided regulation, now that telegraphing is no longer a novelty, is simply absurd, or worse, since it allows the companies to shirk the proper consequences of employing under paid and incompetent operators. At current rates there is no business that can better afford to furnish the best of servants and service than telegraphing, and with the present development of the art there is no more justice in throwing the presumption on the side of inaccuracy and requiring the public to pay two prices to insure the correct delivery of their messages than there would be in applying the same rule to any other service.

The baker who should offer bread at the current rates, refusing to guarantee full weight and sweetness except for double price, would soon discover that the public did not approve of that way of doing business. And the same experience would befall the tailor, shoemaker, carpenter, common carrier, or other man who should attempt to operate on the plan of non-responsibility except for double prices.

The lack of competition and the easy submission of the public to inherited customs have made it possible for the telegraph companies to continue the practice. At last, however, some one has had the spirit to dispute the right of the companies to make the law for themselves, and the United States Court at Leavenworth, Kan., has justified his action. The court held "that any rule or regulation of the company which seems to relieve it from performing its duty, belonging to the employment, with integrity, skill, and diligence, contravenes public policy as well as the law, and under it the party at fault cannot seek refuge. If it become necessary for the company, in transmitting messages with integrity, skill, and diligence, to secure accuracy, to have said message repeated, then the law devolves upon them that duty."

It is to be hoped that this decision is as well founded in law as it is in reason, and that in case of appeal the higher courts will sustain the lower. There is no reasonable excuse for inaccuracy in the transmission of telegraphic messages. The instruments make no mistakes, and it is possible, by double instrumental records or otherwise, to insure the certain delivery of the message received. It might evolve a little more care and a higher grade of operative ability; but the companies can afford that, and the public should accept nothing less from the companies than a full and exact discharge of the duty undertaken by them.

WHY BEEF IS DEAR.

The reasons given for the current high price of beef are many. The winter of 1880–81 was exceptionally severe and heavy losses of stock were suffered on the great cattle ranges of the West. The drought of the ensuing summer acted not less unfavorably upon the smaller herds of the East. The hay crop was short, and the summer and fall pasturage failed over many States; so that farmers were forced to kill their young stock. In this way, we are told, the beef supply was diminished both in quantity and quality, leaving the demand for good beef far in advance of the supply. The exportation of nearly 200,000 cattle contributed still further to lessen the beef supply for home market. Advantage was taken of the situation by speculative dealers and combinations controlling millions of capital, and by local rings of butchers and marketmen, and the price of beef was thereby raised far above what it would have been in the ordinary course of trade.

All these conditions no doubt had their influence; yet underlying them all was one of vastly greater scope and potency. Notwithstanding the enormous advance made in cattle raising during the past twenty years or so, the increased supply, even in favorable seasons, has not been at all commensurate with the increase in the demand for beef. The ratio of increase in cattle is less than that in population, so that even with no change in dietetic habits the demand for beef would tend steadily to outrun the supply. But our appetite for beef increases much more rapidly than our numbers. The marketman makes his daily rounds with fresh beef in hundreds of communities where salt pork was eaten almost exclusively twenty-five years ago; and generally throughout the country beef has largely displaced pork on the tables of farmers, mechanics, and well-to-do people. This partly because of the universal improvement in the scale of popular living due to general prosperity, but more, perhaps, to the influence of an active school of would-be health reformers who have persistently decried pork as an article of food and created a widespread and unreasonable prejudice against it.

Leaving out of consideration any possible increase in the demand for beef for exportation, we may reasonably anticipate that the home demand for beef will continue to increase as fast, if not faster, than the population does; and there can be no marked decline from the present excessive prices until the supply of beef cattle is brought up to the level of the popular requirement. It is not the prime cost of beef cattle in the field or their necessary cost at the shambles, after being driven or carried half across the continent, that chiefly determines the price of the meat to the consumer, but the single fact that the supply is relatively so meager that cattle-raisers can ask and readily get prices which enable them to make twenty, thirty, even fifty per cent profit per annum on the money invested, selling for six cents a pound, live weight, cattle which cost two cents a pound to raise.

Composition and Setting of Cements.

Mr. H. Le Chatelier, who has for some time been making experimental researches into the composition of the slow setting cements known as Portland, and also into the theory of their setting, has recently presented a paper on the subject to the French Academy of Sciences. He finds that the effective elements of these cements are, primarily, a calcareous peridot, $SiO_2 2CaO$, and secondarily, one or more aluminates and ferrites of lime.

On another hand, as concerns the successive phenomena of the setting of cements, he found the following facts by observations with the polarizing microscope: The action of water produces several compounds. The one of these which plays the chief role in the definite hardening crystallizes in hexagonal plates analogous to those of hydrate of lime, CaO,HO. This was not collected in sufficient quantity to determine its composition. At any rate, it is a product derived from calcareous peridot, and is, in fact, much more abundant in those cements that are exclusively formed of this silicate and not aluminous.

There are also formed (but only in aluminous cements) long needles, which are interlaced in every direction, and the number of which in quick-setting cements is very great. These crystals, when exposed to dry air, become dehydrated and undergo considerable contraction; and when heated in water at 50° C., break into fragments and become reduced to a powder. They result from the action of water upon the tricalcic aluminate. The author ascertained that the latter body, $Al_2O_3 3CaO$, dissolved in pure water in the proportion of 3 grammes per liter, and in larger proportion in salt water, although in this case it became partially decomposed.

These remarks explain the differences that have been observed in practice between slow setting and quick setting cements that are always very aluminous.

Calcareous peridot possesses a remarkable property which ought to give a key to a quite frequent phenomenon in the manufacture of cements. Heated up to the melting point of soft iron, then allowed to cool progressively, it exhibits itself first in the form of a semi-translucent stony matter; then the mass disintegrates and finally becomes reduced to an impalpable powder formed of *debris* of crystals. The inequality in the dilatation of the surfaces brought together by the grouping of the crystals is undoubtedly the cause of the breaking. But if the crystallization has taken place at a lower temperature, there is no grouping of the crystals, so that their symmetrical faces adhere, and there is consequently no pulverization on cooling.

Preparing for the Transit of Venus.

The organization of the parties to observe the transit of Venus on December 6 next, has been delayed in consequence of the failure of Congress to complete the Sundry Civil Appropriation Bill. The Commission has, however, selected the chiefs of parties and the stations at which observations are to be made. Of the stations in the Southern hemisphere two will be in South America, one in South Africa, and one in New Zealand. The southernmost of the South American stations is to be at Port Santa Cruz, on the east coast of Patagonia, in 50° of south latitude. The other South American station will be at Santiago, in Chili, or at some point in the interior. The exact locations of the stations in Cape Colony and New Zealand have not been fixed, but will depend upon the weather probabilities as learned by the observers after their arrival. The following men have been selected to take charge of the four parties: Lieutenant S. W. Very, U. S. N., for Santa Cruz, Patagonia; Professor Lewis Voss, of the Dudley Observatory, Albany, for Santiago, Chili; Edwin Smith, of the United States Coast Survey, for New Zealand; Professor S. Newcomb, superintendent of the Nautical Almanac, for the Cape of Good Hope.

As the parties have not yet come together, it is possible that there may be some changes in these arrangements. The principal stations in the United States will be four in number; namely, Cedar Keys, Fla.; San Antonio, Texas, and Fort Thorn, New Mexico. It is expected that they will be in charge of Professors Hall, Harkness, and Eastman, of the Naval Observatory, and Professor Davidson, of the Coast Survey. The stations to be established by European governments in this part of the world are as follows: Germany, at Hartford, Conn., and Aiken, S. C.; France, one in Florida, one at Martinique, one in Mexico; Belgium, one in Texas; Great Britain, one at Bermuda, one in Jamaica, and one at the Barbados. The American observers will depend chiefly upon photography, which is their strong point, the American photographs taken at the last transit being the only ones which were serviceable. The Germans depend upon the heliometer, and the French and English and Belgians upon contact.

New Hybrid Silk Moth.

Mr. Alfred Wailly, whose reports on silk-producing and other Bombyces reared by him will be found in THE SCIENTIFIC AMERICAN SUPPLEMENT, has submitted to the Council of the Society of Arts, London, specimens of cocoons and moths of a new silkworm, which he has reared by the crossing of *Attacus* (*Antheræa*) *Roylei*, female, the Himalayan oak silkworm, *Attacus* (*Antheræa*) *Pernyi*, male, the North China oak silkworm. The resulting hybrid is larger than either of the parents. Mr. Wailly writes that "the larvæ of the hybrids were reared with the greatest success in France, Germany, Austria, England, Scotland, and United States of North America, and everywhere splendid cocoons were obtained. This year (1882), in April and May, the moths of this hybrid emerged from the cocoons in equal proportions of male and female, all perfect insects, which paired with the greatest facility." He concludes by saying: "Contrary to what has taken place with the crossing of different species of silk producing Bombyces, I have this time produced a new species, which is larger, stronger, and I think superior in every respect to the parent species, and susceptible of reproduction."

To make plaster of Paris hard enough for a mould for metal, use ten per cent of alum in the water used for mixing the plaster.