rich Krupp maintained a pension fund for his employes, amounting to $4,125,000.

Notwithstanding his vast benevolent interests, he is said to have been an autocrat in the management of his affairs. He was almost unknown by sight to his workmen, and rarely visited the works or even his offices. Unlike his father, he took no interest in the technical side of his business, and yet in fifteen years he more than doubled the fortune which he inherited.

AN AMERICAN PARALLEL TO THE TULIP CRAZE IN HOLLAND.

BY IRVING U. TOWNSEND.

Probably few persons not thoroughly conversant with the history of the silk industry in America, are aware that the tulip mania which raged in Holland nearly three hundred years ago, had its counterpart here two hundred years later.

Five hundred dollars was often paid for a bulb of the Admiral Liefkens or of the Gouda variety, $1,000 to $1,200 for a Viceroy, and $2,000 for a Semper Augustus during the mania. In 1634 the craze became so great that all usual industries were abandoned. A choice bulb sold for $1,900 in cash, two horses, a carriage and a set of harness, representing in all $3,000. Persons frequently invested $50,000 in a few dozen bulbs with which to begin business, mortgaging their houses or giving personal property in exchange. These extraordinary values checked the cultivation of tulips, as the bulbs could be bought and at once sold at a profit to speculators. Finally the real tulip lovers became disgusted and in February, 1637, suddenly placed large quantities of the most valuable varieties upon the market. This produced an immediate and disastrous decline in the price of bulbs. Without a day's warning, thousands found themselves ruined. It was several years before Holland overcame the effects of this strange mania.

Now comes the analogy. James I., who almost insanely hated tobacco, was determined that silk worms should be reared in Virginia, mainly because he thought he could thus destroy the tobacco culture, which he ordered to be abandoned. Some silk was produced and sent to England. The coronation robe of Charles II. was made from such silk. During the next hundred years there occasionally appeared a waistcoat or handkerchief of a Colonial delegate, made from homespun and woven silk, and sometimes grand ladies were arrayed in gowns of native-grown silk. For a time silk culture met with great success in Georgia. In 1759, 10,000 pounds of raw silk were thence exported to England. Connecticut was, however, the center of the industry. The Legislature offered a bounty for planting trees. As late as 1825 the culture of silk was very general there and also flourished in Massachusetts. In Pennsylvania it was undertaken and continued with success until the Revolution.

Silk worms were fed on the white mulberry (*Morus alba*) until 1830, when there appeared the Chinese mulberry or *Morus multicaulis*. Dr. Felix Pascalis made known the remarkably rapid growth and the supposed excellent qualities of the tree, thus opening this Pandora's box whence so many evils escaped. It was predicted that by its culture two crops of silk could be raised annually. It had large, thin, tender leaves; it could be propagated easily by cuttings and cultivated as a shrub; and it was claimed that its leaves formed the most nutritious food for silk worms. Soon all the agricultural literature and the newspapers of the country became surfeited with descriptions of this wonderful tree.

At this very time Congress was considering the subject of silk culture. In 1825 the country had imported silk goods valued at $10,000,000, and had exported breadstuffs worth only $5,000,000. This was considered an alarming state of affairs. Secretary Rush of the Treasury was directed to prepare a manual on the growth and manufacture of silk. This was issued in 1828 and known as the "Rush Letter." Many documents relating to sericulture were published by Congress. A Congressional committee recommended that all public lands be leased gratuitously to those who would undertake the cultivation of the mulberry. A bill barely failed of passage that authorized an expert to instruct the farmers everywhere how to cultivate the *Morus multicaulis*. The Massachusetts Legislature ordered the preparation of a manual on silk culture which was very potent in fomenting the craze. The legislature of nearly every State provided for the payment of liberal bounties for planting mulberry trees and raising cocoons.

Thus it was that a speculative furor, a veritable madness, seized upon all classes of people, and particularly—of all men—upon the shrewd, calculating Yankee. It raged like an epidemic. Not only agriculturists, but doctors of divinity, law and medicine, scholars, tradesmen and mechanics, men and women, old and young, were infected with an insane passion to raise mulberry trees. Every one thought the glorious day was dawning when each farm would be a nursery for the young trees, and every house have its cocooneries and its silk worms yielding two or more crops of cocoons yearly. The farmers' wives and daughters, when not feeding the worms, were to reel the silk which would become as cheap as cotton, every woman having at least a dozen silk dresses. A writer of the day said, "You can scarcely go into a house but you find the inmates engaged in feeding worms."

The large profits anticipated in producing silk were insignificant compared with the fortunes that all expected to make by raising the new mulberry tree. This was planted in close hills or in hedges, it adorned highways, and rarely was a garden or any cultivated spot to be seen without it. In 1834 trees of a season's growth were sold for $3 to $5 a hundred, but they soon sold at $25, $50, $100, $200, and $500 a hundred, and sometimes $7 apiece. There is recorded an instance of two trees of one season's growth, raised by one Elder Sharp in North Windham, Conn., which were sold at auction. The first brought $106, and the second $100. Further sales were then withheld because the bidding was not considered to be sufficiently spirited.

As cuttings with buds or eyes were sufficient for planting, slender switches two feet long sold for $25 a dozen and were declared to be worth $60. In fact, the value of the trees became greater than that of the silk which they could by any possibility produce. They became worth too much to be used for silk culture. When the craze reached its height, but little silk was produced for every one was busy raising the new mulberry tree. The speculation in planting, buying and selling trees withdrew attention from the more legitimate business of raising silk worms. Men expected to make fortunes in a few months buying land and planting mulberry slips, and the silk companies almost without exception sank their capital in this way, many fully equipped mills being closed.

One farmer planted $1,000 worth of trees in ¾ of an acre and sold them the next year for $6,000. Elsewhere the trees upon two acres brought $4,000, those upon fifteen acres brought $32,500, and those upon ten acres brought $38,000. The sales in a single week in Pennsylvania exceeded $300,000, and often the same tree was sold several times at advancing prices. A newspaper of the period said:

"Friday, the 'Alabama' took to Baltimore 22,000 mulberry switches, the value of which at the lowest calculation, based on actual sales throughout the country, cannot be less than $45,000. The number of eyes on these switches is ascertained by carefully counting them, to be 2,254,000, which would be considered cheap at 2 to 2½ cents a piece. The whole was raised on fifteen acres of land that would be considered well sold at $10 an acre in ordinary situations."

In 1839, just before the people came to their senses, a nurseryman sent an agent to France to purchase several millions of young trees. He carried $80,000 in cash as a first payment. When the trees arrived, the inevitable crash had come, and the nurseryman failed for so large an amount that he could never reckon up his indebtedness. His trees were offered in vain at a dollar a hundred for pea brush.

After the crash some large holders sought to unload without loss. They chartered an unseaworthy vessel, loaded her with trees and sent the cargo heavily insured via New Orleans to Indiana. To their great chagrin the vessel reached New Orleans safely and the trees were transferred to river boats at great expense and hurried on to their destination. When finally they arrived no one would take them as a gift.

When the fever was over and the people realized that their capital stock was suddenly worthless, a deep reaction set in. They pulled up all the mulberry trees in a rage and burned them as brushwood. The numerous companies which had invested their capital in them succumbed almost without exception. In 1841 only one survived and that perished four years later. In 1844 a violent storm following a general blight destroyed most of the remaining *Morus multicaulis* trees and even the more hardy white mulberry variety. This was the finishing blow and thus silk culture in America practically ceased to exist. No industry ever, in this country, received such a crushing stroke.

From that day to the present, sericulture has at times been spasmodically undertaken on a small scale in many States, but the total output has been almost infinitesimally small. The Secretary of Agriculture is now endeavoring to revive American sericulture by governmental aid.

RESTORATION OF THE PARTHENON.

Despite foreign criticism Greece is determined to restore the ancient Parthenon. At first the work was to be carried out with old fragments of marble taken from the surrounding earth, but the authorities finally decided that nothing but new, freshly quarried stone should be used. The result will probably be grotesque, for the ancient stone is weather-stained.

The original appearance of the old structure can probably never be restored. It has been quite definitely settled that although the edifice was built of the purest white marble, it was colored here and there. It is likely that the sculpture was also relieved by color and that the moldings were painted or gilded. The Greek government intends completely to restore the building merely so far as its original shape is concerned.

SCIENCE NOTES.

An oxyacetylene blow-pipe is described by M. Fouché in the Bulletin of the French Physical Society. The flame is formed by the combustion of a mixture of one part of acetylene to ¼ of oxygen, and in order that the explosion may not travel back into the blow-pipe, a jet velocity is required, due to the pressure of a water column four meters in height. The flame melts most metals readily; it will solder iron and steel. Even silica and lime are melted by it. With a reduction of the proportion of oxygen, the flame becomes luminous, and on falling on lime the free carbon goes to form carbide of lime.

J. O'Brien contributes a suggestive note to the Gardener's Chronicle, on the differing odor of *Odontoglossum hebraicum* as observed at different periods. When first flowered by the writer the blooms had a marked cinnamon odor, quite distinct from the hawthorn fragrance of other members of the group. On passing into other hands, the plant, when it first flowered, gave off the hawthorn odor but on the next occasion of its blooming the smell was that of cinnamon. The writer does not state if these differences of odor have been traced to diverse periods of the blooming. It has been noticed by those who grow the common jasmin that the flowers, when first expanded, possess in a marked degree the delicious fresh odor which is characteristic of them. But as flowering progresses, the perfume becomes less delicate, and the blooms are then very attractive to blue-bottle flies. This would appear to have some connection with the recorded formation of indol in the jasmin bloom as the process of flowering approaches completion.

Mr. J. Halm, of the Royal Observatory of Edinburgh, has proposed a new and more complete theory of the sun, briefly as follows: Previous theories of the periodic changes have taken no account of the absorbing envelope surrounding the photosphere. If the loss of energy by radiation exceed the production of heat due to shrinkage, the temperature must fall. The level of the layer of maximum radiation, i. e., of the photosphere, must shift toward the center, and consequently the photosphere becomes protected by a greater thickness of absorbing and reflecting matter. After a time the increasing reflection may overheat the photosphere, but the overheated material may be retained at the level of the photosphere by convection currents until the upward tendency becomes so strong as to produce an eruption by which thermal equilibrium is temporarily restored, after which the cycle is repeated. The mathematical expression of the theory gives an equation from which a curve of sun spots may be computed which agrees very closely with the results of observation, while a "great period" of solar phenomena is accounted for by changes in the intensity of the convection currents, the equation showing that when the spot development is powerful the rise from minimum to maximum will be accelerated. A remarkable conclusion from the theory is that times of maximum spottedness correspond to times of minimum radiation, which would seem to be supported by the more important recent researches.

At the recent International Aeronautical Congress at Berlin Prof. Dr. Assmann, Director of the Aeronautical Observatory of the Prussian Meteorological Institute, described his registration balloon of caoutchouc or Para rubber, which was one of the novelties of the meeting. The ordinary *ballon-sonde*, made of silk or paper and open at the bottom, has the great disadvantage that, when it approaches equilibrium in the upper strata of the atmosphere, its velocity of ascent decreases and the effect of insolation on the thermograph becomes greater, without it being possible to determine afterward the place where the solar disturbance began during the ascent or where it disappeared during the descent; in fact, it is only in certain cases that we can distinguish between the insolation influence and the curious thermal anomalies that have been described by Teisserenc de Bort and Hergesell. The use of a closed balloon made of elastic material has this advantage, that in proportion as the inclosed gas expands, the ascensional force is increased so that the balloon rises faster with augmenting height until it bursts and then falls to the ground with diminishing velocity, because checked by a parachute. The time of equilibrium is therefore reduced to an instant, and although the higher the altitude the more intense is the solar radiation and its effect on the thermograph, yet the speed of ascent and descent is also increased and, consequently, the ventilation, which counteracts the radiation, is likewise stronger. The least possible weight of balloon envelope and of registering apparatus is required, for the lighter the whole apparatus, the less gas is needed, and the smaller the quantity of gas the more it can expand before the envelope bursts at a proportionally greater height.