THE INDIA-RUBBER AND GUTTA PERCHA INDUSTRIES.*

The lecture, of which the following is an extract, lately given by Mr. Thomas Bolas, F.C.S., before the Society of Arts, formed one of those admirable Cantor Lectures which are annually given to members. The importance of the India-rubber tree in connection with the many and useful purposes to which it is applied will be seen, upon a perusal of the lecture, which was opened by a description of the sources of India-rubber.

The earliest rumor of the existence of caoutchouc reached Europe nearly 500 years ago, the first visit of Columbus to Hayti having brought to light the fact that the natives of this island were in the habit of making playing balls of an elastic gum. Nothing more appears to have been heard of India-rubber until Torquemada, rather over 250 years ago, described the Mexican Indians as not only making balls of India-rubber, but also as fabricating helmets, shoes, waterproof fabrics, and other articles of elastic gum. We do not hear, however, of samples of India-rubber reaching Europe until long after this, and little more appears to have been learned regarding the substance until the celebrated French naturalist, La Condamine, made a communication to the Academy of Sciences at Paris concerning caoutchouc, he having had ample opportunities of studying the subject in Para. He tells us that the substance in question was used for making torches, these being only an inch and a half in diameter by two feet long, and yet burning for twelve hours. Again we hear of the use of India-rubber for playing balls, and it appears that the natives were in the habit of using enema or ejection bottles made of caoutchouc.

Soon after La Condamine's communication to the Academy of Sciences, samples of India-rubber frequently reached Europe, and scientific men began to make investigations regarding this remarkable body. Between 1760 and 1770 we find Fresneau and Macquer studying the subject, and the last named investigator made tubes and other articles of caoutchouc by dissolving it in ether and coating moulds with the solution, so that a solid skin of caoutchouc should remain adherent to the mould on the evaporation of the solvent.

From this time until the end of the eighteenth century, the India-rubber industry may be considered to have been undergoing its period of gestation, and to have been born with the dawn of the present century. Among the first of the important patents regarding the utilization of caoutchouc is that granted in 1823 to Charles Macintosh, for dissolving the substance in coal oil, or coal naphtha, and the use of this solution as a waterproofing agent.

About the same time, elastic webbing was first made with threads cut from the raw rubber, and other minor applications of caoutchouc to the industrial arts were adopted from time to time, until the great discovery of vulcanization inaugurated a new epoch in this branch of industry, rendering it possible to so far alter caoutchouc as to make it capable of resisting, to a great extent, the action of heat on the one hand and cold on the other hand.

The milky sap of many plants contains caoutchouc, suspended in the form of minute transparent globules, these being frequently as small as one twenty-thousandth and one fifty-thousandth of an inch in diameter; but comparatively few plants contain sufficient caoutchouc to render them important sources of this body.

The trees which yield the largest supply of the best quality of caoutchouc consist of various species of hevea, which flourish in the northern districts of South America, especially in the province of Para, some portions of the valley of the Amazon being crowded to an extraordinary extent with heveas. The abundance of the India-rubber trees in Para may be judged of by the fact that this province alone exported 7,340 tons of caoutchouc in the year 1877, more than half of this being sent to Liverpool.

* Land and Water.

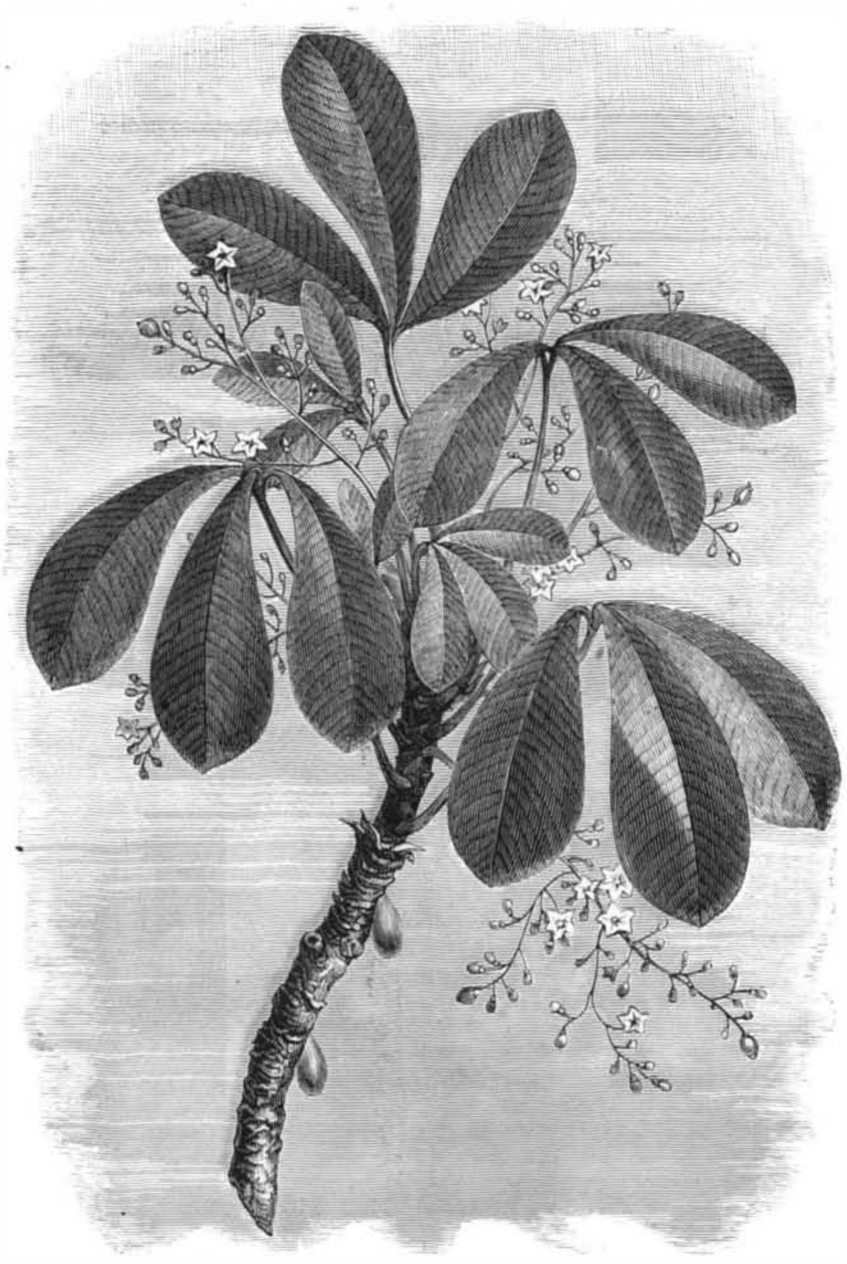

Fig. 1.—HEVEA GUIANENSIS.

Fig. 2.—COLLECTING THE JUICE.

Among the heveas most productive of caoutchouc may be mentioned the *Hevea brasiliensis*, which flourishes in Para, and yields some of the finest caoutchouc, and often attains a height of sixty to seventy feet, with a diameter of nearly three feet; and the *Hevea guianensis*, a similarly magnificent tree, likewise abundantly productive of caoutchouc; and the *Hevea spruceana*, a smaller tree, which grows almost exclusively in the province of Para. The lecturer here projected on a screen a lantern slide, representing the foliage and flower of the *Hevea guianensis*, of which Fig. 1 is an illustration.

In collecting the juice, an illustration of the process being given by Fig. 2, a series of cuts are made through the bark of the tree; either shells or clay vessels are attached to receive the exuding milky sap, and when sufficient of this has been collected, the operation of drying it is performed as follows: A kind of wooden bat, thinly covered over with clay, is dipped into a pail filled with the juice, and the bat thus coated is held over a fire, fed with certain wild nuts, which in burning give off abundance of aromatic smoke. In Fig. 3, which represents this operation, it will be seen that a kind of short chimney is fixed over the fire to lead the smoke compactly upwards. As soon as the first layer of juice has become indurated, the bat is again dipped, and the drying operation is repeated, layer after layer being thus dried on the bat, until a thickness of nearly an inch is attained. A knife cut is now made in the bottle or biscuit of caoutchouc thus obtained, so that it can be removed from the wooden bat and exposed to the air to become still furthur indurated. Para caoutchouc, if prepared in this manner, gives forth a fragrant aromatic odor.

The residues of juice left in the various vessels employed, the scrapings of the incisions, together with other materials which the ingenious native thinks he can shuffle off on the unsuspecting merchant as caoutchouc, are made into balls, and sold as "negro head." The negro-head rubber is frequently made into crude representations of animals, which will pass about equally well for a horse, a pig, or a crocodile.

The milky juice of the Para rubber trees has approximately the following composition:

Caoutchouc	32
Albuminous, extractive, and saline matters	12
Water	56
	100

As a rubber producing tree, the *Ficus elastica* stands next in importance of the heveas. The *Ficus elastica* grows abundantly in India and the East Indian Islands, one district in Assam, thirty miles long by eight miles wide, being said to contain about 43,000 trees, many of them attaining a height of a hundred feet. This tree also grows freely in Madagascar, and it is well known to us as a greenhouse plant, a sketch of which may be seen on Fig. 4.

The juice of the *Ficus elastica* contains notably less caoutchouc than that of the American trees, the proportion very often falling as low as ten per cent of the juice. A vine-like plant, the *Urceola elastica*, which grows abundantly in Madagascar, Borneo, Singapore, Sumatra, Penang, and other places, yields a considerable amount of caoutchouc of very good quality.

Africa yields a considerable quantity of caoutchouc, but generally soft and of inferior quality. It is believed to be yielded by various species of landolphia, ficus, and toxicophlea.

Caoutchouc is nearly colorless, and when in thin leaves tolerably transparent. It, like very many other substances, contains nothing but carbon and hydrogen, but its properties differ very widely from those of other hydrocarbons almost identical in composition. It has been found to contain, in one hundred parts, 12·5 of hydrogen and 87·5 of carbon.

Caoutchouc, as might be supposed, burns very readily, and leaves no residue. It is soft, and very imperfectly elastic, in the true sense of the term; that is to say, it does not return to its original dimensions after having been considerably stretched.

As regards the stretching of India-rubber, there is a point at which it requires a greatly increased force to stretch it, and at this point it seems to become fibrous in texture, as you may perceive by examining this extended sample by the aid of a magnifying lens. India-rubber has valuable electrical properties, as you are no doubt aware, it being an admirable insulator, and having a remarkable tendency to become electrical by friction.

Freshly cut surfaces of India-rubber cohere very strongly when brought into contact, and this is well illustrated by the old way of making a tube of unvulcanized caoutchouc.

Cold has a remarkable effect on caoutchouc, rendering it rigid and inelastic, and this circumstance considerably detracts from the value of unvulcanized India-rubber. A strip of India-rubber, soft and pliable, will, upon exposure for a few minutes to a temperature of 0° Cent., or the freezing point, become rigid and stiff, but its original pliability may be restored, either by warming or by applying sufficient tensile strain to it, to extend it to three or four times its length. In each case it is restored to its original condition. In the case of the stretching it is very likely that the effect is due to heat evolved during that operation.

The effects of heat on India-rubber present many points of interest. A band of caoutchouc attached one end to an index, stretched to the zero of a paper scale, will, if a gentle heat be applied to it, contract, as regards length, but expands in a transverse direction, causing the index to move rapidly through a space of several degrees. This property, which stretched caoutchouc possesses, of contracting by heat, may be described by saying that within certain limits the tensile elasticity of caoutchouc is increased by an elevation of temperature. Caoutchouc, however, if heated to 100° Cent., softens considerably, and almost entirely loses its elasticity, while a heat of 120° Cent. produces a most decided softening effect on caoutchouc of the best quality, but after exposure to this temperature it recovers its pristine state by exposure to cold for a moderate period. If, however, the action of heat has been pushed still further, say to 200° Cent., the caoutchouc becomes converted into a permanently viscous body, which has little or no tendency to harden again. This viscous substance possesses the same composition as unaltered caoutchouc, and is of value as a medium for making air-tight joints, which can be easily undone.

When caoutchouc is subjected to a temperature somewhat above 200° Cent., it becomes converted into a variety of volatile hydrocarbons, which present many points of interest, and you will find a tolerably full account of them in the manuals of chemistry. India-rubber is subject to two kinds of deterioration and decay. In one instance it tends to become soft, and loses its elasticity, while in the other it becomes friable, yellowish, and resinous in its nature. The last mentioned kind of deterioration has been clearly and indubitably traced to an oxidation of the caoutchouc. This oxidation is tolerably rapid when the caoutchouc exists in a finely divided state and when it is exposed to damp at the same time; but the alternate damping and drying of the caoutchouc tends more towards its rapid oxidation than does a continual state of dampness. The resinous matter resulting from the oxidation of caoutchouc has been carefully studied by Spiller, who found that a sample of felt, originally composed of cotton fibers and India-rubber, had become so far changed during six years as to contain no trace of caoutchouc; but in its place he found a resinous substance resembling shellac. This resinous body, of which a sample is before you, is easily soluble in alcohol, and also dissolves in benzole. Alkalies dissolve it readily, and acids precipitate it from the alkaline solution. It contains 27·3 per cent of oxygen.

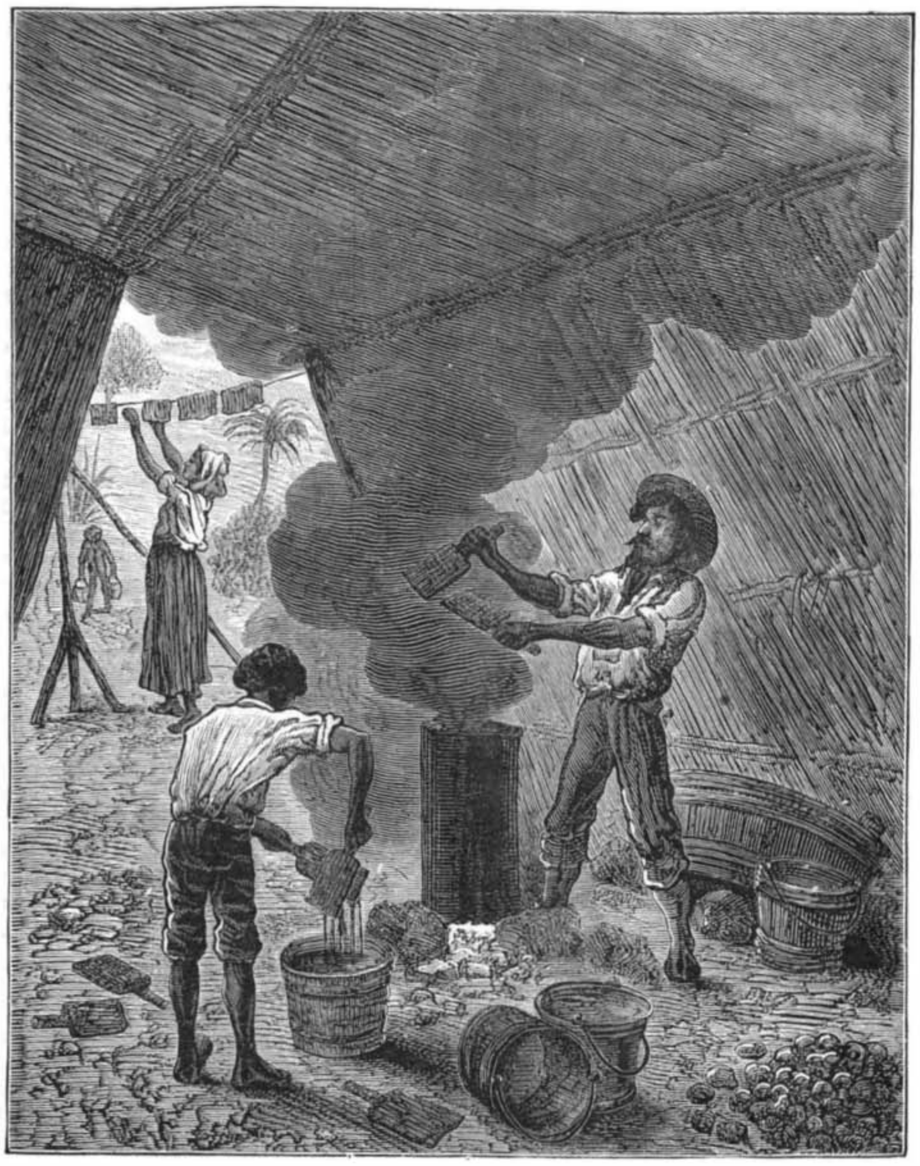

Fig. 3.—SMOKING THE GUM.

The conditions under which the softening of the India-rubber takes place are not so well understood, but there is some reason to believe that this is due to incipient oxidation. Ozone oxidizes caoutchouc with extreme rapidity, as Warren pointed out in 1877.

It is extremely probable that the rapid deterioration of caoutchouc, which is known to take place under conditions which are not perfectly understood, is frequently due to the corrosive and oxidizing action of ozone.

Ozone, or some agent nearly resembling it, is often produced when oil of turpentine is exposed to the air, and this circumstance may perhaps explain the destructive influence which oil of turpentine occasionally exercises on India-rubber.

Exposure to sunlight often causes the destruction of India-rubber, either converting it into a soft and sticky substance, or into a hard body, less soluble in benzole than unaltered caoutchouc; and it is quite possible to obtain a photographic print by exposing a film of India-rubber under a negative, and then dissolving away those parts on which the light has not acted by means of benzole. It is generally a discreet thing to keep India-rubber where it will not be exposed to the prolonged action of a powerful light, although there are cases in which exposure to light is a useful aid to the process of vulcanization. India-rubber is, to a certain extent, porous and cellular in its texture, as may be seen by a microscopical examination of a thin section. Again, if a thin leaf of caoutchouc is boiled for a long time in water it absorbs a considerable proportion of this liquid. The amount may, in some cases, rise as high as 25 per cent. In a similar manner alcohol is absorbed by India-rubber, but this fluid is absorbed more readily than is the case with water.

Now we pass on to a more important matter, namely, the action of such liquids as benzole or coal naphtha on caoutchouc. Here are two cubes of Para rubber, each being three-eighths of an inch across the face. One of these I will preserve as a pattern, and the other I will suspend in a bottle containing benzole. The cube suspended in the benzole will immediately begin to swell, and will continue to do so until it has attained a bulk about one hundred times as large as its original size. During the time that the cube is swelling in the benzole a certain proportion of the caoutchouc will become dissolved out, and incorporate itself with the bulk of the solvent. Now, as a matter of fact, every kind of natural India-rubber contains two distinct modifications of caoutchouc, one of which tends to swell up in such a liquid as benzole, while the other dissolves and forms a true solution. The first mentioned of these bodies may be referred to as the fibrous constituent of caoutchouc, while the second may be spoken of as the viscous constituent. The proportions in which these two bodies occur in raw rubber varies extremely; Para rubber, of good quality, containing only a small proportion of the viscous constituent, while African tongue, on the other hand, consists principally of the viscous modification of caoutchouc. The viscous constituent of caoutchouc is the agent principally concerned in the joining together of freshly cut edges of India-rubber. The treatment of the juice of the India-rubber trees is often of such a nature as to greatly deteriorate the caoutchouc obtained; a considerable proportion being thus changed from the fibrous to the viscous condition. This kind of injury to the caoutchouc can be obviated by coagulating the milky juice, and carefully drying the clot after it has been subjected to pressure. For experimental purposes alcohol may be employed as a coagulating agent; while, on an industrious scale, alum has been tried with apparently an excellent result. The milk is strained to remove solid impurities, after which a small proportion of alum solution is added. The clot which separates is next drained or pressed, after which it is dried. Caoutchouc dissolves more or less perfectly, according to its condition, in various liquids, among which may be mentioned the various fixed and hydrocarbon oils, chloroform, ether, and carbon disulphide. Unless, however, the caoutchouc has been masticated or otherwise degenerated, it is doubtful whether a true solution is obtained. When a clear limpid solution is required, one of the best solvents is that proposed by Payen, namely, carbon disulphide, mixed with 5 per cent of absolute alcohol. If one part of masticated caoutchouc is dissolved in thirty parts of the above solvents a solution is obtained which can be filtered through paper, and may be employed in covering the most delicate moulds with successive layers of caoutchouc.

Fig. 4.—FICUS ELASTICA.

Caoutchouc may be utterly ruined by the use of impure solvents, and those experimenting with india-rubber solutions should in cases where it is desirable to regenerate the caoutchouc, by allowing the solvent to evaporate, take the utmost care not to employ any solvents which contain fatty or greasy matter.

Weak or diluted acids have little or no action on caoutchouc in the majority of cases, but strong sulphuric acid slowly acts on it, the action becoming rapid if heat be applied. Strong nitric acid acts on it with some energy, causing its entire destruction, and in a similar manner it is destroyed by the prolonged action of chlorine, bromine, or iodine; although these reagents, when their action is kept under control, have a vulcanizing or strengthening action.

A Peculiar Steamboat.

A propeller of novel construction has just been finished in San Francisco, California, to ply between that city and the Eel River Valley. The condition of the route required a staunch sea boat, which should also be of light draught, to be able to cross the bar at the mouth of Eel River.

The vessel is 152 feet in length, 140 feet length of keel, 26 feet beam, 9 feet depth of hold, and will register 250 tons. When loaded with 300 tons of freight she will draw only 7 feet of water. She is flat-bottomed, but has a tapering bow and stern, and her lines are as beautiful and graceful as those of a yacht. The peculiarity of the boat consists in the arrangement of the two propellers. Instead of projecting from either quarter on either side of a single rudder there will be two rudders, and each propeller will be arranged with respect to its corresponding rudder, just the same as it would be if there were a single propeller. There are in reality three keels, the center one curving up at the stern, following the line of the vessel. Those on either side, however, are 12 or 15 feet apart, and run straight out beneath the stern, where there are two stern posts and two rudders. The spaces between the keels and the hull proper are filled in solidly with knees, strongly bolted in every direction. There is left between the two keels a wide space, which will give free access to water, so that each propeller will act as well as if it were the only one used to draw the boat. The propellers are 6½ feet in diameter, of the Hirsch patent, and the pitch of the blades is set opposite, so that in going ahead both will turn to the center. They will be driven by twin compound engines, set 9½ feet between centers, with a surface condenser between. The condenser will contain 753 tin-plated brass tubes, ⅝ inch in diameter, secured in end plates with a wooden ferrule, and affording 618 feet of cooling surface. The condenser will be operated by a Blake compound air circulating pump, throwing 300 gallons per minute. The engines will have high and low pressure cylinders, the high pressure being 11 inches in diameter and low pressure 20 inches, with a 15-inch stroke. The steam will be supplied by a tubular boiler, with 3-inch return tubes. The engines will be so arranged that the engineer will face the bow, and will regulate his propellers by levers on either hand—pushing them forward when the bell signals "Go ahead," and bringing them back when he is signaled to back the vessel. The arrangement of the propellers is such that one may be backed while the other moves ahead, and the boat can thus be turned in her own length. This is of especial importance, on account of the narrow and crooked channel across the Eel River bar, where boats often ground because of their inability to turn quickly enough. The two keels under the stern will serve to protect the propellers if the boat grounds.

Water as a Prophylactic and a Remedy.

At the recent meeting of the American Neurological Society in this city, a paper was read by Dr. S. G. Webber, of Boston, upon this subject, from which we abstract the following:

Many people had a notion that it was injurious to drink at meals, but a moderate quantity of fluid taken at meal time was rather beneficial than otherwise. A large class of patients were affected with symptoms of an indefinite character—a vague unrest, showing itself by discomfort or even pain, sometimes in one place, sometimes in another. They were usually subject to constipation, often had an unhealthy hue of the skin. They were frequently classed as hypochondriacal or hysterical. There was no well defined disease. These patients usually drank too little water. The waste of the tissue changes in the system must pass into the blood, and could only leave the system in a state of solution. During comparatively good health, the amount of blood was maintained at nearly the same figure, and only so much water would be parted with through the skin, lungs, and kidneys as could be restored from other sources. If too little water was ingested, the perspiration would be slight, the elimination of urine would be diminished, and the excretion of waste material would be lessened. The blood would be continually saturated, or nearly so, with the results of disassimilation. The removal of the waste of tissue changes was not accomplished with sufficient regularity, and the tissues became clogged with used up material and nutrition was interfered with. The balance each day against health was very slight; but after a time there was such an accumulation that unpleasant symptoms were developed. If the person continued to eat heartily, either the surplus food passed off by the intestines, or was deposited in the shape of fat, the nitrogenized portions assisting to load the urine with urea and the urates. Let such a person drink a large amount, and the blood, having a sufficient supply of water, more urine would be secreted, the loss made good to the blood by absorption, and a larger amount of waste products would be taken up to be eliminated; more urea or phosphoric and sulphuric acids passed off by the urine, which was increased in amount, and there was more disintegration of the tissues. This last was made up by new material, so nutrition was increased. The doctor found that neurasthenic patients did not drink enough.

Dr. Beard remarked that he had found thirst a prominent symptom of neurasthenic patients. He had been using Summit water with good results. He used the bromides alternately with tonics and a free supply of water. The plan was very satisfactory.

Dr. Webber said that patients who drank no more than a pint or twenty ounces of water per day, had told him that they were not thirsty, and were surprised when he told them to drink more water. These directions being complied with, the patients, in the course of the week, developed thirst, and drank as many as three pints a day.

Analyses of Barley, Rice, and Maize.

The following comparative analyses of the three grains are by Pillitz:

		BARLEY.		RICE.		MAIZE.	
		Air dried.	Dried at 257° F.	Air dried.	Dried at 257° F.	Air dried.	Dried at 257° F.
Moisture		13·88	—	12·51	—	13·89	—
Starch		54·07	62·65	74·88	85·41	62·69	72·27
Insoluble ash		1·07	1·23	0·39	0·45	0·33	0·38
Fatty matters		2·66	3·08	0·78	0·90	4·36	5·03
Cellulose		7·76	8·88	0·76	0·87	4·19	4·82
Insoluble albuminoids		12·43	14·28	8·78	10·01	8·63	9·95
Dextrine,	Soluble in water	1·70	1·96	1·11	1·27	0·76	0·83
Sugar,	Soluble in water	2·43	2·71	traces	traces	1·38	1·59
Soluble albuminoids,	Soluble in water	1·77	2·05	0·41	0·46	1·87	2·16
Soluble ash,	Soluble in water	1·26	1·45	0·45	0·61	1·15	1·32
Extractive matter,	Soluble in water	1·50	1·71	0·11	0·12	1·43	1·65
		100·53	100·00	100·18	100·00	100·68	100·00

Enemies of the Tea Plant.

Speaking of blight, we think that if more care was taken to watch its first appearance, many of the remedies prescribed might be possibly effectually applied. But when blight has been allowed to spread over a large area, it becomes almost impossible to stop it. Bushes on which blight appears should be promptly treated, wherever possible, and different known remedies tried. It is seldom that an area is attacked all at once, and there is no doubt that with spider and some other blights, they are carried about by the coolies from bush to bush. It is generally supposed that heavy rain washes away the red spider. To a certain extent, no doubt, it does, but the creature has a trick of getting underneath the leaf when he finds the moisture too strong for him, and when the warm sun comes out again he recommences his peregrinations and destructive action over the surface of the leaves. The activity of the insect is something surprising, and an investigation, under the microscope, of the leaves attacked will show them transparently red, and covered with hundreds of eggs, with little spiders emanating therefrom and cutting about with amazing vigor. The unhatched eggs (that is those not yet matured) are unfortunately not destroyed or washed off the bush by the rains, in consequence of being practically gummed to the leaf, and thus a second syringing or treatment should follow very quickly. If heavy rain falls at the right time, it may save the trouble of syringing.

Besides the red spider blight, the Darjeeling district is suffering from green fly blight. This pest eats the outside of the stem of the flush, causing the leaf to curl up and wither by reason of the sap being prevented from rising. There is also the red bug, which cuts through the upper shoot of the flush, and makes it droop off. Then the mosquito blight, which, puncturing the leaf, and preventing the distribution of sap, hardens it.—*Indian Tea Gazette.*

Distortion of Lenses by Pressure or Strain.

Many photographers have from time to time remarked that it is occasionally impossible to focus an object sharply and clearly, even with a lens known to yield a satisfactory result in ordinary cases. Setting aside such obvious causes as light shining into the lens, or the presence of moisture on one of the glasses, there can be little doubt that the most frequent source of the difficulty in question is a bending or distortion of the objective by some mechanical force acting on it. In the case of lenses burnished into their mounts, a contraction of the ring by cold may distort the lens uniformly, if its fit in the mount is accurate, merely altering the focus and disturbing the corrections of the instrument. If, however, the cell in which the lens may be mounted is not turned with extreme accuracy, or if the outside of the lens itself is not truly round, so irregular a distortion may arise as to altogether destroy the defining power of the combination to which the lens belongs. There is no question that the practice of burnishing lenses into their mounts has its disadvantages, for when this plan is adopted the operator has no easy remedy against a "frost-bound" lens, excepting to keep the instrument warm during the time he is using it. If, on the other hand, the glasses are not cemented in their cells, they are liable not only to be misplaced by careless persons, but also to be distorted by being screwed down in their places by an undue degree of force. Lenses should generally be left just the least bit loose in their mounts—not quite enough to cause any possibility of shaking, but the right degree of looseness can generally be estimated by making an attempt to turn the lens in its setting. Few persons realize the ease with which glass bends and yields to pressure.—*Photographic News.*

ENGINEERING INVENTIONS.

An improvement in endless cable railways has been patented by Mr. Samuel M. Pettengill, of Brooklyn, N. Y. It relates to railways provided with a moving endless cable, rope, or chain, for propulsion of the cars. The object of this invention is to furnish the cars with means for seizing and firmly holding to the rope or cable without shock.

Mr. James B. Jenkins, of Warren, Ill., has patented a grapple for lowering pipes into wells that may be detached from the pipe automatically by sliding it down on the pipe until it comes in contact with a coupling.

An improvement in that class of railways in which no wooden ties are used, and the pot sleepers or chairs are flared to rest directly upon the ground, and are cast in one and the same piece with a jaw which is perforated with holes for the fish bolts, between which jaw and the fish plate the rails are bolted, has been patented by Mr. William Rainbow, of Chancery Lane, England. The improvement consists, mainly, in the means for connecting the chairs so as to preserve the gauge of the road.

A clock device to be used on railroads to be operated by passing trains, whereby the time elapsing between the passing of one train and its next succeeding one will be correctly indicated to the engineer of the succeeding train, has been patented by Mr. Alma P. Burroughs, of Seneca Falls, N. Y.

Mr. Augustus B. Wood, of Fountain Hill, Ark., has patented a cheap and economical oscillating engine furnished with a valve so arranged and controlled that friction and pressure upon the valve seat are reduced simply to that which is necessary for preserving a steam tight joint between the two.

An improved low-water alarm for boilers has been patented by Mr. Nathan L. Adams, of Fort Collins, Col. The object of this invention is to furnish steam boilers with an improved device that will indicate automatically and give an alarm when the water in the boiler falls below the safety point.

Mr. Anton Pohl, of Baltimore, Md., has patented an improved spark arrester, in which the joint action of gravity, deflection, and centrifugal force is employed to separate the sparks, cinders, and solid matter from the smoke as it escapes through the stack of a locomotive, whereby the work may be effectually accomplished within the limited space of the stack without materially intercepting the draught. The improvement consists in arranging an annular chamber around a cylindrical stack, and providing the stack with a spiral deflector plate, which will give a rotary motion to the smoke and cause the solid matter to be thrown off against the side walls of the stack, where it is intercepted by projecting plates and conducted through openings into an adjoining annular chamber and deposited at the bottom.

An improved car coupling has been patented by Mr. Edward S. Plimpton, of Denison, Ia. This invention is an improvement in the class of car couplings in which the coupling pin is provided with an arm that projects from the head thereof and rests in a socket in the front top portion of the draw head, so as to constitute a fulcrum on which the pin may swing when pushed back by the link in the operation of coupling.

A Magic Lantern and Six Slides for Six Cents.

A small tin lantern, about three inches high, with lamp, slides, and two lenses, is actually being now sold in London at the above mentioned price; while a larger one of a similar character costs the somewhat more extravagant sum of fifteen cents. The small lantern is of German make, and when one considers that the manufacturer cannot get more than four cents for the article, it is a matter of wonder how it can be produced for the price. Very little can be said as regards the artistic merits of the slides, but like the old Dutch tiles, they at least possess the merit of being hand-painted—if, indeed, this be a merit. The lenses, which, as regards optical work, are superior to many spectacle glasses sold in London, give, as an advertisement would put it, "a brilliant illuminated disk six inches in diameter." There is also sold in London at the present time, a toy camera-obscura about the same size as the magic lantern in question. Who knows but what the present pushing age may produce a small tin photographic camera, double slide. two dry plates, and lens for about 25 cents? It could certainly be done if the work were executed on the same scale of cheapness as in the case of the magic lantern. It is, perhaps, not generally known that a very passable photograph can be taken with a common penny magnifying glass, if it be stopped down and a proper adjustment made for the difference existing between the chemical focus and actinic focus.—*Photographic News.*

Brilliant Tints of Californian Flowers.

Under the title of "A Botanist in Southern California," Mr. J. F. James contributes to the *American Naturalist* some interesting sketches of the vegetation of the country in the vicinity of Los Angeles. Rain falls there only from November to March, and the rest of the year is hot and dry. By the middle of June or July vegetation is parched up, and the country has a very depressing aspect; but the spring is glorious. Then the plains surrounding the city, the hills, and the valleys are one mass of gorgeous, brilliant flowers. They are there by thousands upon thousands, and of almost endless variety. Most conspicuous of all, both for its abundance and its color, is the Californian poppy, *Eschscholtzia californica.* It covers acres of ground, and the bright