GATHERING AND CURING CRUDE RUBBER.

Crude rubber is imported into this country from many widely separated sections of the globe, and in a wonderful variety of forms, the chemical characteristics of the substance changing widely under varying conditions of harvesting, curing, etc.

The first knowledge of rubber is said to have been secured through La Condamine, a French philosopher, who in 1730 was sent by his government to Peru to measure an arc of the meridian, the specimens he secured going to form museum exhibits. South America produces the best rubber in the world, as well as the most of it. The Amazon Valley, embracing rubber forests in Brazil, Bolivia, and Peru, is the center of the industry, the product being exported from the city of Para, whence the name Para rubber.

CURING PARA RUBBER WITH THE FUMES OF THE URUCURU NUT, UPPER AMAZON RIVER.

GATHERING PARA RUBBER IN THE UPPER AMAZON RIVER.

The tree which produces rubber, or caoutchouc, as it is called by the natives of South America, is found chiefly in the tropical zone. The rubber trees on the Amazon rise without branches to a height of from 50 to 60 feet, being topped off by deep green leaves six or seven inches in length. Peru's product, lower in grade than Para, is known as "Caucho." The rubber trees of Nicaraugua and other Central American States, also found in Ecuador, Venezuela, Colombia, and Mexico, produce rubber known as "centrals." The Atlantic States of Brazil, south of Para, produce rubber trees from which come the grades known as "Mangabeira," "Pernambuco," and "Ceara."

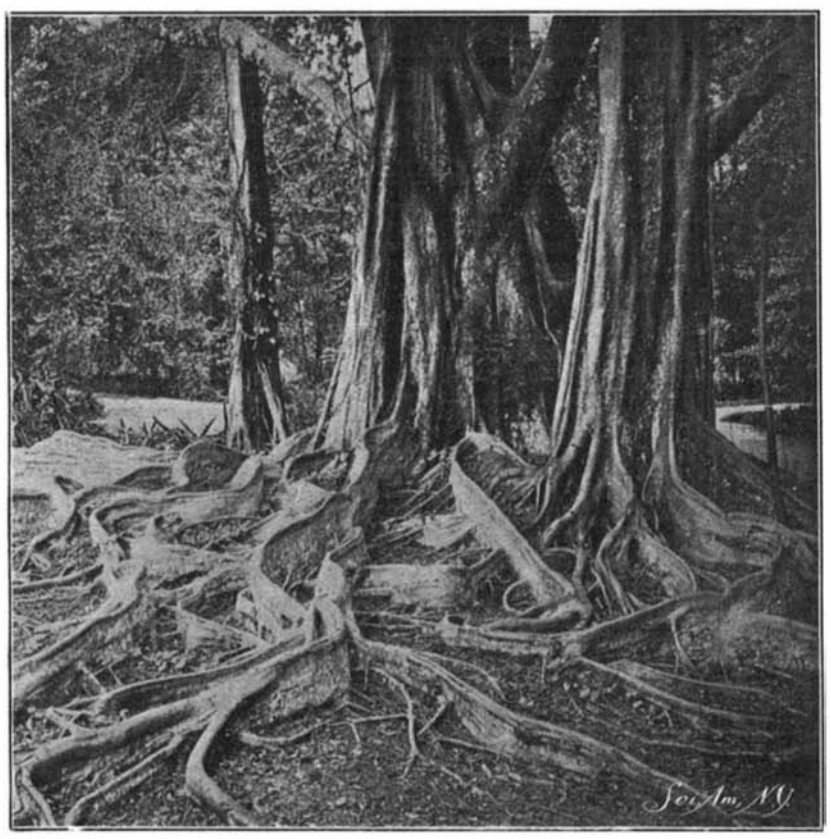
Africa comes next to South America in the amount of rubber produced, and in the interior of that country there are great rubber forests as yet untouched. Rubber is to be found on the east and west coasts and also on the Island of Madagascar. The East Indies furnish comparatively little rubber, the first exported coming from Assam, one of the rubber trees of which district is shown in the accompanying illustration.

The rubber from the Cameroons is in the shape of little black balls, while that from districts farther up the African coast comes in the shape of flat, ugly fragments, known as "oysters."

Fine Para rubber reaches this country in the form of "biscuits," the excellence of this grade being due in a large measure to the natives' methods of gathering and curing it. They make a longitudinal gash in the bark of the tree with a narrow hatchet, inserting a wedge to keep the gash open, and placing a small earthen or clay cup beneath the gash to catch the thick, white, oily liquid which flows from the wound. In a few hours the milk ceases to flow, each wound yielding from three to five tablespoonfuls. The "Seringero," or gatherer, then empties the contents of the cups into an earthern vessel, as indicated in the accompanying illustrations. As the milk soon coagulates the gathering is quickly followed by the curing process, which is done by building a fire of Urucuru nuts, over which is placed the bottomless earthen jar or pot shown in the illustration, the pungent fumes issuing through the small aperture at the top serving to "cure" the rubber, which is passed slowly through the hot smoke.

To form the biscuits, the natives take long stakes of wood, sometimes pointed at the end, and quite frequently shaped like a paddle, dip them into the sap buckets or basins, holding them in the smoke after each dipping, until the successive films of rubber solidify around them. A biscuit of Para rubber, therefore, represents the slow and laborious accumulation of hundreds of dippings, so that quite a stretch of the imagination would be necessary to arrive at the number of dippings required to form the huge Para biscuit illustrated herewith, which weighs 1,120 pounds and measures 4 feet 5 inches in height, 3 feet 5 inches in diameter, and 9 feet 4 inches in circumference. Such immense masses of crude rubber are said to actually represent a loss to the grower, being used principally by importers for exhibition purposes. Sometimes the natives use a stone as a nucleus, and, to prevent this method of securing an illegitimate profit, the biscuits are split in halves before shipment so as to reveal the stake hole running through the middle.

HUGE BISCUIT FINE PARA RUBBER WEIGHING 1,120 POUNDS.



RUBBER TREES IN THE ASSAM DISTRICT OF EAST INDIA.

Residues, and What to Do With Them.*

Briefly, I may tell you that I found the residues of the gold toning bath so much resembling the residues I had to do with in my business of a goldsmith, that I determined to find what the value of the old toning baths really were. To that end I dissolved 2 ounces of sulphate of iron in a quart of hot water. This I put into a two-gallon jar, and as the baths were used up they were poured into the jar after two years. The precipitate was filtered, dried, and burned in an old iron ladle; it was then a heavy brown powder. To this I added twice its weight of pearl-ash, and after much mixing in a mortar, put into a crucible and submitted to a strong heat for an hour, and this gold was in the bottom of the crucible and weighs ¼ ounce troy.

I had it flattened out to what you see, just in the state in which gold-beaters use in the manufacture of gold leaf. The amount of gold recovered I estimate to be 70 per cent of the twenty-four 15-grain tubes bought. I expected to have found some silver from the albumenized paper toned, but I did not. The gold by assay is 23⅝ carats of fine, or 996 in 1,000.

This is a button similar to the first, only heavier. Of silver residues I have saved only the first washings and trimmings of albumenized paper. Common salt was used as a precipitate, and treated generally the same as the gold; it weighed over 11 ounces when it was put into the crucible, now it weighs nearly 5 ounces. These products prove most conclusively the value of residues.

*Paper read at the Photographic Convention of the United Kingdom, July, 1900, by S. B. Webber, reported in The British Journal of Photography.

The Archæological Exhibit of the Department of Fine Arts.

The archæological exhibit of the Department of Fine Arts at the Paris Exposition shows the different expeditions which have been made by the French Government. The Archæological College of Athens has been for some time engaged in excavations at Delphi, and the present state of the work is shown. The sanctuary of Apollo has been almost entirely uncovered; it includes the main temple, theater, and a great number of surrounding structures. But little remains, however, above the foundations, as is shown by a large water-color sketch of the ruins; another sketch shows the restoration; the temple is surrounded by a number of small buildings or pavilions, which contain the offerings made by the different nations. The façade of one of these, belonging to Cnidos, is reproduced in actual size, being about 20 feet long and 25 feet high. The portico is upheld by two caryatides of singular form, somewhat in the archaic style, standing upon square pedestals; the cornice has reliefs representing battle scenes; those of the entablature represent a number of figures seated. Two archaic statues of Apollo are shown, and several figures of a more recent style. The column and the sphinx of the Naxians and an acanthus column surmounted by three female figures are shown in full size. A number of other collections are shown, including that of the expedition of M. de Sarzec in Chaldea, completing the large collection already at the Louvre.

THE Trans-Siberian Railroad will be completed at the present rate of working in about two years, the cost probably considerably exceeding the original estimate of $175,500,000.

The Railroads of Europe 1875-1899.

The table which follows has been compiled and converted from l'Economiste European, of Paris, by the Philadelphia Commercial Museum :

RAILROADS OF EUROPE ON JANUARY 1, 1875, AND JANUARY 1, 1899.

	Miles, 1875, per Million of Inhabitants.	Total.	Miles, 1899, per Million of Inhabitants.	Total.
France	352	12,898	670	25,897
Germany	381	16,109	563	30,776
England	499	16,449	527	21,528
Austria-Hungary	273	10,083	483	21,805
Belgium	324	2,131	560	3,781
Bulgaria	324	2,131	178	616
Denmark	339	635	669	1,617
Spain	211	3,484	445	8,102
Greece	4	7	232	591
Italy	166	4,578	305	9,759
Luxemburg	827	169	1,210	270
Netherlands	261	984	329	1,694
Portugal	137	641	280	1,466
Roumania	150	766	332	1,894
Russia	126	9,665	232	24,808
Finland	249	465	604	1.605
Servia	249	465	144	353
Sweden	514	2,235	1,247	6,359
Norway	22	311	571	1,230
Switzerland	371	1,017	730	2,302
Turkey	111	353	154	978
Isles of Malta	....	....	....	....
Jersey and Man	...	...	211	68
Total	5,317	83,680	10,676	167,439

The Kachin Developer.

We have submitted, says Photography, the new kachin developer to a most vigorous test; we have developed over a hundred negatives with it, using the formula given below. One cannot wish for a more satisfactory developer. It does not stain the plates or the fingers, and has no injurious action upon the skin. It gives good brownish-black negatives, quite free from fog, without the necessity of employing any bromide or other restrainer whatever. Development with it took about six to ten minutes to complete, ample density being obtained very easily.

The formula which we adopted to secure so excellent a result is a simple one. Three solutions, each ten per cent, are required: One of sodium carbonate, one of sodium sulphite, and one of kachin. In making up the ten per cent solution of kachin, instead of water some of the ten per cent sodium sulphite solution is used. For each ounce of developer we took :

Kachin (ten per cent solution)	40 minims.
Sodium carbonate (ten per cent solution)	½ ounce.
Sodium sulphite (ten per cent solution)	½ ounce.

We got, as will be seen, a trifle more than an exact ounce, but such a difference is unimportant, and the composition of the developer is easier remembered in this way.

The solution, as we finally used it, will be seen to contain approximately 4 grains of kachin, 26 grains (22 + 4) of sodium sulphite, and 22 grains of sodium carbonate.

Another formula, given in a little book entitled "How to Develop with Kachin," is as follows :

	British System.	Metric System.
A. Kachin	160 grains (avoir.)	9 grammes.
Sodium sulphite (cryst.)	2½ ounces.	62·5 "
Water up to	20 fluid ounces.	up to 20 c. c.
B. Sodium carbonate (cryst.)	2 ounces.	50 grammes.
Water up to	20 fluid ounces.	up to 500 c. c.

For use, take equal parts of A and B. More diluted developer gives softer results The solutions should be used at a temperature of 60° to 65° Fahr. Assuming exposure to have been correct, with this solution the image commences to appear in about one minute, and, when full density is required, development is completed in from four to six minutes. Softer effects are obtained in from three to four minutes.

For stand development, the plates are placed, a dozen or more at a time, in a grooved trough containing the developer, and development continues with a rapidity depending upon the strength of the solution.

With the following solution normal development is completed in about ten to fifteen minutes. To prolong development add more water :

	British System.	Metric System.
Kachin	115 grains.	7·5 grammes.
Sodium sulphite (cryst.)	560 "	36 "
Potassium ferrocyanide	140 "	9 "
" bromide	23 "	1·5 "
" carbonate	1,150 "	75 "
Water up to	70 fluid ounces.	up to 2 liters.

Throughout these experiments we employed no bromide or other form of restrainer whatever. Our plates, having been exposed (on all sorts of subjects) with an exposure meter and not by guesswork, were all correctly exposed, and however much they differed in the nature of the subject they developed up well with the very simple solution we have named. Bromides seem to have little effect on kachin. This is well shown by the fact that three or four plates can be developed one after another in the same solution without any marked prolongation of the time of development. With most developers, as our readers well know, this is not so. The soluble bromide liberated from the plate into the liquid during development acts as a restrainer, and retards the action of the solution upon the next plate that is put into it. With each plate that is developed it will be seen, then, that the developer is not only getting weaker in the active agent, but is also getting stronger in restrainer.

On the subject of restrainers it has been found that a four per cent solution of ordinary borax used with kachin in the proportion of ten to thirty drops to each fluid ounce results in the production of enormously increased contrast. Plates which have received an exposure of many times the normal may be converted into satisfactory, and even brilliant, negatives by the judicious use of borax in the developer.

Building Loan Associations.

The secretary of the United States League of Local Building and Loan Associations has compiled the following statistics for 1899, which will be found interesting, as no data of this nature is collected through any other source from year to year. It should be remembered that the figures do not include "national" associations; only those that are local and truly co-operative :

States	Associations.	Members.	Assets.
Pennsylvania	1,174	281,456	$12,120,436
Ohio	773	287,477	102,400,699
Illinois	599	100,000	54,104.602
New Jersey	335	90,100	46,100,000
New York	299	89,409	37.253,725
Indiana	424	109,043	31.435,587
Massachusetts	125	68.349	26,744,647
California	151	37,780	20,285,454
Missouri	191	38,000	13,835,817
Michigan	72	32,775	10,159,562
Iowa	79	23,000	5,723,769
Connecticut	15	12,773	3,774,526
Wisconsin	52	13,450	358,902
Kansas	46	12,000	2,880,764
Nebraska	60	13,813	3,332.781
Maine	32	8,115	2.975.716
Tennessee	26	4,795	2,874,097
Minnesota	46	7.500	2,848,179
New Hampshire	17	4,950	1,921.927
North Dakota	7	1,000	364,130
Other States	962	267,800	97,137,800
Totals	5,485	1,503,625	$581,857,170

The Current Supplement.

The current SUPPLEMENT, No. 1286, is an unusually interesting issue. There is an excellent portrait of King Humbert, and also portraits of the present King and Queen of Italy. "The Borsig Engine" at the Paris Exposition gives a full-page engraving of this great engine. "The Future of the Automobile" outlines suggested improvements. "Excavations at Tell-el-hesy, the Site of Ancient Lachish, Syria," is an elaborately illustrated article. "Microbes—What Are They?" is by Dr. Henry G. Graham.

Contents.

(Illustrated articles are marked with an asterisk.)

RECENTLY PATENTED INVENTIONS.

Agricultural and Logging Implements.

GUIDE AND SUPPORT FOR DRAG-SAWS.—EDGAR F. LAFAYETTE, Sedro, Wash. This invention is a small device adapted for attachment to logs or felled trees for guiding or supporting a drag-saw while they are undercut. The device embodies spikes hinged to a bar and adapted to be driven into the log, and a slide adjustable along the bar to support the saw in proper position. The spikes can be folded flat upon the bar so that the entire device occupies but little space.

PLOW.—RICHARD H. PURNELL, Rosedale, Miss. The beam of the plow is made of metal tubing. The cultivating devices are carried by a standard formed with a concave or semicircular upper edge in which the beam fits. The beam and semicircular portion of the standard are bound together by a coupling-band. The entire arrangement is such that great rigidity is secured, as well as lightness and simplicity.

Electrical Apparatus.

ELECTROLYTIC APPARATUS.—ANDREW PLECHER. Habersham and Second Streets, Savannah, Ga. This apparatus is to be used for electrically decomposing any liquid into its constituent gases and especially for decomposing water into hydrogen and oxygen. The apparatus is spheroidal in shape and consists of two separate, closed cells having registering openings by which they communicate. An encompassing band or jacket completely encircles and holds them together. The cells are provided with electrodes, circuit-wires, and gas-discharging pipes. The inventor has been particularly careful so to construct his apparatus that it can be readily transported, that the greatest possible electrode surface is obtained, and that repairs can be easily made when desired.

GAS-BATTERY.—ANDREW PLECHER, Habersham and Second Streets, Savannah, Ga. The surface action of sponge-platinum causes two gases (oxygen and hydrogen) to unite, as every one knows, and to heat the platinum red hot so that the gases are automatically ignited. It is Mr. Plecher's purpose to prevent the production of heat attending the union of the gases and to get its equivalent in electric current. In a porous cell finely-divided platinum is placed. To one side of the cell hydrogen is conducted; to the other, oxygen. When the hydrogen and oxygen unite through the action of the platinum, suitably placed electrodes will gather the liberated forces of opposite polarity as union takes place and carry them off through the conducting wires of an extraneous circuit.

ELECTROMAGNETIC TELEPHONE.—ANDREW PLECHER, Habersham and Second Streets, Savannah, Ga. The telephone includes in its construction an iron box to which an iron circuit-wire is attached. In order to render the boxes magnetic an insulated wire is wound around the circuit-wire. The box is provided with two diaphragms between which a variable-resistance medium is suspended. A small bulb is used to increase or decrease the air-pressure in the box and thus to regulate the amplitude of movement of the variable-resistance medium. The two diaphragme, as they vibrate in opposite directions in response to the vocal impulses, augment the effect on the resistance medium one hundred per cent. The fluctuations are electrically transmitted.

TIRE-SEPARATOR.—DELORE J. LAHAY, Nadeau, Mich. Ordinarily the two sections of a double tube tire adhere to each other so tenaciously that their separation is a matter of no little difficulty. The present invention provides means whereby this separation can be easily accomplished. The means in question comprise a frame or body portion capable of encircling the inner tube and provided with anti-friction wheels or rollers upon which the tire is compressed. The separator is movable between the two tubes to force them apart.

Vehicles, Harness, Etc.

DRAFT-EQUALIZER.—JOHN A. BELTZ, Buxton, N. D. This draft-equalizer, comprising broadly two doubletrees held to rock upon each other and also upon a wagon-pole, prevents any animal in a four-horse team from shirkinghis duty; for the pull of one horse will be thrown upon the neck of the delinquent animal. The draft-strain is entirely disposed at the rear end of the pole, so that the animals pull with greater effect in moving the loaded wagon than is otherwise possible. The device is so constructed that the forward pair of animals control the side movement of the wagon-pole together with the rear pair of animals and must pull equally with them, an arrangement particularly serviceable in rounding corners.

BIT.—MICHAEL MCNALLEY, St. Louis, Mo. The bit invented by Dr. McNalley is designed to induce a horse to carry his head outward and away from the chest rather than to drop his chin in the direction of the chest. The bit is simple and durable, and is so made that it will not irritate the horse or tend to injure the jaw or mouth.

Industrial Apparatus.

MAGNETIC SEPARATOR.—CHARLES F. COURTNEY and ROBERT BUTTERWORTH, Broken Hill, New South Wales. Comminuted ore or other mixture is passed through a highly-concentrated magnetic field in the form of a film, so as to prevent the paramagnetic particles from becoming prematurely detached from the magnetic poles and swept away by contact with the passing stream of matter of lower magnetic permeability with which they are associated. The material is prevented from falling freely until it enters the magnetic field, so that the particles, however low their magnetic permeability, are not lost. The invention is also adapted to separate paramagnetic substances of different degrees of magnetic permeability. For, by regulating the intensity of the magnetic field and the time during which the material is acted upon, a substance having a certain degree of magnetic permeability can be obtained.

CURTAIN FOR DUST-COLLECTING APPARATUS.—ARTHUR S. DWIGHT, Kansas City, Mo., and RUDOLF RUETSCHI, Argentine, Kans. In order mechanically to precipitate and collect metallic fumes and flue-dust in metallurgical establishments, the inventors employ curtains, the members of which present oblique surfaces or facets to the longitudinal currents of the gases between adjacent curtains, so as to divide the current into a larger number of smaller oblique currents and to form eddies or whirls near the facets. Thus is insured a thoroughand rapid mechanical precipitation of the solid matter in the gases on the surfaces or facets. The inventors obtain a large frictional surface for a very short flue, and therein resides one of the merits of their device.

Railway-Appliances.

SPRING-SEAT.—WILLIAM BORCHERT, Carson, Nev. The seat is particularly adapted for use in locomotive-cabs. It is provided with such equalizing devices that it will always be parallel to the base, so that all springs will be equally compressed whether a man sit on a corner or edge. The seat is, therefore, comfortable under all conditions.

Miscellaneous Inventions.

SASH-HOLDER.—JOHN BOHLEN, Big Rapids, Mich. The sash-holder is designed to be used in connection with a rack of any kind and is so constructed that it can be locked in or out of engagement with the rack and supported in such a manner that the window to which it is applied may be conveniently operated when the latch is out of engagement with the rack.

LOCK.—THOMAS CHURCHILL, Hampton, Va. Mr. Churchill has already patented a lock in which the outer knob is made incapable of turning the spindle except when temporarily locked thereto by a key which is inserted concentrically through the knob and is made to act upon clutch devices which cause the knob to be coupled to the spindle. The present invention comprehends further improvements relating more especially to the locking or clutch mechanism which connects the knob with the spindle and which is applicable to any of the ordinary forms of locks, having the usual squared spindle.

SIGN OR SIGNAL FOR CALLING CABS.—ARTHUR G. R. NICHOL, Manhattan, New York city. The invention provides a simple means whereby a clerk in a hotel or theater may call cabs or other carriages successively or simultaneously. Electric lamps of various colors are used, which are flashed by inserting plugs in proper openings. In order to prevent mistakes, the plugs are made to fit only the contact plates for which they are intended. And in order still further to guard against mistakes, plugs of like shape are connected by strings. Hence the operator can not inadvertently leave one plug of a set in a contact-plate; for the entire set must be removed before the connecting-string can be taken off the switchboard.

VENTILATED BOOT OR SHOE.—JAMES J. PEARSON, 40 Wall Street, Manhattan, New York city. This ventilated shoe is provided with a ventilating mat interposed between a perforated insole and the outer sole. The mat is of elastic rubber and is connected with a channel leading to the heel-vent of the shoe for the ingress and egress of air. The most prominent feature of the invention, a feature, which, it is claimed, is not possessed by any similar shoe, is the impossibility of entrapping air in the sole. The air circulation is free, longitudinally and laterally. The cushioned tread, reinforcing devices, and cheapness of manufacture are other features which deserve to be mentioned.

COMBINED HEATER-SHIELD AND VENTILATOR.—ALLAN B. SHANTZ, Walkertown, Ontario, Canada. Much danger is incurred by improper ventilation and especially by arrangements which draw air into a room from a point near the ground, since the gases arising from decaying animal and vegetable matter must also be drawn in. The present invention provides an apparatus by which air is received from an elevated point, the lower impure strata being withdrawn from the room. The novel feature of the invention is an ingenious double-walled shield used in connection with a heater.

TAPE-MEASURE ATTACHMENT.—CORNELIUS H. ELKSKAMP, Telluride, Colo. The inventor has busied himself with the production of an attachment for the end of a tape, which attachment can be readily applied to a floor, stake, post, or the like, so that the tape can be readily run out. The end of the tape is provided with an eye in which a link is held pivoted in a post of such construction that it can be readily driven into a floor, tree, or the like.

PICTURE-FRAME.—ALBERT F. MESSINGER, Phœnix, Arizona Territory. The inventor has devised a novel construction which enables him to mount exteriorly on the frame a picture representing a building, and to move this picture out of sight so that a second picture is made to appear, which represents the interior of the building shown on the first picture. The device is particularly useful for advertising purposes, since it combines in one arrangement views of the exterior and interior of a business establishment.

DUPLEX PENHOLDER.—HARVEY and FRANK LONGENECKER, Beamsville, Ohio. This penholder contains a simple mechanism which permits a ready projection of one pen-socket and at the same time causes