India Rubber in South America.

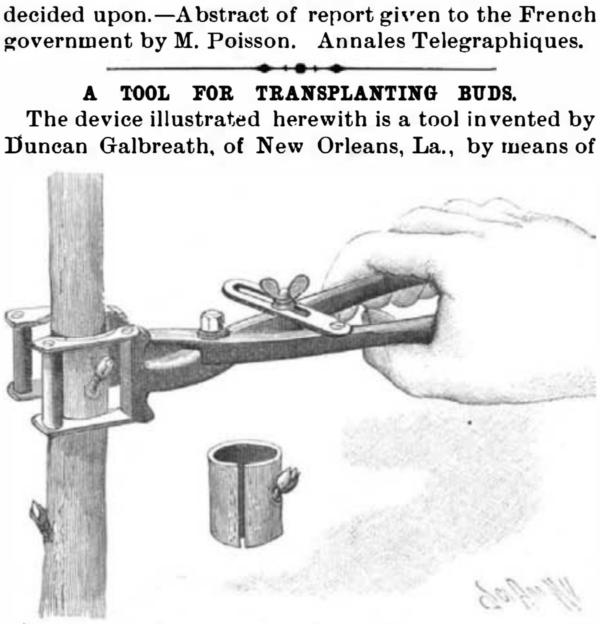
M. Eugene Poisson, who was sent by the French government to South America to examine into the India rubber question, has lately returned, and the official report which he gives presents many points of interest. The principal object of the expedition was to obtain information as well as seeds and plants, with a view of propagation in the French colonies. The city of Para, Brazil, was first visited ; this is one of the great centers of the rubber industry, and the product found in the region is one of the most highly esteemed by the trade. To give an idea of the extent of the traffic in the region called Amazonia, it may be remarked that for the year preceding June 30, 1897, the fifteen principal houses have exported 22,300,000 kilogrammes of rubber, whose total value is estimated at $23,000,000. The Para rubber is taken from a tree belonging to the Euphorbiaceæ, genus Hevea, which grows in the damp earth on the borders of the numerous affluents of the Amazon. Divers species of this tree exist in different regions, giving different qualities of rubber; thus in lower Amazonia is found the H. Braziliensis, in the environs of Manao the H. discolor, and in the regions of the Rio Negro and Rio Naupes the H. pauciflora and H. lutea. In spite of efforts which have been made to determine the value of each of these species, this has been difficult, if not impossible, as it demands a prolonged sojourn in the humid forests which is not without peril for a European, as examples have shown. M. Poisson visited the forests near Para to observe the collection of the rubber. It appears that the natives distinguish two kinds of trees, which they call the white and the black Hevea, from the difference in the color of the leaves, the black giving the better quality of milk, but the mixture of the two seems to be superior to either taken separately. The hevea generally grows singly, and the seringueros, or sap-collectors, sometimes cover several miles in collecting the product. M. Coudreau, the explorer, has seen groups of trees on the banks of certain rivers, but very far from the main stream, generally in localities where it is impossible to stay on account of the clouds of mosquitoes found there. M. Poisson was able, after some difficulty, to secure samples of the milk for analysis, in well-corked bottles, but under the influence of the tropical heat fermentation often takes place. In the Amazon region the rubber is extracted by making a shallow incision in the bark of the tree with a small hatchet ; below the cut is placed a small tin vessel held in place by its sharp rim, which is forced lightly into the bark. The contents of the buckets are emptied into a calabash and taken to the carbet, a small installation where the operation of "smoking" is carried out. This consists in dipping a blade of wood with a long handle into the milk, then exposing above a terra-cotta furnace in which burn small pieces of wood and the fruit of a certain palm called the attalea ; the operation is repeated until a mass of sufficient size has been obtained, when it is detached by slitting one side. It is in this form that the rubber is delivered to commerce. The aim of this treatment is not only to evaporate the water and avoid putrefaction of the rubber, but the nut of the attalea possesses specific properties ; analysis of the smoke shows the presence of acetic acid, which causes the milk to coagulate instantly, the creosote acting as an antiseptic.

The province of Ceara was next visited ; here the rubber is obtained from a tree also of the family of Euphorbiaceæ, the Manihot glaziovi, which grows in dry soil ; it is a tree of medium height—10 to 12 meters at most. Its milk is thicker than that of the Hevea, and it coagulates more rapidly. For this reason it is usually collected by allowing it to run down the side of the tree, where it dries in one or two days ; it sometimes reaches the ground, becoming mixed with impurities. It is exported in several forms, either in balls or cakes more or less mixed with sand and debris, in globules formed by making light incisions in the bark, or in cakes prepared, like the Para rubber, by the fuming process, which is coming more and more into practice. As to the production of rubber in Ceara, no exact figure could be obtained ; but according to the dealers, 400 tons had been produced in 1897. The governments of these two regions have endeavored to organize plantations by offering prizes, but with little success ; the growth of the manihot is, however, very rapid, plants of five months attaining a height of 7 to 8 feet, and in one year, 12 feet. A third variety of rubber tree which merits attention is the Hancornia speciosa and its varieties, which give the rubber known as Pernambuco. It is a small tree bearing an edible fruit, which is sold in the markets. At Ceara, where samples of this rubber were seen, it was learned that it is nearly all exported to Liverpool ; the quantity produced is, however, relatively small. M. Poisson had some difficulty in obtaining seeds ; those of the hevea keep but a short time ; the ceara varieties are more satisfactory. These seeds are greatly sought for by Americans, Englishmen, and Germans, but their collection must be carefully watched over, as the natives, suspicious of foreigners, will try to destroy their value, either by boiling or otherwise ; 100,000 seeds of the hevea and 320,000 of the manihot were secured, with a loss of 30 per cent on the former, which should always be counted upon.

In the island of Trinidad was found the Miumsops balata, a magnificent tree of great height, and a diameter which sometimes exceeds 1½ meters. The product of this tree is greatly esteemed, but in the island the wood alone is used, its hardness and durability rendering it valuable. The Balata rubber comes usually from Venezuela or the Guianas, passing to Trinidad, which becomes its reputed place of origin. The incision made in this tree gives a milk which is very dense, flowing with difficulty ; the coagulation is slow, requiring about twenty-four hours in the air. The government of Trinidad, which has a very fine experimental plantation, has been making trials of a Mexican rubber tree called the Castilloa elastica, with such encouraging results that a large plantation has been decided upon.—Abstract of report given to the French government by M. Poisson. Annales Telegraphiques.

A TOOL FOR TRANSPLANTING BUDS.

The device illustrated herewith is a tool invented by Duncan Galbreath, of New Orleans, La., by means of

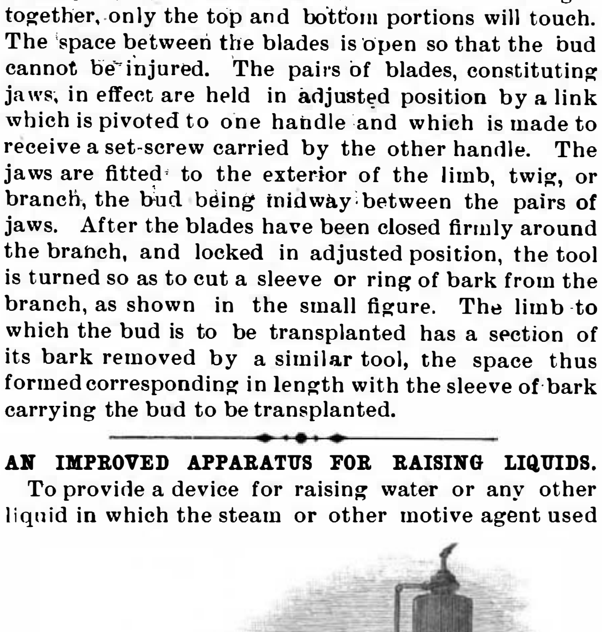


GALBREATH'S TOOL FOR TRANSPLANTING BUDS.

which buds may be transplanted without injury. The tool consists of two pivoted levers or handles, each having a cross-head upon one end. To each cross-head a pair of blades is screwed, formed with concave cutting-edges, so that when the handles are brought together, only the top and bottom portions will touch. The space between the blades is open so that the bud cannot be injured. The pairs of blades, constituting jaws, in effect are held in adjusted position by a link which is pivoted to one handle and which is made to receive a set-screw carried by the other handle. The jaws are fitted to the exterior of the limb, twig, or branch, the bud being midway between the pairs of jaws. After the blades have been closed firmly around the branch, and locked in adjusted position, the tool is turned so as to cut a sleeve or ring of bark from the branch, as shown in the small figure. The limb to which the bud is to be transplanted has a section of its bark removed by a similar tool, the space thus formed corresponding in length with the sleeve of bark carrying the bud to be transplanted.

AN IMPROVED APPARATUS FOR RAISING LIQUIDS.

To provide a device for raising water or any other liquid in which the steam or other motive agent used



ELLIOTT'S APPARATUS FOR RAISING LIQUIDS.

is automatically controlled, Mr. Ralph W. Elliott, of Oakley, Cal., has invented the apparatus represented in our illustrations. Fig. 1 is a partial section of the apparatus ; Fig. 2 a detail. The apparatus consists of a vessel submerged in the water to be raised, and provided at its bottom with a self-closing and opening inlet-valve. The water admitted by the valve is discharged by a central pipe connected with the next vessel above, and provided at its lower end with a self-opening and closing inlet valve. The discharge pipe, as shown in Figs. 1 and 2, passes up through a cylinder superposed on the vessel and forming part of the valve for controlling the steam. The steam is led into the cylinder by a pipe connected with an annular chamber having openings leading to the outside of the cylinder. A second set of openings above the first serves to connect the cylinder and vessel with the atmosphere. A ring-shaped valve, alternately closing the two sets of openings, is provided with downwardly-extending rods, having collars guided on the central discharge-pipe. Between the collars a float is mounted on the rods.

When the valves are in the position shown in Fig. 1, the steam or compressed air is cut off, and the water will flow into the vessel through the open inlet-valve at the bottom, causing the float to rise. As the float comes into contact with the upper collar, the ring-shaped valve is raised, closing the air-inlet openings, opening the steam-pipe, as shown in Fig. 2, and permitting the steam to flow through the annular chamber into the vessel to force the water up through the discharge pipe. As the water falls within the vessel the float sinks, finally touches the lower collar, thereby pulling the ring-shaped valve down, shutting off the steam, and opening the air-inlets. The steam under pressure passes out into the atmosphere ; water again rises within the vessel; and the cycle begins anew.

The perfect automaticity of the operation constitutes the most striking feature of the invention.

A Gelatino Citrate of Silver Emulsion for Photographic Paper.

At a recent session of the Union Nationale des Sociétés Photographiques de France, M. A. Blanc brings out the fact that the formulæ for preparing the photographic papers of the citrate of silver type are little known, and he proposes to give a formula which he has found very good in practice, giving very clear whites with a great facility in toning. Before proceeding to prepare the emulsion proper, a preservative emulsion is first prepared according to the formula :

Alcohol, 90°	15 c. c.
White shellac	5 grammes.

Dissolve hot and pour rapidly into 100 c. c. of boiling water ; filter through absorbent cotton. The yellowish-white emulsion thus formed will keep for a considerable time. To prepare the sensitive emulsion, he proceeds as follows :

SOLUTION A.

Gelatine, best quality	9	grammes.
Chloride of cobalt, 5 per cent solution	6	c. c.
Neutral tartrate of ammonia	2	grammes.
Citrate of ammonia	½	gramme.
Water	70	c. c.

This is to be placed in a porcelain receptacle of about 150 c. c. capacity ; in a smaller vessel is placed—

SOLUTION B.

Nitric acid	2·3	grammes.
Distilled water	20	c. c.

After mixing, add 2½ grammes crystallized nitrate of silver.

The vessels A and B are placed in a water-bath and the temperature kept between 70° and 80° C. Each solution having been well mixed, B is poured rapidly into A, and to the emulsion which forms is added :

Alcohol, 90°	10 c. c.
Preservative emulsion	5 c. c.

Mix and filter through absorbent cotton : the emulsion is then ready to be applied to the paper. It should be used as soon as possible after preparation, as it will not keep longer than a few days. The paper, of course, may be kept for a long time without deterioration.

Copper Iodide Reactions.

M. Pozzi-Escot has lately given an account to the Academy of Sciences of a series of reactions which he has carried on with the iodides of copper ; he has succeeded in obtaining two new compounds. These take the form of minute crystals, whose formation may be observed to advantage under the microscope. It is already known that if iodide of potassium is added to a cupric salt, a precipitate is obtained which is a mixture of iodine and cuprous iodide, Cu_2I_2. The experimenter has obtained the cupric iodide, in combination with ammonia, in two different forms. The first of these is the iodide, $CuI_2,4NH_3,H_2O$, which takes the form of small tetrahedral crystals of a fine blue color ; it is obtained by treating an ammoniacal solution of copper by ammonium or sodium iodide. A second and rather unstable compound has also been obtained, which the experimenter supposes to be $CuI_4.4NH_3$. Its formation gives a fine reaction when viewed by the microscope. To a solution of a cupric salt is added a slight excess of ammonia ; this is heated to 40° C., and a solution of ammonium or sodium iodide added. Under these conditions the liquid becomes yellow green and deposits fine rhomboidal crystals of a blackish-brown color, and sometimes orthorhombic crystals of an orange tint. These preparations, seen under the microscope, resemble the iodoplatinate of potassium, but the distinction is easy to make, and besides the crystals change their form and color rapidly. In 10 to 40 minutes, according to the conditions of the experiment, one finds only flat and short prisms and irregular crystals, whose color has changed to a light yellow-green.