

to recent improvements in machinery it is expected that the cost of production will be reduced to such an extent as to enable America to compete successfully with England in neutral markets. Inquiries begin to come in from South America, and there is a fair prospect that in a few years the exportation of steel rails will become possible.

BIRDS OF PARADISE.

The Zoölogical Society, of London, have just made an important addition to their attractive collection in the shape of two male examples of the lesser Bird of Paradise in full plumage, for an illustration of which we are indebted to the *Illustrated London News*.

The lesser Bird of Paradise (so called from its being somewhat smaller in size, though not inferior in beauty to the greater Bird of Paradise, *Paradisæa apoda* of naturalists) is very abundant in certain parts of the northern peninsula of New Guinea, and is also found in the adjacent islands of Mysol and Salawatty. It lives in bands in the vast forests, feeding principally on mucilaginous fruits of various fig trees, but occasionally devouring grasshoppers, locusts, and other insects. The splendid plumes, so well known under the name of Paradise Birds' feathers, are only developed by the adult male birds, the females and young males being comparatively insignificant in appearance. These specimens are very rare, only two examples of the same species having been previously conveyed to England.

Silk Culture in America.

In January, 1876, Mr. Samuel Lowery, principal of an industrial school for colored people, at Huntsville, Ala., started the culture of silkworms in that State by procuring 500 eggs. Only 200 proved fruitful; but from the cocoons spun by them about fifteen spools of silk thread were made by a rude hand process. The thread was exhibited at the Huntsville Fair, and attracted considerable attention. In 1876, Mr. Lowery hatched 500 worms, from which he got silk enough for twenty spools of thread. Last year the crop numbered 100,000 worms. Fed on white mulberry trees, the worms did well, and thus far no symptoms of disease have been noticed. It is now proposed to plant twenty acres with mulberry cuttings, which, in the course of a year, will furnish food for two or three million worms.

The new industry is thought to be very promising for the colored population of the South. Suitable land can be had for from \$4 to \$20 an acre, and farms of twenty acres or less will furnish employment and support for a family. In France the silk culture is almost wholly carried on by small farmers, and in Alabama the cultivators have the advantage of being able to gather two harvests in a year. Raw silk is worth from \$4 to \$6 a pound, and the value of raw silk imported amounts to something like \$6,000,000 a year.

FIBRIN.—M. Setchenoff has found that the white of eggs, on being boiled in vacuum, turns solid as fibrin. In order to ascertain if the yellow of eggs has some influence on this reaction, experiments were made, and it was found that when a small quantity of the yellow is admixed, the solidification of the albumen, as mentioned above, is five times quicker. This fact, besides being a matter of great importance for physiology, allows us to obtain the albumen in a more pure form.

Test of Woody Fiber.

Dr. Wiesner recommends phloroglucin as an extraordinarily delicate reagent for woody fiber. Place a drop of a half per cent solution of phloroglucin upon a bit of pine, and moisten the spot with a drop of hydrochloric acid, and there immediately appears a beautiful lively red stain, verging upon violet. On drying, the violet tinge becomes still more marked. Even if the solution contains only one hundredth of one per cent of phloroglucin, the red color is very decided; and if there is not more than one thousandth of one per cent, the reaction can be recognized, under proper precautions. If a strip of pine is allowed to remain in such a solution for twenty-four hours, hydrochloric acid gradually draws out a perceptibly reddish satin. The slightest traces of woody substance in vegetable tissues can be readily detected in this manner. The tenderest germs, by means of this reaction, show a woodiness in the cells.

American Leather in Europe.

We have the testimony of the leading manufacturer of boots and shoes in Europe to the effect that the leather market is no longer in European hands. America regulates the price, and from being a large importer, we have turned the current, and are exporting enough to affect European production seriously. In his pamphlet, "Look out for Yourselves," addressed to Swiss manufacturers, Mr. Bally says: "European seaports have become, in part, great depots of American leather. All the Europeans interested in the manufacture of leather speak badly of this red American leather; but it is not so much because of its quality and the short time employed in tanning it (because in these respects it can bear comparison with European leather) as because of the very successful competition of this article. Certainly it is not very pleasant to be compelled to recognize the fact that a former market has become a dangerous competitor." Efforts were made as early as 1847 to find a market in England for American leather, and again twenty years later; but it was not until 1872 that an actual demand began to be felt. In the latter half of that year the export of sole leather, from the port of New York, was 311,914 sides; the next year about 660,000 sides were exported; in 1874, nearly 860,000; in 1875, over 917,000; in 1876, there were exported 1,084,522 sides; and from January to November, 1877, the number reached 863,434 sides. A little more than half the leather exported passes through New York. Last year the tanned leather shipped from Boston exceeded \$2,000,000 in value. The exports from Philadelphia, for the same period, amounted to nearly \$1,000,000.

Nearly half the leather exported goes to Germany. The English now rate American leather as unexcelled by any except their best oak-tanned. The German dealers will take nothing but the very best leather.

There is little difference in the machinery employed in the tanneries of this country and England; but owing to the high price of bark the English have resorted to chemical substitutes, and the quality of their leather has been injured. The same cause tends to decrease the annual product of Germany. France keeps out American leather by a high tariff. Denmark, Norway, and Sweden are importing it in small quantities, and there is a small but growing trade with Russia. In



BIRDS OF PARADISE.

addition to a considerable quantity of rough and finished upper leather, the export this year from all American ports is estimated to be likely to reach 2,000,000 sides. American leather of all kinds, with the exception of finished calf finds a ready market abroad.

The Sugar we Use.

The United States consumes annually between six and seven hundred thousand long tons of cane sugar, less than 13 per cent of which is of home production. The leading sources of foreign supply are; Cuba, 450,000 tons; Spanish possessions, 50,000; Porto Rico, 30,000; French islands, 22,000; Brazil, 18,000; Dutch East Indies, 11,000; British West Indies, 10,000; British Guiana, 10,000; Sandwich Islands, 10,000. Twenty-one other countries supply less than as many thousand tons in all. In 1862 our home product was 191,000 tons; it fell to 5,000 tons in 1865; then slowly rose to 79,600 tons in 1871. The crop of 1876 was 77,000 tons.

The Bahama Pineapple Tree.

A large proportion of the area of the Bahama Islands is devoted to the cultivation of fruit, of which oranges and pineapples are the principal; and at the present time the fields in the estates on which the pineapples are growing form a peculiar feature in the landscape. The appearance of the broad expanse of young fruit, with its clusters of delicately tinted, but sharp and serrated leaves, rising only a short distance from the ground, and covering the undulating fields, produces a very remarkable effect. In no other branch of agriculture can so curious a picture be produced as in the growth of these vast numbers of pines. As many as a million and a half of the fruit have been collected from a single

acre at one crop. The appearance of these pineapple estates has as little in common with the sugar plantations or paddy-fields of the tropics as with the corn fields or vineries of Europe. In a few weeks these pineapples will be making their appearance in the English markets. They are shipped in an unripe state, and mature during the voyage, and hence are not so excellent in quality as the English hot-house fruit, or as if they were properly ripened in the ground. The pineapples of New Providence, however, are superior to any other variety, and often attain an enormous size. One, grown in Pembrokeshire, weighing $10\frac{1}{2}$ lbs., and measuring $10\frac{1}{2}$ in. in height, exclusive of stalk and crown, and 22 in. in circumference, was served up at the coronation banquet of George IV., and since then the improved modes of cultivation have greatly increased the size and quality of the fruit. There is an enormous demand for the Bahama pineapples both in Europe and America, and a new industry has lately sprung up in the island in preserving the fruit in tins when they are fully ripened; one factory in Nassau alone exports annually a million tins, valued at £16,000. These fruits are superior to those sent away earlier in the season, as they are ripened naturally and packed in perfect condition, instead of being gathered when only half ripe.—*The Colonies and India.*

New Mechanical Inventions.

An improvement in Dies for Forming Settings for rings, lockets, etc., is the subject of a patent recently issued to Mr. H. Henrich, of New York city. In the face of the lower die is a cavity of the proper size having beveled edges. A block is inserted, leaving a wedge-shaped groove between it and the bevel of the die. The blank is then forced into this groove by the impact of the top die or stamp, and a setting, having an outer beveled edge and interior square shoulder, is thus formed at one operation.

The Power Hammers commonly used in the manufacture of charcoal blooms, billets, and other iron are made in one casting, and the continual jarring often impairs the quality of the cast iron of which they are made, so that the arms break, and a new casting is required. Mr. G. M. Dillon, of Chateaugay Lake, N. Y., seeks to obviate this difficulty by making the hammer in two parts, namely, the arms which carry the breaking, drawing, and smoothing faces, and the husk or rocker into which the arms are fitted, the arms being secured by wooden wedges.

Mr. P. A. Peer, of Comstock, Mich., has made an improvement in Fan Mill Irons, which consists in using a hub or spider cast with radial loop sockets, to receive the arms of the fans, and keyed upon the driving shaft. Each arm rests against a shoulder on the hub, and is secured by a nail or screw on the inside of the socket.

In a new Washing Machine, patented by Mr. Wm. Haas, of Walla Walla, W. T., the principal features are lower stationary and upper reciprocating beaters, the latter pivoted in a way to secure a peculiar sliding motion; the division of the suds box by a slotted partition, on one side of which are the beaters and clothes, and on the other the arm and pivot of the movable beater; and the peculiar jointing of the connecting bar which operates the movable beater, allowing the latter to be raised so as to permit the clothes to be readily inserted or removed.

An ingenious Odometer, or instrument for measuring and indicating the distance traveled by a carriage, has been patented by Mr. L. C. Perkins, of Webster, Mass. It is intended for the use of liveries, where it is desirable to know the exact amount of work performed by the horses during absence from the stable, and its mechanism is prevented from being tampered with by means of a sealed cover.

Mr. Albert Demo, of Camden, N. J., has invented a novel Marine Engine, suited to a peculiar class of steamer. It is constructed so as to drive the paddles against the water with greater force than that with which they are drawn back, keeps the paddles at right angles to the line of stroke during the propelling movement, and closes them to a feather while being drawn back. Special arrangement is made to prevent jar at the ends of the stroke.

Olive Oil Soap.

The article soap appears destined to become one of the principal industrial products of the island of Corfu. The chief obstacles in the way of increased production—namely, the scarcity or dearth of the two main substances which enter into its composition—are in a fair way of being removed. The first and most costly of these ingredients, olive oil, is being produced in increasing quantities. The method employed for crushing the olives preparatory to extracting the oil is of the most primitive kind: a vertical stone cylinder of great volume and weight, attached to a shaft, is made to revolve by horse power in a slightly concave bed of the most solid construction. In this receptacle the freshly gathered olives are placed, and by the action of the revolving cylinder reduced to a pulp more or less comminuted according to the degree of pressure. The pulp is then removed and inclosed in flat circular bags of about two feet in diameter, and then subjected to the action of a strong screw press, set in motion by a lever projecting horizontally, and worked by the united efforts of several men. When under this operation, which is most laborious, the oil ceases to flow, the now strongly impressed pulp is withdrawn, and collected in heaps out of doors, where it is left to dry or ferment according to the accidents of the weather. Till recent times this refuse was occasionally employed as a manure, and partly used by the bakers for heating their ovens.

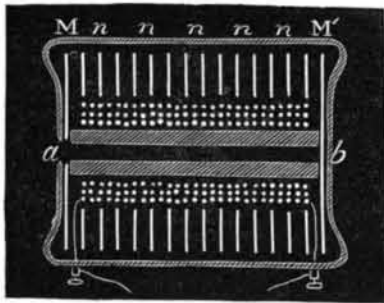
For this latter purpose it was largely exported to Malta, where it fetched remunerative prices; and this traffic continued until it was put a stop to by the imposition of an export duty by the Hellenic Government, which absorbed the whole of the profits previously obtained.

The accumulation of this material in the islands, in all of which olive oil forms one of the chief products, says the *Journal of the Society of Arts*, had become enormous, in spite of the local consumption for the purposes above stated, when it occurred to some ingenious person to subject it to a chemical analysis, with the view to turning its properties to some useful account. The result was that it was found to contain from 2 to 4 per cent of pure oil. This discovery once made, in 1869 a firm, composed of three enterprising capitalists, was established, and works on a large scale were constructed, with a view to extracting the oil. The process employed is both simple and ingenious, and has turned out a complete success. It consists in forcing, at a high temperature, bisulphide of carbon through a given quantity of the refuse, which, after being reduced to a fine powder by being passed between cast iron rollers, is inclosed in an airtight metal cylinder of great strength, communicating with another receptacle or reservoir, also airtight, through which the bisulphide is forced from beneath, carrying along with it the oil disengaged by its action. After a sufficient time allowed for cooling, the reservoir is opened, when the oil, now of a greenish color, but almost inodorous, is found floating on the surface of the bisulphide, whence it is bailed out and preserved in casks. The bisulphide remains unchanged in its qualities, and but slightly diminished in quantity, ready, with slender additions, for operating afresh. This substance is now known in commerce under the designation of "pyrene oil," from the Greek word signifying core, or kernel.

The second ingredient is soda, which has to be wholly imported from abroad, at a proportionately high cost. An almost unlimited supply might be obtained were the manufacture of sea salt, from which it is extracted, carried on to an extent of which it is capable. It is satisfactory to observe that a concession of the extensive salines at the western extremity of the capacious bay, which extends beyond the town and port of Corfu, has been obtained from the government on advantageous terms, by a private company, with the view of employing the produce in the manufacture of soda, for which works are in the process of erection. The soap, which is made by hand, is, for the most part, exported to Continental Greece and Turkey; as, also, a portion of it to Trieste and Venice. It is packed in deal boxes, containing 150 lbs. each. As the profits to be derived from introducing this article into the English market have not escaped the calculations of the manufacturers, it is but fair to state that the purer ingredients in its composition are occasionally adulterated by an admixture of fuller's earth, which, while it adds considerably to the weight, impairs its quality.

M. TROUVE'S NEW TELEPHONE IMPROVEMENTS.

M. Trouvé has recently communicated to the French Academy of Sciences an account of a new telephone which he has devised, which, while being a modification of Bell's, gives, it is stated, much better results. Its construction will be understood from the engraving herewith given. *a b* is a tubular magnet surrounded by a coil of wire. Opposite one pole, *a*, is a circular membrane, *M*, similar to that on the ordinary telephone, except that it is pierced with a central hole, the diameter of which equals



that of the aperture through the magnet. Opposite the other pole, *b*, is a diaphragm, *M'*, in which there is no orifice. If speech be uttered before the diaphragm, *M*, the sonorous waves throw it into vibration, and then, continuing, their movement through the magnet excites the diaphragm, *M'*. The magnet is thus influenced at both poles, and much more intense currents are induced in the coil. The receiving apparatus, similar to that just described, receives the corresponding currents, and its two diaphragms likewise vibrate. The ear, placed at *a*, receives the sounds, therefore, from both.

In order to compare, experimentally, the results furnished by the Bell telephone with those of the multiple telephone, sounds were received on the unperforated diaphragm of the latter alone, which, thus used, corresponds to the ordinary Bell instrument. Then the multiple telephone was turned, and on placing the ear at the opening, *a*, it was at once remarked that the intensity of the sound was doubled. The sound is still further augmented by placing between the end diaphragms a series of others, *n*, rounding the solenoid and influencing it over its entire length.

M. Trouvé has, besides, recently invented a telephone on a new principle, which is made as follows: A metallic vibrating membrane constitutes one of the poles of a high tension battery. The other pole is adjusted before the plate by a micrometer screw, which allows of varying its distance from the membrane without the two ever coming in contact. This distance, however, should never exceed that which the

battery current can pass over. If by sonorous waves the transmitting membrane is caused to vibrate, during the vibrating movement the distance between the poles, and hence the intensity of the current, will be constantly modified. These modifications determine, in the receiving apparatus, variations of magnetism corresponding to variations of intensity of the transmitting current, which cause the vibration of the receiving membrane. It will be observed that this new telephonic system is based on the resistance of the exterior current of a high tension battery, and this it would seem possible to modify within very wide limits by placing the membrane in different media, such as rarefied air or other gases, to which vapors capable of modifying the resistance might be added.

Is there a Hole through Mercury?—Are all the Planets Rings?

Mr. Richard A. Proctor, the eminent astronomer and eloquent lecturer, gives a report in one of the English papers of his personal observations of the recent transit of Mercury, made with an $8\frac{1}{2}$ inch reflector, and notes a very interesting if not remarkable discovery. He says:

"A bright spot was seen on Mercury's disk. It appeared to me perfectly central and of sensible magnitude. My eldest daughter, who observed with me, described it as a mere point, and quite central, as if the disk were a round piece of black card, and the bright spot were a hole pierced through with the compass point in striking out its circular outline. I noticed one feature in the bright spot which seemed to me decisive as to its subjective nature: when a small cloud passed over part of the sun's face, nearly the whole of which was in the field of view, the bright spot perceptibly waned in brightness, though not crossed by the cloud. This I noticed distinctly three several times. Another feature—perhaps a mere illusion—was that it seemed to me, as the spot thus waxed and waned in brightness, that it was triangular in shape. I could not distinctly recognize this peculiarity when the luster of the spot was steady. The aspect of the spot was not perceptibly modified when the telescope was released from the driving clock and Mercury allowed to approach the edge of the rather wide field of view."

We published in the *SCIENTIFIC AMERICAN* several years ago the vagaries of a backwoods philosopher to the effect that our earth had a central cavity of enormous dimensions, extending from pole to pole, through which the ocean waters ebbed and flowed; and he declared that whenever any ship could reach the north pole it might sail placidly into the aforesaid cavity and reach the bowels of the earth; where a strange race of human beings would be found living in peace and happiness; with other marvels in multitudinous numbers.

In view of Mr. Proctor's discovery, the knowledge that Saturn has planetary rings, the fact that when a milk pail is whirled like Jupiter the liquid moves outward, leaving an opening in the center, who knows but Mercury has a hole through it, and that the bright spot seen by Mr. Proctor was simply the sun shining through the aperture? If Mercury is tubular, may not the earth be also? This is one of the questions that Captain Howgate or Mr. Bennett have before them for solution in carrying forward their polar expeditions.

The Use of the Agricultural Department.

The annual attack upon the Department of Agriculture is serviceable in bringing into strong relief the advantages derived from its labors. Some points brought out in the recent discussions in Congress are worth noting. In justification of the work of distributing seeds, a member said that the seed oats sent out to the Northwest have improved that crop more than enough to pay all the expenses of the Department for the past five years. Another member said that a single package of Foltz wheat received in Kansas a few years ago had been the means of changing the entire product of a large area, giving the best article they had ever had. Similarly of sorghum, which has put millions into the pockets of the farmers of the West, said a member, "The molasses and sugar that have been produced from it will more than pay every dollar expended upon the Agricultural Department."

Our Steam Street Railways.

The New York correspondent of the *Baltimore Sun* is evidently not in love with the new system of iron railway bridges that now occupy some of our finest avenues. Speaking of the Gilbert Elevated Railway and the recent accident caused by one of the first trains, he says:

"Celebrating the event by frightening a car team on a track below into a mad runaway, the Gilbert elevated vehicles may now be considered as available for all travelers wishing to avoid death in curb shattered or post splintered conveyances of the streets. The moving, hideously clattering crest of a straddling iron monster, which has settled upon miles of once thriving thoroughfares, to suck all the business life out of them, the Gilbert cars are the sworn enemies of equine and human nerves alike, and will have what sonorous reporters call their 'holocaust' of victims before the year is out."

American Stamping Mill for Peru.

An eighty stamp mill, one of the most complete and powerful ever undertaken, is in process of construction in this city, for use at the famous Oroya silver mines of Peru. It is to be ready for shipment July 1, and will require a 1,200 ton ship for its transportation.