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ORGAN BLOWING APPARATUS.

It is only recently that motive power has been substituted for manual labor in supplying wind to church organs, many of which are of mammoth size, requiring from two to six stalwart men to keep the bellows full while the organ is playing, the employment of which manual labor is attended with great inconvenience and expense; for whenever the organist wishes to practice, or the choir to have a rehearsal, the blowers must be obtained if possible, and if not, then the playing must be postponed to a more convenient season; for it almost invariably happens that those who perform this service are otherwise employed during week days, and their services can only be had when they can be afforded most cheaply and conveniently.

An instrument of music costing so much as the organ, and which is as susceptible of constant use without injury as a piano, should be in a condition to be used at any time, and without the trouble of obtaining one or more persons to blow the bellows; in fact, no pipe organ, whether for the church, parlor, or public hall, can be considered complete without some automatic action to supply the wind, thus rendering it as convenient to use as the smaller keyboard instruments.

The advent of the cold water engine has opened a new era for this, the grandest and most powerful of all musical instruments, rendering it as accessible and convenient to use as the piano or flute. We give here with a fine illustration of an organ blowing apparatus, designed by G. W. Lascell, and executed by the Cold Water Engine Company, of Watertown, N. Y., for Christ Church, Brooklyn, E.D. (Rev. Dr. Partridge's), on Bedford avenue, near South Ninth street.

The engine is the Coats & Lascell patent, illustrated in the SCIENTIFIC AMERICAN of July 8th, last, so modified in form as to be peculiarly well adapted to the blowing of church and parlor organs, for which it has proved to be all that could be desired. It has received the hearty endorsement of Messrs. Jardine & Sons, builders of the organ, and all interested, who have examined the apparatus and witnessed its performances.

By reference to the engraving it will be seen that, in this engine, the crank has been dispensed with, and a new valve gear substituted for the ordinary eccentric motion, by which it is impossible for the engine to be caught upon the dead centers, or to stop at any point from which it will not readily start again—an important and even indispensable requisite in engines for organ blowing purposes.

The bellows is double acting, with stationary heads, A, and a movable piston, B, the whole covered substantially with leather. As the piston is moved forward or backward, the wind is forced alternately through the pipes, C, to the wind chest, D, at the top of which the trunk, E, is attached, through which the wind is conducted to the organ, as shown in the engraving. A portion of the organ is broken away, revealing a section of the bellows, on the back side of which is a stationary post, F, to which a beam is hinged, which extends across to the front side; and the end resting on a bar, which, with the post in the rear, supports this beam or lever at nearly the highth to which the bellows rises when fully inflated.

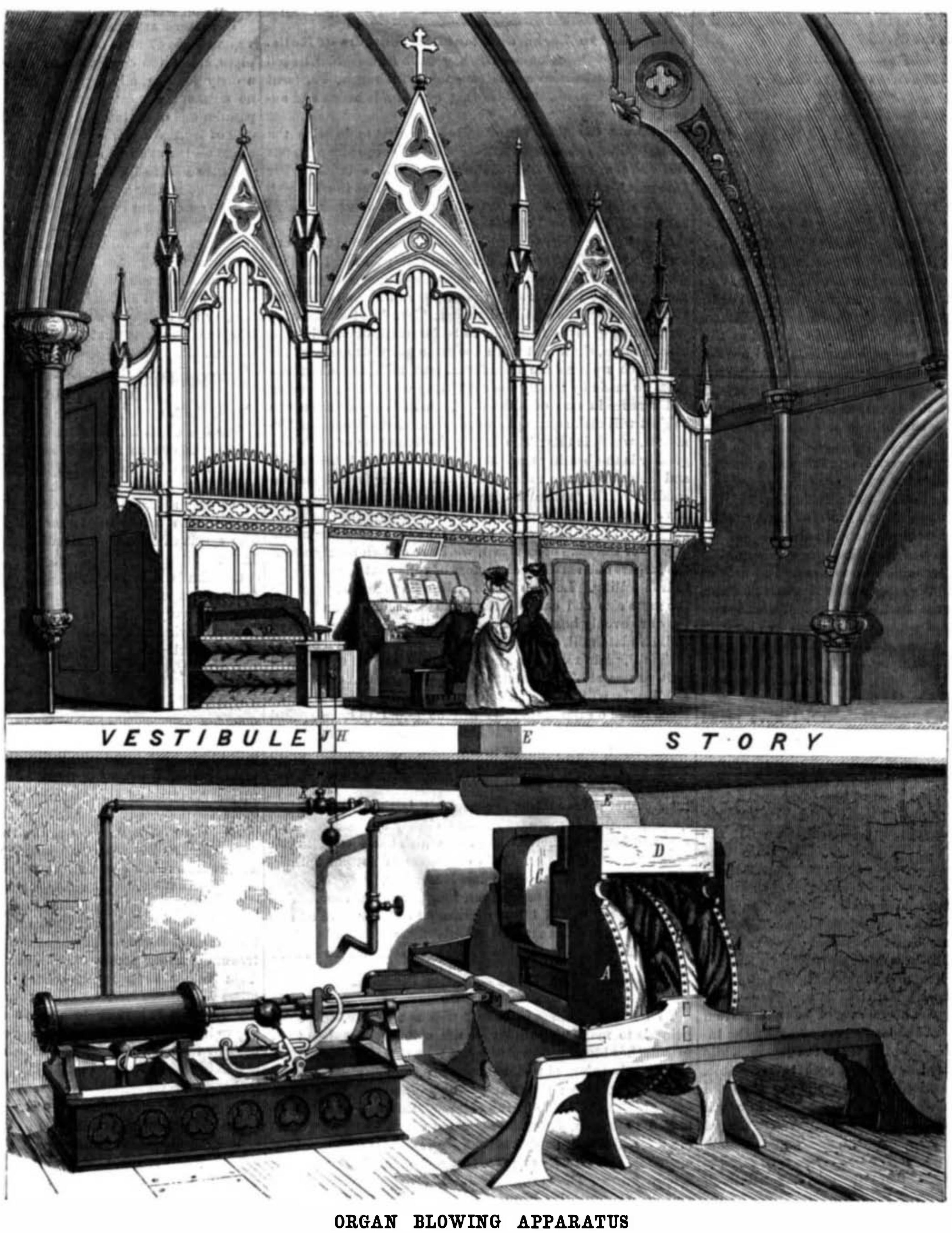
On the center of the top board of the organ bellows is a stationary block, G, which, as the bellows rises, comes in contact with the lever and lifts it. To the front end of this lever the governor valve rod, H, is attached, which is connected with the governor valve in the water pipe, so that, when the bellows is filled to the maximum point, the water is gradually shut off by the rising of the bellows, thus slowing the speed of the engine or stopping it entirely, and *vice versâ*, as the exigency of the case may require; thus the organ bellows is made to supply its own needs automatically, and with such a degree of nicety, in the adaptation of want and supply, as no hand blowing can at all approximate. Besides this, the organist is freed from all fear or anxiety, lest the man at the bellows may be careless or inefficient and mar or cut short his performance. In this, the organist is assured that whether he connects the full organ, or uses but a single stop, or however frequent or sudden may be the changes, the bellows is always full, ready for any emergency, provided always that the blowing apparatus is of sufficient capacity. In this case, as in all others of this manufacture, the capacity is more than ample to meet all the demands upon it.

The feeders of this organ discharged 24 cubic feet of wind to one revolution of the hand crank, while the apparatus now attached discharges 90 cubic feet to one revolution of the engine, and consequently is fourtimes the capacity of the original organ feeders, The engine is, therefore, made to move very slowly, it being constantly held in check by the well-filled bellows of the organ, holding the governor valve of the engine nearly shut, allowing it to move but six revolutions per minute at the highest speed, and one and a half as the lowest; consequently the cost of water consumed is reduced to a nominal sum, the organ blowing expense being brought within 35 cents per Sunday for the prolonged services of the Episcopal and Catholic churches, and less than half that for the others.

Within convenient reach of the organist is the hand wheel, I, attached to the upper end of the rod, J, which extends down to the stop valve, K, and by which he starts the engine at the commencement of the service, and stops it at the close. Thus the organist is the engineer; the engine requiring no attention except a little oiling occasionally.

All parts of this engine that would come in contact with the corrosive action of water are made of brass, which, with the frictionless balanced valve before described, renders this one of the most effective, economical and, for aught we see, durable machines that could well be devised.

These engines are manufactured by the Cold Water Engine Company, of Watertown, N. Y., to whom our readers are referred for further information concerning them.



ORGAN BLOWING APPARATUS

Devices for Raising Sunken Vessels.

Thomas Collier, of New York city, has invented improvements in apparatus for raising sunken vessels.

In the application of his system, the hatches will be stopped or closed by two pieces of strong plank, rabbeted at the edges, and covered on the upper surface by sheets of india rubber or other suitable packing, one of which sheets is adjusted between the parts forming the rabbeted joint, while the other laps over the joint, the plank being inserted through the hatch below the timbers, and clamped up to them and the framing of the hatch, by bolts connected to them by eye-bolts, and passing through the cross pieces temporarily inserted in notches in the sides of the frame.

But in the case of the hatch through which the hose for pumping out the water is passed, the bolts are made longer, and are supported by bridges spanning the hatch, one near each end. The planks for this hatch have short tubes permanently fixed in them, projecting at each side, and screw-threaded for attaching the hose, which will be in two sections, one extending below into the hole, with a nozzle or strainer at the end, and the other upward to the pumping apparatus to be adapted for pumping water out and air in. The two pieces of plank are employed for closing the hatches, because they may be admitted through the hatches, while a single piece wide enough for the purpose could not. Stop-cocks in the short hatch tubes are employed to close them in case, by any accident, the tubes above become ruptured, in which condition the water would flow into the hold. The cocks are rigged with cords and pulleys or other apparatus adapted to work them from the deck of the vessel above. The smoke-pipe, or the hole through the deck therefor in case the pipe is carried away, will be closed by a sheet of india rubber, placed over it, and a closed sack, being placed over the rubber is made fast to the deck by a ring or cleats fastened down over the edge in any way to hold the sheet and sack in place when filled with air forced in through a light flexible hose, leading up to the top, which forces the said sheet and the bottom of the sack down upon the deck and closes the opening water tight, the top of the sack being prevented from rising by cords rigged over it. The sack may have a short tube attached to it for admitting water to sink it to the vessel for adjusting thereon, after which the water may be forced out by the air pumped in, and the said short pipe closed. A hole through the side of the hull will be closed in the same manner, as indicated. In either case, when the opening is wide, bars of wood or iron will be placed across to prevent the packing from being pressed in the hole.

The hatch closing apparatus will be found very serviceable in case of storms at sea, as a protection in case the "booby" or other hatch is carried away, as often happens.

Other small holes may be stopped by a plug, india rubber washers, and an inflating tube, arranged to admit the air above the washer and pass it snugly to the deck, the flange of the plug being nailed down to the deck.

The Physical Features of Insanity.

Dr. T. B. Tuke, a physician of eminence and learning in the science of mental disease, read a document at the recent meeting of the British Association for the Advancement of Science, in which he said:

"It is generally acknowledged that the intellectual powers are manifested through the gray matter of the cerebrum, and as in insanity these faculties were impaired, exaggerated or perverted, I believe that, by examining the brains of the insane, a hope exists of discovering a road for arriving at a solution of the functional difficulty. The time has passed when the term mental disease, insanity, or madness, conveyed, to the minds of physicians, the idea that the mind or its faculties were the entities which were the subject of disease. By a process of reasoning the pathologist has arrived at the conclusion that the abnormal physical manifestations are de pendent upon primary or secondary changes in the nerve tissue; that insanity is a *symptom* of disease, not a disease itself, and that the cause of the disease must be looked for in the brain. Six years ago I commenced a systematic microscopic examination of the brains of the insane, and with this most important result, that in every single instance a marked departure from healthy structure was observed.

"I am not prepared to designate the individual part of the brain specially affected in the different forms of insanity; but I may say generally, that the *corpora striata* are the portions most frequently found affected, and that the cerebellum is the organ least frequently subjected to disease. Further, that the white matter is much more liable to evident structural morbid change than the cortical substance in comparatively recent cases; and that where the intellect has been in abeyance for prolonged periods, the structure of the gray matter of the cerebral convolutions is difficult of demonstration, the layers are found indistinct, as the cells are few in number and generally small in size. In the fifty-three cases of chronic insanity which I have examined, I have found distinct structural changes in the brain of each.

The Beehive.

What does it matter in what kind of hive or box the bees are kept? says a correspondent of the *Gardeners' Chronicle*. It does not matter much during the summer months, if the bees be located in a good district for honey collecting. But we have to provide for one or two contingencies, and not a few drawbacks from the extremes of heat and cold—the sun heat melting the new combs in wooden boxes, as happens even in the straw hives, which are the best substitute for the natural habitat of the honey-bee, because the straw absorbs the moisture within the hive in winter, and, with slight protection from the summer heat and winter rains, has carried through many a stock of bees. But there is the drawback of providing stands for the straw hives, as well as covers from the weather; and then how completely is the state of the interior condition of the hive a dead letter to the owner, while transportation for fresh pasturage for the bees is impossible. Then comes the period for smoking and driving, to save the hives of the bees at the honey harvest, if the old plan of the brimstone match has really been set aside. What a hard task has it been to introduce this "humane system," in spite of the able writings of the Rev. W. C. Cotton, with Mr. Robert Golding's straw hives and pamphlet—or any collateral, or safer, or nadir hiving; or even the "bar-frame plan," with all the German and American adaptations of more recent dates. Writings of the late lamented Mr. Woodbury, who did so much in introducing thoroughly the yellow banded bee, commonly called the "Ligurian bee," and which has become quite a profitable business in America and England, although the first agent, Mr. Neighbour, of London, had the *Apis ligustica*, from Mr. Herrmann, of Switzerland, only in 1859, who called this bee *Apis Helvetica*. But to return to the question of hives. No hive yet introduced by hive masters and sellers has been constructed to meet the wants of the bees, but rather the capricious fancies of bee-keepers, where the maker has to tax his skill and ingenuity to meet these wants, while every season apparently requires a new hive or a new book to be foisted on the public, while the true principles have been lost sight of both for economy and the right management of the honey bee. No hive could be so easily converted, either for the usual profitable keeping of bees, or the scientific observation of the same, as the "bar, frames," by those who wish to combine the two; but they generally fail in their object by their own zeal in finding out a "perfect cure" for all the ills that bee management has to contend with, and the beehive seller and constructor is always ready to assist the "new idea"—to put in a hinge or a bar, or some piece of glass that would surely make the hive a marvel of invention! instead of taking a lesson from the simple wants of the bees. We may then sum up the history of the bee hive with a hop, skip, and a jump,—from the Schirach suggestion to Huber, who used the leaf hive, and the improved bar fixed Grecian hives of Golding, made in straw and circular, to the adapted wood and straw hives of Mr. Woodbury, who introduced the system of compound bar and frame, with the adjusted bar of Mr. Golding, having guide combs affixed, to make the bees build in a perfectly straight line; but none have attempted the first views of the "bar frame hive," which followed on the heels of the Grecian hives, not with any view to multiply bee apparatus, bee houses, or sheds, or the necessity of stands, covers, dividers, or glass frames, except for the ladies and timid bee keepers, but with the single object of an easy mode of inspecting each comb, and protecting the inmates of the hive, and transporting the hive and bees bodily anywhere and at any moment.

Difference in Large and Small Diameters of Rolls.

In No. 4 of *Miscellaneous Rolling Mill Information*, issued by Lewis & Rossiter, Second avenue, Pittsburgh, Pa. (sent free on application), the following question is asked and answered:

"Has not the diameter of rolls somewhat to do with the size of billet necessary to fill a groove of given size? To put the question more plainly before you: Will a billet or bar that will fill to a nicety a groove of certain size in rolls of 8 inches diameter, also as exactly fill a groove of same size in rolls of 12 inches or 16 inches diameter?

"Answer: A billet that will exactly fill a groove in 8 inch rolls will over fill the same groove in rolls of 12 or 16 inches diameter, for the reason that the small roll elongates the iron more than the larger rolls; the larger roll spreads the iron more than does the smaller diameter. Templets that are used for turning grooves in guide rolls for ovals, diamonds, and other shapes, show that when the same templets are used for eight inch rolls as are used for 12 inch rolls, the difference must be made by letting the rolls jump when working, or by a difference in size of billet used. A little thought on the subject will make quite plain the principle that governs the matter, which is this: The larger the diameter of rolls the greater is the bearing that they have on the iron being rolled, and instead of large rolls rolling out in length, as does the small rolls, they make the iron more dense, and, as we said, have a greater tendency to spread it.

"We give the following, to more fully convey our meaning. For the sake of contrast, we have chosen nearly about the largest and smallest diameters of rolls that are employed in iron rolling. Let two pieces of iron be taken, of precisely the same size and cut precisely the same length, and, after they are evenly heated, let one be rolled thinner on a 24 or 30 inch plate mill, and the other to same gage on an 8 or 10 inch mill, plain rolls, allowing each to spread all that it will as it passes straight through. The piece drawn out by the small rolls will be found longer than the other, while the piece rolled on the large rolls will be found to have spread more than that rolled on the smaller rolls. Had the pieces, when rolled, been confined in a groove so that neither could have spread, even then the iron rolled on the smaller rolls would have been the longest.

"Another point touching this subject is, that iron rolled on large diameters is more solid, more closely approaching iron that has been hammered, than that which has been rolled on rolls of small diameter. This difference is not perceptible, may be, in all cases, nevertheless it is a fact.

"In conclusion, we answer, yes, the diameter has something to do with the size of billet necessary to fill a groove of certain size. A billet that will exactly fill a groove in 8 inch rolls will fin when entered in a groove of same size in 16 inch rolls."

Non-Smoking Chimneys.

To build a chimney so that it will not smoke, the chief point is to make the throat of the chimney not less than four inches broad and twelve long; then the chimney should be abruptly enlarged to double the size, and so continued for one foot or more; then it may be gradually tapered off as desired. But the inside of the chimney, throughout its whole length to the top, should be plastered very smooth with good mortar, which will harden with age. The area of a chimney should be at least half a square foot, and no flue less than sixty square inches. The best shape for a chimney is circular or many sided, as giving less friction (brick is the best material, as it is a non-conductor), and the higher above the roof the better.

Manufacture of Paraffin Oil in Scotland.

It is to Reichenbach, who is generally regarded as the discoverer of paraffin, that we are indebted for the name by which this oil is now mostly known. Paraffin is formed from *parum affinis* (little allied, or little affinity—in consequence of its power to resist the action of the strongest acids and alkalies). Paraffin, or coal oil, is made from coal or shale, the precise difference between which is not very easy to determine; at all events, upon a subject on which so many doctors differ, we may well be excused if we do not attempt to arbitrate. We may be safe in saying, however, that the district in Scotland, which produces the valuable mineral from which oil is made, stretches nearly the whole distance from Edinburgh to Glasgow. The quantity of crude oil contained in a tun of coal or shale varies considerably. A really good shale says the London *Grocer*, is reckoned to produce from thirty-five to forty gallons of crude oil per tun, thirty-eight gallons being considered a high average, though we were shown several specimens of coal which were said to contain as much as seventy; but the high price which had to be paid for this rendered it unremunerative in the face of the low prices which are at present obtained for the burning oil. The shale has to undergo the operation of being broken into small pieces before it is put into the retorts. In some cases this is performed by a huge machine, called "the crusher." Once between the wheels of this apparatus, the largest blocks are smashed into the required size, with as little regard to the difficulty of the operation as if they were mere lumps of blackened chalk. Some idea of the power of these machines may be found in the fact that one of them, which we saw in the full work at Addiewell, one of the refineries belonging to Young's Paraffin Light Company, was said to crush between its ponderous rollers about 3,000 tuns per week. In some refineries, however, they still prefer to adhere to the to the more primitive style of breaking by hammer, similar to the mode of preparing stones for macadamised roads. The shale, having been broken into the required size, is put into the retorts, some of which are placed horizontally, others vertically.

The retorts are gradually raised to a dull red heat, when vapors begin to come off which are passed through a series of pipes, called the condensers or coolers, where they form into a dirty looking, oily liquid, very impure, and possessing by no means the most pleasant odor. It is, however, rich in paraffin and other ingredients of more or less value, the process of separating which we now proceed to describe. The crude oil is put into a large cistern, and maintained at a temperature 150° to 160° Fah. for some time. This has the effect of separating a considerable quantity of the tarry matters which, on account of greater density, settle to the bottom of the cistern. The lighter oil is then transferred to an iron still furnished with a worm or condenser immersed in water, and kept at a temperature of about 55° Fah. Heat being applied to the still, the oil distils over, and is condensed in a worm, whence it is passed into a tank or agitator for purification, by the action of sulphuric acid, the subsequent process being analagous to that employed in the rectification of petroleum oils.

Cutch and Gambier.

Says the London *Daily Recorder*:

The dye cutch is from a tree, the *acacio catechu*, and is familiarly known as *terra Japonica*. This latter name originated in an ignorant belief that, primarily, cutch was an earth from Japan, but as that *terra Japonica*, turned out to be only a *terra incognita*, the illusion was dispelled by time, but not so the misnomer, which is current to this day. The acacia catechu abounds all along the coasts of Eastern India.

Catechu is a brown astringent substance, easily obtained by the evaporation of its own inspissated decoction. The process is very simple; the outer bark of the tree is carefully removed, when the interior colored portion of the wood develops itself; this is cut up, dissolved by a heated solution, evaporated, solidified cubicaly, and then packed in boxes for export.

The commercial utility of this article is very great. It is a most facile dye, rich in tannin, solvent in water, and with great affinity for cotton, to which it gives a permanent brown. It is not however limited to this color, or to this material, for it yields blacks, greens and drabs to silk and other manufactures. The fact of its applicability to cotton, however, suggests an important consideration to the producer and importer, and that is, that as surely as the manufacture of cotton goods increases, so surely will the consumption of cutch; and, that as soon as statistics register any question as to its supply, so soon must its value enhance.

Gambier is repeatedly confounded with cutch, and wrongly termed catechu, or *terra Japonica*. Gambier is so called, from its being the inspissated juice of the *uncaria gambir*, a native tree of the Malay peninsula. Its chief source of production is from Rhio, a town in the island of Bintang, about thirty miles from Singapore, which port is the principal place of exportation. It is made in a similar way to cutch, and owing to its richness in tannin and economy in price, is mostly used by tanners, though available for many dyeing purposes and akin to cutch, to which, however, it is much inferior in this respect.

Les Mondes, reports some recent experiments made with a saccharine product, extracted, many years ago, from a plant called *Achras sapota*, indigenous to Martinique. The sugar was found, on an elaborate analysis, to consist of 52 per cent of cane sugar and 45 per cent of milk sugar. This result was obtained by boiling in alcohol of 90 per cent, the milk sugar being found in the condition of an undissolved residue.