

THE CODONOPHONE.

The codonophone (bell music) is a new instrument designed as a substitute for chimes in the theater. It consists of a series of metal tubes, which, under the action of a blow, enter into vibration and render sounds analogous to those of bells.

Mr. Gailhard, the director of the Paris opera house, when he mounted the ballet named "Le Rêve," the first representation of which took place last June, obtained from a manufacturer in England a sufficient number of tubes to form a true chime that imitated bells quite well and gave forth sounds of a very satisfactory purity.

These tubes are of brass, and of a uniform diameter of $1\frac{1}{2}$ inch and a thickness of one-tenth of an inch. Their length varies according to the note to be obtained, and is determined by means of an iron rod that traverses the tube at each of its extremities, and is riveted externally on each side.

Mr. Lacape, a Parisian piano manufacturer, with these new elements constructed for the opera house a true musical instrument formed of twenty-five tubes, and having a range of two octaves (from *do* to *do*, key of *sol*). The heavy hammers that strike each tube have an escapement. They are set in action by means of a keyboard and of a mechanism analogous to that of a piano. The playing of this instrument is a very simple and easy matter.

The lowest note is given by a tube 6 feet long that weighs about eight pounds and is equivalent, as to sound, to a bell weighing 176 pounds. The other tubes gradually diminish in length and weight up to the twenty-fifth, which is 3 feet in length and is equivalent to a bell weighing 72 pounds. The tubes collectively weigh about 220 pounds, and are equivalent to a chime of bells weighing from 3,300 to 4,400 pounds.

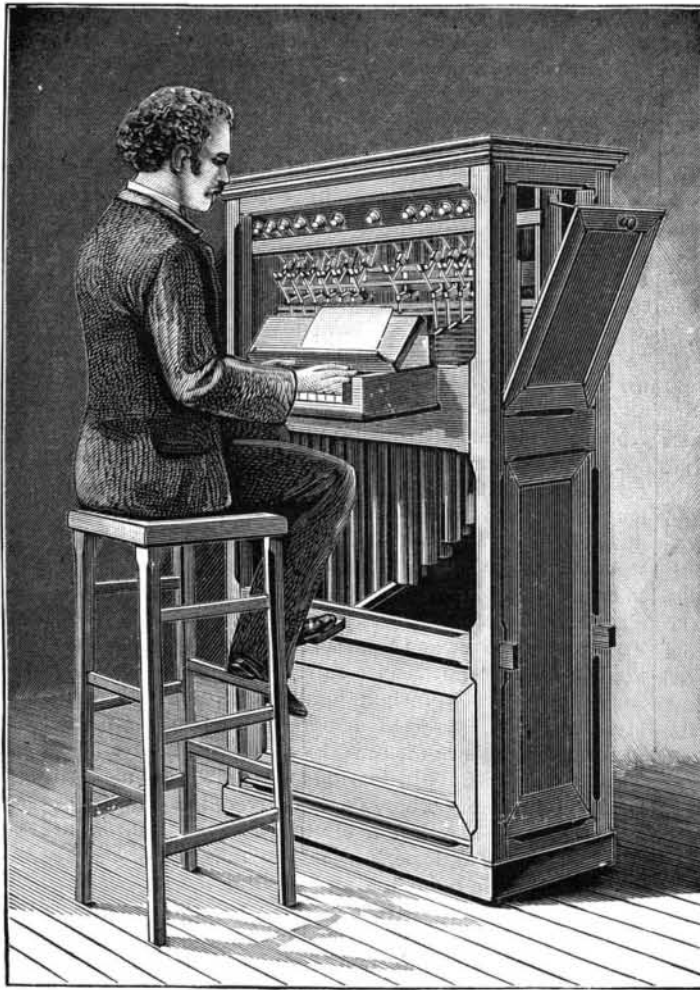
The codonophone, as now established, is capable of replacing what is called the sharp village chime. Although we thus succeed in producing sounds like those of bells, it must not be concluded from this that, as regards intensity and range of sound, we can succeed by this means in replacing those made in the open air.

In order to produce sounds analogous to those of large bells, it might be possible to use tubes of great length and wide diameter. This, in fact, is the method employed at the Bayreuth Theater in Richard Wagner's "Parsifal;" but, in order to re-enforce the sound, large counter-bass cords and tam-tams are made to vibrate in unison, while the tubes are struck with hammers. In the "Rheingold" of the same author, an endeavor has likewise been made to imitate the sound of bells by means of a heavy cord that is made to vibrate within a sonorous box.

Again, we may mention a powerful chime composed of large bronze tam-tams, which is installed in the new Burg Theater of Vienna.

In the opera theater, in order to produce the sound of large bells in "Patrie," they use Mr. Sox's bell, which weighs but 15 pounds and gives the same notes

as an ordinary bell of several thousand pounds. This is formed of a sheet of brass six one-hundredths of an inch in thickness, in which several concavities have been made with the hammer. But, in order to re-enforce the sound and prolong the vibrations of this bell, it is necessary at the same time to produce the same note in unison with saxhorns, while an ordinary 220 pound bell gives it also, but two octaves higher.



THE CODONOPHONE A NEW MUSICAL INSTRUMENT, DESIGNED TO IMITATE THE RINGING OF BELLS.

We shall recall the fact, *apropos* of this, that, according to what is generally admitted, the number of vibrations of a bell varies in inverse ratio of the cube root of its weight, that is to say that the latter increases very rapidly with the lowness of the sound. As bells are always very heavy and pretty high priced, relatively to the note that they give, we may see how advantageous it is to be able to produce the same note with lighter instruments, such as metal tubes, especially in a theater, where we have no need of the same intensity of sound as in the open air. For our figure of the codonophone we are indebted to *La Nature*, and for the description of it to *Le Gentle Civil*.

Ribbed Boiler Tubes.

The Serve tube is a French invention, and differs from the common boiler tube in having a number of thin longitudinal ribs on its inside, usually eight, which extend radially toward its center. The boilers tested were each 10 feet 6 inches in both diameter and length, and were each provided with 126 tubes, $3\frac{1}{4}$ inches diameter and 7 feet 6 inches long. The heating surface of each plain tube was 5.95 square feet and that of each ribbed tube 10.42 square feet. The total heating surface of the ordinary boiler was 956 square feet and that of the ribbed tube boiler 1,536 square feet. The furnaces were alike, two furnaces to each boiler, each 2 feet 10 inches diameter. The area through the tubes for the passage of the gases was decreased by the ribs, being 802 square inches in the ribbed tube boiler and 852 square inches in the plain boiler. The grate surface in each boiler was 31 square feet. In a twelve hour test, in which the induced fan draught was carefully regulated so as to cause the same amount of coal to be burned in each boiler, the amount of coal burned in each was 11,872 pounds, and the water evaporated, from a temperature of about 60 degrees into steam at about 10 pounds pressure, was in the case of the ribbed boiler 114,600 pounds, and in the case of the plain boiler 103,000 pounds, an advantage in favor of the ribbed boiler of over 11 per cent. In another test of three hours' duration the gain in economy was over 14 per cent.

Another Proposed Large Tunnel under the Thames.

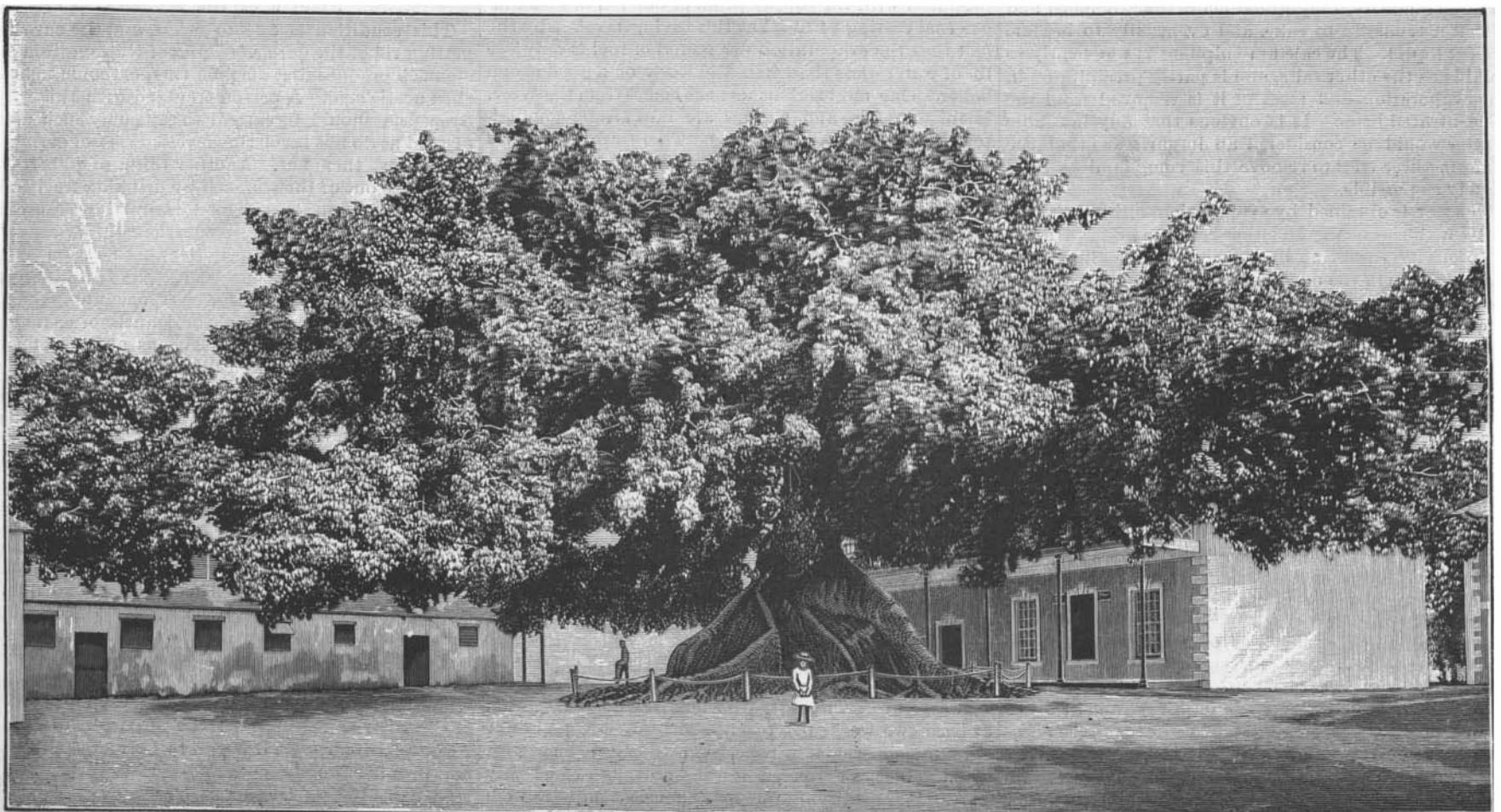
Sir Benjamin Baker, who was instructed by the London County Council to advise upon the practicability of carrying out the Blackwall Tunnel Scheme, has at length completed his labors, and his report has been issued to the members of the County Council.

It is chiefly based on observations of tunnels of a similar character in America, one of which has been successfully completed at Sarnia, while the other is in progress under the Hudson River. Sir B. Baker, who has only recently returned to England after inspecting these works, concludes, from his observations, that the proposed tunnel from Blackwall to Greenwich is entirely practicable. Sir Benjamin Baker recommends that in the first place a tunnel should be constructed of sufficient size to accommodate two lines of vehicular traffic, and that foot passengers should be provided for by a separate tunnel.

THE SEBAE OR SILK COTTON TREE.

BY J. F. COONLEY.

The sebae or silk cotton tree, *Eriodendron anfractuosem*, is a native of the West Indies. The one represented here is a very wonderful and interesting specimen, now existing at Nassau, N. P. Its branches spread over one hundred and seventy feet, and would extend still further, but are cut off frequently, as they



THE GREAT COTTON TREE OF NASSAU.

encroach on the police barracks. The huge roots seen in our picture spread nearly forty feet above the ground. When we take into consideration that here is a tree spreading its branches nearly or quite ninety feet northeast and southwest from its trunk, that owing to the rock on which it grows will not admit of its roots penetrating the earth to support such an immense spread of limb and foliage, we have to admire the wisdom of nature in building the immense braces or supports in the form of roots, by which this mass is upheld, and those all, or nearly all, on the surface of the ground. Several of the spaces between these roots would hide a horse completely from sight. The foliage falls near spring, and in a few days it starts again. I have seen it with bare branches Saturday evening and thick with foliage the following Monday morning. It seems magic the way the foliage develops. The immense roots and the extreme spread of the branches of this particular tree may be due, to a great extent, to its peculiar location. It stands in the rear of the public buildings, and is by them protected from the high

the door to the other room, which the Gees used as a kitchen. The bodies of Mr. and Mrs. Gee, lying in a cramped position, met her gaze. The sight was too much for her, and she ran shrieking down the stairs and fainted.

Mr. G. H. Warner, who lives next door, came in and, detecting the odor of gas in the room in which the bodies were, opened the doors and windows and attempted to resuscitate the man and woman. The bodies were cold and his efforts were of no avail.

At the inquest, Mr. Warner testified that he turned off the jets in the gasoline stove, opened the windows, and the stove was a new two-burner.

Prof. B. P. Colton, professor of chemistry in the Normal university, was called and said that the natural odor or fumes of gasoline was not suffocating; that the gasoline stove in ordinary running can and does sometimes produce a carbonic acid gas that would cause an intense headache, but would be slow in its effects. He said also that it produced a carbonic oxide when only partial combustion occurred, which would

declared that the gas was so deadly that one breath was sufficient to destroy life.

Increasing the Sensitiveness of Photo. Films.

The following process is by York Schwartz, of Hanover, Germany. It consists in mixing the material for making the film with or coating the photographic films with formaldehyde or a compound of formaldehyde with bisulphite salts.

The process is based on the discovery that the sensitiveness of silver compounds to light is materially increased or that the effect of light on the same is continued by the presence of formaldehyde, or a compound of formaldehyde with a bisulphite of an alkali metal or of ammonia or of substituted ammonia (capable of forming bisulphite) in the sensitive silver compounds.

For photographic purposes these discoveries may be utilized as follows: First, by adding one or more of the specified compounds, either alone or in mixture with other substances, to the substances for making the



THE GREAT COTTON TREE OF NASSAU.

winds from the sea and the hurricanes, and to that fact may perhaps be attributed many of its peculiarities. At one season of the year, near spring, it sheds a silky fiber like cotton, only much finer, that covers the ground for a long distance, wherever the wind takes it. This fiber probably gives it its name of the silk cotton tree, by which it is familiarly known. The engravings are from photographs of the tree.

Dangers of Gasoline.

A single breath of carbon monoxide gas will knock a man down as quickly as if struck by a club. *The Pan-agraph* gives account of two recent cases at Normal, Texas, which should serve as a warning to those who use gasoline or coal stoves.

A short time ago Mr. John W. Gee and his wife and six months' old child came to Normal from El Paso. He came to attend the university, and they rented two upstairs rooms. In one of the rooms they had a gasoline stove and did their cooking, and the other was used as a sleeping room.

One morning they arose about 5 o'clock, and were heard for the last time about 6 o'clock. At 7 o'clock the Gee baby was heard crying, and a neighbor went upstairs to ascertain the cause. The baby was in the sleeping room, and she picked the child up and opened

prove fatal if a full breath was taken. It is the same as that formed in hard coal stoves. Other roomers in the house testified to the happy relations existing between the deceased and that they had no trouble or differences.

The jury rendered a verdict to the effect that Mr. and Mrs. Gee came to their deaths by inhaling carbon monoxide gas, produced by a gasoline stove. The faces of the dead looked perfectly natural and gave evidence that the grim reaper's work was done quickly. The baby was slightly affected by the gas, but is now all right.

The room in which the accident occurred is a small one and the windows and doors were closed tight. The couple were dressed and had apparently had breakfast. The stove had been used, and from some cause, which does not clearly appear, gas was generated. It is believed that this was heavier than the air, and hence hung in a thick mass near the floor. The supposition is that Mrs. Gee stooped down for some purpose, and, getting a breath of the poisonous vapor, fell. Her husband, in attempting to pick her up, met the same fate, and fell dying beside her. This supposition is formed from the position of the bodies. For some time after the windows had been opened there was a strong smell of the gas in the room. Prof. Colton

films at the time of the production of the sensitive film; second, by bathing the finished photographic film in a solution of the said compounds or mixtures before the film is exposed to light; and third, by treating the photographic film after exposure with a solution of the said compounds or mixtures. In this case the changes produced in the film by the action of the light are continued, so as to obtain in this manner the same result as by a correspondingly longer exposure to light.

The application of the said compounds constitutes an important improvement in the manufacture of photographic films, because they possess in an increased measure all advantages of the substances hitherto employed for similar purposes without sharing their faults—for instance, the tendency to form clouds or specks or of imparting a yellowish tint to the film.

THE Otis Steel Company, of Cleveland, which has the largest plate mill in the world, a few days ago rolled a 20 inch ingot of 8,500 pounds down to three-quarter inch plate with one heat. Some of the members of the Iron and Steel Institute, who visited these works during their tour of inspection in this country, were surprised at seeing plates rolled direct from the ingots without being hammered or otherwise prepared.