Accordingly, in 1882, some birds were imported from Cape Town, and in 1886 and 1887 further shipments were forwarded from Natal. This last was made by Mr. Cawston, who landed forty-two birds out of fifty-two. They were then taken to Mr. Cawston's "Norwalk Ostrich Farm," in Los Angeles, California, where our illustrations were taken. The voyage from Natal to Galveston, Texas, took seventy days, a ship having been chartered for the purpose, every ostrich having a separate padded box. Mr. Cawston has been successful in raising a large number of young birds—those in one of the illustrations being one and two weeks old. The climate and the country—as had been expected—appear to be admirably suited to the culture of these birds. The experiment also appears to be fairly profitable, as from one small bird and two hens he produced—principally by means of incubation—eighteen chicks in one season. Before they were ten weeks old he sold them for 87*l*., some going to Arizona, where a farm is being established, and others being purchased for exhibition purposes. In addition to this the feathers will realize 50*l*., making a total result of about 140*l*. from three birds. Ostrich feathers, we should mention, are protected in the United States by an import duty of 25 per cent, and, as the farm is close to large cities, good prices can be obtained for them.—*London Graphic.*

Japan.

The staple food of Japan is rice, and it is grown throughout the empire, not only wherever irrigation is possible, but the species known as upland rice is grown on high, dry ground, needing no irrigation, just as wheat is grown in America. In this consular district, Nagasaki, says John M. Birch, U. S. consul, the lowland variety of rice and the best rice in Japan is grown, and in such quantities that it is becoming a leading article of export. The fields in which it is grown in this district are small—the largest seldom being over one-fourth of an acre in area—and lie almost entirely under water from the time the seedling is planted in May or June until the ripened grain is harvested in October or November. The water so necessary is conducted to the fields, which have raised borders, by means of conduits from numerous streams, or, in times of drought, from basins, which have been constructed to retain the contents of these streams flooded during the rainy season. The sides of the numerous hills surrounding this city are laid out in terraces, and into the levels which are intended for rice, the water collected on the higher grounds is led by conduits, the quantity being regulated by means of dams provided with flood gates, so as to be let on or shut off at pleasure. On the level plains in the interior of the island of Keirshin, irrigation, however, is not so easy, the farmers being compelled to pump the water to the higher level of their fields from the streams or reservoirs. The pump in universal use resembles a water wheel, or a steamer's paddle wheel, and is made to revolve by a man ascending the float boards.

In the spring, about the month of March, the fields, which have been left without cultivation during the winter season, are dug up and begin to be prepared for rice sowing. In digging the ground the farmer uses for the purpose a mattock-shaped agricultural implement universally used in Japan. This implement is used as our laborers use the mattock, or the blade may be fastened to a wooden beam, thus forming a plow, which is drawn by a horse or an ox. The broken ground is then thoroughly saturated with a liquid manure, consisting of all sorts of refuse, such as night soil mixed with bathing water, rotten grass, bamboo leaves, and when dried by the sun the ground is again dug up and flooded with water to the depth of three inches. Through the slush is drawn an agricultural implement somewhat resembling a harrow, for the purpose of disintegrating the soil and thoroughly mixing the manure with it. The soil is now ready to receive the seedlings, which have been grown from the seed rice. The seed rice being soaked until ready to sprout is sown in very heavily manured patches of ground, covered with water during the night, and drained off during the day; and when the sprouts are six inches high, which is in the month of May, they are transplanted into the prepared fields as shallowly as possible (the number depending on the quality of the ground), in tufts of several plants, about six inches apart, and arranged in such a way that all the roots are of the same length. The work is done by all the members who are able to wade about in the water. The rice spouts thus planted require a great deal of manuring and cultivating before they put forth the ripened ear. It is estimated that from the planting time until the harvest, in November, the fields are hoed once every two weeks, in order that they may be kept free from weeds, water plants, etc. When the ear is about to burst forth the earth must be drawn up to the roots, and at the same time the plants must be heavily manured, which is done by the farmer pouring on the roots of each tuft liquid manure, consisting of a mixture of everything which is supposed to possess fertilizing qualities, but of which night soil is the principal ingredient.

In September the fields are permitted to become dry, and in October and November, when the ears present a yellow color, the grain is cut by an agricultural implement resembling a sickle, dried on the fields as our farmers cure the newly cut grain, made into bundles, and taken to the farmyards. The heads are then pulled from the straw by drawing the bundles through a comblike arrangement of wooden or iron teeth, hulled or thrashed by spreading them on a mat and beating them with a flail, and separated from the chaff by running the thrashed grain through a machine made of two bamboo baskets, placed one upon the other and full of cut bamboos placed on end, which form the cleaner. The food rice is also further cleaned by pounding it with a pestle, in a mortar-shaped vessel, and where a number of pestles are used in as many mortars, they are set in motion by water or steam power.

PHOTOGRAPHIC NOTES.

Improved Hydroquinone Developer.—Considerable discussion in regard to the hydroquinone developer has been going on in the various English photographic societies. Among the latest results made public is a developer recommended by Mr. Montefiore, which consists specially in omitting the use of sulphite of soda as a preservative and substituting therefor the comparatively new chemical meta-bisulphite of potash.

The formula as reported in the *Photographic News* is as follows, which is the proper strength to apply to the plate:

Hydroquinone	1	gr.
Meta-bisulphite of potash	2	"
Carbonate of potash	8	"
Hydrate of potash	2½	"
Water	1	oz.

Negatives may be fully developed with the above solution in five minutes. The solution was very cold. If too warm, it may soften the film too much, as the caustic potash is quite powerful.

Experiments we have made in preserving solutions of hydroquinone with meta-bisulphite of potash have been very satisfactory, and in using it in making positives for the lantern we have had much success.

Meta-bisulphite of potash may now be ob[illegible] chemically pure from American merchants i[illegible] graphic materials, and as a much smaller quant[illegible] needed than of bisulphite of soda, it is considerably cheaper. The proportions of two grains of the meta-bisulphite to one grain of hydroquinone or pyrogallol appear thus far to be the best.

Solutions of hydroquinone and meta-bisulphite of potash in distilled water, which we have kept for over three months, still remain colorless.

Substitute for Negative Varnish.—Says Mr. P. A. Schestakoff in a foreign photographic publication, reported in the *Photo. News*, simply flow the negative with common turpentine. It takes rather longer to dry than ordinary varnish and somewhat weakens the negative, but it takes the retoucher's pencil perfectly and at the same time protects the film against dampness.

Wrought Iron Water and Steam Pipes.

There are three classes of pipes in general use, known as the *common*, the *extra*, and the *double extra*. These terms refer to the thickness of the pipes only, but they are also known by the names of "*butt-welded*" and "*lap-welded*," descriptive of their mode of manufacture. Boiler tubes are always lap-welded. Butt-welded pipe is only made up to certain sizes, but lap-welded pipe can be procured of all regular sizes. Formerly pipes were made from charcoal iron skelps exclusively, but within a short time steel has been used and has given general satisfaction.

In procuring the fittings for iron piping it is necessary not only to state the size, but also whether they are to be of cast or malleable iron. Fittings of malleable iron have a neater appearance and are lighter than those of cast iron, but are very difficult to break, and it often happens, when making extensive repairs, that the time expended in taking off a fitting and saving it would more than amount to its value, and for this reason cast iron fittings, though somewhat clumsy in appearance and heavier, are often employed, as a few blows of a hammer will break them so that they can be removed without trouble.

Wrought iron pipe can now be procured from one-eighth of an inch to twenty-four inches in diameter, and it has been proposed to make them of even forty-two inches.

The usual length of pipe, as furnished from the mills, is sixteen feet, but greater lengths can be obtained to order at an increased price per foot.

The size by which a steam or water pipe is known is its supposed internal diameter—but this diameter, though about uniform among manufacturers, does not exactly conform to the size at which it is rated—being with common pipe a little in excess, and with double extra pipe somewhat less.

Boiler tubes are always rated by their external diameter, and closely conform to their rating. They are also made of very superior charcoal stock, and their ends are annealed. In ordering boiler tubes, their length as well as their diameter must be stated. Nothing need be said as to their thickness, as that is a constant for every diameter.

To the above the *Safety Valve* adds: In ordering pipe or boiler tubes, always deal with a firm of good repute, for there is plenty of pipe in the market of questionable character, and boiler tubes can be found both of very poor material and below the standard thickness.

On the Discharge of a Leyden Jar.

FROM A LECTURE BY DR. OLIVER LODGE AT THE ROYAL INSTITUTION, ON FRIDAY EVENING, MARCH 8, 1889.

The main topic of discourse was the oscillatory character of the well known Leyden jar spark. Each spark is in reality not simple, but complex, and though it lasts only an inconceivably small fraction of a second, yet by a sufficiently rapid revolving mirror it can be analyzed into a number of distinct oscillations or alternations of current, separated by momentary pauses, analogous to the vibrations of a loaded spring or the reed of a musical instrument. If the discharge be interrupted before it is complete, the jar can be found charged in a precisely opposite way to what it was at first. The fact is that the discharge has inertia and overshoots the mark, first in one direction, then in the other, precisely as happens with a swinging pendulum.

The original experimental discoverer of the fact of oscillation in a Leyden jar discharge was stated by the lecturer to be Joseph Henry, of Washington, in 1842. But the fact has been lost sight of, and it was Helmholtz, in 1847, who showed that oscillations were a necessary consequence of the conservation of energy; while in 1853 Sir Wm. Thomson gave the complete mathematical theory of the subject.

The oscillations have been seen, after considerable labor and careful experiments, by Feddersen in Germany; but they are ordinarily of extraordinary frequency. They are often more than a million per second, and usually more than a hundred thousand. They can be easily got as high as a hundred million per second, and if they were made very much more frequent still, they would begin to affect the eye with the sensation of light. It is this fact that light is excited by and consists of minute electric oscillations, as worked out [illegible] the mathematical theory of Clerk-Maxwell and now experimentally established by the recent brilliant discoveries of Herz—it is this fact, said the lecturer, which incloses the whole subject with such profound interest and importance.

Having sketched out this view of the subject and illustrated the mechanism of the oscillations by mechanical analogies, Prof. Lodge proceeded to show how he had found it possible to make the oscillations much slower, and ultimately to bring them within the range of audition.

He then proceeded to exhibit these comparatively slowly oscillating sparks to the audience, the whistling and musical sound of the sparks being most apparent, the lowest note obtained corresponding to about 500 vibrations per second.

These musical sparks were then analyzed in a slowly rotating mirror and spread out into a long and serrated band, having much the appearance of a singing flame similarly analyzed.

Having made this demonstration visible to the entire audience, the lecturer next proceeded to exhibit another recently dicovered fact, viz., that the plane of polarization of light could be easily rotated by a Leyden jar discharge, and that the restored light was oscillatory in precisely the same manner as the spark.

A long tube of bisulphide of carbon, surrounded by a helix, was employed, and light, after being sent through this and through an analyzer, was submitted to the same rotating mirror as before, and the beaded band of light made distinctly visible.

These were the principal experiments; but other matters, such as sympathetic electric resonance, by which the discharge of one Leyden jar could be made to burst an air condenser properly timed to its oscillation period, were referred to, and also demonstrated in the library during the evening.

The lecture was concluded with the following peroration:

"An old and trite subject is thus seen to have, in the light of theory, an unexpected charm and brilliancy. So it is with a great number of old and familiar facts at the present time. The present is an era of astounding activity in physical science. Progress is a thing of months and weeks, almost of days. The long line of isolated ripples of past discovery seem blending into a mighty wave, on the crest of which one begins to discern some oncoming magnificent generalization. The suspense is becoming feverish; at times almost painful. One feels like a boy who has been long strumming on the silent keyboard of a deserted organ, into the chest of which an unseen power begins to blow a vivifying breath. Astonished, he now finds that the touch of a finger elicits a responsive note, and he hesitates, half delighted, half affrighted, least he be deafened by the chords which it would seem he can now summon forth almost at will."