THE JOHNSTON HARVESTER PRIZE.

Our readers are already aware that the field trials of agricultural machinery at the Paris Exhibition of 1878 resulted in an overwhelming victory for American manufacturers. The special prizes for exceptional merit, as displayed in these practical contests, were twelve objects of art—Sèvres vases—only eleven of which were awarded, no sufficiently meritorious competitor appearing for the twelfth. Of the eleven awards seven fell to Americans, one to a French exhibitor of an American machine, two to French exhibitors of French machines, and one to an English exhibitor.

In the harvesting tests thirty-five reapers were entered, but only one award was made to that class of machines—the splendid specimen of ceramic art shown in the accompanying engraving—and that fell to the Johnston Harvester Company, of Brockport, Monroe county, N. Y., who have just received their prize.

The vase, as will be seen from our engraving, is of the shape called "tazza." It stands ten inches high, the bowl having a depth of three inches and a breadth of fourteen and a half inches across the top. Outside the prevailing colors are blue and gold; within are panels of scroll work, tritons, and trefoils, with circular bands in gold. In the center is a raised medallion representing the city of Paris—a female head with a mural crown. Around the medallion are scrolls, rosettes, fruits, wheat ears, and other agricultural symbols. Around the body of the vase is a wreath of fruits, flowers, and grain, with a spiral pink band bearing the inscription, "Exposition Universelle, Paris, 1878," and medallions with agricultural symbols. The pillar is in blue and gold, with bands, frets, and festoons; and the foot has a circular band inclosing quatrefoils on a green ground, broken by four panels, severally containing the words "Sèvres," "Paris," "Exposition," "1878." The intrinsic value of the vase is placed at one thousand francs; but that is a small matter compared with its actual value as a testimonial to the practical superiority and exceptional merit of the reaper which earned it in a field contested by so many able rivals.

Jacobsen's Method for Photo Printing.

Prepare a carbon picture in the usual manner upon a sheet of glass, and surround the picture with a wooden frame which exactly fits round the sheet of glass. Then pour into the frame a mixture (not too hot) of one part of gelatine, one part of gum arabic, and two parts of glycerine. When the mass has stiffened in the frame, carefully remove the latter from the former with a knife, and with equal care invert the gelatine plate, with which the carbon picture will now be incorporated. To ink the picture use a ground glass roller, and the inking process proceeds most favorably when done upon a smooth, elastic support like that used for rolling letter press forms. The printing ink, which must be very thick, is previously dissolved in oil of turpentine or in benzole, and some of this solution, without the addition of varnish, is poured upon the plate and distributed over it by the glass roller.

The plate being inked, a sheet of uncoagulated albumenized paper corresponding in size to the picture is laid upon it, and an India-rubber roller is passed softly across the paper, which is then lifted off the plate. The albumenized paper, which absorbs moisture readily, should not be allowed to lie too long upon the plate for fear of the albumen dissolving off and dirtying the plate. It is not necessary to damp the plate with water, as it possesses sufficient moisture to allow of a dozen impressions being taken. Of course this moisture is exhausted at last, but the plate is sufficiently hygroscopic to absorb enough moisture from the atmosphere in the course of a few hours to allow of printing being resumed.

While in other lichtdruck processes the image is sunk into the plate and the ink has to sink into the shadows, this method has the advantage of furnishing a relief which facilitates printing. By this process, also, round objects, such as bottles and vases, can be printed—possibly even with colors, which could be burnt in."

The Entrance to New York Harbor.

A bill has been introduced in the House of Representatives at Washington to create a permanently deep, wide, and straight channel through Sandy Hook bar to the port of New York. The bill provides for the construction of such works on the seaward or outward side of Sandy Hook bar as may be necessary to effect permanently and beneficially the part known as the Swash channel "and the fourteen foot channel." The works are not to impede navigation, and they are to begin not later than one year from the passage of the act. The works are to be pushed so as to increase the depth six inches annually until the full depth of thirty-one feet six inches shall be obtained, otherwise the provisions of the act shall be void.

When the full depth is obtained the sum of $5,500,000 shall be paid. The sum of $30,000 is to be paid annually for the maintenance of the requisite depth, said payments to be made three months after the expiration of each year. The

SEVRES VASE—SPECIAL PRIZE, PARIS EXHIBITION.

terms and conditions of the various payments are as follows: $500,000 to be paid when a depth of 27 feet 6 inches and a mean width of 200 feet are obtained; $500,000 when a depth of 28 feet is obtained; $500,000 when a depth of 28 feet 6 inches and a width of 300 feet are obtained; $500,000 when a depth of 29 feet is obtained; $625,000 when a depth of 29 feet 6 inches is obtained and a width of 400 feet; $625,000 when a depth of 30 feet is obtained; $625,000 when a depth of 30 feet 6 inches and a width of 450 feet are obtained; $625,000 when a depth of 31 feet is obtained; the final payment in full of $1,000,000 when the full depth of 31 feet 6 inches and a width of 500 feet are obtained.

The persons engaged in the work are not to shut off the

SEVRES VASE—TOP VIEW.

flow of water through any of the channels over the bar by damming up, by the erection of jetties, or by impeding or controlling in any way the natural flow of the water, nor resort to dredging, blocking, or any stirring-up process, for the purpose of more quickly achieving the required depths, but shall make the channel permanently deep.

William A. Brown.

Mr. William A. Brown, one of the largest umbrella manufacturers in the world, died in Philadelphia, Saturday, December 13, in the seventieth year of his age. He was born in Portsmouth, N. H.

Weight Applied to Money.

At a recent meeting of the Bankers' Institute, London, Mr. Barclay V. Head, assistant keeper of coins at the British Museum, read a paper "On the origin and transmission of some of the principal systems of weight as applied to money from the earliest times to the age of Alexander the Great." Mr. Head stated that a theoretically perfect system in which all measures and weights were referable to one and the same unit had been attempted (if never quite attained) twice only in the whole history of mankind; once by the Babylonians in their sexagesimal system, and once again, after a period of 3,000 years, by the French in their decimal system. Numismatists were generally agreed that the Lydians, about 700 B. C., were the inventors of the art of coining, and that the earliest coins were composed of electrum—a natural compound of gold and silver found in the washings of the river Pactolus. This coinage lasted about a century and a half, and was then superseded by a bi-metallic currency of gold and silver, instituted by Crœsus. Henceforth bi-metallism in the currency became the rule in Asia down to the age of Alexander, being based upon the constant fixed ratio of 1 to 13½ between gold and silver. The currency of European Greece, Mr. Head believed to have been generally monometallic, based upon silver, not upon gold. This continued to the time of Philip of Macedon, in whose reign the rich gold mines of Philippi were discovered, and gold for the first time became abundant in Europe. Philip thereupon reorganized his currency, introducing bi-metallism, with the view of artificially keeping up the price of gold as compared with that of silver. This device was futile, and Alexander the Great returned to the ancient system of mono-metallism, based upon silver, though he coined gold. From this time the gold coinage was regarded merely as bullion, no attempt being made to regulate the value of one metal by the other. Mono-metallism henceforth became universal, even in Asia. This change from a double to a single standard in Asia was facilitated, in Mr. Head's opinion, by the sudden depreciation of gold (for the first time in history) consequent upon the dispersion by Alexander of the long-hoarded treasures of the Kings of Persia.

The "Kohinoor" Pearl.

Some months ago the pearl fisheries of the Miami River, Ohio, were described at considerable length in this paper. The past season has been signalized by the discovery of an agatized pearl, weighing forty-six and a half grains. The groundwork is beautifully agatized with the pearly iridescence shining through. It is the only pearl of the kind in pearl history, a history which dates back at least two thousand years, for the Ceylon fishery has been known for quite that length of time. Being the first of its kind, its value cannot be estimated. It is singular, too, that it was found embedded in the flesh of the mussel; all others taken from this river were found between the flesh and the shell, or embedded in the shell.

The prosecution of this industry is due largely to Mr. Israel Harris, a banker of Waynesville, Ohio, who has already a collection of over a thousand Miami pearls of all sizes and values, some of them of odd and irregular forms. Some resemble human hands; one is a small shell to which a coating of pearl has been added. His latest important acquisition, the agatized pearl, he calls the "Kohinoor."

A Large Consignment of Silkworms' Eggs.

A consignment of silkworms' eggs, filling six freight cars, and valued at $850,000, arrived in this city December 19, from Yokohama, by way of San Francisco. The eggs were from Japanese nurseries, and had been collected and consigned to silk growers in France and Italy by their agents at Yokohama. The route followed was chosen in preference to that by the Indian Ocean and the Suez Canal owing to the lower temperature. Great care has always been necessary by the Indian Ocean route, and, even when that was exercised, consignments were often spoiled by the high temperature in doubling the southern points of Hindostan. The increased number of transfers slightly injures the eggs, but the aggregate damage is considerably less by way of New York than by way of the Suez Canal. The eggs are packed in cases measuring three feet in length by about one foot in width and depth. Each case contains about 600,000 eggs, gummed to strips of cardboard separated by layers of tissue paper. From twenty to twenty-five strips are placed in each case, each strip containing from 30,000 to 35,000 eggs. With this simple packing and with due precautions against moisture and high temperature, these delicate structures are transported three-fourths of the distance round the earth in perfect safety, provided always that a moderately cold fresh air is given free access to the quarters in which they are stored. Heat, it is stated, produces an immediate effect upon the development of the larvæ, thus rendering it impossible to deliver them in good condition for growing.

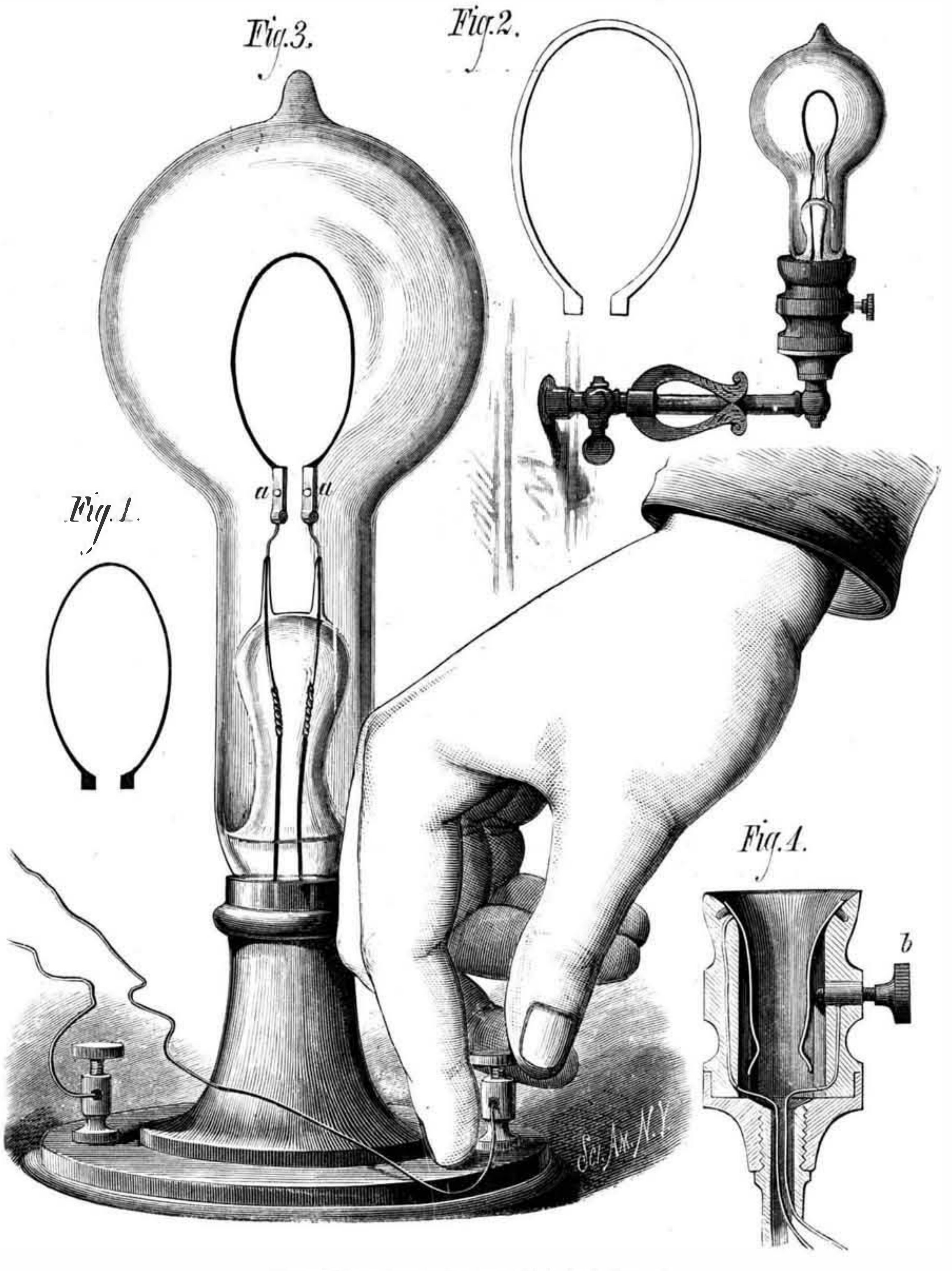
The partial failure of the European silk crop the past year has made an unusual demand for Japanese eggs, and other large consignments are anticipated.

EDISON'S LATEST ELECTRIC LIGHT.

It is somewhat strange that carbon, the only substance of any value for the contact surfaces of telephone transmitters, should also prove to be the only substance suited to the light-giving portion of electric lamps. The production of an electric light by the incandescence of platinum is, for the present at least, laid aside by Mr. Edison for the more promising and more satisfactory carbon. Not the carbon so familiarly known in connection with electric lighting, but a new article having different qualities, and remarkable both for the simplicity of the process by which it is made, and its efficiency as a light-giving body when raised to incandescence by the passage of an electrical current.

The discovery of this new form of carbon was partly accidental, but more the result of Mr. Edison's faculty of seizing upon the slightest suggestion and following it as long as it invites investigation.

The first carbon prepared by Mr. Edison for this purpose was formed of a thread enveloped in a paste made of lampblack and tar, and carbonized at a high temperature. This carbon thread, although not remarkably successful, gave sufficient encouragement to warrant further investigation in the same direction. After the trial of a number of other substances it was determined that the best of all was paper, simple plain paper, without lampblack or other applications. In making these carbons the quality of cardboard or paper known as Bristol-board is used.



EDISON'S LATEST ELECTRIC LAMP.

The completed carbon is shown full size in Fig 1; the blank from which it is made is shown full size in Fig. 2. It will be observed, by comparing Fig. 1 with Fig. 2, that the paper shrinks enormously during the process of carbonization.

The manufacture of these little carbon "horseshoes," as they are called at Mr. Edison's laboratory, is very simple. The paper blanks, after being cut by dies in the form shown in Fig. 2, are subjected to heat sufficiently strong to drive off by destructive distillation all volatile matters. The paper horseshoes thus prepared are placed with alternate layers of tissue paper in shallow iron boxes, and weighted down with thin plates of ordinary carbon. These boxes are closed by tight-fitting covers, and placed in a muffle, when they are raised to a high temperature, which is maintained for a considerable time. The only index of the completion of the process is the crackling of the oxide formed on the exterior of the iron boxes. After cooling the carbons are removed from the iron boxes and placed between the jaws of small platinum vises, *a a*, which are supported on thin platinum wires blown in the glass base and forming the electrodes. A portion of the glass base and the carbon and its supports are inclosed by a glass bulb, from which the air is so completely exhausted by means of a Sprengel pump that only a millionth part of the original volume remains.

Mr. Edison has improved the Sprengel pump so that high vacua may be produced in 25 minutes instead of the 45 hours consumed in the operation by some of our physicists. The vacuum is so nearly perfect that none of the tests to which the lamps have been subjected so far, indicate the presence of the slightest trace of air.

For making his Sprengel pumps and other vacuum apparatus, Mr. Edison fortunately secured the services of an expert glass worker, who was formerly engaged in the laboratory of the famous Geissler, of Bohn.

The electrical resistance of the slender carbon horseshoe is 100 ohms, and, while the lamp shown in Fig. 3 is intended to afford a light equivalent to a single four foot gas jet, it may be forced to give a light equal to that of 8 or 10 such jets. We saw a single lamp of this kind giving a light that enabled us to read the SCIENTIFIC AMERICAN 100 feet away. This was certainly an extraordinary performance for a piece of carbon having a surface no larger than that shown in Fig. 1.

One of the most remarkable experiments connected with the exhibition of these lamps was that of connecting one of them with the main electrodes by means of a yard of No. 36 copper wire, no larger than a horse hair. The light was maintained without heating this very small conductor. Of course a wire of this size is too small to use in regular practice, but it strikingly exhibits the advantage of having a light-giving body of high resistance.

The carbon is very tough and flexible, and not liable to be broken or injured by jars. We saw one of the carbon horseshoes nearly straightened before it broke. The carbon not only withstands rough mechanical usage; it is also proof against injury by the sudden turning on and off of the electric current. One of these carbons has been subjected to the severe test of applying and removing the electric current a number of times equivalent to 36 years of actual daily use, and yet the carbon is not in the least impaired.

The horseshoe form of the carbon has a great advantage over the straight pencil or the voltaic arc, the light being more diffused, and therefore softer and mellower, casting no sharp black shadows, nor giving such an intense light as to be painful to the eyes. The light resembles that of a gas jet excepting in the matter of steadiness, the electric light being perfectly uniform and steady.

The lamps are connected in multiple arc, *i. e.*, the two wires leading from the electrical generator run parallel to each other, and the lamps are placed between and connected with each wire. As Mr. Edison has his circuit arranged it does not make the slightest difference, so far as the lamps are concerned, whether one or fifty of them are in use; it does make a difference, however, in the power consumed at the generator. The regulation of the current is reduced to the simple matter of varying the intensity of the magnetic field in which the armature of the generator revolves.

The entire lighting apparatus of a house, store, office, or factory, consists in the lamps and a few wires. There are no regulators, no complicated switches, no resistance coils to replace the lamps when the latter are not in use. The lamp, in its present form, is as simple as a candle, and, candle-like, it may be taken from its socket and replaced. This may be done while the current is on.

The construction of the socket which supports the lamp will be understood by reference to Fig. 4.

The lamp has attached to its electrodes slips of copper, which are bent upward against the sides of the glass, and touch two springs at opposite sides of the socket. One of these springs is connected with one of the electrical conductors; the other spring merely touches the copper strip, and does not form a part of the electrical conductor until it is touched by the thumb screw, *b*, this screw being connected with the second electrical conducting wire. To start the light it is only necessary to turn the screw, *b*, until it touches the spring. To stop the light the screw is turned in the reverse direction. From this it will be seen that the electric lamp is managed easier than a gas burner, as it requires neither lighting nor regulating.

On the evening of our visit to Mr. Edison's laboratory, he had more than thirty of these simple little lamps in operation, the current being supplied from one of his machines. Each lamp gives a clear, soft light equal to that of a four foot gas burner. These lamps had already been in continued operation for more than 48 hours, and they had seen altogether as much use as they would in 30 days of ordinary domestic or business service. The light certainly leaves nothing to be desired so far as its efficiency is concerned, and we are assured by Mr. Edison that, on the score of cheapness or economy, his system of illumination is far in advance of any other, not excepting gas at the cheapest rates. It seems that the subject of general electric lighting is now reduced to a mere question of time. If Mr. Edison's lamps withstand the test of time, he has unquestionably solved the vexed question and has produced what the world has long waited for: that is, an economical and practical system of electric lighting adapted to the wants of the masses.

The details given above were obtained by us direct from Mr. Edison and his assistants during a recent visit to the Menlo Park laboratory.

Nitrolin.

A new explosive compound, known as nitrolin, is compounded as follows: From 5 to 20 parts of sugar or sirup are mixed with from 25 to 30 parts of nitric acid in a wooden or gutta percha vessel. Of this compound 25 to 30 parts are mixed with 13 to 35 parts of nitrate of potassa and from 13 to 15 parts of cellulose.—*Chem. Centralblatt.*

MISCELLANEOUS INVENTIONS.

Mr. David Booker, of Edom, Texas, has patented an improved implement for trimming and cutting and laying down hedges. It consists in a peculiar combination of knives and levers.

Mr George C. Phillips, of Silver City, Nev, has invented a steam piston packing, which consists in making the suitable packing rings with their adjoining faces inclined in opposite directions, so that the pressure of the gland will compress and expand the packing rings alternately to pack the piston and stuffing box, such rings being used in connection with a conical sleeve of novel construction, which sits within the stuffing box and around the piston rod.