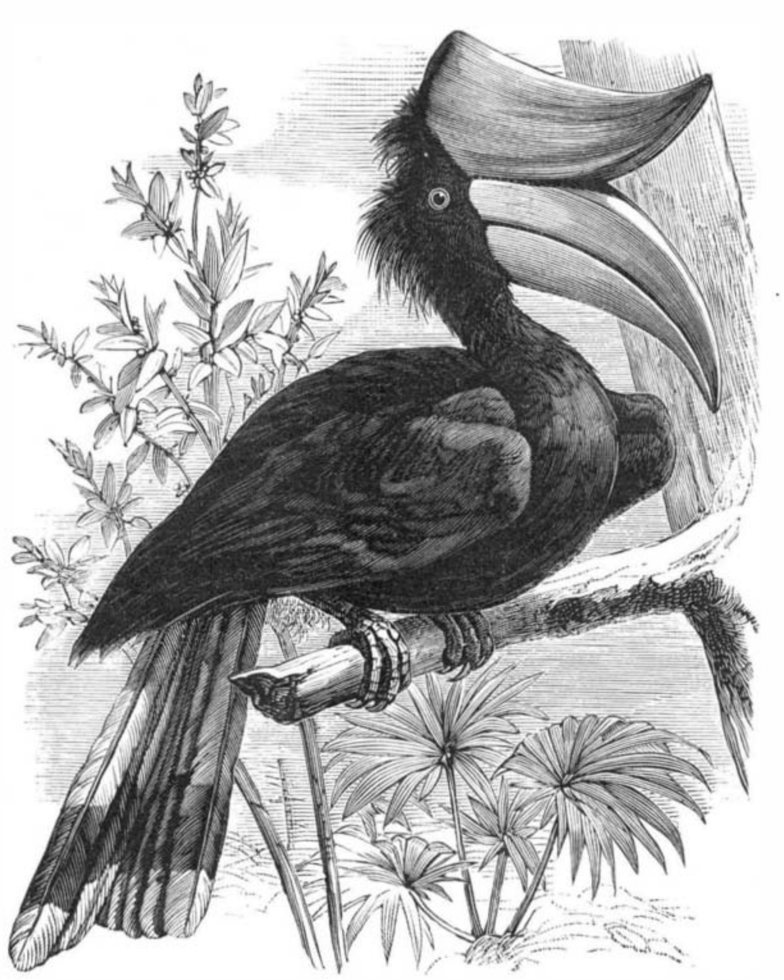
THE RHINOCEROS HORNBILL.

There are many strange and wonderful forms among the feathered tribes; but there are, perhaps, none which more astonish the beholder who sees them for the first time than the group of birds known by the name of hornbills. They are all distinguished by a very large beak, to which is added a singular helmet-like appendage, equaling in size the beak itself in some species, while in others it is so small as to attract but little notice. On account of the enormous size of the beak and helmet, the bird appears to be overweighted by the mass of horny substance which it has to carry, but on closer investigation the whole structure is found to be singularly light and yet very strong, the whole interior being composed of numerous honeycombed cells with very thin walls and wide spaces, the walls being so arranged as to give very great strength when the bill is used for biting, and with a very slight expenditure of material.

The greatest development of beak and helmet is found in the rhinoceros hornbill, although there are many others which have these appendages of great size. The beak varies greatly in proportion to the age of the individual, the helmet being almost imperceptible when it is first hatched, and the bill not very striking in dimensions. The beak gains in size as the bird gains in strength. In the adult the helmet and beak attain their full proportions. It is said that a wrinkle is added every year to the number of the furrows found on the bill. The object of the helmet is obscure, but the probability is that it may aid the bird in producing the loud roaring cry for which it is so celebrated. The hornbill is lively and active, leaping from bough to bough with great lightness, and appearing not to be in the least incommoded by its huge beak. Its flight is laborious, and when in the air the bird has a habit of clattering its great mandibles together, which together with the noise of the wings produces a weird sound. The food of the hornbill seems to consist of both animal and vegetable matters. We take our illustration from Wood's "Natural History."



THE RHINOCEROS HORNBILL.

Saw Tempering by Natural Gas.

Beaver Falls, Pa., contains several gas wells at an average depth of eleven hundred feet, yielding about 100,000 cubic feet of gas every twenty-four hours. This gas has been introduced into a large saw tempering furnace at that place in the works of Emerson, Smith & Co. The furnace is 8 feet wide by 14 feet long. It is said to be a perfect success, giving a uniform heat, and there being no sulphur or impurity in the gas the steel is not deteriorated in the operation of heating.

THE JAPANESE BUILDING AT THE PARIS EXHIBITION.

Japan, on the terrestrial globe, lies furthest away in that direction beyond the Far West of America, and beyond the wide Pacific. The Japanese structure has a simple and solid aspect, resembling the portal of a half-fortified mansion, with massive timber frames at the sides; but it is adorned with two handsome porcelain fountains, and each of these is designed to represent the stump of a tree supporting a shell into which the water is poured from a large flower. Before entering the porch a large map of Japan and a plan of the city of Tokio are seen displayed on the walls to right and left.—*Illustrated London News.*

Machinery for New York State Capitol Building.

The Buckeye Engine Company of this city have been awarded the contract for a pair of condensing engines, cylinders 14 inches diameter, stroke 28 inches, for the State Capitol Building at Albany, New York. The engines will be of the company's usual horizontal type with automatic cut off, and will be elaborately finished.

The Explosiveness of Flour.

Professors Peck and Peckham, of the University of Minnesota, have been making an extensive series of experiments to determine the cause of the recent flour mill explosion at Minneapolis. The substances tested were coarse and fine bran, material from stone grinding wheat; wheat dust, from wheat dust house; middlings, general mill dust, dust from middlings machines, dust from flour dust house (from stones), and flour. When thrown in a body on a light, all these substances put the light out. Blown by a bellows into the air surrounding a gas flame, the following results were obtained:

Coarse bran would not burn. Fine bran and flour dust burn quickly, with considerable blaze. Middlings burn quicker, but with less flame. All the other substances burn very quickly, very much like gunpowder.

In all these cases there was a space around the flash where the dust was not thick enough to ignite from particle to particle; hence it remained in the air after the explosion. Flour dust, flour middlings, etc., when mixed with air, thick enough to ignite from particle to particle, and separated so that each particle is surrounded by air, will unite with the oxygen in the air, producing a gas at high temperature, which requires an additional space, hence the bursting.

There is no gas which comes from flour or middlings that is an explosive; it is the direct combination with the air that produces gas, requiring additional space. Powerful electric sparks from the electric machine and from the Leyden jar were passed through the air filled with dust of the different kinds, but without an explosion in any case. A platinum wire kept at a white heat by a galvanic battery would not produce an explosion. The dust would collect upon it and char to black coals, but would not blaze nor explode.

A piece of glowing charcoal, kept hot by the bellows, would not produce an explosion when surrounded by dust, but when fanned into a blaze the explosion followed. A common kerosene lantern, when surrounded by dust of all degrees of density, would not produce an explosion, but when the dust was blown into the bottom, through the globe and out of the top, it would ignite. To explode quickly the dust must be dry. Evidently when an explosion has been started in a volume of dusty air, loose flour may be blown into the air and made a source of danger.

New Engineering Inventions.

Erskine H. Bronson, of Ottawa, Ontario, Canada, has patented an improvement in Automatic Switches for Railways, which consists in an arrangement of sliding cams for moving the switch rails, and in treadles to be operated by the pilot wheels of the locomotive, and in intermediate mechanism for connecting the treadles with the switch operating cams, the

THE JAPANESE BUILDING AT THE PARIS EXHIBITION.

object being to provide a switch will be operated by the pilot wheels of the locomotive as it approaches the movable switch rails.

An improved Refrigerator Car has been patented by Michael Haughey, of St Louis, Missouri. The object of this invention is to ventilate and cool railway cars used in the transportation of perishable articles. This car has a novel ventilator and ice box and is provided with a new form of non-conducting walls.

CROOKED JOURNALISM.

In the English scientific journal *Engineering*, of June 21, 1878, appears a six column article on "Edison's Carbon Telephone," illustrated with ten engravings from Mr. Prescott's recent work on "The Speaking Telephone, Talking Phonograph, and other novelties." The descriptions of the cuts, and the rest of the information given, so far as correct, obviously come from the same source.

So far as correct: unhappily for the honor of scientific journalism, the writer's desire is plainly not so much to do justice to truth as to exalt Mr. Hughes at the expense of Mr. Edison. To this end he has studiously suppressed from Mr. Prescott's description of the carbon telephone the points which establish Mr. Edison's claim to the prior invention or discovery of everything involved in Mr. Hughes' microphone, while he has as studiously dwelt upon those same points as constituting the peculiar merits of Mr. Hughes' work.

For example, while he uses Fig. 21 of Mr. Prescott's book, he leaves out the very important little diagram numbered 20. It represents one form of the apparatus to which Sir William Thomson refers in the letter in which he says:

"It is certain that at the meeting of the British Association at Plymouth last September, a method of magnifying sound in an electric telephone was described as having been invented by Mr. Edison, which was identical in principle and in some details with that brought forward by Mr. Hughes."

The figure looks altogether too much like one form of Mr. Hughes' microphone to allow of its use in an article intended to establish the novelty of Mr. Hughes' discovery.

The omissions from the text are quite as significant. Under the first cut used in *Engineering*, Mr. Prescott says: "In the latest form of transmitter which Mr. Edison has introduced the vibrating diaphragm is done away with altogether, it having been found that much better results are obtained when a rigid plate of metal is substituted in its place. . . The inflexible plate, of course, merely serves, in consequence of its comparatively large area, to concentrate a considerable portion of the sonorous waves upon the small carbon disk or button; a much greater degree of pressure for any given effort of the speaker is thus brought to bear on the disk than could be obtained if only its small surface alone were used."

The *Engineering* writer coolly suppresses this important statement. He does worse: he puts in its place the false statement that "the essential principle of Mr. Edison's transmitter consists in causing a diaphragm, vibrating under the influence of sonorous vibrations, to vary the pressure upon, and therefore the resistance of, a piece of carbon," and so on.

A little further on, while repeating Mr. Edison's account of the experiments which led to the abandonment of the vibrating diaphragm (page 226 of Mr. Prescott's book), the *Engineering* writer drops out the following remark by Mr. Edison: "I discovered that my principle, unlike all other acoustical devices for the transmission of speech, did not require any vibration of the diaphragm—that, in fact, the sound waves could be transformed into electrical pulsations without the movement of any intervening mechanism."

Worse yet, in the very face of Mr. Edison's assertion to the contrary—an assertion which he could not by any possibility have overlooked—this most unscientific journalist says: "Mr. Edison finds it necessary to insert a diaphragm in all forms of his apparatus, that being the mechanical contrivance employed by which sonorous vibrations are converted into variations of mechanical pressure, and by which variations in the conductivity of the carbon or other material is insured. . . . On the other hand, Mr. Hughes employs no diaphragm at all, the sonorous vibrations in his apparatus acting directly upon the conducting material or through whatever solid substance to which they maybe attached."

In this way throughout the offending article, the writer persistently robs Edison to magnify Hughes, giving credit to Mr. Hughes for exactly what he has suppressed from Mr. Prescott's book. To insist as he does, that, because Mr. Edison covers his carbon button with a rigid iron plate, in his very practical telephone, therefore a vibrating diaphragm is an essential feature of Mr. Edison's invention, is a very shallow quibble in the face of Mr. Edison's and Mr. Prescott's statements that the carbon button acts precisely the same in the absence of such covering, though not so strongly. Mr. Edison's laboratory records show a great variety of experiments in which the carbon was talked against without "any intervening mechanism." In a telephone for popular use, however, to be held in the hand, turned upside down, talked into, exposed to dust and the weather, it was obviously necessary to use some means for holding the carbon in place, and to prevent its sensitiveness from being destroyed by dirt and the moisture of the breath when in use. For this purpose a rigid iron partition seemed at once convenient and durable. It is not in any sense a "vibrating diaphragm."

With a persistence worthy of a better cause, the *Engineering* writer returns to the point he seems especially anxious to enforce. Toward the end of the article he says: "In every instrument described by Mr. Edison the diaphragm is the ruling genie of the instrument. Professor Hughes, however, has through his great discovery been enabled to show that variations of resistance can be imparted to an electrical current not only without a diaphragm, but with very much better results when no such accessory is employed."

The animus of all this is only too apparent. Altogether the article is the most dishonest piece of writing we have ever seen in a scientific periodical; and although the article appears in the editorial columns of *Engineering*, we prefer, for the honor of scientific journalism, to think that the management of that paper was not party to the rascally act. It is more credible that a gross imposition has been practiced by some trusted member of the *Engineering* staff, orby some contributor whose position seemed to justify the acceptance of his utterances without any attempt at their verification. It is well known here to whom, in London, at Mr. Edison's request, Mr. Prescott sent proofs of the matter abused, together with electros of the cuts used, in *Engineering*. Accordingly the burden of dishonor lies upon or between a prominent British official on the one hand, and on the other a journal which cannot afford to leave the matter unexplained. Whoever is hurt, we sincerely hope that the fair fame of scientific journalism for candor and honesty may come off unstained.

A More Perfect Production.

The highest skill in manufacture or in production of any kind is not yet the prevailing characteristic of American industry. Uniformity of production, of whatever kind, is of much greater importance than to attempt the manufacture of any grade for which the material or the tools, the machinery or the knowledge of the workmen is not fitted. The highest condition of product in any nation is to produce the finest or highest cost articles in the most perfect manner, and to have material and machinery adopted, and the skilled workmen, so as to be able to so produce economically. But until the master hand is satisfied of all the requisites for producing fine goods, he should confine production to the best his facilities will make in the most perfect, uniform manner.

Samples of fine goods are shown all over the country every day, and were consumers or merchants sure that the product would be the same, there would be much less difficulty in introducing and more home made goods used where now importations are depended upon. The Stevens crash mills import raw flax because it is to be had according to sample, perfectly classified, and saves the employment of skilled labor to assort and classify, and of purchasing a great deal not wanted. The manufacturers of edge tools and knives use imported steel because it is warranted and the warrant proves good, while the uncertainty of American steel is such that a knife will often crack in tempering and cause the loss of labor worth ten times the difference in the price of the steel. Samples of alpacas and other dress goods are shown in our jobbing houses fully equal to any imported goods, but the goods when received are quite often of various grades and imperfections of character.

The imperfect or second quality productions find sale, but at a much lower price, and are to be found at second rate places, the imperfections slight and the goods perhaps generally quite as serviceable, but not absolutely so, and first class houses, catering to those who pay highest prices, cannot afford to have any other house carry better articles than they do. The use of perfect appliances and the best material and the employment of the highest skill are not yet the first step and an absolute necessity, as it should be, in America. The supply of such machinery, material, and labor can be had if those who propose to enter the production of first class articles will insist upon it, and if such supplies are appreciated by the payment of their higher value. The American standard of production is not the highest, and it can be materially elevated, and while, as at present, too many common articles are supplied, the leading manufacturers should turn to producing finer, the finest, and in smaller quantities, to take the place of many articles now imported, and to supply the new market which such productions will always create in any country.

The Wool Product of the World.

From an interesting article on the wool trade of the Pacific coast, published in a recent number of the San Francisco *Journal of Commerce*, we learn that the number of sheep in the world is now estimated at from four hundred and eighty-four to six hundred millions, of which the United States has about 36,000,000, and Great Britain the same number. From 1801 to 1875 the wool clip of Great Britain and Ireland increased from 94,000,000 to 325,000,000 pounds. That of France has increased almost as rapidly, though the wool is finer, as a rule, and hence the superiority of French cloths. Australia produces nearly as much wool as the parent country—Great Britain. The United States product increased from very little at the beginning of the century to about 200,000,000 pounds at the present time. Of this California has produced about one fourth, and the Pacific coast as a whole almost one third. If the ratio of growth shown in the past prevails in the future, the day is not far distant when the Pacific coast will produce at least one half the wool produced in the United States, as not only California and Oregon, but also Washington, Idaho, Montana, Utah, and New Mexico are well adapted to its production. The wool clip of Australia is about 284,000,000 pounds: that of Buenos Ayres and the river Plata, 222,500,000 pounds: other countries not previously given, 463,000,000 pounds. The total clip of the world last year was about 1,497,500 000 pounds, worth $150,000,000. This when scoured would yield about 852,000,000 pounds of clean wool.

Street Main Joints.

At the annual meeting of the New England Association of Gas Engineers, Mr. Thomas, of Williamsburg, made the following remarks on this subject: "In my early experience with the Williamsburg Gaslight Company, with which I became connected in the year 1854, I found pretty nearly all the street mains that were laid were connected with cement joints. While there is no doubt in my own mind that a joint can be made perfectly tight with cement, I much prefer the lead joint. Another thing to be taken into consideration to keep tight joints is that the mains should be laid a sufficient depth under the surface to protect them from the action of severe frosts. A great many of the mains were not more than 18 inches or 2 feet below the surface of the streets, and at this depth in our climate it is a matter of impossibility to keep joints tight, as the action of the frost in winter will displace the mains and cause the joints to leak. From the bad manner in which our mains were laid, and the cement joints leaking so much, we could not afford to turn gas on during the day. Had we done so we should not have had any to supply the city at night, and we were thus compelled to shut off the gas just as soon as there was any apology for daylight, and keep it shut off as late as possible in the evening.

"With the most careful working in this manner, for a period of nine or twelve months, our losses from leakage amounted to about 52 to 55 per cent of the gas manufactured. A great part of this loss was caused by the cement joints leaking, and also a part due to the fact that the mains were not at sufficient depth under the surface to protect them from the action of the frost. As soon as we possibly could I went over the whole of our mains (there was about 17 miles in all), stripping them, cutting out the cement, and rejointing them with lead. In one season we got the loss from leakage down to 20 per cent, and this with the gas turned on during the 24 hours of the day.

"One great objection to cement joints is the rigidity of them; in cases where pipes have been disturbed by other excavations and settled, I found in all cases that the mains were broken. In a leading main from our old works, with cement joints, the main, a 10-inch one, was broken entirely off and fractured lengthwise besides, by the upheaval of the ground from frost. In some of the same mains that we had rejointed with lead the mains were drawn apart, drawing the lead out, but with very little loss of gas, as the gasket being driven in tight prevented any great leakage. In cases of this kind the lead was easily driven back, and the joint made perfectly tight again. I have never in our city put in any street mains that I have not used lead in the joints, and in laying mains we always make them gas tight with the gasket used.

"At the present time we have over 90 miles of street mains laid, and outside of our loss from street lamps (we get paid for three foot burners and they average about 3¼ foot) our loss from leakage will not exceed 6 per cent. We have suffered severe loss of gas from sewering in our city. In some cases where there are railroad tracks in the streets, the sewers have been run on both sides of the street, alongside and parallel with our pipes; these excavations are much deeper than our mains lie, and the earth is always filled in loosely and left to settle.

"In cases of this kind, whole blocks of mains were dragged down, the pipe broken, and the joints partially pulled apart; at the same time the leakage from the joints was not so great, the gasket preventing the leakage. In laying street mains, what you want particularly to attend to, and especially in the East here, where you have colder weather than we have (we have not seen much winter until we came on here), is to get them down under the surface a sufficient depth to protect them from the frost. With us the least depth is 2 feet 9 inches under the surface of the street, and I am confident, could our mains remain in the ground as we put them down, our loss from leakage by them would be very small indeed. While, as I stated in the beginning, I have no doubt that a cement joint can be made tight, I can see no benefit in using cement for the purpose, as I consider lead far superior in accommodating itself to any upheaval or settling of the earth where the mains are laid down."

Successful Shad Hatching.

Professor J. W. Milner, who has charge of the shad hatching operations under the direction of the United States Fish Commissioner, Professor Baird, is now engaged in the preparation of the report of the work for the season just completed. Speaking of the work on the Atlantic seaboard, and the distribution of young fish, the report says that at the Salmon Creek Station, on Albemarle Sound, they obtained 12,730,000 eggs, and turned out 3,000,000 young fish. At the Hâvre de Grace Station 12,230,000 eggs were obtained, and 9,575,000 young fish were turned out. About 6,000,000 young shad have been distributed in the rivers emptying into the Atlantic and Gulf of Mexico during the season. The distribution of shad during the past season has been carried on on a much larger scale than in any previous year, and with great success. The restocking of the rivers of the Atlantic is only the work of a few years.