REMARKABLE ACCIDENT TO A RED DEER.

The accompanying engravings represent a curious mishap to one of the red deer in Windsor Park, the following account of which is given by Mr. Frank Buckland, in *Land and Water* :

On the 16th of January last, one of the keepers who has charge of the deer in the royal domains was going his rounds, when he suddenly came upon the scene as represented in Fig. 1. A magnificent red deer was lying on his back, with his leg tightly fixed in the forked branch of a whitethorn tree. This unfortunate animal was lying on his near or left side, with the tip of his right shoulder resting against the trunk of the tree. The chest and fore part of his body were clear of the ground, suspended by his right or off foot in the fork of the tree. Immediate examination showed the keeper exactly what we see in the engraving, Fig. 2, except that the body of the animal (in the engraving) is no longer attached to the foot. The keeper attempted to remove the foot, but found it so tightly fixed that with all his force he was quite unable to do so. The shank bone of the stag's foot was fractured and splintered diagonally. The fractured bones had made their exit by a cut through the skin, thus causing a compound comminuted fracture. The portion of the bone below this fracture—tough and strong as the red deer's shanks are—was shattered into minute fragments the size of dice. The bone was again fractured at its lower part, and the thick skin entirely lacerated through. The large sinews at the back of the bone, as well as the wire-like sinews that work the toes of the foot, were elongated and pulled out, and in fact everything was broken right off except two very slender sinews and a small portion of the skin. The total length of the portion of the deer's leg caught in the tree is seventeen inches; from the fracture to where it was torn off, eight inches. The leg was caught by the branches of the tree about four feet from the ground, and the lowest boughs carrying leaves were about nine feet from the ground. The deer was dead, and it is not known how long he had been held a prisoner by his foot.

As there were no eye witnesses as to how this occurred to the stag, it becomes somewhat difficult to account for this extraordinary event. It is probable, however, that in consequence of the weather the animal was short of food, and that in his wanderings he had observed above his head something edible on the lower branches of the thorn tree, possibly leaves, moss, or lichens, on which deer feed in snowy weather. These he could not reach when standing on all fours. He, therefore, probably raised himself upon his hind legs, and when stretching himself upward and forward, the hoofs of his hind legs slipped from under him, or else, when letting himself down again, his right leg slipped suddenly between the forked branches of the tree, and was instantly held there tight. The animal then probably began immediately to struggle, but the more he kicked and fought the tighter the wrist of his foot got wedged in; in fact, when the preparation was brought to me the foot was so tightly fixed into the notch of the tree that it could not have been more jammed if it had been hammered down, and then a long screw passed through it. In his struggles to get loose the first thing that happened was the fracture of the leg bone. This allowed the animal to fall on his back, from which position, of course, he could not rise. Terribly alarmed at what had happened to him, the poor stag then began to pull and tug at his captive leg, assisting himself so to do by means of his horns. In his frantic exertions to get free, the stag a second time broke his leg, then the skin gave way, and lastly, the large tendons. If his strength had lasted long enough to have ruptured the two small tendons it is possible that he might have escaped, leaving his leg in the fork of the tree. Prince Christian, having been informed of the accident, judiciously ordered the portion of the tree which held the foot to be sawn off bodily. He then kindly sent the whole thing to me, with a request that the foot should be preserved for him without being removed from the fork in which it had been so tightly jammed by the animal itself.

The preparation will be the most unique specimen of an accident that ever occurred in the royal forest in the annals of English history.

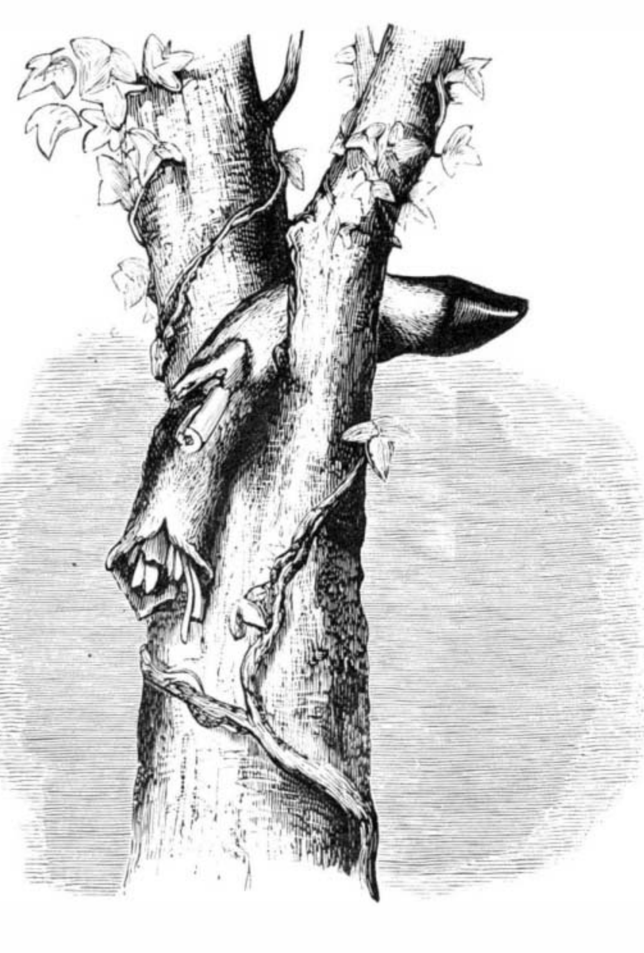


Fig. 2.—FORE LEG OF THE STAG CAUGHT BY FORKED BRANCHES.

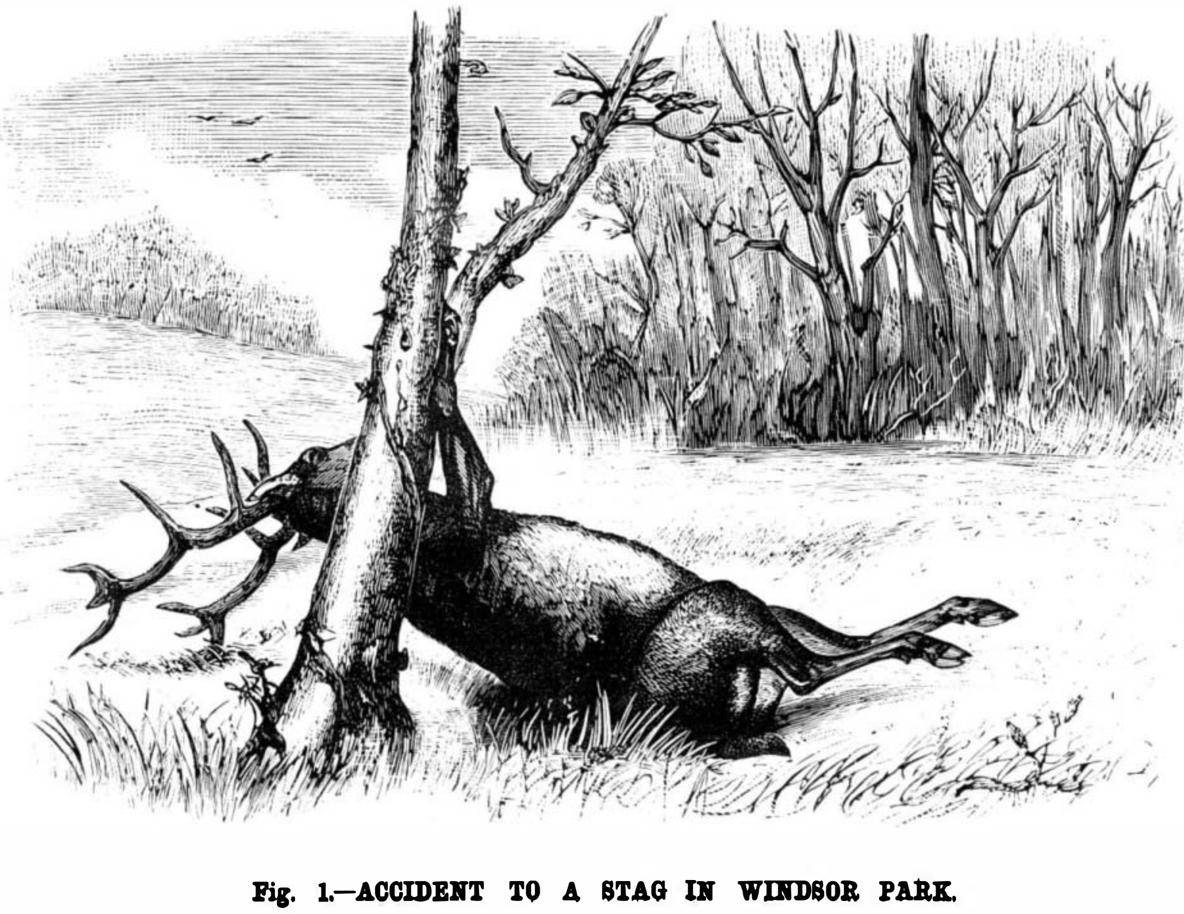


Fig. 1.—ACCIDENT TO A STAG IN WINDSOR PARK.

Coral.

The popular idea that coral is formed by an insect busily working to build up reefs in the ocean, is erroneous. A piece of coral is composed of the skeletons of tiny animals that in life are covered with a gelatinous substance. More than a thousand species of the coral animal have been described by Dana in his work entitled "Corals and the Coral Islands."

Of the sub-kingdoms into which the animal kingdom is divided, namely, vertebrates, articulates, mollusks, radiates, and protozoans, coral animals belong to the radiate division. These creatures have no sense except a low degree of sensitiveness, and live in salt, clear water, having a temperature of from 68° to 85° Fah. They do not live singly, but grow together in clusters, which start from a single, little animal, that is soft, oval; white, and jelly-like, and has the power of rapid motion. It attaches itself either to a rock or the sea bottom by one end, while the other spreads. Then a mouth, stomach, tentacles, and corporeal partitions are soon formed, and the last become quite hard from accumulations of particles of lime.

Coral animals belong to the class familiarly called polyps, and they multiply themselves by eggs and also by budding, until there are countless numbers living together in one community. Different kinds of coral bud in different ways; as some grow in bunches, others in round masses, and so forth. A piece of dead coral shows the spot were every animal has lived. As a mass of coral grows, the lower creatures gradually die, but their hard skeletons, consisting mainly of carbonate of lime, remain and furnish a firm foundation for those that work above them. By the striking of the waves against this foundation, its interstices gradually become filled with mud, bits of shells, and other substances which sea water contains, so that it grows firmer and firmer. If such a foundation is laid upon an elevation of the ocean floor, it is likely to continue to increase in size; but by the time it has reached the sea-level, the whole community of coral animals has become lifeless, for these polyps cannot live out of water. The beating billows break off portions of the skeleton formation, which are soon worn into sand by the water, and afterwards, perhaps, thrown with other *débris* upon the surface of the mass, which is thus supplied with soil. Then perhaps seeds are scattered upon this soil, which give rise to vegetation, and so a pleasant home is prepared for man.

These coral structures, called reefs, are often circular in form, and many of them inclose a lake or lagoon, whose waters furnish an excellent harbor for ships.

These reef-builders have not only built up large islands, but also considerable portions of the continents of Europe and America; and some of their structures must be of great age, as remains of a prehistoric civilization have been found upon them.—*From a lecture delivered by Prof. B. F. Mudge in Science Observer.*

Industrial Uses of Bamboo.

A late report of Dr. Schlich, Conservator of Forests in Bengal, says that there are about 1,800 square miles of pure bamboo forests in the Arrakan division of British Burmah, within a moderate distance of the coast, and all accessible by navigable streams. All these bamboos have flowered several years ago, and the ground is now covered with seedlings, which make the forest impassable. The question as to the practicability of using this plant for purposes of paper-making has several times been raised by Mr. Thomas Routledge, of England, and he has very recently returned to the charge again in a pamphlet entitled "Bamboo and its Treatment," wherein he has brought together information from botanists and cultivators well worthy of serious attention. From the *Lumberman's Gazette* we learn that a company has been formed in England, with a large capital, for the extensive and various utilization of this plant in the arts of industry, the enterprise having its origin in the multitude of uses for which the material is and for so long a time past has been employed in India. Besides being used in the latter country in the construction of the implements of weaving, Bamboo is there utilized for almost every conceivable purpose for which wood is resorted to in other countries. It forms the posts and the frames of the roofs of huts; scaffolding for building houses; raised floors for storing produce, in order to preserve it from damp; platforms for merchandise in warehouses and shops; stakes for nets in rivers; bars, over which nets are spread to dry; the masts, yards, oars, spars, and decks of boats. It is used in the construction of bridges across creeks; for fences; as a levee for raising water for irrigation. It is the material of which several agricultural implements are made, as the harrow, the handles of hoes, clod breakers, etc.; hackeries or carts, doodles or litters, and biers are all made of it; and a common mode of carrying light goods is to suspend them from the end of a piece of split bamboo laid across the shoulder. Further, a joint of this material serves as a holder of many articles, as pens, small instruments, and tools, and as a case in which little articles are sent to a distance: a joint of it also answers for the purpose of a bottle, and is used for holding milk, oil, and various fluids, a section of it constituting the measure for liquids, in bazaars. A piece of it, of small diameter, is used for a blowpipe to kindle the fire, and by gold and silver smiths in melting metals. It also supplies the place of a tube in distilling apparatus. These, of course, comprise but a portion of the uses to which this valuable material is applicable, and it opens up a wide field for manufacturing industries.

NEW AGRICULTURAL INVENTIONS.

A gang plow in which the tongue and axle frame are combined with a pair of plow beams, connected adjustably at the rear end and pivoted to the tongue in front, so that it may be readily operated, has been patented by Mr. L. M. Kelly, of Litchfield, Ky.

An improved cultivator fender, which may be used with either a one horse or two horse cultivator, has been patented by Mr. Andrew Simmons, of Green Vale, and Michael Simmons, of Lena, Ill. It is designed to prevent the earth from being thrown upon the plants by the cultivator plows.

Mr. R. D. Norton, of New Sharon, N. J., has patented an improved pulverizing disk harrow, in which some of the details of the machine are perfected so that it is rendered more durable and effective.

An improved machine for the distribution of liquid or powdered poison upon cotton or other plants has been patented by Mr. Thomas B. Taylor, of Mount Meigs, Ala. It consists mainly in a perforated cylinder mounted on bearings supported by a plow beam, and capable of turning so as to sift or sprinkle the poison on the plants.

Ozone in Relation to Health and Disease.

Henry Day, M.D., in an address delivered before the Congress of the Sanitary Institute of Great Britain, gives the history of the discovery of ozone, and notices the successive theories of Schöenbein, Williamsom, and Odling concerning its nature. He then describes the pathological action of this form of oxygen, and reveals facts which will probably startle those who believe ozone and "ozonized" articles of food or of medicine to be universally beneficial. He describes the death of animals after exposure to ozonized air under symptoms closely resembling those of acute bronchitis. He considers that if present in excess in the atmosphere, catarrh, bronchitis, and even pneumonia would be its natural results. Whether there is ever such an excess as would involve these consequences is an open question. He feels also bound to admit, according to the researches of Dr. Moffat, that during "ozone periods," apoplexy, epilepsy, vertigo, neuralgia, and diarrhea are more frequent. Further investigations in this direction are imperatively needed, but what has been said may serve as a caution to dabblers in science who keep an ozone apparatus in action in their sitting-rooms as a prophylactic against diseases in general.

The absence or the deficiency of ozone has been, perhaps, too hastily placed in connection with zymotic disease. But that such a connection exists in case of cholera can scarcely be doubted. The author shows that in 1864, in the Bombay Presidency, cholera was in its greatest ascendency when ozone was either wanting or at its minimum; that the disease showed a most marked decrease when ozone was registered as increasing, and when at its maximum the epidemic ceased altogether if the maximum continued for any time. Similar results were obtained at Strassburg in 1854 and 1855, and the experiments of Mr. Glaisher and of Dr. Moffat give confirmatory testimony. Whether there may be other causes in operation in addition to deficiency of oxygen is still doubtful. As a disinfectant the author pronounces it the best, safest, and least objectionable known. That it may kill disease germs—whatever they may be—is no doubt highly probable from its action on the superior animals; but the question arises, pertinently says the *Chemical News*, Which will be killed first? and adds, We are somewhat surprised at finding in this address no reference to the well known and justly admired work of Dr. C. B. Fox.

Varying Velocity of Sound.

Some interesting experiments have been made at the U. S. Arsenal at Watertown, Mass., to determine whether the velocity of sonorous waves is or is not affected by variations in intensity and pitch. A 6 lb. brass field piece was placed in the midst of a large level field, and behind it, at distances ranging from 10 feet up to 110 feet, were placed a series of membranes electrically connected with a chronograph, which would thus give the instant at which the sound wave from the gun met each membrane in succession. The experiment was repeated many times and always with the same result. It was found that immediately in the rear of the cannon the velocity of sound was less than at a distance, but that going further and further from the cannon the velocity rose to a maximum considerably above the ordinary velocity, and then fell gradually to about the ordinary. When the gun, however, was pointed at right angles to its first position it was found that the position of maximum velocity was brought nearer to the cannon, and if the gun had been turned in the direction of the line of membranes, which was impracticable, it is thought the retardation which produced the first low velocities would probably have become an acceleration. The heaviest charges of powder caused the greatest deviations from the ordinary velocity. The experiments, accordingly, prove that the velocity of sound depends to some extent on its intensity, and that experiments on the velocity of sound in which a cannon is used contain an error, probably due to the bodily motion of the air near the cannon. Evidently a musical sound of low intensity must be used for a correct determination of the velocity of sound.

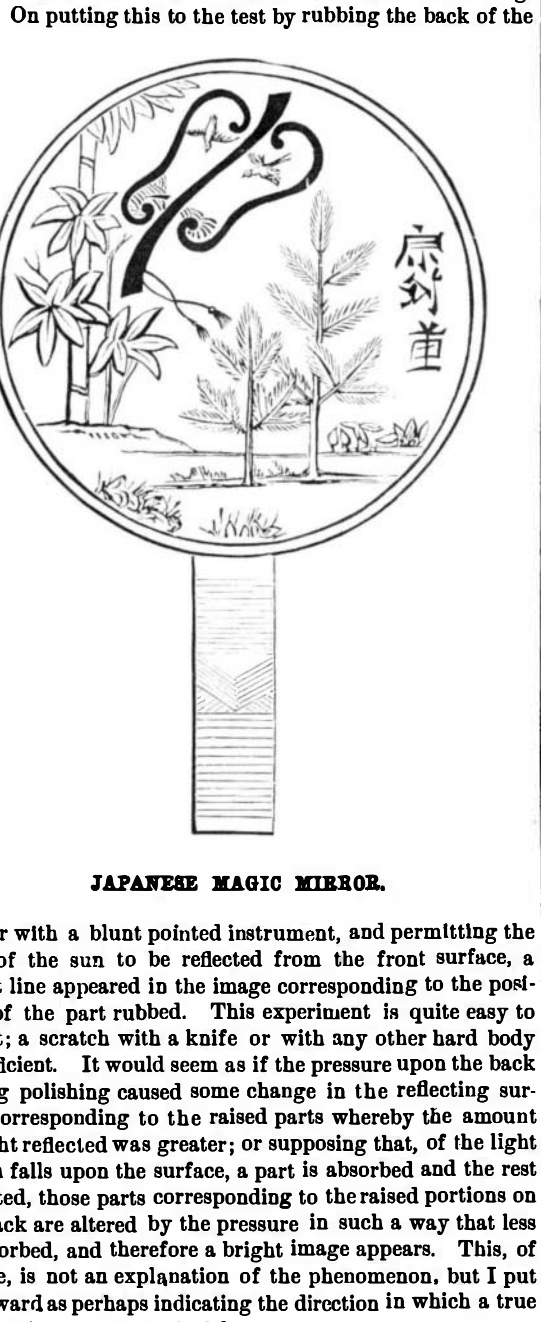
JAPANESE MIRRORS.

Mr. R. W. Atkinson, of the University of Tokio, Japan, communicates to *Nature* the following interesting account of these curious mirrors:

A short time ago a friend showed me a curious effect, which I had previously heard of, but had never seen. The ladies of Japan use, in making their toilet, a small round mirror about 1-12 to ⅛ inch in thickness, made of a kind of speculum metal, brightly polished and coated with mercury. At the back there are usually various devices, Japanese or Chinese written characters, badges, etc., standing out in strong relief, and brightly polished like the front surface. Now, if the direct rays of the sun are allowed to fall upon the front of the mirror, and are then reflected on to a screen, in a great many cases, though not in all, the figures at the back will appear to shine through the substance of the mirror as bright lines upon a moderately bright ground.

I have since tried several mirrors as sold in the shops, and in most cases the appearance described has been observed with more less distinctness.

I have been unable to find a satisfactory explanation of this fact, but on considering the mode of manufacture I was led to suppose that the pressure to which the mirror was subjected during polishing, and which is greatest on the parts in relief, was concerned in the production of the figures. On putting this to the test by rubbing the back of the



JAPANESE MAGIC MIRROR.

mirror with a blunt pointed instrument, and permitting the rays of the sun to be reflected from the front surface, a bright line appeared in the image corresponding to the position of the part rubbed. This experiment is quite easy to repeat; a scratch with a knife or with any other hard body is sufficient. It would seem as if the pressure upon the back during polishing caused some change in the reflecting surface corresponding to the raised parts whereby the amount of light reflected was greater; or supposing that, of the light which falls upon the surface, a part is absorbed and the rest reflected, those parts corresponding to the raised portions on the back are altered by the pressure in such a way that less is absorbed, and therefore a bright image appears. This, of course, is not an explanation of the phenomenon, but I put it forward as perhaps indicating the direction in which a true explanation may be looked for.

The following account of the manufacture of the Japanese mirrors is taken from a paper by Dr. Geerts, read before the Asiatic Society of Japan, and appearing in their *Transactions* for 1875-76, p. 39:

"For preparing the mould, which consists of two halves, put together with their concave surfaces, the workman first powders a kind of rough plastic clay, and mixes this with levigated powder of a blackish tuff-stone' and a little charcoal powder and water, till the paste is plastic and suitable for being moulded. It is then roughly formed by the aid of a wooden frame into square or round cakes; the surface of the latter is covered with a levigated half-liquid mixture of powdered '*chamotte*' (old crucibles which have served for melting bronze or copper) and water. Thus well prepared, the blackish paste in the frame receives the concave designs by the aid of woodcuts, cut in relief. The two halves of the mould are put together in the frame and dried. Several of these flat moulds are then placed in a melting box made of clay and chamotte. This box has on the top an opening into which the liquid bronze is poured, after it has been melted in small fireproof clay crucibles. The liquid metal naturally fills all openings inside the box, and consequently also the cavities of the moulds. For mirrors of first quality the following metal mixture is used in one of the largest mirror foundries in Kiôto:

Lead	5 parts.
Tin	15 "
Copper	80 "
	100

For mirrors of inferior quality are taken:

Lead	10 parts.
Natural sulphide of lead and antimony	10 "
Copper	80 "
	100

"After being cooled the melting box and moulds are crushed and the mirrors taken away. These are then cut, scoured, and filed until the mirror is roughly finished. They are then first polished with a polishing powder called *to-no-ki*, which consists of the levigated powder of a soft kind of whetstone (*to-ishi*) found in Yamato and many other places. Secondly, the mirrors are polished with a piece of charcoal and water, the charcoal of the wood, *ho-no-ki* (*Magnolia hypoleuca*) being preferred as the best for the purpose. When the surface of the mirror is well polished it is covered with a layer of mercury amalgam, consisting of quicksilver, tin, and a little lead. The amalgam is rubbed vigorously with a piece of soft leather, which manipulation must be continued for a long time until the excess of mercury is expelled and the mirror has got a fine, bright, reflecting surface."

Professors Ayrton and Perry give the following explanation of the phenomena of the Japanese mirror:

"The magic of this Eastern mirror arises not, as has been supposed, from a subtle trick on the part of the maker, nor from inlaying of other metals, nor from hardening of portions by stamping, but from the natural property possessed by certain thin bronze of buckling under a bending stress so as to remain strained in the opposite direction after the stress is removed. And this stress is applied partly by the *megebo*, or 'distorting rod,' and partly by the subsequent polishing, which in an exactly similar way tends to make the thinner parts more convex than the thicker."

Lifting a Railway Bridge without Stopping Traffic.

A dispatch from Easton, Pa., dated April 10, states that the cleverest feat of engineering ever attempted in that region has just been successfully carried out. It seems that, owing to their immense weight, the iron shoes, in which rest two of the spans of the long bridge of the Lehigh Valley Railroad, had sunk about an inch, throwing the bridge out of grade. The inside masonry of the pier being less solid than the outer casing, it was evident that the depression would continue; accordingly an iron casting, 12 feet long, 3 feet 3 inches wide, and 3 inches thick, and weighing 7,000 pounds, was placed under the spans to elevate them, the spans being raised for that purpose by hydraulic jacks. The spans weigh 180 tons each. The spans were raised, the masonry redressed, the castings placed in position, and the spans lowered, without the stoppage of a single train.

A Large Steel Bridge.

The five span steel railway bridge over the Missouri River at Glasgow, Mo., is the first large bridge in this country built entirely of steel—from nuts to girders. The American Bridge Company built it of steel manufactured by the Edgar Thompson Bessemer Steel Works, but the steel was made by the A. T. Hay process. This consists of a decarbonizing followed by a recarbonizing of the iron, by which much greater tensile strength and elasticity are secured. This kind of steel allows of the construction of a much lighter bridge than if made of wrought iron, and is not affected by frost or cold weather.

Erratum.

In the description of Messrs. Pew & Wearts' carbureter, in our last issue, there is an obvious error in the statement of the economy of the apparatus. It should read: The gas meter registers one foot per hour for each burner, instead of the usual six feet, or only one hundred and twenty-five feet during five tests of five hours each, as compared with seven hundred and fifty feet, the amount usually consumed.

Importance of Patents Abroad.

The American Consul at Verviers, Belgium, in a dispatch to the Department of State, recommends American inventors to procure patents for their inventions in Europe as well as in the United States; that the drawings in the SCIENTIFIC AMERICAN are extensively copied in Europe, and American inventions are thus reproduced with no profit to the inventors.

THE MEXICAN EXHIBITION.—At the end of March 600 mechanics and laborers were engaged on the Exhibition Building, which was making rapid progress. Señors Riva Palacio and Sebastin Camacho are reported to have offered to advance the Government a loan of $200,000 toward completing the Exhibition Building at an early day.

IT is said that the oil that exudes from orange peel when bent between the fingers, will check the progress of carbuncles in their incipient stage. Perhaps the oil may also be useful for other cutaneous eruptions.