THE TAPAYAXIN.

Mr. F. W. Fanning, of Corsicana, Texas, has forwarded us a specimen of the crowned tapayaxin or horned lizard (*phrynosoma cornutum*). This curious reptile is not uncommon in the South and in California, and is stated to be very lively when at liberty, pursuing its prey with much eagerness. In confinement, however, it becomes almost torpid, remaining for some hours in the same attitude. In spite of its formidable looks, it is perfectly harmless, and can be taught to eat flies from its owner's hand. Red ants are its favorite food; but it will eat insects of all kinds. Its general color is gray, one variety (*phrynosoma Blainvilii*) being variegated with irregular bands of brown. This animal is sometimes erroneously called the horned frog and horned toad.

Mr. Frank Buckland describes a specimen in his collection as follows: "My new friend is about the size of a common sized toad, and at a distance off looks very like one. He is covered all over with spines, some of which are larger and stronger than others; he has two fixed spines, one over each eye, and three fixed spines on each side of his face. At the top of his head are situated the two biggest spines, each about half an inch long, giving him a most diabolical appearance All the spines are fixed firmly into his head. As will be seen by the picture, his body is covered with spines of different sizes, and set into his skin very thickly. The consistence of the spines reminds me much of the spines of the blackthorn. The color of the animal is gray, varied with brown and ochrey yellow; in fact it is very like the color of the bark of an old tree."

The tapayaxin sent us by Mr. Fanning has remained very quiescent since his arrival, hardly deigning to notice the flies placed in his box for his sustenance. He is apparently in good health, and his reticence of speech may be attributed to his philosophical temperament, and perhaps to some provincial bashfulness, natural to a new comer to the metropolis.

Lightning Conductors.

Dr. Mann lately showed, at the Science Conference at South Kensington, how unimportant is the form of lightning conductors, whether rods, ropes, or pipes; and that the real desideratum was that they should be of sufficient size to afford an unobstructed path for the passage of the electric fluid. He insisted on the necessity of a goodly number of points, and above all upon the indispensability of large earth contact, saying that a lightning discharge passing through a large rod with an ample earth contact is only a gentle stream of low tension; but that, if the size of the rod or the area of its contact with the earth is diminished, the tension is increased, and the fluid has a dangerous tendency to discharge itself laterally by chance outlets.

IMPROVED DOOR KNOB.

The chief failing of the ordinary door knob is that it works loose. Sometimes this occurs from the wood of the door not being properly seasoned, and hence shrinking, and frequently from the device itself not being secured to the woodwork as tightly as it should be. The above difficulty is claimed to be completely remedied in the improved knob illustrated in our engraving. The roses are secured to the door by little points on the underside. There is but one screw, which is attached to one of the knobs, and passes through the square rod. This is regulated, as shown, by a small catch pushed by a spring into a notch. As this notch represents an adjustment of but the one hundredth part of an inch, it is easy to see how well the knob can be made to fit. In mineral and porcelain knobs, the necks are secured by spurs going down in grooves and turning under the material of the knob.

The device is strong, easily adjusted, applied, or removed, simple and suitable for all kinds of knobs or latches. Further information may be obtained by addressing the Parker & Whipple Company, West Meriden, Conn., or 97 Chambers street, New York.

Mechanical Photo-Printing.

The following practical directions for mechanical photo-printing are from the text of Herr Husnik:

Use for the supports some plates of glass one quarter of an inch or less in thickness, roughened on one side by means of very fine emery and water, and applied by friction from another and smaller piece of glass to which a handle is attached. Do not allow the emery to become dry, or it will produce deep scratches. A circular motion should be adopted, using considerable pressure, and in about twelve minutes a very fine grain will be obtained. If plates be employed that have been previously used, remove the gelatin by immersing in a vessel containing a solution of soda. This wash keeps more than two months, and it is always possible to strengthen it by the addition of lime. The gelatin, in the case of a plate that has been previously used, will detail itself in about twelve hours. Rinse the surface and rub with emery to remove the gelatin that may have lodged in the pores; but this time one application of the emery will suffice. The glasses thus prepared are washed in several changes of water and wiped dry with clean cloths.

First: Preparation of the plates.—Take fresh albumen 25 parts, distilled water 45 parts, silicate of soda 8 parts. Mix well together, beat to a froth, and allow to stand for several hours; then decant the clear part and filter it two or three times so as to ensure its being free from impurities.

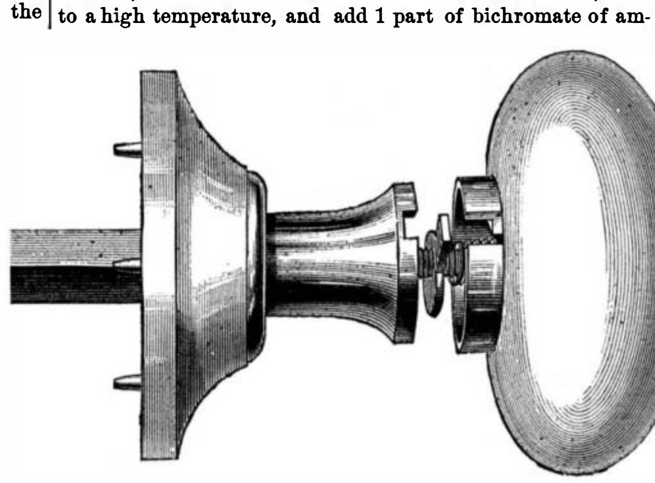
In preparing the plates, place them, ground side uppermost, on a large slab of glass carefully leveled; and having brushed them over with a soft brush to remove all dust, pour a little of the preceding liquid near one edge, and cause it to flow over the surface by slightly inclining the large slab. If the liquid do not flow over the glass easily, it can be helped on by using a small slip of paper, taking care that it does not run too fast. Now raise one of the corners so as to allow the superfluous liquid to flow off the plates into a receptacle placed beneath; and if there be any air bubbles on the glass, pour some of the solution over it again while the

THE TAPAYAXIN OR HORNED LIZARD.

glass is in an inclined position, leaving it thus to dry. The superfluous liquid can be filtered and used again. A great number of plates may be prepared in this way and kept for about six months; but it is better not to use them on the day on which they are prepared, as they improve by keeping.

In order to coat the plates with gelatin, they ought first to be carefully washed with cold water, taking care not to injure the prepared side. Let them stand upright until dry, after which they are ready to receive the gelatin, which is done in the following manner: Provide a case with a bottom of sheet iron and a curtain for the top; and in the interior, about two and three quarter inches from the bottom, place a frame, upon which stretch calico or filtering paper, so as to diffuse and equalize the heat, which is obtained from a spirit lamp. About two and three quarter inches or so from the top, bars of iron with leveling screws are placed horizontally. A thermometer, with the bulb inside and tube and scale outside, fastened at the side, indicates the temperature of the interior. Place two, three, or more of the plates on the leveling screws, laying them in a horizontal position; shut the case and heat to 110° Fah.

During this time put 15 parts of the finest French gelatin in 300 parts of distilled water, and leave it to soak for about an hour, after which dissolve in the water bath. Next, heat to a high temperature, and add 1 part of bichromate of am-



WHIPPLE'S DOOR KNOB.

monia and 1 part chloride of calcium; when these are all dissolved, add 60 parts of ordinary alcohol, after which filter. This solution is poured upon the heated plates, and must be spread by means of a small slip of paper. Experience regulates the proper quantity to be applied, and a considerable degree of dexterity will be required; but this is easily attained. Care must be taken to prevent the layer from being either too thick or too thin. The plates thus coated are placed in the case to dry at the temperature of 110° Fah., and after being well dried, they will keep in summer for about eight days, and in winter about four weeks, in a dark place; they improve by keeping.

Exposure.—With a good negative in the shade an exposure of from fifteen to forty-five minutes will be required, according to the intensity of the light—diffused light giving the best half tints. After exposing, the bichromate not acted upon by the light is removed by being washed with water, and the plate is then well drained and dried. In about three hours it is ready to be printed from.

Printing.—The plate is attached, by means of plaster of Paris, to a lithographic stone, and submitted to the action of a lithographic press. Damp the plate and ink it with two kinds of ink, one stronger than the other. After obtaining a print the plate is moistened, wiped with a cloth, and inked. If the details in the shadows be not properly brought out, put extra pressure on that part. One plate will furnish a considerable number of proofs, provided the instructions be carefully carried out and the gelatin be of good quality.

Final observation. This method, according to Herr Hisnik's experience, is the best in use, and it gives certain results. Some photographers substitute isinglass for a portion of the gelatin, but this substance can rarely be obtained of good quality.

The choice of the inks is very important. Munich varnish ought not to be used for black, as it attacks the gelatin and the plate loses its vigor. Good black printing ink answers better when mixed with red oxide of iron, and a little César varnish imparts a good brown tint.

Utilization of Waste.

Cotton waste is a singular example of the successful application of scientific utilization. It is the collected sweepings of the card room, and formerly had no value. Large heaps were suffered to accumulate until it fermented, and was then spread over the land. After that, cartridge paper makers bought it at $10 to $20 per tun; then it rose in price, and means were found to bleach and tear it up, in order that it might be respun and woven, and now there is a trade of 14,000,000 cwts., giving employment to 500 dealers. The various uses are all exhibited, and the refuse is then sold for engine cleaning, and finally to the paper maker; jute is next. An immense trade has been created. It is a product of Bengal, and formerly was used only for gunny bags, to pack rags or merchandise in, but now it yields to processes which fit it for weaving with silk or cotton, or in the making of thread, ropes, sail cloth, and with wool in flannels and carpet, and with cocoa nut fiber for matting, etc. During 25 years the consumption has risen from 391,000 cwts. to 1,250,000 cwts., and the value from $450,000 to $5,000,000, and the refuse now equals the original import of the raw material.

Failures---What they Teach.

The numerous failures and suspensions which have made the commercial world, since the panic of 1873, one of constant upheaval and change, should be utilized, by those fortunate ones who have thus far escaped disaster and by those who are entering, for the first time, the field of business life, for the lessons that may be drawn from them. Failures, like every species of mishap, only follow from a sufficient cause; and usually it is one that could have easily been counteracted or avoided if the fact of its existence had not been unknown. And it is just here that we find so many of our business men weak. In their acquaintance with their own business, they lack that complete command, of the calling they have professedly made themselves master of, which alone enables one to understand and avoid its dangerous points.

The man who makes a study of or who devotes time to an accurate and scientific education in the business he has chosen, as a means for the accumulation of wealth, is now rarely found; and it seems to us that a large number of the failures of the last three years might justly be attributed to this cause. The idea seems to prevail that a business transacted on one's own account is a kind of perpetual motion, that, once started, will not only keep itself in operation, but may be drawn upon to an almost unlimited extent for the means to sustain other enterprises. The inventor who spends years in attempting to realize his impossible machine is not more certain of failure than he who starts in business with such expectation. The time when money could be made by ignoramuses, and when wealth could be had almost for the taking, has faded far away into the dim past; and an era of strife and struggle has dawned, in which only those who have most carefully prepared themselves for the warfare can hope to succeed.

It is not luck that makes one man fail and his neighbor succeed; it is not fickle fortune that brings clouds of difficulties upon one while another has apparently plain sailing; it is something far more certain in its operations than either of these. It is skill and a perfect command of his resources that enables one man to advance where another can make no progress; and these two qualities are possessed only by those who have made their business the one thing they must become perfectly familiar with.

The world is not yet so crowded that any need go to the wall to support the rest; there is room for all, and an abundance to spare. The great want is for more men who are well qualified for work, and who will put their shoulders to the wheel and push. Any person who is determined to win, and who unites with his perseverance sense enough to know that success comes only to those who deserve it, by the patience and skill with which they toil, has before him an inviting field for labor, and may enter it with the assurance that, if his efforts are rightly directed, they will meet with a sure reward.—*Northwestern Lumberman.*

FILTERS for waterworks may be calculated for as follows: 1 square yard of filter for each 700 gallons in 24 hours, formed of 2 feet 6 inches fine sand, then 6 inches common sand, 6 inches shells, and lastly 2 feet 6 inches of gravel. Perforated pipes should be laid in the lowest stratum, to carry off the supply of filtered water.

Illumination of Lighthouses.

M. E. Allard, engineer-in-chief of the Administration of Lighthouses, has lately brought before the Paris Academy of Sciences some papers on the illuminating power of the flames employed for illumination, their transparency, and the translucency of the atmosphere. The first paper treated on the transparency of flames. The burners used in lighthouses have diameters of from 1 to 5 inches, and carry from 1 to 6 concentric wicks. In measuring the luminous intensity of the flames which they produce, it is found that these intensities increase a little less rapidly than the consumption of oil, and also that the intensity for each $\frac{1}{4}$ of a square inch of apparent surface increases, while, on the contrary, the intensity for each $\frac{1}{16}$ of a cubic inch of volume diminishes in direct proportion to the diameter. These results can only be explained by admitting that the transparency of the flame is not absolute.

This is the object of the first investigation made by M. Allard; he has determined the co-efficient of this transparency by three series of experiments: by measuring the intensity of different flames with a flat wick looked at sidewise or edgewise; by means of a curved mirror, which reflects towards the focus the rays which it receives, and thus causes them to pass through the flame; and by measuring the intensity of an electric light across a flame of large diameter. These investigations have led to the adoption of the number 0·8, as a mean value of this co-efficient reduced to a thickness of 0·39 inch in the flame passed through. One important conclusion is arrived at, namely, that the total quantity of light produced, or the absolute intensity, increases much more rapidly than the weight of oil consumed; but as the quantity of light absorbed, by the passage of the rays across the flame itself, increases in a still greater proportion, the difference between these two quantities, or the effective intensity, follows a law of augmentation a little less rapid than the consumption of oil.

M. Allard was next engaged on the translucency of the atmosphere. The observations made by lighthouse keepers on the visibility of neighboring lights consisted in noticing, three times each night, whether each of the lights could or could not be perceived, so that it might be ascertained, at the end of a certain number of years, how many times out of a hundred each of these lights was visible. A diagram showed, for each of the lights noticed, what is the limit of translucency in which it ceases to be perceived from the place of observation.

In another paper M. Allard has studied the impressions produced on the organ of sight by flashing lights. It appears that, by causing a series of flashes to be succeeded by equal intervals of darkness, each flash at moderate speed produces the same effects as if in an isolated state; in proportion as the speed increases, the impression on the retina is prolonged, and after a certain speed the effect is that of a constant light

Volatilized Gold.

General Howston lately donated to the Microscopal Society of San Francisco a slide mounted with volatilized gold, which, under a $\frac{2}{3}$ objective, opaque, was not only a beautiful but instructive object. The microscopic globules were perfect in shape, and were obtained at some distance from the melting pot, from which they had been thrown off by the draft and heat in a volatile form, so to speak, and condensed in the air in the form of minute shot, forming a veritable shower of golden rain. With all the care and appliances for the prevention of wastage in smelting or refining gold, a portion is lost in this way; and no doubt the roofs of the houses adjacent to mints and refineries would yield enough of the precious metal to show the color, at least, under the microscope.

Hiring Horses.

It has been decided, says the *Turf, Field, and Farm*, that when a horse or carriage is let out for hire, for the purpose of performing a particular journey, the party letting warrants the horse and carriage fit and competent for such journey. If the hirer treats the horse or carriage as any prudent man would do, he is not answerable for any damage either may receive. But he must use the horse for the purpose for which he hired him. For instance, a horse hired for saddle must not be used in harness. If the hirer violates this express condition of the contract, he is liable for any damage that may occur. If the horse is stolen through the hirer's negligence, such as leaving the stable door open all night, he must answer for it. But if he is robbed of it by highwaymen, when traveling the usual road at usual hours, he cannot be held for damages. As these questions are frequently in dispute, it is not out of place to shed a little light upon them.

Comparative Photographs of Blood.

The *American Naturalist* states that Dr. J. G. Richardson, for the sake of illustrating in criminal cases the distinguishable appearances of different kinds of blood, has flowed drops of blood from different animals so nearly in contact on the glass slide that portions of the two drops appear in the same field, and can be photographed together. Dr. C. Leo Mees has modified this method, and obtained exquisite results in specimens presented to the microscopical section of the Tyndall Association. He spreads the blood by Dr. Christopher Johnston's method, which is to touch a drop of blood to the accurately ground edge of a slide, and then draw it gently across the face of another slide, leaving a beautifully spread film. In this way one kind of blood is spread upon the slide and another on the cover. When dry, one half of each is carefully scraped off with a smoothly sharpened knife, and the cover inverted upon the slide in such position as to bring the remaining portions of the film into apposition. Under the microscope and in the photograph the two kinds of blood appear in remarkably fine contrast, even those bloods that are too nearly alike for safe discrimination in criminal cases being easily distinguished when thus prepared from fresh material.

Musical Sand.

Mr. Frink states in the "Proceedings of the California Academy of Sciences," that, in order to ascertain, if possible, "the cause of the sound that is produced by the sand from Kauai, presented to the Academy at a former meeting, I investigated its structure under the microscope, and I think the facts I have ascertained fully explain the manner in which the sound is produced. As the grains of sand, although small, are quite opaque, it was necessary to prepare them so that they should be sufficiently transparent to render their structure visible. This was effected by fastening them to a glass slide and grinding them down until one flat surface was obtained. This surface was then attached to another slide; and the original slide being removed, the sand was again ground down until sufficiently transparent. The grains were found to be chiefly composed of small portions of coral and apparently calcareous sponges, and presented under the microscope a most interesting object. They were all more or less perforated with small holes, in some instances forming tubes, but mostly terminating in blind cavities, which were frequently enlarged in the interior of the grains, communicating with the surface by a small opening.

A few *foraminiferæ* were also met with, and two or three specimens of what appeared to be a minute bivalve shell. Besides these elements, evidently derived from living beings, the sand contained small black particles, which the microscope showed to be formed principally of crystals of augite, nepheline, and magnetic oxide of iron, imbedded in a glassy matrix. These were undoubtedly volcanic sands. The structure of these grains, I think, explains the reason why sound is emitted when they are set in motion. The friction against each other causes vibrations in their substance, and consequently in the sides of the cavities they contain; and these vibrations being communicated to the air in the cavities, under the most favorable conditions for producing sound, the result is the loud noise which is caused when any large mass of sand is set in motion. We have, in fact, millions upon millions of resonant cavities, each giving out sound which may well swell up to resemble a peal of thunder, with which it has been compared; and the comparison—I know from others who have heard it—is not exaggerated. The effect of rain in preventing the sound is owing to the cavities in the sand becoming filled with water, and thus rendered incapable of originating vibrations."

Another Opportunity for Inventors.

An interesting competition is about to be opened by the German society *Verein von Gas and Wasser Fachmännern Deutschlands*, which offers a prize of $400 to the author of the process for the economical purification, from carbonic acid, of illuminating gas obtained from coal. The systems now commonly employed involve either hydrate of lime, certain salts, muriate of manganese for example, and iron oxides. Whether these methods leave more or less to be desired according to the nature of the coal distilled, or whether the forms of purifiers are imperfect, it is nevertheless certain that carbonic acid still remains present in illuminating gas, and its presence is decidedly unhealthy. Either a new system for its complete removal, or an effective improvement on the older processes, is required. The invention must be economical, easy of manipulation, and must not lower the illuminating power of the gas. The memoir describing it must be complete, and explain both the theory and the practice. Manuscripts must be signed with some distinctive device, which is to correspond with a similar mark on a sealed packet in which is written the name and address of the author. Communications are to be addressed to the president of the commission, Dr. Schilling, at Munich, prior to December 31, 1876.

Microscopic Ruled Test Plates.

"The finest lines I have succeeded in ruling are about $\frac{1}{100000}$ of an inch in width. These values are substantially the same as those given by Dr. Royston-Pigott, as representing the ultimate limit of visibility under the microscope. The smallest angle at which an object can be distinctly seen is stated by him to be 6″, while other writers place it as high as 60″, or even 120″. Even the smallest value named is much too large. I will at any time undertake to rule a a single line, $\frac{1}{30000}$ of an inch in breadth, which can be seen at the distance of seven inches from the eye. This corresponds to an angle of about 1′. In this case the line is filled with plumbago; but if reflected from a silvered surface, it can be easily seen at the distance of eleven inches from the eye. Comparing minute particles of matter which can be seen under a Tolles' $\frac{1}{10}$ objective with those which can be measured, in the way indicated above, there is every reason to suppose that the limit of visibility falls beyond $\frac{1}{4000000}$ of an inch. It is quite possible that the conclusion reached by Sorby, that the microscope has already reached the limit of its power in separating lines whose distance apart is equal to one half of a wave length, may be found to be justified by future observations. It is certain that no lines beyond Nobert's 19th band have ever been resolved. The great difficulty in distinguishing true from spurious lines has caused more than one skillful microscopist to doubt whether the resolution has been certainly carried as far as that point. But that light is 'of too coarse a nature' to enable us to see particles of matter, as small as $\frac{1}{2000000}$ of an inch, is a conclusion which can be refuted without the slightest difficulty."—*William A. Rogers.*

VENTILATION OF RAILWAY TUNNELS.—Mr. G. J. Morison says that, when tunnels without shafts are to be ventilated, fans should be employed to keep up an artificial ventilation; that for a given amount of traffic the power required to ventilate long tunnels varies as the fourth power of the length; that when a long tunnel is to be ventilated it is more advantageous to have a double line tunnel with trains in each direction than two single line tunnels with trains in one direction only; that for every tunnel there is a limit to the amount of traffic, where locomotives are used, beyond which ventilation becomes impossible: this limit cannot be very definitely fixed, but for a tunnel of twenty-two miles it does not exceed a total of twenty trains a day.

Inventions Patented in England by Americans.

[Compiled from the Commissioners of Patents' Journal.]

From July 4 to July 28, 1876, inclusive.

ACOUSTIC TELEGRAPH.—T. A. Edison, Menlo Park, N. J.
AXLE BOX AND OILER.—J. N. Smith, Jersey City, N. J.
BATTERY.—J. Byrne, Brooklyn, N. Y.
BOILER.—V. D. Anderson, Washington, D. C.
BOTTLE STOPPER, ETC.—S. S. Newton, Binghamton, N. Y.
CARTRIDGE PRIMER, ETC.—E. Remington & Sons, Ilion, N. Y.
CLEANING BOLT CLOTHS.—L. V. Rathbun, East Pembroke, N. Y.
CLEANING COTTON, ETC.—R. Kitson, Lowell, Mass.
COPYING PRESS.—W. B. Sargent, New York city, *et al.*
DRIVING CHAIN.—W. D. Ewart, Chicago, Ill.
ENVELOPE MACHINE.—M. S. Chapman, Hartford, Conn.
FLUID METER.—W. Smith, San Francisco, Cal.
FOLDING PAPER.—S. D. Tucker, New York city.
LANTERN, ETC.—J. E. Folk, Brooklyn, N. Y.
LUBRICATOR.—T. F. Stevenson, New York city.
OIL STOVE.—E. B. Cox, New York city.
OIL STOVE.—O. Edwards, Northampton, Mass.
PAPER-CUTTING MACHINE.—E. Schlenker, Buffalo, N. Y.
PAPER MATERIAL.—W. F. Nast (of New York city), London, England.
PENCIL SHARPENER.—J. Herts, New York city.
PIN PACKAGES, ETC.—G. C. Hoadley, New Haven, Conn.
PREPARING CHINA GRASS, ETC.—J. B. Vogel *et al.*, New York city.
PROJECTILE.—B. B. Hotchkiss, Paris, France.
SCOURING LEATHER, ETC.—F. A. Lockwood, Fall River, Mass.
SHARPENING SAWS.—W. L. Covel, Providence, R. I.
SPINNING MACHINERY.—T. Mayor, Providence, R. I.
STEAM GENERATOR.—D. Renshaw, Cohasset, Mass.
TRANSMITTING POWER.—J. Good, Brooklyn, N. Y.
WASHING BARRELS, ETC.—G. Schock, New York city.
WATCH ESCAPEMENT.—F. H. Voigt, Buffalo, N. Y.
WATCH KEY.—J. S. Birch, New York city.
WRINGER ROLLER.—G. P. Clark, Windsor Locks, Conn.

Recent American and Foreign Patents.

NEW CHEMICAL AND MISCELLANEOUS INVENTIONS.

IMPROVED RELEASING DEVICE FOR STABLES.

Arthur Chapman, Doylestown, Pa.—This invention consists of a longitudinal rod that extends along the manger of the stalls, and is hinged thereto, having slightly curved fingers or hooks, that retain rings, to which the cattle are fastened. A crank attached to the rod at the outside of the building operates the rod, and releases all the rings when turning the same.

IMPROVED SNAP HOOK.

Newton E. Cissna, Sioux Falls, Dakota Ter.—This is an improved snap hook for connecting the various straps, rings, and other parts of a harness, by which the straps may be readily taken out and inserted, and securely and reliably retained therein. When the tongue is swung in outward direction to be at right angles with the hook, the strap, ring, or other article is introduced, and by carrying the tongue back on the hook, firmly retained therein. The draft on the tongue causes the closing of the same, and secures the locking of the snap hook.

IMPROVED STREET LAMP.

John S. Woods, Brookline, Mass.—This consists of a duplex reflecting lamp, in which an oil holder is located between two burners, both of which are supplied from it, and it serves for the support of reflectors for the burners, to throw the light in opposite directions along a street.

IMPROVED GALVANIZING MACHINE.

George R. Acheson, Philadelphia, Pa.—This invention consists of a machine with rollers for tightening the wire cloth while passing through the galvanizing or painting liquid. Suitable skimmers and beaters are arranged in connection with the cloth at both sides of the same, to secure the regular tinning or painting. A sectional and diagonally jointed winding-up roller serves for being readily taken out of the cloth.

IMPROVED PHOTOGRAPHIC PICTURE CASE.

Thomas F. Adams, New York city.—This is a case with hinged door, to which the frame-carrying board is hinged, to be opened and closed with the door, and locked into open position by suitable spring bolts. The supporting board carries a number of photograph frames, so hinged to intermediate pieces that any one may be readily swung to either side for the inspection of the photographs.

IMPROVED LIME KILN.

Daniel G. Farrell and Andrew T. Lien, Mason City, Iowa, assignors to Farrell, White, & Lien, same place.—The object here is to afford a better application of the fire to the limestone than in kilns constructed in the usual way; to make the kiln airtight, even should it crack; to avoid the use of heavy timber and rods for tying the kiln; to cause the lime to drop evenly to the center of the draw; to avoid the necessity of drawing the lime while at a white or red heat, and to enable the lime to be dropped readily and surely. The invention consists in providing the kiln with a case and filling the space between them with clay, to render the kiln airtight, even in case it should crack in consequence of the effect of excessive heat. The invention further relates to a device for dislodging the lime and causing it to drop into the hopper.

IMPROVED LATTICE PIERS FOR TIMBER TRUSS BRIDGES.

Lewis Scott, Brighton, Mich.—In this invention two sets of posts are so arranged in a truss bridge that they will incline in opposite directions, and be located on opposite sides of the girts. They are all sustained upon a common base, that is thus connected with a superposed beam, so as to form a re-inforcement brace or support to each other. This has the effect of dividing and evenly distributing the weight or strain along the whole length of the foundation or base.