LOOSE PULLEY LUBRICATOR.

The accompanying engravings—Fig. 1 is a perspective view and Fig. 2 a longitudinal sectional elevation—show a loose pulley oiler, in which the flow of the oil is automatically controlled by the speed of the pulley, and which is remarkably simple in construction and reliable in operation.

By unscrewing the lid or cover, C, the reservoir, B, can be filled with oil. Within the reservoir is a piston, E, which is normally kept at the inner end of the cylinder by the tension of the spiral spring, D. During the revolution of the pulley the piston, thrown out by centrifugal force, exerts a pressure upon the oil corresponding to the velocity of the pulley, and forces it through the feed pipe, F, to the nozzle on the

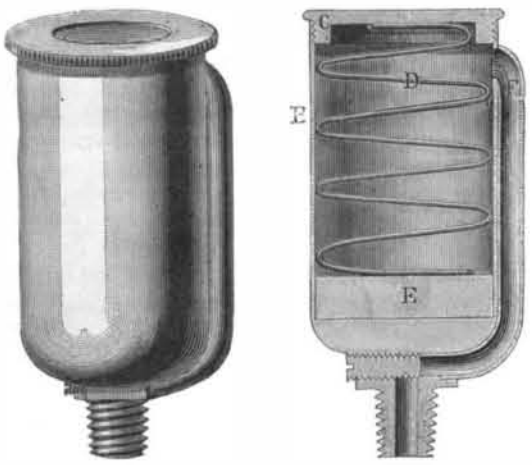


Fig. 1. Fig. 2.

LOOSE PULLEY LUBRICATOR.

shaft. The supply is regulated by means of a screw, which may be set so that the reservoir will be emptied in a few minutes, or so that the amount will last for weeks; when the proper aperture for the screw has been ascertained by experiment, the oiling of the pulley requires no further attention. When the pulley stops, the flow of oil also stops; and the spring, carrying the piston back, draws all the oil out of the feed pipe into the reservoir, thereby preventing the wasting or spilling of oil—a fact which, it will be readily understood, brings, besides the advantage of economy, that of absence of soiling of fabrics, of soaking of belts with oil, and other inconveniences incident to the old methods of lubrication.

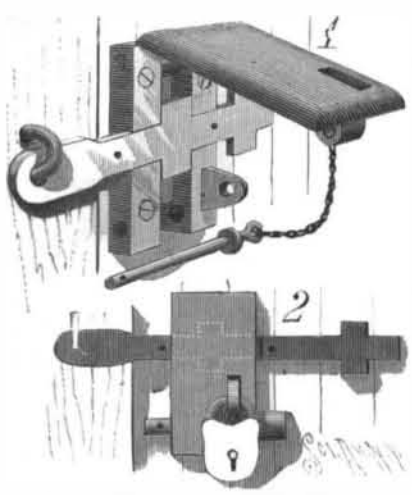
These lubricators, made by the Loose Pulley Lubricator Manufacturing Company, of Middletown, Conn., are adapted to pulleys from six inches in diameter and upward, and are screwed into the pulley hub by tapping out the oil hole, an operation easily performed without removing it from the shaft.

Endurance of Woods.

In some tests made with small squares of various woods buried one inch in the ground, the following results, says *The Garden*, were noted: Birch and aspen decayed in three years; willow and horse chestnut, in four years; maple and red beech, in five years; elm, ash, hornbeam, and Lombardy poplar, in seven years; oak, Scotch fir, Weymouth pine, and silver fir decayed to a depth of half an inch in seven years; larch, juniper, and arbor-vitæ were uninjured at the expiration of the seven years.

FASTENING FOR FREIGHT CAR DOORS.

The base or stationary part of the fastening, shown open in Fig. 1 and locked in Fig. 2, has corner holes to receive bolts by which it may be attached to the car body. One of the bolts is made with an eye head to pass through a slot in the cover and receive a padlock, when desired. The cover is made with an eye upon the inside of one end to enter a recess in the base, and receive a pin by which the two parts are hinged together. Upon the inside of the other end of the cover is an eye to enter a recess in the end of the base, and receive a pin passed through a transverse hole in the base. The pin is made with a head on one end and a hole through the other end to receive the wire of the seal, which is also passed through a hole in the hasp, which is hinged to the door by a staple and formed with two cross heads as shown in the engraving. In the base of the fastening is a transverse groove for the body of the hasp and a longitudinal groove for a cross head. The hasp is secured in place in the grooves by the cover. With this construction the door can be fastened fully or partly closed, and when fastened and sealed cannot be opened without breaking the seal.



This invention has been patented by Mr. G. A. Germond, whose address is Station R, New York city.

Good Inventors.—Poor Lawyers.

One of our English exchanges says of English inventors that they are usually clever and necessarily of ingenious turn of mind, but concludes that they as a class should make poor lawyers. The writer cites a case which has heretofore appeared to be interminable, and had assumed something of the proportions of a *causecelebre* in the annals of patent litigation. It was the old story of alleged infringement of a patent right, and the appeal against the decision of the inferior courts was dismissed in the superior court in favor of the respondent, not because there was or was not infringement of the patent right, but because the appellant had in his specification insufficiently described the character and defined the limits of his invention. There was apparently some ground for the belief that the appellant had room for complaint against the respondent, inasmuch as the Bench remarked that it was a matter for regret to have to come to the decision which, as a matter of law, had to be come to, as the invention in question was a valuable and clever one.

Here, then, valuable patent rights have been practically a loss to the original inventor because of his having failed to observe sufficient care in the wording and preparation of his specification. It is impossible to say how many valuable inventions have been lost to their inventors from a similar cause. It is not sufficient, in order to secure the fruits of a valuable invention, to merely patent it. The degree of protection afforded by a patent depends, to a great extent, upon the proper wording of the specification, which should carefully define the nature and scope, if not the limits, of the invention. It should omit nothing that it is of present or prospective utility to state. The less ambiguous it is, the fewer are the chances and possibilities of infringement and ultimate pecuniary loss.

Steel against Iron.

Mr. William F. Zimmermann, of the Pittsburg Testing Laboratory, has completed for the Detroit Dry Dock Company a test of the new steel plates which will enter into the construction of the new steamer they are building for the Detroit and Cleveland Steam Navigation Company. The average tensile strength of the plates is stated to be 60,000 pounds to the square inch. This soft steel is said to be of such remarkable elasticity that a piece of plate may be stretched one-half longer than its usual size without parting. The Detroit Dry Dock Company recently made some experiments of its own with the soft steel used in the construction of the new steamer Mascotte at its yards in Wyandotte. They were made both with soft steel and the best quality of iron used in the construction of iron ships. Strips of cold steel plate $\frac{5}{16}$ inch thick and ¾ inch wide were twisted like an auger in a lathe, and even doubled, without cracking or causing a single abrasion of the metal's surface. Angle irons were flattened cold and bent in like manner. Another strip was bent repeatedly without causing it to break or even flaw. In the presence of the owners of the Mascotte, a large ball weighing 950 pounds was suspended at a height of 35 feet, and allowed to drop on a $\frac{5}{16}$ inch plate, bulging it about 20 inches into the ground without breaking it. The ball was then dropped on the reverse side of the plate, and this repeated five times without breaking the plate. The same test was made with a ½ inch iron plate, and it was broken the first time. These tests are regarded as furnishing a conclusive demonstration of the comparative merits of soft steel and iron for resisting sudden shocks, and consequently of their respective merits as materials for the construction of modern ships.

Decomposition of Cast Iron by Heat.

From some experiments which M. L. Forquignon made upon malleable iron, he was led to suppose that cast iron, at a temperature somewhat inferior to its melting point, is decomposed into free graphite and a purer carburet of iron. He accordingly heated cast iron in a vacuum to a temperature of from 900° to 1,000° C., for several days, without melting or softening. The metal became malleable, and its surface was covered with a dull grayish efflorescence, which produced a mark upon paper or on rough porcelain. The fracture was sometimes of a uniform black, like that of a lead pencil, and sometimes it was dotted with black grains of amorphous graphite, regularly disseminated throughout the mass. It seems probable, according to the *Comptes Rendus*, that this partial decomposition depends upon a tendency to equilibrium between the carbon, the iron, and the carburet of iron, the relative proportion of each of these bodies being a function of the temperature. The decomposition of a homogeneous solid into two other solid bodies is a very rare, if not unique, phenomenon.

THE SMALLEST FIRING REVOLVER.

The very diminutive firearm illustrated in our engraving is the workmanship of Mr. Victor Bovy. It is shown in actual size; and of working revolvers, it is undoubtedly the smallest in the world. The dimensions are truly Liliputian; the total length, from handle to muzzle, is 1½ inches, and the weight is something under half an ounce. The cartridges shown are also natural size, though only about a quarter of an inch in length, and the weight of shell, charge, and bullet is only a trifle over a grain. The charge consists entirely of fulminate, as the dimensions are too small to permit the use of powder. It is in all respects a perfect little instrument, and quite as complete as larger revolvers. There are six cartridge chambers, a self-cocking device, and a minute rod for discharging the empty shells. In spite of its pygmy proportions, its execution is quite comparable with larger arms. At a distance of ten inches it gave a penetration in wood of three-sixteenths of an inch, while at four and a half feet the bullet passed through a pane of ordinary glass. The

THE SMALLEST FIRING REVOLVER.

accuracy of aim is naturally limited by the short barrel and nearness of the sights to each other, though at four and a half feet the bullet passed within two and three-eighths of an inch of the bull's eye. The revolver has the appearance of a toy, but it is nevertheless a veritable weapon, and if directed toward a vital part would be quite capable of producing a serious wound.

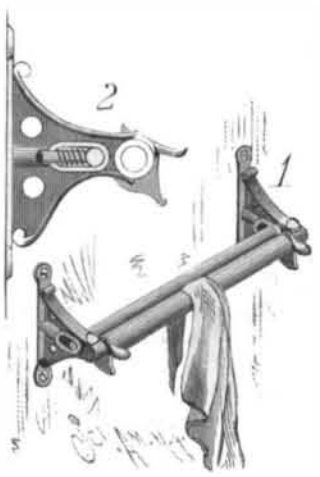
Fast Railway Time.

A train carrying the president and directors of the Delaware, Lackawanna & Western Co. recently made the trip over the Morris & Essex Division, from Hoboken to Washington, N. J., 67 miles, in 1 hour 24 minutes, being at the rate of 47·9 miles per hour for the entire distance, including two stops for drawbridges and slow running required at other points. The fastest time made was on the 4·6 miles between Port Morris and Waterloo, which was run in 4 minutes, or at the rate of 69 miles per hour. The 20 miles from Port Morris to Washington was run in 19 minutes, or at the rate of 63·2 miles per hour. The train consisted of 3 cars, and was drawn by engine No. 134, which has 18 x 24 in. cylinders and 5 ft. 6 in. driving wheels.

The fast train on the West Shore road on June 4 last made the run from Newark, N. Y., to East Buffalo (94 miles) in 119 minutes. Of this time 13 minutes is deducted for stops, leaving the actual running time 106 minutes, being at the rate of 53·2 miles per hour. The actual running time from Frankfort to East Buffalo (202 miles) with 6 cars was 254 minutes. On June 17 the same train with 7 cars ran from Newark to East Buffalo in 105 minutes, and from Frankfort to East Buffalo in 247 minutes, or at the rate of 49·1 miles per hour.

TOWEL RACK.

The simple and convenient towel rack shown in the engraving has been patented by Mr. Joseph Bergsten, of Rockford, Ill. Each bracket has a bearing in which the reduced ends of the outer towel holding roller are journaled; on each end of the roller is a cam plate having a finger piece by which it may be turned. The ends of the clamping roller are supported in slots and are pressed outward by springs as shown in Fig. 2. The rear roller being forced back by turning one or both of the cams, the towel may be placed between the rollers, where it will be firmly held, after the cams have been moved back, by the springs forcing the rear roller outward. Should it be desired to hang a towel in the rack, one or more towels being already in, a cam at one end only need be turned to separate the rollers, to allow the extra towel to be placed between them. To remove the towel it only necessary to pull them from between the rollers, which turn as the towels are drawn out.



Electricity and the Statue of Liberty.

Some of our daily contemporaries appear to be getting alarmed lest the statue of Liberty be slowly but surely destroyed through the electrical action developed by the contact of the internal bracing of iron with the shell of copper. There is, however, no ground for such fears. Mr. Bartholdi, it is hardly necessary to say, foresaw the possible danger from this source, as well as that due to expansion, and took the proper precautionary measures to obviate both. It is proposed (according to *Le Genie Civil*), when the parts of the statue are assembled, to insulate the two metals by interposing small plates of copper covered with rags smeared with red lead—a method successfully employed in the sheathing of sea going vessels.

Notwithstanding the letters communicated by certain electricians to some of the daily journals, it would seem that too great importance is being attached to this matter. No precaution whatever against galvanic action was taken in the case of the 75 foot statue of St. Charles Borromeo (on Lake Maggiore), which, although constructed of copper only one and a half millimeters (0·06 inch) thick, and internally braced with iron that is in direct contact with the shell, has held its own for nearly two centuries without any perceptible change. Again, in the theater of Monte Carlo, which is situated very near the sea, and which was constructed over four years ago, the cupola is of copper in direct contact with the iron framework that supports it; yet no injury to it, due to galvanic action, has as yet been observed.

Ethnology.

The Director of the Bureau of Ethnology at Washington, Major Powell, has mapped out the work in his department for the coming fiscal year. The interesting government researches into the life history and arts of the early Americans, which were inaugurated several years ago, are to be continued and extended. The work of this department has already attracted much attention on all sides, and the additions of the coming year promise to be of much value.

Dr. Cyrus Thomas, who is in charge of the division of mound exploration, will resume the work begun about three years ago, and will be aided by two or three assistants. He will first visit Wisconsin, in order to examine the effigy mounds in that locality, and later in the season will go to Tennessee and Mississippi, where investigations are already in progress. Since being in the field, Dr. Thomas has secured about 15,000 specimens of the handiwork of the mound builders. Many of the mounds are undoubtedly very ancient, but others are of comparatively modern origin, and bear date subsequent to the advent of the Europeans. One mound in Tennessee disclosed a string of sleigh bells buried among the flint and bone implements in such a position that it undoubtedly formed part of the original deposit. In another in Georgia, two copper plates were found bearing figures resembling those discovered in Central American ruins. The workmanship on these plates is much superior to that on any of the accompanying articles, and leads to the suspicion that they came from the South. They are the only indications which might point to any connection between the mound builders and the Aztecs or Pueblos, while, on the other hand, there is much to make us believe that the origin of these curious mounds is directly traceable to the ancestors of the Cherokee and other races of the Mississippi valley. A Spanish coat-of-arms in silver and other articles of European manufacture have been found in a Mississippi mound at a point which De Soto is supposed to have visited. As the earlier Spaniards were regarded by these simple people as celestial visitors, it is quite possible that the mounds containing European articles were built in commemoration of the supposed divine visitation. The purpose of many of the mounds is still a matter of conjecture, while others were undoubtedly intended as places of burial, or were even the foundations of Indian villages, which were thus secured from inundations.

Mr. Victor Mendeleff, the artist and architect, whose models of the Pueblo and cliff villages form so interesting an exhibit at the National Museum, has already started upon his work in New Mexico, Utah, and Arizona. Last year he visited the Chaco Cañon in New Mexico, and made surveys of several pueblos of high antiquity. The ruins of this locality are of masonry, and are far superior to the adobe pueblos of the present day. In places they are still 40 feet high, and show the floor lines of three or four stories. The largest of these ancient apartment houses covers more ground than the capitol at Washington. Mr. Mendeleff, who has been engaged in the study of Pueblo architecture for several years, will first visit the Moki towns, seven in number, three of which are found on a narrow mesa, whose precipitous sides are nearly seven hundred feet high. Later he will go the Cañon de Chelley, in Arizona, where a narrow gash in the earth, a thousand feet deep and fifty miles in length, contains a number of cliff villages of considerable extent, many of which are perched high upon the rocks, six hundred feet above the bottom of the ravine. He will also make survey of the "seven ruined cities of Cibola," in the neighborhood of Zuñi, so celebrated in Spanish fable and romance.

The study of the sign language and picture writing will also be continued. Having found the key to the expressive gestures of the aborigines, it has been found that the rock etchings and paintings existing in all parts of the country, which were before so meaningless, are now easily translatable to any one familiar with the sign language. The pictography of these ancient American races is found to be almost identical with that of the Chang dynasty, which flourished in China 1500 B.C. Investigations will also be continued into the verbal language of the different tribes, with a view to their better classification.

Philology, which has revealed so much of the ancestry of the European nations, promises to be no less useful in determining the relationships of the North American tribes. The two most powerful tribes of the Southwest, for instance the Apaches and the Navajos, have in this manner been traced to a common origin in British America, where the parent stock, speaking the same language, are still found.

These investigations have established the fact that the advancement of the North American tribes, as illustrated by their art during the past two or three centuries, is exactly equivalent to that existing in Europe and the East during the stone age.

ELECTRIC FAN.

A very refreshing invention, especially for the hot weather season, is the electric fan shown in our engraving. It consists of an ornamental standard, about a foot high, on which is mounted a screw propeller fan. On connecting the wires of a battery with the standard the fan revolves rapidly, and delivers a cool breeze in any direction desired. The upper part of the standard, on which the fan is carried, is hinged, which allows of the adjustment of the fan to any desired oblique position. The battery is contained in a little box, 4½ inches square and same depth, holding liquid enough to run the fan for several hours, when it is poured out and replaced by a fresh supply.


Pat. applied for, S. M. & Co.

We have had one of these little fans running on our desk for several days past, and it gives much satisfaction. They are made by Stout, Meadowcraft & Co., 21 Ann Street, New York, whose excellent and reliable work in the line of small electrical lights and other instruments is well known.

The Treatment of Corpulence on Physiological Principles.

As analyzed by the *Birmingham Medical Review*, November, 1884, Ebstein, in his work on corpulence, gives some valuable practical points for the reduction of obesity. According to him, fattening is strictly analogous to the fattening of cattle, and depends on overfeeding. He, however, disputes the current view that fat makes fat; on the contrary, he thinks fatty food protects the albumen, and prevents its forming fat. His plan of treatment, therefore, consists in moderating the quantity of food, and while cutting off all vegetable carbo-hydrates, sugar, starch, etc., allowing a moderate quantity of fat, two or three ounces daily, to be taken. He also suggests that the diet should be monotonous, greasy, and succulent, so as to cause satiety rapidly. He disallows beer, but permits light wines.

The plan advocated appears rational, and is free from the objection to Banting's method, which is too much like starvation. The following is the diet used successfully by Ebstein in one of his cases:

Breakfast.—One large cup of black tea—about half a pint—without sugar; two ounces of white bread or brown bread, toasted, with plenty of butter.

Dinner.—Soup, often with marrow; from four to six and one-half ounces of roast or boiled meat, vegetables in moderation, leguminous preferably, and cabbages. Turnips were almost and potatoes altogether excluded. After dinner, a little fresh fruit. For second course a salad or stewed fruit without sugar. Two or three glasses of light wine, and immediately after dinner a large cup of black tea, without milk or sugar.

Supper.—A large cup of black tea, as before. An egg, a little fat roast meat, or both, or some ham with its fat, Bologna sausage, smoked or fried fish, about one ounce of white bread, well buttered, occasionally a small quantity of cheese, and some fresh fruit.

On this diet the patient lost 20 pounds in six months.

Ebstein insists on the necessity of always keeping to the restricted diet if the tendency to corpulence is to be successfully combated.—*Therapeutic Gazette.*

Origin of Gulf Stream Life.

In speaking some time ago of the almost incredible profusion of animal life in the surface waters of the Gulf Stream, the suggestion was made that a biological question of no small interest and importance was forced upon us by the facts there presented. The question is this—Where shall we look to find an origin for the bioplasm there displayed? From the lowest to the highest, from the infusoria to the fishes and the cetaceans, they are preying upon one another. We see how the blackfish and the dolphins live. They are but appropriating the flesh of fishes, squids, etc., already existing as perfectly formed animal food, and digesting it for their own nutriment. This is plain, and in accordance with common experience, but as we go on down in the scale we must presently be brought to a pause.

Animal bioplasm, according to all the recognized laws of modern physiology, cannot be produced from inorganic materials. No one principle has seemed to be more thoroughly established than this—that it is the peculiar function of the vegetable kingdom to absorb the proper inorganic materials, say carbon, oxygen, nitrogen, and hydrogen, and transform them by its wonderful and life-giving power into organic substances, into bioplasm first and then into the various tissues required. It has been held that the food, properly speaking, of all forms of animal life must have had these inorganic materials transformed into organic substances before ingestion, otherwise there was no possibility of its assimilation; that carbon, oxygen, and hydrogen were all of them foreign bodies to us, and when introduced into our systems, perhaps mechanically with our food, must remain of no service to us, and could never be by our powers of digestion transformed into a hydrocarbon, like sugar for instance, or starch, or fat.

This has been, and is, the accepted theory and belief, and yet if we adopt it and follow it out to its legitimate conclusions, we shall find the facts which were previously stated as to the teeming life of the Gulf Stream exceedingly difficult of explanation. The vast proportion of that life must originate in the region where it lives and dies. Some favored wanderers come in from outside, for the cetaceans, the sharks, the albicore, barracuda, dolphin, etc., travel fast and far, but they are of small importance in the aggregate. There must be of necessity a very large amount of new bioplasm in constant and daily origination from inorganic materials. The question is, Whence does it come?

It is the unanimous testimony of the observers on the staff of the Fish Commission, from whom the facts as to the abundance of the surface life are derived, that the water of the Gulf Stream is remarkably clear and transparent, that the manifestations of vegetable life in it are very small indeed. There are masses of Gulf weed floating here and there, but not in any great quantity, nor is there reason to believe that the Gulf weed is used for food, except very slightly, by the animals around it. Many of the hydroid polyps are attached to it, and drift with it, but they use it only as a moving house, a boat, or raft, so to speak, while they industriously collect their food from the water around them. Some of the small fishes, specially the curious, grotesque looking *Chironectes*, make the same use of the Gulf weed tangles as do the polyps, but they never touch it as food. It is quite sure that the Sargassum furnishes small amount of material for new bioplasm. Nor does there seem evidence that any of the algæ are sufficiently abundant to afford any relief from the perplexity. Even the minute, microscopic diatomaceæ which swarm so infinitely in many parts of our shallow waters are apparently in small numbers in the Gulf Stream, and we have, therefore, no profusion of vegetable life which in the slightest degree corresponds to that of animal life.

The only explanation that seems available is this—that some, or perhaps all, of the lower forms of animal life have really the power which has hitherto been reckoned the peculiar prerogative of vegetable organisms, that of transforming inorganic matter into organic. If we assume this, the mystery of the origin of the swarming myriads is at once removed. Nor is the assumption one that need startle us, for we well understand that along the border line, on either hand, the functions which are shown in the higher grades to be clearly animal or vegetable are so slightly specialized or differentiated as to have much less significance than in the more complicated types.

Disinfectants.

Two pounds of copperas, or sulphate of iron, dissolved in a pail of water, will greatly assist in purifying a privy or cesspool. A pound of nitrate of lead dissolved in the same way is excellent for sinks, drains, or vaults. Chloride of lime is also effectual, or a layer of charcoal dust will prevent offensive odors arising from any decomposing substance. The quantity of these substances will depend upon the amount of filth to be deodorized, and the length of time during which they will be effectual will depend upon local conditions.