NEW FASTENER FOR GRAIN-CAR DOORS.

The great failing in grain car doors as ordinarily made is their liability to become loosened so as to allow grain to escape. When doors are nailed to compensate for defects in their fasteners, the doors soon become destroyed and the jambs or casings are permanently injured.

We give an engraving of a grain-car door fastening which remedies these defects and permits of fastening the door quickly and securely, and in such a manner as to avail of the jarring of the car to tighten the fastenings rather than loosen them. The inventor of this fastener has been for many years a shipper of grain, and being familiar with the defects of other doors, and knowing the requirements of the case, has devised the door shown in the illustration, which is believed to overcome all of the difficulties hitherto experienced, and to be capable of closing a car so that the grain cannot leak from the door; in fact, the greater the amount of jarring the more firmly does the door become fastened. The fastenings are upon the outside and in plain view, and the door can be loosened and lifted as easily as an ordinary gate is opened. It will be seen that its construction is inexpensive, and that it may be readily applied to old cars, not only furnishing a complete door, but also supplying a protector for the door jambs.

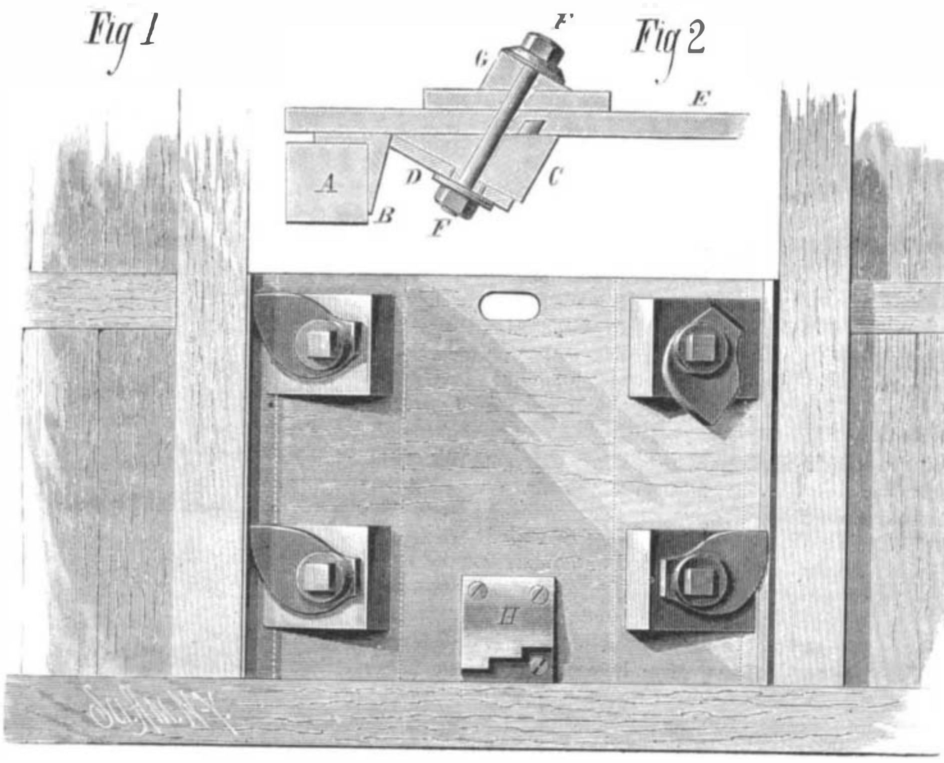
In the engraving, A is the door jamb, and B is a false jamb, made of angle iron and having its inner face beveled or inclined from within outward. C is a wedge-shaped block having on one face a projection on which a cam, D, is pivoted, and on the opposite face two projecting lugs, which enter corresponding inclined sockets in the door, E, to steady the blocks, C, in position.

On the inside of the door, E, are secured vertical panels or braces for strengthening it. The cams, D, are held in place by bolts, F, that pass diagonally through the block, C, door, E, and a wedge-shaped washer, G, which is on the inner face of the panel.

The cams, D, have their semicircular or rounded edges beveled to correspond with the bevel of the false jambs, B, so that when turned and forced down against the bevel of the false jambs, B, as shown in Fig. 1, the cams will draw the door outward and hold it firmly against the outer faces of the jambs. By striking up the cams the door is loosened, and can then be pried up for the removal of the grain from the car by inserting the end of a bar under one of the steps of the block, fixed centrally at the lower edge of the door, a suitable fulcrum being placed in position for the prying bar

It will be seen that the false jambs, B, and beveled edges of the cams, D, form opposite inclined planes, that will continue to bear the same relation to each other and together operate to hold the door tightly closed, however great may be the wear on them.

This invention was lately patented by Mr. Aaron Burntrager, of Mulberry, Ind., who may be addressed for further information.



BURNTRAGER'S GRAIN-CAR DOOR FASTENER.

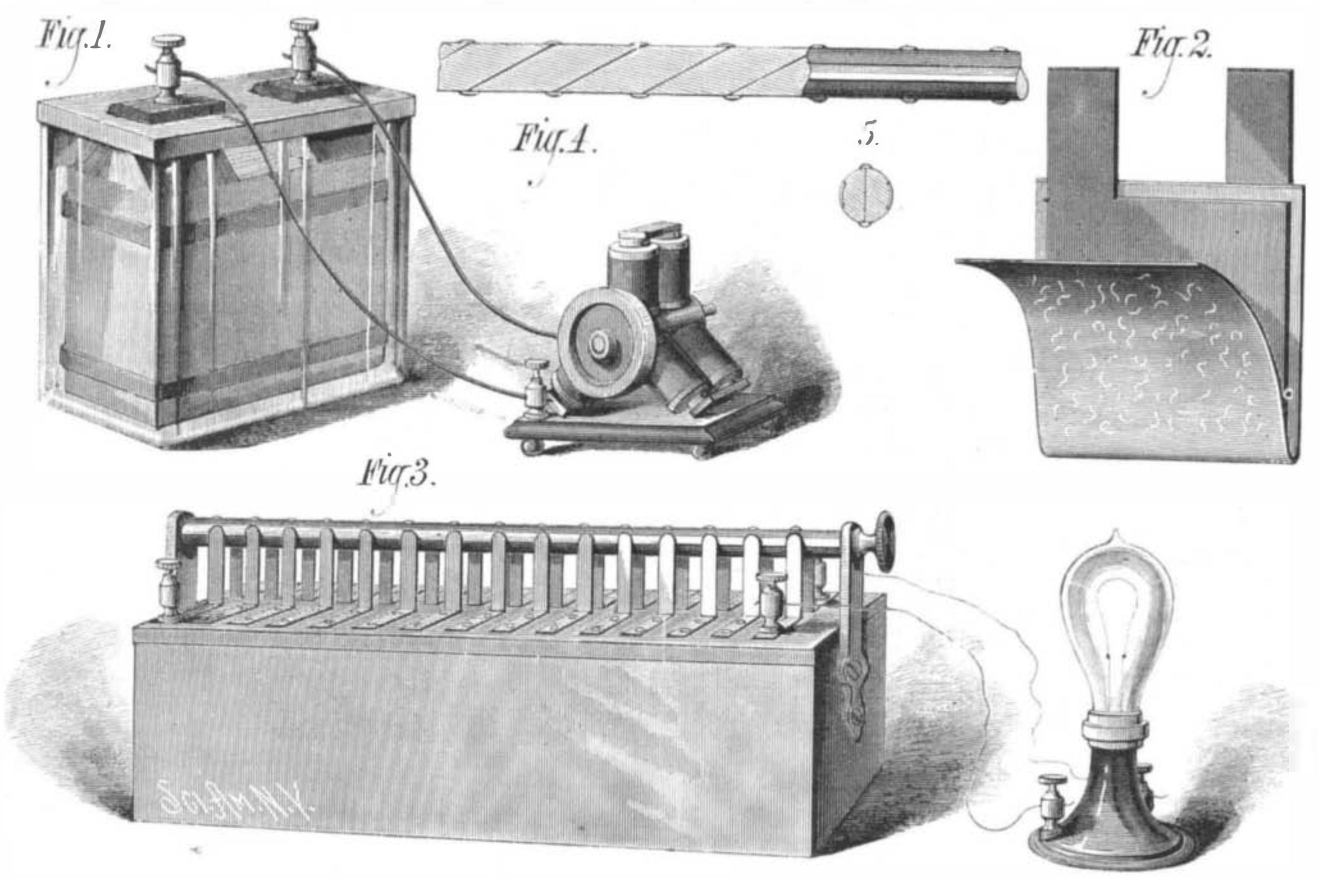
STORING OF ELECTRICITY.

One of the latest and most interesting of electrical novelties is the improvement in the secondary battery of Gaston Planté, by M. Faure, which has been brought to the notice of the scientific world by the accounts of the transportation of a box of "electric energy" from Paris to Glasgow, for the purpose of having it submitted to Sir William Thomson, the eminent electrician, for tests and measurements. The results of this experiment have been pronounced wonderful, but no facts have yet been made public which afford a basis for an estimate as to the commercial value of the invention.

An extemporized Faure secondary battery of small dimensions has been in operation for several days in the office of the SCIENTIFIC AMERICAN, and although no extended tests have been made as yet, the results of the experiment are very promising. We give below an account of the experiment for the benefit of such of our readers as may desire to investigate the subject.

In attempting to follow M. Faure's plan of construction some difficulty was experienced in making the red lead remain in place during the rolling up of the two electrodes. Therefore the battery was constructed of square plates of lead, each having an ear projecting upward from one side, for attachment to a binding post. This plan succeeded very well, the flat plates having the advantage of retaining a great quantity of red lead and of being easily formed into a compact pile.

Fig. 1 in the engraving shows a single pile operating a small electric motor. Fig. 2 shows the method of combining the plates. Fig. 3 shows how a battery may be arranged with a commutator for combining the elements for tension or quantity, and Figs. 4 and 5 are respectively longitudinal and transverse sections of the commutator.



STORING ELECTRICITY.—THE NEW SECONDARY BATTERY.

The plates employed in the experimental battery were of pure lead foil, having the thickness of a postal card, a width of 7 inches, a height of 7½ inches, with an ear projecting from the top 1½ inches wide and 3 inches high. The total effective surface on both sides and edges of each plate is 100 square inches. Ten such plates are sufficient for a single element for ordinary uses, and such an element may be fairly charged by means of four gravity cells, but a stronger current is much quicker and more satisfactory. The method followed in building up these secondary elements was as follows:

After cutting out a sufficient number of lead plates, pieces of canton flannel, 15 inches long and 7½ inches wide, were cut, and finally as many sheets of blotting paper, 7½ inches square, as there were lead plates were provided.

The next step was to prepare a thick paint of red lead by mixing the dry pigment with water containing one-tenth of sulphuric acid. This paint had a consistency of paste, and was applied thickly to one side of the sheet of lead with a common flat paint brush. The canton flannel having been painted to within one-quarter inch of all its edges on the nap side, the lead was laid, painted side down upon the painted canton flannel, when the other side of the lead was painted and the cloth was neatly folded over the lead, completely enveloping it with the exception of the ear at the top, and projecting about one-quarter inch beyond all of the edges of the lead. The lead with its envelope was then laid upon a level board, and another plate was prepared in the same manner and placed over the first, with an intervening layer of blotting paper, and with the ear placed opposite the ear of the first. Other lead plates were added in the same way, with the interposed sheet of blotting paper and with the ears alternating in position, as indicated in Fig. 2. When ten plates had been placed together in this manner they were clamped together with two or three elastic bands, and the ears were brought together and passed through a slit in the wooden cover of the containing cell and bent down upon the top of the cover, as shown in Fig. 1. They were then pierced and traversed by the screw of a binding post which enters the wood. In this way each pole of the element was furnished with a binding post, and at the same time firmly secured to the cover. The cell was then partly or wholly filled with acidulated water—water 10 parts, sulphuric acid 1 part—and after the cloth and blotting paper had become saturated the element was connected with four gravity cells. In one hour the element had stored electricity sufficient to heat 1½ inches of fine platinum wire to redness, to work a magnet strongly, and to run at a high rate of speed for fifteen minutes a small electric motor, that requires at least ten gravity cells to operate it. After this preliminary experiment a number of the new secondary elements were prepared in the same way and charged separately with a dynamo-electric machine. One element of ten plates, after receiving the current from the dynamo, for ten minutes operated the small motor above referred to for something over three hours.

Another ten minutes' application of the current from the dynamo charged it, so that after eighteen hours of rest it yielded a current which seemed as strong as when it was first charged on the previous day; but a time test proved that it was incapable of running the motor for quite so long a time as when the current is used soon after storing. However, it proved that a large quantity of electricity could be stored and retained for a considerable time.

Six elements of ten plates each can be readily charged with the smallest current that can be obtained from a two light dynamo machine; that is, a current that will not support a single arc light will easily charge the number of elements, and they will readily support a single Reynier or Werdermann lamp.

For general experimental purposes the battery may be conveniently arranged as shown in Fig. 3. Each pole of each element is connected through the cover to a spring which is bent upward at right angles. The springs of the two opposite poles of the battery touch upon opposite sides of a commutator cylinder supported a short distance above the top of the box.

Two opposite sides of the commutator are provided with straight bars connecting all the springs on each side, so that the current from all of the positive electrodes may be taken from the binding post attached to the spring at the end of the series on one side, and the current from all of the negative electrodes may be taken from the binding post at the end of the series of springs on the opposite side. When the commutator is in this position the battery may be charged and a quantity current may be obtained from it. When a current of high intensity is required, the elements are connected in series by means of the diagonal wires running through the commutator cylinder and terminating in buttons arranged on a median line between the metal strips. With this device all that is necessary to connect the elements for intensity is to turn the commutator through a quarter of a revolution.

It is too early to speak with any degree of confidence in regard to the capabilities of this new battery, but it seems susceptible of a great number of very useful applications.

For general experimental work its advantages are obvious. For electric lighting on a small scale it appears practicable, since a larger secondary battery may be charged by a small battery during the night and day for use during the evening. For use in connection with small electric motors for domestic purposes it would seem to have another application. For galvano-cautery it may serve a good purpose, and there are a thousand uses requiring only a brief expenditure of considerable power which would allow a large margin of time for the accumulations of electricity, where this battery may be advantageously applied.

The action of the battery is thus described in one of the English journals: "When a current is passed into this cell the minium on one plate is reduced to metallic lead, that on the other is oxidized to a state of peroxide. These actions are reversed while the charged cell is discharging itself."

A Water Carrying Tortoise.

At a meeting of the California Academy of Sciences the other evening, a very fine specimen of the desert land tortoise, from Cajon Pass, San Bernardino County, in this State, was received. The specimen had been carefully prepared, and was as large as an ordinary bucket. The tortoise is a native of the arid regions of California and Arizona, and Prof. E. T. Cox, who was present, related a curious circumstance connected with it.

He found on dissecting one of them that it carried on each side a membrane, attached to the inner portion of the shell, in which was about a pint of clear water, the whole amount being about a quart. He was of opinion that this water was derived from the secretions of the giant barrel cactus, on which the tortoise feeds. This cactus contains a great deal of water.

The tortoise is found in sections of country where there is no water, and where there is no vegetation but the cactus. A traveler suffering from thirst could, in an emergency, supply himself with water by killing a tortoise. They are highly prized by Mexicans, who make from them a delicious soup. The foxes of the desert attack the tortoise and finally overcome it by dragging them at times for miles.

B. B. Redding said he would try to obtain a live one for the Academy, in order that its habits and peculiarities may be carefully observed and noted. He instanced being on the Gallapagos Islands in 1849, and assisting in the capture of 92 land tortoises, varying from 450 to 600 pounds in weight, which the vessel brought to San Francisco and sold for more money than the whole cargo of lumber netted at that time. They were two months on board the vessel, yet ate nothing, and those killed had in them considerable quantities of pure water. They live on the high lava rocks, which rise as mountains on the island, where there are no springs or streams, and the only dependence of animal life for water is necessarily upon the irregular and uncertain rain showers.

It may be mentioned that the tortoise are of different species, though they may have the same habit in respect of carrying water. The famous edible species of the coast of the Pacific and Indies, of which the headquarters is at Gallapagos Islands, is the *Testudo Indica*. They grow to five, six, and even seven hundred pounds or more. Those found in this State are smaller, and are the *Agassii* species, first described some years ago by Dr. J. G. Cooper, if we recollect aright. Those Mr. Redding describes from the Gallapagos were offered water while on the ship, but refused it. Yet when killed they all contained water. The place they inhabit is a dry one, lacking water. It may be that they go to the high places and obtain it from the vegetation, the same as our species does.—*Mining and Scientific Press.*

THE SLENDER DRAGON FLY.

There are many species of dragon flies, all similar in their habits. They are properly named, being among the most voracious and cruel of insects, and even in their preliminary stages they exhibit their predatory disposition. In their larval and pupal state they inhabit the water, and are found in most streams, propelling themselves along by a very simple apparatus. They breathe by means of the oxygen which is extracted from the water, the liquid passing into and out of their body through a gill at the end of the tail. After giving up its oxygen the water is violently expelled, thereby forcing the insect forward.

The lower lip is jointed and can be extended about an inch. When at rest it may be folded, and can be protruded and withdrawn. It is furnished with a pair of forceps at the end, so that it may be able to grasp objects. This creature remains for some ten or eleven months in the preliminary stages of existence before developing into the perfect insect.

SLENDER DRAGON FLY.

Our engraving represents the slender dragon fly (*Lestes*). The male has a light gray encircling band around the middle part of the emerald-green body, the brown or black wing markings have almost a white edge, and it has two large pointed teeth at the inner edge of the clasping pincers.

The manner in which this species lay their eggs has been observed by Siebold, on the borders of a pond overgrown with rushes, and is shown in the engraving.

After the pairing the male clasps the female firmly by the neck and controls her movements. Both fly in this condition with outstretched bodies, lighting upon the water plants and appearing to be animated by one will. Frequently the male settles down on the top of one of the rushes; in this case the female curves her body, and placing the point of it behind the feet, pushes the sabre-formed egg-depositing instrument from out its horny sheath and presses it into the outer skin of the rush. As soon as this is done she creeps down the rush a single step, piercing another place with this apparatus, and continues to work in this manner, drawing the male after her, until the bottom of the rush is reached. Then both fly away to another rush and repeat the operation. Upon the stalks worked upon in this manner there may be perceived rows of whitish yellow spots. A strip of the skin of the rush is ripped up from the top to the bottom by this operation, but is pressed back again by the convex part of the apparatus after it is withdrawn. In almost every one of these pierced places an egg is found deposited in the back part of the roomy air cells of the rush, with its pointed dark-brown end crowded into the inner part of the principal crevice; the somewhat thicker rounded end is of a pale-yellow color and projects into the cell.

Sometimes no egg is found behind the pierced place in the rush; in this case it is probable that no time was given to the female to deposit one, for the male often flies up before the whole length of the stalk is traversed. Pairs of these insects have been observed upon the rushes which grow up out of the water. This does not prevent them from pursuing their accustomed way to the base of the plants. They both disappear under the surface of the water, having previously laid their four wings close together.

If the female betakes herself to the water the male quickly follows after, and she does not begin her work until he is quite surrounded by water. He bends the back part of his body into a position like that of the female, so that all the pairs that have been observed under water form a double curve with their bodies. A thin stratum of air clings to their bodies, their legs, and wings, which they use without doubt for breathing, for they will remain under water half an hour, for here as on the land they descend in the pond to the base of the rush. When they have reached the bottom they creep up the stalk again and fly away. It often happens that when one pair are already upon a rush

Minute Disease Organisms.

The organisms described by Pasteur as the origin of epidemics and contagious diseases are so minute and few compared with the multiplying swarms of bacteria, etc., pervading all generating solutions, that it becomes necessary to provide a means of eliminating the masses of infusoria from solutions to be studied under the microscope. These microzoa haunt even the clearest water at times. M. Certes suggests the use of osmic acid as a sure means of killing them without destroying their tissues. He dips a glass rod into the solution to be examined, and then into 1½ per cent solution of the acid; washing this in a narrow test tube of distilled water, it is easy to collect what is necessary.

GOOD bricks are unquestionably the best building material used. They come nearer to being fireproof than any other substance. Iron is treacherous and almost worthless in many places where it is used. A good oak pillar is far better as a support in case of fire than iron.