to reproduce the motions as well as the features of the subject. The details of the structure can be clearly made out in engraving No. 6. It consists of a floor of steel I beams which carries a series of three concentric steel tracks. Upon this rotates a massive frame, at one end of which is a stage supplied with the necessary scenery, and at the other end a corrugated iron house in which is located the mutograph. The stage is bolted to the frame, but the house travels upon a track and may be moved to or from the stage as required. The frame carrying the stage and house rotates about the smaller circular track located beneath the house, and may be swung around so as to throw the light full upon the stage at any hour of the day.

Our thanks are due to Mr. Herman Casler, the inventor of the above described apparatus, and to Mr. W. K. L. Dickson, the pioneer investigator in the art of moving photography, for courtesies extended.

THE ESSICK HOT FLUID BATTERY.

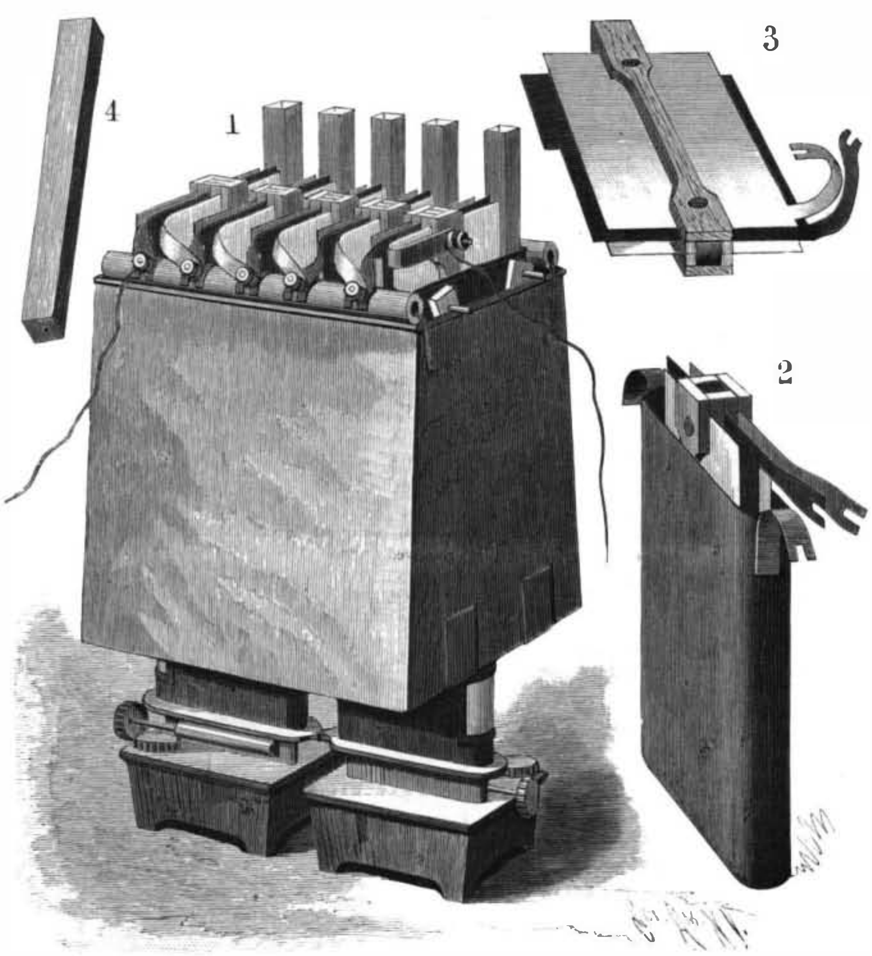
There has recently been exhibited in this city a new primary battery from which quite remarkable results are obtained. It represents a modification of the well known Daniell battery. It includes a zinc copper element of large superficial area excited by a solution of copper sulphate, its action being greatly accelerated by the application of heat.

The cell consists of a rectangular vessel, which, in the model battery illustrated, is $1\frac{5}{8}$ inches by 8 inches in horizontal section and 11 inches high. Within the vessel are contained three plates, two of zinc and one of copper between them. Strips of wood are used to prevent contact of the plates. These are bolted together by bolts passing through the wood, as shown in one of the illustrations. For each cell a feeding tube, a rectangular tube of copper about an inch square, is provided, whose end is closed with a perforated diaphragm. This tube sets into one end of the cell. Through this tube, whose lower end is shown in the cut, copper sulphate solution is fed, or the tube may be packed with crystals of copper sulphate. It rests upon a projection of the copper plate, so that it reaches about half way down to the bottom of the cell.

Any number of these cells may be packed in the external vessel, which is bottomless, and merely holds them together and keeps the heat from disseminating. The supply of copper sulphate is introduced into the feeding tube, and heat is applied.

As a source of heat, a couple of ordinary kerosene oil stoves are used in the battery illustrated, which contains five cells connected in series. It will be evident from the description and drawings that the very large surface of copper and zinc are very close together. This, of course, tends to reduce resistance, besides which, both sides of the zinc are made fully operative, because the copper vessel is connected by the ribbon to the central copper plate, so that this interior surface acts as a negative element.

Quite extraordinary results are obtained. It is said that a single cell will give from fifteen to thirty-eight amperes at a pressure of about one volt. This, of course, makes the battery of very high power. How long it will run, in view of the fact that it has so small a cubic capacity for liquid and that no arrangements are made for keeping the liquid at a constant strength, is not certain.



THE ESSICK HOT FLUID BATTERY.

Queer Things About Mankind.

Few people are aware of the wonderful engineering skill and ingenuity with which their bodies are constructed. If patents were taken out for all the clever contrivances to be found there, they would probably keep the staff of the Patent Office going for three months.

Who would think that in his eye there is a block and pulley, or "tackle," as the sailors call it, as complete and efficient as that with which a ship hoists her mainsail? There it is, however; and whenever you look at the tip of your nose the muscle that moves your eyeball works in it. There are several of these pulleys in the body.

Another clever dodge of Nature is shown in the bones of the face. Accomplished engineer that she is, she always uses the smallest quantity of material sufficient for strength. In making the bones of the face, she wanted a large surface to which to attach the muscles; but, as she didn't wish to encumber us with heads as heavy as an elephant's, she burrowed hundreds of little holes in the bones, called air cells, and thus secured strength, large surface and lightness.

In the same way she made the long bones of the legs and arms hollow in the middle. What a saving this is may be understood from the fact that a hollow shaft of bone or iron—or any other substance—is about twice as strong as a solid shaft containing the same quantity of material.

When you get a severe cold you are apprised of the presence of another cunning device—the Eustachian tube. This tube is two inches long, and passes from the inside of the ear to the back of the mouth. It was put there to keep the air at the same pressure inside the drum as outside. Otherwise there would be no vibration of the drum, and you would be almost stone deaf. When you get a bad cold this tube sometimes becomes inflamed and blocked, and you are made quite deaf.

Adam's apple, if it was once that fruit that brought into the world all our woe, is now a useful organ. It serves as a sort of storage cistern of the blood for the supply of the brain. When the heart sends up too much blood Adam's apple intercepts it, or part of it; and when the direct supply from the heart temporarily runs short, Adam's apple gives up its store.

The liver is a most wonderful organ, containing facilities of several kinds. But perhaps the most wonderful thing in it is that part set aside to look out for and arrest poisons.

All the food that you eat, except the fat, has to pass through the liver before going to the heart and body generally; and in the liver there appear to be stationed something of the nature of customs officers, who examine every bit of food and remove from it all substances dangerous to the body. But they are only capable of dealing with the small quantities in ordinary food, and when you are so foolish as to eat poisonous mushrooms or mussels, they are quite overpowered.

Another protection from danger is afforded you by the supply of a small quantity of hydrochloric acid to the stomach. There are little machines in the stomach specially designed for the manufacture of this acid from the salt you eat, and they are so regulated that they produce a quantity equal to one-fifth of one per cent of the contents of the stomach. Experiment shows that this is exactly the percentage required to destroy the microbes that we swallow in thousands in our food. But for this thoughtful provision of Nature we would probably get a new disease with every meal.

Most people know the use of the epiglottis, which saves us from imminent death every time we swallow a bit of food. At the back of the mouth the air passage and the food passage cross each other, and, whenever we swallow food, it would inevitably go into the windpipe and choke us, only that this little body pops down and covers the entrance. It is like the policeman who regulates the traffic where streets cross.

The semicircular canals, for centuries a physiological puzzle, are an extraordinary device for enabling us to keep our balance. They are little channels, hollowed out, in connection with the ear, in the bones of the head, and partly filled with fluid lymph. As our head or body sways the fluid moves, acting like a spirit level, and informing the brain whether we are standing in the perpendicular or at a dangerous angle.

One of the most valuable of all the inventions made for our comfort and safety is the perspirative gland. It acts like the safety valve of a boiler, letting off heat when we are becoming dangerously warm. If our temperature rose seven or eight degrees, we would not have twenty-four hours to live. The value of the sweat gland is therefore obvious. In fact, without it a football, or cricket, or rowing match would be out of the question, and we could not safely walk at a speed of more than a quarter of a mile an hour. Nature has taken good care, however, that we should not run short of these useful organs, and has given us no less than 2,500,000 of them.

So inventive was Nature when constructing our body that the difficulty is to stop enumerating her clever ideas. She saw that we would very soon grow tired if we had to hold up two heavy legs by means of muscular effort, so she made the hip joint airtight, and the pressure of the air alone keeps the leg in its place.

At the same time, although she had not discovered ball bearings, she made the ball of the leg bone and the socket of the hip so smooth, and oiled the joint so well, that the friction is practically nothing.

When the spinal canal in the backbone was made, great pains had to be taken, for, while it consists of many pieces and is freely movable, it contains the precious spinal cord, one nip of which would be fatal. The measurements are so accurate that there is no danger of such an event. Wherever there is much and free motion, as in the neck, the canal is large and open, and a nip is impossible.

Again, the heart and lungs are, of course, the very basis of our life. They are in constant motion, and if allowed to rub against the chest walls around them they would either get inflamed or wear away by friction. Nature has therefore surrounded them with a double sac, and between the outer and inner layers of it she has placed a quantity of lubricating fluid.

But the most remarkable of all devices is that for splicing broken bones. The moment a bone is broken, a surgical genius is at once dispatched from the brain to the spot. He proceeds to surround the broken ends with a ferrule of cartilage. This is large and strong, and takes quite a month to complete. When the two ends are held firmly and immovably in place by the ferrule, this mysterious surgeon begins to place a layer of bone between them and solder them together.

And when the layer is complete and the bone securely welded he removes the ferrule, or callus, just as the scaffolding is removed from a finished building. Often a bone does not get broken for two or three generations, and yet this power to form the callus, and knowledge of how to do it, is never lost.—From Answers.

Horseless Cabs to Hire in New York.

In the Scientific American for March 13, 1897, will be found an article on the electric hansom cabs which were brought to New York to compete with ordinary cabs drawn by horses. It was quite a time before the company could obtain the necessary permission to run their cabs for hire upon the streets, but the licenses having been obtained, the cabs are now a well known sight in the upper part of New York, and occasionally they may be seen going as far down town as Wall Street, winding in among the trucks and cable cars. This open competition with horse-drawn vehicles may be regarded as one of the most satisfactory events in the motor carriage world for a long time.

A New Photographic Paper.

One of the latest novelties in the photographic line is a self-toning collodion sensitized paper prepared by coating the paper with a collodion emulsion mixed with the silver and the toning chemicals, such as chloride of gold. When a sheet of the paper is placed in the printing frame behind a negative, the printing takes place in the usual way, but instead of being a red color, it prints the same color as the ordinarily finished print does, the operation being continued until the print looks a trifle darker than is desired.

It is then placed directly in a fixing bath composed of hyposulphite of soda and water for a few minutes, washed in changing water for half an hour, then dried and mounted. The prints are very satisfactory, equaling in brilliancy those made in the ordinary way, and are said to be fully as permanent.

By the consolidation of the two great iron manufacturing firms of Schneider and Canet, of Paris, the heads of the two foundries visited President Faure recently and assured him that France now has an iron manufacturing plant rivaling the Krupp establishment in Germany.