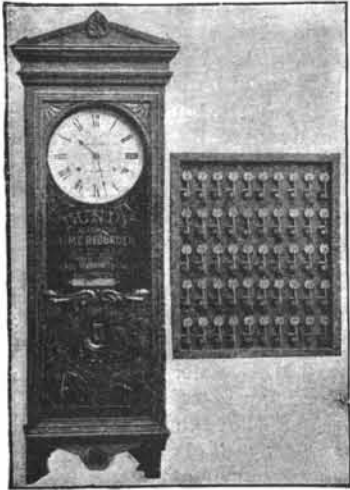


**THE BUNDY AUTOMATIC TIME RECORDER AT THE EXPOSITION.**

The exhibit made by the Bundy Manufacturing Co., of Binghamton, N. Y., at the Columbian Exposition, was a striking one, as is evidenced by our illustration, and the time recorder furnished by this company was the only one receiving an award, a medal and diploma being awarded it. The Bundy system was also used exclusively during the construction of the Exposition buildings, and during the continuance of the Fair, for recording the time of mechanics, clerks, laborers, etc., including all employes except the Columbian guards, who were under military discipline. For this purpose about thirty-five recorders were employed in various locations upon the grounds, besides others in different "model" establishments, as the model paper mill,



**THE BUNDY TIME RECORDER.**

model laundry, the Libby glass works, the Shoe and Leather building, etc. Our readers will remember that we have heretofore published a description of this improved time recorder, which is designed for use in factories, shops, stores, offices, or wherever the time of employes is required to be noted and a record kept thereof. It operates in connection with a standard clock, and the recording mechanism is arranged in a suitable casing within the clock case, below the dial, there being a central opening in front for the admission of a registering key. The clockworks are of the best variety, the Seth Thomas 100 beat pendulum movement, and the ink ribbon is in the casing with the mechanism, the reel of paper on which the record is made being just below. At one side of the clock, as shown in the small view, is an open case or keyboard fixed against the wall, in which are hung numbered keys. Each workman or employe whose time is to be taken is given a number, and in going to or departing from work he takes his key from the keyboard, inserts it in the keyhole of the recorder, turns it one quarter around, and then removes and hangs it up again. He thus records upon the paper ribbon within the machine the number of his key and the exact hour and minute of his arrival or departure. In going out he also holds down a lever projecting through the clock case on the left hand side, and a star is then printed in front of the hour record on the paper strip. The latter can be readily removed, as often as desired, for filing away, and forms a perfect and indisputable record of the workman's time. A bell rings as each record is made, thus preventing one from registering for another without detection, and after the key is inserted it cannot be taken out until it registers, neither can a second registry be made without removing the key.

At the present time, as we are informed, there are over 2,500 of these time recorders in use in various manufacturing and other industries throughout the country, where they are giving great satisfaction and paying their original cost several times over each year.

**Postal Service in Interior Africa.**

A five cent stamp will take one of our mammoth Sunday newspapers from this country to the white stations on the far Upper Congo. The probability is that the actual cost of delivering one of these newspapers at Stanley Falls, for instance, is twice or three times the amount of postage charged.

It is carried over the ocean about 7,000 miles before it enters Africa. It is transhipped three times before; at Matadi, ninety miles from the sea, it is placed on the

back of the mail carrier who is to transport it 235 miles around the cataracts of the Lower Congo before it is placed on one of the steamers of the upper river, and the carriage becomes reasonably cheap again. Every pound of mail that goes to the Upper Congo is incased in waterproof wrappers, and for more than two weeks it is carried up hill and down, under the scorching sun and through the tropical rains, on the backs of porters; and when it finally reaches Stanley Pool the mail is sorted for shipment by one or another of the little steamboats that drop the mail packages at the government stations or the commercial posts as they thread their way among the islands for a thousand miles up the main river, for 800 miles up the Kassai and Sankuru tributaries of the south, or for 500 miles up the Mobangi affluent of the north.

All these Upper Congo stations, some seventy-five in number, isolated as they are from the rest of the world, have most of the conveniences of the modern postal service. When white men among the cannibals and the dwarfs write to their friends at home, they have the neat postage stamps of the Congo Free State to affix to the envelopes. If they wish to send money home they may procure money orders at any of the stations of the State, where, also, the orders they receive from abroad are cashed.

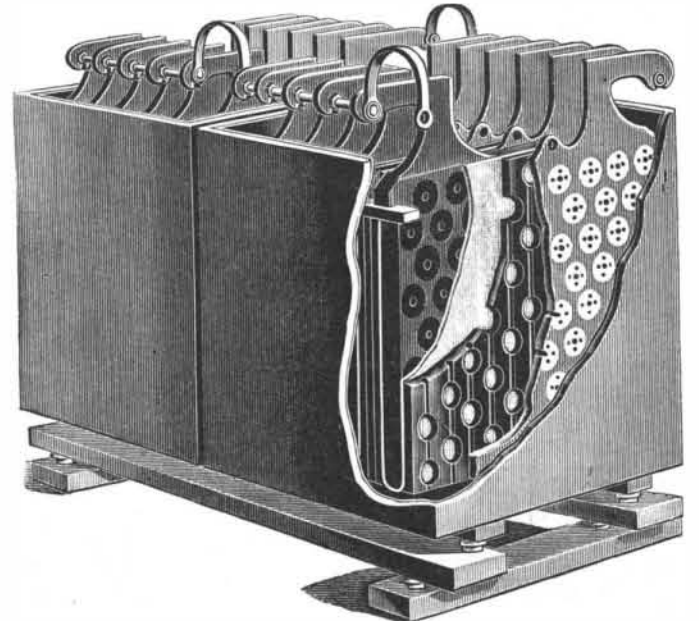
The only respect in which the service is deficient is that the mails are irregular, for the white pioneers often wait days and even weeks for the arrival of the mail steamer which is not only to bring them tidings from home but also the stores which they need in carrying on their work.—Pittsburg Dispatch.

**African Ants.**

Dr. Sharp gives the following extract from Dr. Livingstone's "Narrative of an Expedition to the Zambesi:" "We tried to sleep one rainy night in a native hut, but could not because of attacks by the fighting battalions of a very small species of *Formica*, not more than one-sixteenth of an inch in length. It soon became obvious that they were under regular discipline, and even attempting to carry out the skillful plans and stratagem of some eminent leader. Our hands and necks were the first objects of attack. Large bodies of these little pests were massed in silence round the point to be assaulted. We could hear the sharp, shrill word of command two or three times repeated, though until then we had not believed in the vocal power of an ant; the instant after we felt the storming hosts overhead and neck."

**A NEW STORAGE BATTERY**

It seems to be a well established fact that the efficiency of electric lighting stations can be greatly increased by the addition of a suitable storage battery plant, which will utilize the surplus energy of the engines, so that they can be run continuously at their maximum load, consequently securing the greatest economy. In Europe, the practice of using storage batteries during the day which are charged by the dynamos the latter part of the night is becoming common. To some extent the same thing has been done in this country. In Paris, the Popp Company, operating twenty-five sub-stations, employs a storage battery at each station having a capacity of from two to three

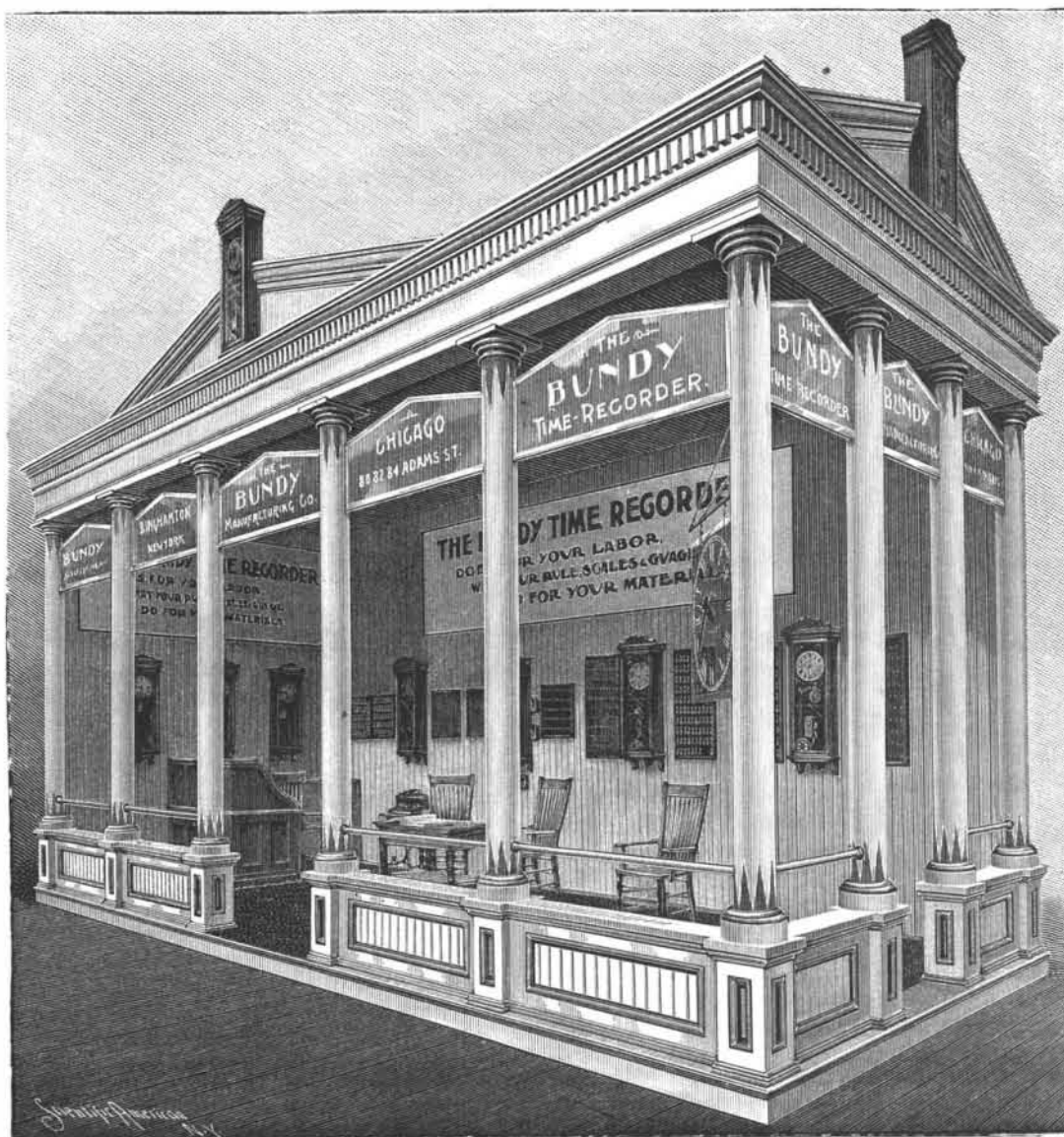


**Fig. 1.—NEW STORAGE BATTERY.**

thousand ampere hours, and feeding over 100,000 lamps. In Germany and England the same thing is seen; in Hanover 20,000 lamps are operated by storage batteries: Dusseldorf, 20,000; Bamberg, 2,700; Darmstadt, 5,800; Hamburg, 12,000; Elberfeld, 14,000, and so on. These sub-stations are all supplied with the chloride type of storage battery, similar to that which we here illustrate.

The Electric Storage Battery Company, of Philadelphia, is introducing in this country the chloride accumulator, and have established works at Gloucester, N. J. The elements of the chloride battery are made of tablets cast from fused chloride of lead and zinc, which are held together by a frame or rim of antimonious lead. The tablets which compose the plates are subsequently converted into active material of perfect character by electrical action. The crystals which are formed in this manner are needle-shaped, running through the plate perpendicular to the surface. By the elimination of the chlorine, innumerable minute cells are formed around these crystals, giving an enormously extended surface, which is essential for the great capacity. This material is entirely different in character from the ordinary active material which is mechanically applied, and it has proved itself to be much more durable, uniform, and efficient.

Fig. 1 is a perspective view of a pair of accumulator cells, with parts broken away to show the interior, and Fig. 2 is a side view of the accumulator plates. The reduction of these plates requires from 12 to 24 hours. Every trace of chlorine is finally removed by washing the plates in running water, after which they are charged continuously for several weeks, until the crystalline spongy lead has been completely converted into peroxide. The negative plate of the battery is separated from the positive plate by a separator, S, made of wood soaked in insulating compound and perforated and grooved longitudinally to permit of the free circulation of the electrolyte. The positive plate is made considerably heavier than the negative plate, and is surrounded by asbestos



**THE WORLD'S COLUMBIAN EXPOSITION—EXHIBIT OF THE BUNDY TIME RECORDER.**

cloth, which incloses the tablet of the plate and prevents short-circuiting by confining the active material to its place.

The capacity of the chloride cells is from 5 to 6 ampere hours per pound, with a discharge rate of one-half ampere for each plate. Notwithstanding this high capacity and the high rate of discharge, the efficiency of the cell is very high, the loss in current being less than 10 per cent, and the watt efficiency is from 75 to 85 per cent.

A large plant of chloride cells having a capacity of 1,894 ampere hours has been placed in the Provident Life and Trust Company's building in Philadelphia, which, on a recent test, exceeded by nearly 50 per cent the guarantee given by the company. The chloride battery plant, used in connection with the Germantown, Pa., electric lighting station, has a capacity of 1,000 ampere hours, which is soon to be doubled.

This battery has been found to be efficient in trac-

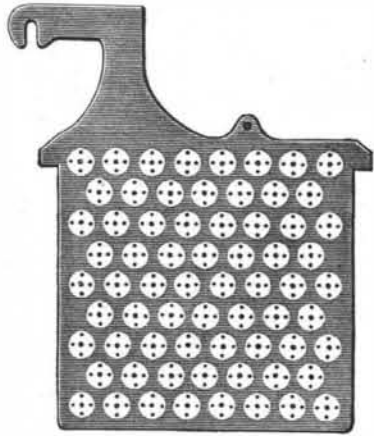


Fig. 2.—CHLORIDE ACCUMULATOR PLATE.

tion work. Thus two sets of chloride batteries of ninety-six cells each have been in use on the Metropolitan Railway at Washington since last April. The car has run 8,000 miles and has been run for three days continuously, while the batteries have remained unchanged.

Storage batteries diminish in capacity with increased discharge, so that when cells are called on for heavy rates of discharge, this feature becomes one of importance where economy is a consideration.

Fig. 3 is a diagram of curves showing the capacity of the chloride accumulator under these varying conditions. These curves show the results of various tests. It will be seen by comparing the different results that in every case there is shown to be a difference in capacity of only 1/2 between the lowest and the highest rate of discharge. Thus, while the smallest element, weighing 50 pounds, has a capacity of 320 ampere hours when discharged in 24 hours, its capacity is still

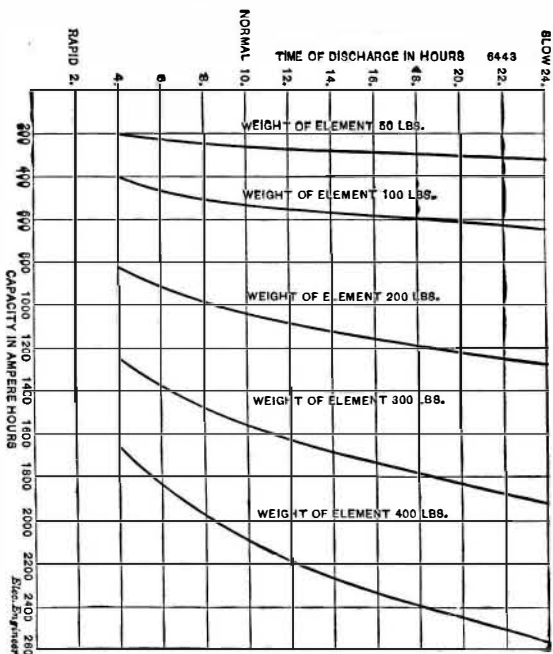


Fig. 3.—CURVES SHOWING CAPACITY OF PLATES.

as high as 210 ampere hours when discharged in four hours, which is six times its previous rate.

We understand that the largest storage batteries in the world are being made on this principle. As to the matter of durability, the manufacturers claim, and users testify, that this cell is practically indestructible. Further particulars regarding the chloride accumulator may be procured from the Electric Storage Battery Company, W. W. Gibbs president, Philadelphia, Pa.

**Physical and Chemical Ingredients of a Man.**

A notable object of interest is described as among the contents of the National Museum, Washington, showing the ingredients which go to make up the average man, weighing 154 pounds. A large glass jar holds the ninety-six pounds of water which his body contains, while in other receptacles are three pounds of "white of egg," a little less than ten pounds of pure

glue, thirty-four and one-half pounds of fat, eight and one-fourth pounds of phosphate of lime, one pound carbonate of lime, three ounces of sugar and starch, seven ounces fluoride of calcium, six ounces phosphate of magnesia and a little ordinary table salt. The same man is found to contain ninety-seven pounds of oxygen, fifteen pounds of hydrogen, three pounds and thirteen ounces of nitrogen, and the carbon in such an individual is represented by a foot cube of coal. A row of bottles contain the other elements going to make up the man; these being four ounces of chlorine, three and one-half ounces fluorine, eight ounces phosphorus, three and one-half ounces brimstone, two and one-half ounces each of sodium and potassium, one-tenth of an ounce of iron, two ounces magnesium, three pounds and three ounces of calcium.

**Lemons and Oranges.**

The Florida lemon season, which commenced early in September, is about ended. Only a small portion of the crop, estimated variously at from 25,000 to 50,000 boxes, came to this city. The percentage of handsome Florida oranges has been small, the bulk being rusty or "horny," and prices have been unsatisfactory to the growers. The average freight on a box of lemons from Florida to New York is fifty cents, while from Sicily the cost for transportation is but thirty-two cents, with duty amounting to as much more. The railroad charges from California on a similar package are eighty-seven and a half cents, but the crop in California is small, and as yet only specimen lemons have been seen here. Nearly three million boxes of lemons came into the United States from Mediterranean ports during last year. The lemon season with local dealers begins November 1, when the first new Sicily lemons are due, and continues the year through. While the over-importation of Mediterranean lemons last year has left a large supply of old stock on hand, there are just now no good lemons to be had here. During November of last year 120,000 boxes of new-crop Sicily lemons were sold in New York, but none have yet reached this port this season. The first cargo of Messina lemons is, however, expected daily, and another steamer, carrying above 20,000 boxes of the same high grade, is due in a few days. The crop of Florida oranges this season is the heaviest known, a conservative estimate being 4,500,000 boxes, while it is believed by other authorities that 5,000,000 boxes will go out of that State. The weather in Florida during the summer was highly favorable for the development of the fruit, and many young groves are coming into bearing for the first time. The fruit is ripening earlier than it has for several years past, and is reaching this city in heavy quantities, but prices are very low, due to decay caused by recent rains. Recently there arrived, besides large quantities of the fruit bound for other points, about 60,000 boxes, while but a few days previous 42,000 boxes were thrown on this market. The heaviest receivers are the Florida Fruit Exchange, who sell the product of above 8,000 growers at auction. An average price of recent sales is \$1.60, and this nets the grower but sixty-five cents a box on the tree, the return heretofore having been about a dollar a box. Since the middle of September 25,000 boxes of Florida oranges have been sent to England by the exchange, with generally satisfactory results.

**Legal Uses of Photography.**

The legal uses of photography were shown by the testimony of Mr. Spencer, the photographic expert of Washington C. H. The case was the famous Stubblefield-Munford controversy, which has been dragging through the courts of Fayette County for years. The litigation involves 1,500 acres of the finest farming land in Fayette County.

During Monroe's administration this tract was willed by one of the old Munfords to his five heirs, and the present suit was brought on the deed of sale signed by them. The Munford heirs deeded the land to Stubblefield, who afterward sold parts of it to different parties, who have had to pay twice for their land by decision of court.

The case the other day was an appeal asking a new trial in order that new evidence may be introduced. The new testimony is the photograph of the original deed of sale made by Mr. Spencer. All previous decisions have been made in favor of the Munford heirs on the ground that Anna Munford, one of the original five heirs, had never signed the deed to the Stubblefields.

The deed of sale, discolored and yellow with age, was taken to Mr. Spencer by the attorneys for the defendants. The closest examination failed to disclose any evidence of more than four signatures, and only the fact that the space for the fifth remained caused the attorneys to think that it had once existed.

Under the closest watch of the clerk of the court, who could not allow the original to leave his hands, Mr. Spencer photographed the deeds. On the plate he saw traces of the signature, and, on enlarging the negative ten times, the entire name was as plainly seen as when first written. The presiding judge was much in-

terested in Mr. Spencer's evidence, and left the bench that he might more closely examine the negatives.—*Cincinnati Tribune.*

**Recipe for the Attainment of Old Age.**

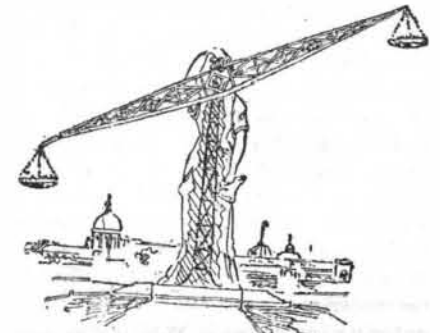
"The reason I have lived so long and kept always so well and hearty," said recently Miss Eliza Work, of Henrietta, N. Y., who will be 100 years old if she lives six weeks longer, "is because I never drank tea or coffee, and, above all, never got married."

Miss Work keeps house for her nephew, George W. Lincoln, and keeps no help. She was born at St. Johnsbury, Vt., on January 8, 1794, and came to Monroe County eighty years ago with her brother. At the age of 91 she traveled alone to her native place, and declares that she was not a bit tired, either going or returning.

"I have done a big day's work every day for more than ninety years," she says, "and I expect to do a great many more. I have never had occasion to use spectacles yet, and my teeth are the same teeth I have always had. My brother lived to be 101, and would have lived much longer if he had never married. He drank coffee and tea, too. People who marry and drink coffee and tea ought not to expect to live very long."

**A NOVELTY FOR THE MIDWINTER FAIR.**

Among the applications for permission to make novel exhibits at the coming midwinter fair in San Francisco is one by Edward M. Greene. It is a mammoth scales of Justice. The figure of Justice is 150 feet high. The cross beam of the scales she holds in her hand is 300 feet long. Each scale is a car capable of holding fifty people, who may be carried to a height of 288 feet. The whole arrangement is to be manipulated by machinery placed beneath the base of the



MAMMOTH FIGURE OF "JUSTICE."

statue. There is telephonic communication between each car and the engine room and everything may be regulated smoothly and quickly. The *Chronicle* thinks there is no doubt that the statue would make a unique display and might perhaps share the honors with the electric tower.

**The Search Light in Warfare.**

The Spanish cruisers Alfonso XII., Conde de Venadito and Melilla steamed on the night of November 13 near the Moorish encampment, not far from Melilla, and at about 11 o'clock suddenly illuminated the whole country around, taking the Moors by surprise and pouring shells upon them with unerring accuracy by the light of the powerful lamps. A terrible cannonade continued from the ships and the forts the remainder of the night, and according to the report many were killed. The lights seemed to have terrified the Rifians fully as much as the destruction that followed, for they offered no opposition, but ran about like madmen seeking shelter in caves.

**A Word to Mail Subscribers.**

At the end of every year a great many subscriptions to the various SCIENTIFIC AMERICAN publications expire.

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