

Scientific American.

ESTABLISHED 1845.

MUNN & CO., - - - EDITORS AND PROPRIETORS.

PUBLISHED WEEKLY AT

No. 361 BROADWAY, - - NEW YORK.

TERMS TO SUBSCRIBERS

One copy, one year, for the United States, Canada, or Mexico, \$3.00
 One copy, one year, to any foreign country, postage prepaid, £0 18s. 5d. 4.00

THE SCIENTIFIC AMERICAN PUBLICATIONS.

Scientific American (Established 1845).....\$3.00 a year.
 Scientific American Supplement (Established 1876)..... 3.00
 Scientific American Building Edition (Established 1885)..... 2.50
 Scientific American Export Edition (Established 1873)..... 3.00

The combined subscription rates and rates to foreign countries will be furnished upon application.

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MUNN & CO., 361 Broadway, corner Franklin Street, New York.

NEW YORK, SATURDAY, JULY 22, 1899.

FLOATING OF THE "PARIS."

In spite of the fact that she had lain for fifty-two days on the rocks of the stormy Cornish coast and had fallen into such an apparently hopeless plight that her owners had abandoned her to the underwriters, the "Paris" has surprised everybody, including the salvage crews who were at work upon her, by suddenly sliding free of the rocks that held her. It seems that a Danish and two German salvage vessels were slewing the "Paris" around in order to assist the divers, when it was found that the good old ship was afloat. She was at once moved for several hundred feet until clear of the rocks, and early the next day was towed into Falmouth Harbor. Here it was found that the damage is much less than was suspected, the cabled reports stating that the largest hole in her bottom is only about three feet square. The keel and forward half of the bottom, which rested upon the ledge, are, of course, badly dented; but the main structure of the vessel does not appear to be overstrained. That this great ship of over fifteen thousand tons displacement should have stood this extraordinary test so well is a tribute to Mr. Biles, her designer, and the Clyde yard in which she was constructed a dozen years ago.

COMPARATIVE OPERATING COST OF HORSE AND ELECTRIC DELIVERY WAGONS.

A paper of very timely interest was recently presented at the general meeting of the American Institute of Electrical Engineers, on the subject of the comparative operating costs of horse and electric delivery wagons in New York city. The investigation, which was carried on during the past year in the city of New York, formed part of a graduation thesis in the Electrical Engineering Department of Columbia University, and the authors, G. C. Sever and R. A. Fliess, are to be congratulated on the careful method adopted and the practical value of the results obtained.

The method pursued was to gather together carefully recorded data of the hours of service, loads carried, and cost of operation, of both the horse-drawn delivery wagons and those electrically-driven, which are now in service at some of the large department stores in New York city. The paper, which is published in full in the current issue of the SUPPLEMENT, will be found to contain, in addition to the valuable comparisons above mentioned, some very interesting information regarding the elaborate delivery service which is maintained by all of these large institutions. The nature of this delivery service necessitates a highly organized system of delivery by means of small units capable of carrying from 700 to 800 pounds over short distances, and at considerable speed. Some of the wagons make two and some three deliveries a day, and the average load the year around is not over 800 pounds. As the return journey is seldom made entirely empty, the average load carried throughout the trip is about 500 pounds. The mileage per wagon per day is remarkably constant, as determined by means of an odometer placed on the axle of one of the wagons. To determine the average speed, one of the authors of the paper spent a number of days on his wheel following delivery wagons of many different kinds. His wheel carried an accurately tested cyclometer and also a carefully tested tachometer. The drawbar pull of the wagon was determined by the use of a traction dynamometer. It was found that the average pull per ton was 60 pounds on cobblestones at a speed of 7 miles per hour, and at the same speed the drawbar pull on asphalt was 40 pounds per ton. The average weight of the wagon, with its load and the driver and boy, was 2,075 pounds. The tabulation of the data shows that the average speed, while in motion, was 6.7 miles per hour, and the actual time that the horse was working from the time he left the stable until he returned to it, was one hour and thirty-eight minutes. The horse was at rest for nearly two-thirds of the time occupied by each trip. Taking the drawbar pull at 50 pounds per ton, it was found that the horse exerted 0.89 of a theoretic

cal horse power for one hour and thirty-eight minutes. This was all the work done by this particular horse on this day. On the following day two trips were made over the same ground, and the average work per day, the year round, may be taken as not over 16½ miles at 50 pounds pull per ton, at a speed of 7 miles an hour. The length of the working life of a horse in this service is seldom over five years, and at the end of this time he has depreciated in value fifty per cent.

For comparative purposes the authors assume that the horse covers 21 miles a day in place of 16½ miles, and on this basis, taking into consideration the interest on the cost of horse and wagon, the stable rent for the same, the cost of driver and helper, etc., it was found that the cost of hauling one ton one mile was 17.373 cents. Taking another case where two horses are used to a delivery wagon, and three deliveries are made each day, the total distance covered being 42 miles, it was found that the cost under these highly favorable conditions per ton mile is 10.2 cents, the load in each case being taken to include the weight of wagon, driver, boy, and the freight carried.

The tests of electric delivery wagons were made over some 60 miles of the streets of New York, and included all conditions of weather and some of the heaviest grades in this city. The method of making the tests consisted in measuring the watt-hours of energy supplied by the storage batteries during the run and of taking the distance and speeds by tested cyclometers and tachometers. The first tests were made upon a vehicle intended for the delivery of light goods from a large drygoods store in New York city. A curious fact brought out in these tests is that the power consumption is not greatly affected by change of pavement, as from cobble stones to asphalt. The average of ten readings taken during a run of 13 miles in very bad weather gives the power consumed on asphalt pavement as, volts 85.3, amperes 23.1. In a run of 6.25 miles over a continually ascending route in which the total weight of wagon, passenger, etc., was 4,200 pounds the following results were shown: Average speed, 8.44 miles per hour; watt-hours per car mile, 218.28; watt-hours per ton mile, 103.95. Running in the opposite direction and with the grade the speed was 8.08 miles, the watt-hours per car mile 171.74, and per ton mile 81.08. From these and other tests it is deduced that 105 watt hours per ton mile is quite within the reach of actual practice under service conditions to-day, and under ordinary conditions a well designed electric delivery wagon should certainly not consume over 120 watt-hours per ton per mile.

On the above basis it is deduced that at a rate for power of 5 cents per k. w. hour, the total cost for 42 miles of one wagon, one driver, and one boy, including interest on wagon, interest on stable rent, etc., is 387.77 cents as against 428.54 cents for the horse-drawn vehicle with two horses as mentioned above. Hence the cost per pound of delivery is 0.017 cent less than the figures for the horse. But in connection with these figures it must be remembered that while the horse averages 21 miles per day at 7 miles per hour, the automobile covers 42 miles at the rate of 9 miles per hour. Hence the automobile can do the work of two horses in 1.34 hours less time with a saving of 40.75 cents per day on each 2,400 pounds of goods delivered.

THE WAGE OF ORIGINAL RESEARCH.

At first glance an announcement just issued by the United States Civil Service Commission appears to be of great interest to those of our young men trained in special scientific work, who very naturally look to the government as a principal employer of the scientifically educated.

On the recommendation of the Secretary of Agriculture the last Congress appropriated a lump sum to pay for the services of young men who might be appointed in the scientific division of the Agricultural Department, to be detailed at experiment stations. The Civil Service Commission was called upon to prepare an examination. As a result of the commission's labor the following has just been issued:

"The United States Civil Service Commission announces that it desires to establish an eligible register for the position of scientific aid, Department of Agriculture. The examination will consist of the subjects mentioned below, which will be valued as follows: College course, with bachelor's degree, 50; post-graduate course and special qualifications, 25; and thesis or other literature, 25.

"Applicants will be limited to graduates of colleges receiving the benefits of grants of land or money from the United States.

"Each applicant must file with United States Civil Service Commission, Washington, D. C., a properly certified statement as to the length of time spent in college, the studies pursued, the standing in these studies, the special work it is desired to take up, and the special qualifications for such work, and, finally, a thesis upon such special scientific subject as the applicant may select, or, in lieu of this, any literature on scientific subjects published over his own signature."

So far, so good; although it must be plain, to those

informed, that the selection of only those coming from institutions of learning that have called for or needed governmental subsidies will shut out many of the most capable young men from such an eligible list, as most of our great schools of science do not come within that category. However, this is not a matter of major importance, as the next two provisos in this most remarkable enactment completely shut out the very young men who, it is to be presumed, the government desires to employ in this scientific corps. These provisos read:

"The length of time any scientific aid may serve in the department is limited to two years.

"The salary shall not exceed \$40 per month."

The stupidity of the first of these provisos, perhaps, rather exceeds anything of the kind that has yet emanated from Congress. Why a man who is at all worthy of employment as an investigator in economic science should at the end of two years—just when he must, by all ordinary reasoning, be reaching a fair degree of usefulness in his special work—be set adrift to find a new occupation, or, at best, a new employer, only an American Congressman can explain.

Even this blunder could be forgiven to men who, as a rule, regard such offices as these as only so many voters placated, if the utterly indefensible salary of "forty dollars a month" did not reduce the whole matter to an absurdity.

After the ordinary common school education, with four years of collegiate training and, perhaps, a year or two more of special post-graduate study following, the young man who finds himself on this eligible list enters upon his duties at a wage one-third less than that given a street-car conductor and fifty per cent less than that paid a laborer or door tender in the department in which he will be employed. After much patient toil at work, and after four years of arduous study, he will find himself dictating the results of his researches to a stenographer, receiving a salary almost twice as large, although only four or five months of training were required to fit her for that position.

When he was last in this country, the late Prof. Huxley said in an interview that the thing that most impressed him in the scientific world, on this side of the Atlantic, was the great benefits that the United States had derived and were deriving from the researches of its scientific men and the very low estimate that this country placed upon the labors of those very men. He pointed out that many, in fact most, of our students in economic science at that time were men who as teachers, as lecturers, or as editors or authors, or in other fields of like exacting nature, were literally giving the products of their spare time to their fellow men for the love of science. He pointed out that, in a government like ours, it ought to be apparent to those who made the laws and held the national purse strings that no better investment of public funds could possibly be made than such as would look toward the encouragement and material support of the struggling student in science.

The life of the late Prof. C. V. Riley, long United States Entomologist, is a case in excellent point. Had Prof. Riley's salary been twice what it was, had it, in fact, been equal to that of a Congressman, and had he drawn it for every year of his life, the sum total would not nearly have equaled the value of the work he did, in the common interest, in the one field of grape culture and the introduction and propagation of *Vedalia cardinalis*. Yet that was but one of many lines of research, the valuable results of which Prof. Riley gladly and freely gave his fellow men the benefit of; and, thank good fortune and in spite of Congressional stupidity, the Rileys are still a goodly host in our scientific ranks.

A wage of nine dollars a week, with a two years' limit to the period of usefulness, is not the way to encourage original research and investigation, the benefits of which are to belong to the nation. An insect-spraying device, based on discoveries given by Riley to the agriculturists of this and other lands, is now bringing its "inventor" more per week than Congress considers the work of an investigator to be worth per month. The Biblical adage, "The laborer is worthy of his hire," is a true double entendre; he does, indeed, soon become worthy of it—and of no more! The man who finds that the government values his ultimate mental efforts in the public behalf at the per diem wage of a trench digger, if he be not one in ten thousand, is apt soon to agree with his employer and render him just the amount and sort of service paid for by that wage.

SPAIN SELLS CRUISERS.

At a recent meeting of the Cabinet Council of Spain, the Minister of Marine announced the sale of the Spanish cruisers "Patriota" and "Rapido" to the French transatlantic line and to a German steamship company. These vessels were formerly the "Columbia" and "Normannia," of the Hamburg-American line. They were purchased by Spain at the beginning of the late war and were converted into cruisers and renamed. They never took any active part in hostilities.