

Communications.

Our Washington Correspondence.

To the Editor of the Scientific American:

In reply to a request from the Committee on Patents as to what legislation was necessary to preserve the models saved from the fire, the Commissioner of Patents has sent a letter to that body, stating that he estimated that about one third of the 90,000 patented models that were in the fire were of metal, and that probably one third of these metal models were so little damaged that by cleaning, polishing, etc., they could still be made available for exhibition and for a fuller understanding of the invention when the drawings and specifications fail, as they often do, to throw sufficient light on the inventions they are supposed to describe. The amount requisite to clean, identify, and re-arrange these damaged models, including the cases to contain them, the Commissioner estimates at \$40,000. In addition to this he states that, besides the damage done by the fire, many thousand complicated models in the classes of sewing, spinning, and weaving, were drenched by water, and are rapidly corroding. Many of these will require taking to pieces, cleaning, and polishing, which the Commissioner thinks will cost about \$5,000 more, and therefore asks for an appropriation of \$45,000 for this purpose.

A bill has been introduced by Senator Windom to establish a Department of Commerce, essentially the same as that favored by the National Board of Trade, providing for the erection of a new department with secretary and assistant secretary, to be appointed and confirmed in the same manner as the other members of the cabinet, and to be charged with the supervision and care of the agricultural, commercial, manufacturing, and mining interest of the United States, so far as the national government is empowered by the Constitution. The new department is, if the bill becomes a law, to have charge of the execution of all laws relating to foreign and domestic commerce, customs, internal revenue, taxes, to navigation, lighthouses, rivers and harbors, and collect statistics relative to our agricultural, commercial, manufacturing, and mining interests and tabulate them.

Mr. Loring has introduced into the House a bill designed to aid in the establishment of additional telegraphic cables between this country and Europe, which proposes to give a liberal charter to a company said to be already organized, and ready to go to work as soon as they can obtain the charter. The company propose to run a line by way of the Azores, and offer to give the government the perpetual free use of the cable to an amount not exceeding the number of words which has been sent over the existing cables by the government in any one year. The bill provides, also, that in five years after the cables shall have been in working order, the rates shall be reduced to 20 cents per word, at the expiration of eight years to 17 cents, in twelve years to 13 cents, and after fifteen years to 10 cents. In return for these low rates, they ask for an exclusive right to land cables on our Atlantic coast.

A bill has been introduced by Mr. Paddock to authorize the appointment of a Committee on Forestry and Tree Planting, to examine and report upon the condition and management of the cultivated forests in Europe; the cost of growing, cultivating, and protecting the same; also the observed influence, if any, upon the climate and water supply of the country; and to examine and report upon the best varieties of trees to plant for the production of forests.

The manufacture of perfumery for exportation is becoming a large and growing interest, in which thousands of barrels of alcohol are used, but owing to a peculiarity of our revenue laws, nearly, if not quite all, of this is imported, because it can be withdrawn without the payment of duty. American alcohol cannot be used in this business without the payment of tax, and there is no provision of law which would authorize a drawback upon the exportation of such perfumery. There appears to be no good reason for this discrimination against our distillers; and the Commissioner of Internal Revenue, in his recent report, recommends appropriate legislation to allow alcohol to be used by manufacturing perfumers in the goods for exportation, without the payment of tax, under proper restrictions against fraud.

Captain Tyson, in command of the Florence of the Arctic expedition, has forwarded a letter by a returning Scotch whaler, to Captain Howgate, under date of September 29, reporting his safe arrival, after a long and tedious voyage of forty days, at Niuntlick harbor, Cumberland Gulf. The crew were all in good health and spirits, and Messrs. Sherman and Kumlein are reported as doing very well in their respective departments. Captain Tyson proposed moving to the head of the gulf in a few days, where he intended to establish winter quarters, and carry out his instruction in reference to the collection of materials for the main expedition of next year.

The Fish Commission are at work upon the head waters of the Potomac, stocking them with California salmon, 30,000 having been just shipped from the hatching house at Druid Hill Park, Baltimore, being the first shipment of a lot of about 200,000 eggs received about the 1st of October from Professor Baird's camp on the McCloud river, California. The prospect of thus successfully stocking the Potomac and other rivers appears very favorable, as the success of their introduction into the Delaware has been demonstrated beyond a doubt, several fish weighing from five to ten pounds having been taken in it, as the result of stocking that stream a year previous to the commencement of the

work on the Maryland rivers. About 200,000 more eggs are now on their way from the McCloud river, which will be hatched at Druid Hill Park, and distributed to the various rivers. The operations of the Commission in another direction during the summer have brought to light a fishing bank hitherto unknown, about fifteen miles from the mouth of Boston harbor, which is so rich in fish that upwards of 1,000 lbs were taken within half an hour by trolling, among which a splendid species of flounder, heretofore supposed to be peculiar to Greenland, was discovered. In the investigations in which this discovery was made, which are under the general direction of Professor Baird, assisted by Messrs. Verrill, Wilson, Goode, and Bean, observations are made as to the natural history and economical value of the marine animals of the coast, and as to the temperature of the water in different depths and localities. In some cases, at the depth of 100 hundred fathoms, the thermometer was found to stand at 30° Fah., or below the freezing point of fresh water, and yet these spots preëminently abounded in animal life, great quantities of fish being taken from them.

The Entomological Commission having, during the past season, accumulated a large mass of information regarding the locust and other similar insects, and the best means of preventing their ravages, will shortly present a report thereon to Congress, which, it is hoped, will be of great value to our western agriculturists.

Messrs. Scudder and Bowditch, who have, under the direction of Dr. Hayden, of the Geographical and Geological Survey, been making a tour through Colorado, Wyoming, and Utah, exploring for fossil insects, report that they have secured large numbers of specimens. Near Florisante, the tertiary basin was found exceedingly rich in insects and plants, and Mr. Scudder estimates that the extent of insect-bearing shales are at least fifty times as great as the rich one in Southern Bavaria. Upwards of 6,000 insects and 3,000 plants have already been received from Florisante, and as many more are expected before the close of the year. Besides these specimens, many more are to be received from Wyoming, as arrangements have been made to receive all the specimens found in a newly discovered rich deposit of fossils in the tertiary strata of that territory; and it is believed that, within the next few months, the amount of material at hand for the study of this subject will be greater than ever before possessed by any single naturalist. Professor Leidy, who has also been operating under the direction of Dr. Hayden in the neighborhood of Fort Bridger, Uintah Mountains, and the Salt Lake basin, has made a large collection, comprising the lowest and simplest forms of animal life, many of which require high microscopic power to distinguish their structure.

The House of Representatives having called upon the heads of departments to report what objections, if any, there were to making obligatory, in all government transactions, the use of the metric system of weights and measures, the Secretary of the Navy and the Postmaster General have sent replies, the first of which states that he sees no objection, except that in the matter of the soundings on the charts. "If it were applied to these, it would probably involve the total loss of all charts and chart plates now in use, and would be prejudicial to the exchange of charts with England." The Postmaster General states two objections, one of which is that the lack of knowledge and experience of the postmasters at the small offices and the public at large would render the system unsatisfactory in its workings, and the other is the expense attending the change, which would involve the purchase of 43,867 metric balances, which would probably cost \$124,788. This alleged necessity of changing the balances has called out the suggestion that, as 15 grammes have been made the lawful equivalent of the ½ ounce for postal purposes, all that is necessary is to increase the movable weight on the present balance to the amount of 5 $\frac{3}{5}$ per cent, and to add a smaller proportionate weight to the pan, which would render the present balances capable of weighing letters on the metric system: the notches which now indicate one, two, or more half ounce rates, would then indicate corresponding 15 gramme rates.

Washington, D. C.

OCCASIONAL.

The Standard of Metric Measurement.

To the Editor of the Scientific American:

Permit me through the columns of your valuable paper to correct an error quite prevalent in regard to the base of the "French Metric System." It is generally supposed that the meter is exactly the one ten millionth of the earth's quadrant, and consequently an absolute invariable unit, something in Nature which remains the same from age to age, and which if lost could be regained with exactness and certainty.

Can such a unit as above required be obtained for a reference by the means employed, and then re-obtained, should occasion require?

It was supposed in Newton's time that the earth was not a perfect sphere. Richer, who was sent by the Academy of Sciences, of Paris, to Cayenne in 1672, observed that the pendulum which vibrated seconds in Paris lost about 2 $\frac{1}{2}$ daily at Cayenne. This fact, as Newton explained in his "Principia," must be the consequence of the reduction of the force of gravity, either by effect of the centrifugal force or an increased distance from the center. The deductions of Newton and Huyghens that the earth was a spheroid, like that already observed of Jupiter, flattened at the poles, conflicting with the opposite conclusions of the first Cassini, induced the Academy of Sciences to cause exact measurements of meridional arcs to be made both near the equator and the

polar circle. The celebrated commission of the Academy of Sciences left Paris in 1735: Bouguer, La Condamine, and Godin to join in Peru the officers appointed by Spain, Antonio d'Ulloa and Jorge Juan; and Maupertuis, with four others, to proceed to the Gulf of Bothnia, where they were joined by the Swedish astronomer, Celsius. Ten years were spent by the party in Peru in the measurement of an arc of over three degrees in length, extending from latitude 2° 3' north to 3° 4' 32" south; and the length of a degree at the equator, reduced to the level of the sea, was calculated by Bouguer at 362,912 feet.

The northern party found a place for their operations between Tornea, in Lapland, and the mountain of Kittis. The difference of latitude being determined, they measured a base line upon the frozen rivers. The arc being then calculated, it was found to give about 367,500 feet as the length of one degree. The greater length of the degrees as they approached the poles was thus established, and consequently the greater equatorial than polar diameter of the earth.

In 1791 very extensive operations were commenced in France with the object of obtaining the exact length of the quadrant of the meridian, in order to make use of a definite part of this natural and permanent quantity as a standard unit. The measurements were carried out on the meridian of Paris under the distinguished astronomers, Delambre and Mechain. The line was extended across France from Dunkirk to Barcelona, making an arc of about 9°, and every precaution was taken to insure the greatest accuracy in the measurements. Though this arc thus determined was sufficient for the purpose required, the French astronomers in 1805, after an interval of three years, began to carry the measurement still further south, Biot and Arago directing the work after the death of Mechain. It was continued until Formentary was reached, distant about 12° 22' south from Dunkirk.

A similar anomaly was noticed upon some portions of this arc, and the same was observed in the English surveys, that where these portions were considered separately, the length of the degree appears to increase toward the equator. The effect is to produce an uncertainty in the exactness of the result obtained, showing that there must have been some error in the measurements of the meridian, as the true curvature of the earth has been established beyond a doubt, that it is an oblate spheroid, and that the length of a degree increases as we approach the poles.

In the deliberations of the members of the Academy of Arts and Sciences, at Paris, the length of the pendulum at first appeared proper for a basis for a system of weights and measures, being easy to determine, and consequently to verify, if it should be necessary, by any accidents happening to the standards; but it was thought that to take, as was proposed, for the unit of measure the length of the simple pendulum vibrating seconds, was to employ, in order to determine a measure of length, not only a heterogeneous element, namely, time, but also an arbitrary division of time, namely, the second. A measure of length was, therefore, preferred that did not depend on any other quantity; but it will be seen that observations of the pendulum can, nevertheless, be employed as a means of verifying, and even of finding, that unit of measure, although they have not served as the basis of its determination.

In short, as it has been found that the one ten-millionth of the earth's quadrant (or the meter) differed only from the length of the pendulum beating seconds at Paris about six millimeters, both units would have led to results almost exactly similar. But after years of troublesome experiment and trial of the metrical system, the only advantage that has been gained is that of establishing one common standard, the meter, and that has just now been shown is not correctly what it is intended to represent. If uniformity was the object sought it might just as well have been obtained by making their ancient toise (so universally known) the standard.

The chief recommendation of the metrical system, or of the meter, as stated in their decree, as well as the authors of the system, Brillat, Brisson, and Tarbe, is that should it be ever lost or altered it may be easily restored, not by a second measurement of the meridian, but by comparison with the pendulum. Thus they allowed the pendulum to be the regulator of linear measure as well as of time, and in short, the ultimate criterion, and of course the principal standard.

If before the meter was adopted as the standard, other meridians on different parts of the earth had been measured, as one in the United States, and a mean taken of the several, the results would have been more satisfactory.

In the astronomical calculations of the length of an arc of the meridian, base lines are used which must be measured by arbitrary means, whereas the length of the pendulum beating seconds at a given latitude of the sea level is a unit of itself, and the labor of re-obtaining it when lost, with certainty and exactness, is reduced comparatively to a minimum.

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Iron and Its Companions.

In the ordinary metallurgic products of iron a number of other metals may almost always be detected by analysis. Among the metals that accompany iron are manganese, nickel, cobalt, chromium—which metals are all likewise found in meteoric iron—also copper, vanadium, titanium, and tungsten. It is a curious fact that the spectrum of the sun indicates the presence of iron, together with all of the metals above named except tungsten and vanadium.