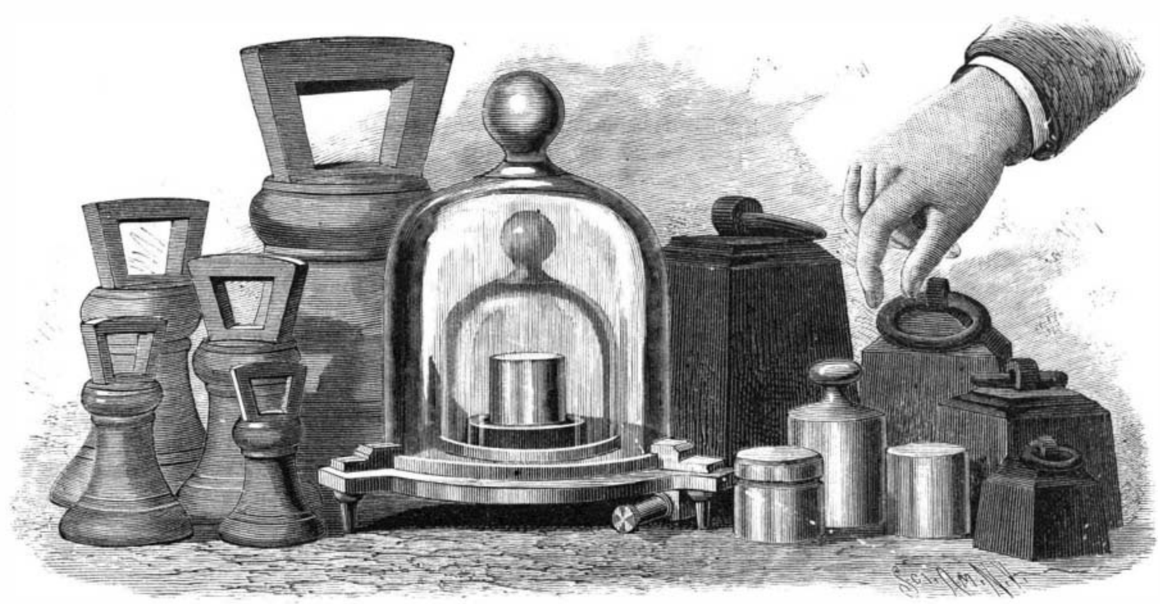
THE UNITED STATES COLLECTION OF STANDARD WEIGHTS AND MEASURES.

We illustrate in the present issue the collection of standard weights and measures, preserved at Washington, in the fireproof building of the United States Coast and Geodetic Survey. Many of these are now of purely historical interest, the more recent ones only being accepted as absolute standards.

The smaller cut is devoted to the collection of weights. Among these are shown the cruder forms of weights originally used in this country as standards. In the foreground of the picture, to the right of the glass case, are three which are of special interest. One which is nearly cylindrical in shape, with a slight groove around its upper portion, is known as the gilt pound, and represents the British unit of weight. Immediately back of it is the "committee kilogramme." It can be recognized by the knob on top. It is a brass weight, and is one of a number made at the same time under the charge of the French committee who, near the end of the last century, established the original metric standards of measurement. It was procured for Mr. F. R. Hassler by M. J. G. Tralles, early in the present century. M. Tralles certifies it to have been of true weight within one-half milligramme at the furthest. It is a cylinder 53 millimeters in diameter, the height being equal to the diameter. To the top of the knob it is 78 millimeters in height. The knob is 25 millimeters in diameter. The original committee had a peculiar stamp, which consisted of an ellipse supposed to represent a meridian section of the earth divided by two diameters into quadrants, three of which quadrants were shaded, while the figures 10,000,000 were marked within the unshaded quadrant near its outer perimeter. This, of course, is an allusion to the base of the metric system. This stamp is impressed upon the bottom of the kilogramme we have described. The metal of which it is composed seems to have been porous, as it shows minute holes and considerable oxidation. It is, of course, of great historical interest.

The third of this group of weights, a simple cylinder in shape, is known as the Arago platinum kilogramme. The Hon. Albert Gallatin when United States minister at Paris in 1821 procured this standard, together with the eminent physicist's certificate stating its exact relation to the French standard, the "Kilogramme des Archives." The letter accompanying it is dated Sept. 7, 1821.



COLLECTION OF STANDARD GOVERNMENT WEIGHTS.

It has had a number of comparisons. In 1879 it was compared with the British platinum kilogramme and its specific gravity was determined by Chaney. In June, 1884, it was taken to Paris and compared with the international standard, at the International Bureau of Weights and Measures, and was returned to the United States in the personal care of Dr. Thomas Craig, reaching the office on Sept. 3, 1884.

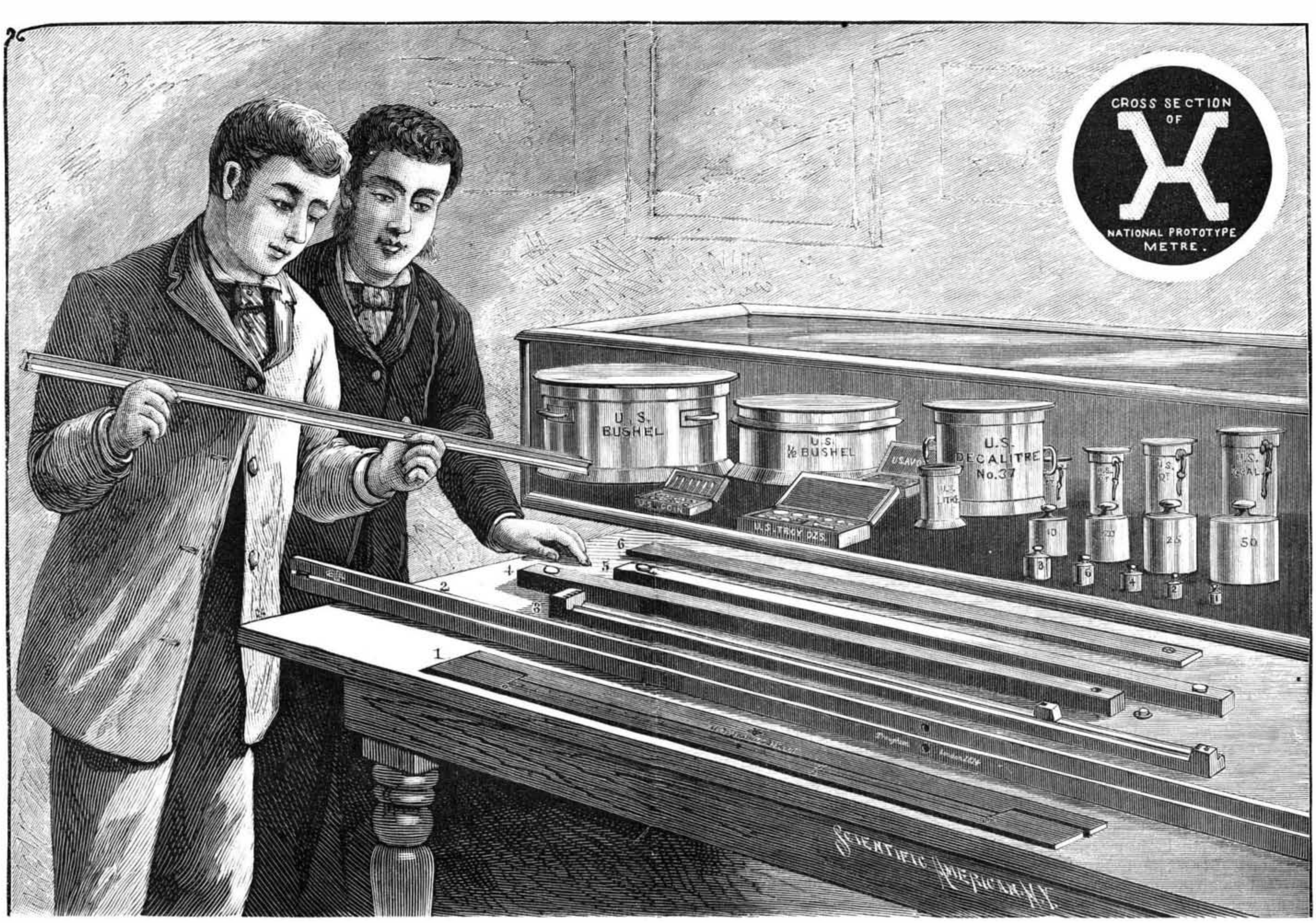
Under the glass shade in the center of the drawing is a representation of the national prototype kilogramme, No. 20. This represents a kilogramme constructed by the co-operation of the principal governments of the world. In 1870, under invitation of the French government, delegates of the leading nations met in Paris and were organized into an international commission for the construction of a new meter, as an international standard of length. Professors Henry and Hilgard acted as the United States delegates to this convention.

In 1872 a treaty was signed at Paris establishing the International Bureau of Weights and Measures, which is under the administrative direction of delegates from the countries concerned. A large number of learned men were employed to study the methods to carry out practically the theoretical requirements of the case. Eventually standard meters and standard kilogrammes were constructed, which are termed international prototypes, and reproductions were distributed by lot to the different governments in September, 1889. The reproductions are termed national prototypes and are numbered consecutively.

For the preservation of the original international prototypes a subterranean vault is provided at Paris. This secures them against accident and against any sudden or great change in temperature which might conceivably bring about a change in the molecular structure of the metal. In this vault they are kept under lock and key, three different keys being required to open the vault. The keys are in charge of three separate individuals. The American national prototypes will be preserved in Washington, with similar precautions to those just described in the case of the originals in Paris.

The prototype kilogrammes are made of a standard alloy of 90 per cent platinum and 10 per cent iridium, with a tolerance of 2 per cent either in excess or deficiency. The form of the kilogramme is a cylinder with slightly rounded edges, its height being equal to its diameter; its weight is referred to vacuo and it is practically an exact copy of the international prototype.

The national prototype meter, No. 27, is of the same alloy as that composing the prototype kilogramme just described. Its cross section, adapted to secure it against flexure and to allow of rapid accommodation to changing temperature, is shown in the corner of the



STANDARD AND HISTORICAL WEIGHTS AND MEASURES OF THE UNITED STATES GOVERNMENT.

large cut. The observers in the same cut are supposed to be holding a copy of it in their hands. The cross section is shown of the true size. The bar is 1·02 m. long. The meter is defined by lines drawn upon the upper surface of the portion connecting the side elements of the bar. It will be observed that the cross section is not symmetrical, and that the surface just referred to corresponds with the medial plane of the mass of metal.

Upon the table in the large cut are shown other standards of measurement. Fig. 1 is the U. S. standard yard, such as is supplied by the Federal government to the different States. It is an end measure and consists of the yard proper and of a template which nests into it so as to protect its terminal planes from deterioration.

Immediately back of it, and represented by Fig. 2, is what is known as the Troughton scale, made by a London maker, bearing his name and dated London, 1814. It was made for the use of the Coast Survey of the United States. It is a brass bar with an inlaid silver scale. It is 86 inches long, 2½ inches wide, ½ inch thick. The strip of silver which runs down its center is inlaid flush with the brass and is a little more than one-tenth of an inch wide. Two parallel lines are ruled upon the silver longitudinally, being about one-tenth of an inch apart. Starting at about 3·2 inches from one end of the bar, the graduations begin, and the silver strip is divided for its length into tenths of inches. As a standard of reference the interval between the 27th and 63d inches of that scale has been adopted. This portion, it is found, corresponds to the mean of the whole scale, and has been compared with other standards.

Fig. 3 in the same cut shows the yard and ell bed plate made by Thomas Jones, instrument maker for the Honorable Board of Ordnance, etc., of Great Britain. This bears the impression of the exchequer stamp. Two grooves run longitudinally along the bar, with stops at the ends. The length between one pair of stops is supposed to be a yard, and that between the other pair an ell. It was made in the early part of the present century.

Figs. 4 and 5 represent copies of the British standard yard, and are designated respectively bronze No. 11 and iron No. 57. They were presented to the United States by the British government through G. B. Airy, Esq., Astronomer Royal. They were received in 1856, and are accompanied by statements as to their length, coefficients of expansion and directions for use. Each bar is 1 inch square in section and 38 inches long. At each end are wells ½ inch in diameter and sunk ½ inch below the surface, thus reaching the medial plane. In the bottom of each well is a gold pin one-tenth of an inch in diameter, upon which are drawn three transverse and two longitudinal lines. The yard is given by the distance from the center of one middle transverse line in one well to the corresponding point in the other well. Covers are provided for the wells in order to protect them from dust. The alloy used in the bronze bar consists of 16 parts of copper, 2½ parts of tin and 1 part of zinc. The iron yard is made of Low Moor iron. They are inscribed in each case with the temperature at which they are supposed to be standard, 61·79° Fah. for the bronze bar, 62·58° Fah. for the iron bar.

Fig. 6 represents a committee meter standardized by the French committee in 1799. It is one of fifteen similar bars made at that time, and is an interesting reminiscence of the famous determination of the meter. It was presented to F. R. Hassler, already alluded to, who later became the first superintendent of the Coast Survey, by J. G. Tralles, of the Helvetic Republic. Mr. Hassler brought it to this country in 1805. It is a plain iron bar 29 mm. wide and 9 mm. thick. It is an end measure, the entire cross sections of the bar being designed for abutting surfaces. It is stamped with three dots as a designating mark, and also possesses the three-quarter shaded ellipse already described as the mark of the original committee.

In the glass case back of the linear standards are shown various standards of measure and weight, which speak for themselves. It is sufficient to say that the measures of capacity are fitted with glass plate covers. In use these are to be slid over the accurately ground edge of the metal so as to secure absolute fullness A set of United States coin weights, troy ounces, etc., are also preserved here. All these standards are kept in a room which is dark and dustless. The two prototype standards will be preserved in specially constructed safes.

Our thanks for the facilities afforded in the preparation of this article are especially due to Dr. T. C. Mendenhall, superintendent of the United States Coast and Geodetic Survey.

The ceremony of breaking the seals of the prototype meter No. 27 and kilogramme No. 20 took place at the White House in the presence of President Harrison, Secretary Blaine, Secretary Windom and a distinguished company, on January 2, 1890. The departments were represented by the following, who signed a memorial to the effect that they had witnessed the ceremony: Prof. T. C. Mendenhall, Superintendent United States Coast and Geodetic Survey; Prof. S. P. Langley, Secretary Smithsonian Institution; R. M. Hunt, Esq., President of American Institute of Architects; Col. Thos. L. Casey, Chief of Engineers U. S. Army; Capt. R. L. Phythian, U. S. Navy, Superintendent U. S. Naval Observatory; Wm. Henry Trescot, Esq., U. S. Delegate to International Congress of Three Americas; Oberlin Smith, Esq., President American Society of Mechanical Engineers, and many others, including members of Congress, professors, members of the Coast and Geodetic Survey, and members of engineering and scientific societies.

As Others See Us.

The visit of the Iron and Steel Institute to this country and the criticisms made by some of its members upon the management of our iron and steel works have called renewed attention to the differences between American and foreign engineering practice to which we have frequently referred.

The point of difference which is most observable is the rapidity with which all operations are conducted in America as compared with foreign iron and steel works. Here both men and machinery seem to be strained to the utmost in the effort to turn out the largest possible number of tons in a day. The energy of the American owners is concentrated on the saving in two great factors in production, the number of men employed and time. Wages are high, therefore the labor must be dispensed with wherever possible and automatic machinery substituted. Time is still more valuable, and none of it must be wasted. It appears to be as criminal for a machine or a furnace to stand idle as for a man.

In consequence of this hurry and rush in American works, other economies are apt to be neglected, and such neglect seemed to elicit criticisms from our English visitors which overbalanced their approbation of our skill in other directions. The waste of material was especially objected to. The amount of our crop ends in steel mills would not be allowed in any English works. Our steam engines were thought to be decidedly wasteful of steam, and our boilers not durable nor safe. Fuel economy, except in a few of the best managed works, seems a matter of no importance, and no attempt is made to save by-products of coke ovens as in Europe.

No doubt many of these criticisms are well deserved. Until the introduction of natural gas in Pittsburg, the waste of coal in the iron works of that city was simply scandalous. Scarcely a steam boiler could be found in the city in which the temperature of the chimney gases was not from 800° to 1,000° Fahr., and the puddling and heating furnaces were, with but few exceptions, of the old styles which seem to be especially calculated to utilize only five per cent of the fuel burned in them, and to waste the other 95 per cent. Steam engines also, except in recently built or remodeled works, were of the old fashioned, slow stroke, throttling and non-condensing styles, the retention of which in these days of compound condensing engines is a disgrace. Since natural gas has been introduced, its great abundance and cheapness have even served to retard improvements in steam plants in iron and steel works, but now that there are signs of the exhaustion or curtailment of the supply, and the price charged for its use is raised, there will likely be more attention paid to its economy.

In each of the cities which the foreign guests visited the daily papers showed their usual enterprise in printing interviews with some of the visitors, in which they were made to express unbounded astonishment and approbation of what they had witnessed in America; but to one who had traveled with them from place to place it was noticeable that the expressions of commendation were generally offset by criticisms. What nature had given to America, such as her climate, her scenery, her greatness of distances, her mineral and agricultural wealth, her natural gas, were extolled as they should be; but what man had done was usually but faintly praised. "Very clever! but I think our way is quite as good, if not better," was a common verdict. The large daily product of our blast furnaces was attributed to our excellent ores, and not to skill in management, and the short life of the furnaces was contrasted with the long life of foreign furnaces, to our detriment. Our rapid rail rolling was thought not to produce as good rails, and to be obtained with an excessive wear and tear of mill and driving of the men, which would not be submitted to in England. Even our newest machine works, such as the Westinghouse Air Brake Works, at Wilmerding, were found fault with as not being sufficiently lighted.

Much of the criticism was undoubtedly due to the mental habit of the Englishman—he is usually on the lookout for something to find fault with; but it is well for us to be criticised occasionally, as it may reveal to us shortcomings which we had not before suspected, and lead to improvements in our practices, even if it should necessitate the copying of some foreign ideas and methods. While we do lead the world in the output of our blast furnaces, converters and rail mills, there are many lessons we may yet learn from our transatlantic rivals.

It is a conspicuous fact, which was frequently brought out in addresses made at the meetings, that America is indebted to England for nearly all our iron and steel metallurgical methods, and while our iron and steel engineers have taken precedence in developing the mechanical engineering features of the works, they have not been noted as originators of new metallurgical processes. The names of Huntsman, Cort, Neilson, Heath, Mushet, Bessemer, Siemens and Thomas stand pre-eminent as English metallurgical discoverers, and no list of Americans can be named who can by any stretch of the imagination be compared with these as great originators and discoverers in iron and steel metallurgy. The one American engineer who by common consent is accorded the first rank among American steel works engineers, the late A. L. Holley, was strictly a mechanical engineer, and his work was in improving the methods of handling Bessemer steel and not in the process of making it. Of those who have brought our practice to its present stage of progress, such as the brothers Fritz, the two Joneses, Forsyth, Fry, and Hunt, there is not one who has contributed to it any original metallurgical idea. They have merely as mechanical engineers adopted the leading ideas of the foreign metallurgists, invented and improved machinery for carrying out these ideas, and have shown extraordinary skill as organizers of men and machinery in such a way as to turn out vast amounts of product.

The time has now come, however, when metallurgical discoveries ought to be as much expected here as in Europe. Many of our establishments are now on a solid basis, possessing great wealth, mechanical equipment which ought to be good enough for ten or twenty years without further improvement, excellent organization of both technical and managing staff, and finely equipped chemical laboratories. Some of these works should be able not only to develop students and discoverers, but to provide them with sufficient money for metallurgical experiments.

Another path in which the American works can now develop is in that of reducing wastes of fuel and of material. Now that mechanical engineering has developed machinery for handling to such an extent that the smallest possible amount of manual labor is required, the engineers might be allowed to take a rest in this direction and devote themselves to perfecting the steam boilers and engines and furnaces, with a view to saving fuel. The question of coking our poorer coals should be studied, and methods adopted of saving the valuable products now thrown away in the waste gases. The waste in crop ends, in scaling, in fluxing, etc., should also be studied, and remedied.

If the owners of our larger works would pay some attention to these questions, it would result before long in removing the reproach that we are behind Europe in these matters, and might in time enable Americans to point to a list of metallurgists who would rank with the English names above and with the list we already have of mechanical engineers.—*Engineering and Min. Jour.*

Destruction of American Forests.

At a recent meeting in Berlin of the Geographical Society, Chief Forest Master Kessler called attention to the extravagant waste of timber in the United States. Among other interesting details Mr. Kessler spoke of the tremendous destruction of forests in the United States during recent decades of years. Quoting from the tenth census, he stated that in 1880 the 25,708 saw mills then in operation converted $120,000,000 worth of raw timber stock into various kinds of lumber, and he asserted that at the same rate there would be no good-sized timber left in forty years. He spoke of the enormous waste of wood through forest fires, which are the result, for the most part, of carelessness or a desire to clear land for cultivation, and declared that the planting of new forests, which has of late years received some attention in the Eastern States, cannot begin to offset the waste of forests. He said that there is every reason to fear that America will soon be a country impoverished for tree property. Mr. Kessler made the striking comparison that, while the United States had but 11 per cent of its area covered by forests, the empire of Germany has 26 per cent of its entire area so covered. Mr. Kessler said that the reckless destruction of forest trees in America and the indifference manifested by Americans in the restoration of forests is a menace, not alone to the wealth of the nation, but threatens serious deterioration both to climatic conditions and the fertility of the soil.

"IT is not intellectual work that injures the brain," says the London *Hospital*, "but emotional excitement. Most men can stand the severest thought and study of which their brains are capable, and be none the worse for it, for neither thought nor study interferes with the recuperative influence of sleep. It is ambition, anxiety, and disappointment, the hopes and fears, the loves and hates of our lives, that wear out our nervous system and endanger the balance of the brain."

An Official Trial of the Philadelphia.

The new steel cruiser Philadelphia, bearing the blue pennant of Rear Admiral L. A. Kimberly, President of the National Board of Inspection, returned to New York, November 1, from a forty-eight hour trial at sea. The cruiser has been accepted by the government, but this final trial was prescribed in the builders' contract for the purpose of testing her seagoing qualities and discovering any latent weakness in construction. To remedy such possible defects, $35,000 has been retained by the government from the contract price.

The tests were in the main satisfactory, although the board finds room for improvement in numerous minor details, such as storage of boats, fitting of davits, etc. Three gun carriages were disabled. Owing to the foul condition of the cruiser's bottom, no trial of speed over the measured course was made.

It was the admiral's intention to take the vessel to sea immediately, and the necessary orders were issued. Before they could be carried into execution the English steamer Bremerhaven, of Liverpool, which had anchored in defiance of warnings that her berth was too close to allow her to swing clear, was swept by the current against the Philadelphia's port bow. The cable compressors were unlocked and a signal to back quick and hard was rung in the engine room. The engineer threw the throttles open, and the sudden rush of steam in the air-pump engine disabled that delicate and complicated piece of machinery. When the cruiser was backed out of danger an investigation of the damage showed that the bolts of the low-pressure crosshead of the starboard air-pump engine were broken, and that several hours' work was necessary to replace them; so departure was delayed. The forward torpedo port sustained some slight damage, and a strongback was broken. No other damage than this was done.

The broken machinery having been repaired early October 30, the steam capstan was put in motion, the anchor run up, and the cruiser headed seaward. The main ship channel was the route chosen, and while standing through it another mishap befell the Philadelphia, namely, a collision with the coal schooner Gower.

Captain Rodgers, on the bridge of the Philadelphia, set both engines full speed astern. The next moment the schooner struck the Philadelphia on the starboard side and ranged alongside. The latter was perfectly motionless at the moment of contact, and a few seconds later her powerful engines had gathered sternway, and the vessels cleared. The ease with which the magnificent cruiser was handled is the best criterion of her efficiency.

The Philadelphia was uninjured, and having ascertained that the schooner was in no need of assistance, proceeded on her course.

When well clear of the land a strong westerly wind rolled up a choppy sea, with an occasional heavy swell. Through it the cruiser steamed, pitching deeply at times. The roll of the ship was almost imperceptible. Her pitching tendencies are due to the extreme fineness of her lines. Her movements, however, were always steady and easy and without a tendency to throw a person off his feet.

At 10 A. M. the gun divisions were called to quarters. Two rounds at high elevation and extreme train forward and aft were fired from each gun of the main battery. The blast shattered the glass in the skylights and damaged two cutters. The deck and gun platforms stood the severe strain well, but defects developed in the carriages of three six-inch rifles which will probably disable them.

These guns are mounted on central pivot gravity return carriages designed by the Bureau of Ordnance and cast by the Standard Steel Works. Cracks appeared in the piston rod lugs of numbers 3 and 4 starboard and number 4 port. The cracks, known as "heat cracks" to foundrymen, seem to have been calked over and sal ammoniac rubbed in, which rusted the steel effectually and concealed the defects until the shock and strain of firing opened them. The carriages are cast in one piece, and it is difficult to see how the defects can be remedied. New carriages will, in all probability, have to be obtained.

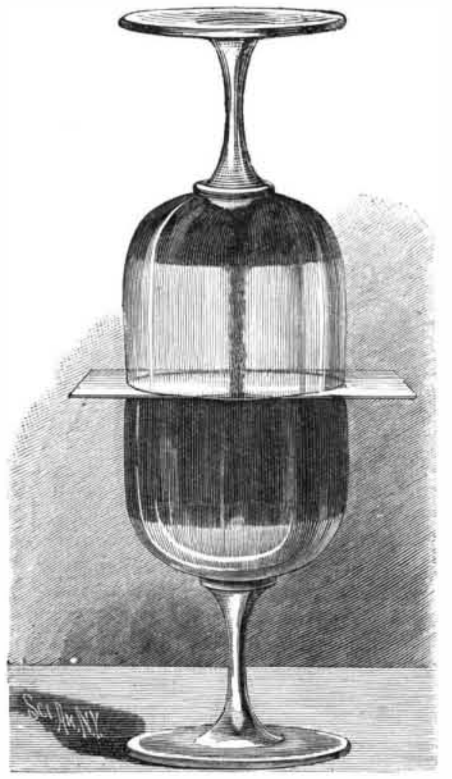
The speed and turning trials took place on the following day. Full steam power was used. With 123 pounds of steam and making ninety-five revolutions to the minute, the cruiser's helm was put hard to starboard. She described a circle in 6 minutes and 3 seconds. Under the same conditions with port helm the time was 5 minutes and 33 seconds. With starboard helm she heeled 3 deg., and with port 8 deg. The reason for this remarkable performance has yet to be explained. The severest test to which the cruiser was subjected was reversing the engine while running full speed. The peculiar type of her engines enabled the vessel to perform the test safely and successfully.

The time from going full speed ahead until headway was checked was 1 minute and 50 seconds. The cruiser's tactical diameter, which is the diameter of the circle in which she can turn, is 2,400 feet. With one propeller backing, the diameter is much less.

Associated with Admiral Kimberly on the Board were Capt. Henry Erben, Commander W. R. Bridgeman, Lieut.-Commander Hemphill, Lieut. L. C. Logan, Chief Engineer Buehler, Naval Constructor Hanscom, and Capt. Porter, of the Marine Corps.

AN INTERESTING EXPERIMENT.

A rather amusing trick can be performed at the dinner table with the aid of two wine glasses and a visiting card. Take two claret glasses of the same size, and fill one with claret quite to the brim, and the other with water. Cover the glass containing the water with the pasteboard card and then ask if any one at the table can transfer the claret into the glass containing the water without pouring out or spilling the liquid in either glass. At first it appears that this is quite impossible, but it may be easily accomplished by inverting the glass containing the water and placing it upon the other glass. After the edges of the two glasses have been brought opposite one another, the card is slipped carefully to one side so as to open a small communication between the two glasses; this done, there immediately begins an exchange of the liquids, and it is observed that the claret is flowing in a gentle stream into the upper glass, the water descending through the small opening and displacing the claret. The claret soon begins to spread out in an even body over the water contained in the upper glass. This process continues until there is a complete interchange of the two liquids. Of course the explanation is simple enough.



GRAVITATION OF LIQUIDS.

The water being a heavier liquid than the claret sinks into the lower glass, and the claret is forced up to fill the displacement of the water. It flows in a steady, clear-cut stream, and the effect as it rises through the water is very fine.

It is remarkable that in this experiment there is no observable intermixture of the liquids. The water contained in the lower glass after the experiment is quite clear and transparent. It is also curious that the water in the upper glass passes the space between the rims of the glasses, and enters the lower glass without any leakage whatever. This, however, is fully explained by the surface tension existing on the liquid at this point.

The card used in this experiment is about the thickness of an ordinary postal card. The experiment is easily performed and is worthy of trying. The upper glass containing the water may lifted and carried about while the card is attached, without holding it on with the hand, thus illustrating in a well-known way the effect of atmospheric pressure.

Aluminium—Grabau's Method.

BY M. JEHON.

This process is based upon the reduction, by sodium, of fluoride of aluminium, produced from the action of sulphate of alumina upon fluor spar and cryolite; but the latter mineral is only employed at the commencement of the operation, it being reproduced in large quantity in an artificial form, as a consequence of the reduction of the fluoride of aluminium, and of a much higher degree of purity than the natural mineral, which always contains spathic iron ore and quartz.

Production of Fluoride of Aluminium.—From ten to thirteen parts of sulphate of alumina, dissolved in water, is mixed with finely divided fluor spar, and heated to 60 deg. Centigrade for several hours, when a partial decomposition of the fluor spar takes place, giving sulphate of lime and aluminium fluoride. By repeating the operation several times, about 66 per cent of the sulphuric acid in the sulphate may be replaced by fluoride. It is more convenient, however, not to push the change beyond 55 per cent. The result is a solution of fluo-sulphate of alumina, $Al_2Fl_4SO_4$, which is filtered, freed from iron by prussiate of potash, and boiled down to the consistency of sirup. This is then mixed with finely ground cryolite to a stiff paste, giving when dried in a lead basin of 150 deg. C. a spongy mass, which is broken into pieces of the size of a walnut, and subjected to a dull red heat in a cast iron vessel in a muffle. This decomposes the remaining sulphate of ammonia, giving as a result pure fluoride of aluminium and sulphate of soda. The latter salt is washed out with boiling water, about 15 per cent of the former also going into the solution. The residue, or 85 per cent of the fluoride in the material treated, is pressed into cakes, dried, and broken up.

Reduction of Fluoride of Aluminium.—The reduction of the fluoride by sodium is performed in a cast iron vessel, whose diameter is equal to its height, lined with cryolite, either rammed, or preferably in the form of bricks, made coherent with a solution of common salt. The fluoride is heated to redness in an iron cylinder with a refractory lining free from iron and silicon, and having a cover at the top and a counterpoised drop bottom. The fluoride does not melt, and is but slightly volatile if kept well covered. The heated charge is dropped into the reducing pot, and immediately afterward an ingot of sodium, heated nearly to its melting point, is added, the whole being covered up by an asbestos cloth. The reaction is very violent; the charge boils, and often flame colored by sodium escapes from beneath the cover. When the proportions of sodium and aluminium fluoride are so chosen that only one-half of the latter is reduced, the remainder combines with the fluoride of sodium formed in the reduction and produces cryolite, which at the end of the operation is found as a well-melted mass, the temperature having risen to a red-white heat, having below it a lump of aluminium, covered with a thin adherent crust of cryolite. The cryolite so produced is much purer than the natural mineral, being perfectly free from iron and silicon, and in consequence the aluminium obtained is often very pure, assaying up to 99·77 per cent, according to the results obtained at the Ecole des Mines, Paris. The sodium used is obtained by a new method, which is only described in general terms, some details not being completely protected. It consists essentially in electrolyzing melted chloride of sodium in a crucible. One electrode is of carbon, and the other an iron wire. The latter plunges into the center of the crucible, and is covered by a bell of porcelain with hollow sides, and a central tubulure connected with the sodium condenser by an iron tube, which carries away the globules of sodium as they form and rise to the surface; the chlorine goes to the carbon electrode. The production of cryolite in this process is rather larger than the amount necessary for reduction, and therefore some surplus will remain for disposal. This may be used by glass makers. As compared with Deville's process, it is said to utilize the sodium more perfectly, from 83 to 90 per cent of the reducing effect being realized, as compared with 76 per cent.—*Annales des Mines.*

Nickel-in-the-Slot Hot Water.

In Paris they now have stands in the streets, a faucet projects from the structure, and under it is a place to set a pail. Near the faucet is a slot, large enough to admit a copper five centime piece, and beside the slot is a button. To use the apparatus, a pail is set in the appropriate place, a five centime piece, equivalent in size and value to the old-fashioned copper cent, is dropped into the slot, and the button is pushed; whereupon a jet of steaming hot water issues from the faucet, and runs until nine quarts have been delivered, when it stops. It may be imagined that in a district thickly settled with poor families, the cost of hot water so obtained is much less than it would be if a fire were kept in the cooking stove to heat it, and the housekeepers who would otherwise have to do their washing with cold water must bless the inventor. The apparatus has, however, another use. It is the custom in Paris for hackmen to keep "bouillottes," or cans of hot water, in their carriages in cold weather, to warm the feet of their patrons, and it is often troublesome and expensive for them to get the water renewed as it cools. By means of the new kiosks, the bouillottes may be replenished with the smallest trouble and expense, to the great benefit of the drivers. The interior of the kiosk is partly occupied by a coil of pipe, within which is a gas burner, for heating water rapidly. The coil communicates with the city water supply, so that the water drawn through is always fresh. The gas is not wasted by being kept burning all the time, but is lighted by the pressing of the button, which also opens the faucet, and the automatic closing of the faucet, and turning off the gas, after the pailful of water has been delivered, are effected by simple devices.

THE wholesale price of whalebone is now $10,000 a ton. A project is on foot to organize whaling expeditions from Australia to the Antarctic seas, where it is believed plenty of whales are to be found. It is an almost untouched whaling ground.