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.

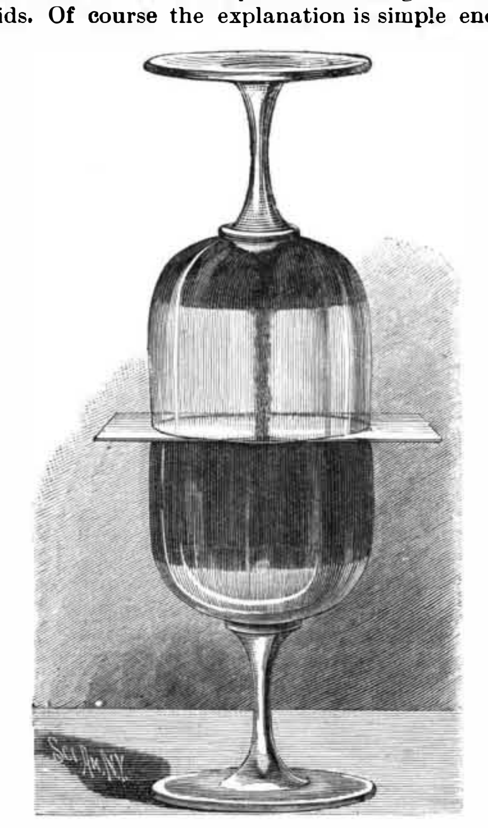
The speed and turning trials took place on the following day. Full steam power was used. With 123 pounds of steam and making ninety-five revolutions to the minute, the cruiser's helm was put hard to starboard. She described a circle in 6 minutes and 3 seconds. Under the same conditions with port helm 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.