termining the cause of this difference, he made a series of experiments on all the copper which had been used in her Majesty's dockyard. By steeping these different coppers in salt water for nine months, a series of actions set in, which, by subsequent weighing, were accurately determined. The following table exhibits the results of these experiments:—

	Grains.
Electrotype copper, loss per square inch,	1.40
Selected copper,	1.10
Copper containing phosphorus,	0.00
Copper from the "Florin,"	1.12
Dockyard copper, No. 1,	1.66
Ditto No. 2,	3.00
Ditto No. 3,	2.48
Ditto No. 4,	2.33
Muntz's metal,	0.95

Mr. Phillips inquired if the specimens were wholly exposed to the water, or were only partially exposed, so as to allow the action of air, as in the latter case the chloride of magnesium in sea water would give rise to the formation of an oxichloride, but which would not be formed if air were absent. Captain James said they had been wholly immersed.—*Proc. Brit. Assoc.*

*Method of Regulating the Flow of the Injection Water into the Condenser, applicable principally to Marine Engines. By G. J. CUNNACK.**

The injection water, as is at present the general practice, being allowed to flow into the condenser in an uninterrupted stream, and requiring the constant attention of the engineer, so as to proportion the quantity of injection to the bulk of steam proceeding from the engine, this latter must be subject to great variation, particularly in the case of marine engines when the paddles are exposed to a heavy sea, which at times almost brings them to a stand-still; and, as the injection water still flows, the air pumps become subjected to a severe strain resulting from the partial choking produced by the excess of water. On the other hand, should the speed of the engines become accelerated, and the injection remain unaltered, a loss of power must ensue from imperfect condensation.

The manner in which it is proposed to remedy these irregularities, is by causing the difference of pressure in the condenser to act on a throttle valve in the injection pipe, similar in construction and effect to the one in the steam pipe connected with the governor in land engines. A small cylinder of any requisite diameter, open at the bottom to the condenser, and at the top to the atmosphere, is fitted with a piston, the rod of which is connected by means of levers, on the one side with a balance or spring, and on the other with the governing lever of the throttle valve in the injection pipe. The lower end of the cylinder being open to the condenser, the piston will be subjected to the pressure arising from the vapor within it, this being usually computed at 5 lbs. per square inch; the atmosphere acting on the top of the piston with a force of 15 lbs. to the inch, would leave a force tending to depress it in the cylinder of 10 lbs. A weight, acting

* From the London Artizan, for December, 1849.

by means of the long lever, is so arranged as to compensate for this difference, and keep the piston in equilibrium so long as the pressure in the condenser remains at the proper point, namely, 5 lbs. to the square inch.

Supposing that, from an insufficient supply of injection water, this pressure should be exceeded, the piston will rise, and lifting with it the end of the lever connected with the throttle valve in the injection pipe, will increase the flow of water and produce the required effect of more perfectly condensing the exhaust steam. On the other hand, should the flow become too great, so as to carry the amount of rarefaction too far, the piston would be depressed from the preponderance of atmospheric pressure, and the action on the throttle valve would be reversed, so as to diminish the quantity of water flowing through it. The piston, not being exposed to the action of heat, can be easily kept air tight by a packing of soft leather, and, if necessary, a small quantity of oil kept on the top of it would be an additional security against leakage. There is a spring in the cylinder, to prevent the too sudden rise of the piston, and ensure its gradual action on the throttle valve of the injection pipe. The latter valve is supposed to be placed between the injection cock and the condenser.—*Proc. Roy. Cornw. Polyt. Soc.*

For the Journal of the Franklin Institute.

Performance of the Steam Ship "Philadelphia."

I send you the performance of this ship, as taken from her log-book, during her recent trip to Havana, via Charleston and Savannah. She left here on the 20th December, at noon, and made Cape Hatteras in 27 hours, with an average pressure of 16 lbs. of steam, cutting off at one-third; revolutions per minute, 15. After passing the Cape, the wind came ahead and soon increased to a gale of great force, and blew for 24 hours, when it gradually fell off. During the gale the engines were worked at full stroke, and the pressure kept at 15 lbs.—engines making 9 and 10 revolutions per minute. The severity of the gale may be imagined, when the distance of 70 miles was all that could be made in 22 hours. The wind continued ahead for the balance of the distance to Charleston,—time from dock to dock, 76 hours.

The ship remained at Charleston four days, being two days more than was intended. This was found necessary, as the pipes to the brine pumps, and also the blow-off pipes from the boilers, were known to be partially obstructed; and, on examination, small pieces of wood and other refuse matter (which must have been left in the boilers) were found and taken out. She left Charleston on Friday, the 28th, and Savannah on the 29th, for Havana, and the run from port to port was made in 69 hours. Several hours were lost on this passage from keeping too far out from the shore, and thus having a portion of the Gulf Stream to contend with; still, as this was the first trip, it was perhaps more prudent to do so.

She remained at Havana until the 10th of January, and while there took on board 50 tons of Scotch bituminous coal. On the return trip to Savannah, it was found that it required $1\frac{2}{3}$ tons of that coal to give the same effect as 1 ton of anthracite coal, her usual consumption being 1 ton of the