GOVERNORS FOR MARINE ENGINES.

So far as we know, the importance of providing a governor for steamships was first prominently brought before the public through our columns several years ago; and since that period, Silver's and other marine governors have been invented. Although these things are facts, and the necessity of such a steam regulator for paddle-wheel vessels is universally admitted, yet such a contrivance is almost unknown, so far as its application is concerned. In view of this, we embrace the opportunity of giving the substance of a paper on such governors, lately read before the Institution of Engineers in London, by Peter Jensen, of Sweden, and published in *Newton's Journal*:—

The engines in very large screw steamers, with deep draught, are considered to work with sufficient regularity even in a gale, as the size and weight of a ship, to a great extent, prevent it from pitching; and for this reason no great difference in the depth of immersion of the screw takes place; but, except in the above case, serious irregularity is experienced in the working of marine engines in a heavy sea, when the screw or the paddle-wheels are deeply immersed and the next moment revolving half or more in the air. A waste of power then occurs; it is at that time wasted in driving the screw of the paddle-wheels with great speed in a little draught of water, and a great amount of slip or loss in the effective speed of the vessel consequently ensues. In applying a governor to marine engines, economy of power must result, as in the case of stationary engines. Moreover, most of the accidents occurring to marine engines are due to the sudden shocks that will happen during a gale, even in well-balanced engines. The lubrication is also often rendered difficult, because the oil is thrown out of the cups; and the great amount of wear and tear in marine engines may be attributed partly to the shocks and irregular motion, and partly to imperfect lubrication.

Marine engine-governors have been attempted on several occasions, but only very few are yet applied. An ingenious modification of the ordinary Watt's centrifugal governor has been employed for this purpose—Silver's four-ball governor (illustrated on page 356, Vol. XI., SCIENTIFIC AMERICAN), in which the action of a spiral spring is substituted for that of gravity, and the whole apparatus is balanced so as to remain undisturbed in action during the pitching of the vessel. But the mode of action of all such governors is, by checking the supply of steam, to control the speed of the engine *after* it has begun to change either to quicker or slower; and it has appeared to the inventor of the governor forming the subject of the present paper, that the principle desideratum in a good engine-governor is an instantaneous action, so that whenever the screw or the paddle-wheels are going down in the water, more steam may be admitted to the engines as quickly as possible, and in the opposite case the admission of steam may be as quickly checked, before the speed of the engines has been sensibly affected.

The construction of the new marine engine-governor is as follows:—A cylinder is placed at each inner side of the vessel below the water line; the bottom of the cylinders communicating with the water outside by means of valves. Each cylinder is fitted with a piston, which is loaded with a spring, either of steel, compressed air, or india-rubber. The piston rods act upon bell-crank levers, which, by means of connecting rods, give motion to a common spindle from which the throttle-valves of the engines are worked. When, therefore, the pistons go down, the throttle-valves are closing; and when the pistons go up, the valves are opening. Now, as the pressure of the external water increases in proportion to the depth, when the opening of the valves come into different depths in consequence of the pitching or rolling of the vessel, the pressure on the pistons will be changed proportionately; and to each pressure will correspond a certain position of the pistons and of the throttle-valves connected with them. Omitting the pitching of the vessel in a paddle-wheel steamer, and considering only the rolling motion, when one paddle-wheel is deeply immersed and the other nearly or entirely out of the water, the pressure on the two pistons will be different: but supposing them connected together, the position of both, and of the throttle-valves, will be then corresponding to the difference of resistance on the two paddle-wheels.

If these cylinders are placed as near to the propeller as convenient, so as to insure pretty nearly the same depth of immersion, this apparatus will then act as a governor for the engines; for when the propeller is revolving in a light draught of water, the supply of steam to the engine is proportionately diminished; and when revolving in deep water, the supply of steam to the engine is proportionately diminished; and when revolving in deep water, the supply of steam is proportionately increased.

In a discussion which followed the reading of this paper, Mr. W. Smith thought it was very desirable for attention to be drawn to the great importance of having such a governor generally employed in marine engines, for controlling their speed in rough weather; he considered an efficient governor was even more necessary for marine engines than for land engines, for not only were marine engines subject to more sudden shocks, but there were abundant facilities for repair on land, while at sea any accident to machinery was of much more serious consequence, involving the risk of disabling the vessel. He thought the governor described would be very serviceable if properly applied, and in the best situation. Another governor had also been recently designed for the same purpose, similar in many respects to the one now described, consisting of a long vertical cylinder fixed in the after part of the vessel near the propeller, having the piston connected to the throttle-valve by levers, and adjusted to the draught of water, with springs to give a quicker action; and for paddle-wheel steamers, two of these cylinders were proposed to be employed, and to act separately on the throttle-valve. He understood this governor had been tried in one of the Glasgow and Philadelphia steamers; but it did not appear to have been very successful in working, and had therefore been removed.

The governor described in the paper was not required in still weather, when the work upon the engine was nearly uniform, as the ordinary governor was then sufficient for regulating the speed; but a separate special governor might be desirable in stormy weather, to avoid the objectionable necessity of a man standing by the throttle-valve to ease the engine instantly when beginning to run off. Several plans had been proposed for that purpose at different times, in one of which a pendulum weight was employed in connection with the throttle-valve, to regulate the admission of steam according to the rolling motion of the vessel.

Mr. Jensen said he had long had this plan of governor under consideration, and, on coming over to England, expected to find some such contrivance already in use for regulating the speed of the engine in stormy weather; but on making inquiries on the subject, he could not learn that such a governor had ever been tried, and was therefore induced to bring it forward, as something of the kind was evidently much needed in a rough sea.

A HUMBOLDT INSTITUTE.

Immediately after Humboldt's death a meeting of ministers of state, foreign ambassadors and men of science and of business, was held in Berlin, in order to determine in what way they might best testify their respect for his memory. It was unanimously deemed best that Humboldt's monument should be one which might exert a living, active influence, by promoting the advancement of the sciences, and especially those in which he took particular interest. It was decided to inaugurate a movement which should not be limited to his own city or nation, but which, extending beyond the boundaries of Prussia, of Germany and of Europe, should be shared in by the whole civilized world. A committee of nineteen was appointed to carry out these views, and has issued a public address, inviting contributions for the foundation of an institution dedicated to Humboldt's memory, bearing his name, and devoted to the furtherance of the sciences in whose field he most labored—especially to natural history and geography in its widest sense.

The plan contemplates the equipment of able men for special researches and explorations, the immediate selection to be made by the Royal Academy of Sciences at Berlin. It is intended that the funds shall be employed to enable men of known ability to prosecute special researches attended with expenses beyond their means.

Contributions will be received and transmitted by Dr. Jacob Bigelow, President American Academy in Boston, and by Professor Louis Agassiz, or Dr. B. A. Gould, Jr., in Cambridge, Mass.

PROPERTIES CHARACTERIZING STEEL.

The distinction between iron and steel, notwithstanding the present advanced state of chemistry, is not very clearly understood. We know only that steel is a particular modification of iron—that it is a compound of carbon and iron in an intermediate state between that of malleable and pig-iron; but in what respect the carbon it receives makes such a marked difference in the character of the two materials is certainly not so well understood. Pure iron, indeed, is considered to be wholly divested of carbon; but it is not likely that such a piece of iron, in a solid bar, was ever produced; so that all malleable iron, in some measure, partakes of the property of steel. The increase in weight which the bars of iron receive in their conversion to steel have been stated to be from four to twelve ounces per hundred-weight, but this proportion does not agree with other estimates. Should the process be pushed much further than this, the steel would melt, and, in the act of fusion, would take an additional dose of carbon sufficient to bring it to the state of No. 1 pig-iron.

The pecular property of steel, which renders it so valuable in the arts, is that it may be made extremely hard, or tempered to any degree between extreme hardness and the total absence of that property. These different states are produced by raising the temperature of the steel to a certain point, and then suddenly immersing it in cold water or some other fluid. This property renders it extremely useful in the formation of various cutting tools, springs, &c. When very hard it is brittle, resists the file, yields sparks in collision with flint, and retains magnetism for a long time. Its hardness and temper are destroyed by heating to redness, and leaving it to cool gradually. It is malleable at a red heat, is less so at a white heat; and if exposed to a higher degree of temperature it is fused, and returns again to the state of pig-iron.

DYEING HATS AND FEATHERS.

To Dye Straw Bonnets Black.—Suppose there are two bonnets to dye, one leghorn and one straw. Put an ounce of sulphate of iron into a vessel with two gallons of water; make the liquor boil; then put in the bonnets, and let them boil for one hour. Then take out the bonnets, and hang them on a peg to dry. When dry, rince them in cold water. This portion of the process of dyeing is called mordanting, the liquor being termed the mordant. After the bonnets are thus mordanted, the mordant must be poured out of the boiling vessel, and two gallons of clean water made to boil in its place; into that liquor put half a pound of gall nuts (broken) and half a pound of logwood, together with the bonnets, and allow the whole again to boil for one hour. Then take them out of the hot liquor, and hang them to dry as before, when they will be of dusky brown-black color. Chip bonnets as a rule do not require so long as straw, because the chip takes the dye easier. The final process is to size or stiffen the bonnets, and put them into shape. This operation requires two ounces of best glue, put into two quarts of cold water overnight, and next day completely dissolved by boiling. When the glue is melted, strain the liquor (then called size) into an earthen vessel. Into this put the bonnets one at a time, till thoroughly soaked. When the bonnets are taken out of the liquor all superfluous size must be sponged off. They are then brought into shape as they get gradually dry, or they may be dried on a block. After this sizing process the color of the dye is improved, and becomes black as jet.

To Clean and Re-Dip Black Feathers.—Feathers that have become rusty in color may thus be restored: First, well wash the feathers in soap and water, using the best mottled soap, and the water scalding hot for the purpose; then thoroughly rinse them in clean water and dry them. Next, take half an ounce of logwood, and boil in a quart of water. When scalding hot, put in the feathers, and there let them remain till the liquor is cold, after which rinse them in cold clean water, and put them to dry. Finally, rub or brush over the feathers the smallest portion of oil, which simple operation brings out the glistening jet appearance in a remarkable manner. If you draw a long strip of paper between the thumb and a blunt pen-knife blade, the paper will curl up. Feathers may be treated in the same way, using only such tender care as may be expected to be required in "touching a feather."

SEPTIMUS PIESSE.