Correspondence.

The Armament of Our New Battleships and Cruisers.

To the Editor of the SCIENTIFIC AMERICAN :

Those of your readers who, like myself, are interested in naval matters would, I think, be glad to find in your columns an expression of your views on the armament of our new armored cruisers and battleships.

That of the cruisers, as given in your issue of August 11, at page 90, viz., four 8-inch guns and fourteen 5-inch, would seem to be rather feeble for vessels of 13,500 tons displacement.

So many vessels of the armored cruiser class are now built with ample protection of 6-inch Krupp armor, against which the 5-inch gun is quite ineffectual and which even the 6-inch is powerless to penetrate at the ranges which would obtain in action, that the sole reliance of these cruisers for inflicting material injury on vessels of their own class must be upon their 8-inch guns, and of these they are to carry but four, while the "New York," if my memory serves me, carries six and the "Brooklyn" eight, and their displacement is about 4,000 tons less than that of the new cruisers. A recent design for armored cruisers for the Italian Navy calls for a vessel of 20 knots speed, 8,000 tons displacement, well protected with 6-inch Terni armor and carrying twelve 8-inch guns, eight of which can be brought to bear on either beam and six ahead and astern.

Such a vessel would seem to be more than a match for our new cruisers, and I am eager to know what reason exists for giving ours such inferior offensive power in spite of their greater size.

It may be, however, that in giving in your issue of August 11, the armament proposed for the cruisers of 13,500 tons, that for those of 8,000 tons, authorized by the same act, has been given.

Even should this prove to be the case, we would still seem to have designed a much less powerful vessel than the Italian design of the same displacement.

A similar criticism, viz., that of carrying too few 8-inch guns, may be made on the battleships of the "Georgia" class.

Apparently (SCIENTIFIC AMERICAN, July 28, 1900) they are, like the "Kearsarge" and "Kentucky," to carry but four 8-inch guns, while the "Rhode Island" and "Virginia," on the same displacement, carry eight, the armament in all other respects being the same, with the exception that the "Rhode Island" and "Virginia" have two less 6-inch guns than the "Georgias."

One is forced to ask what advantages the "Georgias" possess to compensate for their inferior armament, for inferior it certainly is.

I hope that you may deem these matters of sufficient interest and importance to justify an expression of opinion thereon on the part of the SCIENTIFIC AMERICAN.

EDMUND M. PARKER.

Peterboro, N. H.

Air Resistance to Moving Bodies.

To the Editor of the SCIENTIFIC AMERICAN :

The experimentalists who have preceded Mr. Adams in the field of air resistance to fast railway trains, have shown, so far as we are able to judge, from the data which they have placed at our disposal, that the cone-shaped body of air, which is swept along in front of the locomotive, is quite as efficient as any substitute that they are able to devise for the reduction of frontal air resistance to the passage of the train. If they could have first satisfied themselves that nature offers this assistance to the solution of the problem of fast transportation, it is probable that, like Mr. Adams, they would have at once abandoned this part of the experiment, and confined their investigations to the determination of the extent of the frictional resistance against the larger surfaces of the following train. Nature's "air-splitter" adds nothing to the weight of the train, and also reduces friction to the minimum.

The writer has endeavored to show, in previous articles, that the minimum of frictional resistance is also attained by the envelop of air that accompanies the entire train; that this envelop of practically conjectural air will always be present, however smooth the walls of the train, or regular and unbroken their contour; and that all attempts to attain a lower resistance will necessarily fail, because there is no available material for the construction of housings that will take the place of the light and volatile substance that Nature supplies and adjusts to the best possible advantage.

If railway trains were constructed with wide extending projections, of large frontal areas, so that the volume of air-displacement would be materially increased, there evidently would be something to be gained by their removal; but as this is not the case, it is probable that Mr. Adams' train, like every other, carries with it, in still weather, a large body of air, extending many feet on either side of the road-bed.

A light breeze is sufficient to remove the greater part of this body of air from the windward side of the train; but on the leeward side it is somewhat extended thereby. It has also been observed that the column of moving air is much deeper toward the rear of the train, so that if we suppose the entire volume disturbed to be made visible, it would present the spectacle of an enormous wedge-shaped body, accompanying the train at varying velocities, trailing its outer strata along the roadside, and pressing the swiftly moving currents nearest the train into the partially rarefied column that follows in the rear. After the train has rounded a sharp curve, the inertia of the air currents carries them a considerable distance, on the convex side, in a line tangent to the curve, and the train proceeds several hundred yards before an equal body of air is collected. It would seem, at first sight, that the accumulation and disbursement of such large volumes of air should make a serious draught on the power of the engine, but that such an assumption is unwarranted is shown by the fact that, among others of similar import, the slightest breeze, blowing at any angle across the track, is sufficient to reduce them, on the windward side, to a depth too shallow to be safely observed from the roadside.

A steam or sailing ship passes through a medium many times heavier, with relation to bulk, than itself, which is quite the reverse of a railway train, and the work of overcoming the inertia of the water, which is forced into currents of varying directions and velocities, is, therefore, only superficially analogous to that of a train and its relation to air resistance. It is easy to understand how a yacht's speed may be accelerated by a correctly drawn contour; but it is doubtful if the advantages of a burnished surface below the water line, if at all appreciable, have ever been accurately determined. If a film of water, however thin, clings to the walls, the work expended in polishing their surfaces has surely failed of the intended result. The fast ship drives the water, owing to its inertia and interchangeability, in almost all directions; the fast train, when passing through an equally still medium, owing to its slight inertia, draws with it an enormous body of air.

A speed of twenty-five or thirty miles an hour is very readily attained, by properly proportioned passenger trains, for the reason that within these limits the horse power of the engine increases with enormous rapidity, and, with late cut-offs, the limit of the boiler's capacity is soon reached. At fifty miles an hour, with average sized driving wheels, the best ranges of expansion are necessitated, and the utmost power of the engine is usually attained, owing largely, at higher speeds, to well-known difficulties of admission, compression and exhaust. Nevertheless, it is a well established fact, that on level roads, without any substantial increase in power, and at very high velocities in spite of serious reductions in effective cylinder pressures, speeds of eighty, ninety, and even one hundred miles an hour are still possible. As every ounce of train resistance, whether atmospheric or frictional, is measured with unerring accuracy, by the horse power developed, and, as the maximum power cannot be maintained at these excessive speeds, it follows that the total train resistance must then be correspondingly reduced, and especially as the work of speed acceleration must also be taken into account. There is a very promising field for scientific research in this connection, and it is safe to say that the elucidation of these remarkable facts will not be favorable to the commonly accepted theories of air resistance.

W. F. CLEVELAND.

Moncton, N. B., Canada.

A Powerful Developer.

The following developer is recommended by Mr. A. L. Henderson, of the London and Provincial Photographic Association :

NO. 1.

Hydroquinone	120 grains.
Metol	40 "
Adurol	40 "
Water	27 ounces.

NO. 2.

Sodium sulphite	2 ounces.
Sodium hydrate	60 grains.
Potassium carbonate	60 "
Water	27 ounces.

Equal parts of each to be used.

Restrainer :—Potassium cyanide, 20 grains to 1 ounce of water, and of which 1 ounce could be mixed with every 4 ounces of developer.

The developer may be made up in two parts, one without the restrainer and another with. If the image flashes up too quickly in the former, the plate should be at once transferred to the restrainer solution.

In this, instead of the shadows fogging over as usual, they will remain perfectly clear, resulting in a complete graduated negative. He considers this restrainer much better than the usual bromide.

THE indigo production in Java is rapidly falling off. Many of the planters are growing tobacco instead. The artificial product is steadily displacing it. A new process is being used, however, which permits of obtaining a higher percentage of coloring matter from the leaf and also produces a purer indigo.

Engineering Notes.

The British Admiralty are introducing a new weapon into the English Navy. It is a modification of the Hotchkiss, but instead of being quick-firing the breech mechanism is self-feeding and automatic. The gun throws a 3-pound shell at the rate of 400 rounds per minute. It will probably be officially designated as the 3-pound automatic gun.

Field Marshal Count Von Waldersee, who is to take command of the allied forces in China, has taken with him to the scene of operations a portable asbestos house, which has been placed at his disposal by the German government. The house is packed in sections, ready for immediate erection, and when set up provides seven large and comfortably appointed rooms. The material of which the structure is manufactured is called "asbestos slate." It is proof against fire and water, is as hard as slate, and yet can be nailed and planed like a piece of wood. The substance is very light and is an excellent insulating material against heat and cold.

For several years scientists and chemists have been conducting experiments and researches, with a view to discover a means of utilizing immense heaps of spent sand and glass, discarded as refuse by the plate glass manufacturers. Messrs. Pilkington Brothers, who are probably the largest glass manufacturers in Great Britain, have an accumulation of 1,500,000 tons of this residue at their works at St. Helen, in Lancashire, and over 1,200 tons are added to this huge pile every week. The question of the profitable disposal of this waste has long occupied their serious attention. Dr. Ormondy, however, has discovered a means of converting this refuse into serviceable bricks. He has subjected some of the bricks that he manufactured from this material to very severe tests. The experiments have been eminently successful, and bricks manufactured from this waste will soon be placed upon the market. The process is said to be economical and cheap. The bricks are said to be of the highest quality, and particularly adapted to special operations, besides ordinary building purposes, for which bricks have not hitherto been proved serviceable.

In the construction of the new bridge spanning the River Thames at London a curious difficulty has arisen. When the contractors submitted their tender to the London County Council, it was expected by both parties that it would be possible to build the Westminster abutment upon the blue clay. Operations have disclosed the fact, however, that no blue clay exists at that particular spot, and examinations of the abutment of the old bridge which the present structure will replace have revealed the fact that the abutment in this case did not rest upon the blue clay either, as was at first supposed, but rested upon an abutment of timber. To excavate down to the blue clay would entail such an enormous expense that it has been decided to follow the plan adopted in the construction of the old bridge to build the abutment on piles. Consequently several hundred piles have been driven into the blue clay surmounted by a thick layer of concrete with big blocks of stone embedded. This unlooked-for development has considerably retarded the progress of operations, but now the work of the erection of the piers is in full swing. Owing to the exceptional strength of the tide at this point the work is rendered somewhat difficult. When completed the bridge will be 80 feet in width and will be ornamented only in a sufficient degree to make it harmonize with modern ideas. The bridge is not merely an ornament, but is to be of use.

Engineers cannot fail to be interested in the paper read by Dr. Goldschmidt, of Essen, at the meeting of the German Gas and Water Association, Mayence, on his new welding process with thermit. This substance, a mixture of metallic oxides with aluminium, permits a fusible mass of an especially high temperature to be produced quickly and simply. This finds employment in the production of chemically pure metals free from carbon—chromium, manganese, vanadium, and ferro-boron—and is of great importance in ornamental iron work. Further, it is used for welding pipes, and rails, can be welded at any place and at any time without having a workshop, simply by means of a melting pot, at a very small cost. The welding is said to be very successful, and can stand a pressure of 400 atmospheres. Liquid thermit poured on to an iron sheet melts it as hot water melts snow. In Essen, Brunswick, and Hanover the tram rails are welded by this system. The process is as follows: The melting pot is filled with some tar oil, an inflammable mixture is added, and then lighted with a match. Spoonfuls of thermit are then added, which lights of itself; the whole is quite harmless, and temperatures of 3,000° C. can be obtained in a few minutes. The contents of the melting pot are then poured on the parts to be welded. The melted mass in the melting pot is iron, called alumino-thermo iron; on the top floats melted corundum, an aluminium oxide. The operation is carried out so quickly that the melting pot remains cold, and can be taken in the hand after being emptied. A mixture of this kind, if not too expensive, ought to be of great value to the ironfounder for burning small defects in castings.