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NEW YORK, SATURDAY, SEPTEMBER 1, 1900.

AIR RESISTANCE TO MOVING BODIES.

We publish, in another column, a letter from a correspondent who holds very pronounced views as to the exaggerated importance attached to the element of air resistance by such experimentalists as Mr. Adams, whose sheathed train, popularly known by the weird name "Windsplitter," is just now attracting much attention. Mr. Adams, whose theories have appeared so plausible to one of the leading railroad companies as to lead them to place a standard locomotive and train at his disposal and give him right of way over their main line of track, is convinced that the inertia of the air is not merely an obstacle in the way of high speed in railway trains, but that at the highest speeds it is the most serious resistance of all. Our correspondent, on the other hand, would have us believe that air resistance is greatly overrated, and that beyond the head resistance encountered by the locomotive in opening up a path for the train through the still atmosphere, the latter exerts but little retarding influence upon the following train. The truth lies somewhere between these two extremes. It is probable that Mr. Adams overestimates the air resistance—it is certain that our correspondent places it too low.

Considering how greatly it affects the problem of high-speed transportation, whether by train, trolley, automobile, bicycle, or even by those elusive phantoms, the airships and dirigible balloon, it is truly astonishing that we are possessed of so little data of a practical kind on the subject of air resistance to moving bodies. We say this with a full appreciation of the experimental work that has been done with whirling bodies and by means of gages carried upon moving trains; for, despite the facts that have been thus acquired, it is certain that they have yielded comparatively little data that is of practical value as applied to the air resistance to large bodies of broken contour and uneven surfaces traveling at high rates of speed. If our readers will take the trouble to look up a few of the treatises that have been written upon the question of train resistance, they will find that, whereas the author in each case proceeds as upon firm ground when he is speaking of wheel resistance, axle resistance, internal resistance of engines, etc., as soon as he enters the field of air resistance he moves with halting steps, as one uncertain of his foothold or moving in the dark.

There is a growing conviction among railroad men that, although Mr. Adams may be attempting to prove too much, he is opening up a question that is of far greater importance in the economics of transportation than has generally been supposed. We ourselves have long been of the opinion that if a special series of tests were to be carried out, under varying conditions, and with every refinement of scientific accuracy, to determine the exact amount of atmospheric resistance due to what we might call (adopting the language of the ship designer), the "bow wave," the "wake" and the "skin friction" of a train, the results would be as surprising as they would be valuable. If form has such an important relation to speed in a body moving through the fluid, water, it is surely not unreasonable to suppose that form has some relation to speed in a body moving four or five times as swiftly through the fluid, air. It is true, as our correspondent states, that the train carries along with it strata of air; but so does the ship carry strata of eddying water, and it is in the endeavor to reduce the speed of these currents, and so avoid the loss of power due to setting them in motion, that a "Columbia" or a "Shamrock" is sheathed with costly metal alloy and burnished to the smoothness of glass. The smoothing down of the irregularities in the surface of a train is done to reduce the velocity of these air currents and limit the air resistances mainly to those due to displacement at the engine, and replacement at the last car of the train.

Closely allied to the questions of sheathing is that of tapering the ends of a train. To what extent it would be possible to conform to the theoretical "bow" and "stern" form that would probably be suggested by the results of the proposed investigation, would be largely determined by considerations of convenience in operation.

THE ELEMENT OF SAFETY IN SMOKELESS POWDER.

During one of the violent electrical storms which recently passed over New York city, a powder boat upon which was stored a considerable amount of smokeless powder was struck by lightning, and a case containing fifty pounds of this powder ignited and its contents entirely burnt up without producing even the semblance of an explosion. Stored in the same boat, and adjacent to some of the cases which were ignited, were several kegs of black powder which, thanks to the non-explosive character of the smokeless powder, were merely scorched on the outside of the kegs.

The valuable quality of smokeless powders which renders them slow-burning and non-explosive, so long as they are exposed to the atmosphere or contained only within the slightly resisting walls of a tin can or a wooden packing case, was not the immediate object of the patient investigation which has resulted in the invention of these powders. The quality of safety is incidental to the quality of slow-burning, which is the prime requisite of all powders of this class. The common black powder, with which we are all familiar, is quick-burning; that is to say, it is converted into gas immediately upon ignition, there being practically no interval between the moment of ignition and the moment of complete combustion. If a small quantity of it is ignited in the open, it is burnt with practically explosive effect, and when it is contained in an enclosed or strongly resisting chamber such as a bore of a gun or rifle, the whole of the charge is converted into gas at the instant of ignition by the primer. The curve of pressure down the bore of the gun is consequently very uneven, being remarkably high over the powder chamber, and falling rapidly to a very low point at the muzzle. The manifest advantages of producing a powder which, as the projectile passed down the bore, would burn slowly and progressively, giving off increasing volumes of gas corresponding to the increasing space behind the projectile, led to the invention of slow-burning powders, and it is still the inspiration of all investigations along these lines.

Other things being equal, the rate at which a charge of smokeless powder will burn and be converted into gas, is proportional to the pressure to which it is subjected. A stick of powder may be held in the hand at one end, while it is burning at the other end, the rate of combustion under atmospheric pressure being very slow; but, if the same stick is burnt in a closed vessel where there is a consequent rise of pressure due to the gases which are given off, the rate of combustion will increase proportionately to the pressure.

In the remarkable incident to which we have referred, we are informed by Messrs. Von Lengerke and Detmold, of this city, the owners of the powder boat which was struck by lightning, that the corner of the cabin structures on deck was shattered, and the whole of it burst into flame. Captain Jensen, of the boat, after rowing his wife ashore, pluckily returned to the powder boat and commenced to put out the flames. While he was thus engaged on deck he perceived what he describes as a muffled sound like the blows from a succession of air waves, striking the deck beneath him, and on opening the door leading to the hold of the vessel, found that the fire had communicated to a number of wooden cases filled with five-pound tins of smokeless "E. C." powder. The pressure due to the ignition of the powder had burst open the tops of the tins and blown off the cover of the wooden packing case, after which the contents had burnt up without doing any further mischief beyond scorching the surrounding cases and black powder kegs. The incident affords a remarkable proof of the impossibility of exploding this type of powder in the shape, and under the conditions in which it is ordinarily handled, shipped, and stored.

A NEW GAS BATTERY.

A Savannah inventor, Mr. Andrew Plecher, has devised a most interesting gas battery. The generation of the current is effected by the direct chemical union of two gases—oxygen and hydrogen, for instance It is well known that certain substances, such as palladium and platinum, or other metals of this group, have the peculiar effect of causing the union of two such gases when brought together on its surface. In the "Doebereiner" lamp, for instance, where a mixture of hydrogen and oxygen impinges upon the platinum in a finely divided condition, the surface action of platinum causes the two gases to unite and to heat the platinum red hot, which in turn automatically ignites the gases. The chemical union of the two gases in such case is attended by the correlated phenomenon of heat, for the reason that the interatomic action produces a series of short circuit couples whose resistance gives heat instead of electric current.

Mr. Plecher's invention is designed to prevent this production of heat, and to get its correlative equivalent in electric current by separating the positive side of the atoms from the negative side, and by thus segregating the positive from the negative forces to carry them off in an extraneous circuit which permits it to be used in a controllable electric circuit. Briefly, the invention consists in a cell whose body structure is of some porous material which is homogeneously filled throughout the entire structure with platinum, or its equivalent in a finely divided condition. This cell body has brought to its surface on one side one of the gases, and on the other side the other gas, and the cell is provided with two gathering electrodes of great superficial extent, one of them bathed in the hydrogen-saturated surface of the cell and the other in the oxygen-saturated surface of the cell, whereby when the hydrogen and oxygen unite through the action of the finely divided platinum the two electrodes will gather the liberated forces of opposite polarity as union takes place between the atoms, and carry them off through the conducting wires of an extraneous circuit.

AN INTERESTING CLOCK.

Messrs. William Potts & Sons, the well-known clock makers of Leeds, England, have just constructed for that city what is claimed to be the greatest horological achievement of the century. The clock is a huge one, and in it are combined many features of the most remarkable clocks in the world, such as those at Berne and Strasburg Cathedral.

The huge clock dial, which is of polished copper with the figures inscribed upon it in blue, is flanked upon either side by a mail-clad knight, each holding above his head a battle-axe, which serves to strike the gongs at the quarters and hours. Above the clock, upon a kind of perch, stands a large cockerel. In front of the dial is a platform.

When the quarters of the hour are reached the mail-clad knights strike their gongs. Immediately on the left hand side of the dial a door opens automatically, and there issues forth a British soldier in full uniform. When he reaches the center of the platform he halts and salutes in precise military manner. He then passes on to the left, and is followed by a kilted Highlander, who repeats a similar performance when he reaches the middle of the platform. Then comes an Irishman in the old dress of his country, brandishing a shillelah; then a Canadian boatman with his paddle, and finally, a Hindoo, wearing his turban and loin cloth. When the figures have passed round the platform they disappear from sight through another door, which closes automatically upon the last figure's exit. Then the cockbird overhead flaps its wings, raises its head, and gives three lusty crows. The figures are manufactured of copper bronze, while many of the other parts of the clock are constructed from gun metal. The escapement is the double three-legged gravity by Lord Grimthorpe, who is probably the greatest living authority on clocks and bells.

INQUIRY CONCERNING WATER TUBE BOILERS.

The British Admiralty are going to hold an exhaustive inquiry in connection with the respective advantages of the water-tube boiler and the cylindrical boiler as used in the British Navy. The committee consists of seven members: Vice-Admiral Sir Compton Domville, president, who has had under his command vessels equipped with both types of boilers; Mr. List, the superintendent engineer of the Cunard Steamship Company; Mr. Milton, chief engineer-surveyor of Lloyds Registry of Shipping; Prof. Kennedy, formerly professor of engineering at University College; Mr. Smith, an engineer in the Royal Navy holding the position of inspector of machinery; and another gentleman whose name is not yet divulged. The committee will ascertain, practically and experimentally, the relative advantages and disadvantages of the Belleville boiler for naval purposes as compared with cylindrical boilers; will investigate the causes of the defects that have occurred in these boilers, and in the machinery of ships fitted with them. The committe will then report as to how the defects may be remedied, or averted altogether, and will also report upon the other types of machinery employed in the vessels. In short, the committee of inquiry will completely overhaul all the various types of machinery employed in the British Navy, and then report as to which is the most reliable, trustworthy, and efficient. To enable them to carry out their practical experiments, the "Hyacinth," which is supplied with water-tube boilers, and another cruiser fitted with cylindrical boilers, will be placed at their disposal. Copies of the reports of all the defects of machinery and boilers that were developed during the recent maneuvers of the Channel Squadron will be handed to the committee, and they will inspect the vessels in which the accidents occurred.

THE question of the gender of the word "automobile" has just come up for adjudication by the French Academy and the "Immortels" have decided to make it masculine. Many French purists disagree with the Academy. Still it seems eminently proper to make the rattling combination of iron and fire, or electricity, masculine.