

WEDGING OF GASES WHEN CONFINED.

In remarking on the experiments made in England with guns, or rather steel tubes open at each end, we said, in our issue of June 29d, that we could account for the velocity imparted to the projectile only on the hypothesis that the air, in the rear of the charge, confined between two felt wads, was compressed laterally, changing its particles from the spherical to the cone-like form, and thus acting as wedges, producing a transverse strain upon the walls of the tube, and forming, at the instant of discharge, a diaphragm of resistance, acting as a solid breech.

Although not certain of being correct in venturing this supposition, which, however, was the only hypothesis on which we could found a theory accounting for the results of the experiments, we have some additional evidence that this is the path for investigating these facts. We give, with this article, a cut representing two conical bullets fired from a Colt's revolving rifle of thirty-one inches length of barrel and "44" caliber. The circumstances are these: One of our correspondents, H. W. S. Cleveland, of Danvers, Mass., in using the Colt's rifle at a target, left his wiping rod in the piece to attend to a temporary call, and when he returned, forgetful of what he had done, he fired his rammer at the mark. He fired again, and again, until he began to imagine from the appearance of the target that he had been shooting "wild." He found, on examination, that he had pierced the target with a queer shaped projectile. Disengaging it he found it as it appears



in the illustration. One ball, probably that which projected the wiping rod, had lodged in the barrel for want of projectile force to propel it and the rod beyond the muzzle. The next ball fired struck the lodged ball and drove itself against it, changing the form so much as to alter a cylindrical shot, with cone-like termination, into a cylinder, compressed in a concave form at the end which before was a cone, and expanding the barrel about ten inches from the muzzle. On the whole outward surface of this compressed cylinder the rifles or "gains" of the gun barrel are clearly impressed. It is evident, then, that the explosion, in connection with the obstacle interposed between the projectile and the atmosphere by the lodgment of the first ball in the barrel, changed the form of the projectile from that of a cylinder, convex at the top, to that which is represented in the illustration. The Colt's bullet offers only a portion of its surface to the effect of the discharge combined with the rifling of the piece. But this projectile is clearly marked with the "gains" of the barrel for its whole length. As this length is more than that given to an ordinary bullet, and, besides, as the illustration shows, the bullet is "upset" or contracted in length by the explosive force of the gas, it is evident that an agent differing from that employed in discharging a projectile from a gun was a means in producing this effect. The bullet, notwithstanding its compression, which changed its form from that of the ordinary projectile to that of a perfect cylinder perforated at one end, where before it presented a cone-like protuberance, is now a cylinder bearing on its entire length—which is almost as much as its original length—the marks of the rifling of the gun. It seems to be evident that another force than that of explosion, or percussion in a direct line, was exerted to produce this result.

Again, the appearance of the ball, which was lodged in the piece in advance of that which drove it out, is such that it is hardly possible to draw any other conclusion from its elongated and attenuated appearance than that the wedging of the gases against the walls of the gun tube contributed to compress the material of which it is composed.

Having some doubts as to the critical acumen of our informer, we had an interview with him, in which we plainly stated these doubts. We had the idea that possibly the bullet which showed the rifling on its surface was the first which left the

gun, or, at least, the first which struck the target. Our doubts were removed when he told us that he found the double projectile in the target—a cedar post—the elongated bullet in advance of the other, and the two so firmly united that it required some force to separate them. Could the two bullets have changed their relative positions in the flight from the gun? This would be against the experience of gunners, or those who use the rifle. Undoubtedly the elongated projectile reached the target first, and its elongation was due to a compression it was subjected to before it reached the target; otherwise how could it appear lodged in the target in advance of the bullet which followed it, showing on its surface the rifling of the gun and the depression of the butt of the first bullet?

In regard to this singular matter, Mr. Cleveland makes the following statements:—

"The position of the first bullet in the barrel was about ten inches from the muzzle. To move that bullet forward would require but little force, as any one may prove by ramming a bullet through a barrel. It is obvious, therefore, that no portion of the enormous force required to expand the barrel could have been exerted against the bullet, or it would have given way instantly. The only conceivable mode in which this lateral pressure could be produced, is by the wedging together of the component particles of air. The process of the operation was therefore in the following order, although the whole performance was (to our apprehension) instantaneous. The column of air between the two bullets being compressed by the advance of the rear one, and wedged together by its lateral pressure, caused the barrel to expand at the base of the bullet which was fast in the gun. The moment this expansion commenced a space was opened round the bullet, which was instantly filled with the air, and the bullet being of soft metal, was compressed and elongated, thus relieving the barrel from the necessity of further expansion. At the same moment, this elongated bullet was struck by the one in the rear, the point of which was expanded by the blow so as to fill the threads of the rifle, and the two passed out together, firmly united, but with their momentum so far diminished that they made but a slight penetration of the target."

It seems plain that the principle of Hardy's non-recoil gun is at least worth investigating, and it shows, also, that our idea of the compression of explosive gases is the best means of accounting for such a singular phenomenon as this we illustrate.

We wait for further information. Evidently there is much in this matter that ought to engage the attention of our scientists and mechanics. If Hardy's plan for firing projectiles, from tubes open at both ends, has any value as a useful means of simplifying gunnery, it should be known, and it seems that such experiments as we have illustrated will do much toward giving that information.

NATIONAL ACADEMY OF SCIENCES.

This body has just held a session of five days at Northampton, Mass. A large number of the most distinguished scientists of the country were in attendance, and the proceedings were of a most satisfactory character to those attending, particularly to the learned men themselves.

It is unfortunate, in our opinion, for the country at large, that these gatherings do not assume a character of a more useful and popular nature. By many they are regarded as convenient occasions to ventilate speculations and theories looking to no useful result as their ultimate. Science should lead and direct art, but papers on abstractions, which, by no effort of the mind and no endeavor of the will, can be made to yield a particle of useful information, are altogether out of place in a meeting of scientific men. Whether language belongs to the field of physical science or to the domain of moral philosophy, does not appear to be a question that can in the remotest degree affect the improvement of the race. Such problems may do very well as amusements for hypercritical minds or transcendental tastes, but for all their benefit to the world at large we might as well have a treatise on the cause of lunacy in bedbugs.

It is pleasant to know that all the investigations and the amusements of this scientific society are not of this style. It may be well enough to allow some

mere abstract speculator to ventilate his learned nonsense before a company of sympathizing *sarcasms* and befogged listeners; but the true value of the Academy must be found in their useful labors.

Speaking of the labors of the Academy, the reporter for the *Tribune* says that "Professor Bache, the President, was in such intimate relations with the Government, and Mr. Lincoln set so high a value upon his services, that a Cabinet meeting was held in his office every week during the war. It was Professor Bache who made the Academy especially valuable to the Government. By his vast labors during the war, Professor Bache was entirely broken down, and for the last year has been utterly unable to work. It is to be most ardently hoped that he may soon recover and resume his great usefulness to the country and to science. Of the immediate usefulness of the Academy to the country, there is sufficient evidence in the fact that the annual report shows that the Government has referred to the Academy for reports on the following subjects:—

"In the first year, from the Navy Department, weights, measures, and coins, their decimalization, etc.; methods of protecting the national currency from being counterfeited; Saxton's alcometer, intended as a substitute for the hydrometer now in use. The protection of the bottoms of iron vessels from corrosion by sea-water and from fouling. The correction of the compasses of naval vessels, especially of iron vessels and iron-clads. The inquiries as to the expediency of continuing in their present form the publication, by the Navy Department, of the wind and current charts, and of the sailing directions. In the second year, from the Surgeon General—as to the best method of testing the purity of whisky employed for medicinal purposes. From the Navy Department—to conduct, witness, and report, upon experiments on the expansion of steam. From the Treasury Department—the examination of aluminum, bronze, and other alloys, for the manufacture of cent coins.

"On most of these subjects the Academy has already, by a committee, presented elaborate reports, which have been accepted as decisive and exhaustive so far as they claim to go. It will be seen that these subjects embrace matters of the utmost importance to the country. Thus the Academy has indorsed the French decimal system of weights and measures as against the anomalous and puzzling lack of system now in use in this country, and recommended its adoption. Should their suggestions be followed, their influence would reach almost every person in the country almost every day, and after the change was once made, affect him most desirably."

Bleeding from the Nose.

Some two years ago, while going down Broadway, in New York, blood commenced running from my nose quite freely. I stepped aside and applied my handkerchief, intending to repair to the nearest hotel, when a gentleman accosted me, saying, "Just put a piece of paper in your mouth, chew it rapidly, and it will stop your nose bleeding." Thanking him rather doubtfully, I did as he suggested, and the flow of blood ceased almost immediately. I have seen the remedy tried since quite frequently, and always with success. Doubtless any substance would answer the same purpose as paper, the stoppage of the flow of blood being caused doubtless by the rapid motion of the jaws, and the counter action of the muscles and arteries connecting the jaws and nose.

Physicians state that placing a small roll of paper or muslin above the front teeth, under the upper lip, and pressing hard on the same, will arrest bleeding from the nose—checking the passage of blood through the arteries leading to the nose. H. C. K.

THE London Pneumatic Dispatch, by which small parcels are transported from one part of the city to another, by means of the exhaustion of air from a tube, is familiar to our readers. It appears, from a report recently made by the directors of this company, that 120 tons of goods can be transmitted through the tube every hour, at a speed of eighteen miles an hour, and that the cost is less than one penny (two cents) per ton for each mile. They anticipate large dividends from the line when completed to points outside the city.