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The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are *sharp*, the articles *short*, and the facts *authentic*, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

THAT NEWPORT CONFERENCE.

Some few months ago a conference of leading officers and officials of the navy was held at Newport behind closed doors. Although the only fact positively made known to the public regarding this assembly was that its deliberations were to be held in absolute secrecy, the close of the conference was followed by the usual and seemingly inevitable leakage of information. The latest statement of what occurred appears in one of the current magazines in the form of an anonymous article. The facts there presented agree fairly well with the whisperings which have gone abroad regarding the doings of the conference; and they may be taken, we doubt not, as fairly correct.

The Newport conference, it has been pretty generally made known, was called by the President for the consideration of the alleged defects in our warships; and we are told that the whole of the charges made in a certain magazine article and reiterated in the subsequent controversy were carefully gone into. The members of the conference represented every branch of the service that has to do with the design, construction, and subsequent handling of our warships and their equipments. Members called to the conference brought with them elaborate statistics, drawings, etc., bearing upon the disputed points, and the opposing parties were given an opportunity to state their views, compare notes, examine into the supposed defects, and propose the proper remedies.

It will be remembered by those who followed the controversy in its early stages that the principal charge made against our battleships was that their armor belts were altogether too low, and that it was urged that in future ships these belts should be raised several feet. It will also be remembered that, in an investigation of the facts, as given in the Scientific American of January 25 of this year, it was shown that the armor belts of our ships are placed in the same relation to the normal water-line as those on the battleships of leading foreign navies. It was further shown that to raise these belts several feet, as the critics desired, would be to bring the unarmored under-water portion of the hull nearer the surface, and put the ships in that much greater peril, when they were rolling at sea, of being pierced in their vital parts and either sunk or permanently disabled.

It now appears, according to figures given by the anonymous writer of the article above referred to, that it was finally determined, not that the water-line belts were too low, but that they were not low enough; for in future warships the top edge is to be 4 inches higher and the bottom edge 12 inches lower, measured with regard to the water-line of the ships when they have two-thirds of their coal, stores, and ammunition aboard. In other words, the whole body of the armor belt is to be sunk in new ships 8 inches lower with regard to the normal water-line than it was the custom to place it before this Newport conference was held. For it must be remembered that the normal water-line under which our existing ships were constructed is the water-line (to quote the official designation) of the "ship as designed, fully equipped, ready for sea, with two-thirds of the coal supply, ammunition, and stores."

So much for the armor belt controversy.

The conference further voted that the broadside guns for defense against torpedo attack shall, in the future, be mounted one deck higher than in the present ships; that is, they will be moved up from the gun deck to the main deck. This decision was based upon the experience of the fleet under Admiral Evans in its cruise to the Pacific, when it was found that the guns on the weather side of the ships, when they were steaming at speeds of over 10 knots, were so wet as to interfere with the gunners. It should be clearly understood that this change was not recommended because these batteries were carried at a lower elevation than similar guns in foreign navies (as a matter of fact these guns are higher in our ships than in the British, German, and Japanese navies), but because it was realized that the greater displacement and wider margin of stability of our ships of the "Dreadnought" type rendered it possible to carry these guns at a higher elevation than could be done on the smaller ships of an earlier date.

Another important change, the motive of which is to be found in the experience had during the Russo-Japanese war, relates to the smokestacks of our future warships where they pass through the central box battery. In future this portion of the stacks is to be protected by armor. The Russians suffered great inconvenience from the penetration of the base of the smokestacks by shell fire, the furnace gases escaping into the battery and, in some cases, even into the turrets, and driving the men from the guns. It will, of course, be impossible to put armor of any great thickness around the smokestacks, nor will it be necessary. The shells that enter the broadside battery will be exploded by the 6-inch armor with which it is protected. It will be their fragments only that will strike the armored bases of the smokestacks, and penetration will be unlikely.

Taken altogether, the information which has leaked out through the closed doors of the Newport conference indicates that the broad principles of construction upon which the modern ships of our navy have been built received the indorsement of a very strong majority of the officers present. Some details will be improved, but no sweeping changes will be ordered either by way of reconstruction of existing ships, or redesigning of those at present under construction.

THE FORCE INVOLVED IN AUTOMOBILE COLLISIONS.

Every one who has witnessed the result of a serious automobile or railway collision must have been astonished by the evidence of the development of forces by which strongly built vehicles of iron and steel were almost instantly transformed into shapeless heaps of splintered and twisted fragments. Not every collision is as destructive as this, but the possibility of such a result is always present where heavy vehicles are moving with great speed, and hence an analysis of the conditions which determine the magnitude and effects of the forces of destruction will be of interest.

An automobile or, for that matter, any very swiftly moving vehicle is, in effect, a projectile which differs in no essential respect from a shell discharged by a modern field piece. The kinetic energy which a projectile possesses in virtue of its mass and velocity is necessarily expended in destructive action when the flight of the projectile is suddenly arrested by an obstacle of any sort. The destructive effects are divided between the projectile and the obstacle in the inverse ratio of their respective powers to resist deformation. For example, a shot fired at a board fence perforates and splinters the wood without itself sustaining appreciable damage, but a lead bullet fired at a steel plate is flattened without indenting the steel. If the projectile and the obstacle are similar in material and strength of construction, both will be damaged. In automobiles and other vehicles the conditions are essentially the same as in the case of the projectile. If, for example, the brakes are applied to an automobile when it is running at full speed, the kinetic energy of the forward motion is gradually absorbed by the friction between the brakes and the wheels, and converted into heat, and the car is gradually brought to rest. Again, if the motor is stopped without applying the brakes, the energy of motion is gradually used up in overcoming the resistance of the air, the rolling resistance at the points of contact with the road, and the friction at the axle bearings. The car, therefore, comes to rest, after running a distance inversely proportional to the magnitude of these frictional and other resistances.

To continue the comparison with a projectile, let us suppose that the car, running at full speed, is steered against a light picket fence, and the motor is stopped. The car will shatter the fence and go through it almost unharmed and with little loss of speed, but if it encounters a succession of similar obstacles it will finally be brought to a stop. Nor would one solid board fence stop the automobile, though it would reduce its speed, but the car would probably dash itself to pieces against a rocky cliff or stout masonry wall, without materially affecting either of those obstacles. In short, the weaker of two colliding bodies sustains most of the damage caused by the collision.

The effect depends also on the distance run by the vehicle between the first moment of impact and its final stoppage. Other things being equal the intensity of the destructive forces is inversely proportional to this distance, and the disintegrating effect of these forces depends more on their absolute intensity than upon the length of time during which they act. Hence a sudden stoppage, as in the case of collision with a stone wall, develops forces which the strongest materials cannot withstand.

At the moment of impact against an obstacle the moving car possesses a certain kinetic energy which is equal to the product of the force required to bring it to rest multiplied by the distance through which that force acts. This kinetic energy is also equal to the mass of the car multiplied by half the square of its velocity. For a car weighing one ton and running at a speed of 30 miles per hour the kinetic energy is equal to 60 foot tons, or the work done in lifting the car 60 feet. In other words, the velocity of 30 miles per hour is about equal to the velocity acquired in falling 60 feet, and if a car moving with this velocity strikes an immovable obstacle it will fare as badly as it would in striking the ground after falling 60 feet. The force of the impact is proportional to the square of the velocity, and the sudden stoppage of a car going 60 miles an hour is equivalent to a fall of 240 feet.

Now let us examine the conditions existing immediately after the impact. An automobile is an assemblage of many parts, of various degrees of strength. The shock is transmitted from the point of impact through all the parts, producing in each a tendency to break at its weakest point.

The work done in pulling apart a steel bar one foot long and one inch square is equal to nearly 4½ foot tons, but an automobile weighing one ton and running 60 miles an hour possesses energy enough to sunder 25 such bars, or 50 steel bars of the same cross-section and half the length either successively or simultaneously. The same amount of energy would suffice to shear off 260 1-inch steel bolts or rivets, 500 ¾-inch bolts, 2,500 oak pins one inch square or 25 oak beams 10 inches square. The energy of the car is one-fourth greater than that of the 12-pound shot which leaves the muzzle of a 3-inch gun with a velocity of 1,000 feet per second. Such a shot is crushed on striking an armor plate of hardened steel, although it is protected by a steel cap, and as a whole is stronger than any part of an automobile.

In a head-on collision between two cars of equal weight and speed the amount of kinetic energy destroyed is twice the amount involved in the impact of either car against a fixed obstacle, but the destructive action is divided equally between the two cars so that the effect on each is equivalent to the effect produced by running into a stone wall. In a collision between a heavy and a light car, the latter suffers more severely than the other.

THE 1908 VANDERBILT CUP RACE.

The fourth contest for the Vanderbilt Cup will be memorable because, for the first time, the famous trophy was won by an American in an American-built car. It occasions no surprise that the honor should fall to a Locomobile; for those who were present at the race of two years ago will remember that it was a machine of this make, driven by Tracy, that made the fastest lap of the race; and that the uniformly fast running of the car would have probably landed it in the first position, had not continual tire troubles developed. This year, fortunately, there was only one tire mishap, which happened on the final lap and caused the loss of not over one minute. The fact that it was necessary to use non-skid tires the same as in 1906, shows that there has been a decided improvement in American-made tires of this type.

The course, which is 23.45 miles in length, was laid out to include some twelve miles of the new Parkway, which has been finished with an excellent concrete surface. The grand stand is located at the center of this stretch of the course; and it was over this section that the fastest time was made. The race consisted of 11 rounds, making a total distance of 258.06 miles. Seventeen cars started. Eleven of these were American machines, while of the remaining half dozen, one (the Isotta) represented Italy, two (a Hotchkiss and a Renault) France, and three Mercedes cars Germany. Of the American cars, the two Locomobiles and two of the three Thomas machines were high-powered racers, while the remaining Thomas, the 6-cylinder Acme, and Chadwick cars, and the two Knox and Matheson machines were more moderate-powered stock chassis, as was also the Italian Isotta car. All the other foreign cars were high-powered machines. Robertson made the fastest lap of the race in the winning car in 20 minutes and 54 seconds, or at the rate of 67.32 miles an hour, and the race was won by 1 minute and 47 4/5 seconds in 4 hours 48 1/5 seconds, at an average speed of 64.28 miles an hour, the second place being taken by the 60 H.P. Isotta car. A gratifying feature of the race is the fact that it was run without any fatality, or even serious accident, either to drivers or spectators.