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NEW YORK, SATURDAY, MAY 12, 1906.

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.

A FUEL EFFICIENCY TEST OF AUTOMOBILES.

Never before has there been held in this country an automobile contest having so many participants as had the Two-Gallon Efficiency test, conducted by the Automobile Club of America on Saturday of last week. Not only were the entries seventy-one in number, but the proportion of starters was large, there being sixty-five machines in all. The main object of the test was to determine the fuel consumption per mile of the various automobiles. First, second, and third prizes, consisting of a valuable gold punch bowl and a silver cup and medal, were awarded to the three cars that made the highest scores.

The score of each car was obtained by multiplying the total weight of the car when loaded (to which weight 800 pounds were arbitrarily added) by the distance run. Thus, in reality, the contest was placed on the ton-mile basis, which would cause the large, heavy cars to win over those of lighter weight if the former were not handicapped. This, it seemed, must be so, since ordinarily gasoline consumption does not increase directly with the weight, and a heavy car is found to be much cheaper to run per ton-mile than a light car. Despite this well-known fact, the committee in charge penalized the light cars by taking the weight of all two-cylinder machines as but 75 per cent of their actual weight, and that of the single-cylinder cars as but 70 per cent. The test favored the heavy four-cylinder cars, therefore, and it seemed well-nigh impossible that any other type of car could win. The surprising result was, however, that the winner happened to be a four-cylinder light-weight runabout of the air-cooled type, a car which is a distinctively American invention. This machine, weighing with driver and observer 1,500 pounds, ran from 57th Street and the East River to North Haven, Conn., a distance of 87 miles, upon two gallons of gasoline, at an average speed of 17½ miles an hour. When the fact is considered that the first 35 miles of road were in a very muddy condition, owing to a cloudburst occurring while the car was traversing them, it seems quite possible that a distance of 90 miles, or 45 miles per gallon, could have been covered had the road been dry. The automobile editor of this journal, who had the pleasure of being the observer on the winning car, believes that this distance could readily have been covered in fair weather and with dry roads, in view of the facts that the low speed had to be used on a considerable number of hills that could otherwise have been mounted on the high gear, and that the dampness of the air necessitated the opening of the needle valve of the carbureter more than is required on a pleasant day.

The car that won the second prize was likewise one of the latest types of air-cooled cars that American ingenuity has devised and perfected. The distinctive feature of this car's motor is that the cylinders are incased in aluminium jackets, through which air is forced by a powerful gear-driven blower, while in contradistinction to this system the motor of the winning runabout is cooled only by the natural draft of air as the car moves forward, the motor in this case being placed transversely at the front of the car and also being provided with auxiliary mechanically-operated exhaust valves, to aid in the quick expulsion of the burnt gases. The needle valve of the carbureter also can be adjusted from the driver's seat. This is a very good feature, that is found on scarcely any other make of car. Both of these machines are familiar to our readers from descriptions published in our automobile number of January 13 and previously. A car of the same make as the winner holds the transcontinental record, which was made in less than 33 days.

The car which obtained third place was a well-known French make of 4-cylinder water-cooled machine. This car had a score of 180,642, as against the 200,100 of the winner and the 194,953 of the second car. It weighed 3,110 pounds, and covered 46.2 miles, while the second car weighed 3,270 pounds, and made 47.9 miles. The cost of running per ton-mile of the first

six cars, figured with fuel at 20 cents per gallon, is 0.613, 0.517, 0.556, 0.559, 0.500, and 0.640 of a cent respectively. The fourth machine was a large French car with a record for fuel economy; the fifth was an 18-passenger bus; and the sixth a light tonneau having the same make and size of engine as the winner. A one-cylinder buckboard made 101.6 miles, and a single-cylinder tonneau carrying four people, 56.8.

PREVENTION AND MASTERY OF DISEASE.

It is probable that most of us have heard more or less about the remarkable success which attended the efforts of the Japanese to prevent and control disease among their armies in Manchuria; but it has remained for Major Louis L. Seaman to place the full facts before the world in a work to which he has given the appropriate title "Real Triumph of Japan." The high reputation of Major Seaman as an army surgeon, and the fact that his assertions are based upon personal observation during his presence with the armies in Manchuria, place the statements contained in his work, extraordinary though they be, beyond all question as to their veracity and accuracy.

It is shown by Longman's Tables that for nearly two centuries past, in wars that extended over any great period of time, on an average at least four men have perished from disease to every one who has died of wounds. In the late Boer war 8,221 officers and men were sent home on account of wounds, while 63,644 were invalided home by disease. Major Seaman quotes from Vital Statistics for 1898, in which the Surgeon-General of our army shows that while deaths from battle casualties were 293, those from disease amounted to 3,681, or 14 from disease to 1 from casualty. These surprising figures are compared with the record made by the Japanese. The Japanese statistics show that from February, 1904, to May, 1905, although 52,946 were killed or died from wounds, only 11,992 died from various diseases. That is to say, only one died from sickness to every four and one-half men who died in battle or from wounds.

This complete reversal of the statistics of the two leading nations of western civilization constitutes, according to Major Seaman, the real triumph of Japan; for it is a fact that in their war with China only ten years before, the Japanese lost about the same average as that which prevailed during our own civil war, namely, three from disease to one from bullets. In that war they realized that disease was even more fatal than the enemy's weapons, and in the intervening years they set out to master the invisible foe with a success to which the statistics, as above given, bear eloquent testimony. These results were obtained by careful study of military sanitation and hygiene, and by a most thorough bacteriological examination of the water along the line of march and in the vicinity of the camps. The water-testing outfit formed part of every sanitary detachment, and every foraging and scouting department was accompanied by a medical officer, who made an examination of the water to be used by the troops. In view of the extraordinary facts developed as the result of Major Seaman's investigation, it is not putting the case too strongly to say that, as matters now stand, the medical corps has as much, if not more, to do with the winning of campaigns and the mitigation of the horrors of war as any other department of the army.

FIREPROOF QUALITIES OF REINFORCED CONCRETE.

In a recent issue we drew attention to the fact that, because of its strength, resiliency, and monolithic or one-piece construction, reinforced concrete was admirably adapted to resist the shock of earthquakes, and we strongly recommended the system for the rebuilding of San Francisco. We now wish to emphasize the fact that armored concrete is equally well adapted to resist the fierce heat of such a conflagration as that which completed the ruin of the city. Mention should first be made, however, of certain additional facts which have come to light regarding the behavior of reinforced concrete buildings that were exposed to the most destructive shocks of the earthquake. The first case is that of the bell tower of the Mills Seminary, which, although it is some 75 to 80 feet in height, was not even cracked by the severe shaking to which it was subjected. The other two instances are to be found in Stanford University, where the Museum Building and Roble Hall, both built of reinforced concrete, are standing practically intact amid the widespread ruin, and in some cases the absolute demolition, of the other buildings of the University, all of which were massively constructed with a special view to withstanding earthquake shock. Two wings built of brick had been added to the Museum Building since its completion. These were thrown down, while the concrete structure passed through the ordeal satisfactorily. Roble Hall is built with concrete walls and floors of wood. The only damage to this building was due to the falling of a chimney, which broke through the floors, killing one of the inmates.

As to the ability of reinforced concrete to stand the

test of fire, although there are no advices at hand to show that any such construction was put to severe fire test in San Francisco, enough has been learned in experimental tests made for building departments, and particularly in an exceedingly fierce fire which occurred to a concrete building in Bayonne, N. J., three or four years ago, to render it certain that buildings of this type would have passed through even the San Francisco ordeal satisfactorily.

One of the most conclusive tests by fire, loading, and water was that made last year by the Bureau of Buildings of New York city of a reinforced concrete floor, carried on two reinforced concrete girders, supported by four columns. The purpose of the test was to determine the effect of a continuous fire below the floor of four hours at an average temperature of 1,700 deg. F., the floor carrying a load of 150 pounds per square foot. At the end of four hours, the red-hot floor was to be subjected to a stream of cold water for five minutes, and then the upper side of the floor was to be flooded at low pressure. As the result of the test there was some flaking of the surface of the concrete, which did no material damage to the building. A stream of water knocked off the concrete from the bottom at one of the girders at the center, exposing the metal rods for a few feet, and there were some slight cracks of no material significance. With the exception of these defects, the whole floor system, in spite of the severe ordeal through which it passed, was found to be in excellent condition. The test was carried out under Prof. Ira H. Woolson, of Columbia University, and on the satisfactory results achieved the system received the approval of the Bureau of Buildings of the City of New York, for whom the test was made.

But the most severe test, the one which is generally accepted by engineers and architects as proving on a large scale the fire-resisting qualities of reinforced concrete, was the fierce fire which burnt out the mill of the Pacific Coast Borax Company at Bayonne, N. J., on the night of April 6, 1902. The building, which measured 200 feet by 250 feet, was four stories high in the main portion, and the remainder consisted of a single-story wing. The fire, which started from the bursting of an oil main and was fed by a large amount of inflammable material, was an exceedingly hot one; as was proved by the amount of fused cast iron from the machinery and copper from the dynamos and motors, which was found on the various concrete floors (themselves intact) after the conflagration. Everything that the building contained was completely burnt up, and nothing but the monolithic concrete structure remained. This was found to be in absolutely perfect condition, so much so that the building was put in first-class shape at a cost of less than one thousand dollars. Evidence of the ability of such a structure to pass through a severe fire test, and yet maintain its integrity, was found in the fact that although the heat must have exceeded 2,000 degrees, the side walls, four stories high and 200 feet long, without any cross walls to tie them, were found, at the conclusion of the fire, to be absolutely in line, both vertically and horizontally.

The question of the extensive use of reinforced concrete in the rebuilding of San Francisco is greatly dependent upon the attitude which may be taken by the San Francisco labor unions, which hitherto have opposed the system so vigorously and successfully, that of late but little of it has been used. We note, however, from press dispatches, that the unions have signified their intention to suspend all restrictions which might hinder the rapid rebuilding of San Francisco, and it is to be hoped that this conciliatory and humane attitude will be extended to cover the important question of constructive materials.

THE GOVERNMENT AS A CEMENT MANUFACTURER.

The government wants Portland cement, and wants it badly. With twenty-four big irrigation projects under construction, requiring hundreds of thousands of barrels of cement, the engineers are finding it next to impossible to obtain anything like the quantity needed. The unprecedented demand for this commodity all over the West has already overtaxed the capacity of the mills, and almost without exception the government's requests for bids are turned down. Apparently no manufacturers west of the Mississippi are able to supply new orders. In reply to inquiries from the government they state that owing to the unusual demand, new orders cannot be accepted for several months to come. Recently proposals were requested from eight manufacturers and dealers in cement for 2,000 barrels required on an Idaho project. Only one proposal was received, and that was at a rate fifty per cent higher than the firm would have sold a few months ago. Still later invitations for bids for several thousand barrels were sent to twenty-three dealers. Again but one firm submitted a bid, and this was nearly sixty per cent higher than the normal profitable rate of sale by this firm. Other attempts to purchase cement have been similarly unsuccessful.

The Reclamation Service is gravely concerned. It