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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.

A TRIBUTE TO ROOSEVELT'S TECHNICAL JUDGEMENT.

Be he Czar, King, or President, there is no executive among the nations in whom catholic interest, broad information and versatile genius are such valuable qualities as in a President of the United States. Certainly it would be difficult to find another head of a great people, who is called into such close touch with so many widely different subjects, and afforded such an unrivaled opportunity to leave the imprint of his personality upon the national life—political, social, technical, and commercial—as the man who for the time being holds the unique position of our President.

Among Mr. Roosevelt's predecessors, there have been men who surpassed him—far surpassed him—in their knowledge of certain special problems that came up for legislation; but in the bewildering variety of subjects of which he possessed more than average knowledge, and in his ability to seize quickly the salient facts of problems with which his acquaintance was more limited, Mr. Roosevelt stands quite alone.

Himself robust, direct, and practical, he prefers the concrete to the abstract; and it was therefore natural that some of the best of his executive work should have been done in connection with questions of a technical-constructive or engineering character. Although Mr. Roosevelt is not by training an engineer, there is little reason to doubt that, had his intelligence and energy been turned in this direction, he would easily have risen to the front rank. In no profession is a true sense of proportion—the ability quickly to separate the essential from the non-essential—more valuable than in that of the engineer; and this quality our ex-President possessed in a remarkable degree and used to most excellent effect. For it is a fact that in all the great engineering problems that called for executive pronouncement and action, almost invariably, as the records of his seven years' presidency show, Mr. Roosevelt recommended legislation which met with the approval of the great body of professional men throughout the country. In proof of this it is sufficient to mention his attitude to the navy, the Panama Canal, and the vast problem of the conservation of our national resources.

There are not wanting proofs, concrete and costly, of the evil of unintelligent and obstinate forcing of lay ideas upon the professional men who design the *matériel* of the United States navy. Mr. Roosevelt's administration has been singularly free from such errors. He was a close student of naval affairs, and he understood the trend of naval development so well that the Department always found in him an appreciative and able advocate of its new designs. He favored the building of battleships rather than cruisers, and of all-big-gun battleships of the largest displacement. He was keenly alive to the value of target practice, and our present splendid shooting is largely due to his powerful backing of the officers who devised and carried through our present methods. To him, moreover, we shall owe, in no small measure, the system of promotion by selection and for merit; to say nothing of the coming reform of our present cumbersome methods of naval administration. It is true that in some details of his naval policy the SCIENTIFIC AMERICAN has been opposed to Mr. Roosevelt's recommendations, as, for instance, when he would have placed a seagoing officer instead of the Chief Naval Constructor at the head of the consolidated bureaus; but this has been the rare exception.

It is largely due to the clearheadedness and powerful influence of Mr. Roosevelt that this nation is not now engaged in the Herculean task of digging the Panama Canal down to sea level. There is something agreeable to nature, and therefore attractive, in the idea of a canal through which the water flows from ocean to ocean without obstruction. Mr. Roosevelt evidently thought so; and when his board of foreign and American engineers went down to the Isthmus to examine and report on the matter, he told them that he hoped they would find a sea-level canal to be feasible. The majority of the board reported, as he had hoped, in favor of a sea-level canal; and yet Mr. Roosevelt advocated the adoption of the minority report in favor of a lock canal. His critics called him erratic; but the fact is that, when the arguments in favor of a lock canal were presented, his practical judgment saw that they were unanswerable; and his fearless rectitude led him to condemn at once and strongly the very type of canal for which he had asked. The progress of events has proved the wisdom of his course. The lock canal is being successfully built; and a board of engineers, all experts in hydraulic work, has pronounced it to be the only type that will satisfactorily meet the conditions at the Isthmus.

For many years the professional world has been painfully aware of the unrivaled extravagance with which those great national resources with which the engineer and architect are most closely concerned are being exploited for private profit. They have realized that the nation was living on its capital and rapidly approaching, as far as these resources were concerned, a condition of national insolvency. Here and there, and not infrequently, a note of warning was sounded; but these men had neither the time nor the political vantage ground from which to set in motion the machinery of federal legislation. In President Roosevelt—ranchman, hunter, lover of the forest, rivers, and mountains—was found the very man to appreciate the magnitude of the threatened disaster and awake the nation to its responsibilities. His latest work in promoting the Congress for the conservation of our national resources, forms a fitting climax to his seven years' work in this and allied fields of endeavor.

A CRUISER WITHOUT FUNNELS.

The dispatch recently cabled from England to the effect that a big-gun cruiser is about to be laid down which is to be driven by gas engines and will, therefore, be entirely without smokestacks, has brought so many inquiries to this office, that we have published on another page a digest of the principal work that has been done hitherto in applying producer-gas engines to the propulsion of warships. In view of the fact that the largest engine of this type known to have been successfully tested in any sea-going vessel is of only 500 horse-power, the next largest being an experimental engine of 1,000 horse-power, it is safe to say that the British Admiralty is not committing itself to the immediate installation of producer-gas plants in any first-class warship. The new vessel, to be known as the "Indefatigable," is to be an enlarged "Indomitable"; and as the cruisers of this class carry engines which indicated on trial about 47,000 horse-power, it certainly does not appear likely that the British navy will commit itself to a jump of from 500 to nearly 50,000 horse-power, without a very considerable intermediate period of experimental trials. If the results obtained with the 1,000-horse-power experimental engine are as satisfactory as those obtained with the plant of half the power, we may look for tests with a 5,000 or even a 10,000-horse-power installation, the power being developed upon three or possibly four shafts. But if producer-gas engines were installed on the new "Indefatigable," it would be necessary to develop from 10,000 to 12,000 horse-power on each of four shafts. No such engines exist, even in stationary gas-engine practice, where the maximum size is from 5,000 to 6,000 horse-power.

However, the advantages of the application of the producer-gas engine to warships are so many and valuable as to make it well worth the while of any great navy to spend lavishly for experimental work aiming at the solution of the difficulties attending the problem. The removal of smokestacks would abolish the telltale smoke and render it frequently possible for a fleet to get within range before being discovered. The number of guns that could be carried on a given displacement would be increased and their arcs of fire enlarged. The perils of suffocation, due to smokestacks being torn open by exploding shells, would be completely removed; since the products of fuel combustion would be discharged through an exhaust in the stern near the water-line. Because of the high fuel efficiency, which is 80 to 100 per cent better than that of the ordinary marine steam plant, a ship would be able to steam nearly twice as far on the same coal supply. If the nation which first perfects a large marine gas engine should also possess the facilities and capital to rapidly build a fleet of gas-engine battleships and cruisers, she will gain a lead over her competitors that might take years to overcome.

VENTILATION OF PASSENGER COACHES.

From the description of the seventy-five steel passenger cars recently ordered for the Pennsylvania Railroad, it is evident that the company are in a fair way to secure the fireproof and collision-proof qualities which are sought in the design of the cars. Outside of mahogany window sashes and seat frames, the cars will be entirely free from wood fittings, the total weight of wood in each car being only 300 pounds out of a total weight of 116,000 pounds for the entire structure. The collapse of the car in collision is guarded against by the provision of a central steel box girder 24 inches wide and 9 inches deep, extending throughout the floor framing for the whole length of the coach. This massive construction will receive the full brunt of a collision, and serve as a defense against that disastrous telescoping, which is the most fruitful source of fatalities in accidents of this kind.

It is to the ventilation of these cars, however, that we wish to direct attention. The subject is particularly timely just now, when the traveling public is being put to so much inconvenience through the overheated and stuffy conditions which are the rule rather than the exception on some railroads. In a properly ventilated car the whole of the air should be renewed at frequent intervals; it should be warmed, and the proper amount of moisture should be imparted to it. The mere provision of steam pipes, and the opening of a few ventilators in the roof, will not secure the desired results. The air will be heated, but not properly renewed; and a considerable portion will be endlessly circulated between floor and ceiling, and dried out by steam heat to the point at which it becomes uncomfortable, if not positively distressing.

In the new Pennsylvania coaches the air enters by two hoods on diagonally opposite corners of the car roof. From the hoods it is led down by vertical ducts, placed within the sides of the car, to a horizontal duct adjoining the side sill and running the full length of the car between the floor and the sub-floor. Above the floor, for its full length, along the sides, are rectangular ducts in which are placed the steam heating pipes. The outside air enters the hoods and passes through the ducts beneath the floor, to openings into the duct containing the heating pipes. Here it is thoroughly warmed and is finally discharged into the aisle of the car through outlets provided beneath each seat. The air is liberated through ventilators in the roof, which are furnished with valves that regulate the escape of the air. The forward movement of the car forces the air in under a slight pressure, and the restraining action of the discharge valves maintains this pressure and prevents drafts of cold air passing in through cracks in the doors and windows. The system is an excellent one, being founded on thoroughly sound principles of ventilation; but we would suggest that, if provision could be made for adding the requisite amount of moisture to the warmed air before its admission to the car, its hygienic qualities would be improved, particularly for passengers whose throat and nasal passages are subject to catarrhal and kindred troubles.

A SUCCESSFUL FRICTION CLUTCH.

The clutch, on account of troubles with motors and axles, has not until recently received attention and development. Many types have been evolved, the principal and earlier one still used having the open air engagement, such as the leather-faced cone, the internal expanding type with the leather face, and the external contracting type. They are all subject to the influence of moisture, oil or dirt, which cannot be kept from their facings. The ideal clutch is the multiple-disk type, one in which the working parts are inclosed in a tight case filled with oil, and the uncertainties of the open type are eliminated. The disadvantages of this flat-plate multiple-disk clutch are, however, that the small frictional area which can be attained in the comparatively small space to which the designer is limited, makes necessary large spring pressures in order to transmit the power. The spring pressure in the usual type of flat-plate clutch is generally about 60 pounds to the square inch. This naturally means a greater tendency to undue wear and heating of the plates, with the consequent burning of the lubricant, or, in extreme cases, the warping of the plates. The solution of these problems was obtained in the successful use of a disk for transmitting power by the friction contact of highly lubricated V-shaped wedge plates. The 35 deg. angle corrugated plates give three times the frictional area of equal-sized flat plates, and will, therefore, transmit three times the horse-power, but with one-third the spring pressure, and therefore with one-third the pedal pressure. The clutch is self-contained, and not subject to outside conditions; except that in cold weather the oil becomes thick much in the same way as it does in the motor and transmission. This is easily overcome by using a mixture of half light cylinder oil and half kerosene.