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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.

THE NEW CUNARDERS.

The preliminary work, looking to the determination of the dimensions and the character of the motive power, of the two great transatlantic liners which are to be built for the Cunard Company has progressed so far, that we are now enabled to announce authoritatively the leading characteristics of these two remarkable ships. As regards dimensions, it may be stated that the new vessels will be so large as to completely dwarf even such huge vessels as the "Deutschland" and "Kaiser Wilhelm II." While there will be a considerable increase in the length, the new boats being about 100 feet longer than the "Kaiser Wilhelm II.," we must look to the increase in beam and draft to account for the enormous displacement of 40,000 tons which the new ships will reach. Of the fast liners, the "Kaiser Wilhelm II." is the broadest, with a beam of 72 feet, while her draft is 29 feet. The new Cunarder, however, will have a beam of not less than 80 feet and a minimum draft of between 34 and 35 feet, and the length over all will be 800 feet. From these dimensions it will be seen that the ratio of beam to length is larger than has marked the more recent transatlantic ships. Tank experiments, however, have shown that for these vessels the best speed lines can be obtained with the proportions given above.

In view of the fact that the SCIENTIFIC AMERICAN has urged that the time was ripe for the introduction of the steam turbine into the transatlantic service, we are gratified to be able to state that there is every possibility of turbine engines being installed in these vessels in place of the usual reciprocating engines. The matter has progressed so far that a special commission has been appointed to investigate the whole question of the economy of the steam turbine, and to advise as to its suitability for the new ships. The British Admiralty, which was invited by the Cunard Company to assist in the proposed investigation, have nominated as their representative the Deputy Engineering Chief of the Navy, together with the secretary who served on the Naval Boiler Committee, which has recently been carrying out such extensive and widely-known tests of the merits of the water-tube boiler. The Commission also includes the General Manager of the Cunard Company, the Engineering Surveyor of Lloyds Registry, besides several eminent engineers of the leading shipbuilding firms in Great Britain. The Commission will carry out an exhaustive series of trials, to determine the question of the steam consumption or fuel economy of the steam turbine when fitted to merchant ships. The results of the Admiralty trials of the new torpedo boat destroyer "Velox," which carries the Parsons steam turbine, will be placed at the disposal of the company, and it is probable that special trials of the steam turbine passenger ships that have lately been constructed for the Channel service will be carried out for the benefit of the Commission.

The determination to consider seriously the installation of turbines on these important vessels has been prompted by the universally good results obtained on the turbine passenger vessels now in service, and also by the difficulty of securing satisfactory shafting of the great size that would be necessary to transmit the total horse power of from 70,000 to 75,000, which will probably be indicated on these vessels when they are being pushed to their maximum speed. The leading firms, both in Great Britain and Germany, that manufacture steamship shafting, have expressed themselves as fully alive to the difficulty of finding satisfactory reciprocating engine shafting that would transmit 25,000 horse power per shaft, the largest power that any shafting is at present called upon to transmit being about 18,000 horse power. By the use of the turbine, with its high rotative speed, the dimensions of the shafting would, of course, be proportionately reduced, with well-known beneficial results. Another powerful argument in favor of the turbine has been the fact that while reciprocating engines of the size necessary would call for about 10,000 tons weight of machinery, the total weight necessary, were turbines used, would be only about 7,000 tons. Consequently, the size, the displacement, and cost of the ships could be reduced by 3,000 tons without affecting their revenue-earning capacity; for the passenger accommodation would remain the same. Furthermore, in view of the fact that steam turbines of 10,000 indicated horse power are now being built on the Continent under a guaranteed steam consumption of less than 9 pounds per indicated horse power, it will be seen that the great saving in weight and space due to the use of turbines can reasonably be expected to be made without any sacrifice of steam economy. Even if we admit that reciprocating and turbine engines would exhibit about the same steam economy, the turbines would show a great reduction of oil consumption and repairs, both costly items in the engine room of the high-speed liner; while there would be a considerable reduction in the necessary staff of engineers. This is proved by the fact that even in the relatively small Channel steamers "Queen" and "Brighton," which are not of more than 2,000 tons displacement, there are three fewer engineers required in each engine room than would be carried if the engines were of the normal type.

The report of the turbine commission, which will be delivered probably within a couple of months, promises to be one of the most valuable documents of the kind that have recently been made public. As to the speed of the new ships, there will be a call for 25 knots sustained sea speed, with probably a trial speed of 26 knots per hour. The vast size of these vessels, the enormous momentum which they will have when running at full speed, will render them comparatively independent of adverse weather; and it is quite within the range of possibility that a ship leaving New York at 10 o'clock on Saturday morning will be in the Mersey early in the afternoon of the following Thursday.

STEEL-CONCRETE CONSTRUCTION.

A most important addition to the list of available building and structural materials, and one that is making rapid headway in favor, is the combination of steel and concrete, whose successful introduction and exploitation is to be credited to French engineers. The reputation of concrete as a building material is almost as old as history itself; but although this material is admirably adapted for structures in which the stresses to which it is subject are chiefly those of compression, it has always been recognized that its lack of tensile strength placed a strict limit upon its usefulness. Thus, it is a most excellent material for foundations, retaining walls, and pavements, and for monolithic construction in the building of breakwaters and other subaqueous work, and in the construction of great reservoir dams. When it comes to using concrete for structures that are subjected to a transverse stress, or indeed any stress but that of direct compression, the material becomes altogether unsuitable. Thus, although the upper half of a concrete beam might have ample strength to resist compression, its lower half, unless the section were made of an impossible bulk, would fail for lack of tensile strength. The French engineers, however, have very cleverly overcome the difficulty by a judicious incorporation of steel rods or other structural steel shapes within the mass of concrete, in such a way that the finished member is reinforced in that portion of it that is subject to tensile stresses. Thus, in the case of a beam, or of an unsupported floor surface, the steel rods are laid in place near the under surface, and the concrete mass is then formed in around them, the proportion of the section of the steel to the concrete being calculated to bring the tensional strength of the concrete up to the required point. The frictional contact, or "bond," between the steel and concrete is estimated, where the work is properly done, at several hundred pounds per square inch, and the result has been proved to be eminently satisfactory. In the building of arch bridges, it has been found possible to make such a reduction in the thickness of the arches that a steel-concrete arch compares favorably in lightness and grace of appearance with an all-steel arch bridge. The new construction is finding a wide variety of uses, and reinforced concrete columns are now being used in active competition with all-steel columns in building construction. A notable instance of the great utility of the system is found in our own Rapid Transit tunnel in New York, where the method of building the walls and roof of I-beams with concrete arches turned in between, has given way to a new type of steel-concrete work in which the walls are finished off with plane surfaces. The cost of materials is considerably less, and, because of the simplicity of the system of erection, there is necessarily a great saving in labor. The new construction is one of the most interesting that has been introduced of late years into general engineering and building work, and there is no doubt that it will serve to break the practical monopoly which steel has held in certain lines of engineering construction.

NEW FIELD GUN FOR THE BRITISH ARMY.

There is to be introduced into the British army, to replace the types already in vogue, a new field gun, the features of which are accelerated quick firing, efficiency, strength, and mobility. When the number of batteries was increased some time ago, the new German quick-firing field gun was adopted, as it was considered that it was the best in existence. These guns, however, have proved a miserable failure. They were accurate enough so far as their actual shooting was concerned, but they were not sufficiently quick-firing in the sense in which quick firing is at present implied, and they were of too light construction. Breakdowns were frequent with the gun carriages, and they had practically to be rebuilt at the government arsenal before they were fit for hard service.

A short while ago the British War Department secured two of the most recent field guns now used in the French army. Modifications were carried out and improvements effected to adapt them to the exigencies of the British army, and from the experiments that have been carried out upon the government proving grounds, they have proved eminently successful, and superior to any other quick-firing field guns used by other countries, with the exception of France.

The new weapon possesses four salient features in its design: the improved breech action, increased range, greater rapidity of fire, and perfect absorption of the recoil. The extreme range is 10,000 yards, and the rapidity of fire is 29 rounds per minute. Owing to the improved time-fuse that has been devised, shrapnel fire is now rendered effective at a range of 6,400 yards, which is a tremendous advance upon any field gun in use in the British army at the present time. The interrupted screw principle in the old type of breech action has been entirely dispensed with. The old threaded, coned steel breech block necessitates intricate and delicate mechanism in order to cause it to work efficiently, and furthermore requires skillful manipulation in the insertion of the shell to prevent the burring of the thread. This care impeded celerity in loading and firing to an appreciable extent. The new breech is that, invented by Col. Deport of the French artillery, and in the place of the threaded cone block, there is a plain steel disk swinging on a pivot, and operated by a system of levers and ratchets. A crank handle is connected to this steel disk, and when this is pulled, the disk slides round upon the pivot, admitting the insertion of the projectile into the bore, while a reversion of the opening action closes the breech ready for firing. Directly the disk swings to and closes the breech, an automatic device fires the gun. This is a very simple contrivance, and expedites the rapidity of discharge to a very marked extent, as the whole operation of loading and firing can be accomplished in about two seconds. At a trial of this weapon in the French army, a gunnery detachment fired eight rounds in fifteen seconds, and thirty rounds have been discharged in the space of one minute by expert gunners. Another advantage of this system lies in the fact that if it is desired to maintain a slow rate of firing, it is only necessary to throw the automatic firing mechanism out of gear, which operation is effected by a simple device, and the gun is then fired in the orthodox manner by the pulling of a lanyard, which actuates the striker. When the shot has been fired, as the breech is opened, an extractor comes into action, grips the cartridge remaining in the breech, and jerks it out, so that the gun is ready for the immediate insertion of another charge. Fixed ammunition, consisting of the cartridge and shell joined in one piece, is employed for this weapon.

The hydro-pneumatic brake for the absorption of the recoil is also utilized. This mechanism comprises two almost vertical pistons, which are partially filled with a mixture of glycerin and water. When the gun is discharged, it rises under the force of the shock, and in doing so the mixture in the pistons, together with a certain amount of air which serves as a buffer or cushion, is forced through small holes in the piston head, and the resistance offered to the liquid, together with the weight of the weapon itself, is such that the shock of the recoil is entirely absorbed. After the shock has been thus taken the gun returns to its normal position for loading and firing again. The advantage of this system is that the gunnery detachment need not retire from their positions during the moment of firing, but can maintain their ground with absolute safety. By this means no loss of time in loading is incurred.

The government war authorities have carried out most severe trials with this weapon, but so successfully has it emerged from the ordeal, that the field artillery batteries are to be equipped with it at once. Furthermore, owing to the unique success of the breech mechanism, an effort will be made to adapt it to the requirements of the heavy guns carried on cruisers and battleships.