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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 ERA FOR THE STEAM ENGINE.

Unquestionably, in the development of the steam engine, we are just now entering upon a new era, which, when steam has ceased to be used as a prime mover, and the history of the age of steam comes to be written, will be distinguished sharply from the first era, which is now apparently drawing to a close. To Watt, we take it, must always belong the credit of having opened, in a practical way, the era of the reciprocating steam engine, and to Parsons will belong the credit of being the first to demonstrate in a commercial sense that the term of usefulness of the reciprocating engine was, at least for the majority of uses to which it has been put, drawing to a close, and that the era of the simpler and more efficient turbine had arrived. In saying this we would be careful to emphasize the fact that as long as steam continues to be used, the reciprocating engine will, for some classes of work, continue to be the most serviceable motor. To particularize, we have only to refer to the steam locomotive, to convince everyone who is familiar with the demands and exigencies of locomotive service, that the turbine is never likely to displace the reciprocating engine in this class of work.

As an electrical drive, however, it is pre-eminently qualified, and since electrical power seems destined to indefinitely enlarge its field of application, the growth of the steam turbine in connection with the electrical industries is destined to be rapid and widespread. But although the turbine is not applicable directly to the locomotive and the street car, it is the ideal motor for the propulsion of steamships. This is said with a full appreciation of the fact that there are difficulties of reversing which limit the maneuvering power of a ship in entering or leaving a dock, or in making landings; for this objection has been largely overcome by the provision of separate reversing motors. In any case, the difficulty is so greatly outweighed by the economy of the turbine in weight and fuel, and by the advantages of a complete absence of vibration, that we look to see the steam turbine enjoy a monopoly, as a marine engine, second only to that which it will achieve in connection with electrical power on land. Indeed, the only classes of work to which the turbine may not prove to be immediately applicable are those which involve much starting and stopping, and considerable running at slow and intermediate speeds. In work of this kind the reciprocating steam engine will always find a limited sphere of usefulness, unless, indeed, even here it is driven out by the ubiquitous electric motor.

The advance of the steam turbine during the past few months, both in size and power, and in its application to large plants, has been quite remarkable. Two of the largest manufacturing concerns in this country have been for some years watching closely its development, and have themselves been conducting experimental work to determine its efficiency and to improve upon existing forms. Although the Parsons turbine is an English invention, and practically all the work with large units that has been accomplished has been done by these machines, it is a fact that the Westinghouse Company, which secured the rights for the Parsons turbine in this country, has already built, or is now building, eight turbines of from 750 to as high as 2,500 horse power. These Westinghouse-Parsons machines, as they are called in this country, have been giving most excellent results, and the 2,500 horse power turbine, which has now been employed for about a year in an electric light and power plant at Hartford, Conn., is the largest turbine and probably the most economical steam engine in the world. In addition to these machines, we understand that the same company has received an order for a large turbine for South Africa, which is to be used in a big power-transmission scheme that is being worked out in the Rand gold fields. The General Electric Company have in operation at their works a 750-horse power turbine of the bucket-and-nozzle type, the plans for which have been worked out by the company's engineers. This turbine has also shown excellent economy, and we understand that the company stands ready to manufacture it upon a commercial scale.

Most significant fact of all, pointing to the ultimate monopoly of the steam engineering field by the new type of engine, is the confidence with which the great railway and power companies are adopting the turbine in large units as a drive for electrical generators. We referred last week to the fact that the London underground railways were equipping a 100,000 horse power plant with ten 10,000 horse power turbines. We are now able to announce that it is only the conviction that nothing of an experimental nature must be allowed to enter into the equipment of the new Rapid Transit Subway's power plant that prevents its equipment with the steam turbine. As it is, only six engines of the reciprocating type have been ordered, and the balance of the order has been left open with the expectation of installing the turbine when there is a demand for the full power of the station. Reference was also recently made in these columns to the probability of the new 25-knot liners for the Cunard Company being driven by turbine engines, while a sister ship to the turbine passenger steamer "King Edward," which did such good work on the Clyde last year, is under construction, and three large steam yachts have also been ordered in Great Britain which are to be equipped with the same motive power. Incidental evidence of the widespread appreciation of the fact that we are on the eve of revolutionary changes in motive power came to our notice the other day in the case of one of the largest steam yachts that has ever been planned in this country. At the eleventh hour the owner requested that the plans be held in abeyance for another season until the performance of the new British turbine-propelled yachts could be noted.

TEMPORARY RELIEF AT THE BROOKLYN BRIDGE.

For want of the necessary farsightedness on the part of city officials and the heads of the great railroad companies, New York city is confronted with a series of deadlocks in its transportation which are bad enough to-day, and promise to be considerably worse in the future. One of these is occasioned by the notorious Grand Central tunnel and the wretchedly inadequate facilities of the Grand Central Station terminal yard. For this condition of things there is nobody to thank but the Directors of the road, who, rather than make the necessary expenditure in an experimental equipment looking to the electrification of the road, allowed matters to drift to their present intolerable condition. Other deadlocks are to be found at the various points of concentration in the traffic of the Manhattan Elevated Railroads. The City Hall terminal, the transfer station at Harlem River, the express trains on the Ninth Avenue, and the whole stretch of Sixth Avenue, from near the Battery to above the Park, witness, morning and night, a condition of crowding and jostling which can only be matched in the mad struggle of the occupants of a stockyard train at Omaha or Chicago. Here again the intolerable conditions would never have been reached had the railroad company instituted the present changes in motive power some three or four years ago, when the state of the electrical art was quite sufficiently advanced to warrant the change. As an instance of what an aggressive and broad-minded company can accomplish in the struggle to meet the ever-rising tide of travel, we turn with pleasure to the work of the Metropolitan Street Railway Company, who alone seem to have provided for the increasing travel of the future, and have at all times had under way great and costly changes in equipment, which have enabled the company to handle its traffic under conditions that are crowded, but by no means intolerable.

Of all congested centers in the city, unquestionably the worst is the Manhattan terminus of the trolley roads that cross the Brooklyn Bridge. Here, during the past few weeks, it has been a not infrequent occurrence for passengers to be thrown down and so seriously injured as to necessitate their removal to a hospital. Indeed, it was only last week that a policeman that stood six feet something in his stockings was himself dragged unconscious from the crowd. Bridge Commissioner Lindenthal, who has been devoting constant attention to this problem ever since he took office, has recently presented a plan looking not merely to the relief of the Brooklyn Bridge, but to the proper handling of the travel over the bridges which are now under construction. His plan involves the purchase of the block on which the offices of the Staats Zeitung are located, and its conversion into a great terminal yard for the use of bridge trains and surface cars. This improvement, together with the running of the Brooklyn Bridge tracks by way of an elevated structure to the terminus of the two new East River bridges, would involve an outlay of something like $14,000,000, and it is likely that the great cost of the scheme, excellent as it otherwise is, will prevent its adoption.

In any case it is imperative, pending the carrying out of a scheme of relief on a large and permanent basis, to devise some emergency measures which will give immediate relief at the Brooklyn end of the Bridge. The plan proposed by the Bridge Commissioner is to provide a series of loops in the Bridge Plaza at Brooklyn, and run, during rush hours, a series of circulating trolleys over the Bridge, these trolleys to use the new loops on the plaza and the present four loops at the Manhattan end of the Bridge exclusively. Extra loops are to be laid at the Manhattan end of the Bridge, which will be used exclusively for through trolley service. It is estimated that this plan, by greatly increasing the number of trolleys that can pass over the Bridge in a given time, will provide a relief which will make conditions tolerable until a more comprehensive scheme can be devised and put through. The two extra loops could be put down in three or four weeks' time, and by using timber in place of structural steel, as the Commissioner suggests, the necessary changes at the Bridge terminal could be carried out very expeditiously. It certainly seems to us that this emergency plan is about the best that can be devised under the circumstances.

USE OF VARIOUS MOTORS IN AEROSTATICS.

M. Armengaud, Jr., in a paper which he read lately before the Société Civile upon the progress of aerial navigation and the experiments of Santos-Dumont, passes in review the different sources of motive power which are applicable to dirigible balloons, namely, steam, electricity, and explosion motors. As concerns the steam engine, as long as the aerostat is filled with hydrogen it would be imprudent to carry in the car a furnace or burner whose sparks could produce the inflammation of the gases and the explosion of the balloon. Nevertheless, if it were possible to isolate sufficiently the balloon from the car, or to make the former of incombustible material, the danger would be warded off. In the case of the steam engine there is to be considered the weight corresponding to the supplies. This weight is considerable, since it necessarily includes the water and combustible. M. Serpollet, the inventor of the steam system so successful for traction cars and automobiles, says that with his system of flash-tube boiler he is able to reduce to 420 pounds the weight of a machine giving 30 horse power, or 14 pounds per horse power, but it must carry 2½ gallons of water, which would be too heavy a load for the balloon. Perhaps the weight could be reduced still further by replacing the engine by a steam turbine of the Laval or Parsons type. As to electricity as a source of motive power, he mentions that Renard and Krebs in their experiments of 1884 succeeded in reducing the weight of the battery to 880 pounds for a motor giving 9 effective horse power. In this weight of 880 pounds is no doubt included the motor which was constructed by Capt. Krebs and weighed only 22 pounds; this figure has not been diminished since. As to the question of explosion motors, the author considers briefly the history of their development since Lenoir and Hugon, down to the modern forms of Daimler, Panhard and De Dion. It has been necessary to arrive at great speeds in order to utilize to advantage the heat-producing power of the fluid combustible. From 160 revolutions per minute at first, we have now reached 1,600 or more, and it is understood that by thus increasing the speed we obtain ten times the power for a given weight, or what is more interesting here, we diminish the weight ten times for the same power. This lightness may again be increased by reducing the dimensions of certain organs and by using materials which are sufficiently resistant with a small weight; thus steel may be used instead of cast iron, aluminium for the parts which do not work, etc.

The development which has taken place in France in the construction of motors for automobiles pushed the constructors to make motors as light as possible for the class of automobiles known as voiturettes and light vehicles. The De Dion type of motor is a good example of a successful light motor, and this type is now used, with modifications, by many other constructors. Before the experiments of Santos-Dumont it does not appear that aeronauts have been greatly encouraged to use the explosion motor, but it may be remarked that since the time he began his experiments, which is several years ago, the motors have been greatly improved. Among the motors which are now in competition for lightness and power may be cited the Buchet (which is the type last used by Santos-Dumont), the Mors, and the Panhard and Levassor, which arrives at 11 pounds per horse power. A new type is the Bourdiaux, in which the radiating circles on the cylinder are of aluminium and which weighs only 7.7 pounds per horse power for sizes ranging from 10 to 25 horse power and 7.3 pounds from 25 to 50 horse power. For experiments of short duration the aeronaut must add about 1-10th of the weight of the motor for gasoline, and for a voyage of 10 hours it would require the same weight for gasoline as for the motor. As regards the stability of the balloon it would be preferable if the diminution of weight due to the burning of the combustible were compensated by a decrease in the ascensional force. This could be brought about in other ways than by letting the hy-