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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 GATUN DAM MISREPRESENTATIONS.

If it is any satisfaction to the critics, who have recently tried to persuade the people of the United States that the present plan of building the Panama Canal will result in disastrous failure, to know that they have succeeded in imposing on the country the cost of a highly expert commission of engineers, appointed to accompany Mr. Taft to the Isthmus, the probability is that this is all the satisfaction they will derive; for there is but little doubt in the mind of any candid engineer who has examined into the latest data, furnished by Col. Goethals and his band of very able assistants, that the lock canal as now being constructed will be indorsed by Mr. Taft's commission. Certainly the SCIENTIFIC AMERICAN has no anxiety as to the permanence either of the Gatun dam, the locks, or the canal as a whole. We go even further than this, and assert our belief that, by the time the canal is finished, it will be impossible to find a similar engineering work, which has been subjected to such a searching preliminary investigation of the debatable elements of its construction, as this canal has received and is at present undergoing. Nothing has been taken for granted, and millions of dollars are being spent in preliminary investigation, meteorological, geographical, geological, and physical; with the result that by the time of the opening of the canal in the year 1915, the people of the United States may be perfectly satisfied that this, the world's greatest artificial waterway, will be as lasting as the hills which surround it and the two great oceans which it has linked together.

These being the facts, we cannot but feel that the time has come to utter a word of strong protest against the yellow-journal methods which have been adopted by certain professional men, in endeavoring to raise a doubt in the unprofessional—and that means the majority of the public—mind, as to the character of the work being done at Panama. It is not a difficult matter to arouse popular apprehension concerning hydraulic works of great magnitude. It is rendered easy by the fact that the problems involved are often difficult and obscure, and the results of failure usually include large losses in life and property. Because of its great distance from the United States, and because of the fact that this stupendous engineering work is being built in a tropical country, whose physical characteristics and climatic conditions are strange to the people of the United States, the public mind is acutely sensitive to alarmists' rumors, particularly if they are uttered by men whose technical knowledge and wide experience in works of this character would seem to qualify them to speak with authority.

We regret to say that the character of the professional attacks now being made upon the canal arouses a serious doubt as to their being based upon conviction and made in good faith. It is significant that the most bitter opposition has come from men who have their own pet schemes, either for a different type of canal, or a different method of construction. In each case these critics received an impartial and extended hearing before the Isthmian Canal Commission, to say nothing of large opportunities of presenting their views to the world through the medium both of the technical and non-technical press. If these men have failed of conviction they are, of course, entitled to maintain their critical attitude; but the ethics of debate, and particularly of professional debate, demand that their criticisms be presented in a frank and fair spirit, free from any suspicion of subterfuge; and we claim that it is subterfuge to select isolated statements from the published reports of the investigation and experiments of the engineers, separate them entirely from their context, and impart to them a meaning which they were never intended to convey.

As specific instances of this deliberate misleading of the public by the time-honored method of throwing dust into its eyes, it is sufficient to note two notorious instances. During the sinking of borings to ascertain the character of the foundations of the Gatun dam, a small quantity of water appeared in some of the holes. It was insignificant in amount, rose only a small distance in the holes, and was found to be restricted to a few limited areas. Yet, on the strength of this fact, the rumor was started that the whole of the dam was founded upon a "subterranean lake"! Again, in preparation for the depositing of the material of the dam by the hydraulic method, the engineers built a rock fill across the valley along the upstream and downstream edge or toe of the dam, the object of which was to retain the solid material, as it was deposited by the hydraulic dredges, and prevent it from washing away with the water as the latter drained away from the dam. During the progress of the fill across the valley, it encountered the channel of the old French canal, which during the past twenty years had become filled with silt and mud. The engineers determined that it would be cheaper to dump the rock into the mud and let it sink to a solid foundation, than to excavate the mud beforehand. Accordingly, the fill was carried across the old channel; and, as soon as the load imposed was sufficient, the material sank, as the engineers expected and desired, displacing the mud on either side, until the rock rested ultimately on the firm underlying ground. No sooner was this trivial event, which had no significance whatever as affecting the future permanence of the dam, cabled to the United States, than it was seized upon, worked up into an alarmist article which, because of its pseudo-technical flavor, was well calculated to arouse public apprehension, and was distributed broadcast to the press.

The visit of Mr. Taft and his Board of Engineers to the Isthmus will have the desired effect of allaying the public apprehension, which has been aroused by such misrepresentations as we have above referred to. But we are satisfied that, as far as the great body of civil engineers in this country is concerned, the facts which have been developed by the surveys and experimental work of the past few years, so far from shaking their faith in the practicability of the present lock-and-lake canal, have strengthened it immeasurably.

THE NINTH ANNUAL AUTOMOBILE SHOW IN MADISON SQUARE GARDEN.

The ninth annual automobile show in Madison Square Garden was held this year, as usual, by the Licensed Association of Automobile Manufacturers, two weeks after the show of the American Motor Car Manufacturers' Association in the Grand Central Palace. Although the demand for space was greater than ever, and every nook and corner was filled, the exhibition as a whole was not especially interesting, particularly as far as novelties were concerned. There has been no change from standard design by any of the leading makers. They have contented themselves with improving the details of their cars wherever possible, as is shown in the case of the ignition of the motors, which has been rendered more reliable by the general adoption of magnetos. A coil and battery system is generally fitted for reserve, and this being the case, we believe that many owners of cars will be interested in an improved ignition and lighting system, which is intended to replace the magneto. A substantial multipolar dynamo, which weighs 8 pounds less than the usual magneto, is geared direct to the engine, or driven from the flywheel by means of a friction pulley with a governor. A special current-governing device makes it possible to set the charging current at any desired figure up to 10 amperes, while an automatic switch closes or opens the charging circuit when the dynamo starts or stops. In this way the 6-volt storage battery can always be kept charged, and used as a source of current for all the lights of the car, including 30- or 40-candle-power tungsten-filament headlights. An electric siren or horn may also be used.

In addition to a special high-tension ignition apparatus without vibrators, that is run from dry batteries and that produces but one spark in each cylinder in order to ignite the charge, a distinctly new device of somewhat the same character was shown. This new apparatus consists of an ordinary low-tension spark coil with but a single winding, which is used in connection with very small individual spark coils attached to the spark plugs. The first coil is provided with a condenser, and has one end of its winding grounded through the battery, and the other end connected to the center plate of a commutator, the four insulated poles of which are connected to the primaries of the four small spark coils. The condenser discharge, in addition to the regular current, passes through these coils, and produces an oscillatory spark in the secondary at the plugs. This spark is very rapid, and it also has the peculiar quality of not shocking one, as does the ordinary jump spark. The apparatus does away with vibrators, and while there is but one spark, it is sufficiently intense to have excellent igniting qualities.

Shaft drive has become even more popular than magneto ignition, for all but three of the thirty firms exhibiting touring cars showed shaft-driven cars, and twenty-one of them showed this type exclusively. Only cars of the heaviest and most powerful kind were fitted with a double chain drive. In the matter of transmissions, the selective sliding gear type is most widely used. These transmissions generally give three speeds forward and one reverse; but fourteen of the twenty-nine gasoline touring car makers showed machines fitted with transmissions having four speeds forward and one reverse.

The six-cylinder engine, while it has not increased in numbers very largely, has nevertheless become a favorite with many. Nine firms exhibited cars of this type, and one of them especially will build only six-cylinder cars during the present year, as it did last year. The only firm producing air-cooled cars that exhibited also had a six-cylinder machine, while the one firm producing a two-cycle car showed a three-cylinder two-cycle engine, which is, of course, equivalent to a six-cylinder of the four-cycle type. The practice of casting the engine cylinders in pairs is followed by twenty-two makers, while eleven showed separately cast cylinders, and two exhibited engines cast in one piece. Low-tension make-and-break ignition was found on the engines of but four makers.

There were not so many popular-priced cars exhibited as at the Grand Central Palace Show. But five manufacturers showed four-cylinder touring cars, ranging in price from $1,850 down to $1,400. The only other low-priced machines were a single-cylinder touring car at $950, and a two-passenger buckboard at $350. The large majority of machines ranged from $2,500 to $3,500 in price.

A striking feature of the show was the exhibit of motor bicycles in the basement. A score of different makes of machines were exhibited. There were two makes of four-cylinder motorcycles, and one machine equipped with a three-cylinder engine, the cylinders of which had a fan-like arrangement. The majority of the machines were fitted with single-cylinder or V-type engines.

A number of commercial vehicles were shown in the basement, among them being a huge fire-hose wagon for the New York city high-pressure system. The electric vehicles were also numerous, there being no less than eight different makes on view.

THE LABOR INVOLVED IN LIQUEFYING HELIUM.

Few more telling examples of the modern physicist's dogged patience can be found than Onnes' feat in liquefying helium. The achievement is noteworthy, not because any new light was shed on the physics of gases, but because of the painstaking methods employed. Dr. Onnes started at six in the morning. For seven and three-quarter hours he labored to get twenty liters of hydrogen before the real experiment could begin. Between seventy and a hundred liters of liquid air were necessary for the cooling of the helium gas. Liquid air boils at 60 deg. C. absolute; hydrogen at 23 deg. C. The difficulty was to lower the helium down this heat precipice. Under the intense cold, the pressure of the helium fell from 100 atmospheres to 40, and still there was no trace of the formation of a liquid; but as the last lot of liquid hydrogen was introduced the temperature fell to 5 deg. absolute, and then with difficulty Dr. Onnes was able to discern the layer separating liquid from gas. It stood out with the sharpness and precision of the edge of a knife—about sixty cubic centimeters of liquid, which the physicist kept under observation for about two hours. He exhausted it with a pressure of between 2.3 centimeters and 7 millimeters of measure; but no solid was formed, and the liquid remained mobile, with a density of 0.15, the ratio of its volume to the volume of the gas being as one to eleven. At the temperature achieved in this experiment, hydrogen would become as solid as granite. There is great need for further investigation. As Sir James Dewar remarked before the British Association, it is fitting that the final resolution of the last recalcitrant gas should be the work of a Dutch scientist, for it was on the work of Van Dir Waals that the methods for the liquefaction of gases were largely based.

In the matter of the purchase of an automobile, the questions to be considered are the weight and the horse-power. Other things being equal, a motor car should average less than one hundred pounds to the horse-power, and it follows that the lighter the weight of the car, when materials are not sacrificed in its construction, the greater will be the economy in fuel and tires.