speed. As a corollary to this effort, the Corliss valve makers were compelled to modify their Corliss gear, so that the same result was attained, and this they did by adding a second or supplementary governor, the duty of which was simply to turn a right and left screw by which was varied the length of the connection between the governor and the trip gear. By means of a piece revolving between two detents, it is easy to arrange any governor to any degree of adjustment, so that any departure from normal speed shall cause revolution one way or another of the screw sleeve. In the Corliss gear the supplementary governor did this. Supposing a change of engine speed causes a pull of, say, ¼ inch in the trip rod; the supplementary governor puts into gear a winding train, which turns in the screw sleeve in this rod untill the ¼ inch of pull has been let out again. The tripping piece being thus still held at the position it was placed in by the governor, while the latter has been allowed to fall back to position of normal speed, this supplementary action will always bring the engine to its normal. In the old Boulton and Watt days a certain percentage of speed variation was allowed and a suitable fly-wheel added.

As Mr. Aldrich points out, there is a difficulty with large engines in regulating them for sudden and heavy variation of load. In an engine of high reciprocation, say, of ten working strokes a second, the load variation can be coped with in one-tenth of a second, but with large engines where, say, for a 1,000 horse-power, a suitable quantity of steam has been admitted to the cylinder to maintain such power, a sudden decrease of 500 horse-power cannot be coped with until next stroke. In such a case with steam at cut-off for 1,000 h.p. rate at work, there would be 500 h. p. going entirely to acceleration.

It follows that for such a case we must know, or assume, the maximum and minimum loading, and, having fixed upon the speed variation which can be allowed, we must so proportion our fly-wheel weight that the maximum load variation during that portion of the stroke uncontrolled by the governor shall not set free, or absorb so much energy as to accelerate the fly-wheel beyond the allowed limit, or add to the duty of the engine more load than can be taken out of the stored energy of the fly-wheel.

For central station work, Mr. Aldrich is in favor of some kind of electro-magnetic govenor which shall act quickly upon a variation of load, and it would appear that such a governor should act by curtailing the steam supply before it would be influenced by the centrifugal governor; but even the most rapid action cannot possibly take effect after the beginning of expansion, and the problem of regulating large engines is one of the most powerful objections to their use for central station work. The power to cope with an increased load is even more difficult than that of dealing with a suddenly reduced load; for in the latter case it is quite open to us, if we do not mind wasting some of our energy, to cause the electric governor to put in action a a powerful break, but this would have no counterpart in the reverse action of sudden load increase, unless it be in some device for re-admission of steam to the cylinder after cut-off has occurred.

In respect of governing, the steam engine does not compare favorably with the turbine, either hydraulic or steam, for the turbine can be very quickly regulated, being equivalent to a steam engine of infinite reciprocation. In any station the question of engine sizes must very largely depend upon the total power to be generated if great steadiness be required, and in a station with several engines, better results may be expected than from a single engine, which may be drawn upon for the whole of the load variation.

For sudden load variation it will always be difficult to so regulate an engine as to avoid considerable departure from even mean normal speed, but for gradual changes of load the problem was solved half a century ago, in the manner described, and as has been very commonly carried out in Corliss engines, and in the Knowles supplementary governor brought out a few years ago. With these appliances the engineers of the great textile factories preserve an almost absolutely even mean speed, as evidenced by a speed recorder, and any variation in speed during each revolution in controlled by the fly-wheel inertia, With the best of governing, there must always be placed considerable reliance upon fly-wheel action, and this the small, quickly reciprocating engines do, for their small fly wheels have very considerable inertia relative to the stroke duration. The so called slow running mill engines are not really slow running as regards piston speed, and many of them might with advantage be made of higher reciprocating speed and could be, were better attention given to bearing surfaces, which could be run much tighter than they are if more truly circular, for with correct valve setting, the change of direction of pressure need not be accompanied by shock, to get rid of which is one of the objects of the design of single-acting engines.—London *Electrical Review.*

## CHANGES IN THE CANADIAN PATENT LAW.

IMPORTANT amendments have been lately made to the patent act of Canada by the Canadian Parliament. Some new features borrowed from the United States patent laws are noticeable, such as the employment of examiners in the Patent Office to make a thorough examination of the applicant's title to his invention. The other material changes made are noted below.

Models of inventions or specimens of compositions need now only be furnished if required by the Commissioner of Patents. The duration of a patent is to be 18 years, with a fee of $60, with the option, however, of paying partial fees of $20 and $40 for terms of 6 or 12 years.

The inventor's oath or affirmation may be made before a minister plenipotentiary, *charge d'affaires*, vice consul or consular agent, a Judge of any court, a notary public, a justice of the peace, or the mayor of any city, borough or town, or a commissioner for taking affidavits having authority or jurisdiction within the place where the oath may be administered.

Importation of the invention into Canada after 12 months from the time of granting a patent (or any extension of such period) by the patentee, his representatives or assignees for a whole or a part of his interest in the patent, renders the patent void only as to the interest of the party importing or causing to be imported.

A federal court, the Exchequer Court, is given jurisdiction not only of all questions involving the validity of a patent but also of all questions arising as to whether any intrest therein is null and void.

A citizen of Canada electing to obtain a foreign patent for an invention, before obtaining a Canadian patent, shall have the right to obtain a patent in Canada, if the same be applied for within one year of the date of issue of the first foreign patent, the inventor gives notice to the commissioner of his intention to apply for a patent in Canada, then no other person having commenced to manufacture the device in Canada during such period of one year shall be entitled to continue such manufacture after the inventor has obtained a patent in Canada, without the consent of the inventor.

## SPARKS.

Mr. Hendrie, the owner, is negotiating for the sale of the St. Thomas street railway.

A brick addition is being built to the present power house of the North-West Electric Co., Winnipeg, and two additional steam boilers installed.

Mr. F. N. Gisborne, Superintendent of Government Telegraphs, and one of the most able electricians of the day, died at Ottawa on August 27th, aged seventy years.

Messrs. H. P. Dwight, the president, and G. D. Perry, the secretary of the Great Northwestern Telegraph Co.; F. H. Waycott, the manager of the Anglo-American Telegraph Co.; Wm. Wainwright and F. Roper have given notice to the Quebec Legislature of application for incorporation under the name of the Anglo-Provincial Telegraph Co., with a capital of $25,000. This company will carry on a general telegraph business in the province of Quebec, with headquarters at Montreal.

The Merchant's Telephone Co., of Montreal, has applied for incorporation with a capital of $100,000, to do a general telephone and electric business. In order to prevent the concern from being absorbed like its predecessors by the Bell company, each subscriber for a telephone must also subscribe for $100 of its stock and also agree to take his telephone for a period of five years. The rental of a telephone has been fixed at $25 per annum, and the stock of the company having been fully subscribed, will be increased largely.

Under the direction of Mr. A. B. Smith, Superintendent, the Great North Western Telegraph Co., have recently installed as part of their battery plant, a motor generator of new and novel design. The machine has been in practical use for some time past, replacing about one thousand cells of ordinary Calland battery. The officials of the company are so well pleased with the results and the great economy effected that it is the intention to discard the use of chemical batteries and adopt dynamo currents exclusively. This is the first time that telegraph companies in Canada have adopted dynamos for battery purposes, and the new departure cannot fail to be of interest to the fraternity.