our calculations show that the length of air-gap would require to be 3. 24 centimetres. This is some 40 per cent. in excess of the requirements of conductors and clearance; so, if the gap is reduced until it just allows of the requisite clearance, the induction must be increased from 5,000 to 7,000. Keeping the output of the machine the same, however, we can reduce the diameter of the armature to 54 centimetres, and work with an induction in the gap of 6,500. Observe, the magnetizing force spent in the gap has now been reduced by about 7 per cent., but the total field through the armature has been increased by 15 per cent., and the induction in the armature per square centimetre by more than 25 per cent. If we retain the same section of iron in the fields, it may be assumed then that about the same total magnetizing force is required, whether the machine has an armature 60 centimetres diameter, with a gap induction of 5,000 C. G. S. units, or one 54 centimetres diameter, with a gap induction of 6,500. The latter might turn out to be impossible owing to the greater heating of the armature core; anyway, what I am attempting to show now is, that by pressing up the induction with a view of reducing the gap, little if any, advantage is obtained. But by increasing the number of poles, and reducing the gap in that way, we effect, without increasing the gap induction, a marked economy. As it is unnecessary to go into a mass of figures to prove what each can readily prove for himself from the data already before you, I will just give here the results. If we substitute for the two-pole armature of 60 or 54 centimetres diameter and 90 centimetres long a four-pole one of 84 centimetres diameter and 45 centimetres long, a gap induction of 5,000, we require for the magnetizing coils while working at the same speaking limit, and with the same efficiency, rather under 70 per cent. of the copper on the two-pole field. When to the saving in copper there is added the saving in iron, there will be, after the extra labor is debited against the four-pole machine, a considerable balance in its favour. But to go beyond four poles in this case would be a mistake. Increasing the poles always results in actual increase of copper, unless at the same time the power spent in the gap is reduced, and this latter must be effected without reducing the thickness of the armature winding. The economy shown above is simply due to the fact that, in a two-pole machine of the dimensions specified, the gap necessary for the prevention of sparking must be much larger than the conductors require unless pressed up to a high induction. If with four poles the gap is still larger than necessary, we go to six poles, and so on. But when we arrive at a point where increasing the number admits of no reduction in the gap, we go no farther. It may be mentioned, however, that even in sizes where a four-pole construction showed no actual economy in first cost, it might still be preferable to the two-pole on account of its symmetrical field and the absence of the magnet pull.

(To be Continued.)

Mr. F. J. Barkey, is about to introduce incandescent electric lighting to the citizens of Tilsonburg, Ont., having recently purchased a 300 light dynamo for the purpose.

WAYSIDE NOTES.

(By a Travelling Correspondent.)

The town of Petrolia is very poorly lighted, the townspeople being afraid of adopting more generally the electric light lest it might injure their refined oil trade.

Brooks' Peterborough carbons now seem to be meeting with favor, and the electricians who have tried their last effort say they are equal to the carbons made on the other side.

Oil Springs, where there are about 50 steam plants working the different wells, might digest some of the remarks applying to Petrolia. The engineers of Messrs. Fairbanks keep their several plants in a very clean condition. The working of the engines is conspicuous by the absence of "pounding" so general in many of the plants both here and in Petrolia. If the other owners would only get their "rigs" in the same condition, the improvement would soon pay for itself.

The town of Strathroy has in Mr. S. N. Saylor a townsman who ought to have their support and thanks. Entirely at his own expense he has installed an electric light plant, consisting of a 50 h. p. Wheelock engine and a 4 and 8 ampere dynamo 1,000 and 2,000 lights. The town and stores have 30 arc and 5 incandescent lights. Still, the fact is to be regretted that the storekeepers and hotels do not more generally adopt the light. Possibly if the town had'nt it, they would lament the want of it.

The Forest City (London, Ont.) Electric Light Co., which is owned by Messrs. Hunt Bros., are seeking incorporation. The plant consists of two engines, 210 h. p., and a water power of 125 h. p., operating four 40 light, one 20 light and one 10 light Royal dynamos. This Company supply eighty-five arc lights 2,000 c.p., and ten incandescent to the city, and fifty-five arc lights to private users. The plant is under the able supervision of Mr. Robt. A. Lyons, with Mr. Richard Shapland as engineer and assistant.

Petrolia being the seat of the Canadian oil supply for lubricating purposes, may have an interest to our engineer readers. I visited a great number of the oil wells, also the whole of the refineries. The crude oil is forced by a Jerker pump from the rock. Some of our readers may not have seen the "Jerker"; I will explain. The "Jerker" is a wheel laid horizontally, and is worked from the engine by two shafts at each point of its diameter. The shafts work alternately, consequently giving the Jerker motion. From this wheel are attached lines to the pumps at the wells, and by this method as many as 150 wells are pumped by the one engine. At the refineries the crude is distilled and the different oils given off and afterwards manufactured into the cylinder and machinery oils. Some of the boilers here are in such a state that perhaps many of the engineers in our cities would be afraid to run them, the water being very hard and the boilers consequently scaly. I saw three of them opened, and the scale was of a thickness varying from ¼ to ½ inch. Some of of the boilers are run night and day, two men to each "rig," working twelve hours per day each. Don't you think these hours are too many? I do! But there is no help for it—"If you don't like it, you can leave it; lots of men (not engineers) to take your job." The well owners seem to have been very much afraid of the original Engineers' Bill becoming law lest they would have to employ competent men. One of them even went so far as to send a petition against the Bill to the member representing his constituency. It was signed by himself, and the words "and others" added thereafter. Quite a numerously (?) signed petition, eh! There are plenty of good engineers in Petrolia, and lots of material to make more. The men have never had a chance of improving themselves, and have (owing to their long hours), never had inclination or encouragement to do so. There are over 400 steam plants in this oil territory, and out of this number I got only about 50 subscribers. This number is the smallest average by 75 per cent. in the whole of the cities and towns canvassed. This ought not to be. It is to be hoped for the credit of the engineers themselves in the Petrolia oil territory that they will not be behind the engineers in other towns and cities in recognizing in your journal a means of improving their intellectual and financial standing.

I thank those engineers of Petrolia who so kindly let me their assistance in getting subscribers; also for their information respecting their different plants.