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GIVEN BEFORE THE

SELECT STANDING COMMITTEE

ON

AGRICULTURE AND COLONIZATION

SESSION 1914

BY

Mr. G. C. Wilson, M.P. for Wentworth, and

Messrs. F. F. Espenschied and J. W. Purcell, of the Ontario Hydro-Electric Power Commission.

ON

"HYDRO-ELECTRIC POWER AS APPLICABLE TO THE FARM".

OTTAWA

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HYDRO-ELECTRIC POWER

AS

APPLICABLE TO THE FARM.

HOUSE OF COMMONS,
COMMITTEE ROOM No. 105,
WEDNESDAY, February 18, 1914.

The Select Standing Committee on Agriculture and Colonization met here at 11 o'clock a.m., the Chairman, Mr. Sexsmith, presiding.

The CHAIRMAN.—We have with us this morning Messrs. Purcell and Espenschied, of the Hydro-Electric Commission, who will speak to us on hydro-electric power as applicable to the farm. Mr. Wilson, M.P., for Wentworth, has been very closely identified with this movement, and perhaps it would be well if Mr. Wilson were to first give a statement to the committee.

Mr. WILSON.—Mr. Chairman and gentlemen, the reason I spoke in the Agricultural Committee the other day in reference to the use of electricity on the farm, is because I believe that in it we have one of the means of solving the high cost of living and bettering the condition of the dweller on the farm. Some of the statements that will likely be made this morning as to the nature and extent of the work that is being done on the farm by means of electricity may seem amazing to some of you. Such pessimism is the same as we have been up against for the past seven years in connection with the hydro-electric movement. I may say, a published statement that I prize highly to-day is one that I made in the city of Hamilton in 1911, as regards hydro-electric power. What I then said, seemed to be regarded as impossible by some of the residents of the city of Hamilton, and met with the opposition of the Cataract Power Company, and two of the city papers, viz., the Hamilton *Times* and the Hamilton *Spectator*. One paid newspaper advertisement was headed: 'Wilson's Half Truths,' under which headline the papers devoted a half page advertisement to criticisms of my statement, and at the bottom of the page appeared a note reading: 'The above are by no means all of Mr. Wilson's half truths. Telling them all would tire you, but if you want to learn of some more, call 3301, and we'll tell you about them.' That was the way the hydro-electric project was met in the city of Hamilton. It encountered all kinds of opposition, but was ably supported by the Hamilton *Herald*. The city of Hamilton carried a by-law on four occasions, and yet the people did not get hydro, on account of the inaction of the city council.

We are in a position to state to-day something about what has been accomplished by the Hydro Power Commission in the towns and cities, and Mr. Purcell is here to enlighten us as to what can be done on the farm. In the city of Hamilton, and in my own town of Dundas, 'the Hub of the Hydro,' we have the Cataract Power Co. as well as the Hydro, and it was claimed that the prices we said light and power could be sold for at that time were all moonshine, and that it could never be done. To give you an idea of what can be done with regard to the price in the towns and cities, let me state that the city of Hamilton has to-day 7,128 Hydro consumers, and only in operation a little over a year. The average price per kilowatt hour for residence lighting for the year 1913 is 4½ cents. Some of you that are interested in the price

charged in your own town, if you will take these figures down, will then realize what you are paying and what we are getting it for. The average price for December per kilowatt hour for commercial lighting in Hamilton was 2⅛ cents, and the average residence account for the Hydro-Electric Commission for the city of Hamilton is 96 cents per month, and the average commercial account is $2.70 per month. The department for the year 1913 shows a net surplus of $34,000. The Cataract Power Co. in the city of Hamilton took about fourteen years in getting 9,000 consumers, and the Hydro-Electric connected up 6,500 in one year. The price paid for power in the city of Hamilton for the first year was $17.92 per h.p. per annum. I should have prefaced my remarks by stating that the Hydro-Electric is a cost proposition, and in every case the price comes down when the profits are shown to warrant a reduction, and these profits go back to the user in the form of reduced rates. If you are not a user of Hydro-Electric power or light in a city, township or village, you do not pay for it in the same manner as you do for waterworks, &c. When this movement was inaugurated it was alleged that it would involve a higher tax. The Hydro-Electric power does not add one cent to your taxes in any shape, form, or manner. Its opponents cannot name a town where it has increased taxes, and if surplus there is it must be taken for the reduction of the price to the consumer or an extension of the system. As I have already said, Hamilton started by paying $17.92, and to-day is only paying $15 per h.p. for 24-hour power. In Hamilton the Cataract Co. formerly charged for one h.p. $4.67 per month; under Hydro rates, one h.p. used for ten hours per day, twenty-five days per month, costs $1.54 per month. It has been stated that the price should have been the same all over the province of Ontario. You would never have had any Hydro-Electric system if that had been the case. You have to pay more for your power the farther you are away from the source of supply, but that does not necessarily show that the price for light in some towns farther away than Dundas and Hamilton are from Niagara Falls will be higher. The proof of this is to be found in the Hydro-Electric report, where you will learn that the city of St. Thomas is selling light cheaper than the city of Toronto. Toronto gets her power for $15 per h.p., and the city of St. Thomas pays $28. Toronto price is 4c. per 100 sq. ft. of floor space, and 3c. per kilowatt hour, less 10 per cent; but St. Thomas is selling light cheaper than Toronto, the St. Thomas rate being 4c. per 100 sq. ft. of floor space, and 2½c. per kilowatt hour, less 20 per cent. That is the same price as in the city of Ottawa. The city of Ottawa as you know has two systems—the Hydro-Electric and the local plant. They introduced the Hydro-Electric system into the city of Ottawa some years ago, and instead of paying 15c. per kilowatt hour, as they formerly did, they are to-day getting it for 4c. per hundred sq. ft. of lighted area, and 2½c. per kilowatt hour less 20 per cent discount. The 'floor space' or 'lighted area charge' of 4c. per 100 sq. ft. is uniform over the Hydro system, and this fixed charge provides all that is necessary to pay for the cost of plant at the end of twenty or thirty years. There is no increased tax rate, because only the users pay for it, and there is no meter charge. We maintain that it is wrong to allow any of these public utility companies to charge for meter rent. I do not know what some of you may be paying, but the customary price has been 25c. per month for electric or gas meters. An electric meter may be bought for $8.50, and, at the rent of 25c. per month, you have paid for it in less than three years, but yet you never become the owner; it always belongs to the company. Under the Hydro-Electric you pay no meter charge although your current is measured to you by meter. We make what is called a fixed charge or a floor space charge, by taking the outside dimensions of your house; that is, if it was forty feet by twenty-five feet, we multiply the figures, and that gives one thousand feet. If the building is a two-story one, we double it and that makes two thousand feet. Then we take off ten per cent, because we claim we do not light the walls or partitions in the house. That would make a floor-space charge on 1,800 sq. ft. at 4c. per 100 ft. makes 72 cts. In the city of Ottawa you pay 2½c. per kilowatt hour, and both are subject to a discount of 20 per

cent. For instance, a house of 1,800 sq. ft., burning 30 kilowatt hours in a month, would have to pay $4.50 under the old rate of 15c. per K.W.H. I am not saying they paid the meter rent at that time, because I am not sure; but if they did this would have to be added. Under the Hydro-Electric to-day, the same man who lights that house and burns 30 kilowatts a month, pays $1.32 per month as against $4.50. The question is asked: Does it do away with the other company? No. In the city of Ottawa they are both making money. There are more people using electric light, and they are getting the benefit of the competition. The same is true of Hamilton and Dundas. As regards my own town, two systems located there, and they are both making money, in spite of the reduction in rates that has been made. Speaking about the question of cost, I do not mean to talk shop; but here is a case of lighting a store I formerly had. If I had been lighting it under the Cataract Power Co. or the Dundas Electric Light Co., it would have cost me $55.57 per month. Under the Hydro-Electric Company the bill is $11.27.

By an HONOURABLE MEMBER.—How in the world did you burn so much light?

Mr. WILSON.—Because under the Hydro-Electric Commission the policy is to get people to burn the light. The current is furnished at such cheap rates that you can afford to burn it. A well-lighted store is good advertising. The Dundas Electric Co. advised me that the price being charged was too low, and that I would have to pay higher. The increase would have meant that I would have had to pay $69.40 for what my successors now get from the Hydro for $11.27. They burned 461 kilowatt hours during the mouth.

By Mr. SCHAFFNER.—How big is the store you are talking about.

Mr. WILSON.—A hardware store, twenty-five feet by a hundred, three storys, with iron house in rear.

Mr. SCHAFFNER.—We paid 20c. per kilowatt in a store of 50 feet by 26 feet. We did not pay anything like the figure you mention.

Mr. WILSON.—How much do you burn?

Mr. SCHAFFNER.—We light our store.

Mr. WILSON.—The difference is there just the same. It does not make any difference if you only burn 10 kilowatt hours. In the one case the rate is less than 2½ cents per K.W.H. and in the other you are paying 18 or 20 cents.

Mr. SCHAFFNER.—Twenty cents.

Mr. WILSON.—That is the highest rate I ever heard of.

Mr. SCHAFFNER.—We get a 10 per cent discount but pay 25 cents meter rent.

Mr. WILSON.—That makes the charge 18 cents net, which is a very high rate. I might say that in Seaforth—the farthest point at present reached by the Commission, as to which I have any statistics with me—the charge does not average 6 cents per K.W.H.

Mr. EDWARDS.—Where does the town of Seaforth get its power?

Mr. WILSON.—From the Hydro-Electric Commission.

Mr. EDWARDS.—Does the power come from Niagara?

Mr. WILSON.—From Niagara. Seaforth is on the Niagara circuit.

Mr. PURCELL.—The distance is 125 miles.

Mr. WILSON.—While on this point it might be interesting to note the distance that this power can be carried. Some person asked me a question in regard to that the other day. Let me indicate to you the route of transmission on the map. Here is Niagara Falls (indicating on map). The power is brought to Dundas station and it is then sent to the different points: Dundas to Toronto, Dundas to Guelph, Dundas to London, and so on. This line to London is to be extended to Windsor. We shall then have high tension, or 110,000 volt lines covering a distance of 389

miles. There are already constructed 286 miles and the extension to Windsor will bring the mileage up to 389. There are 374 miles of 13,000 volt line constructed and 72 miles under construction.

Mr. EDWARDS.—How far east of Toronto do the transmission lines extend?

Mr. WILSON.—They run just to Toronto. Of course there are other systems under the jurisdiction of the Hydro-Electric Commission and they will be described by the two engineers from the Commission who are to address you this morning. In addition to Niagara Falls there are other places where power is bought and distributed by the Commission. At its inception the Commission only intended to distribute power, but at two points about which the engineers will speak to you, the Commission will develop as well as distribute electricity.

Mr. STEELE.—What is the length of the line from Niagara Falls to Windsor?

Mr. WILSON.—It will be from 240 to 250 miles. Take some of the towns that are selling power and light. There is St. Mary's, for instance, that Dr. Steele can tell you more about than I can. St. Mary's was selling electrical energy for residence lighting at 4 cents per hundred square feet and 6 cents per K.W. and not making any money. The rates were reduced to 4 cents per hundred square feet and 5 cents per K.W., and the town is now making a profit; the reduced rates attracted more customers and consequently created a greater business. The town of Seaforth pays $40 per horse power and sells residence lighting at 4 cents per hundred square feet and 4 cents per K.W.H. with 10 per cent off. That is one of the farthest points in Ontario to which the Commission has extended its lines up to the present, the rates mentioned are amongst the highest paid on the system. Take the village of Waterdown, in the county of Wentworth, which is served from the Dundas station. In 1912 it paid $37.50 per horse power. On account of the increase in business and having a large power customer in the immediate locality the price was reduced to $26. It only takes about 35 horse power to light the streets and supply the residences with light and power.

Mr. EDWARDS.—What is the population of that place?

Mr. WILSON.—About 700. Their lighting rate is about 4 cents per 100 square feet and 4 cents per K.W.H. less 10 per cent discount. The idea the Hydro-Electric Commission has in view is to get the current out to the farmer. If you will take down some of the figures I am about to give you, you will arrive at the correct conclusion much more quickly as to the extent to which the Commission has been instrumental in reducing the cost of electrical appliances. Take electric lamps. Some of you may be better informed than I am in regard to the local rates for these lamps, but according to a circular issued by the Commission, 8, 16 or 32 candle power carbon lamps can be bought by the municipality for $8.93 per hundred or less than 9 cents a piece. The municipality can also buy 25 or 40 Watt Tungsten lamps through the Commission at 27 cents each. The superior light efficiency, and the economy in using Tungsten lamps is apparent to every one.

Mr. BRADBURY.—What is the smallest Tungsten made?

Mr. WILSON.—The 25-Watt lamp is the lowest used in my town. I had it from the Chairman of the Commission, the Hon. Adam Beck, that the price of lamps would be further reduced. These Tungsten lamps are selling retail at 32 and 35 cents, and probably most of you outside the Hydro zone pay 65 to 85 cents for the same lamps. A 60-Watt lamp costs the municipality 31 cents, and so on all the way down the published list.

I do not intend to take up your time at much greater length, but I would like to say a word or two as to what we are doing in the county of Wentworth. We are supplying light in East Flamboro, West Flamboro and Barton and the other townships of the county will soon be supplied having made application for power. I made the statement here the other day that our concession lines would be lighted

by electricity in five or ten years at the outside. I repeat that statement to-day. The electric current will be utilized for the manifold purposes of the farm and will serve to light the roadside next to the farm. Already the Wentworth county council is lighting dark places on the roadways and dangerous level crossings in the country districts. In one case it pays $9 per year for a 100-Watt lamp burning every night from darkness to dawn.

Now, I hold that the Power Commission has greatly benefited the manufacturer by reducing his power account. A certain manufacturer in Dundas saved no less than $5,000 a year on his power bill. It also benefits the dweller in the city who can now use electricity at a cheap rate in the operation of such household utensils as vacuum cleaners, toasters, broilers, irons and other electrical appliances. When you learn that an electric iron can be operated at the cost of 1 cent per hour it brings home to you how cheap an operation it is, to say nothing of the convenience. I could go on and enumerate the cost with respect to all the other household articles of daily use, but it would consume too much of your valuable time. Permit me to say that if you wish me to discuss this subject at any future time I shall only be too happy to do so either in private or in public. What we want is to have electrical energy generally used on the farm, because we realize that through its agency we are going to keep the young men on the farm, and we are going to make the conditions in the rural districts just as pleasant and comfortable for the farmer's wife and daughters as they are in the cities. Another important result that we look for through this agency is a reduction in the high cost of living of which we hear so much, as it will assist the farmer by taking the place of farm help. I should not be surprised if one of these days a deputation from southwestern Ontario loomed up with a request that the Government give a subsidy of $6,400 a mile towards the construction of radial railway lines, a project that is deserving of support and one that will improve our transportation facilities and incidentally benefit the farmer by bringing him in close touch with the consumer. I hope every member of the committee will take up the study of this subject and realize for himself the immense benefit that will result from the extension of Hydro-Electric enterprises. What has been done in Ontario can be done in other provinces. Quebec has many water powers, perhaps a great deal more than its neighbour Ontario, and similar natural resources are to be found in other parts of Canada. The result of these enterprises, as I have already pointed out, will be to help the manufacturer, the town or city residents, and the dweller on the farm, and more than anything else will tend to keep people in the rural districts by greatly improving conditions.

Now, I will thank you for your kind attention and will call upon Mr. Espenschield.

Mr. EDWARDS.—In the case of a municipality taking the Hydro-Electric power does the municipality pay the Hydro-Electric Commission for that power and then tax its people, or how is it done?

Mr. WILSON.—Mr. Espenschied will give you all the information in reference to details of that kind, as we have arranged our programme in this way: I had intended, if Mr. Espenschied had not been here, to have discussed the means of taking the Hydro-Eleceric power from Niagara Falls to the municipalities, but as he is here I will leave that to him, as he has the different contracts with him and can give you all the detailed information. I would suggest that all these exhibits should go upon the record so that any member of the committee, or anybody reading this report, may know how this power can be obtained. In this connection I would like to make another suggestion. The reports of the Hydro-Electric Commission do not reach the number of people that we think they should reach, and I would suggest that there is a lot of useful information in the report of the Commission now in the printers' hands, which might with advantage be included in the report of this meeting; extracts from that report with any additional data that can be furnished might,

with the consent of the committee, be printed and sent out as an authentic report, vouched for by the Hydro-Electric Commission, so that there could not be any doubt as to its accuracy any reliability.

Mr. ROBB.—At what price can electric power be furnished to the farmer who does not need a great deal of power?

Mr. WILSON.—Mr. Purcell can take that up and tell you exactly what it costs. In the township of East Flamboro for a half horse power it costs $37.20 per year; for one horse power it costs $50.40 and for two horse power $78.80. For three horse power $103.20 per year. The cost varies according to locality.

Mr. ROBB.—That is for a minimum of one horse power?

Mr. WILSON.—Yes, we will sell him from one-half horse power upwards.

Mr. ROBB.—What is the cost of developing it?

Mr. WILSON.—Well, the Commission buy power at Niagara at $9 per horse power, and it has to be carried say, to the town of Dundas, costing there $15; you understand the expense of carrying it from Niagara Falls to the locality where it is used has to be added to that $9, that is what you might call the freight on it, in which is included interest, sinking fund, depreciation, operation and maintenance charges. The farmer gets it at the actual cost of delivery, nothing further is charged. If you will now allow Mr. Espenchied to speak he will tell you about the amount of power purchased and the amount lost in transmission.

Mr. AIKENS.—You suggested that the Hydro-Electric Commission contemplated developing its own power in some cases; would it have been of advantage to the Hydro-Electric Commission had the control of these water powers been retained and handed over to the Commission for development for its own purposes?

Mr. WILSON.—I do not think there can be any doubt about it, the province of Ontario gave away a great asset when they gave that power at the Falls over to the parties that hold it at the present time, and let us hope that no more water powers will be given away either by Provincial or Dominion Governments, but that they will be conserved for the people of Canada.

Mr. F. F. ESPENSCHIED, Assistant Engineer, Ontario Hydro-Electric Commission.—Mr. Chairman and Gentlemen of the Committee: It affords me very great pleasure to appear before you this morning and I propose to give you briefly the history of the Hydro-Electric enterprise, as far as the Hydro-Electric Power Commission of Ontario is concerned. It is very interesting and I will not take very much of your time in discussing it. About eleven years ago a number of municipalities, some half dozen of them, in the central part of the province of Ontario, chiefly, Toronto, Guelph, Brantford, London and some other smaller municipalities, conceived the idea that they should be able to secure Niagara power at reasonable rates. At that time they all had small services, generated by steam in most cases and their rates were exorbitant. These people became enamoured with the power at the Falls and conceived the idea of getting it for themselves; as no one would bring it to them they thought they would endeavour to bring it themselves. An Act was passed about 1903 empowering these municipalities to appoint a commission to look into this matter and to report to the municipalities on the feasibility of bringing to them Niagara power. That Commission consumed some two or three years in looking into the question in all its aspects, preparing estimates of the cost of transmission and what the Niagara power could be developed for. That report was very interesting and quite voluminous, and it was made up by a number of prominent engineers acting in conjunction with this Commission. The Commission was, I might say, not a technical commission, but it was composed of business men from the various municipalities, among them was the Hon. Adam Beck, who is still with the Commission as chairman. That report aroused a great deal of interest and investigation and produced remarkable results, so much so that the project began to grow by leaps

and bounds and the municipalities originally concerned found that by taking in other municipalities the power cost would be still further reduced, that the more partners there were in the enterprise the cheaper the cost of power would be. The movement grew so rapidly that the province of Ontario was ultimately compelled to appoint a Commission to take over the whole matter. That Commission was composed of three members as at present and it was empowered to prepare further estimates and reports concerning the generation and transmission of Hydro-Electric power to these municipalities. Out of this grew the Hydro-Electric scheme for transmitting power from Niagara Falls to these and other municipalities as shown on this map (indicating map). These were the original hydro lines. Of course I understand you are interested mostly in the question of power on the farm, but you will have to bear with me in this brief explanation, since electric power on the farm is only possible in conjunction with electrical power in the municipality. The electrical wants of the farmers are small, the municipalities' wants are large, and by co-operating between the two, the municipality and the farm, the minimum price is secured as you will understand quantity determines the price in an enterprise of this kind. Without the municipalities the farmers would be unable to get a rate which would be at all favourable; the municipality use 1,000 or 2,000 horse power, where the farmer in the township might use a couple of hundred horse power, so that cheap electric power for the farm is contingent upon the adjoining municipality using it and creating a sufficient demand. The Commission was formed for the purpose of developing and transmitting the power from Niagara Falls, and the original reports included estimates of the cost of development at that point. Negotiations were opened to ascertain what it could be generated for and what it could be procured for from one of the existing companies, and a price was offered by the Ontario power company which, in the opinion of the Commission, it would be cheaper to accept than to put in the necessary plant and to generate power themselves. A contract was accordingly entered into with that company for 100,000 horse-power as a maximum at a sliding rate, up to a certain amount of power at $9.40 per horse power per year, and after at $9 per horse power at the Falls. While there was discussion as to whether or not that was a wise step to take, as a matter of fact it has worked out beautifully.

The power is purchased at the Falls at $9 per horse-power year, at 12,000 volts, the voltage at which it is generated. The Commission has at the Falls a transformer station in which it is stepped up to 110,000 volts, the reason for that being that, at low pressure the transmitting distance is very short, the economical transmitting distance. At high pressure that distance increases greatly until we are enabled to take power to Windsor, and, if necessary, beyond. It is entirely a matter of financial economy how far you shall take power. It is a matter of cost, balancing the cost of the lines and the cost of the power against each other. In other words, showing how much power you can afford to lose in taking it so many miles,—all matters of calculation. This power is transmitted 110,000 volts from the Falls to Dundas, where we have a switching station. At that point we have three lines radiating, one to Toronto, one to Guelph and around the north side of the loop, and one between Brantford and Paris to Woodstock and London. That system is tied together from Stratford, through St. Mary's, to London. A double line is built from Dundas to Toronto, owing to the importance of that route. This one via Woodstock is being double-circuited now down to London. The north side is not double-circuited. However, with this scheme we are enabled to transmit power to Dundas around the loop and back again to Guelph, or via Guelph around and back again to Brantford, from either direction, by opening the circuit at any point, enabling the construction men to work on any section of the line by simply cutting out. At the various muncipalities, for instance at Toronto, Guelph, Preston, Berlin, Stratford, St. Mary's, London, Woodstock, Brantford and Dundas, there are stations for stepping down this current, or pressure of voltage, from 110,000 volts to 13,200 volts, or 6,600 volts or 26,400 volts, as the case may be, thus obtaining secondary voltages. This is necessary since very high voltage necessitates a large station,

requiring a great deal of room and expensive apparatus. We cannot take 110,000 volts to the small municipalities, the cost of the station is too great. We therefore step it down to secondary voltage and transmit it, through these main stepping-down stations to the smaller municipalities. We locate these big stations at the big municipalities, where the field is large enough to warrant this station. We transmit from these big stations to still smaller stations. A net-work is thereby made taking care of the country and gradually growing as its needs develop. For instance, take the Preston station: we have a line to Galt and one to Hespeler at the Berlin station; we now have one to Elmira and another to Hamburg. Out of Stratford we are now going up through Mitchell and up to Clinton and Goderich. Out of London, we have the Asylum and other municipalities. There is also an extension from London to St. Thomas at the high voltage. St. Thomas has a line going down to Port Stanley. Woodstock has branch lines to Tilsonburg and Norwich and also to Beachville and other small municipalities. The new branch station here (pointing) will feed Paris and Brantford and other small municipalities eventually, perhaps, down to Simcoe. From Dundas we feed Hamilton and the surrounding small municipalities and the townships. We also have a small station below Toronto feeding the smaller municipalities along the Lake shore. As the needs demand, stations are built, the line tapped and current distributed at say, 13,200 or 26,400 volts. This is again stepped down in smaller municipalities, the pressure distribution being 2,200 volts as a rule. The reason for this is, that the higher the pressure the more dangerous it is to handle. In a small municipality if you put 13,000 volts around on the streets and local linemen have to tap these lines for services, the risk is too great. We have two voltages, 2,200 volts and 4,000 volts, which the average lineman can handle, and which are sufficiently high to enable the power to be transmitted a reasonable distance; consequently, generally the municipality distributes by low tension lines of 2,200 volts. Here, it is again stepped down. It is all a process of stepping down; we start at high pressure and then step down for the consumer. The lighting customer uses it at 110 volts for lamps, the power customer at 220 to 550 volts at its motors. We have finally reduced it by a number of steps from 110,000 volts to 110 volts, a great step. We cannot afford to step down from 110,000 to 110 volts, as the distance through which we could transmit it would not warrant it. The 110 and 220 voltage is what the customer is supposed to use directly on the lamps. All these steps, of course, cost money, but they cannot be avoided at the present time; we know of no way of stepping down pressure without costing money. It takes sub-stations and it takes transformers, and switching apparatus to accomplish this end. The power at the Falls is cheap, $9 per horse-power per year at the present time. Of course, we cannot expect to sell it to the customer at that rate, for the Commission has some four or five million dollars invested in transmission lines. Some of these high tension stations cost as high as $80,000 each. You have to pay for them some way. This entire scheme is self-supporting; the customer should pay for the service at cost.

By Mr. Morphy:

Q. What is the rate charged in Niagara Falls?

A. They pay at the rate of around $12 there. The cost, I may say, varies as the distance from Niagara Falls and as the load. For mechanical reasons a line has to be put up with certain size conductors, with certain size poles to withstand wind, weather and sleet. You can often construct a line to carry 100 horse-power just as cheaply as one to carry 10 horse-power. You cannot expect to carry ten horse-power ten miles, the cost per horse-power of transmission is too great. You see it is just a question of common-sense as applied to the transmission of electric current. It costs a certain amount to transmit the current and that cost is less as the quantity becomes greater.

By Mr. Aikens:

Q. How much is bought by the Port Arthur and Ottawa systems?

A. I will touch on those matters as I get to them if you do not mind.

The cost of power is a thing which we work out for each place. For instance, we take Stratford, say, as the centre. We figure on what a certain number of horse-power can be delivered for at Stratford, assuming that all the other towns take a certain amount of power; and therein lies the complication. At first, when the first estimates were made to start off with, you would have to assume something. You cannot do any figuring unless you make some assumptions when you have something to go by, but you would have to get hold of the desired data in some way. So each of these municipalities were canvassed and the available power was assumed as close as could be. In this case it was estimated that each of these municipalities would use a certain number of horse-power. That was gotten at by a lot of careful canvassing, counting the horse-power available and deducting a whole lot for those that would not use it—those that had fine steam plants which they thought a lot of—and so forth. This power was estimated for each of the centres in the district. That is the estimated number of horse-power delivered at Stratford, or at London, or at Guelph, or any of the different stations, and contracts were made with the municipalities on the basis of these estimated costs. As a matter of fact those estimates were very conservative, and the cost of power has been a great deal less than was estimated. We believe in keeping within safe figures, in estimating costs high enough so that we do not have to exceed the estimates. It is far safer to estimate on the right side of a project than to have to raise your estimate subsequently; the latter is not a good policy. In that way we endeavoured to arrive at what the power would cost at Stratford, London and Woodstock and various other municipalities. If any municipality in that district did not use as much current as we estimated, that upset the whole plan because the undertaking was on a co-operative basis, and you cannot remove one unit without affecting all the rest of the units in the group. Being self-supporting, you must remember we have no margin to go on; the margin is just sufficient to be safe, and is not one for profit purposes. Therefore it was very difficult at first to arrive at what the proposed power was going to be at these different places; it certainly was some job. However, the price was finally arrived at to the satisfaction of the various municipalities and contracts were entered into to bring the electric current to their doors, at 13,200 volts. That was not what the consumer was interested in; he wanted to know what he could buy electricity for. You see it is one thing to sell electric current to a municipality, and another thing to dispose of it to the consumer. The latter being the man who pays all the bills in a self-supporting proposition, he wants to know what it is going to cost him. Well, here again there was hard work endeavouring to estimate what it was going to cost the consumer. We had to add not only the freight from Niagara Falls to, say, Stratford, and the cost of stepping it down, but also the cost of distributing the electricity around the city. These rates, I might say, were made ample in order to avoid any possibility of having to raise them. All these original estimates have been greatly bettered, and the power is now actually sold at a rate far below the original estimated figure. As the scheme grows, assuming the lines to be of ample capacity to carry a growing load, which they are, the price of power will drop automatically since the cost of these propositions is largely a fixed cost. The cost of power is $9 at the outset, but in most of the municipalities that sum is only a small part of the cost. The greater part of its is made up of freight charges, cost of transmitting, interest, sinking fund, depreciation of lines, cost of patrol, and meeting other necessary expenses at the stations. The cost is arrived at each year by taking the loads of the municipalities and figuring it up again. The Commission then sits and approves of its new rates for the ensuing year. For the last couple of years the rates have been coming down in great shape. In some places they have come down 50 per cent as compared with what they were at the start.

By an Honourable Member:

Q. Tell us what the average selling price is now?

A. To the municipalities?

Q. Yes.

A. I should say it was in the neighbourhood of $22 or $23. Toronto, you must remember, uses a big amount of horse-power—somewhere in the vicinity of 20,000.

By Mr. Webster:

Q. Where is the current measured for the municipalities?

A. It is measured to the municipalities at the sub-station. It is measured to us at Niagara Falls. We then transmit it and add the cost of transmission to the municipality.

Q. Do you find your loss of power greater in high tension lines than in low tension lines, comparatively speaking?

A. We do not find any loss in the high tension lines for this reason. We sell, as we buy, on a peak load basis. A municipality draws 1,000 horse-power for 20 minutes in any month they pay all the month for that 1,000 horse-power. The overlap or diversity factor takes care of this.

Q. Would you recommend a municipality to have a steam auxiliary plant to carry the peak load?

A. That is getting a little away from our subject, and I would rather not make any recommendations in that regard. I would prefer to review facts.

By Mr. Aikins:

Q. You say the charge for supplying electrical power to the municipality averages about $22?

A. Yes.

Q. Does that include the cost of distribution to the consumer in a municipality?

A. No. For instance, you take the town of Galt. The current is sold to that municipality at a rate of $21.50 per horse-power per year, but Galt retails that current not at a flat rate but at a meter rate. It is rather difficult, I am afraid, for you gentlemen to understand, because the direct relation between the flat rate and the meter rate is rather complicated. It is rather a hard matter to describe, except in very technical terms, but I will endeavour to explain it as I go along. For example, these various municipalities have certain loads at certain times of the day, they do not all go on at the same time. In winter time they go on nearly all at the same time, but there is quite a little difference in time between Niagara Falls and Windsor. For instance, it gets dark earlier at Niagara Falls than at Windsor. The sun sets later the farther you go West. As between municipalities in Western Ontario that difference is quite noticeable, and we found that the maximum demands of the various municipalities did not occur simultaneously. The matter results in this, that if you take the demands of all the municipalities in a certain month, you may get a total of 70,000 horse-power. During that month the municipalities will pay for over 70,000 horse-power, whereas we might buy in the neighbourhood of 50,000 horse-power.

By Mr. Webster:

Q. Then you over-lap?

A. Yes, and this over-lapping business is a very vital point in the sale of power. Consequently, we have no line losses, which most people cannot understand. We usually sell more than we buy, and it is some business to do that. When power is delivered to a municipality, they take charge of the distribution of that power themselves. Our direct supervision ceases there. For example, we sell so many horse-power to Stratford. Now it is up to Stratford, or Guelph, or Berlin, or any other place that buys power from us, to sell it themselves. They have to sell the power as they would any other commodity, with this exception: the Commission reserves the right to set the

retail rates. If that were not done there would be a danger of a cut rate, of electric current being sold below cost, to the detriment of the municipality and to the detriment of the consumer. The Commission, by Act of the local Legislature, has reserved the right to set the local rates. The Commission also supervises the method of accounting in the municipalities to ensure that the local distribution system is carrying itself. The local system must carry itself. We tell the people all over the province that the Hydro-Electric system is not a burden on the tax-payer, and we could not very well say that unless we knew it. It would be a very dangerous policy. Therefore we have auditors who examine the municipal books and see that the local distribution system which belongs to them is carried on a self-supporting enterprise; that they are buying their power from us and distributing it at as near cost as they can possibly do it. Our officers, after going over the accounts and the physical condition of the municipality's lines, are able to tell that municipality from year to year at what rates they shall sell the current. We first started out by selling power at a flat rate, but it proved not to be proper practice to follow. However, we improved our system, as much always be the case after experience, and we are now selling entirely at a meter rate.

By Mr. Webster:

Q. How often do you render your municipal accounts?

A. Monthly, there are twelve monthly installments, as the contract provides. The municipality as a rule collects from its customers monthly, and we try to keep the arrangements as uniform as possible.

What I have said covers the municipal corporation, such as that of cities, towns and villages. In villages we have to do more than we would in a large city. The village has not the help that the larger municipalities possess; it is not able to support a superintendent, as the large municipality can, and so we render it a certain amount of service, for which it pays at cost price. In the smaller municipalities the power is sold them at 2,200 volts instead of 13,200. That is done in order to lessen the debenture debt on a municipality and lessen the complicated staff necessary to take care of its plant. We merely sell the municipality power at 2,200 volts, and in all cases it owns the distribution system. We do not own distrbution systems except for a few outside municipalities. A municipality bonds itself to construct its own distribution system, securing from the users sufficient funds to pay for its bonds, debentures and sinking fund, and all operating expenses.

Q. When you run into a city or town that has a municipal plant you use their system, I suppose, as much as possible?

A. We do wherever it is possible.

Q. Using their stations?

A. Yes. In some places they have an old shack on its last legs, which should be torn down. Where that building is of any value we remodel it. We work on the theory that the plant must be operated as efficiently and economically as possibly. We are open to suggestions from any of the municipal officials as to how they shall operate their system after they get it.

Q. Have you any data showing how large a percentage of gain there is in the over-lapping system, to a municipality?

A. No, I could not say, the over-lapping varies from month to month. In winter it is very small. For instance at this season of the year, or to be more particular, in the month of December, we will pretty nearly buy as much as we sell. In the summer time we will buy less than we sell because the load in summer time—that is the peak load—may occur at any time during the day—in fact it does occur during the day—but it does not occur at night.

The electrical current is now sold for two purposes mainly lighting and power. In the summer the power for driving motors is off when the lighting goes on. In the winter the factory using the motor lights up before it shuts down. That causes a

condition of affairs which has to be looked out for. The two go together in the winter, in the summer they miss each other, so that we have got, in making our rates, to take that into consideration also. It is quite a complicated proposition.

By Mr. Morphy:

Q. I understand that in London the total sale of power amounts to 7,000 horse-power, and that city only purchases about 4,000 horse-power?

A. The same thing occurs in municipalities that occurs with us. That is to say the municipality will buy 5,000 horse-power and sell 7,000.

By Mr. Webster:

Q. Has the city of London a steam auxiliary plant to carry the peak load?

A. No, sir, it has not.

Mr. WILSON (*Wentworth*).—Will the members of the Committee permit me to observe that if we do not make more progress we will never get to the stage at which electricity is used on the farm. The members of the Committee, by the frequency of their questions, are delaying the progress of the speaker.

Mr. ESPENSCHIED.—I will just say this: In addition to the Niagara system we have other systems. You will therefore not form the idea that we are fostering one system at the expense of the other. We have at present in operation the Niagara system and the St. Lawrence system, which latter includes the cities and towns along the river. In Ottawa we buy power from the Ottawa and Hull Power Company. In the case of the Severn system we buy from the Simcoe Railway and Power Company. At Port Arthur we are buying from the Kaministiquiea Power Company. In the county of Ontario we are building at Wasdells Falls, on the Severn, ten miles from Orillia. For the Owen Sound district we are building a plant at Eugenia Falls. These are the only systems we are building at the present time. In the case of the other systems we are paying for power for the simple reason that we can get it at a rate that is fair. If we cannot buy power at a fair rate, and the municipalities demand power, then we have to build a new system. So far we have not had to build very much. It is a matter of policy whether we should pay for power or build our own system. The matter has to be looked at in a broad light and in each case it is one for the Commission itself to determine.

By Mr. Armstrong (Lambton):

Q. How many power plants do the Commission own in the Province of Ontario?

A. Simply the two that I have named.

I have so far dealt with the transmission of power from Niagara Falls to the municipalities. From the municipalities that power is now being taken to the farm by means of 2,200 or 4,000 volt lines. This department is quite separate from the municipal department in one way: the power is sold on a different basis. The farmer's demands are small. They are scattered all over the country, whereas the municipality is concentrated. Mr. Purcell has given several years of his time to this work and is more competent to address you on the taking of the electric current from the municipality to the farm. I have therefore much pleasure, with the consent of the Chairman, in giving place to Mr. Purcell.

By Mr. Morphy:

Q. What is the actual loss in transmission of power, the commercial loss, between Niagara Falls and Windsor?

A. It will probably not be over 4 or 5 per cent, it depends entirely on the load.

By Mr. Thoburn:

Q. Where you said that the rate was $20 per horse-power what would it usually cost to manufacture?

A. It would cost more for distributing according to the distance, it depends upon the municipality, and also upon the load, generally $5 or $6 above the price delivered to the municipality.

By Mr. Webster:

Q. The municipalities regulate their own price?

A. No, sir, we regulate the price.

Q. The price at which the municipality sells it?

A. Yes, sir, the whole thing is in the hands of the Commission.

Q. How much power are you distributing altogether now?

A. We have between 50,000 and 60,000 horse-power.

Q. What is the policy of the Commission regarding competition with existing companies?

A. That is largely a matter, with your permission, Mr. Chairman, of local policy. The Commission is endeavouring to be fair with all rate payers, and does not intentionally do any harm to the local power company.

Q. If the local power companies want to deal with you you are willing to deal with them?

A. If satisfactory arrangements can be made the Commission may take power from them. But if the local company is unreasonable then the municipality goes ahead with its own system. That, however, is not necessary as a rule, but, Mr. Chairman, these are questions I would rather not go into at the present time.

THE CHAIRMAN.—The main object in having these gentlemen before the Committee this morning was to discuss the question of electricity on the farm. While the question with regard to the municipality may be very interesting it is more important to this Committee to get information with reference ot the use of electricity on the farm.

Mr. J. W. PURCELL, Assistant Engineer, Ontario Hydro-Electric Commission.—Mr. Chairman and Gentlemen of the Committee: It seems almost ridiculous for a farmer to come before a Committee of the House of Commons and talk to members of Parliament who are orators, upon matters relating to the operation of the farm.

An Hon. MEMBER.—We are all farmers here.

Mr. PURCELL.—I am glad to hear it.

Power is sold to the townships by the Ontario Hydro-Electric Commission exactly the same as it is to any other municipality, on peak load basis of twenty consecutive minutes peak load; the same basis on which we buy it at Niagara Falls. If we had a chart here I could show you what that means, but I will explain it as lucidly as possible. The chart shows the amount of load and time, it is usually divided into five minutes sections, any load holding for twenty consecutive minutes any period during the month established the peak, and upon that basis the charges for the month is made. The township distributes this power to those users who have contracted for it in the township. The Ontario Hydro-Electric Commission builds a line to the farmer's gate, provides the money for the primary lines, it also furnishes the transformers, the secondary lines and the meters, the township has to raise the money to cover the cost of the latter, approximately one-third of the total capital that is expended within the township.

The rate to the farmers is made up of two parts; the service charge and the cost for power. That service charge must be sufficient to cover the annual fixed charges on the capital expended in the township by the Hydro-Electric Commission and by the township, varying with the number of consumers per mile, the number being the average of the users that are in the township. There may be several sections in a township served from different sources or municipalities. With average conditions, considering all those things which affect the cost of construction, the service charge

amounts to $3 per month where there are three consumers per mile, $2.50 per month where there are four consumers per mile, and $2 per month where there are five consumers per mile. That is to cover the cost of readiness to serve the farmer. This is a smaller amount for service than any company on the continent will accept under like conditions.

By Mr. Elliott:

Q. What would be the cost per mile of a branch line?

A. That would depend upon whether it was a three-phase or single-phase line, and how much power there was to be delivered over it.

Q. I mean a line suitable to the locality?

A. Just a minute and I will give you something on that. With three consumers per mile a three-phase line of copper wire, with a capacity of 50 horse power, at the end of ten miles would cost approximately $1,100 per mile.

By Mr. Webster:

Q. What height is the line required to be from the ground?

A. The minimum height is 18 or 20 feet from the country roads.

Mr. SHARPE *(Ontario)*.—I think perhaps it would be better to allow this gentleman to make his statements without too much interruption.

Mr. PURCELL.—I am perfectly willing to stay and answer questions all day today and tomorrow if any gentlemen are willing to remain with me after the meeting. That is what I am down here for.

The cost of power, in addition to the service charge, varies with the different districts and is the cost of the power at the station from which the power is taken plus the cost of stepping down to the voltage used for distribution in the townships and delivery to the point where the township takes it. In other words, if we happen to come into a village where the voltage is right, there will be no additional cost. The main thing to remember is this: the more consumers per mile the lower the service charge, and the more the increase of the uses of electricity in the district the lower the cost per horse-power per year. These are the two factors that enter into the decrease in costs in rural districts.

In 1912, the Hydro-Electric Commission made demonstrations with what we have been pleased to call our syndicate outfits, the 25 h.p. motor, the necessary transformer waggons and the equipment that goes along with them, meters, switches to control it, &c. The outfit was put into service first on August 28th on the farm of Mr. Might in Toronto Township, working on threshing and silo-filling. It then passed on through Waterloo county, up through Oxford and Middlesex counties, and down into Elgin county. The data obtained I have with me in the 1912 report of the Hydro-Electric Power Commission. We will not, however, take time to refer to that because it is of considerable length.

In 1913 we made our demonstrations again, not with the 25 h.p. syndicate outfit, but with the individual outfit, a 5 h.p. motor, doing threshing and silo-filling through Oxford county—I don't think we went outside of it. We went where it was possible to get service connection without difficulty; where there was full transformer equipment at each place so that we did not have to make a temporary arrangement. The demonstrations with this outfit have impressed on our minds the feasibility of a man on a 100 acre farm doing all his work with a 5 h.p. equipment. This is a broad statement, and one which has been questioned by a good many. However, in our threshing test, we were able to put through oats at the rate of 125 bushels per hour for 25 consecutive minutes, and oats at the rate of 100 bushels per hour for one hour. I think that that should convince anyone that this outfit is practicable for the Ontario farmers. Whether it is going to be of use to our farmers from Brandon and other parts

of the West, I do not know. But for our uses in Ontario, the 5 h. p. is certainly the proper thing; and it is surely coming; our farmers are gong to get away from the big outfit. When you are out on the farms and see the outfits for silo-filling, with no help there but the owner of the farm, his hired man and his team for a day or more, paying $15 a day for the outfit, it means they wil come to the small outfit, one which they can own and work themselves in their own way; alone. In addition to the inconvenience of present methods the saving by using the individual equipment is a factor. There is nothing that tends to populate the cities quicker than the system of borrowing your neighbour's help. I have seen so many cases where bad feeling exists between neighbours as the result of it, where one farmer goes himself to assist his neighbour, and the man he gets in return is not the owner of the farm but inferier help in the form of a hired man; in one particular case I know of, the man sent being a young foreigner, who did not know one end of a pitch-fork from the other. Just south of Ingersoll there has been such an outfit used for nearly three years, on the 85 acre farm of Mr. Clark. He has a 5 h.p. motor, his own box for cutting ensilage, with a carrier for elevating it into the silo, and his own individual thresher. He threshes his grain as he needs it in the winter months, the straw falling to the floor. He cuts the straw for use as dry feed to mix with his silage, and grinds the grain as he needs it for use as feed. We are doing the same at the London demonstration farm, at the Sanatorium. We find that the results there are very good; not only do we cut the straw in this case for feed but also for bedding, as the cut straw mixed with the droppings makes a better product for the field in the way of fertilizer.

As to the method of getting power for the farm: The regular proceeding laid down in the Act for that purpose is as follows: A number of ratepayers petition the township council for an estimate of cost. The township council passes this petition on to the Hydro-Electric Commission, who, on receipt of it, make an estimate, keeping in mind the uses in the district in that section. As soon as that estimate is ready it is submitted to the chief engineer of the Hydro-Electric Commission for approval, and, after approval, it is sent back to the township council. The council calls a meeting of the petitioners and submits the estimate—the Act requires the submission of this estimate to them within thirty days of the time it is received from the Commission. At that meeting, or at a subsequent date, they may signify their intention to enter into a contract with the township for power, and as soon as these contracts are received by the township they contract with the Commission. The intent of the petition is to authorize the council to act, and, of course, lines are not built on petitions, but contracts must be made between the residents within the township and the township council before building lines to serve them.

The main thing is: What can a farmer do with electricity when he gets it; how can he use it to his own immediate advantage and gain? That is the point that most of the gentlemen here are interested in and that your constituents want to know, not only in Ontario but in other parts of the country.

The minimum contract that the Hydro-Electric Power Commission will approve in the rural districts is ½ h.p. In West Oxford they are paying $3 per month service charge and $30 per horse-power per year; $96 per year for 2 h.p. If they wanted ½ h.p. it would be $36 plus $15, or $51. The service charge would be the same whether a man took a ½ h.p. or 1, 2, 3, 4, up to 5 h.p. When you get to 5 h.p. you get a quantity that necessitates increase of the transformer capacity and must be considered separately. With the ½ h.p. contract the current is controlled. In the case of anyone wanting to draw for short periods of time more than 1 h.p., which is the capacity of the transformer at that place, he can do so by paying for the current over and above the contract amount. With the 2 h.p. contract, we permit a man to have a 5 h.p. motor if need be; in fact, we recommend it where there are milking and other machines to use the power. The farmer pays the service charge and his power charge, and also pays for the current he draws in excess of the contract at the rate which is

struck for that district. That rate depends on the cost of power in the district. With a ½ h.p. a man can do a number of things. He can light his house with fifteen 20-candle power tungsten lamps, or nine 32-candle power lamps, or six 48-candle power lamps.

By an Hon. Member:

Q. Can he light these at one time?

A. Anyone of these three at one time, or he can use an electric iron, pump water from a medium depth well or use a washing machine, a coffee percolator, a toaster, or a table grill. The ½ h.p. motor will run the following—a complete dairy outfit, consisting of cream separator, churn, and a butter worker—a root pulper if run approximately at the same speed as by hand, or a grindstone, or a small emery stone, or a fanning mill. One h.p. of electric energy will light thirty 20-candle power tungsten lamps, or 18¾ 32-candle tungsten lamps, or 12½ 48-candle power tungsten lamps. It will do all the work that is noted under the ½ h.p., and in addition, will handle most of the heating apparatus which we find listed to-day for use on the table, including a stove of the fireless-cooker type, such a stove being on the market. He can also use a one-burner stove. It will also operate the water heater that has been developed for use on the farm. This heater takes about six-sevenths of a h.p. That leaves, out of your 1 h.p., 150 watts which is ample to light six 20-candle tungsten lamps. The water-heater is turned on after the evening milking. In the morning you have twenty gallons of hot water for washing the milking machine parts, cream separator parts, and other uses in the stable. The speaker happened to be the designer of this heater. Every water-heater is insulated to retain the heat for considerable time.

Mr. ESPENSCHIED.—They use only a part of the equipment at a time?

Mr. PURCELL.—It means you have a lot more apparatus or connected load than you use at one time. For instance, take the farm of Mr. Raymond of North Oxford. He has a connecting load of 7⅚ h.p. He arranges his uses of power and light so that he does not exceed his contract of 2 h.p. at any time. Mr. J. W. Innes, West Oxford, who has, if I remember rightly, a total connected load of about 10 h.p., arranges the use of his electric power so that he does not exceed his 2 h.p.

By Mr. Armstrong (Lambton):

Q. What do you mean by a connected load?

A. Connected load means the sum of capacities of all the apparatus that is connected to the line on each place. Two h.p. of electrical energy will light sixty 20-candle power tungsten lamps, or 37½ 32-candle power tungsten lamps, or 25 48-candle power tungsten lamps, and will do all of the work indicated under the 1 h.p.; in addition, all of the cooking that is now done on a two-burner coal-oil stove, and the oven that was used for that stove can be used on the electric. A 2 h.p. motor will drive all that is listed under the 1 h.p., or any of the milking machines, or most of the cutting boxes, or any of the pumps that are in use on farms to-day, or most of the farm power machinery, or a six or eight-inch chopper.

I happened to hear one of the gentlemen asking what can be done with 2 h.p. with a small chopper, and if I told you we did all the work on two farms, chopping all the grain fed in the winter of 1912-13, and all the grain fed on these two farms up to the present time has been chopped with this 2 h.p. motor, you would be surprised. Oats can be chopped fine at the rate of six bushels per hour, or coarse at the rate of ten bushels. With a 2 h.p. contract, as already explained, a man can have a 5 h.p. motor and pay for his excess consumption. Three of the farmers that we are serving today have five h.p. motors. The three have contracts for 2 h.p. When No. 1 wants to use his 5 h.p. motor, he telephones Nos. 2 and 3, who refrain from using their power during that period. If No. 2 wants to use his 5 h.p. motor he telephones

Nos. 1 and 3, and they in turn refrain for using. I do not know that the farmers are any more honest than the men in town. Probably they would be willing to use power for nothing if they got the chance. Therefore, we have an arrangement whereby we measure the excess current, using a 2 dial meter, which records the excess current taken, which they have to pay for.

There are two methods of installation on the farm that are recommended by the Hydro-Electric Commission. In the one, a motor is installed with a counter shaft along the barn, either on the ceiling of the stable or in the mow above, all the machinery arranged so that it can be driven from and belted to it. There are other farms, however, where such an installation is not possible, where the buildings are widely separated, where part of the work is being done in one building and the balance in other buildings at a distance. For that type of installation we recommend a portable motor. To the motor is permanently attached a cable, say 20, 30 or 40 feet long, permanently affixed to the motor, to the end of which a plug is attached. The motor is mounted on skids or on a truck. Stations are fitted in different places so that attachments can be made. Thus it is possible for a farmer to take the motor out of his barn, as Mr. Raymond does, draw it to the end of his driving shed, and cut his logs, as the farmer referred to did a year ago, when all his wood happened to be in the form of logs; or he can take it to the house when it is needed there for running the washing machine, or doing other work, or to other places where work is to be done.

By By an Hon. Member:

Q. Is it a 2 h.p. motor?

A. Yes, weighing about 170 pounds. It is not taken off the truck when moved about.

By Mr. Armstrong (Lambton):

Q. What are the prices of these respective motors?

A. A 2 h.p. will cost approximately $85. A 5 h.p. approximately $125. A 1 h.p. single phase, $105, and a ½ h.p., single phase, $80.

By Mr. Morphy:

Q. What is the annual cost of maintenance?

A. Of motors?

Q. Yes.

A. I have never figured it out. I may say, however, that I happened to take two motors out of the service, two old type direct current motors made thirty years ago, they had commutators, brushes, and cup oiling bearings. Those motors ran on an average of six hours a day for over twenty years, and I do not think you can find any gasoline engine, steam engine, or any other kind of engine that can be operated for so long a period without a large cost for up-keep. The cost of up-keep on motors of to-day is very low.

Q. Well, how does the cost of a motor for Hydro-Electric power compare with the cost of a gasoline motor?

A. You can figure that out. An electric 3 phase motor will cost approximately just one-half what a gasoline motor would.

By the Chairman:

Q. Are there many farmers using this Hydro-Electric power now?

A. We have at the present time approximately 500 farmers connected and being connected with it in Western Ontario. I want to give the farmers' end of it. I have the definite statements made by several farmers, two of them in writing, they have themselves worked out the cost. In the one case, that of a farmer in North Norwich township, who sends his milk to the condenser and who is paying $96 per year for a

2 horse power, as well as for the excess that is taken over the contract amount, the saving is $63 per annum as compared with former methods of doing the work that is now done by Hydro-Electric power. In another case a man outside Chatham who is not yet being served by the Hydro-Electric but where I discussed the matter wth their Farmers' Club, using as a basis for computation $3 per month service charge and $40 per horse power per year a total of $116 for 2 horse power, he showed a saving of $64 per year. This man is one of the farmers who keeps a set of books on the operation of his farm, knows among other things what the cost is per cow per year and the profit obtained by keeping her, charging stall space, feed, interest on her value, depreciation, &c., to the one side of the account and crediting her account with the revenue obtained by selling milk and at last selling her either for beef or to some one who wants her. He at first did not believe they could advantageously use Hydro-Electric power but after going into it carefully found that he could use it at that price and have a profit of sixty some odd dollars per year.

By Mr. Wilcox:

Q. Would these townships between Windsor and Chatham have to be served from the towns of Windsor or Chatham stations?

A. It will depend upon the distance and load, there will be a dividing line some place on either side of which the district will be served from each of these high voltage stations. The 110,000 volt line runs out of St. Thomas to Ridgtown, on to Chatham, then to Windsor. Municipalities in that section would be served from one of these three stations the route depending on the location of the load in the district.

Q. Take Belle River, where would that be served from, Windsor and Chatham?

A. It depends upon the distance, load and also upon the manner in which it will group up. For instance you have Comber, Belle River, Tilbury and another small place, the name of which I have forgotten for a moment, all these have petitions in at the present time, and we work out our estimates on the basis of supplying them first from one place, and then from another, so that we ultimately find which line would give them the service at the most favourable cost; it is purely an engineering problem.

Q. Can you connect the service to the farmers along the route of these lines?

A. Not on these 20,000 lines, you have to step it down for every municipality, if it is already stepped down for one we might serve others from the same station. If necessary we install a station of some kind for townships and that will serve a considerable district depending on the voltage, the one at Tilbury will probably serve the whole district around there, because you can take from one of those stations 20 horse power at the end of the ten mile line with a reasonable drop in voltage if the voltage used for distribution were 4,000.

By Mr. Robb:—

Q. Can you tell us how you are able to sell power to farmers at $46?

A. Half horse power.

Q. Two horse power at $96, isn't it?

A. $48 per horse power.

Q. Then you charge St. Mary's or Stratford, where they take 300 or 400 horse power, $46?

A. You must remember that the horse power and miles are the main factors in costs. You are trying to compare a municipality where the cost of power was before that, 300 horse power was used at $48 with a municipality that is further down in the line (indicating on map) where the cost of power was $23 per horse power.

Q. What I want to get at is whether the charge in one municipality being $447 the same charge will be made in an adjoining municipality three or four miles from that?

A. The cost per horse power might be just the same although there may be a difference in the service charge. Supposing we are delivering that power to the next township we will just add sufficient to cover the cost of carrying the power from one point to another.

By Mr. Webster:—

Q. Is the initial cost of installing this hydro-electric power very great? Does the farmer need to have a special type of machinery such as fanning mills?

A. No sir, every farm machine that is now driven by power can be operated by hydro-electric just the same as if it were driven by a gasoline engine, except that results would be better on account of uniform speed.

Q. Supposing you had a wooden pump could you work it on that?

A. Yes, you could rig up a walking beam, you could also use a windmill pump, of the type that is to be found in operation on three-fourths of the farms to-day.

By Mr. Morphy:—

Q. As to the capacity of the line and the cost does the usual rule, the greater the consumption the cheaper the price, apply to the farm?

A. It does.

Q. The greater the consumption, the cheaper the cost?

A. The more consumers per mile the lower the service charge, and as the power used in a district increases the price per horse power per year decreases, that is the idea, and that covers the supply to the farms as well as to the municipalities.

By Mr. Hanna:—

Q. What is the size of the thresher you have used in your demonstration?

A. We have a thresher made in Prince Edward Island.

Q. It is small?

A. Not very small; there is a photograph of it in the bunch of photos that has been exhibited to the Committee. You remember the old "Waterloo Chief," that used in last fall's demonstration, was just a little smaller than it. It is considered small if you have in mind the large type of machine that is commonly in use to do a man's threshing in a day. The idea is that with a small machine the farmer can do it when he likes in the winter instead of having to get a large number of men to help him and do it all in a day.

By Mr. Morphy:—

Q. What is the advantage to a farmer? Is it in being able to thresh as he pleases?

A. Yes, there is an advantage in being able to do so as well as the saving effected by this method.

Q. What is it?

A. In the first place you get a better quality of chaff, it absorbs the moisture from the grain when it is kept for a longer period before threshing; then again your grain is a better product from leaving it longer in the head. In 1912 three-fourths of the grain in the country was heated because it was threshed too soon, most of it was harvested wet.

By Mr. Robb:—

Q. You do not make the statement seriously that such a large proportion of grain was injured because it was threshed when the straw was not dry?

A. You must have misunderstood me. What I said was that if there was any moisture left in the grain naturally that grain heated, moisture that would cause the grain to heat is absorbed by the chaff before it is threshed, and the grain keeps better.

By Mr. Best:—

Q. If you leave it in the head until the moisture is absorbed?

A. Absorbed out of the kernel of grain into the chaff. It will not heat then and you can put the grain in your bins and leave it, not having to handle it to keep it cooled.

Mr. ARMSTRONG (*Lambton*):—Mr. Purcell has made the statement that the saving to the farmer amounts to $65 per annum. Might I suggest that his itemized estimate be placed on the record.

By Mr. Morphy:—

Q. Mr. Purcell has stated that the farmer can save $63 or $64 per year by using electricity in preference to some other process. What is that process?

A. If he were doing that work in another way; if he had to take his grain to town for chopping; if he had to have a man at the pump because the windmill is not running; if he had to buy coal oil for lighting, he loses in these ways. By using electricity, he has the power for all these things and for cutting wood, &c.

Mr. ESPENSCHIED:—And there is also the saving on his wife.

Mr. PURCELL.—It will soon be that a farmer must have electricity on the farm or he may not get a wife, because the girls will go to town instead of marrying him.

By Mr. Elliott:—

Q. Where a man wants to fill a silo in a day, or a couple of days, what size of an outfit would he need?

A. The 5 h.p. equipment with cutting box and elevator or carrier will fill a silo about as fast as a man next door with a blower outfit and engine is filling it. They take the full size sheaf, cut and elevate it thirty or more feet just as the blower box does. The theoretical work done with the blower outfit on one place was 4·87 h.p. for cutting and elevating. The difference between the 4·87 h.p. and 18 to 21 h.p. used was absolute loss.

Q. Take an ordinary cutting box with a blower such as is ordinarily used in silo-filling. In ordinary filling you could possibly operate it with 7 or 8 h.p. Where, for instance, they have two or three sheaves thrown in, and possibly a couple went in lapping on one another, would this not make an extra load?

A. The blower box of the large type without a sheaf going through it takes about 10 h.p. to run it—I mean a standard box that is used around the country today. The data obtained in the 1912 and 1913 demonstrations indicate that, to do the same work with a carrier or elevator equipment as compared with the box equipped with a blower, the cost is much in favour of the former (that is the carrier or elevator), the amount of power taken being only one-quarter as much as by the latter. With electricity at 3 cents per kilowatt hour it was 1·5 cents per ton as compared with 6 cents per ton. The blower box is a very extravagant power machine.

By the Chairman:—

Q. The elevator requires less power?

A. The elevator and carrier. You get your material up into your silo by using about 10 p.c. more than the theoretical power.

By Mr. Elliott:

Q. About how much power would it take to run the size of cutting box that you speak of, empty?

A. It will take approximately $1\frac{3}{10}$ h.p. to run either carrier or elevator box empty.

Q. At what speed?

A. 480 is what we are running No. 50 box at.

By Mr. Sharpe (Ontario):

Q. Do the motors easily get out of order?

A. No, they should not. Take a compound motor, made by some of the companies in Canada today: a standard test is to submerge the motor and run it ten minutes under water with full current and full voltage at full speed. It is advisable to use reasonable care; all motors are not submitted to this test.

By Mr. Morphy:

Q. Taking the case of a farmer saving $64 as you mentioned. Supposing that a farmer was using a gas engine instead of a motor and doing the same work with it; what would be the difference in cost, and what would be the saving?

A. None, because he would have to use a gasoline engine for his power, buy his coal oil for lighting, and make arrangements to take care of his washing, ironing, &c., by manual labour. With gasoline he cannot take care of all of these.

Q. Is that $64 assumed or arrived at having regard to these allowances?

A. Yes, it is all itemized. The man's name is Mr. A. S. Maynard. He has kept track of his costs on his farm for fourteen years. He can tell exactly what each cow cost him in the last fourteen years for feed; he charges so much for barn space to each cow, so much for corn, straw and hay; and knows the total cost of production per cow. As a credit he sets the revenue he receives for milk. When a cow produces less than 6,000 pounds of milk he beefs her.

By Mr. Wilcox:

Q. Where does he live.

A. He is at Kent Centre, Harwich township. The other man is in Norwich township, Mr. Fletcher. I have a statement from him.

By Mr. Sharpe (Ontario):

Q. This has been a very interesting session, I am sure. Could we not arrange for a demonstration on the Experimental Farm? I think we should pursue this line of enquiry.

A. Why not go a step further. Here is the Federal Government considering the question of electricity on the farm. Why don't you install equipment on your farm along the lines outlined and have it as a permanent installation?

Q. What would it cost to bring a demonstrating outfit here?

A. I could not say off hand. We might have to borrow some of the apparatus, certain motors and so on.

By Mr. Hanna:

Q. Can you give us a demonstration up in Western Ontario if we go there in a body?

A. Let this Agricultural Committee arrange to go as a body to Western Ontario and see these men doing the work with electricity on their farms. No arranged demonstration can equal a demonstration where the man is using electricity in his own work on his farm.

By Mr. Morphy:

Q. What would it cost to establish an equipment on the experimental farm here?

A. I cannot say just exactly.

Q. Roughly.

A. To equip the farm with electric motor, &c., it would cost approximately $600 to $800.

Q. To equip this farm?

A. I did not mean to include milking machine. Leave that out, because it costs quite an item. I would say all the cost for motors, &c., would be $600 or $800, not including the line up to the farm.

Q. Would $2,000 cover it?

A. It depends on what you wish to install, it would install an equipment for a large plan. I do not know your farm.

By Mr. Glass:

Q. I would like to get information as to the method to be followed to secure the introduction of electricity into a township by the Hydro-Electric Commission. From my own township a largely signed petition was presented, and it was referred back to get additional information for example, the number of lights which each petitioner would be likely to require. I would like to know in the case of such a petition what class of information the Commission would want.

Mr. PURCELL.—That is a very good point. I had forgotten to refer to the fact that we have a standard form in such cases. It consists of a petition addressed to the reeve and municipal corporation, which names the probable number of lights and horse power that will be required. It should be accompanied with a sketch or map showing the exact location of the buildings on the farm.

Q. Any ratepayers applying to the Commission can get a copy of the proper form?

A. Action is usually taken through the Board of Trade or some local organizing body. In the case you speak of the township council can do it.

Mr. GLASS.—I move that a copy of the forms issued by the Hydro-Electric Commission, and referred to by the speakers, be incorporated in the report of the proceedings.

Motion was agreed to.

Committee adjourned.

CLAUSES FROM THE ONTARIO POWER COMMISSION ACT, 1911.

3. Any one or more of the ratepayers in a municipality, the corporation of which has not entered into a contract with the Commission under The Power Commission Act, may apply to the corporation to obtain from the Commission a supply of electrical power or energy for the use of such ratepayer or ratepayers for lighting, heating and power purposes or for any of such purposes.

4. The application shall be in writing signed by the applicants and shall state the lots or parts of lots owned or occupied by each of them respectively, and the purposes for which the electrical power or energy is required.

8. The Council of the Corporation shall thereupon request The Commisson to supply the electrical power or energy for the purposes mentioned in the application.

No. 4.

FORM OF PETITION.

To the Reeve and Counsel of the Municipal Corporation of the Township of.....

GENTLEMEN:

We the undersigned petitioners, request your honourable body to obtain from the Hydro-Electric Power Commission an estimate of the cost to us, respectively of supplying us with Hydro-Electric Light and Power, in accordance with the provisions of 'The Power Commission Act, 1911,' 1 George V, Chapter 14.

We estimate that we will require about the number of lights and horse-power set opposite our respective names.

Name	Lot	Con.	Number of Lights	Number of Horse-Power

No. 5.

FORM OF RESOLUTION BY MUNICIPAL COUNCIL.

Moved by Alderman.....
Seconded by Alderman.....

That the Council of the Municipality of..... requests the Hydro-Electric Power Commission for Ontario to give the Municipality of.....an estimate of the price to be charged to the said Municipality for.....horse power of electric energy from..... to be supplied at....., ready to be distributed by the said Municipality.

FORM OF APPLICATION TO COMMISSION.

No.....

NAME..... Dated.....191.....

Application for Electric Power Service

(Rural)

THE UNDERSIGNED, hereinafter called the Consumer, hereby requests the..... ....., hereinafter called the Corporation, to make the necessary service connections and furnish electrical energy at the premises..... owned by.....and occupied by ..... as a ..... The electrical energy is required to operate..... of.....total horse power capacity. Maximum demand kilowatts.....

The Consumer and the Corporation agree to abide by the 'Conditions' on the reverse hereof, and when signed by the Consumer and the..... of the Corporation, to hold this Application as a contract under the Act to provide for the local distribution of electrical power known as the 'Power Commission Act 1911.'

The Consumer further agrees to take all electrical energy required by the Consumer in accordance with the aforesaid Act, paying quarterly for such energy in accordance with the rates on the reverse hereof, and to accept delivery as soon as connection can be made.

SIGNED.....ACCEPTED FOR THE CORPORATION BY.....
Consumer

DATE.....191....

LOT NO..... CONCESSION NO.....

57794—3

Connected Load.....Horse Power. Date Connected.....191..

Maximum Demand.....Kilowatts. Date Meter Installed.....191 No..

RATES.

.....per service per month, and

.....per H.P. per year.....

.....

.....

.....

.....

.....

CONDITIONS.

1. The Consumer agrees to provide convenient and safe space for the Corporation's meters (for which no rental charges will be made), wires, and all other appliances in said premises, and further agrees that no one who is not an Agent of the Corporation of otherwise lawfully entitled to do so, shall be permitted to remove, inspect, or tamper with the same, and that the properly authorized agents of the Corporation shall, at all reasonable hours, have free access to the said premises for the purpose of reading, examining, repairing, or removing their said meters, wires, and other material and appliances.

2. Meters and all other appliances of the Corporation in said premises shall be in the care and in the risk of the Consumer; and, if destroyed or damaged by fire, or any cause whatsoever, other than ordinary wear and tear, the Consumer shall pay to the Corporation the value of such meters and appliances, or the cost of repairing or replacing the same.

3. The Corporation agrees to use reasonable diligence in providing a regular and uninterrupted supply of electricity, but does not guarantee a constant supply of electricity, and will not be liable in damages to the Consumer for failure to supply electricity to said premises.

4. This agreement shall not be binding upon the Corporation until accepted by it through its proper officer, and shall not be modified or affected by any promise, agreement, or representation, by any agent or employee of the Corporation unless incorporated in writing into this agreement before such acceptance.

5. The Consumer will provide all lines on the premises and all lines connecting premises with the point of delivery, and maintain the same in efficient condition with proper devices, the whole according to the requirements of the Canadian Fire Underwriters' Association.

6. It is agreed that the signature of the parties hereto shall be binding upon their successors or assigns, and that the vacating of the premises herein named shall not release the property from this agreement, except at the option and by written consent of the Corporation.

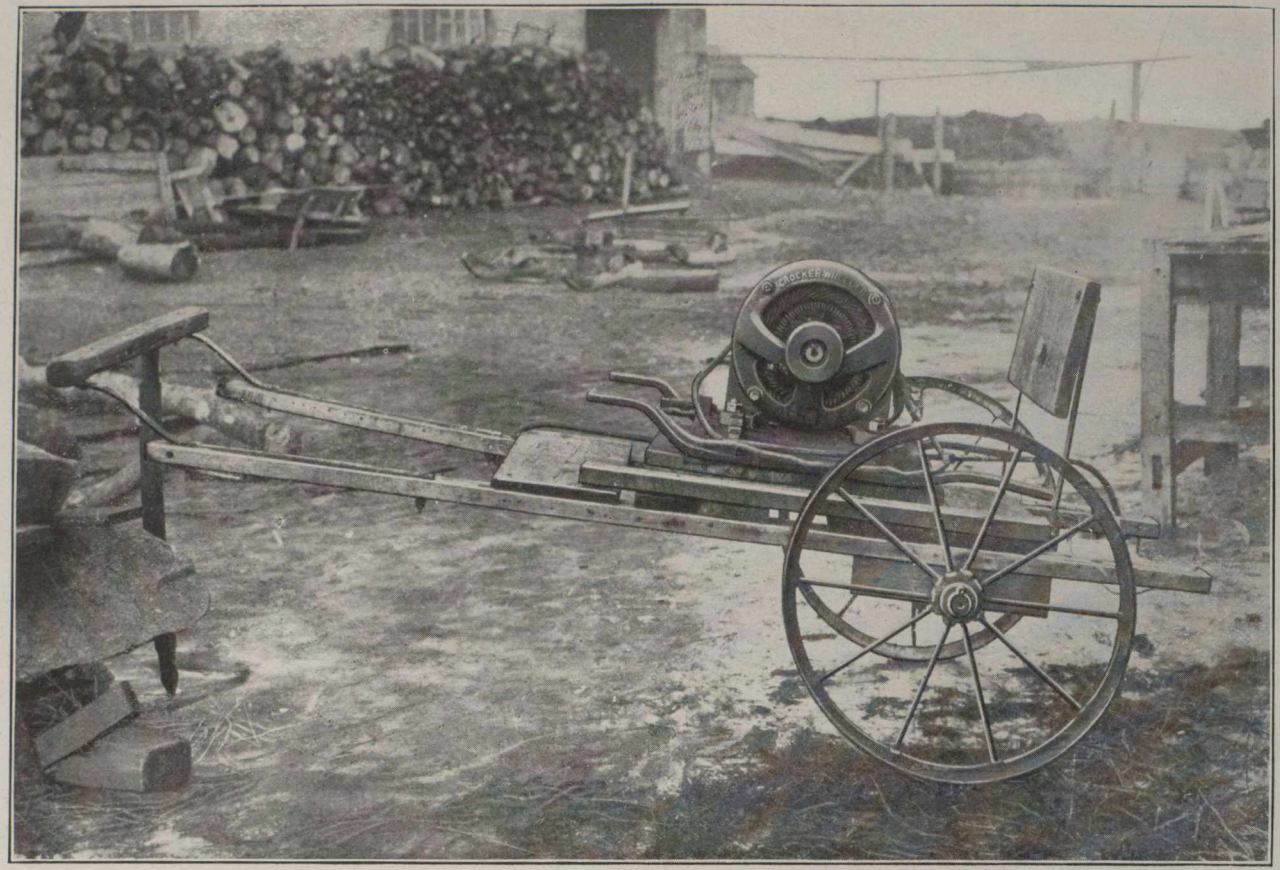
7. If required to fix the basis of billing, the Consumer hereby authorizes the Corporation to install and repair maximum demand or curve-drawing meters, or other measuring devices, at Consumer's expense, or to make tests from time to time to determine the maximum demand of power used. The Consumer agrees not to make any changes in or additions to his apparatus or connected load after the same has been so determined, except with the written consent of the Corporation.

8. All electrical and mechanical equipment used by the Consumer shall be subject to the reasonable approval of the Corporation, and the Consumer shall so take and use the electrical energy as not to endanger the apparatus of the Corporation or cause any wide or abnormal fluctuations of its line voltage. All motors shall be selected with reference to securing the highest feasible power factor at all loads. Minimum power factors, when operating Consumer's maximum load, shall be 80 per cent. for motors up to 10 H.P. and 85 per cent. above 10 H.P.

Hydro-Power Agricultural Demoustration. Silo-filling.

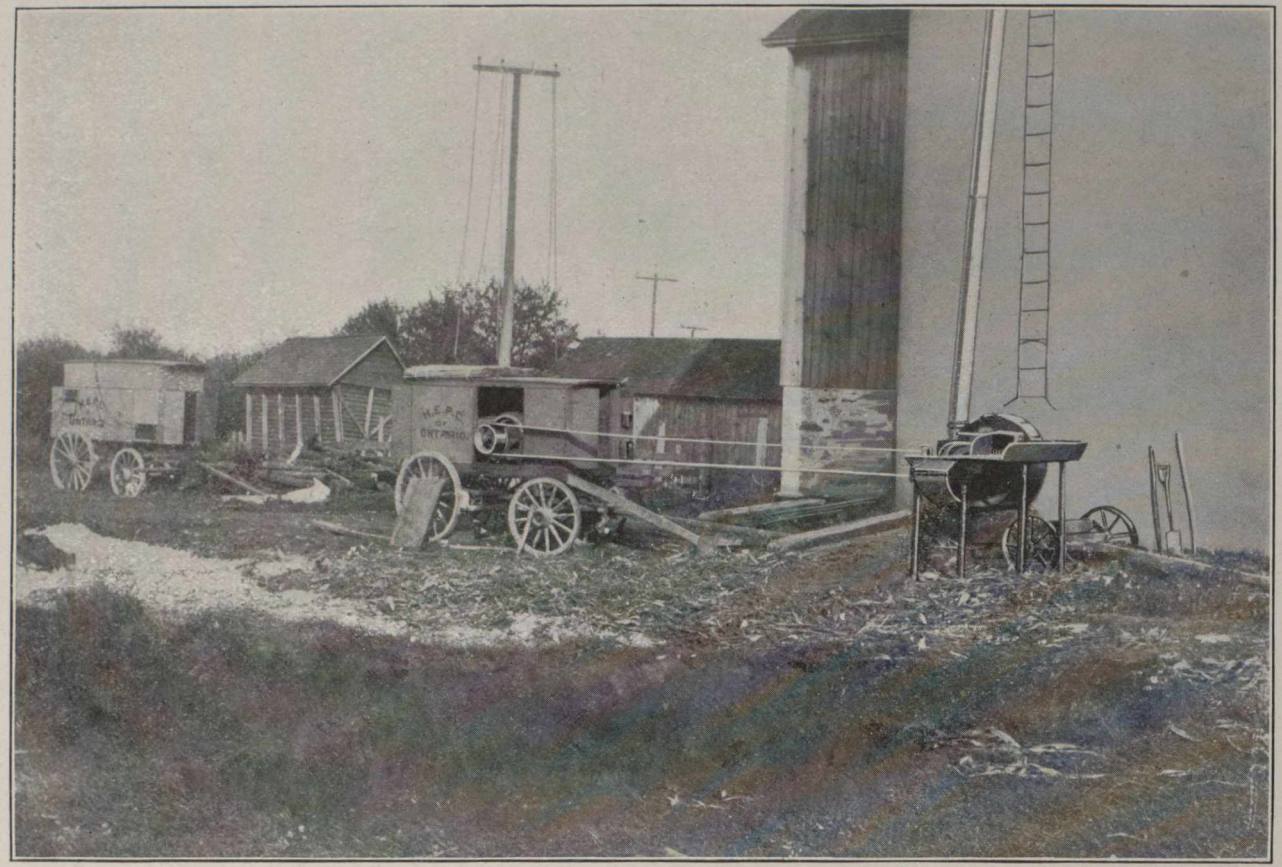
Agricultural Hydro-Power Demonstration, Aug. 28, 1912. Transformer Wagon inside hedge at Mr. Might's Farm.

Agricultural Hydro-Power Demonstration, Aug. 28, 1912. Ontario St. looking north. Transformer wagon and connections to lines operating at 2,200 volts.

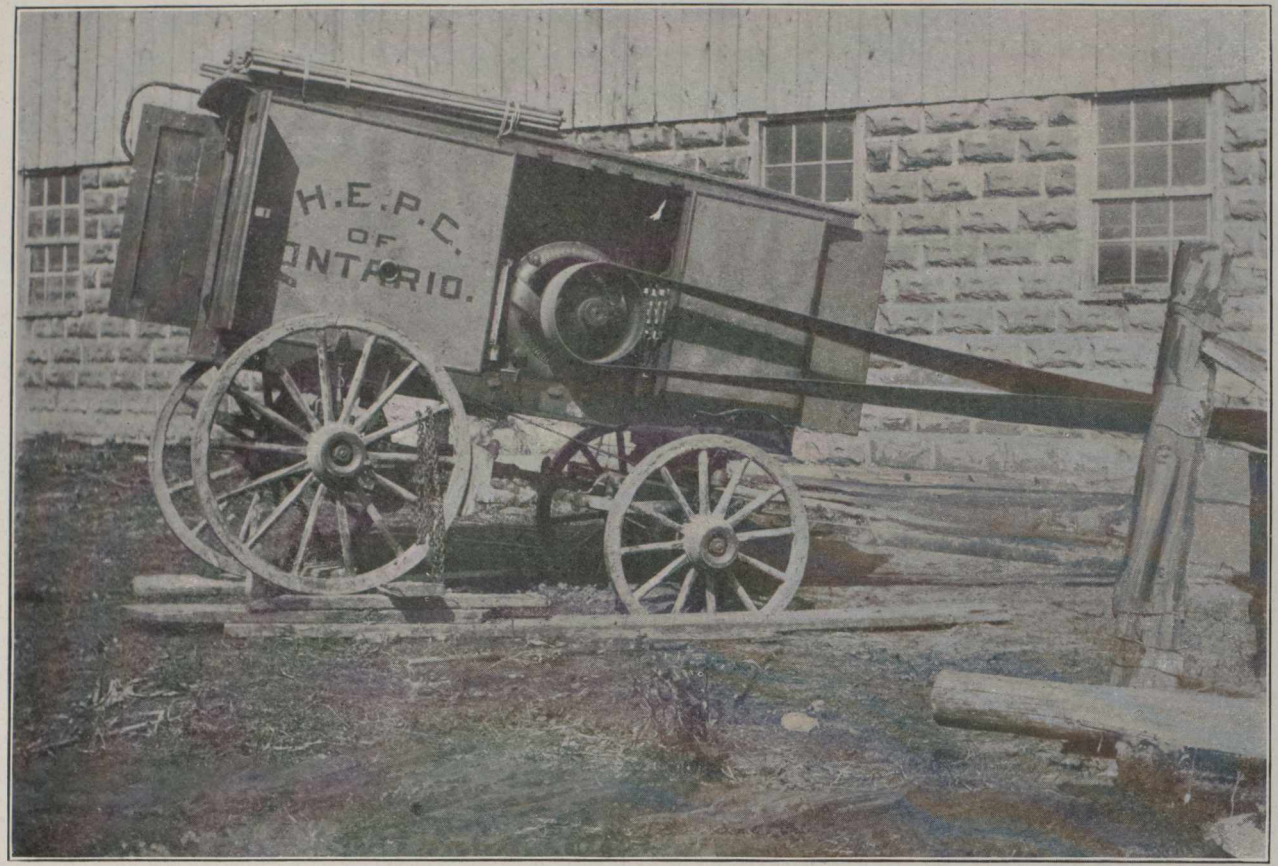


Hydro-power demonstration, Geo. Raymond's farm, North Oxford, showing motor mounted on truck.

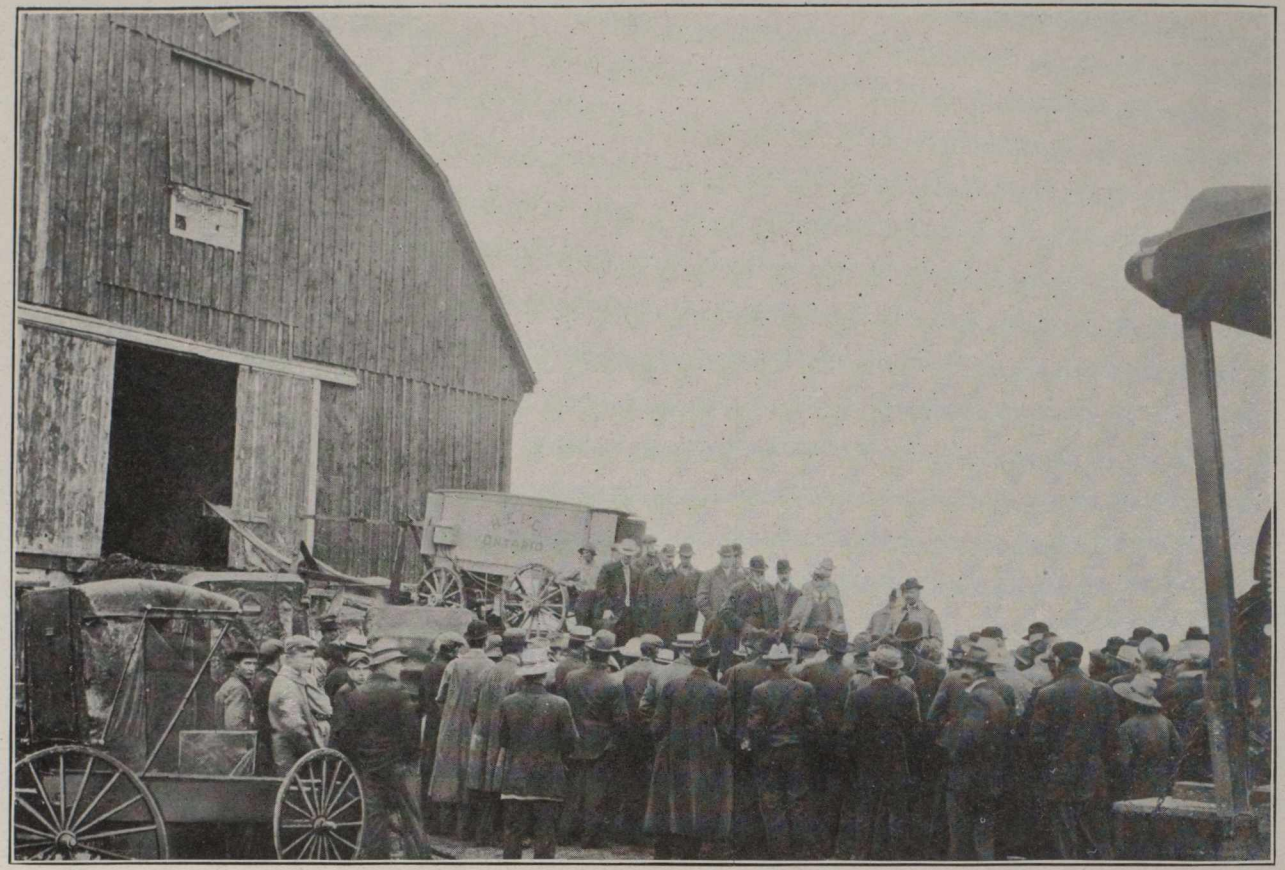
Separator and cutting box driven by 5 H. P. motor at Mr. Clark's farm.



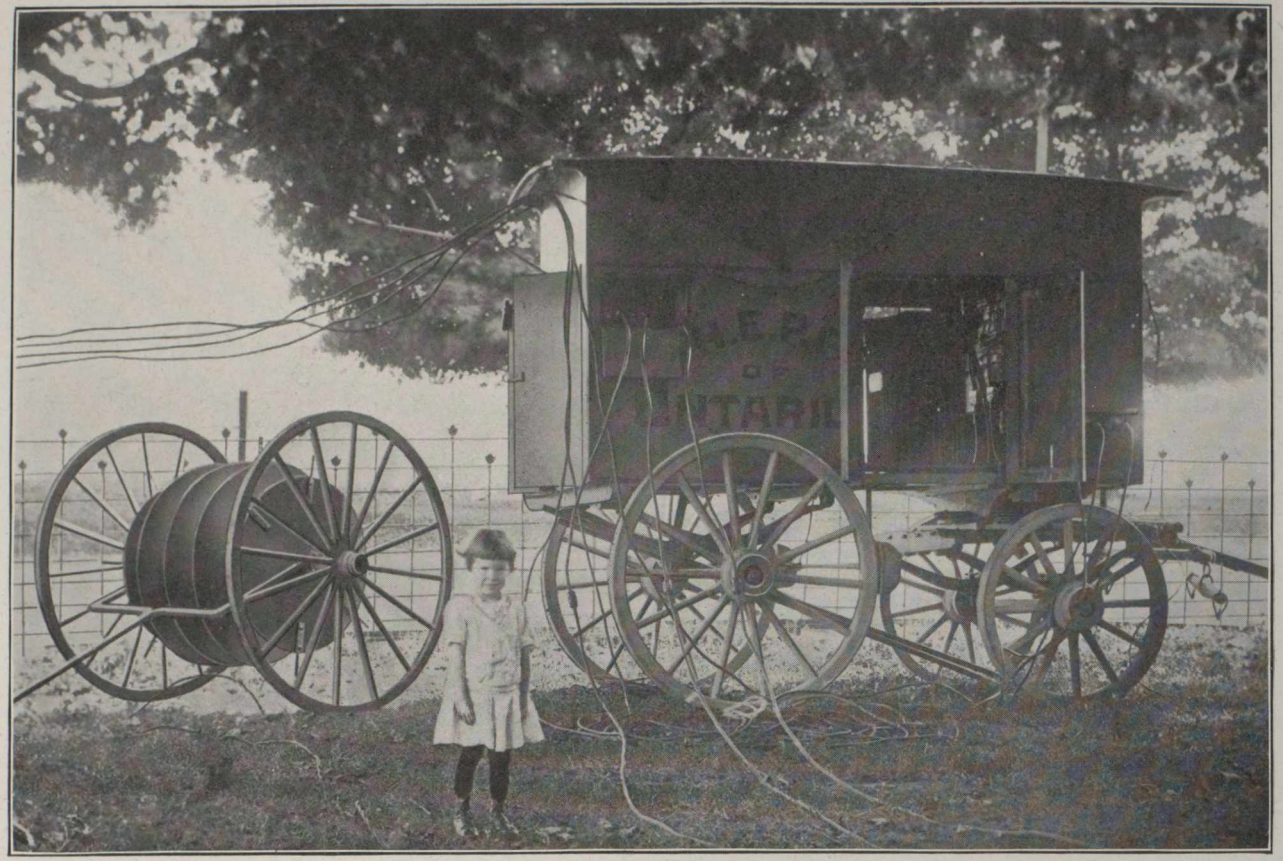
Agricultural Hydro-power demonstration filling Silo at John Inglis, W. Oxford Township.



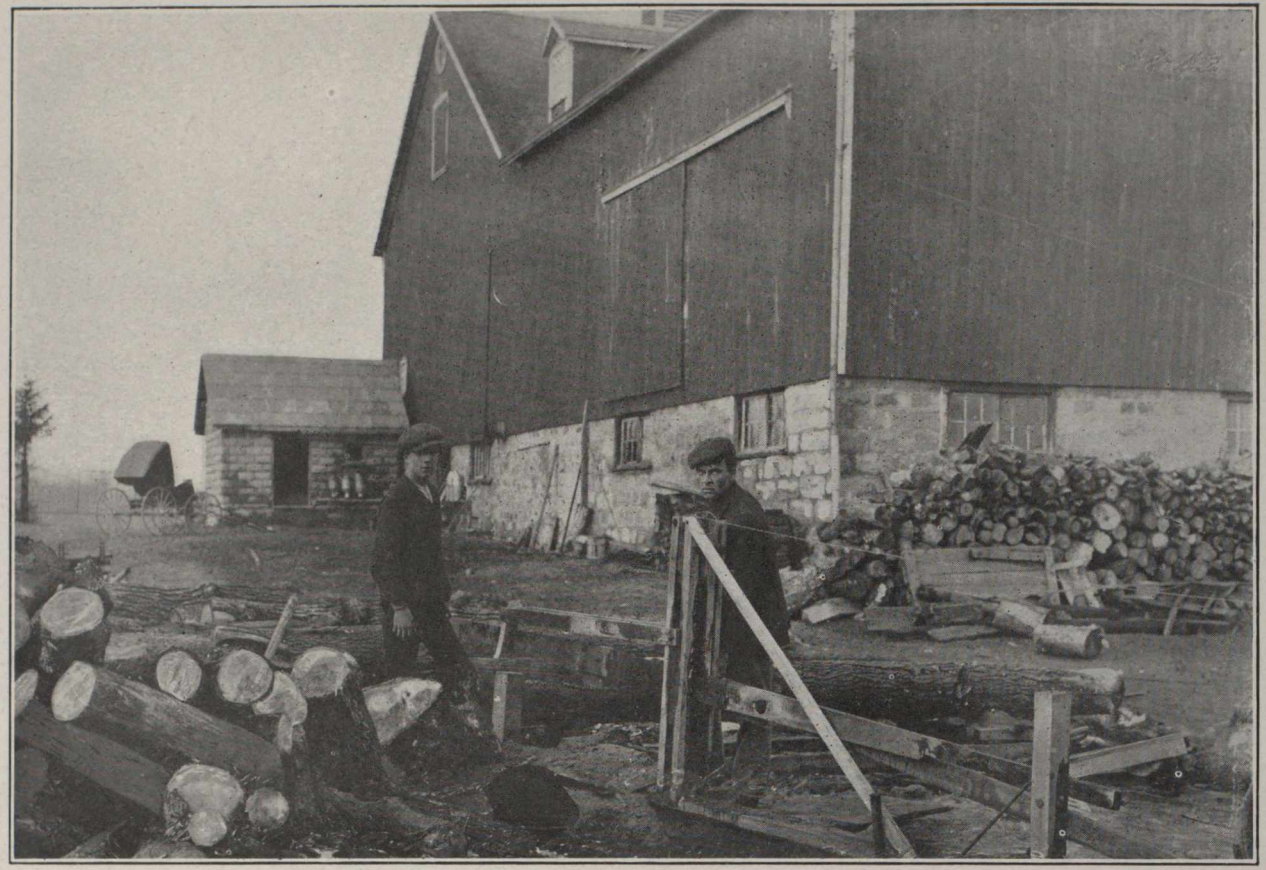
Agricultural Hydro Demonstration, Oct. 6th, 1912. Silo filling at Mr. James' farm.



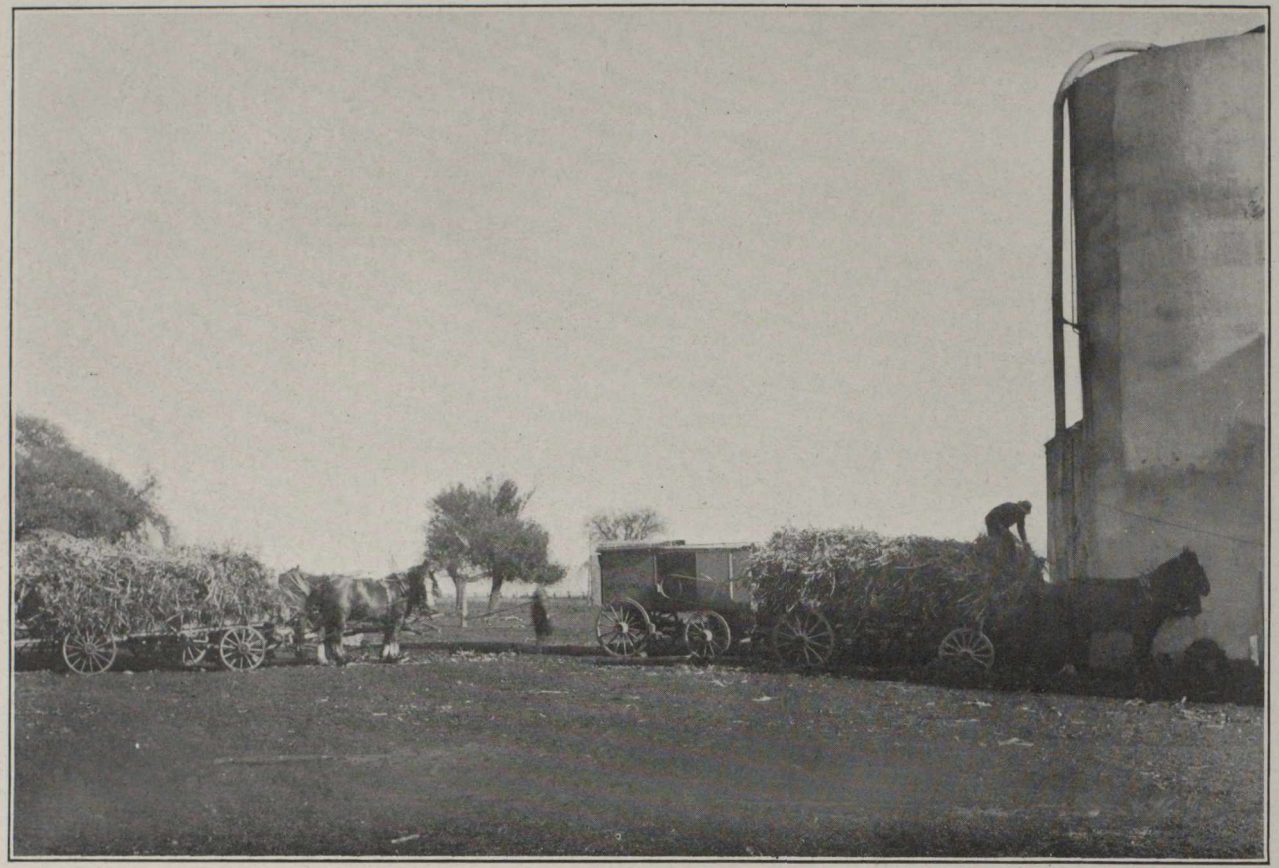
Agric ultural Hydro-Power demonstration, Aug. 28, 1912. Motor wagon and crowd. Hon. Adam Beck speaking.



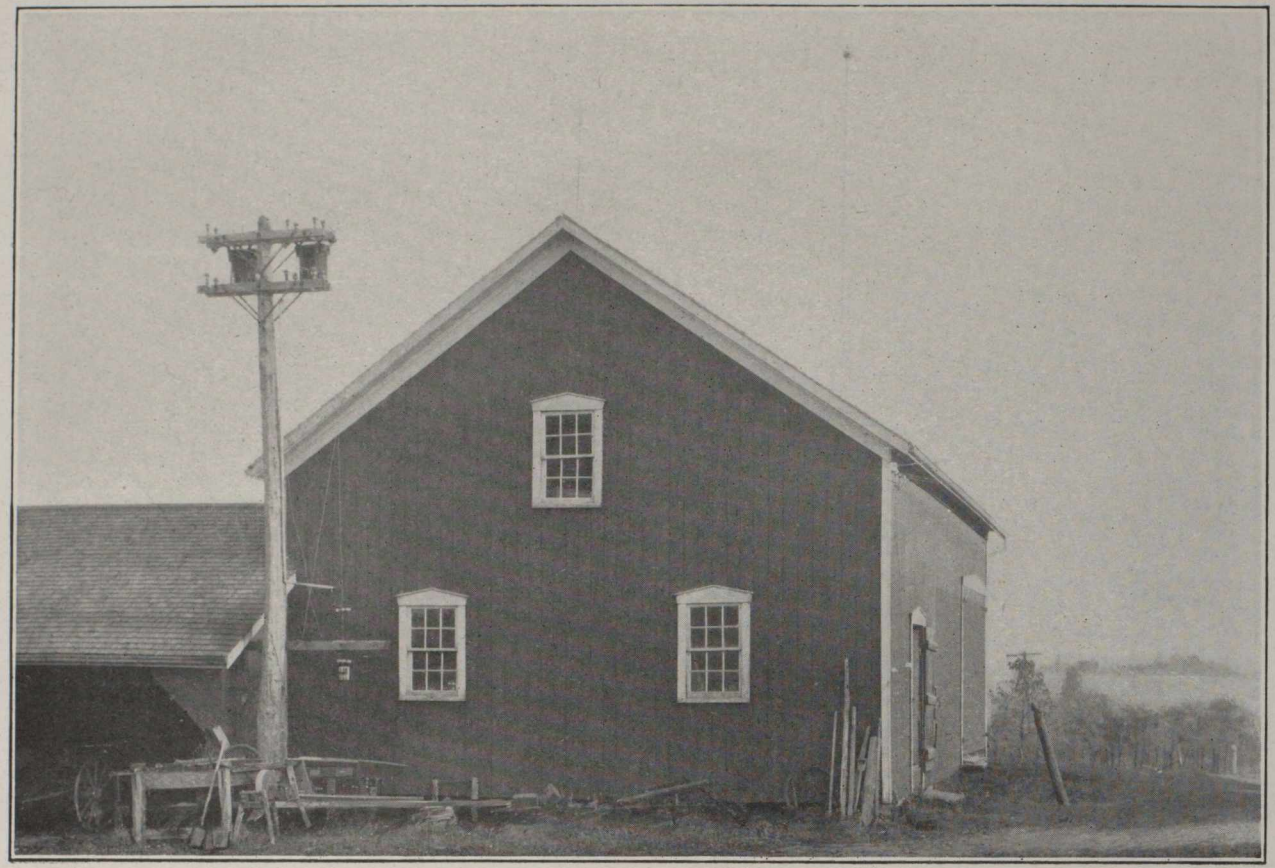
Agricultural demonstration. Transformer, wagon and reel at Mr. John Karn's.



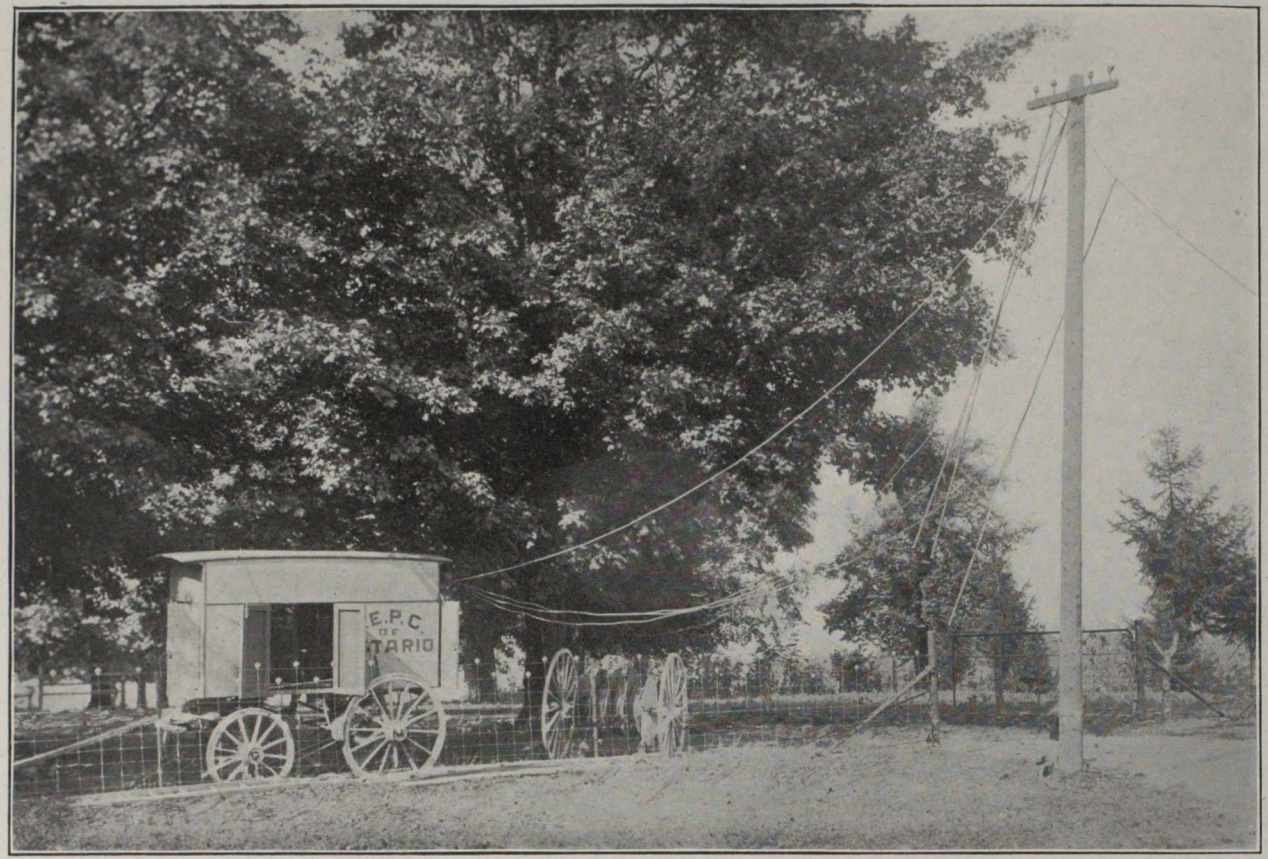
Hydro-Power Demonstration. Geo. Raymond's Farm, showing Drag Saw.



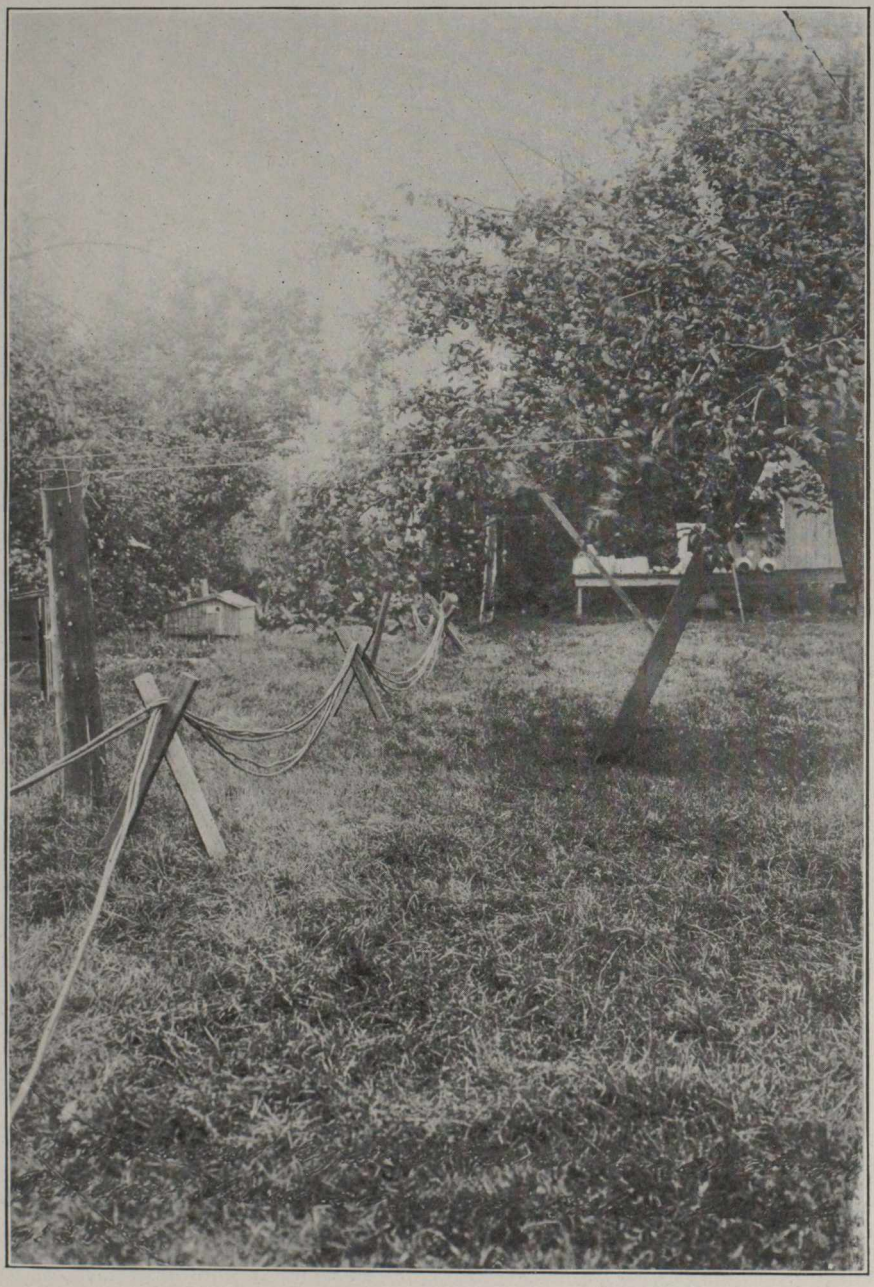
Silo filling with 25 H. P. motor.



Transformers at Raymond's Farm.

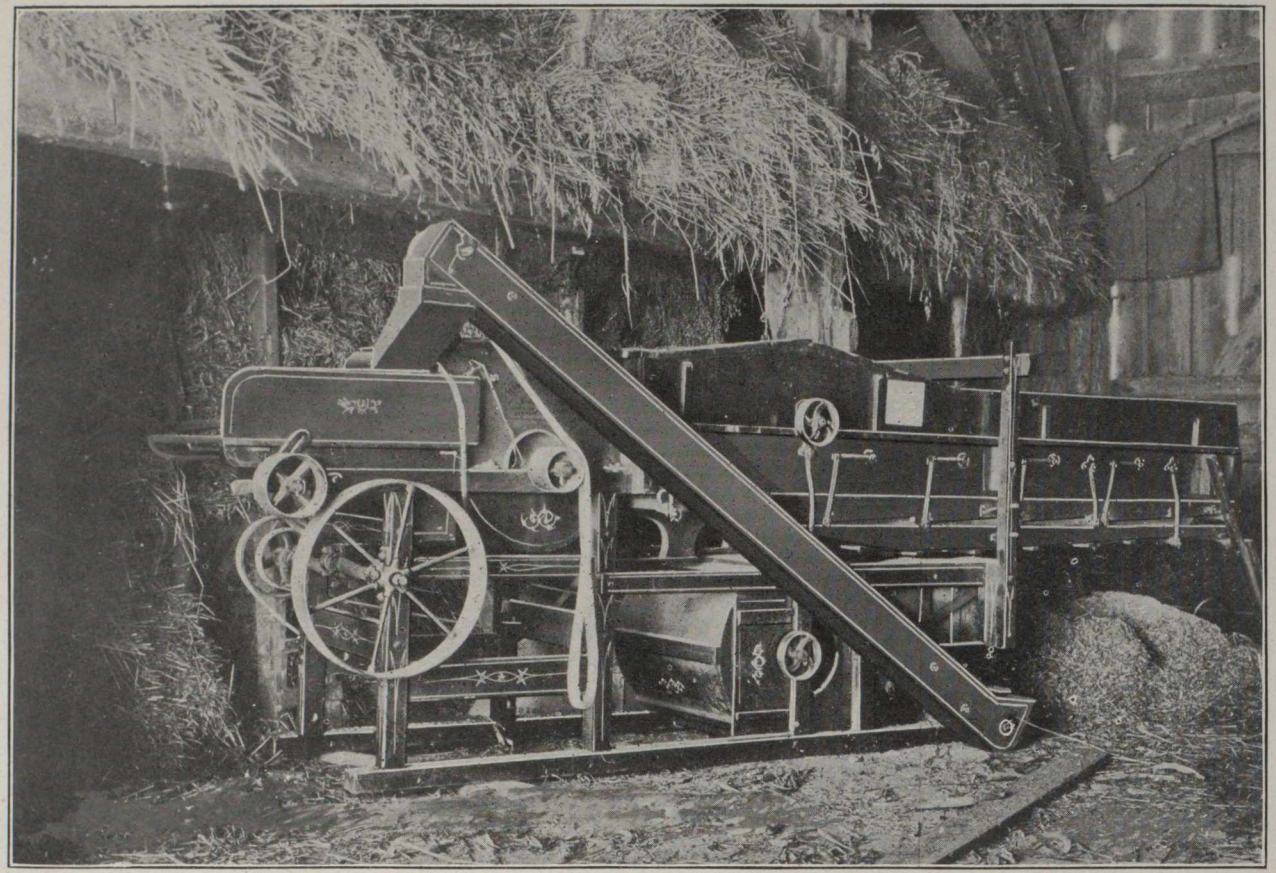


Agricultural Hydro-Power Demonstration. View of Transformer Wagon and Reel showing connection with line.

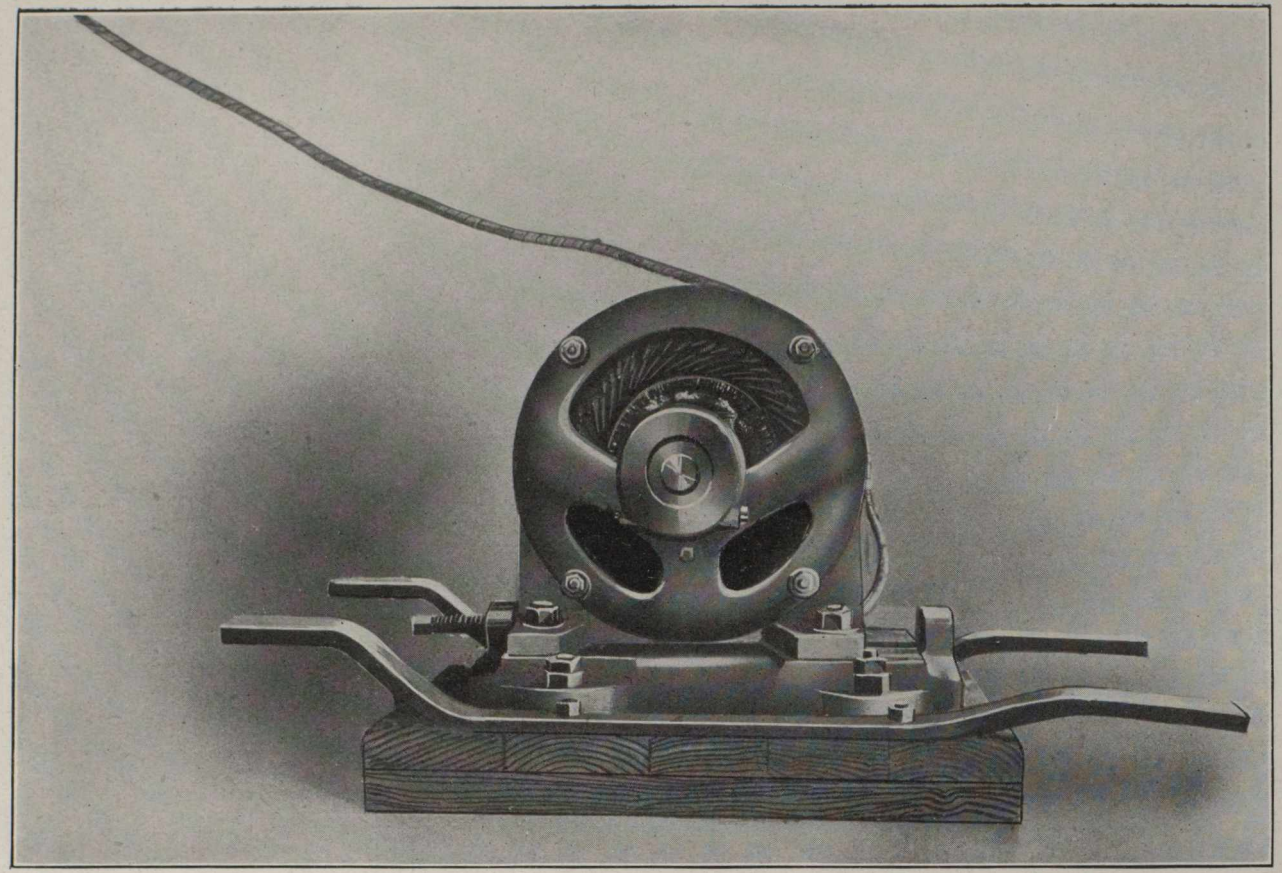


Agricultural Hydro-power demonstration ; general view around motor truck.

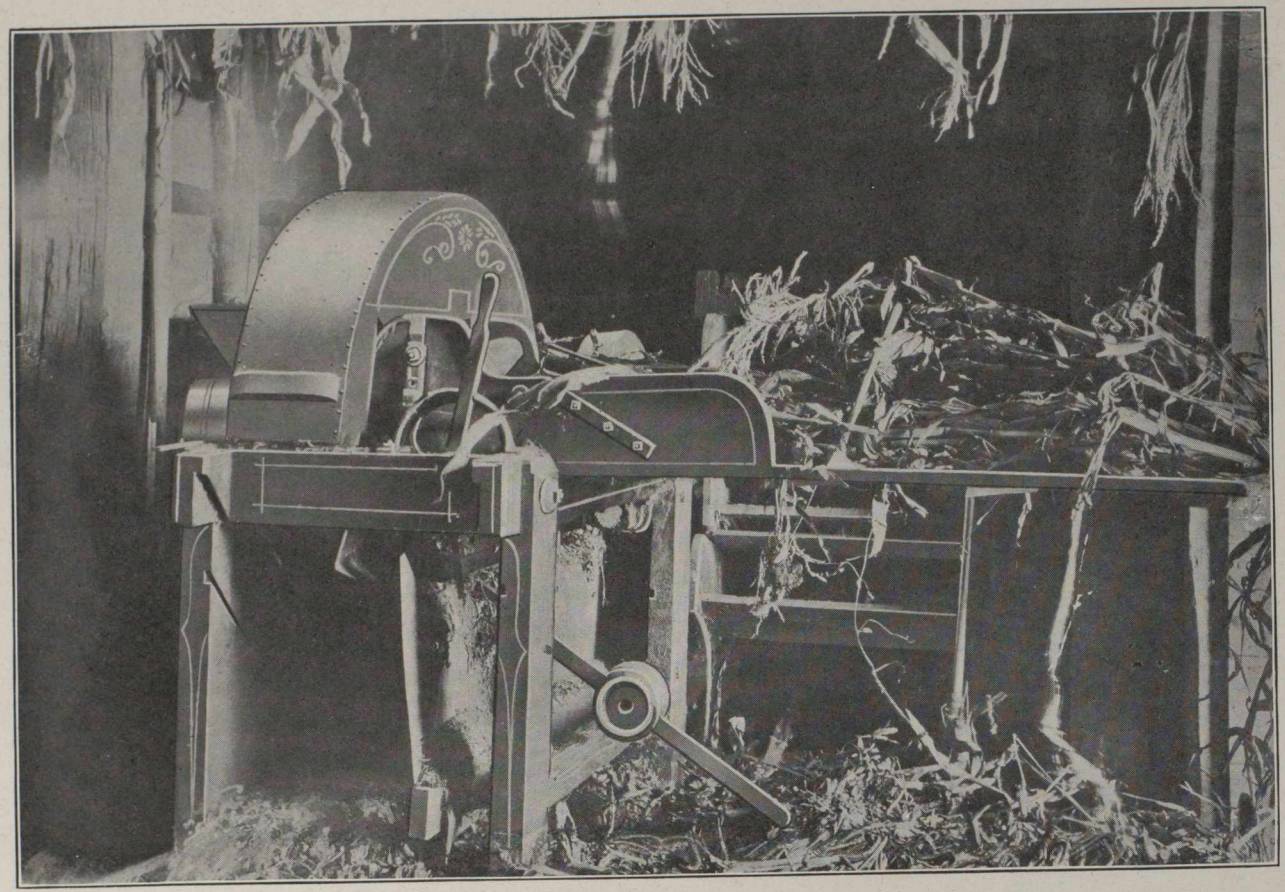
Agricultural Hydro-power demonstration, D. W. Clarke, W. Oxford ; view of box power.



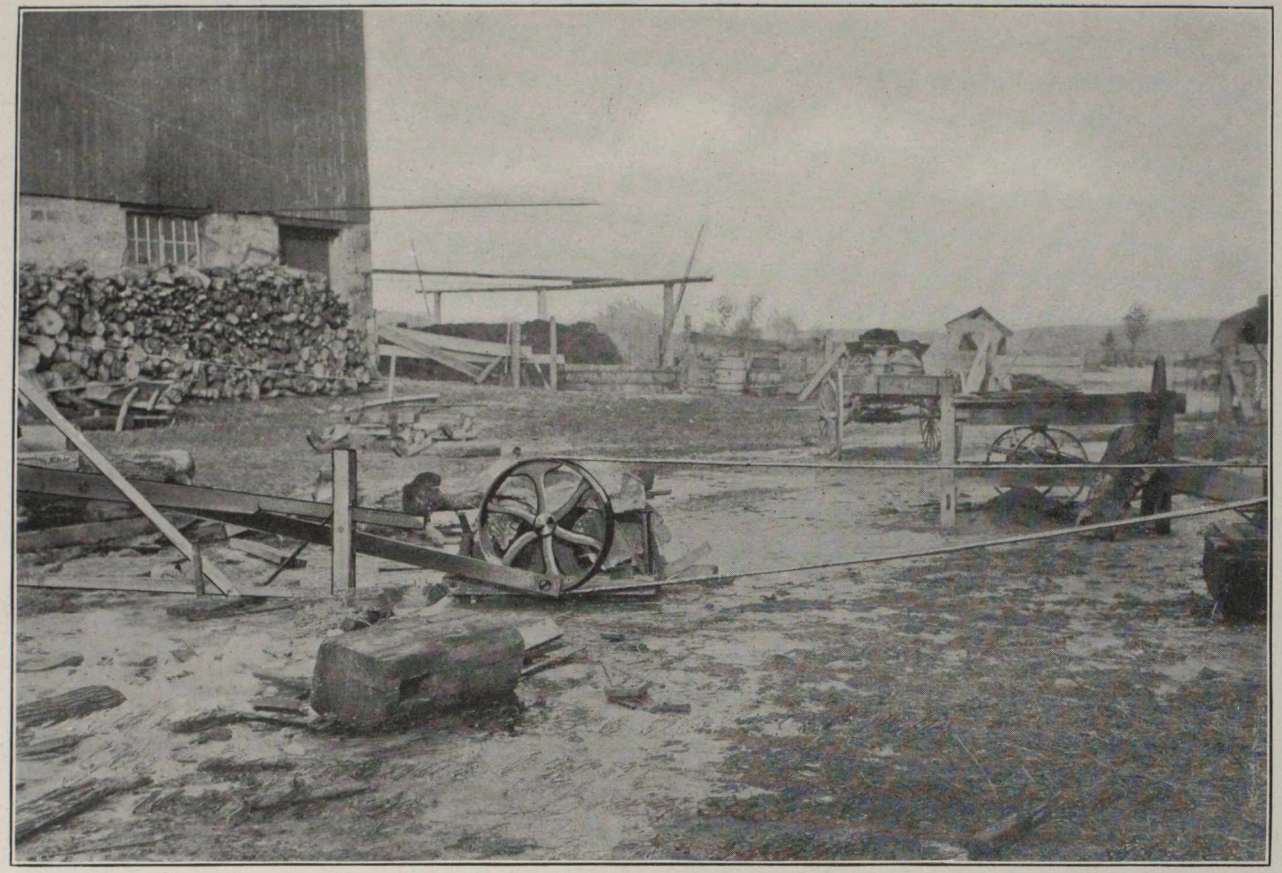
Page Separator for 5 H. P. Motor.



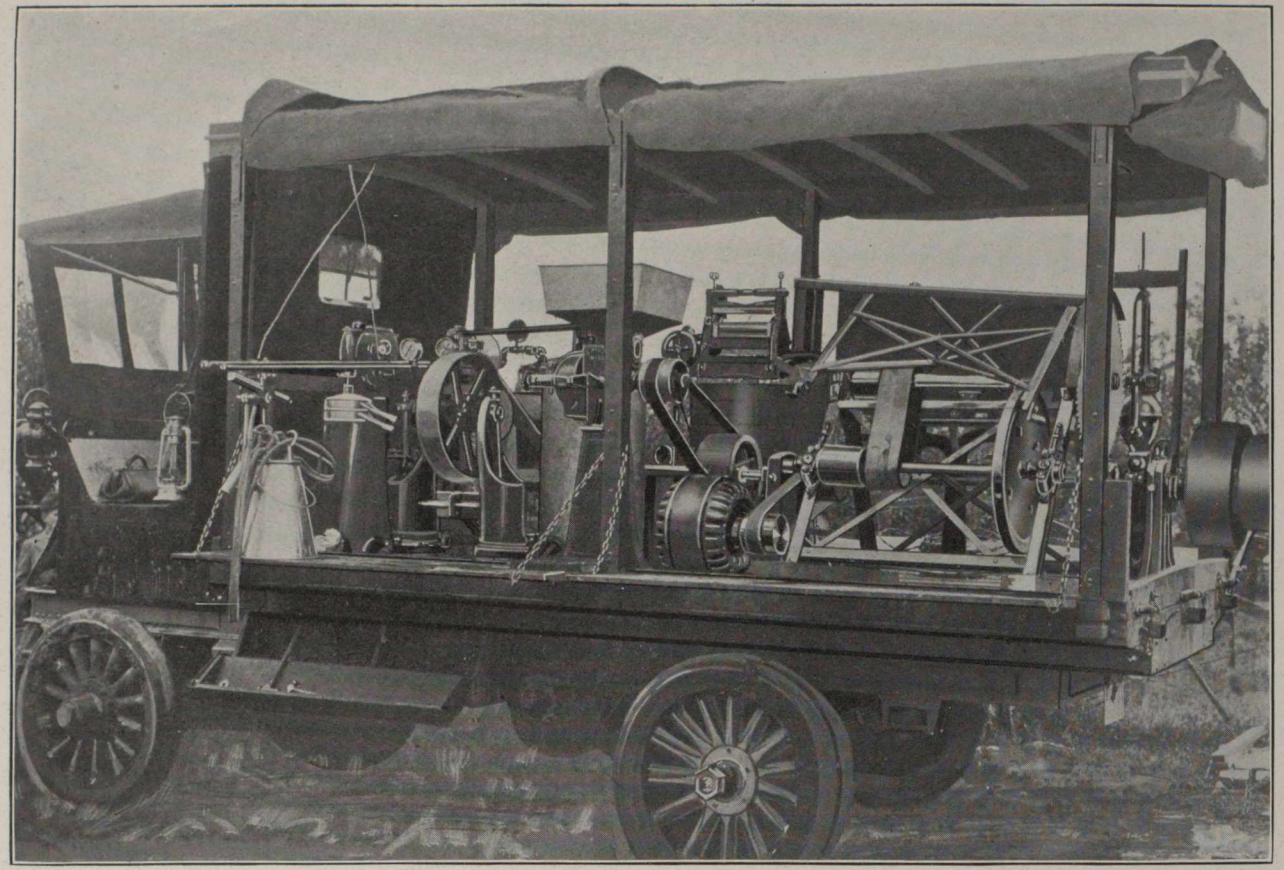
Hydro-Power Demonstration, Geo. Raymond's Farm, 2 H. P. motor which does the work on the farm.



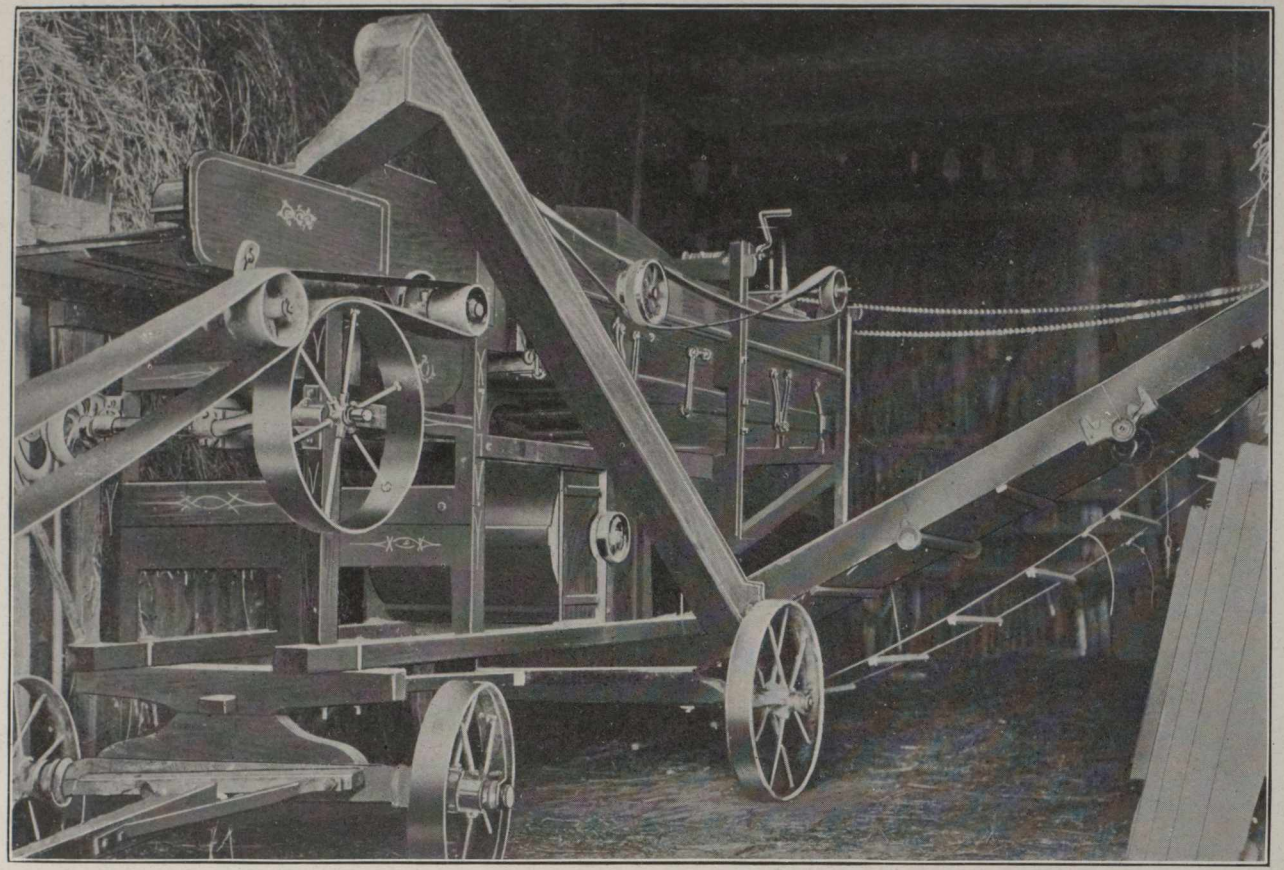
Hydro-power demonstration at Geo. Raymond's farm.



Hydro-Power Demonstration, Geo. Raymond's farm ; Drag saw connected to 2 H. P. Motor.

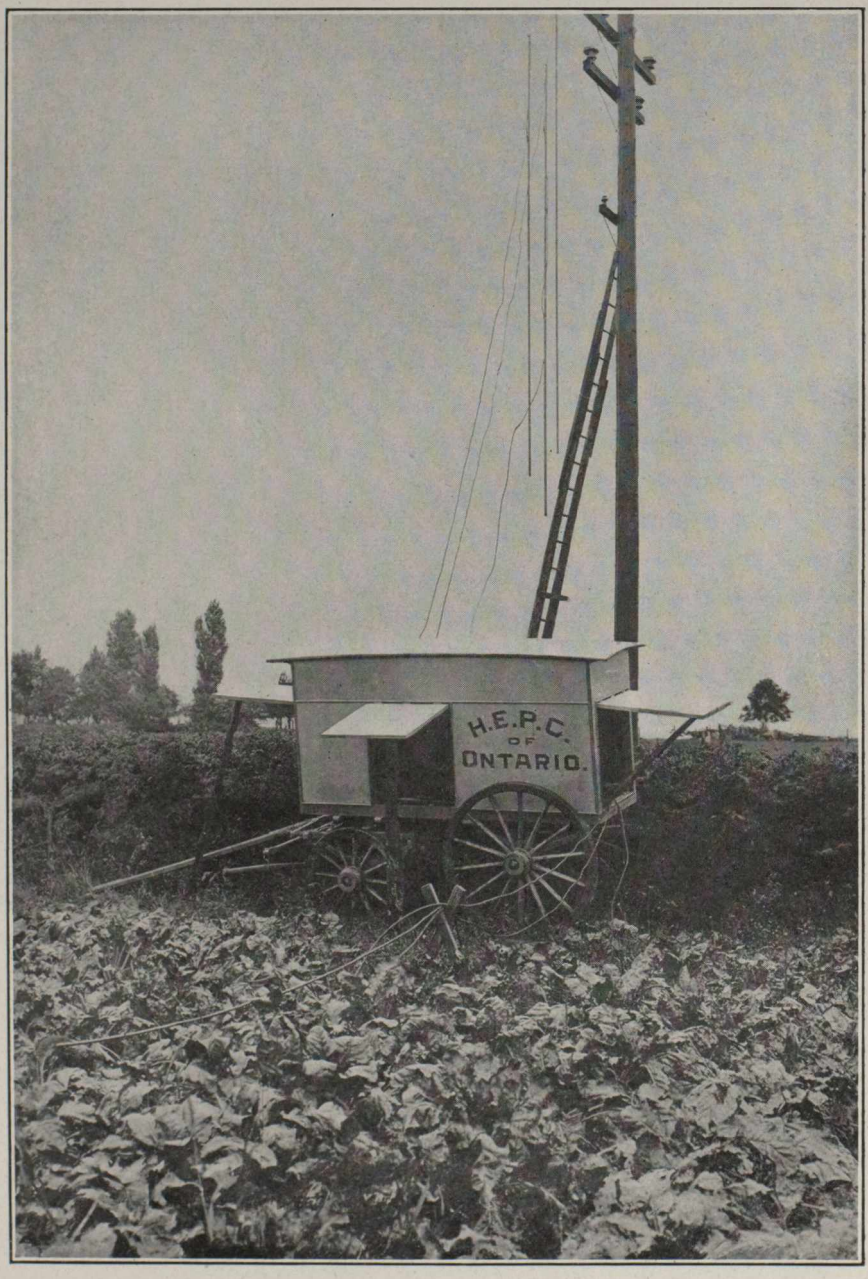


Agricultural Hydro-Power Demonstration, Aug. 28, 1912. View of Truck showing from right to left, Cream Separator, Milling Machine, Grinder and Circular Saw with motor which will drive any of the machines.

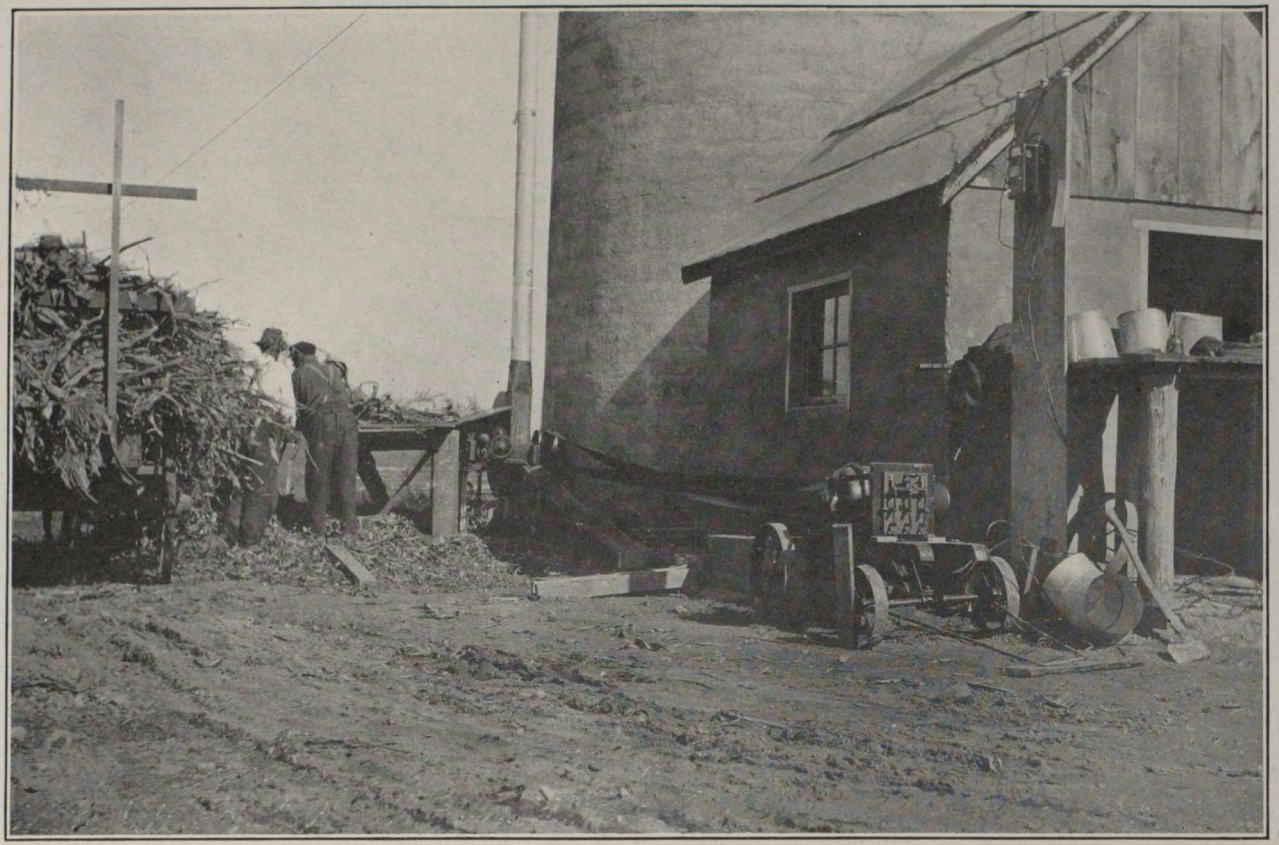


Grain Separator for 5 H. P. motor drive.

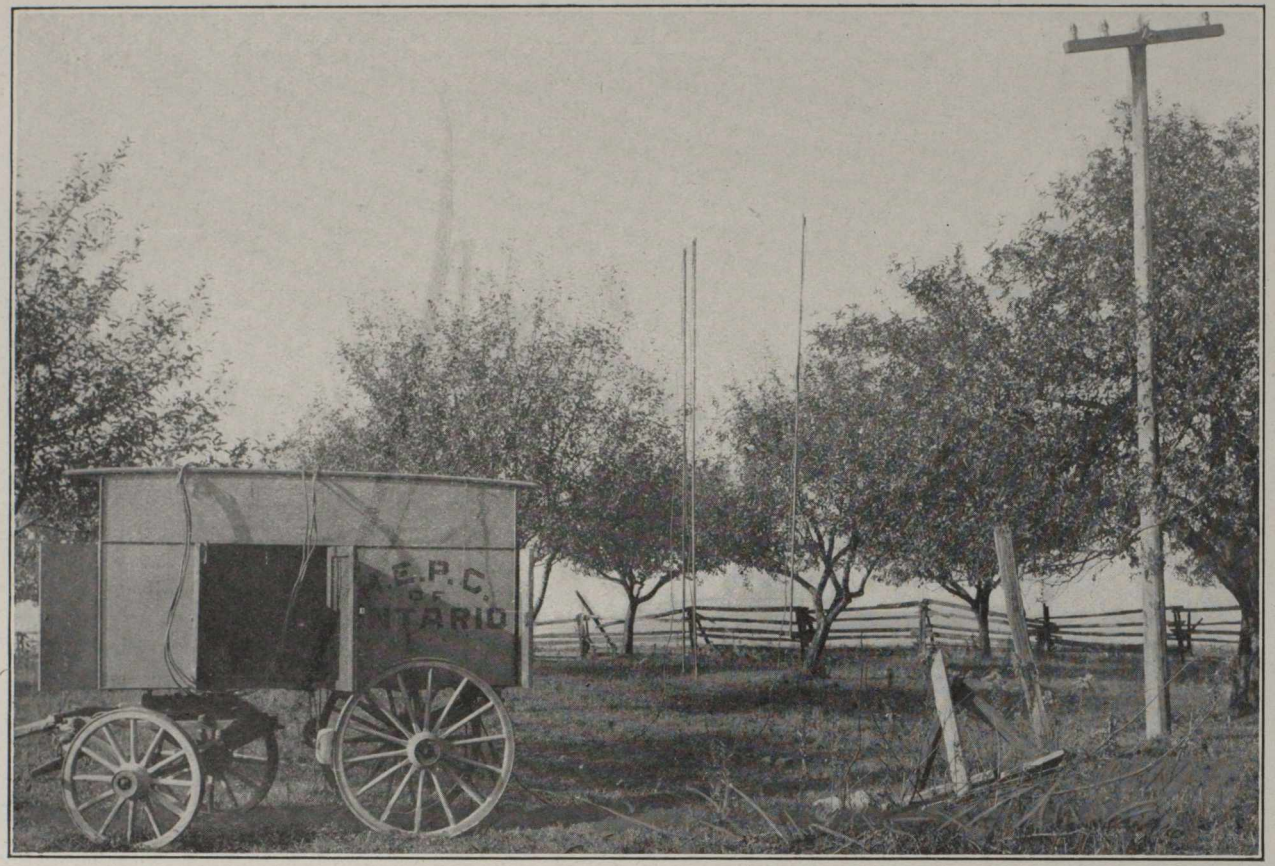
Agricultural Hydro-Power demonstration, December 16, 1912. Filling Silo, G. T. Prowie's, Dercham Tonwship.



Agricultural Hydro-Power Demonstration. Transformer wagon at Hedge. Connections for Power Line.



Silo-filling with 5 Horse Power outfit, at Mike Cornwall's Farm, North Norwich.



Transformer wagon and poles for connecting to line.