Also different surfaces were required for grinding, and a greater differential in the speeds of the grinding surfaces was found necessary. Those necessities were not all discovered at once; but once started in the right direction, as is always the case, necessity became the mother of invention.

As has been said, the wheat must be first considered and put in proper shape for good flour-making, both as to temper and condition of cleanliness. The tempering is done either by wetting, steaming or heating. In high and dry climates the wheat must be dampened by either steam or water or both. In moist climates heat only is required in cold or during dry spells of weather. The rolls for the first and main break must be corrugated eighteen to the inch and made very dull; and the differential must be as one to five; or run the slow roll, it nine inches in diameter, 100 revolutions per minute and the fast roll 500. Those speeds can be somewhat exceeded if output demands, but it is better not much to exceed that speed. Nine-inch rolls should always be used for the breaks. With the dull corrugations and wide differentials, we do not cut, but draw out the bran in wide flakes and at the same time granulate the flour. In that way the flour is separated from the bran clear and in good condition. From the roll it goes to a scalper covered with number 24 or 26 wire. The wire is fine and presents but little scouring action further to wear the bran, as is the case with the early breaks in a gradual-reduction mill. By the action of the rolls the bran has been mostly relieved from its load of flour and is, therefore, very light and floats lightly in the scalper.

The finer portions, that do so much to injure the break-flour in gradual-reduction mills, that may have been detached from the bran by the action of the roll, in a large measure cling to it, because of their natural affinity, and further because there is not severity enough in the action of the scalper to separate them, and float out of the tail of the scalper along with the coarse bran. The product of the first scalper, less the tailing, passes into another scalper covered with number nir - silk at the head and numbers two to four silk at the t... All the flour product, with the very fine middlings, is sifted through the number nine silk; the medium middlings through the coarse cloth at the tail of the reel; and the coarse or germ middlings passes out over the tail of the reel. That is the initial step in short-system milling, and there the whitest flour is made, whiter than any other product in any system of milling, the same kind of wheat being used in all.—*Leffel's Mechanical News.*

LUMBER FREIGHTS.

An Injustice Affecting Ontario Lumbermen, which should be Righted.

MEMBERS of the Ontario Lumbermen's Association, whose headquarters are in this city, are loudly complaining of the treatment which they are receiving at the hands of the Grand Trunk and Canadian Pacific Railway Companies in the matter of freights. A representative of the MECHANICAL AND MILLING NEWS recently set out to investigate the matter, and was not long in finding out that these complaints are well founded. The injustice of which the lumbermen complain arises out of the fact that a correct system of shipping lumber is not in vogue on the railways. While lumber is bought and sold by foot measurement, the freight charges upon it are supposed to be based upon its weight. This being the case, it is at once apparent that facilities should be provided by the railway companies for ascertaining the exact weight of every cargo at the point of shipment, and again at the point of destination. Instead of adopting a system of this kind, the railway compa..., s shipping clerk at the point of shipment, when a car of lumber is to be shipped, walks out and looks at it, guesses that its weight will be about so much, and proceeds to make out his shipping bill accordingly. These shipping clerks are said to have the peculiar faculty of always estimating high, so that when the consignee gets his lumber and compares it with his shipping bill, he invariably finds himself charged with three, five and sometimes eight hundred pounds more freight than he actually received. In this way, it is said, the nominal freight rate of $1 per thousand feet, is increased by about twenty-five per cent., while the profits of the lumbermen ar... ...ed in the same proportion.

There is another matter wh... calls for change in the interest of shippers. When a freight car is turned out new from the manufacturer's hands, and previous to being placed on the road, it is weighed, and the tare stamped upon it. Notwithstanding the fact that this car, from exposure to the weather, becomes in course of time water-soaked and greatly increased in weight, its weight is forever calculated as being in accordance with the figures stamped upon it when new. The increased weight over and above that amount continues to be charged as freight to every unfortunate shipper who may use the car throughout the whole of its future existence. In winter, should a car be side-tracked for a day or two, and loaded up with snow and ice, so much the better for the railway, and so much the worse for the shipper, as such weight must be paid for as freight. Sometimes it happens that a box car in which a cargo of lumber is shipped has previously been used for shipping live stock, and c...ntains several hundred pounds of manure. This also is carried to and fro as freight, and charged accordingly. It will thus be seen that a large proportion *of the lumberman's profits must go to pay unjust* freight charges.

The Ontario Lumbermen's Association have appointed deputations to interview the traffic managers of the railroads, with the object of having the present objectionable system superseded by a more equitable one, but thus far nothing has been accomplished in that derection. The Association will meet shortly to further consider the matter, and before approaching the railway authorities on the subject again, will endeavor to ascertain what system prevails on United States railroads. It should be the object of the railroad companies to facilitate commerce, instead of placing hindrances in its way, as in the present instance. We trust that when the matter again comes before them, they will inaugurate a system that shall be just and equitable.

THE ELECTRIC TRANSMISSION OF POWER.

LET us study this electric transmission a little in detail, said Prof. Ayrton in a recent lecture at Bath, England. I pull this handle, and the bell at the other end of the room rings; but in this case there is no visible motion of anything between the handle and the bell. Whether I ring the bell by pulling the wire, or by sending an air puff, or by generating an electric current by the exertion of my hand, the work necessary for ringing the bell is done by my hand, exactly as if I took up a hand bell and rang it. In each of the three cases I put in the power at one end of the arrangement, and it produces its effect at the other. In the electric transmission how does this power travel? Well, we do not know. It may go through the wires, or through the space outside them. But although we are really quite in the dark as to the mechanism by means of which the electric power is transmitted, one thing we do know from experience, and that is this: given any arrangement of familiar electrical combinations, then we can fortell the result.

Our knowledge of electrical action in this respect resembles our knowledge of gravitation action. The only thing quite certain about the *reason* why a body falls to the ground is that we do not know it; and yet astronomical phenomena can be predicted with marvellous accuracy. I mention the analogy, since some people fancy because the answer to that oft-repeated question, "what is electricity?" not only cannot be given exactly, but can only be guessed at in the haziest way, even by the most able, that, therefore all electric action is haphazard. As well might the determinations of a ship's latitude at sea be regarded as a mere game of chance, because we have not even a mental picture of the ropes that pull the earth and sun together.

This power of producing an action at a distance of many yards, or it may be many miles, by the aid of electricity without the visible motion of any substance in the intervening space is by no means new. It is the essence of the electric telegraph, and electric transmission of power was employed by Gauss and Weber when they sent the first electric message. I am transmitting power electrically whether I now work this small model needle telegraph instrument, or whether I turn this handle and set in motion that little electric fan.

But until about ten years ago the facility that electricity gave for producing signals almost simultaneously at a great distance was the main thing thought of. The electric power consumed for sending the telegraph messages was so small, the amount of power lost *en route* comparatively so valueles , at the telegraph engineer had no need to trouble hi...self with those considerations that govern us to-day when we are transmitting power large enough to work a factory or an electric tramway. Although there are as many as 22,560 galvanic cells at the Central Telegraph Office, London, which cost some thousands annually to keep in order, what is that compared with the salaries of all the 3,088 superintendents, assistants, telegraph clerks, messengers, and the maintenance of the 1,150 telegraph lines that start from the Central Office?

In all the last three of the systems of my list some form of power, such as flowing water or the potential energy stored up in coal, wood, zinc or other fuel has initially to be utilized, this power is given to some form of air, water, or electric pump, which transfers the air power to the air, water or electricity, by which it is conveyed to the other end of the system. There it is reconverted into useful mechanical power by means of an air, water or electro motor.

You will observe that I class together air, water and electricity; but that I do not mean to imply that electricity is a fluid, although in many respects it acts like a fluid, like a fluid of very little mass, however, or, odd as it may seem, like a fluid moving extremely slowly; for electricity goes round sharp corners with perfect ease and without any of the phenomena of momentum possessed by *rushing water. But what I particularly wish* to impress on you by classing air, water and electricity together is that electricity is not, as some people seem to think, a something that can be burnt or in some way used up and so work got out of it. Electricity is no more a source of power than a bell wire is; electricity is a marvellously convenient agent for conveying a push or a pull to a great distance, but it is not by the using up of electricity that electric lights burn or that electro motors revolve. It is by the electricity losing pressure, exactly as water loses head when turning the miller's wheel as it flows down hill, that work is done electrically.

This model shows in a rough symbolical way what takes place in the transmission of power whether by air, water or electricity.

The working stuff, whichever of the three it may be, is first raised in pressure and endowed with energy, symbolized by this ball being raised in the model from its original position to a higher one; it then gradually loses pressure as it proceeds along the tube or wire which conveys it to the other end of the system, the loss of pressure being accompanied by its giving up power to the tube or wire and heating it. This is shown *in the model by the ball gradually falling in its course.* At the other end there is a great drop of pressure corresponding with a great transference of power from the working stuff to the motor, and finally it comes back along the return pipe or wire, losing, as it returns, all that remains of the pressure given to it initially by the pump. The ball has, in fact, come back to its original level.

The problem of economically transmitting power by air, water or electricity is the problem of causing one or other of these working stuffs, air, water or electricity to economically perform the cycle I have described.

In each of the four stages of the process (1) transference of power to the working substance at the pump, (2) conveyance of power to the distant place, (3) transference of power from the working substance to the motor at the distant place, (4) bringing back the working substance, there is loss of power, and the efficiency of the arrangement depends on the amount of these four losses. The losses may be shortly called (1) loss at pump, (2 and 4), loss on the road, (3) loss at the motor.

MOTIVE POWER OF THE FUTURE.

SEVEN years ago, writes a foreign correspondent of the *American Manufacturer*, Sir Frederick Bramwell prophesied at the York meeting of the Association that unless some substansive improvement were made in the steam engine (of which improvement they had as yet no notion) its days for small powers were numbered, and that those who attended the centenary of the British Association, in 1931, would see the present steam engines in museums treated as things of antiquarian interest. After the seven years which have elapsed since the York meeting, and now speaking as president of the Bath meeting, Sir Frederick sees no reason to withdraw that prophesy. The working of the heat engines without the intervention of the vapor of water by the combustion of the gases arising from coal, or from coal and from water, is not now merely an established fact, but a recognized and undoubted commercially economical means of obtaining motive power. Looking at the wonderful petroleum industry and at the multifarious products which were obtained from the crude material, was it, asked Sir Frederick, too much to say that there was a future for motor engines worked by the vapor of some of the more highly volatile of these products—true vapor—not a gas, but a condensable body cabable of being worked over and over again? Was he wrong in predicting that the heat engine of the future would probably be independent of the vapor of water? And, further, in these days of electrical advancement, was it too much to hope for the direct production of electricity from the combustion of fuel?

Mr. James Findlay, ex-M. P. for North Renfrew, who proposed some time ago selling his timber limits on the Ottawa River by auction, has withdrawn the sale.