falling of the effect of the series coils, and any change in resistance due to temperature change. The temperature change will be slow, and is corrected by an occasional change of the rheostat in the shunt-coil circuit, and can be neglected for the present. Should it it be necessary to use a second dynamo of similar design, we cannot proceed as in the case of single shunt dynamos, for if the second dynamo be at exactly the same voltage as the mains at the switchboard when connected in parallel, the combination will be unstable, because if for any reason the voltage of either dynamo varies a little, the effect of the reverse current in its series coil will be to weaken the legitimate current still more, and this in its turn will allow the reverse current to flow more strongly until something burns out. If however there is a third connection made, so that the brushes as well as the terminals of the two dynamos are connected, it becomes impossible for this reversal to happen, and the machines will run perfectly under all changes of load.

The action of compound constant-potential dynamos in parallel is generally misunderstood, and the equalising connection is credited with a remarkable power of control over the output of such dynamos, which it does not and cannot have, as can be seen by watching the dynamos while at work. The common idea is that the equaliser has the property of compelling a lagging dynamo to take its share of the work, and we hear of the wonderful power of control which it has even over dynamos of different types and sizes running under somewhat different conditions Now the real effect of the equaliser is to put the series coils in parallel, so that the total flow of current from the plant will divide between them inversely as their resistance, without any regard as to whether this current comes from one armature alone or is divided among many, and hence it follows that it cannot in any way exercise even the slightest regulating effect on any one dynamo that it does not have over all the rest. The armatures themselves are running in parallel under the usual conditions of ordinary shunt dynamos, and the total current will divide between them under the same laws that would hold if there were no series coils at all, and the current were taken from the two main wires to which the brushes are connected. Should the demand for current be more than equal to the capacity of one dynamo, the addition of a duplicate machine will render it impossible to maintain a constant potential at the distant centre unless both dynamos are run all the time.

CAR LIGHTING FROM THE AXLE.

A highly satisfactory trial trip of the car lighted by the new Young-Muskowitz railway electric-lighting system was made recently over the New Jersey Central Railroad from Newark to Roselle and return. It is an ordinary railroad passenger coach, in which there are twenty-five eight-candle power incandescent lamps. The one-horse power dynamo by which the electricity is generated gets its power from the axle by a series of sprocket wheels and chain belts, and two shafts between the axle and the direct connecting shafts of the dynamo. One of the intermediate shafts is movable or swinging, and makes the chain belts conform to every movement of the car at whatever speed. The power taken from the car axle has, heretofore, gone to waste, and the process by which it is being used to make electricity is called equalizing of power, and by the mechanical contrivances the ill effects of oscillation and vibration have been overcome. While the train is in motion the lights are made directly from the electricity generated up to a certain limit of speed, which is fixed. When higher speed is attained the superfluous electricity generated is stored in batteries under the car, so that at any given time there is sufficient electricity on hand to supply the lights four hours without the train moving. The machinery, complete, weighs about 900 pounds.

ELECTRICAL PURIFICATION OF WATER.

The *Water and Gas Review* gives an account of a new method of purifying water, which has been put to the test at Brewsters, in the United States. The plan is described as being simplicity itself, and is chiefly based on the powers of salt water and electricity. On the occasion referred to, the machinery consisted of a small steam engine supplying power to a dynamo capable of a strength of 750 amperes, and giving a current of four volts tension.

The electric current passes through a series of electrodes in the bottom of a thousand-gallon tank. At an elevation above this tank is another of three thousand gallons capacity, in which is a four per cent. solution of salt water.

The thousand-gallon tank full of the salt water was exposed to the electrical current, and immediately bubbles began to arise to the surface. These were caused by the disorganization of the chloride of sodium, the hydrogen of which rose to the surface and escaped in bubbles which were as effervescent as highly charged soda water. What remained in solution and free to be applied to its destined purpose was chlorine and ozone. The first is a disinfectant in which scientists place great reliance, but the ozone is incomparable. No morbific microbe can exist in any fluid in which it is present.

The contents of the 1,000 gallon tank thus charged were applied to the stream of filth passing through the sewer. One hundred feet away, the sewer stream purled over a bowlder and there the test was made. There was a faint taste of sewer smell given off by the water. A solution of iodide of potassium gave an inky reaction when applied to some of the sewage water. This demonstrated the presence of the ozone, and the chlorine demonstrated itself to the olfactories. To make still surer, the disinfecting water had been shut off, and a stream of undrugged sewer water came. There was not a sign of the inky reaction caused by the iodide of potassium.

Further experiments were made with electrozone, which is the fluid generated by the decomposition of salt water. Putrid meat was freed from all smell, and a bucket of sewer matter dipped up reeking foully from the sewer became odorless.

In practice, it is found that the upper or positive carbon in an electric lamp burns away at about twice the rate of that of the negative or lower carbon.

A writer in the *Chemical News* describes an electric saw, consisting of a platinum wire heated by an electric current, and with which he states the hardest woods can readily be cut. Unfortunately the platinum wire is liable to break, and hence he has also tried a steel wire, platinized by immersing it in a solution of chloride of platinum in ether.