dog; this dog was tipped first one way, then the other, by an electro-magnet, in such a way as to put resistance into the field whenever the voltage rose above one hundred and twenty (I decided to run the dynamo ten volts higher than its normal pressure, as the wire did not heat), and to take out resistance whenever the voltage fell below one hundred and twenty. Again I was disappointed; this affair also, while it did not waste much power, like the frictional cones, required time to work. Both of these machines needed time to perform their work; practically speaking, electricity did not. I therefore came to the conclusion that I must have recourse to some contrivance consuming as little time and energy as possible. Having thus briefly referred to the less gratifying part of my work, I will now endeavor to more fully describe a more practicable system, and one which as a direct result of the previously stated conclusions, I succeeded in operating.

Now in order that you may more fully and clearly understand the exact working of my method, I will ask you to refer to Figure 1, hereunto annexed, which is a representation of my specially constructed dynamo and regulating device, which works so perfectly—when the dynamo is belted directly to the windwheel without any intermediate regulator—that it is impossible to discern any flickering of the lamps. *D* represents the dynamo, of which I have already given a description, with an additional winding *R* on the outside of each field, but wound in the opposite direction. This outside winding is short-circuited at *A B* by a vibrating arm of iron which hangs on a pivot at *P*, and the point *B* is held against the point *A* by a coil spring *S* at the other end of the arm. *M* represents an electro-magnet connected in shunt with the main lines *L* of the dynamo. The manner in which this combination works is as follows: So adjust the spring *S* that the instant that the voltage attempts to rise above one hundred and twenty, the electro-magnet *M* overcomes the tension of the spring *S* and opens the short-circuited coil *R* at *A B*. This not only throws that amount of extra resistance into the field, which alone would diminish the number of amperes of current flowing in the field circuit, and therefore partially demagnetize the field and lower the voltage of the dynamo, but as the current traverses this resistance *R* in an opposite direction to the field current, it acts in opposition to the exciting current of the field, and serves still further to demagnetize the field and bring down the electro-motive force of the dynamo. The pressure, however, does not fall, but the small fraction of a volt before the spring *S* reasserts itself and closes the connection at *A B* when the voltage again attempts to rise, is again prevented by the action of the electro-magnet *M*, a very rapid vibration of the arm *C* continues and the voltage of the dynamo remains constant, regardless of the sudden changes in the direction and velocity of the wind.

Having thus accomplished the most difficult problem connected with generating electricity by the wind—regulating the pressure of the electric current, whereby the dynamo driven by wind power is placed on an equal with the dynamo driven by the best regulated steam or water power—allow me before passing on to the storage of electrical energy to briefly call your attention to a few points of superiority of this mode of regulation over other systems. In the first place, the regulator works quicker than any other of which I know, and consequently it regulates more closely. Besides this, it does not, practically speaking, consume any energy; by which I mean it takes no power to work the regulator, and energy is only wasted by the wheel being driven at times faster than need be, but this is only experienced when there is a superabundance of wind, and never when there is a scarcity. Furthermore, this system has a great advantage over some others which only regulate between certain velocities, as it makes no difference how fast the dynamo runs, it is impossible for the voltage to rise above the required electro-motive force, for just as soon as it attempts to do so the field is demagnetized.

Moreover, there is another great advantage in winding the resistance *R* (in Fig. 1), on the field in the opposite direction to the field winding. In similar regulators where this is not done, the amount of resistance thus thrown into the field to lower the voltage, needs to be more than double the quantity used where the wire is wound on the field in the opposite direction. Consequently, the spark of rupture becomes troublesome; that is, the points of contact have occasionally to be cleaned and platinum or silver contact points have to be used; but in reducing the amount of resistance short-circuited, as is done when it is wound backwards on the field, the spark of rupture causes no trouble whatever; it is, in fact, almost imperceptible where only a few watts are used, providing the points of contact are large. As the spark of rupture is dependent on the number of watts used, the spark may be wholly obviated by using a second dynamo, or exciter, to magnetize the field. When an exciting dynamo is used, it is preferable to use a series-wound machine, wind a few turns in the opposite direction and short-circuiting them as before represented. By using a series-wound dynamo for an exciter there is one other advantage; the self-induction of the field of the dynamo, of the field of the exciting dynamo, and of the short-circuited coils, all tend to hold the electro-motive force steady, and by the use of this series-wound exciter and regulating device, the voltage is held more steady than I ever saw done with the best regulated steam plants. This last plan, however, is not my own. It has long been most satisfactorily used by one of the largest dynamo manufacturing companies on this continent, where a wide range of speed is unavoidable. This last arrangement needs to be resorted to where a large number of watts are used, otherwise the spark of rupture becomes troublesome.

I have been thus particular in regulating so as to have a constant electro-motive force for this reason; in my system of deriving electricity from the wind, the storage battery or accumulator which I use, and to which I will soon refer, is disconnected by an automatic electro-magnetic switch, which at the same time connects the motor or lamps to the dynamo, whenever the wind blows sufficiently strong to raise the electro-motive force of the dynamo to one hundred and twenty. This same switch instantly re-establishes the connection of the motor or lamps with the storage battery, and disconnects the dynamo connection whenever the wind allows the pressure of the dynamo to fall below one hundred and twenty. This automatic switch enables me, without paying any attention whatever to the wind, to take advantage of every wind that blows, and thus not only save electrical energy already stored in the battery, but also to take advantage of the wind which others waste, unless they have a second storage battery, while they are drawing from their accumulator.

Having answered what any electrician must admit to be the most difficult question in connection with deriving electricity from the wind, viz., the generation of a steady electric pressure, I desire, in describing the