SPECIMEN PAGE

Let us take the case of a tramcar weighing 10 tons, driven by two motors working on a line having a tension of 500 volts. Suppose that we have to design an arrangement by which the car will start up from rest and travel 500 feet in 30 seconds. The motors are to be series wound.

First find the least possible accelerating current per motor by Equation 107, remembering that $W=5$ tons. We get $c_a=29\cdot5$ amperes. Take 30 amperes to allow for the resistance of the motor. From Equation 103 we find that the best value of $\frac{Mv}{d}$ is $5\cdot15$. For the present we may take $v=4\cdot78$ and $d=33$ inches, giving $M=35\cdot5$.

The maximum speed is 25 feet per second or 17 miles an hour. If the frictional and other resistances retarding the motion amount to 3,580 inch-pounds of torque on the car axle, the corresponding current will be 15 amperes, and the resistance of each motor must therefore be 0·6 ohm.

The initial acceleration will be 1·25 f.p s. per second, and the current of 45 amperes will be constant until the starting rheostat is all out, at which point the speed of the motor will be given by $n=\frac{500-45\times0\cdot6}{35\cdot5}=800$ r.p.m. The speed of the car will therefore be 24·2 feet per second. Thus we see that if the induction factor is constant, the acceleration can be maintained constant up to a speed of 97 per cent. of final speed; after this point the motor will speed up according to the law already given in Chapter VII.; the error involved in assuming that the acceleration is constant up to full speed will be small, and