BY MANCE'S WHEATSTONE'S BRIDGE METHOD.

217. The arrangement is very similar to the ordinary Wheatstone's bridge for measuring resistances, and its typical form as follows:

In a quadrilateral $A\ B\ C\ D$, (Fig. 19) formed of conductors,

Fig 19.

the sides AB and AD contain known resistances r_1 and r_2, the side BC a resistance r_b that can be varied at pleasure, and the side DC the cell or battery under examination. A galvanometer is placed in the diagonal AC, and a key in the diagonal BD. It will be noticed, on comparing with the ordinary Wheatstone's bridge (Fig. 14), that the cell takes the place of the unknown resistance, the galvanometer the place of the cell, and the key that of the galvanometer. A second key is placed in DC, so that the circuit may be made, or broken at pleasure. On depressing this key the current divides at C, re-uniting again at A, and the part of the current flowing through the galvanometer is, from § 147.

$$c = \frac{r_1 + r_b}{r_b + r_1 + g} \cdot \frac{P}{\frac{(r_b + r_1)\, g}{r_b + r_1 + g} + r_2 + \rho x}$$

When the key in the diagonal BD is depressed, the points B and D become electrically the same, and the part of the current flowing through the galvanometer divides again at A, flowing along AD and ABD. In this case the current flowing through the galvanometer is

$$c' = \frac{r_b}{r_b + g + \frac{r_1\ r_2}{r_1 + r_2}} \cdot \frac{P}{\frac{r_b\left(g + \frac{r_1\ r_2}{r_1 + r_2}\right)}{r_b + g + \frac{r_1\ r_2}{r_1 + r_2}} + \rho x}$$

Now the balance is obtained when, on depressing the key in the diagonal BD, there is *no change* in the deflection of the galvanometer. This requires that the currents flowing through the galvanometer in both cases shall be equal. That is