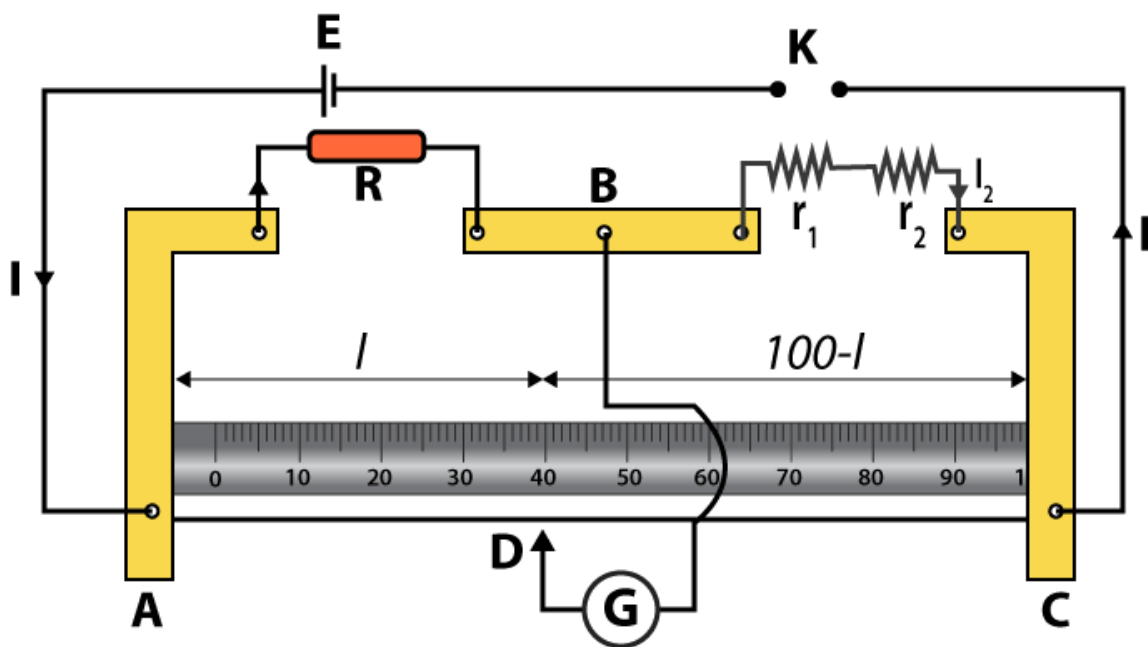## Aim

To verify the laws of series combination of resistances using a meter bridge.

Apparatus/Materials Required

Meter Bridge
Leclanche cell
Resistance Box
Galvanometer
Jockey
Sand Paper
Connecting wire
Two resistance wires
A set square

Circuit Diagram

Theory

(i) The resistance of resistance wire or a coil is given by

$$r = \frac{(100-l)}{l} \cdot R$$

where R is the resistance from the resistance box in the left gap and l is the length of the meter bridge wire from zero ends up to the balance point.

(ii) When two resistors r_1 and r_2 are connected in series, their combined resistance is given as follows:

$$R_s = r_1 + r_2$$

Procedure

1. Mark the two resistance coils as r_1 and r_2.
2. Set up the circuit as shown in the figure above.
3. Connect R1 and R2 as shown in the figure.
4. Tighten all plugs in the resistance box by pressing and rotating each plug to assure that all plugs make good electrical connections. Using sandpaper clean the ends of connecting wires before making the connections.
5. Remove some plug(s) from the resistance box to get the suitable value of resistance R
6. Get a null point D on the metre bridge wire by sliding the jockey between ends A and C.
7. Note the value of the resistance R and lengths AD and DC.
8. Calculate the experimental value of the equivalent series resistance
9. Repeat the experiment for four more values of resistances R. Obtain the mean value of unknown resistance.

Observations Table

Resistance coil	S.No of Observations	Resistance from the resistance box	Length AD = l cm	Length DC = (100 − l) cm	Resistance $r = \frac{(100-l)}{l} \cdot R$	Mean Resistance (ohm)
r_1 only	1. 2. 3.					$r_1 =$ ……
r_2 only	1. 2. 3.					$r_2 =$ ……
r_1 and r_2 in series	1. 2. 3.					$R_s =$ ……

Result

Within limits of experimental error, theoretical and experimental values of R_s are the same. Hence, the law of resistance in series is verified.