Then by the vanishing of moments,

$$P.\,Ab - W.\,Ac = 0$$

or

$$P.\,Ab = W.\,Ac$$

But, by similar triangles, $\dfrac{A\,B}{A\,b} = \dfrac{A\,C}{A\,c}$

and therefore $\quad P.\,A\,B = W.\,A\,C.$

Cor. 1.—The pressure on the fulcrum is the weight $(P + W)$ acting vertically downwards.

Cor. 2.—Since the relation $P.\,AB = W.\,AC$, does not involve the angle at which the lever is inclined to the horizon, it follows that if the lever be at rest in any one position (except a vertical one), on being turned into any other position it will still be at rest.

Case II.—The power P and the weight W acting in opposite (but parallel) directions, and the weight nearer to the fulcrum than the power. Fig. 2.

Using the same construction and reasoning as in the former case, we have here also

$$P.\,AB = W.\,AC.$$

Cor. 1.—The pressure on the fulcrum is here $W - P$, acting vertically downwards. The second corollary also holds.

Case III.—The power P and the weight W acting in opposite but parallel directions, and the power nearer to the fulcrum than the weight. As before, we have Fig. 3.

$$P.\,AB = W.\,AC.$$

Cor. 1.—The pressure on the fulcrum is $P - W$ and acts vertically upwards. The second corollary also holds.

58. In all these cases, the mechanical advantage $\left(\dfrac{W}{P}\right)$ is $\dfrac{A\,B}{A\,C}$ Mech. adv.
or the ratio of the arms of the power and weight. In Case I.