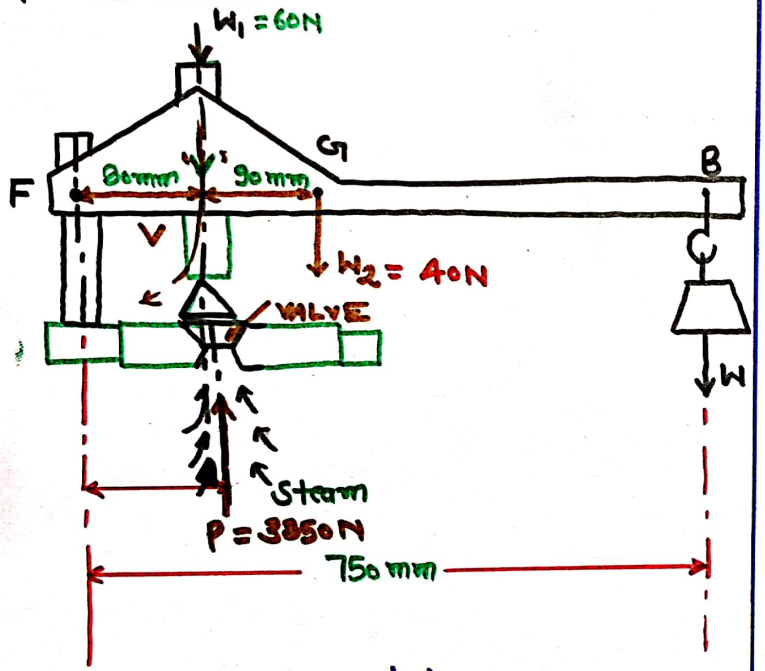
SAFETY VALVE LEVER:-



↳ It is used in steam boilers, Economiser and other pressure vessels where the steam pressure is excess, for safety point of view.

↳ After certain pressure, valve moves up and excess pressure gets released.

Question:- The weight of the safety lever valve is 40N. Its COG is 90 mm apart valve centre, which is on 80 mm from fulcrum. Dia of valve is 70 mm and load of valve is 60N. Then find the min. weight hanging on 750 mm long rod to keeps the pressure of steam $1 N/mm^2$ in boiler.

Given data:- FB = 750 mm

$W_2 = 40N$; FV = 80 mm

VG = 90mm ; D = 70 mm

$W_1 = 60N$; $p = 1 N/mm^2$

$$\Rightarrow A = \frac{\pi}{4} D^2 = \frac{\pi}{4} \times (70)^2 = 3850\ mm^2$$

Total pressure = $p \times A = 1 \times 3850 \frac{N}{mm^2} \times mm^2$

[$p = 3850\ N$]

To find:- W_{min}.

$\Sigma M = 0$

$+P \times VF\uparrow - W_1 \times VF\downarrow - W_2 \times (80+90)\downarrow$

$- W \times 750\downarrow = 0$

$(3850 \times 80) = (60 \times 80) + (40 \times 170) + 750W$

$308000 = 11600 + 750W$

$296400 = 750W$

$W = \frac{296400}{750}$

$[W = 395.2\ N]_{Ans}$