2. In the mechanism, as shown in Fig. 7.32, OA and OB are two equal cranks at right angles rotating about O at a speed of 40 r.p.m. anticlockwise. The dimensions of the various links are as follows :

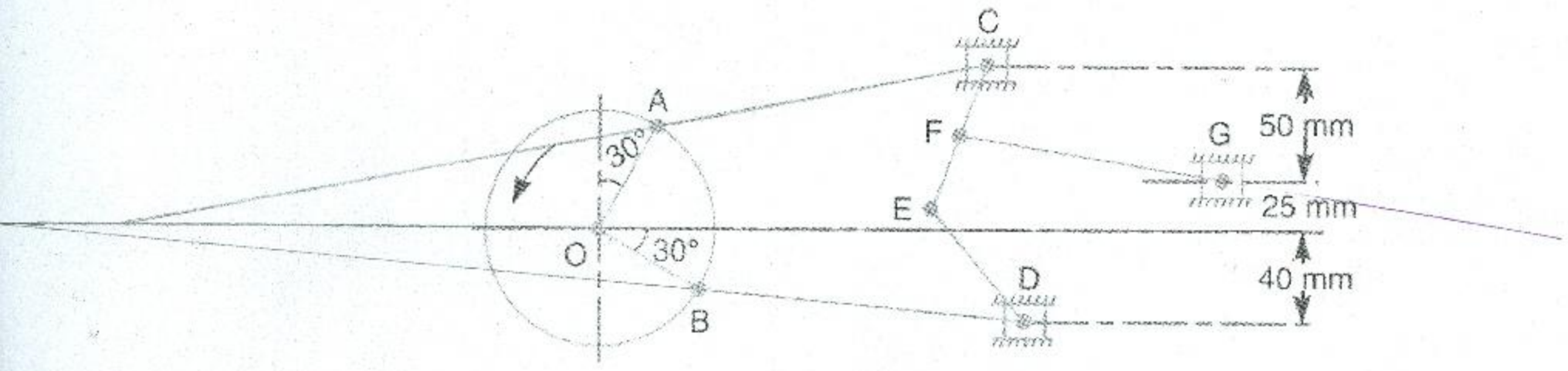


Fig. 7.32

$OA = OB = 50$ mm ; $AC = BD = 175$ mm ; $DE = CE = 75$ mm ; $FG = 115$ mm and $EF = FC$.

Draw velocity diagram for the given configuration of the mechanism and find velocity of the slider G.

[Ans. 68 mm/s]

$\omega_{OA} = 40 \times \frac{2\pi}{60} = 4.189$ rad/s

$V_A = V_B = \omega_{OA}(OA) = 4.189(50) = 209.4$ mm/s

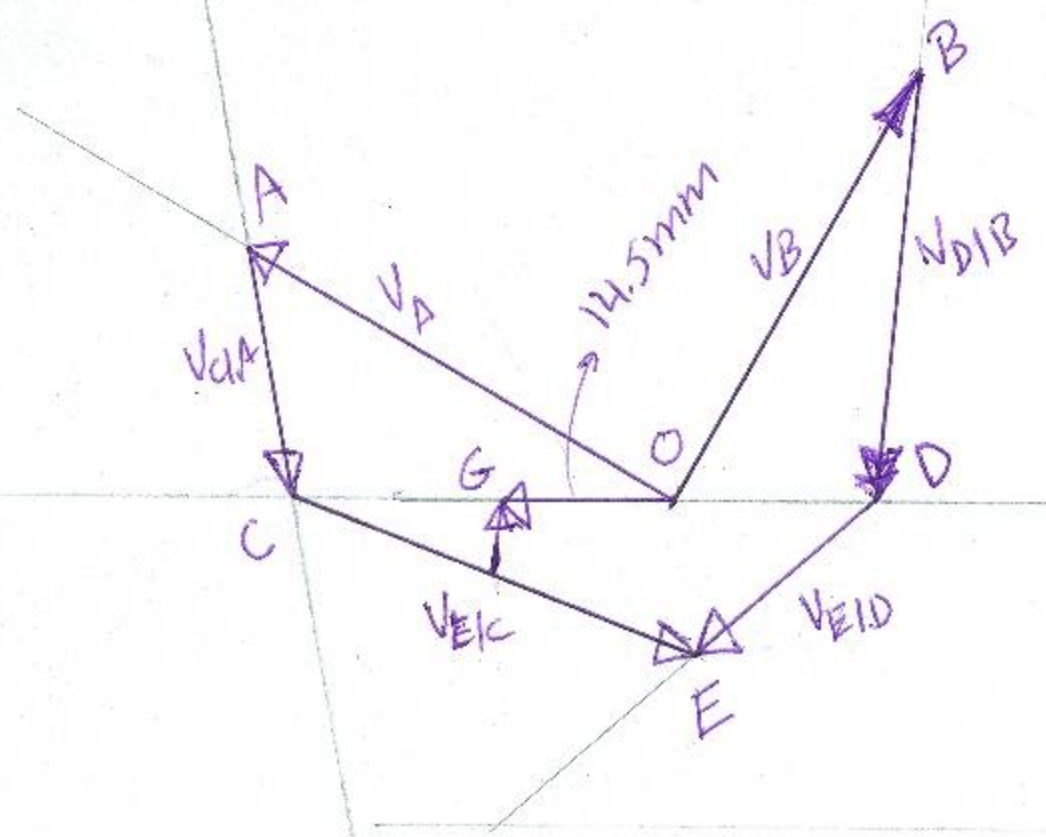
scale 1:5

$\frac{209.4}{5} \cong 41.9$ mm

$= 4.19$ cm

$14.5 \times 5 = 72.5$ m/s

$= V_G$



3. The dimensions of various links in a mechanism, as shown in Fig. 7.33, are as follows :
$AB = 60$ mm ; $BC = 400$ mm ; $CD = 150$ mm ; $DE = 115$ mm ; and $EF = 225$ mm.

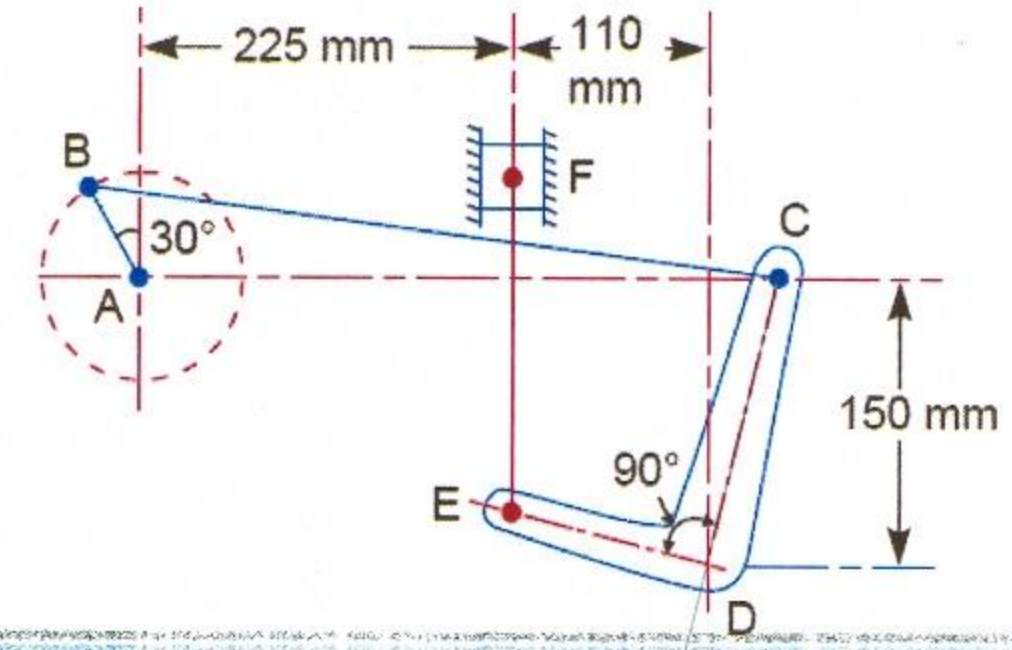


Fig. 7.33

Find the velocity of the slider F when the crank AB rotates uniformly in clockwise direction at a speed of 60 r.p.m. **[Ans. 250 mm/s]**

$W_{AB} = 60 \text{ rpm} = 60 \times \frac{2\pi}{60} = 6.283 \text{ rad/s}$

$V_B = W_{AB}(AB) = 6.283(60) = 377 \text{ mm/s}$

Scale 1:5

$\frac{377}{5} = 75.4 \text{ mm}$

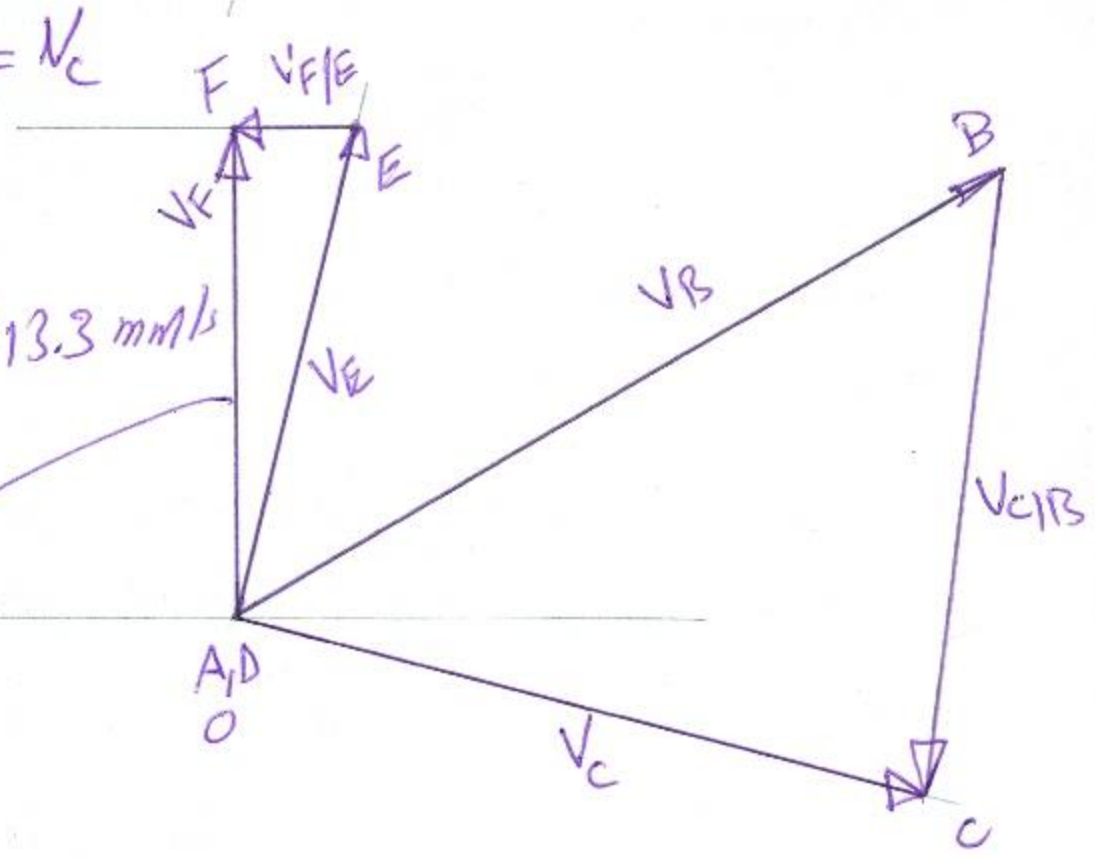
$60.2 \times 5 = 301 \text{ mm/s} = V_C$

$W_{CDE} = \frac{V_C}{CD} = \frac{V_E}{ED} \Rightarrow$

$V_E = V_C \frac{ED}{CD} = 301 \frac{17.5}{24.7} = 213.3 \text{ mm/s}$

$\frac{213.3}{5} = 42.65$

$41 \times 5 = 205 \text{ mm/s} = V_F$



4. In a link work, as shown in Fig. 7.34, the crank AB rotates about A at a uniform speed of 150 r.p.m. The lever DC oscillates about the fixed point D, being connected to AB by the connecting link BC. The block F moves, in horizontal guides being driven by the link EF, when the crank AB is at 30°. The dimensions of the various links are :

$AB = 150$ mm ; $BC = 450$ mm ; $CE = 300$ mm ; $DE = 150$ mm ; and $EF = 350$ mm.

Find, for the given configuration, 1. velocity of slider F, 2. angular velocity of DC.

[Ans. 500 mm/s ; 3.5 rad/s ;]

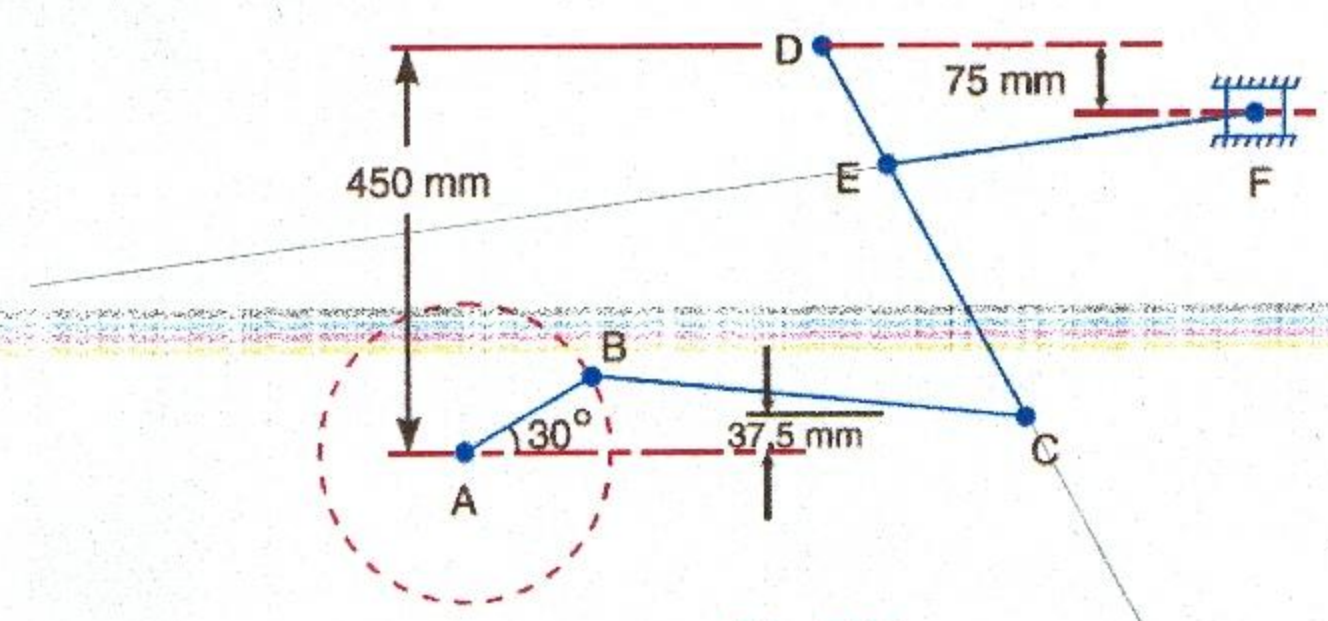


Fig. 7.34

$W_{AB} = 150 rpm = 150 \times \frac{2\pi}{60} = 15.71$ rad/s

$V_B = 15.71 \times 150 = 2.36$ m/s

Scale 5cm ≡ 1m

→ 2.36m ≡ 11.8cm

$\frac{E'C'}{EC} = \frac{D'C'}{DC}$

$E'C' = \frac{300}{450} 83.3 = 55.53$ mm

=

2.63cm ≡ 0.526 m

= 526 mm/s

$= V_F$

8.33 ≡ 1.666 m/s

$= V_C$

$W_{CD} = \frac{V_C}{CD} = \frac{1.666}{0.45}$

= 3.7 rad/s