



## CHAPTER V

### EXPERIMENTS ON TWO RECTANGULAR PORTAL FRAMES WITH FIXED BASES, CENTRAL POINT LOAD

#### Description of apparatus

Details of frame and base fittings are shown in Fig. 5.2. In this case, the two top joints referred to in Chapter IV can be used here. Since the frame stands rigidly on its bases, which are bolted to the test bench, there is no need to use supporting clamps.

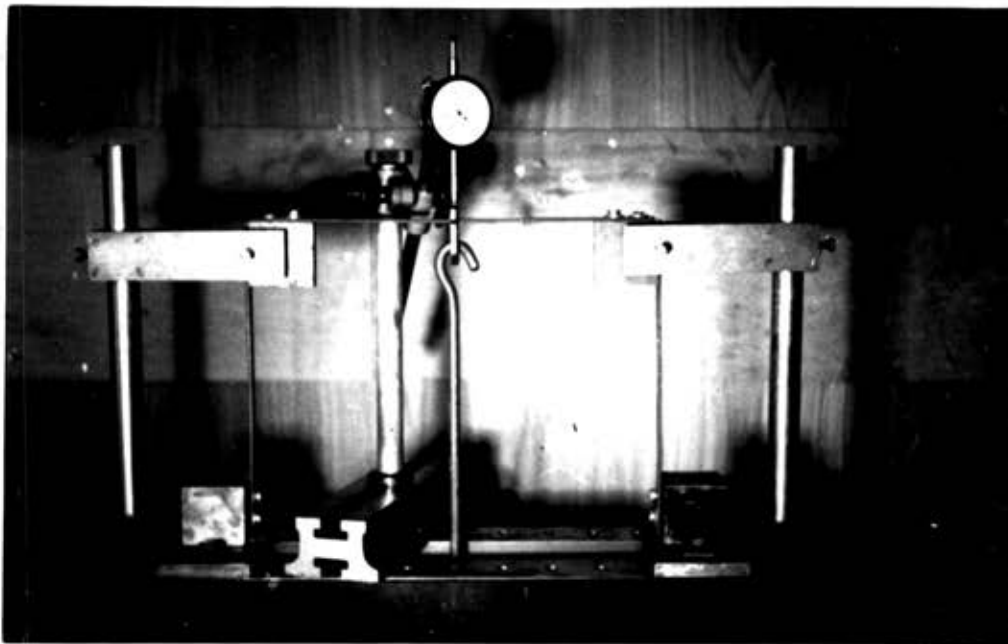
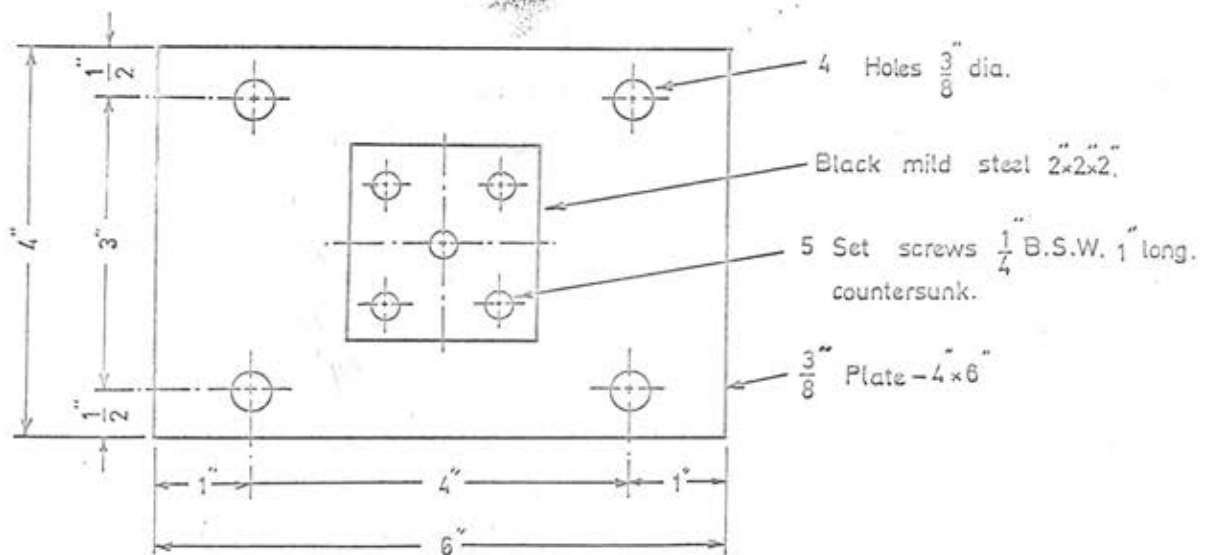
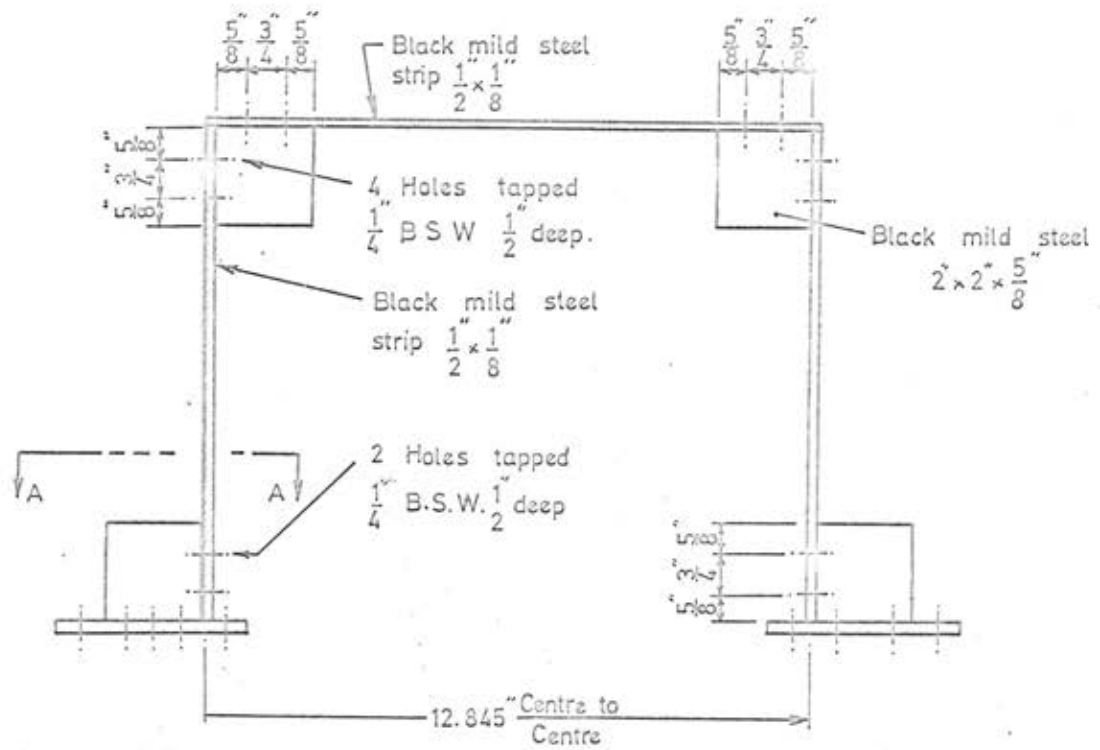
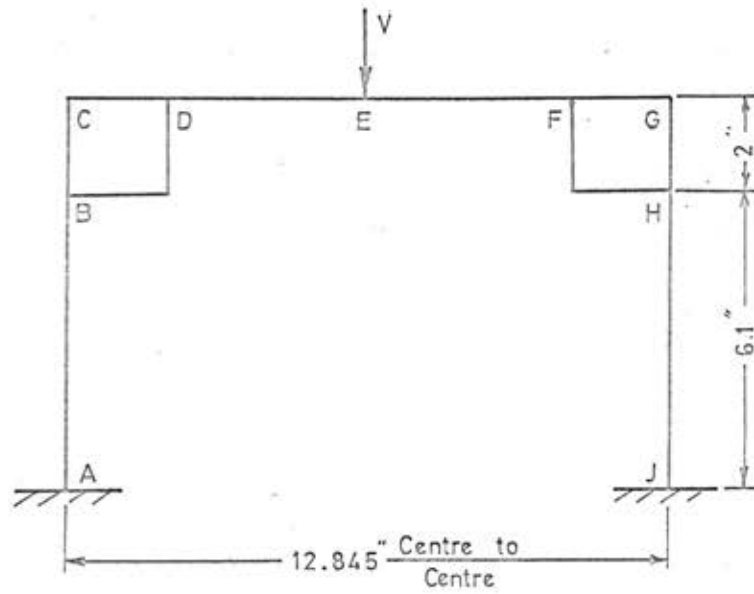


Fig. 5.1. - General arrangement of the apparatus.

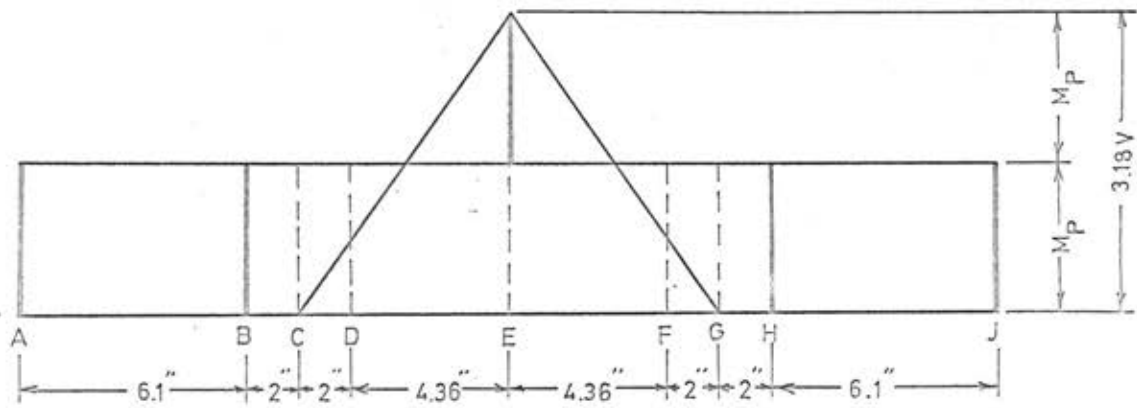


SECTION A - A

Fig.5.2. — Details of frame and base fittings.



(a) Dimensions of frame.



(b) Collapse bending moment diagram.

Fig. 5.3

### Description of tests

The frame was loaded at its mid-span with 10 lb., 5 lb., 2 lb. and 1 lb. as plastic deformation progressed. The vertical deflexion of frame BI was measured by a dial gauge of 0.5 in. range 0.0001 in. division. In case of frame BII the measurement of vertical deflexion was replaced by a dial gauge of 3 cm. range 0.001 mm. division. In addition, another dial gauge of 0.5 in. range 0.001 in. division was used to record the horizontal deflexion of the right hand stanchion.

In order to obtain more satisfactory results, it is recommended that more gauges should be used in measuring the deflexions of both stanchions at various height. With those results, the rotations of the stanchions at the bases could then be compared more significantly.

### Description of results

The signs of a plastic hinge could be clearly seen at B, E and H before complete collapse occurred.

The load deformation curves are shown in Fig. 5.5 and 5.6. It is seen from Fig. 5.5 that the frame carries more load than the theoretical value. This may be due to the effect of strain hardening.

The results of both frames are tabulated in table 5.1. The percentage difference between the theoretical and experimental values are shown in the last column.

Table 5.  
Results of experiment 5

Frame No.	Dimensions of section (in.)		Collapse load (lb.)		Error %
	Depth	Width	Theor.	Expt.	
BI	0.123	0.503	59.9	65	7.85
BII	0.125	0.505	62.2	63	1.27

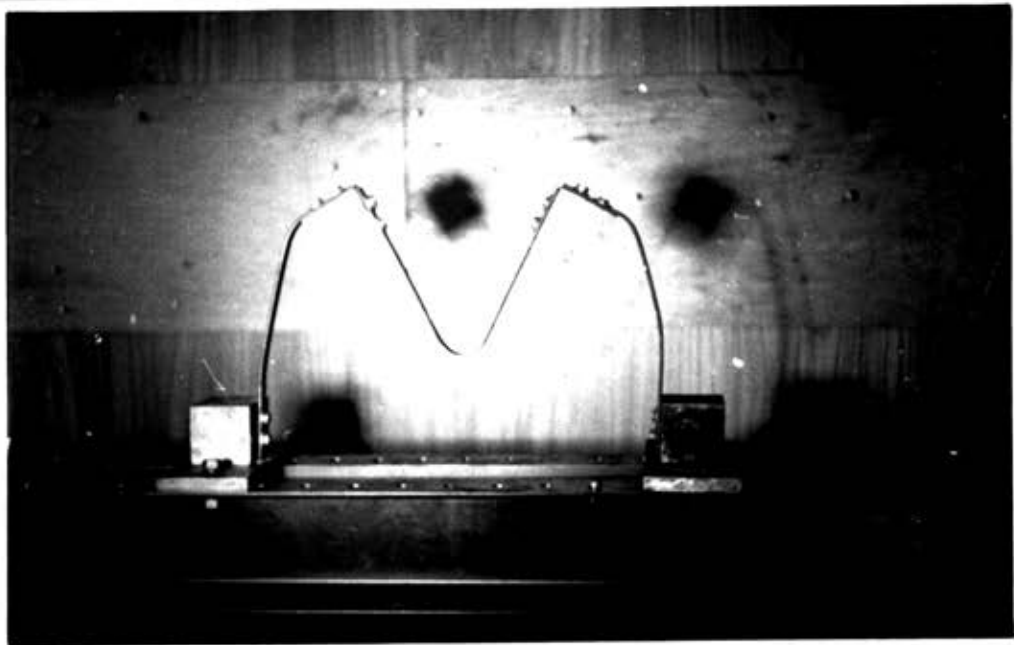


Fig. 5.4. - Mode of failure.

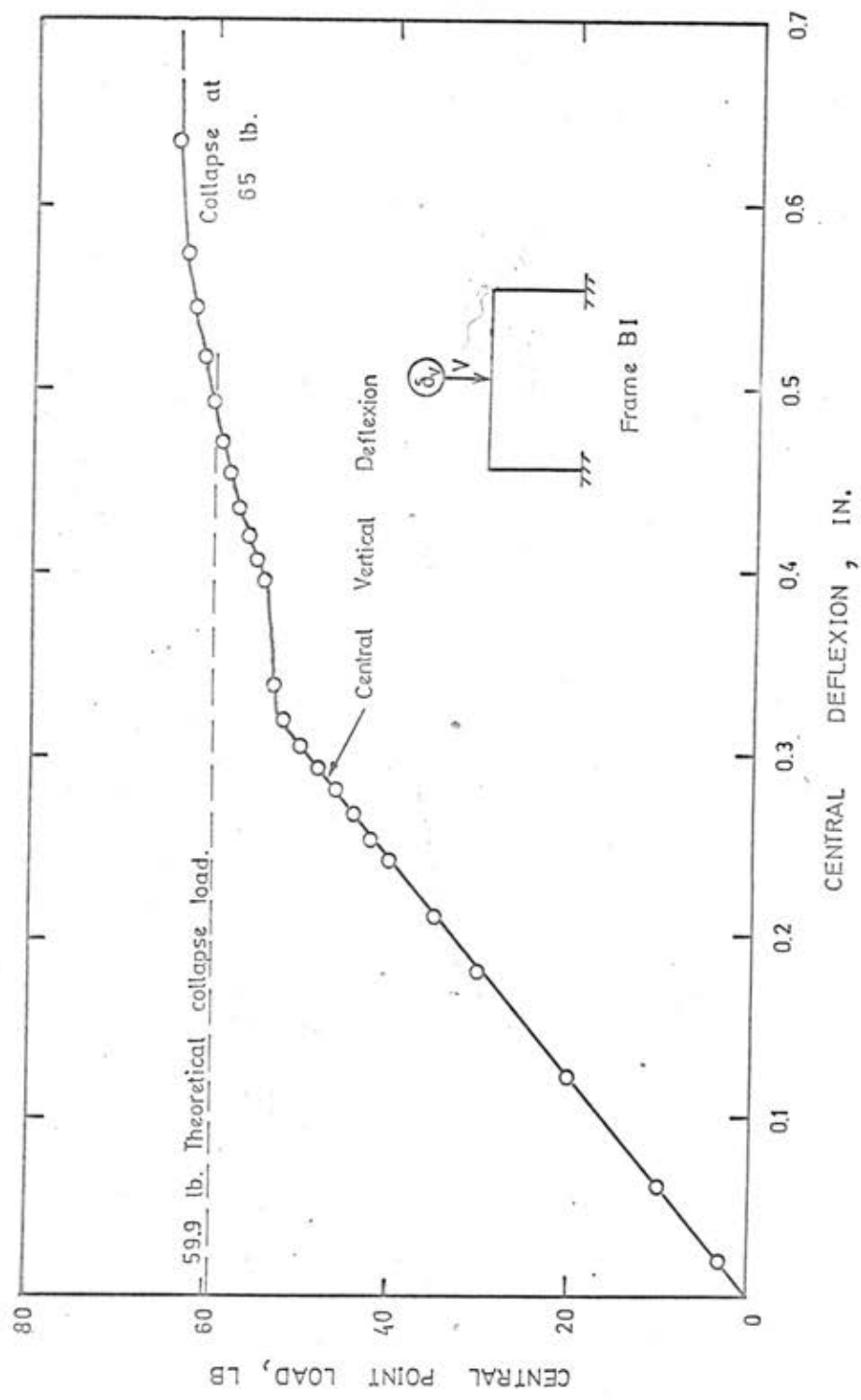


Fig. 5.5.— Central - Load Deflection Curve of Rectangular Portal Frame with Fixed Bases.

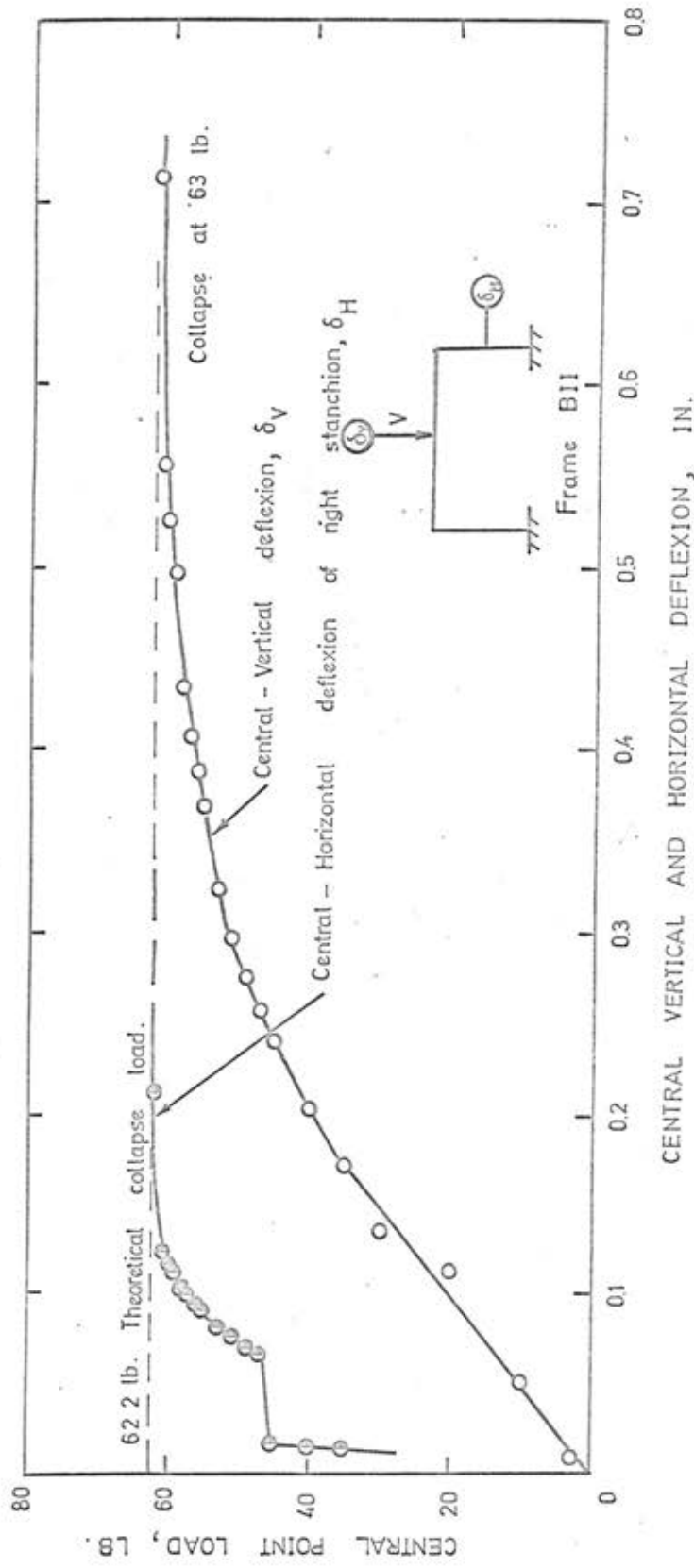


Fig. 5.6 — Central Load Deflexion Curves of Rectangular Portal Frame with Fixed Bases.