CONSTRUCTION OF OVERHEAD LINES

Line Supports

A line support has to perform following functions:

- (i) To keep the proper spacing between the conductors.
- (ii) To keep the conductors at prescribed distances from its grounded parts.
- (iii) To maintain specified ground clearance.

The air and ground clearances are decided by electrical and mechanical considerations.

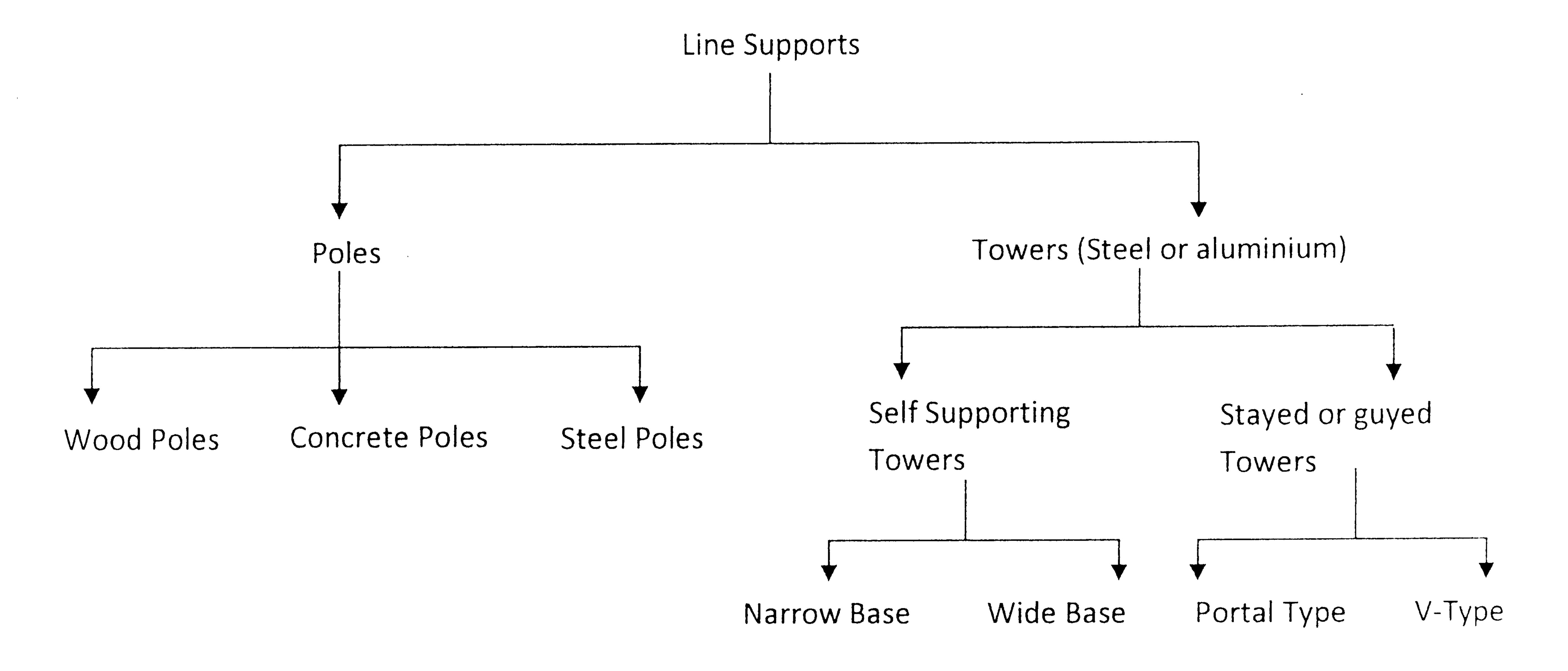
Desirable Properties of Line Supports

- (i) High mechanical strength,
- (ii) Low cost,
- (iii) Low maintenance expenses,
- (iv) Long life,
- (v) Availability of material
- (vi) Easily accessible for painting and erection of line conductors.

Classification of Line Supports on the Basis of Material Used

- (i) Wood
- (ii) Concrete and
- (iii) Steel or aluminium.

Classification of Line Supports on the Basis of Requirements



Poles: These are used for comparatively lower voltages, where the clearance between the conductors and the clearance between conductors and ground is not large. Also in this case mechanical loading is not high.

Wood Poles: Of the various types of supports, wood pole is cheapest. When properly treated with preservative such as creosote, a very satisfactory service is obtained. These poles are very suitable for lines, where spans are short and tensions are low. A wood pole has the limitations of height and diameter.

Concrete Poles: These poles are much stronger than wood poles. Strength is increased if reinforced. These type of poles have longer life due to little deteriorations and maintenance cost is also low.

Reinforced concrete poles are very heavy and are liable to damage during loading, unloading, transportation and erection due their brittle nature. Accordingly, pre-stressed concrete poles are used to overcome the handling and transportation difficulties. These can be manufactured in pieces and assembled at job sites. The weight of pre-stressed concrete pole is considerably less than that of reinforced concrete pole. The material used is also less, but more durable than any other type of pole.

Steel Poles: These are used for low and medium voltage distribution systems. Longer spans are possible with steel poles, so that insulation cost of the line gets reduced. But, transportation of longer steel poles is difficult. Periodic anti-corrosive painting makes maintenance cost more.

Towers: High voltage and extra high voltage lines require larger air and ground clearances. They have large mechanical loadings. Insulation costs are also considerable. Steel/aluminium towers have been developed for such lines where very long spans are essential. The long span construction cuts down the insulation cost considerably as fewer tower supports are to be provided for. Moreover, the possibility of breakdowns are also reduced. They are classified as:

- (i) Self supporting towers,
- (ii) Stayed or guyed towers.

Self Supporting Towers: Self supporting towers are divided into two categories, namely

- (i) Wide base towers and
- (ii) Narrow base towers.

In a wide base tower lattice type construction with bolted connections are adopted. Each leg has a separate foundation. The narrow base design uses latticed construction of angle, channel or tubular steel section, with bolted or welded connections. A narrow base tower requires lesser steel or aluminium in comparison to a wide base tower, but its cost of foundation is more. The selection between the two is to be made on the basis of cost of material, foundations, and right-of-way requirements.

Guyed or Stayed Towers: Guyed or Stayed towers are adopted with a view to reduce weight and cost. Such towers have many identical members. This affords saving in fabrication and facilities assembly and erection as complete unit at the job site. Aluminium guyed towers, due to their much lighter weight are favored for remote areas where transport is a problem.

Both of them have got two masts connected at the top by a cross arm and provided with four guys. In case of portal type structure each mast rests on its own foundation. The four guys are anchored to two double acting guy anchors. A 'V' tower has two masts resting at angle to one another, on one thrust footing only, which is heavier type. Separate anchorages are provided for each of the four guys. The purpose of guy anchorages is to meet varying soil conditions and to take large uplift forces.

SUPPORTING TOWERS

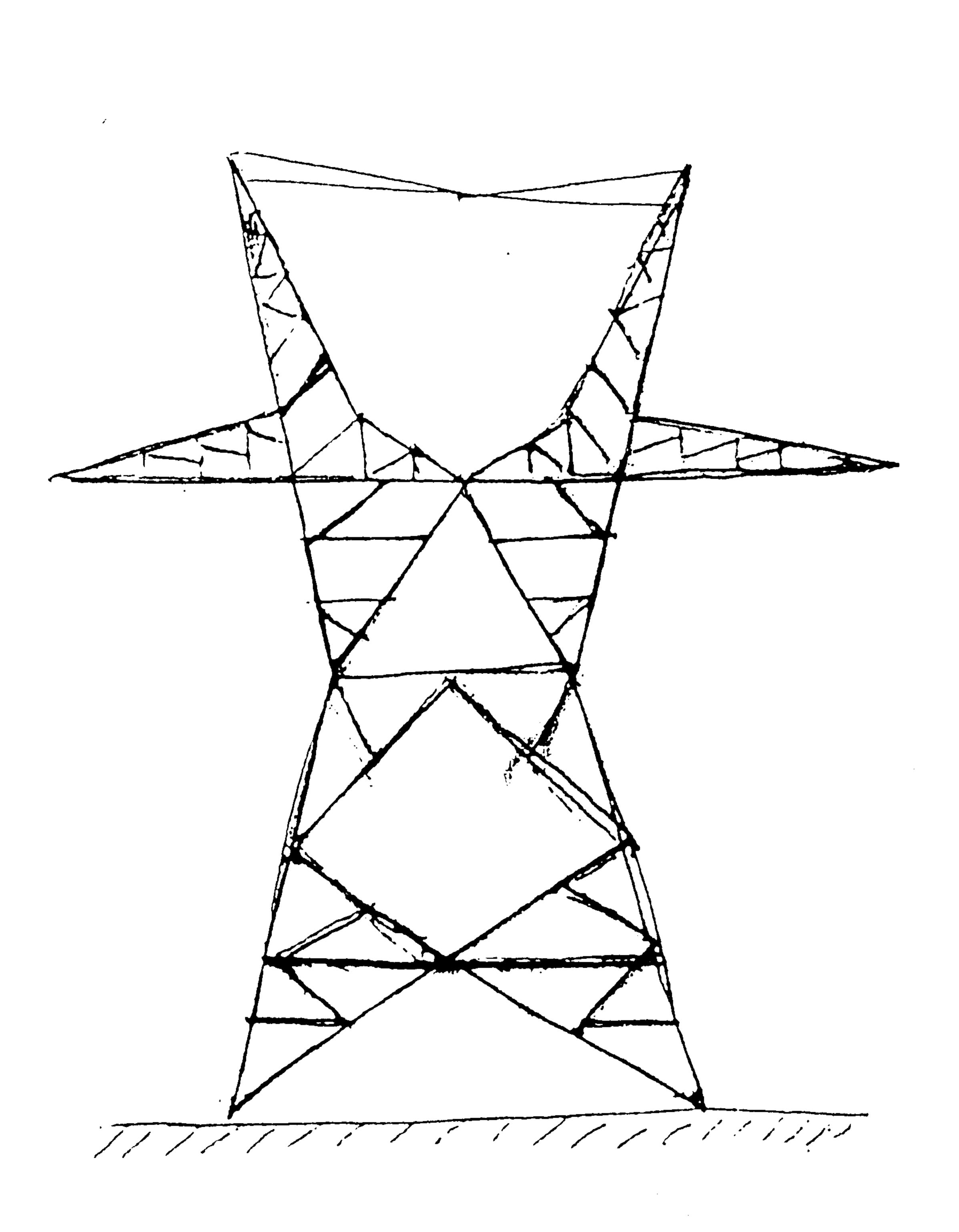


Fig. Wide Base Type

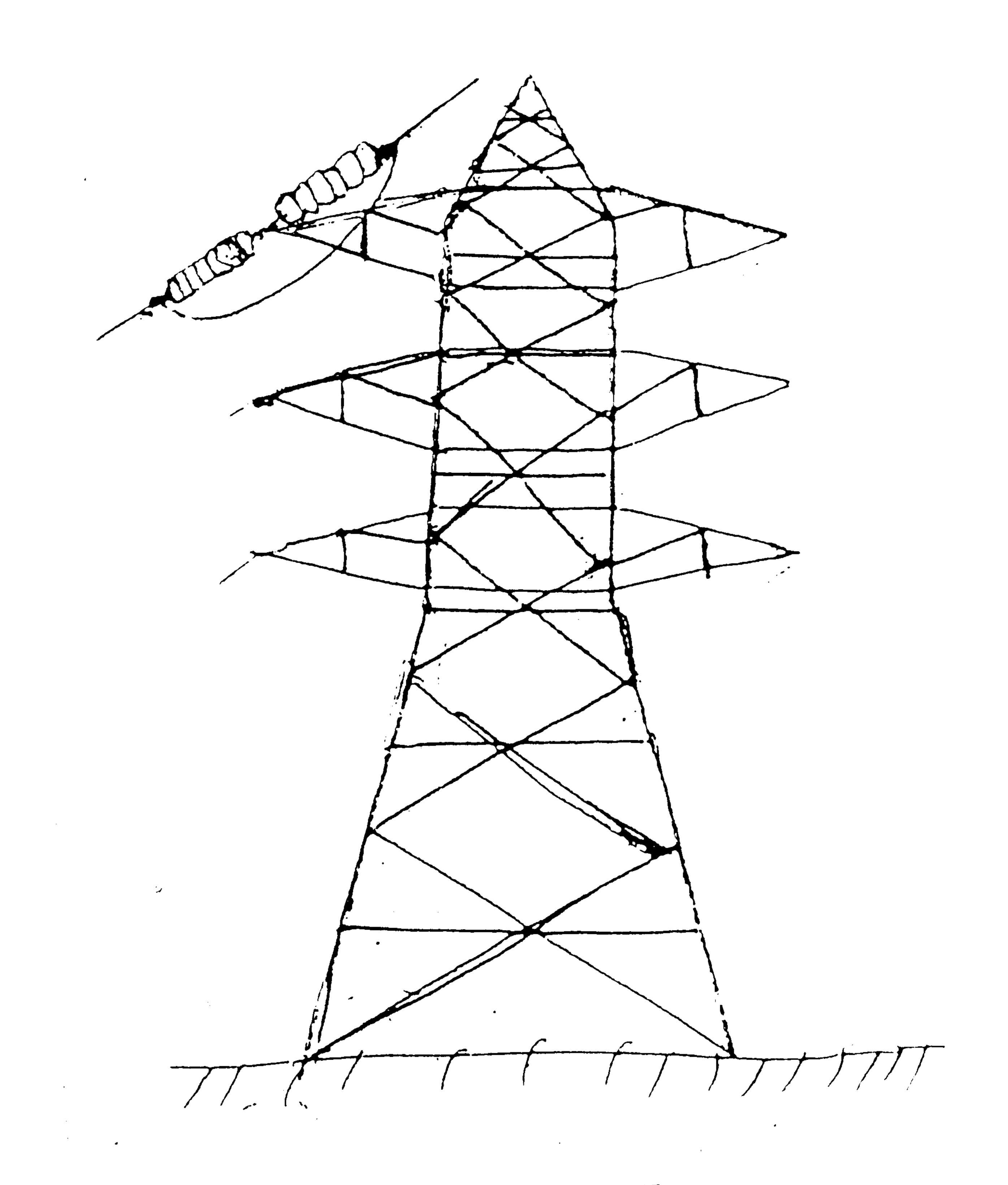


Fig. Narrow Base Type

Self Supporting Towers

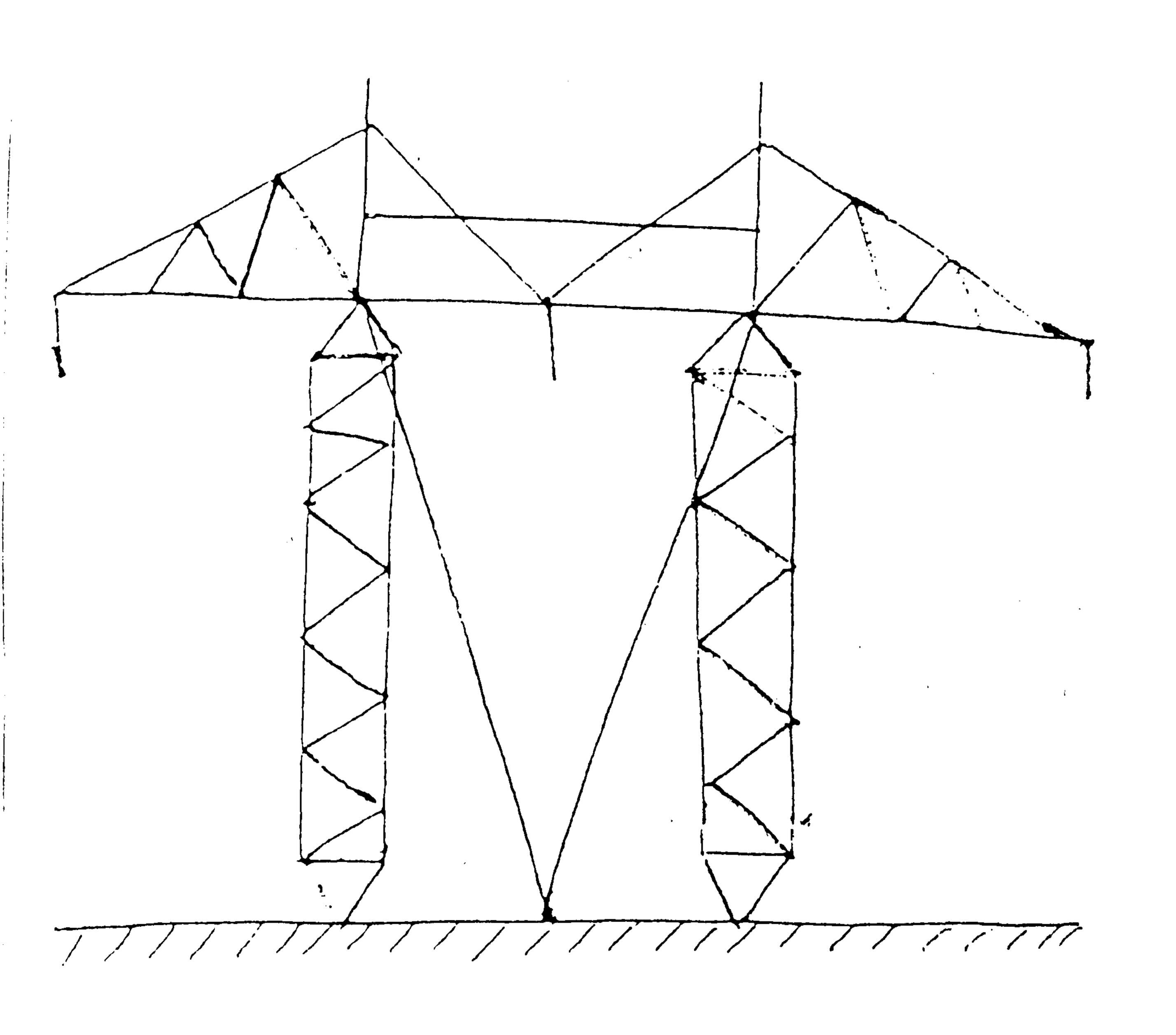


Fig. Portal Type

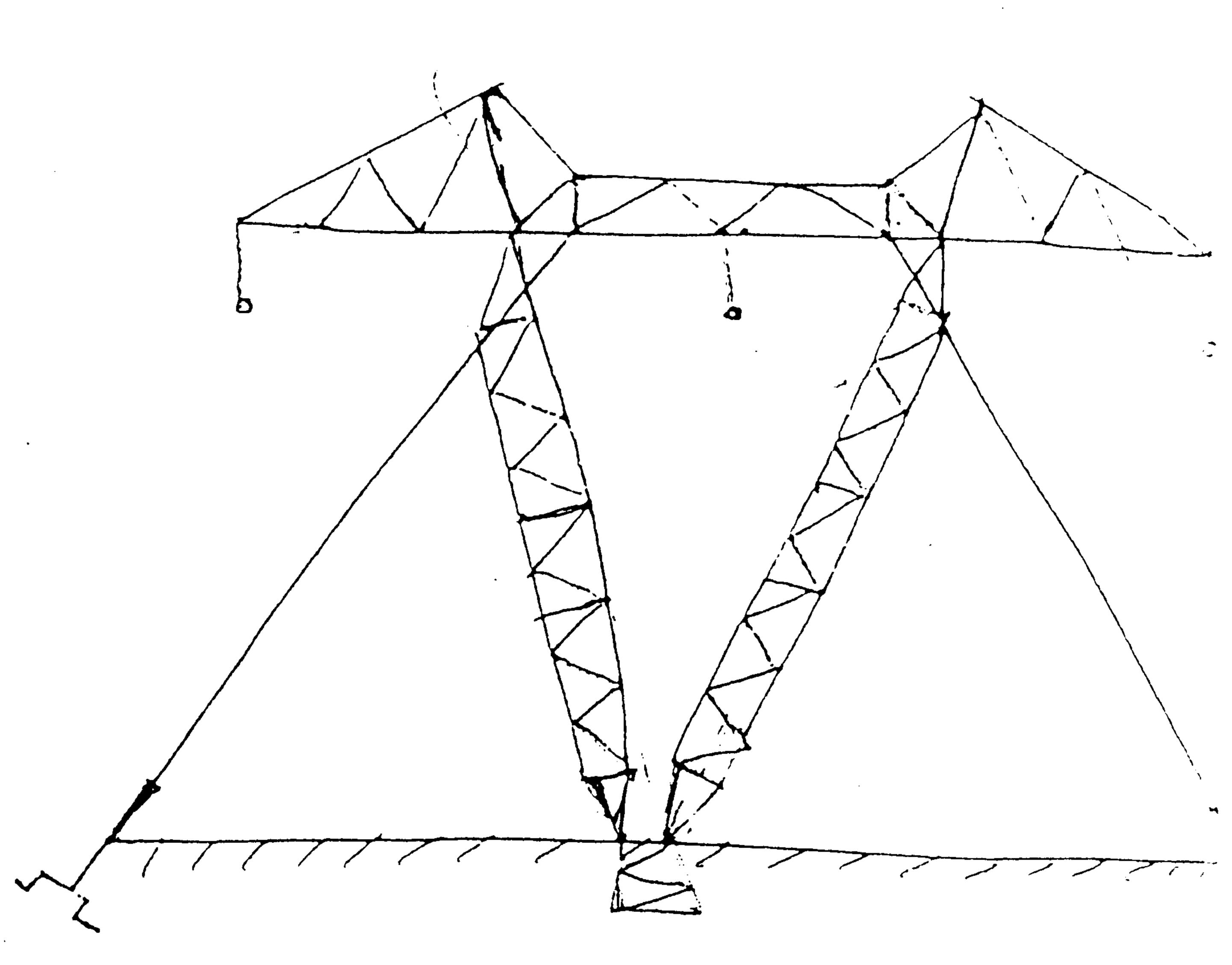


Fig. V-Type

Guyed Or Stayed Towers