his centre of vision when looking towards A becomes, when he looks towards B, the vanishing point for all lines running in the direction $S P A$. In the same way what was his centre of vision when looking towards C, becomes, when he looks towards A, the vanishing point for all lines running in the direction $S P C$. These vanishing points are in the horizon, but when the picture plane is interposed between them and the spectator they are represented by the points A, B and C on the respective picture planes (P. P.).

From what has been said the following rules may be deduced:

I. All retiring lines appear to converge.

II. All parallel retiring lines appear to converge in the same point.

III. All parallel horizontal retiring lines appear to converge in the horizon, represented by $H L$.

IV. All lines perpendicular to the picture plane appear to converge in the centre of vision.

V. The vanishing point of any retiring horizontal line is found by drawing in the proper direction from the station point, a line to cut the horizon, represented by $H L$.

If one edge or face of an object, such as a book or a pencil, be placed against a pane of glass, and its outline traced upon the glass, the drawing of the edge or face will be of the same size and shape as in the object itself; hence it may be inferred that measurements must be taken upon the picture plane (represented by the pane of glass), and that all the points in an object which are in the same vertical plane, will, when occupying positions in the picture plane, be represented by points as far apart as they are in the object. In order to bring any particular point of any object into the picture plane it must be supposed to be moved forward in any direction until it touches the picture plane. The point where it touches the picture plane is called a **Point of Contact** (P.C.). If it be required to find the point of contact of a point situated above the ground plane and away from the picture plane, the point is supposed first to be dropped vertically to the ground plane and then moved towards the picture plane.

For the proper working of a problem in perspective it is necessary that we be able to define with great exactness the size, the shape and the position of the object or objects to be drawn. The position of an object is usually determined by means of some one of its principal points, which is compared, as regards position, with the picture plane, the ground plane, and the line of direction. Thus any point may be required which is 2′ to the right of the line of direction, 3′ back from the picture plane and 10′ above the ground plane; or, a solid object, such as a cube, may be required whose edges are 2′ long, two of whose faces are parallel to the picture plane, and having the near left hand corner of its base touching the picture plane 5′ to the left and 1′ above the ground plane. Broadly stated, the position of objects may be—on, above or below the ground plane; touching, or lying away from the picture plane, and either directly in front of the spectator, or to the right or left.

Besides knowing the size, shape and position of the objects to be drawn we must also know the height of the eye of the spectator above the ground, his distance from the picture plane, and the *scale* on which the drawing is to be made, or, in other words, the proportion which the drawing will bear to the object.

Referring again to the illustration of the railway track (fig. 4) it will be seen that the ties appear to approach one another, as well as to decrease in size, as their distance from the eye is increased. In the case of a rapidly departing train the decrease in size is plainly seen, and gives to the mind the idea that some mysterious contracting force is acting upon the sides of the rear carriage, causing them to become shorter and closer together until, at a distance of about three or three and a half miles, the whole is reduced to a point on the horizon.

This leads up to the next point which it is necessary to consider, viz.: how vanishing lines can be measured to any required length, or, in other words, how the position of any point lying away from the picture plane can be represented.

The mathematical fact or principle by means of which this is accomplished is, *that a line drawn perpendicular to a line bisecting an angle will intersect both lines of the angle in points equidistant from their point of contact.* In fig. 6 $A B$ is limited, $B C$ is unlimited in length. The line $A E$, perpendicular to the line bisecting the angle $A B C$, makes $B D$ equal to $B A$. In the same way the line $F M$, perpendicular to the bisecting line, $H L$, of the angle $F H K$, makes $H N$ equal to $H F$ and $P T$ makes $H R$ equal to $H P$. Applying this principle to what has been learned concerning the drawing of lines in perspective, let $a b$ in $G L$ (fig. 6) correspond to and represent $A B$. The indefinite line $B C$ is perpendicular to $A B$ and therefore a line to represent it in perspective, drawn from b, must vanish in $C V$ (Rule iv.) These two lines are now represented perspectively, and in order to cut off from $b c$ a part which will represent $B D$ it is necessary to draw from a a line which will be the perspective representation of $A E$. By means of Rule v. the vanishing point for $A E$ is found by drawing from $S P$ a line parallel to it, to cut $H L$ in $R M P$ (**Right Measuring Point**). The line drawn from a to $R M P$ represents $A E$ in perspective, and, cutting $b c$ in d, makes $b d$ the perspective representation of $B D$; that is, $b d$ is the foreshortened or perspective length of $a b$ when perpendicular to the picture plane.

In the case of the line $H K$, which is not perpendicular to the picture plane, its vanishing point and measuring point are found by applying Rule v., that is, by drawing $S P\ V P_1$, parallel to $H K$, and $S P\ M P_1$, parallel to $F M$. After finding these points the method of proceeding is just the same as in the other case. The original retiring line is $h\ V P_1$, and it is measured by means