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the steam is released by the opening of the exhaust port, whereas line gh , tangent to the opposite side of the inside-lap circle and passing through center a , shows the position of the crank for the point of compression or the closing of the exhaust port. The maximum steam-port opening is represented by the distance from center a to the outside-lap circle, the measurement being taken along the center-line ae .

By studying these diagrams A and B , the effect of changes in the design of the valve may readily be determined. For instance, if the outside lap is increased (thus increasing the diameter of the lap circle), the point of cut-off will occur earlier in the stroke, giving a greater range of expansion; this change, however, will also cause an earlier compression, even if the inside lap is not increased, because the effect of enlarging the outside-lap circle is to change the position of the inside-lap circle and the angular position of line gh , so that the exhaust port is closed earlier. Increasing the inside lap also increases compression and delays the point of release or exhaust. By means of this diagram, if the point of cut-off, lead, maximum port opening, and point of compression were given, the necessary inside and outside lap and valve travel could be determined.

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