INVOLUTE TEETH

The second and perhaps the most common method of forming the curves for gear teeth is by means of involute curves. Let A and B, Fig. 15, represent the axes of the gears, the pitch circles of which touch at C, and through C draw a secant DCE at any angle θ to the normal to AB, and with centres A and B respectively draw circles to touch the secant in D and E. Now $\frac{n}{n_2} = \frac{BC}{AC} = \frac{BD}{AE}$ so that if a string be run from D to E and used as a belt between the two dotted *base circles* at D and E, we would have exactly the same velocity ratio as if the original pitch circles rolled together having contact at C.

Now, choose any point P on the belt DE and attach at this

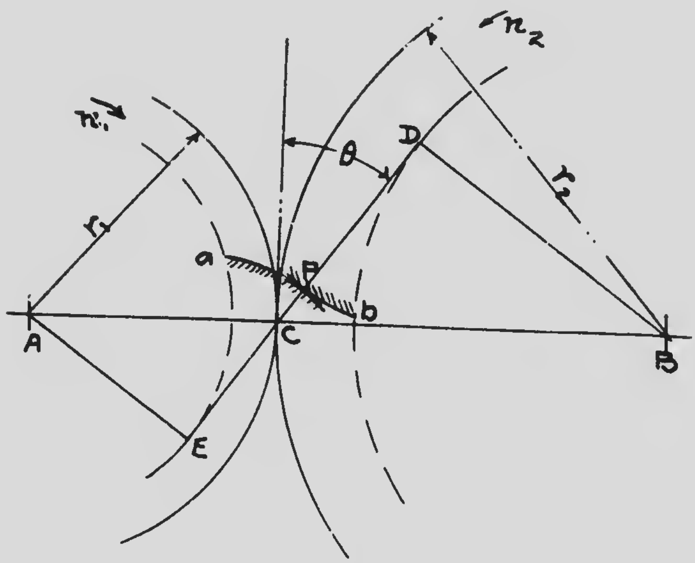

Fig. 15.

point a pencil, and as the wheels revolve it will evidently mark on the original wheels, having centres at A and B, two curves Pa and Pb respectively, a being reached when the pencil gets down to E and b being the starting point just as the pencil leaves D, and since the point P traces the curves simultaneously they will always be in contact at some point along DE, the point of contact traveling downward with the pencil at P. Since P can only have a motion with regard to the wheel aE normal to the string PE, and its motion with regard to the wheel Db is at right angles to PD, it will be at once evident that these two curves have a common normal at the point where they are in contact.