

CHAPTER V.

DETERMINATION OF VELOCITY AND ACCELERATION IN PLANE MECHANISMS.

48. Velocity and Acceleration Determined from Virtual Centres.—It is often necessary to determine the magnitude and direction of the velocity or acceleration of a given point of a given link in a plane mechanism. Such a calculation, for example, is frequently required if we wish to find the forces acting on a part of a machine when in motion, with a view to the correct proportioning of such a part to the work it has to do.

We have already studied this problem in certain cases, especially as regards the cross-head of a direct-acting steam-engine; the question has now to be discussed in a more general manner.

In a given mechanism, having given the velocity of a point on one link, and having found the positions of the various virtual centres, it is possible to determine the velocity of any point on any one of the links.

Take for example the beam-engine of Fig. 96, in which we suppose V_c , the velocity of the crank-pin, to be known. It is required to find the actual linear velocity (i.e., the velocity with relation to the frame or fixed link) of the piston and rod b .

Let a be the fixed link, b the piston, d the beam, e the connecting-rod, and f the crank.

First find O_{bd} at the intersection of a horizontal line through the beam centre O_{da} and the line joining O_{bc} and O_{cd} . Note that O_{ba} is at an infinite distance. Next find

