

PART THE THIRD.

ON ADJUSTMENTS.

CHAPTER I.

GENERAL PRINCIPLES.

456. IN the elementary combinations which have occupied the two previous Parts of this subject, the angular velocity ratio and directional relation in any given combination are determined by the proportion and arrangement of the parts, and will either always remain the same, or their changes will recur in similar periods. But it is necessary in many machines that we should have the power of altering or adjusting these relations. These adjustments may be distributed under three heads.

(1.) To break off or resume at pleasure the communication of motion in any combination.

(2.) To reverse the direction of motion of the follower with respect to that of the driver; that is, to change their *directional relation*.

(3.) To alter the *velocity ratio* either by determinate or by gradual steps.

These changes may be either made by hand at any moment, or they may be effected by the machine itself, by means of a class of organs especially destined for that purpose; and which are in fact a kind of secondary moving powers to the machine.

457. The communication of motion may be broken off by detaching pieces that remain united during the action of the combination, and therefore move as one. Thus wheels and pulleys are connected with their shafts for this purpose, by means of catches or bolts; and shafts are connected end-long with each other by couplings, or other contrivances which admit of being released or put in action at pleasure. Otherwise the communication may be broken off by disengaging the driver from the follower, which in the two kinds of contact action is effected by withdrawing the pieces from each other; in wrapping connections, by either slackening the belt or by slipping it off the pulley; and in link-work, by disengaging the joints of the links.

458. But the whole of these contrivances as well as those by which the directional relation is changed, belong to constructive mechanism, and as they involve no calculations relating to the velocity ratio, which is the principal object of the present work, I shall not enter into any details respecting them, referring in the mean time to the *Encyclopædias* and other treatises on machinery, in which they are fully explained*. The case is different with respect to the third kind of adjustments in which the velocity ratio is the subject of alteration, and I shall therefore give examples of the principal methods of effecting this purpose.

The adjustments of the velocity ratio may consist either of (1) *Determinate changes*, which for the most part require the machine to be stopped, or of (2) *Gradual changes*, which do not require the machine to be stopped.

* Vide especially Buchanan's *Essays on Mill-work* by Rennie, in which these combinations are very fully treated of.