

LECTURE II.

We shall in the present Lecture examine in some detail a few of the results which can be obtained by treating mechanisms upon the plan which Reuleaux has proposed, and which is illustrated by his models; that is to say, by the analytical treatment of which we have already seen the general nature.

We have seen how kinematic chains are built up from pairs of elements and links. The pairing and the linkage renders the relative motions in the chain absolutely determinate, and the determinate relative motion exists equally whether or not any link of the chain be fixed relatively to the earth or to any portion of space that we choose to treat as stationary.

We have now to consider in more detail the effect of fixing one link of the chain. In practice, of course, one link is always fixed, or in other words, its mo-

tion relatively to the earth, to a locomotive or whatever it may be, is made zero. A chain with one link fixed is simply what we know as a mechanism.

In examining pairs of elements we saw that we could fix either element of the pair with lower pairs, the relative motions remaining unaltered; with the higher pairs the inversion gives us a totally different motion. We have seen also that we can fix any one link of a kinematic chain just as we can fix either element of a pair. We therefore can get as many mechanisms from any chain as it has links. From any such chain as Fig. 3, for instance, which has four links, we can get four mechanisms. The fact that a kinematic chain gives us as many mechanisms as it has links appears, looked at from this point of view, a mere matter of course. It has, however, never been hitherto distinctly recognized, so far as I know, and it can hardly be realized too distinctly, the consequences which result from it being most important, as we shall see. All that I shall attempt to do in this

lecture will be to look at some of the mechanisms obtained from the particular chain just mentioned, and various modifications of it.

We have already noticed that the chain has four links. We see further that it is a chain in which all the motions are con-
plane, each of its four pairs being simply a cylinder pair, and the four cylinder pairs having parallel axes. It is so proportioned that by causing one link to swing, another one can be made to revolve. In order that we may refer more easily to the links, a letter is attached to each in the engraving.

For convenience sake we may also use a short symbol for this chain (the one used by Reuleaux) namely, (C''_4) .^{*} The C_4 within brackets stands for the four cylinder pairs, the symbol for parallel being added to indicate their relative positions. This is the symbol for the *chain*, no link being fixed. To distinguish the four mechanisms formed from it, we shall put the letter which stands

^{*}In words "C parallel 4."

