being the case the length OP or a represents $a\omega$ ft. per sec., and the scale is thus $\omega : 1$. Further inspection will also show that since R is stationary, R^1 will lie at the only stationary point in a_1, viz., at O.

The remaining point Q^1 may be found thus: The direction of motion of $Q \frown P$ is $\perp$ to OP or b, and hence, from the proposition already given, Q^1 must lie in a line through P^1 (or P) $\perp$ to the direction of $Q \frown P$, i.e., on the line through P^1 in the direction of b or on b produced. Again, the direction of motion of $Q \frown R$ is $\perp$ to QR or c, and since R^1 (at O) has the same motion as R this is also the direction of motion of $Q \frown R^1$, so that Q^1 lies on a line through R^1 $\perp$ to the motion of $Q \frown R$, i.e., on a line through R^1 in the direction of c, and thus Q^1 is fixed. The velocity of Q is then $Q^1O \cdot \omega$, the direction in space is $\perp$ to OQ^1 and the sense is fixed by that of ω.

Since P^1 and Q^1 are the images of P and Q on b, we may regard P^1Q^1 as the image of b, and shall in future denote it by b^1, similarly R^1Q^1 (OQ^1) will be denoted by c^1. By a similar

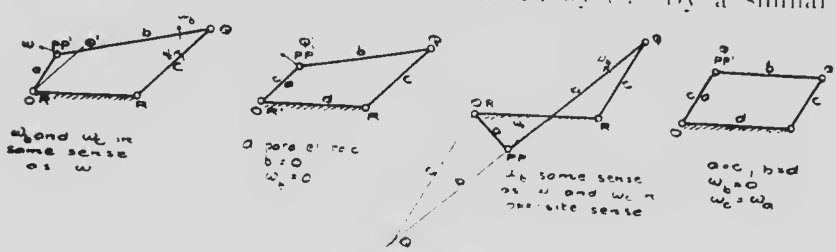

Fig. 5.

process of reasoning it may readily be shown that if S is a point on b midway between P and Q then S^1 will divide P^1Q^1 equally, and also T^1 may be found by the relation $R^1T^1 : T^1Q^1 = RT : TQ$.

The diagram may be put to further use in determining the magnitude and sense of the angular velocities of b and c when that of a is known. Let ω_b and ω_c denote respectively the angular velocities of the links b and c in space, the angular velocity of the link of reference being ω. Now since Q and P are on one link b, which has an angular velocity ω_b, therefore the velocity of $Q \frown P$ is $QP \cdot \omega_b$ or $b \cdot \omega_b$, and since Q^1 and P^1 are points on a, whose angular velocity is ω, therefore the velocity of $Q^1 \frown P^1$ is $Q^1P^1\omega$ or $b^1\omega$. But Q^1 has the same motion as Q, and P^1 has the same motion as P, and therefore the velocity of $Q \frown P$ is the same as that of $Q^1 \frown P^1$ or $b\omega_b =$

$$b^1\omega, \text{ i.e., } \omega_b = \frac{b^1}{b}\,\omega = b^1 \cdot \frac{\omega}{b}. \quad \text{Similarly } \omega_c = \frac{c^1}{c} \cdot \omega = c^1 \cdot \frac{\omega}{c}$$

and since b and c are fixed in length the length of the images