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force are so chosen that the unit of force acting on the unit of mass will generate a unit of velocity in a unit of time.

The product of the mass of a particle into its velocity is called its momentum. It follows from what has just been said that the expression "change of motion" means change of momentum produced in a given time.

These results are peculiarly important in dynamics, but in statics, where the particles acted on are all initially at rest and remain so, they have not the same significance.

17. In the third law the principle of the transmissibility of force is implied. The principle is more clearly stated in the remarks which Newton added to his laws of motion. The law asserts the equality of action and reaction. If a force acting at a point A pull a body which has some point B held at rest, the reaction at B is asserted to be equal and opposite to the force acting at A. In general, when two forces act at different points of a body there will be equilibrium if the lines of action coincide, the directions of the forces are opposite, and their magnitudes equal.

From this we deduce that when a force acts on a body, its effect is the same whatever point of its line of action is taken as the point of application, provided that point is connected with the rest of the body in some invariable manner.

For let a force P act at A and let B be another point in its line of action. We have just seen that the force P acting at A may be balanced by an equal force Q acting at B in the opposite direction. But the force Q acting at B may also be balanced by an equal force P' acting at B in the same direction as P (Art. 15). Thus the two equal forces P and P' acting respectively at A and B in the same directions can be balanced by the same force Q. Thus the force P acting at A is equivalent to an equal force P'acting at B.

18. Statical Axioms. If we wish to found the science of statics on a basis independent of the ideas of motion we require some elementary axioms concerning matter and force.

In the first place we assume as before the principle of the inertness of matter.

We also require the two principles of the independence and transmissibility of force.

The first of these principles is regarded as a matter of common experience. When our attention is called to the fact, we notice

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