

knives on the sickle, then each knife has an average cutting force of 1 lb. Of course as there is always friction, the actual cutting force will be somewhat less than 1 lb.

Lesson XVII

Record the weather conditions.

Wheels.—What is the advantage of having wheels on a wagon? We have all drawn weights on these small express wagons that girls and boys play with, and we know that it is easier to draw the weight when it is on the wagon than if we tried to drag it along the ground. Why is it easier? We know that it is because of the wheels; but how do wheels make it easier? Let us proceed to answer this question, but first let us settle why it is hard to drag a weight along the ground or pavement or side-walk. You will answer that it is because of the friction between the weight and the other surfaces. Friction is due to small projections in the two surfaces in contact; these projections strike against each other and retard the motion. If the weight and pavement were absolutely smooth it would take no force at all to keep the weight moving on the pavement, if it were once started, and if the pavement were perfectly level. How then does the wheel overcome the friction of the road? If you will examine Fig. 18 you will see that the wheel overcomes the friction of the road by lifting the weight over the projections.

The wheel is really a lever. The obstruction at A is the fulcrum. The force is applied along OF, and the force arm is the perpendicular distance AB from the fulcrum A to the line along which the force acts. The weight is at the axle O and acts along the line OD, therefore the weight arm is AC, the perpendicular distance from the