We have found then two reasons why the traces should be slanted. First, because the wheels sink into the road and the pull on the trace is most effective when it is exerted in a direction parallel to the grade up which the wagon is really going. Second, because the horse uses its weight in pulling, and the sharper the slant of the trace the more effective its weight becomes.

Let us now study the question, What factors determine the size of wagon wheels?

We have already noted some of these factors, namely:

1. Two reasons why the wheels should be large.
2. Two reasons why the traces should slant downwards from the hames, which would tend to make the wheels small.

In addition to these there is:

3. The ease in loading and the stability of the wagon when loaded, both of which are secured by small wheels.
4. The height of the horse, which limits the height of the wheels. If we had horses twice as tall we could make the wheels twice the usual size.

Each of these factors has an influence on the size of the wheels, and in some cases one factor is more important than the others, as will be seen in the following:

In the ordinary wagon which is used for all purposes, the size of the front wheels is determined as follows: When the average height of the horses used is known, and the best slant of the traces for the ordinary condition of the road, then the axle of the front wheel may be as high as the lower end of the traces. A study of the force arm and weight arm in Figs. 18 and 18a shows us that there is no advantage in having the axle higher than this.

The back wheels in all wagons may be higher than the front wheels, because they are pulled by the reach which