CAUSE AND EFFECT.

389. The application of proportion to problems consists in comparing two causes and two effects.

EXAMPLE.—If 5 horses (*1st cause*) eat 10 tons of hay (*1st effect*), 10 horses (*2d cause*) will eat 20 tons of hay (*2d effect*).

390. A *cause* is that which produces a result; it is all that is needed to do a work: men, time, animals, land, capital, material, etc.

391. An *effect* is that which is produced; it is the work done, the money yielded, etc.

392. The cause and the effect are *simple* when they contain only one element; they are *compound* when they contain several elements.

When I say: "10 men cut 100 cords of wood", the cause and the effect are simple. When I say: "10 men in 4 days cut 100 cords of wood", the cause (10 *men in* 4 *days*) is compound; the effect (100 *cords of wood*) is simple.

393. Causes and effects expressing quantities may be represented by numbers; these numbers will be related to each other as the things they represent; again, like causes should produce like effects, and the effects should be in proportion to their causes, namely:

1st cause : 2d cause : : 1st effect : 2d effect .

SIMPLE PROPORTION.

394. A proportion is simple when its four terms consist of single numbers. Thus, 8 : 12 :: 16 : 24 is a simple proportion.

EXAMPLE I.—If 30 acres of land yield 1 650 bushels of corn, how many bushels of corn will 60 acres yield?

OPERATION.

acres		acres		bushels		bushels
30	:	60	::	1650	:	x
1st cause		2d cause		1st effect		2d effect

$$30 \times x = 60 \times 1650$$

$$x = \frac{60 \times 1650}{30}$$

$$x = 3\,300 \text{ bushels.}$$

EXPLANATION. — The acres are the causes; the bushels are the effects; and the 1st cause is to the 2d cause as the 1st effect is to the 2d effect. The product of the extremes is equal to the product of the means. Solving, $x = 3\,300$ bushels.