Basic Machines – Part 1

Course No: M03-035
Credit: 3 PDH

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This course was adapted from the Naval Education and Training Professional Development and Technology Center, Publication No, NAVEDTRA 14037 - training course, "Basic Machines", which is in the public domain.

Note: This course is based on chapters 1 to 6 of this document.

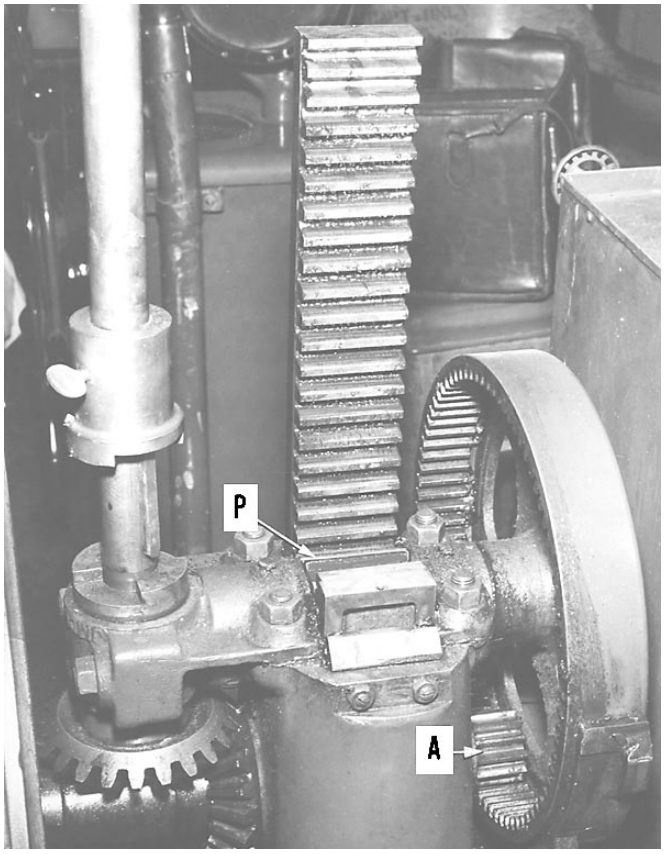

Figure 6-15.—A steering mechanism.

The advantage from C to D is 3 to 1. The sprocket wheel to the far left, on the same shaft with D, is called a wildcat. The anchor chain is drawn up over this. Every second link is caught and held by the protruding teeth of the wildcat. The overall mechanical advantage of the winch is 4 x 3, or 12 to 1.

RACK AND PINION

Figure 6-15 shows you an application of the rack and pinion as a steering mechanism. Turning the ship's wheel turns the small pinion (A). This pinion causes the internal spur gear to turn. Notice that this arrangement has a large mechanical advantage.

Now you see that when the center pinion (P) turns, it meshes with the two vertical racks. When the wheel turns full to the right, one rack moves downward and the other moves upward to the position of the racks. Attached to the bottom of the racks are two hydraulic pistons that control the steering of the ship. You'll get some information on this hydraulic system in a later chapter.

SUMMARY

These are the important points you should keep in mind about gears:

Gears can do a job for you by changing the direction, speed, or size of the force you apply.

When two external gears mesh, they always turn in opposite directions. You can make them turn in the same direction by placing an idler gear between the two.

The product of the number of teeth on each of the driver gears divided by the product of the number of teeth on each of the driven gears gives you the speed ratio of any gear train.

The theoretical mechanical advantage of any gear train is the product of the number of teeth on the driven gear wheels, divided by the product of the number of teeth on the driver gears.

The overall theoretical mechanical advantage of a We compound machine is equal to the product of the theoretical mechanical advantages of all the simple machines that make it up.

We can use cams to change rotary motion into linear motion.