



SECTION IV Nos. 4E-34

Ratchet wheels, drives, stops and miscellaneous movements used in machine construction; types of power saws.

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49. Ratchets, pawls and stops. Ratchet mechanisms occur in a great variety of forms. A ratchet consists of a wheel with teeth called the ratchet wheel which receives periodic or intermittent motion from a swinging member called a ratch or pawl. Another pawl prevents backward motion, this is called a stop pawl.

Model 1 shows three kinds of stop pawls, each form being necessary to perform its function under different conditions of space in mechanisms to which they are attached. A is the hook type and prevents backward motion by engaging with teeth. B is the straight type and acts as a barrier. Both of these have spring tensions to keep them in place. C is the gravity type, which is held in place by its weight below center.

In Model 2, motion is transmitted to the ratchet wheel by the revolving pawl drive. The stop pawl is of the straight type.

50. Pawl drives and stops. The top model has an almost continuous motion. Watch action of stop pawl. The driver, having both pawls attached to it, acts as both stop and driver alternately.

In the bottom model, the stop and driving pawls are independent. This is used in many ways, particularly in connection with counting devices on automatic machines.

51. Pawl drives and stops. These two types of ratchet movements are used where slow rotations are necessary, such as on feeding mechanisms in textile machinery.

52. Geneva movement. Geneva movement is so called because of its use in Geneva watches as a stop wind. The projection on the driving disk acts as the pawl drive, and the concave projections on the lower disc act as stop pawls. This is used at the present time in motion picture machines for moving the film in front of the lens and is known as the intermittent movement. If applied as a stop wind, one of the concave projections must be shaped convex, and the rotation is stopped.

53. Continuous rotary into intermittent motion. Attached to a revolving disk by means of the green arm, is an elbow shaped lever or bell crank (See No. 10). The pawl, attached to this, drives the notched wheel. The desired direction is attained by placing part marked Reverse on right or left of center.

54. Intermittent from continuous rotary motion. The green wheel on horizontal shaft is driving the vertical shaft at right angles through the medium of the toothed drum. The motion of the driver is continuous but that of the drum is intermittent because there is a slight pause between the time a projection on the driver leaves one groove on the drum and enters the next.

55. Cam wheel for intermittent motion. The cam as previously explained is a projection on a rotating wheel for giving or receiving motion against its edge (See No. 24). The shape and size of this edge determines the resultant motion of the follower, which is the rod working through guides. This model is so constructed that the

constant rotary motion of the cam wheel is converted into intermittent vertical motion.

56. Wave wheel for oscillating motion. There is great similarity between this model and No. **55.** No. **56** shows three types of motion; continuous rotary as in the wave wheel, oscillating or swinging as in the lever, and intermittent as in the rod.

57. Jump motion device. The main parts of this device are the worm wheel (above) and worm gear (below). The motion of the worm wheel is continuous because it is on the driving shaft. The teeth on the vertical worm gear mesh with the horizontal worm wheel. When the gear has revolved sufficiently to escape contact on the worm wheel, the red weight (by gravity) advances the gear very quickly to meet the worm and repeat the process. In one cycle, the motion is controlled to be slow when meshing with gear, and very fast when jumping.

58. Ratchet and pawl movement. This is a step ratchet for heavy duty and is very commonly used for pipe cutting dies, ratchet wrenches, etc.

59. Ball bearings. Roller bearings. Bearings are the supports for rotating members or shafts and the term as generally applied includes the whole support. The friction caused by the moving body in the bearing has always been a great problem, until the introduction of ball and roller bearings which are called anti-friction bearings.

The two models on the left employ balls and those on the right use rollers. In all cases, the

outer shell rotating on the axle carries the load and the axle is represented by the red center.

The upper left model rotates in a fixed position or in one plane only.

The lower is "self-aligning" being designed so that if the shaft is brought slightly out of line, the bearing will accommodate the misalignment by swiveling in its container.

The upper right bearing is of the roller type. These rollers revolve around the axle and are held in place by retaining rings.

The lower right bearing is of the same type. The cut-out holes in the wheel show the radial grooves cut in the faces of the rollers to provide oil distribution.

60. Oscillating into intermittent circular motion. The kind of motion and its direction in this model are dependent upon the position of the two green arms, A and B. The rotation of the crank arm which is attached to the driving shaft gives an oscillating motion to the connecting rod, at the other end of which is another crank arm pinned to the center of the rotating disk. If A engages the drum, the resulting motion is intermittent and clockwise; if B engages the drum, the direction is reversed; and if both A and B touch the drum it oscillates in one position.

61. Band saw. The constant rotary motion of the driving pulley (lower) produces a continuous straight line motion of the straight parts of the saw. The upper pulley is a guide. This type is used at high speed for cutting wood or other substances. When run at low speed with high-tempered steel it is used on metals.

62. Jig saw. The vertical saw is drawn down by crank pin, cutting material and is then drawn back by tension of spring above. This type is used for sawing irregular shapes in wood and later the band saw was developed from it. It is possible to saw inside of a form by placing the saw blade through a hole in the work before fastening to spring. When job is complete, saw is loosened and work slipped off.

63. Gang saws, vertical and circular types. The word gang is used when more than one saw is combined to operate at the same time. In the vertical type the power is supplied by a pin on the rotating red disk. A connecting rod is used to transmit the power. This type is used to cut on down stroke only.

The driving shaft runs through the circular saw so the power is directly applied. This type was developed after the vertical and produces a continuous cutting motion. It is the most used now and will saw a log with one cutting, depending on number of saws used.

64. Drum cam. This shows another way in which a cam may be used. The intermittent motion given to the traveling arm depends on the angle or shape of groove in drum. This motion can be worked into many combinations and is used in numberless ways, particularly on automatic screw-cutting machines.