

Machine and Inverse Escapements

MACHINE AND INVERSE ESCAPEMENTS IN GENERAL

In this chapter two more types of mechanisms will be considered—machine escapements and inverse escapements. Neither of these is as popular with machine designers as are ratchets, cams, or Genevas, but both deserve more attention than they get, since they offer the designer significant advantages in many design situations. Both machine and inverse escapements look very much like clock escapements, but neither is designed to run synchronously and both are designed to handle considerably larger loads than the typical clock escapement. Despite the geometrical similarities between these two types of mechanism, they will be discussed separately (machine escapements first) because they differ quite a bit in their operation.

MACHINE ESCAPEMENTS

Description of Machine Escapements

A typical machine escapement is shown in Fig. 12-1. As can be seen from the drawing it looks like a clock escapement except that the scape lever is controlled by the rotation of a snail cam rather than by a pendulum. The scape lever, of course, could also be controlled by a solenoid rather than by an input cam. This would place the length of the dwell period under the control of the operator. In either case, one of the two teeth (pallets) of the scape

lever is always in a position to interfere with the motion of the scape wheel which, therefore, can never run away.

As in a clock escapement, the scape wheel in Fig. 12-1 is continuously urged to rotate by the machine to which it is fastened. A spring or weight could be used, as in a clock or watch, but a slip clutch or stallable motor is more commonly used in machine design. Sometimes, both a spring and slip clutch are used, the clutch being used to limit the torque that keeps the spring wound. Spring loaded escapements are usually called "load-and-fire" escapements. Examples of these will be seen later on.

The machine escapement is similar in some ways to certain types of limited motion clutches. In the next chapter a one-turn ratchet clutch will be seen, for example, that might well be mistaken for a machine escapement. The difference is that an escapement controls or releases energy in some other mechanism; a clutch transmits energy from drive to load.

Figure 12-2 shows another machine escapement. It differs from Fig. 12-1 in that the scape lever has only a single pallet. This mechanism will function correctly only if the scape lever moves rapidly enough to catch each tooth of the scape wheel after every motion of the wheel. As mentioned in Fig. 12-1 one of the two pallets of that scape lever is always in a position to interfere with the motion of the scape wheel. The mechanism of Fig. 12-2, relying as it does on a race between the scape lever and the scape wheel, is a more risky mechanism; but, never-

