A partially opened valve is producing a fraction of the heat available, but there is no way of knowing what the fraction is. *[Figure 7-2]*

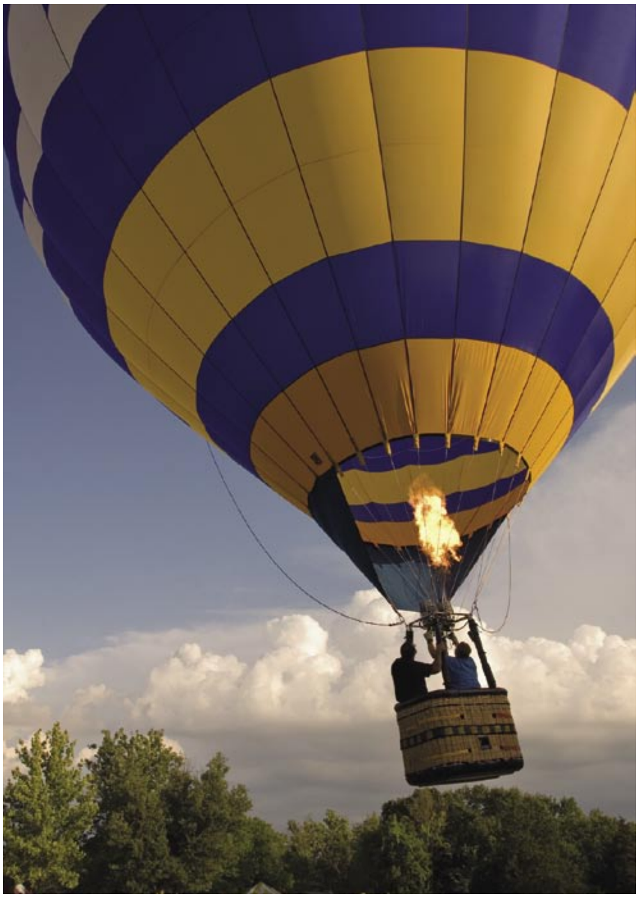

Figure 7-2. *Activated burner.*

Another advantage of briskly opening and closing the valve is to minimize the presence of a yellow, soft flame. During inflation, for instance, a strong, narrow, pointed flame that goes into the mouth opening without overheating the mouth fabric or crew is desirable. A partial-throttle flame is wide and short and subject to distortion by wind or the inflation fan. If less than a full burn is desired, shorten the time the valve is open and not the amount the valve is open. Due to burner design (and the inefficiency of a partially opened valve), four 1-second burns do not produce as much heat as one 4-second burn.

If the mechanical aspects of flying can be learned, the systematic cadence can be converted into a rhythm that is smooth and polished. With practice, the rhythm becomes second nature and pilots fly with precision, without thinking about it. Using the standard burn, pilots can better predict the effect of each burn, minimize the potential danger of a burn to the envelope, and have a better flame pattern. The standard burn is referred to when discussing specific maneuvers.

Straight and Level Flight

Level flight, or equilibrium, is probably the most important of all flight maneuvers, as it serves as a baseline from which all other maneuvers are derived. A good pilot maintains level flight with a series of standard burns.

Level flight is achieved when lift exactly matches weight and the balloon neither ascends nor descends, but remains at one altitude. For every altitude, there is an equilibrium temperature. If a pilot is flying at 500 feet mean sea level (MSL) and wants to climb to 1,000 feet MSL, the balloon temperature must be increased. This is not only to attain equilibrium at the new (higher) altitude, but some excess temperature must also be created to overcome inertia and get the balloon moving.

Theoretically, if a pilot were to hold a hot air balloon at a constant temperature, the balloon would float at a constant altitude. However, there is no practical way to hold the envelope air temperature constant. Each time the pilot burns, the balloon tends to climb. The air in the envelope is always cooling and the balloon tends to descend. If the subsequent burns are perfectly timed, the balloon flies in a series of very shallow sine waves. *[Figure 7-3, Line A]* Of course, any variable changes the balloon flight. A heavier basket load, higher ambient temperature, or sunny day all require more fuel (by shortening the interval between burns) to maintain level flight.

In discussions of level flight, the terms "flying light" and "flying heavy" are sometimes used and bear explanation. A balloon is said to be "flying light" when the sine wave being described in the air is predominately on the high side of the desired altitude *[Figure 7-3, Line B]*. Many new or inexperienced pilots tend to fly light, and use the vent line in order to return to the desired altitude; this may create a situation where the pilot gets into a constant overcontrolling exercise and is best avoided. "Flying heavy" can be described as a scenario where the sine wave is predominately on the low side of the desired altitude *[Figure 7-3, Line C]*; if the balloon is left alone, it tends to fall. Flying heavy can be hazardous when contour flying. A balloon pilot must use all visual cues available and exercise a "finesse" type of control when contour flying (described later in this chapter).

Through experimentation, standards can be established that may be used as a basis for all flights. With practice and using the second hand of a wristwatch, a new pilot can fly almost level. The exercise of learning the pattern of burns (each day and hour is different) is an interesting training exercise, but not a practical real-life technique. The ability to hold a hot air balloon at a given altitude for any length of time is a skill that