different shutter angles. Changing the shutter angle affects how long the film is exposed to light: Reducing the shutter angle reduces the amount of time that the film is being exposed to light, and increasing the shutter angle increases the amount of time that the film is being exposed to light. A variable shutter is sometimes used to achieve some type of exposure effect or visual effect. It sometimes helps to have a variable shutter when filming sports or any other fast action scene. In addition, a cinematographer may want to change the exposure of a shot without affecting depth of field, and this can be achieved by changing the shutter angle. You should also be aware that there may be strobing of the lights when you close down the shutter angle.

Depending on the model of the camera, the shutter may be adjusted during the shot or only while the camera is not running. Check with the rental house if you are not sure if the camera has an adjustable shutter or how the adjustable shutter operates. In most cases the shutter will be one of two types: a solid 180-degree shutter, sometimes referred to as a half-moon shutter, or a double-bladed 180-degree shutter, sometimes referred to as a butterfly shutter (see Figure 1.18).

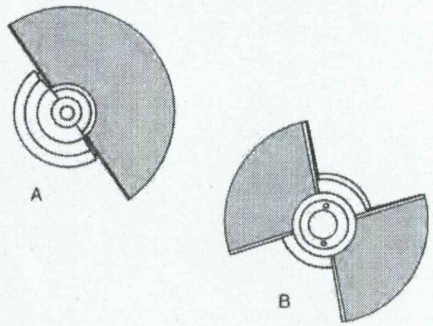

Figure 1.18
A, Standard or half-moon shutter. (Reprinted from the *Hands-On Manual for Cinematographers* with permission of David Samuelson.) **B,** Double-bladed or butterfly shutter. (Reprinted from the *Panaflex Users Manual* with permission of David Samuelson and Panavision Inc.)

In addition to the rotating mirror shutter, some cameras, such as those from Panavision, contain a focal plane shutter. The focal plane shutter is located at the film plane or focal plane, and it is what controls the light striking the film, while the mirror shutter is only for the reflex viewing system (see Figure 1.19).

Inching Knob

Most professional motion picture cameras contain an *inching knob*. This is often a small knob located either inside the camera body or

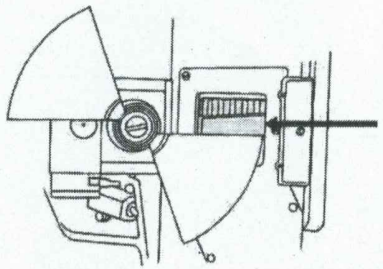

Figure 1.19
Panavision focal plane shutter. (Reprinted from the *Panaflex Users Manual* with permission of David Samuelson and Panavision Inc.)

on the outside of the camera. By turning this knob you can slowly advance or "inch" the film through the camera movement to check that it is moving smoothly. Whenever you thread the film into the camera, you should turn the inching knob a few turns to check that the film is traveling smoothly and not binding or catching anywhere. Failure to turn the inching knob before turning on the camera could result in torn film and ripped perforations.

Viewing System

The *viewing system* or viewfinder allows the Camera Operator to view the scene. Through the years of motion picture production, there have been three basic types of viewing systems used. The rack over viewing system and direct viewfinder are older viewing systems that are not used today for most professional motion picture productions and are not discussed here. The current standard viewing system for professional motion picture cameras is the mirrored-shutter reflex viewfinder system. A reflex viewfinder is one that allows you to view the image directly through the lens, even during filming. The mirrored-shutter reflex system means that the rotating shutter is actually a spinning mirror. As the shutter spins, when it is in the open position, all of the light entering the lens strikes the film and creates an exposure. When the shutter is in the closed position, all of the light is reflected off the mirror and directed to the eyepiece for the Camera Operator to view the shot (see Figure 1.20).

Diopter Adjustment

Because of the differences in each person's vision, the viewfinder of most cameras has an adjustable diopter. By setting the diopter according to your particular vision, the image will appear in focus when you