CLEAN AID CLIMBING • USES OF AID CLIMBING • AID-CLIMBING EQUIPMENT • AID PLACEMENTS • BASIC AID TECHNIQUES • SECONDING • CHANGING LEADS • BIG WALL MULTIDAY TECHNIQUES • THE SPIRIT OF AID CLIMBING

CHAPTER 15
AID AND BIG WALL CLIMBING

Aid climbing is the technique of using gear to support your weight as you climb. It can be as simple as pulling on a quickdraw or as complex as climbing an entire multiday route on big walls with your weight suspended from gear you have placed. Aid climbing is an intricate and personal art, and each climber approaches it somewhat differently.

Historically, nearly all rock climbs included piton placements and aid climbing, and many classic free climbs enjoyed today were first established as aid climbs. Pioneers such as Fred Beckey, Royal Robbins, Allen Steck, and Layton Kor relied heavily on aid climbing to achieve historic first ascents.

As free-climbing skills continue to rise, climbers are freeing many routes originally climbed with aid. But despite the rise in free-climbing standards, there will always be tempting routes that are more difficult still—and so devoid of natural features—that a climber will need some of the aid-climbing skills described in this chapter. And whereas today's elite climbers may be able to free an aid route at a high standard of free climbing, the average

climber will likely still perform aid climbing to complete these routes in the historical style.

Skills in aid climbing can also help overcome unexpected difficulties during normal free climbing. Aid techniques can provide a way to move safely up or down when bad weather or an accident jeopardizes a climbing party. Many routes have short sections of very difficult climbing or poor rock that may be negotiated by aid climbing to reach excellent free climbing or a summit. Finally, aid-climbing techniques give climbers access to the vertical world of the big walls, such as El Capitan in Yosemite National Park, California, that inspire the dreams of so many climbers around the world.

Aid climbing requires skill, judgment, and a lot of practice. To learn both the basics and the many tricks of aid climbing, work with an experienced partner, and climb often.

CLEAN AID CLIMBING

Aid climbing takes a lot of gear, but it does not need to damage the rock. Traditionally, aid climbing involved hammering in pitons of various sizes, and in the early development of climbing, the entire rack for a climb consisted exclusively of pitons. Both placing and removing pitons permanently damages the rock and over time creates scars and ever-widening placements. On popular routes, tiny cracks sometimes evolve into finger or hand cracks after generations of climbers force them to accept pitons. Today, with chocks, spring-loaded camming devices, hooks, and other gear available, climbers have a better chance of climbing aid routes "clean."

A clean placement is one made without using a hammer. Gear placed cleanly can almost always be removed without defacing the rock, leaving no trace of the party's ascent. Nailing in gear with a hammer is more time-consuming for both leader and follower than making clean placements, so climbing clean not only benefits the rock and the state of the route for future parties, but can also speed the ascent.

Because the first-ascent party may have left fixed protection (see "Fixed Protection," in Chapter 13, Rock Protection) such as bolts, pitons, or copperheads, a clean ascent of an aid route often entails using fixed gear while also carrying some pitons, copperheads, and other nailing hardware in case fixed gear has been removed or is no longer usable. Thus, most clean

ascents rely on some protection that earlier parties placed with a hammer and left in place.

Aid and big wall climbers almost always bring a hammer, even if they intend to make only clean placements, as it is a critical tool used for a wide range of functions in aid climbing. Route conditions may require unexpected hammered placements, the hammer may be needed to extend the climber's reach, or it can be essential in removing gear needed to continue the route. Some experienced aid climbers enjoy the added challenge of "hammerless" climbing—climbing with no hammer available on the route—on established aid routes with known fixed gear or even on new routes. Both the clean and hammerless styles of climbing present increasing levels of commitment; climbers choosing these styles should accept the possibility of retreat.

USES OF AID CLIMBING

Aid climbing can be roughly categorized based on the extent of its use on a particular climb. See Appendix: Rating Systems, for information on the various grades of difficulty in aid climbing.

Alpine climbing. When ascending a route in the alpine environment, climbing without weighting any gear is usually the climber's goal. However, climbers may use aid techniques and equipment to overcome short, blank, or extremely difficult sections of a route that otherwise can be free-climbed. This type of climbing often requires little or no specialized aid equipment; usually climbers just use the free-climbing gear they have along. Techniques could include pulling on gear, stepping in a sling, or even creating a makeshift aider or two from slings to get through a section. Sometimes climbers pull on gear to speed progress and minimize exposure to objective hazards or other risks in the mountains. Some routes have one pitch of aid climbing (or a relatively small number of aid pitches on the overall route), allowing an otherwise free line to be ascended. Packs may be hauled on a difficult pitch, or climbers may perform a pendulum swing to reach the next section of free climbing.

Aid may also be used on alpine climbs for extended distances and with aid-specific equipment, although aid- and free-climbing techniques may be interspersed. Long one-day climbs may involve fixing the initial pitches on a preceding day—putting up ropes and leaving them in place so they can be

climbed with mechanical ascenders (a technique called *jugging*) to reach the previous day's high point—and completing the route on a second day.

Big wall aid climbing. Ascents of big walls typically take longer than one day to complete, even if the initial pitches are fixed. These climbs usually involve a bivouac and require hauling techniques. With the proliferation of speed-climbing techniques, some big walls that originally took many days to ascend can now be climbed in a day by expert climbers. Many big wall climbs require aid on every pitch, and wall climbers typically have many items of aid-specific equipment.

AID-CLIMBING EQUIPMENT

The range of equipment used in aid climbing builds on all the gear and techniques described in Chapters 13, Rock Protection, and 14, Leading on Rock. Unique to aid climbing is the use of gear that is designed only for the body weight of the climber. All technical equipment for free climbing is designed to protect climbers in the event of a fall and to withstand the high fall forces generated. In aid climbing, certain equipment is used that is designed only for upward progress on the climb, and this equipment is not expected or rated to catch a fall.

BASIC EQUIPMENT FOR AID CLIMBING

Aid climbing relies heavily on standard free-climbing equipment—aid climbers may simply need more of it. The following gear used in free climbing is also used in aid climbing, with some differences in how it is used at times discussed below.

Chocks and Camming Devices

The same chocks and spring-loaded camming devices (SLCDs, or cams) used in free climbing are used on aid climbs. Units that feature shorter clip-in points are preferred to help gain the maximum elevation out of each placement. Some SLCDs, such as the Camalot and the Alien, feature a large clip-in point on the unit itself in addition to the sling sewn onto the SLCD (see Figure 13-15a and c in Chapter 13, Rock Protection). This feature makes it possible to clip an *aider* (a webbing ladder used in aid climbing, also called an *etrier*) directly to the piece of protection, which is a higher and more

convenient clip-in point than the SLCD's sewn sling (see also "Racking" under "Basic Aid Techniques" later in this chapter). This technique allows the climber to make fewer placements overall by getting as high as possible in aiders on each SLCD placement.

SLCDs specifically designed for tricky placements, such as Totem Cams (see Figure 13-15g in Chapter 13, Rock Protection), feature clip-in points that weight only some of the SLCD lobes, instead of all lobes, to use when it is not possible to place the SLCD with all lobes contacting the rock. Extremely small SLCDs with a traditional design but a small size and low load rating are also helpful on aid climbs to make upward progress. These various specialty cams can be useful in passing difficult moves or sections, but due to their narrow application of use, they usually do not make up the bulk of the gear selected for the climb.

Some SLCDs fit better than others into flaring *pin scars* (rock that has been damaged by placement and removal of pitons). Many aid climbers prefer Aliens for pin scar placements. Alien Hybrids, also called offset Aliens, with cams of different sizes on each side of the unit, eliminate the need to hammer piton placements on many pitches. Similarly, some chocks fit better into pin scars, such as offset nuts (discussed below).

It is often helpful to mix many brands and styles of chocks and SLCDs on the rack when aid climbing, because sometimes the perfect piece for a particular crack will be in between the sizes made by one manufacturer. In that case, a different brand of chock or SLCD that is slightly different in size may fit the crack better.

Small and Offset Nuts

Aid racks include small micronuts that are even more specialized than those for typical free-climbing racks. These very small nuts are often used instead of thin pitons or in pin scars, but they may not be as strong. The smallest sizes are not rated to catch a fall and serve only for upward progress.

Two general styles of micronuts are available. The first is a smaller version of the classic tapered Stopper. The other style, which has both horizontal and vertical tapers, is referred to as an *offset nut*. More secure in flaring cracks and pin scars, offset nuts come in larger sizes than micronuts, usually aluminum in the larger sizes, and are very useful, possibly indispensable, for climbing walls with pin scars. (See Figure 13-10d in Chapter 13, Rock Protection.)

The heads of small nuts are usually made from softer metals, such as brass or copper/iron mixtures. The rock bites into these softer materials, and so these nuts tend to hold better in marginal placements. The very smallest of micronuts by most manufacturers are not rated to take falls; they are used just for upward progress in direct aid. Small and offset nuts can be difficult or impossible to remove after they have been weighted by the aid climber. The heads of the smallest nuts are very small, and the nut's cable blocks the area that a climber would normally hit with a nut tool (see Chapter 14, Leading on Rock). Using a hammer and funkness device (see "Universal Aid-Specific Equipment" below) is often the only way to remove micronuts once they have been weighted.

Carabiners

Aid climbing employs many carabiners. Carabiners are used to rack protection, to sling protection (see "Slings" below), to build anchors, to clip the haul bag to the haul line, to clip critical gear to gear loops inside the haul bag, to attach aiders, daisy chains, and ascenders—and for many other purposes. The more organized and efficient the climbers are, especially at building anchors and packing gear inside the haul bag, the fewer carabiners they will need.

Traditionally, aid climbers preferred oval carabiners for the entire rack because of the *carabiner shift* phenomenon. Carabiner shift occurs after a climber clips one carabiner to another so that a piece of protection can be weighted while the climber stands in aiders, and then a carabiner shifts, making a sound like gear popping. In the context of aid climbing, this can be a terrifying false alarm of an imminent fall. However, the modern techniques of clipping directly in to the aid protection with the aider and using oval keylock carabiners on both aiders eliminate carabiner shift most of the time. As there is no longer a special emphasis on oval carabiners, most aid climbers now carry lighter wire-gate carabiners as much as possible to reduce the overall weight of the aid rack. One common method is to use wire-gate carabiners for protection and slings and to carry conventional-gate carabiners, including many locking carabiners, for anchors. Aid racks are especially heavy on the climb's descent, so saving weight using modern lightweight and wire-gate carabiners pays off.

Ropes

The tough duty of aid climbing usually requires a 10- to 11-millimeter kernmantle lead rope, 60 meters (approximately 200 feet) long. The haul line is typically a second lead rope or a 10-millimeter static line. If the route entails long pendulum swings or other unusual problems, a third rope may be needed—either another kernmantle rope or another static line. When selecting a rope, keep in mind its resistance to abrasion and edge cutting, because of the typically rough terrain and demands associated with aid climbing. See "Ropes" in Chapter 9, Basic Safety System.

Examine ropes often, and consider retiring aid ropes earlier than a free-climbing rope might be retired. Jugging, rappelling, and hauling put extreme wear on ropes. Climbers trust their life to the rope when using ascenders to jug a fixed line, so they do not want to worry about whether they waited too long before retiring it.

Slings

Carry single-length slings for establishing anchors, extending placements to reduce rope drag, and other normal rock climbing uses. Single-length slings are the most useful because they can easily be carried over the shoulder; they can also be carried like quickdraws and easily extended to full length after the first half is clipped to the placement (referred to as "alpine draws"; see Figure 14-7 in Chapter 14, Leading on Rock).

Load-limiting runners, such as the Yates Screamer, are sometimes used to climb above placements of questionable strength. In a fall, the slings limit the shock delivered to the protection (see Figure 9-35 in Chapter 9, Basic Safety System).

Cordelettes and other sling materials used to create anchors for free climbing are equally useful for aid climbing. Cordelettes are popular for anchors on big walls, because multiple anchor points are usually employed. See Chapters 9, Basic Safety System, and 10, Belaying, for more information on slings and cordelettes.

Assisted-Braking Belay Device

Certain assisted-braking belay devices, such as the Petzl Grigri, have special uses in aid climbing. While aid routes can be climbed without these devices, these multipurpose tools (see Figure 10-9 in Chapter 10, Belaying) are helpful in many tricky situations encountered in aid climbing. During long belays, for example, a Grigri can help climbers manage the rope while accomplishing

other tasks such as managing the haul line, eating, drinking, and even relieving themselves. The Grigri is also helpful as a backup when a climber is following; it can be used during hauling; it can substitute as a mechanical ascender if one is dropped; it allows superior control during rappels on a single line—and it serves many other helpful purposes on an aid climb. Be sure to select a Grigri that functions properly on the 10- to 11-millimeter ropes used in aid climbing, as some units are designed for smaller-diameter free-climbing ropes.

Helmet

A helmet is absolutely essential for aid climbing (see Chapter 9, Basic Safety System). Steep terrain, large racks (which make the climber top-heavy), and the dynamics of a popped placement tend to send aid climbers into headfirst falls. Other hazards include rockfall, dropped gear, roofs, and other climbers. If used properly, a chest harness may keep the climber upright if the rope draws taut prior to the climber contacting the rock, but this in no way replaces the need for head protection. Within the range of weight and materials that modern helmets offer, all-purpose hardshell helmets better withstand the rigors and length of aid and big wall climbs.

Gloves

Over and above their value for belaying and rappelling, leather gloves are critical for hauling. Gloves protect the climber's hands during jugging and removing protection. Aid climbing is very hard on gloves, and they need to be replaced often. Leather gardening gloves can be used, with the fingertips just slightly cut off. Tape makes a great reinforcement on the cut edge to keep cut fingertips from unraveling (fig. 15-1).

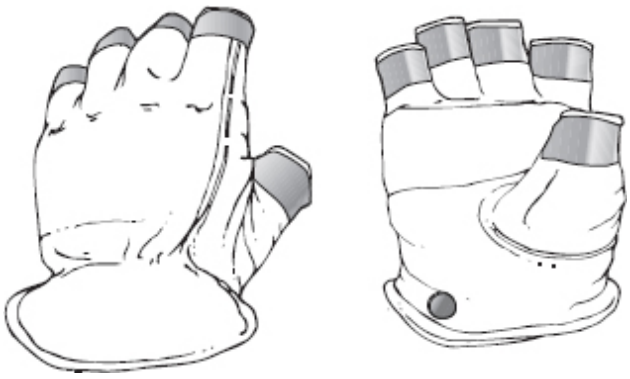

Fig. 15-1. Leather gloves with cutoff fingers, reinforced with tape, and with holes cut as a clip-in point.

Shoes

If the route involves only a small amount of aid, normal rock shoes perform best. If sustained aid climbing is anticipated, shoes or boots with greater sole rigidity provide a better working platform and more comfort. Sticky rubber approach shoes are very popular for aid climbing, including on big walls. They provide arch support and good torsional rigidity for aid climbing yet have a flexible toe and a soft friction-rubber sole for good free-climbing capabilities.

Eye Protection

It is important both for leaders and followers to protect their eyes from debris when cleaning out cracks, from equipment, especially the hammer, and other hazards that could contact the face. Sunglasses typically provide adequate protection; however, leaders may not able to remove sunglasses midlead, and lead times can be many hours. Therefore, consider photochromic or changeable lenses so that eye protection can still be worn comfortably when the weather is not sunny or when the climbing route is in the shade.

Knife

Just as in free climbing, a sharp knife is required equipment on the harness. Climbers often must remove webbing or cord in order to be able to clip a carabiner to a piece of fixed protection, to replace the worn webbing with new webbing, or simply to remove unnecessary old fixed slings from the rock to help keep the climb pristine for other climbers. Given the heavy loads involved in aid climbing, unexpected situations can occur wherein a sling or

cord has to be cut in order to free a load or fix an error. For example, if a climber accidentally ties in a haul bag on a docking cord with a non-releasable knot, the only way to free the bag might be to cut that docking cord (see "Big Wall Multiday Techniques" later in this chapter). A knife comes in handy for repairing or making homemade gear during a multiday climb and for many other purposes.

UNIVERSAL AID-SPECIFIC EQUIPMENT

In addition to equipment normally used in free climbing, aid climbers need a selection of gear that is used both for clean aid climbing and for aid that may involve placing pitons.

Aiders (*Etriers*)

Webbing ladders, called *aiders* or *etriers*, allow the climber to step up from one placement to the next when the aiders are clipped to a piece of protection. When making or buying aiders, consider their intended use. For alpine climbs, minimize weight by using a single lightweight pair of aiders. For most aid climbing, offset-step or ladder-style five- or six-step aiders sewn from 1-inch (2.5-centimeter) webbing are standard (fig. 15-2a and b). They are used, usually in pairs, in leapfrog fashion as the climber ascends. Aiders should be long enough to allow the climber to reach the bottom step of the higher ladder when testing aid placements from a comfortable stance on the lower ladder. More difficult aid routes usually require six-step ladders, because there may be longer distances between placement options and because down-climbing to the lower piece is more common.

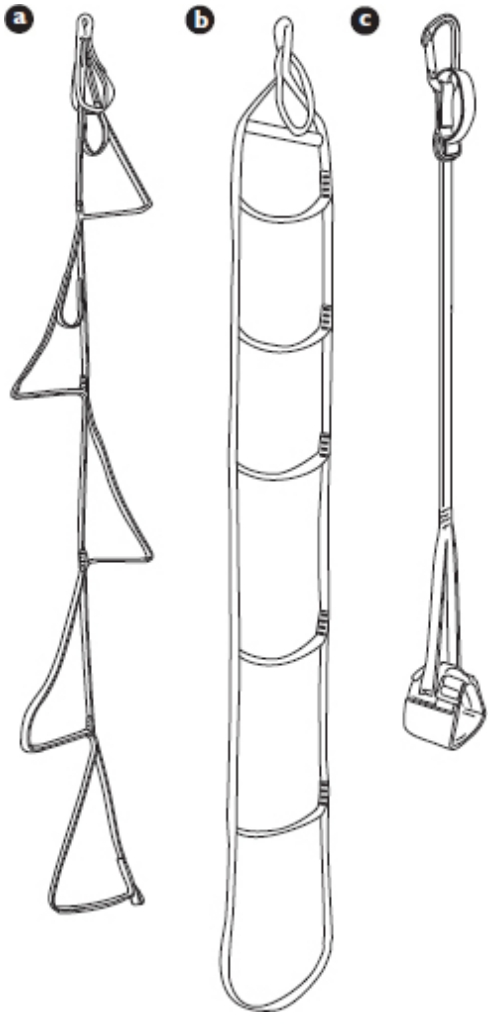

Fig. 15-2. Types of aiders: a, offset-step style; b, ladder style; c, adjustable.

The basic aid sequence (see “The Basic Aid Sequence” later in this chapter) uses two aiders. However, some aid climbers use four aiders, permanently set up in pairs. A third method is to use two aiders but to have a spare third aider available, possibly loose on the harness, for occasional tricky sequences. The use of more than two aiders is popular on more difficult aid routes, but ultimately, the number of aiders used depends on personal preference.

An adjustable type of aider (fig. 15-2c) tends to be lighter and is especially well suited for quick adjustment for optimal jugging. Most climbers use adjustable aiders as follower gear only. Other different aider systems include the “Russian aider” system, which completely diverges from the ladder design: it instead uses a system of slings with small metal rings and a knee strap, which is equipped with hooks that allow the climber to “hook” the

aider and stand suspended in the rings. However, the ladder-type system remains the most commonly used and most commercially available.

Daisy Chains

Traditional daisy chains are sewn slings with multiple loops (fig. 15-3a)—formed by stitching—every 3 to 6 inches (8 to 15 centimeters). Daisy chains are used as tethers to keep new placements and aiders attached to the lead climber; they are an integral part of the jugging setup. A daisy chain should, when attached to the harness, reach at least as far as the climber's raised hand. Typical daisy chains are 45 to 55 inches (115 to 140 centimeters) long. Longer daisy chains are helpful for difficult aid routes, because they permit the climber to down-climb longer distances below a piece of protection, which allows for adequate testing (see the "The Basic Aid Sequence" later in this chapter). The sewn loops are used to shorten the daisy chain when it is used in the jugging mode. This shortening must be done in accordance with the manufacturer's guidelines.

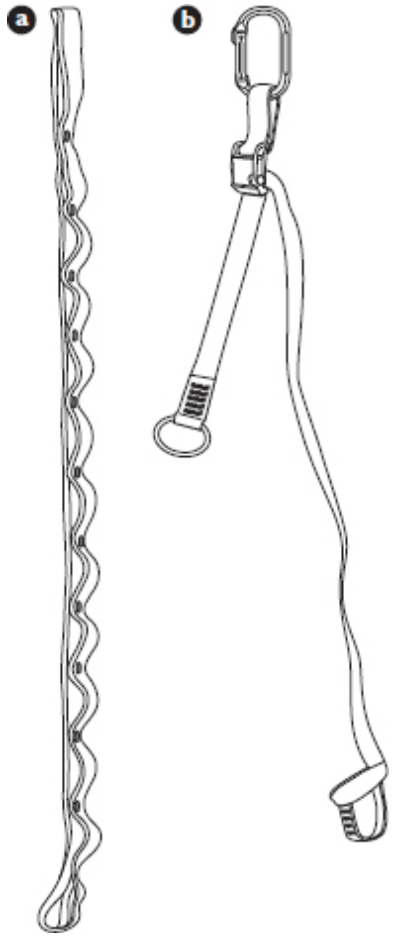

Fig. 15-3. Daisy chains: a, loop-style daisy chain; b, adjustable daisy strap.

Usually two daisy chains are carried, one for the left-side aider and one for the right-side aider. One end of each daisy chain is girth-hitched to the climbing harness through the tie-in points. The other end is attached to the appropriate aider with a carabiner, preferably a dedicated oval keylock carabiner. Connecting the aider to the daisy chain prevents the loss of an aider if it is dropped or if a placement fails, and the daisy chain also provides a convenient method for resting on a placement by using a fifi hook (see below). Adjustable daisy straps (fig. 15-3b) are an alternative to the classic daisy chain, and they have special features outside of their use as a tether (see below). Adjustable daisy straps must also be used in accordance with the manufacturer's guidelines. Some designs are sturdier and more reliable than others.

Fifi Hooks

The classic fifi hook (fig. 15-4a) is girth-hitched to the harness with a sling that reaches 2 to 4 inches (5 to 10 centimeters) away from the harness after the girth hitch is tied. An adjustable fifi hook (fig. 15-4b) is rigged with slippery 6-millimeter accessory cord and is tied in to the harness with one end of this cord, typically with a rewoven figure-eight knot. The adjustable fifi hook can be placed higher away from the harness initially than the classic fifi hook, and then the distance can be shortened as needed by pulling on the cord.

A fifi hook can be a critical part of the basic aid sequence, especially on steep terrain. It is used to hook in to a placement and to hold the climber's body weight. Using a fifi hook or an adjustable daisy strap helps conserve energy when aid climbing steep routes, including roofs. A fifi hook allows climbers to rest on placements, which is more efficient than holding their weight with body tension or with their arms and legs. The fifi hook also provides helpful countertension when used to hook a piece at waist level, after which the climber stands up above it to top-step (see Figure 15-21) or to make difficult reaches above protection, such as on overhangs.

An adjustable daisy strap (see "Daisy Chains" above) can be used in place of an adjustable fifi hook. Some climbers use two traditional daisy chains as tethers to attach their aiders to their harness and one adjustable daisy strap to rest on pieces.

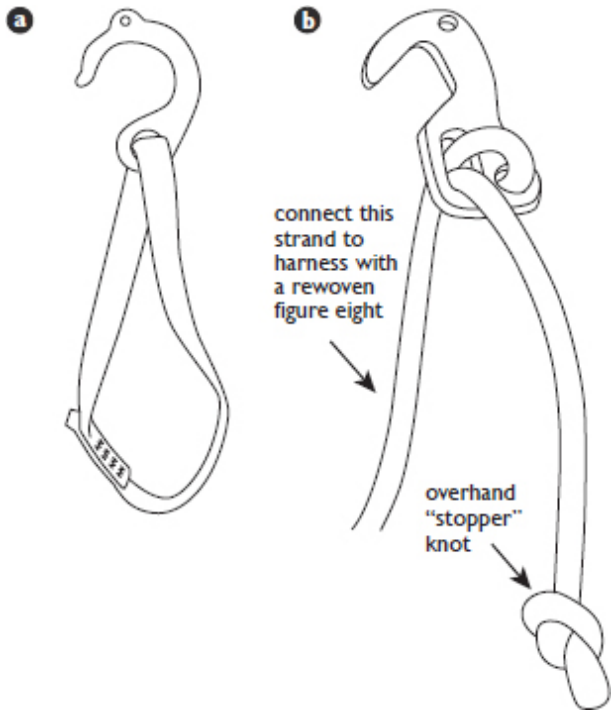

Fig. 15-4. Fifi hooks: a, classic style; b, adjustable.

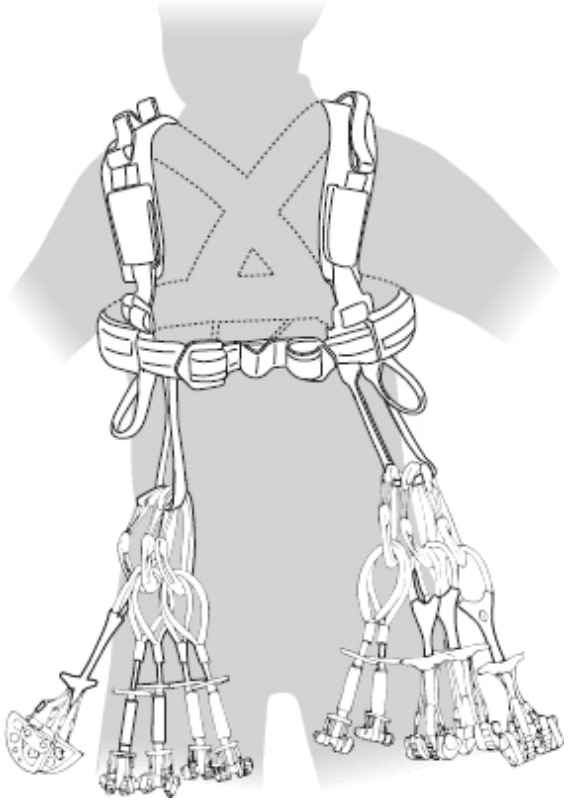

Fig. 15-5. Double gear sling with racked SLCDs (SLCD slings omitted for clarity).

Double Gear Sling

A double gear sling distributes the weight of the hardware, utilizing equipment slings on both sides of the climber's body (fig. 15-5). It improves balance and comfort, and it reduces neck strain caused by the single bearing point of a traditional free-climbing gear sling. A double gear sling can also serve as a chest harness, if it is designed for this use, assisting the climber when jugging up a rope through a steep section, or helping to keep the climber upright during a fall. Racking methods vary widely, but given the weight and volume of gear carried on aid climbs, double gear slings are standard equipment.

Aid-Specific Seat Harness

Harnesses made specifically for aid climbing are not required, but they typically feature an extra-wide belt and larger leg loops, and on some harnesses, both belt and leg loops have padding. Most such harnesses also feature a hammer holster. Some have other special features, including wider,

extra-strong belay loops. All these features help ease the pain of continuous days in the harness during big wall climbs.

Knee Pads

A climber's knees are regularly in contact with the rock during low-angle aid climbing and during hauling, so wearing knee pads protects them. Knee pads should be comfortable. To avoid hot and sweaty knees, choose knee pads with good ventilation.

Belay Seat

A belay seat is a great creature comfort during hanging belays. *Warning:* Never let the belay seat be the sole means of attaching to an anchor. Clip in from the harness to the anchor with the climbing rope as usual, and attach the belay seat to any secure point with its own carabiner. Belay seats can be purchased, or climbers can make their own out of wood, a little padding, and some slings.

Mechanical Ascenders

When aid climbing was pioneered, ascending fixed ropes was always done with prusik hitches. Mechanical ascenders—often referred to as *jugs* or *jumars* (fig. 15-6)—are stronger, safer, faster, and less tiring; they have generally replaced the prusik hitch for ascending a fixed line. The devices are also very helpful for hauling bags up big walls.

All ascenders employ a cam, allowing them to slide freely in one direction on a rope but to grip tightly when pulled in the opposite direction. Ascenders also have a trigger or locking mechanism to keep them from accidentally coming off the rope. Some triggers are difficult to release, decreasing the chance of accidental removal but making it harder to get them off the rope when the climber wants to remove them. They are designed for use by a specific hand, either left or right, and when using two, climbers carry one for each hand. (See "Using Ascenders" later in this chapter.)

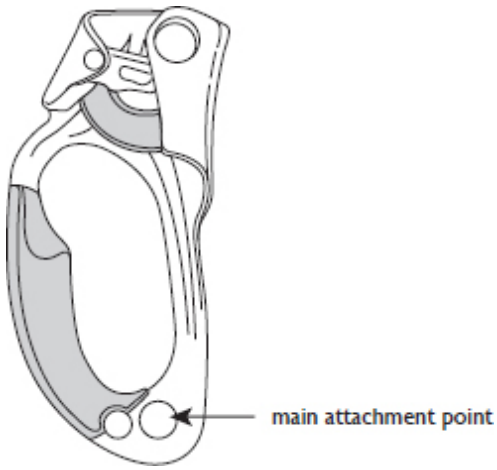

Fig. 15-6. Handled mechanical ascender for left hand (right-hand ascender is a mirror image): the rope passes through the vertical passage near the top; carabiner holes at top and bottom are used for a number of purposes.

In addition to the main opening at the bottom of the ascender, which is used as the primary attachment point, additional carabiner holes at the top and the bottom of the ascender come in handy for a number of purposes.

Big Wall Hammers

The big wall hammer (see Figure 15-7) is a basic aid tool that has a flat striking surface for cleaning and driving pitons and a blunt pick for prying out protection, cleaning dirty cracks, and placing malleable pieces. A carabiner hole in the head is useful for cleaning pieces (see "Cleaning" later in this chapter).

A sling attached to the hammer handle helps prevent the hammer from being lost if dropped. Hammer slings can be clipped to the harness, worn across the body, or even clipped to an aider or piece of gear when the hammer is in use. The sling length should allow a climber to have full arm extension when using the hammer. Be sure to check the sling regularly for wear. It is a good idea to holster the hammer whenever it is not in use, to keep it secure and to allow quick access; a commercial holster can be added to the harness.

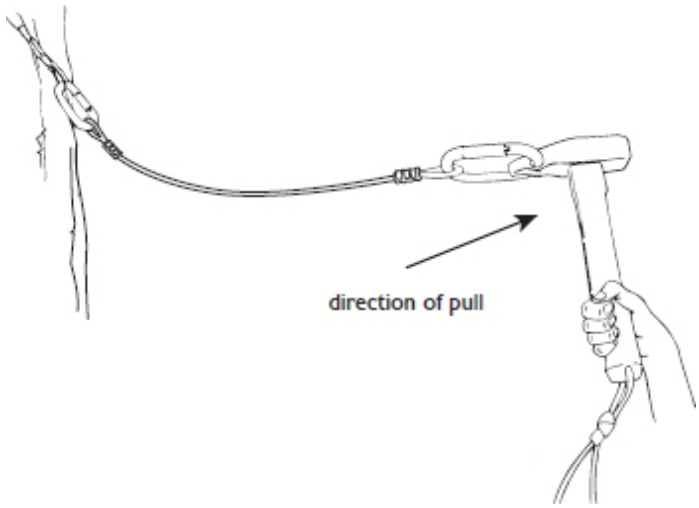

Fig. 15-7. A funkness device clipped to a small nut and the hammer allows the climber to jerk the hammer up and out to clear the wedged piece of protection.

Funkness Device

A funkness device (fig. 15-7), also called simply a *funkness*, is a metal sling made from cable, with loops on each end for clipping carabiners. The device is used as a static sling to assist in cleaning pieces; it is helpful for removing pins as well as nuts that have been weighted by the leader. A climber clips one of the funkness's carabiners to the piece that needs to be removed and connects the other carabiner to the hammer; then the climber jerks upward and outward with the hammer to remove the wedged piece. To remove pins, multiple directions of pull may be needed. A climbing team shares one funkness, which is passed between climbers as they change leads, so the device must work with all the climbers' hammers. In order to withstand the inevitable beating they take, carabiners used with a funkness should be conventional (not wire-gate) and should fit comfortably in the holes of all hammers used on the climb so that the funkness can be easily clipped in and also have adequate range of movement while in use.

Tie-Off Loops

Tie-off loops are carried in a variety of sizes and strengths. Sizes range from 4 to 8 inches (10 to 20 centimeters) long when tied. The loops are made either of full-strength webbing—meaning the webbing has a strength rating expected to arrest a fall—or of thinner ½-inch webbing that is meant for body weight only. Climbers often purchase sewn full-strength tie-off loops to avoid having

a knot on these small slings, but they typically tie their own body-weight tie-off loops (see Figure 9-34b).

Body-weight tie-off loops are very inexpensive to create, which makes them attractive for leaving behind on a route—for example, girth-hitched to fixed gear, often for the purpose of lowering off of a fixed piece when following a pitch. Body-weight tie-off loops are also used to prevent the loss of stacked pieces (see "Piton Placement" later in this chapter).

Full-strength tie-off loops are used on a placement expected to hold a fall. These loops might be used for threading through the head of a fixed piton if the eye would not accommodate a carabiner, for tying off partially driven pins (see Figure 13-9 in Chapter 13, Rock Protection), or for improvising a quickdraw if the leader runs out of gear.

Hooks

Hooks (sometimes called *standard hooks,* with the advent of camming hooks —see below) come in many shapes; they are commonly used to grip ledges or small holes. Hooks are typically made of chromium molybdenum steel for strength and curved for stability. Hooks are used for body weight only and, by their nature, are almost never left behind as protection (see "Hook Placement and Use" later in this chapter).

Attach a sling, usually ½-inch tie-off webbing, to a hook by feeding a tie-off loop through from the front until the knot jams (see Figure 15-8b). The sling should hang from the rock side of the hook, with the knot on the other side. This puts the line of force next to the rock, eliminates rotation of the tip of the hook off the rock feature, and keeps the knot out of the way, allowing the hook to rest against the wall.

Many different sizes and types of hooks can be useful on a big wall. Some popular models no longer commercially available are still considered critical gear for certain types of ascents and popular routes. (This creates a sourcing challenge for aspiring aid climbers.) In general, for most routes consider carrying at least one basic hook (fig. 15-8a), one bat hook (fig. 15-8b), and one large hook (fig. 15-8c). One model, the Talon, features three differently shaped hooks (fig. 15-8d). Because the Talon's two extra hooks can serve as "legs," this hook can be the best fit for some features. It is a good idea to carry two of each type of hook on longer aid routes, in case the same type of hook is needed two times in a row or in case a hook is dropped.

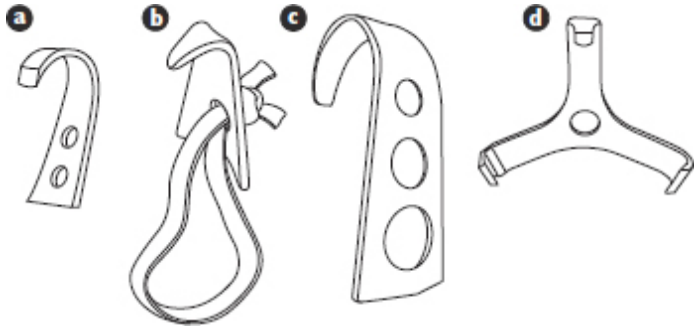

Fig. 15-8. Standard hook types: a, basic; b, bat hook; c, large hook; d, Talon.

Greater stability can be achieved on some placements if the tip of the hook is filed to a point that can be set into small holes drilled at the back of tiny ledges. Bat hooks are used almost exclusively in shallow, ¼-inch-diameter (6-millimeter-diameter) holes that have been drilled for their use.

There are additional variations on the hooks shown here, as well as many more shapes and sizes not shown.

Camming Hooks

Camming hooks (also called *cam hooks*) are simple, hardsteel levers that can be used in any crack that is at least as wide as the thickness of the metal and no wider than the width across the hook's tip. Often, a cam hook can be used to avoid placing a pin, especially in scars made by wedge pitons (Lost Arrows, for instance). While all about the same thickness of metal, cam hooks have different tip widths and "arm" lengths (fig. 15-9a), which produce different leverage on the rock features (fig. 15-9b and c). Too much leverage may bite into the rock or expand a flake, whereas too little leverage may make the placement insecure. Narrow cam hooks tend to have higher leverage; wider cam hooks tend to have lower leverage. Cam hooks can be used in leapfrog style to advance quickly on relatively easy terrain.

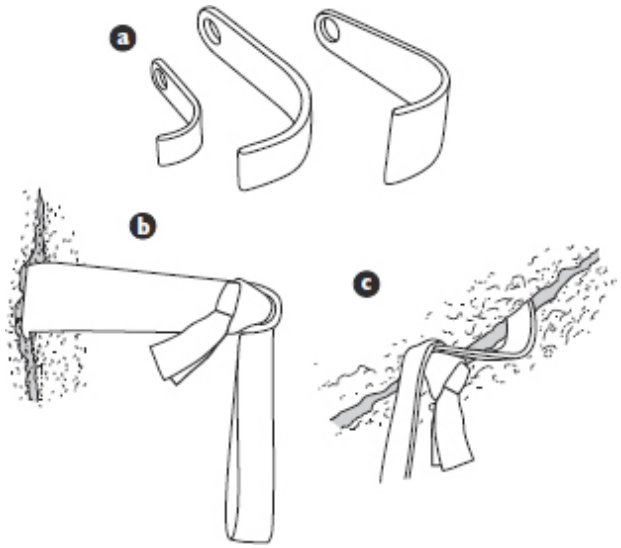

Fig. 15-9. Cam hooks: a, typical cam hook sizes—small, medium, large; b, cam hook placement in vertical crack; c, cam hook upside down under a roof.

Rivet Hangers

Rivet hangers are used to attach to bolt studs and rivets, which are basically shallowly driven ¼-inch bolts with a wide head.

Wire rivet hangers are loops of wire ⅛ inch or 3⁄32 inch (3 or 2 millimeters) in diameter, with a slider to cinch the wire tight (fig. 15-10a and b). Small nuts with wire slings can be used in a similar manner, with the nut itself acting as the slider to tighten the wire against the bolt stud (see Figure 13-7 in Chapter 13, Rock Protection); however, because nuts have a longer wire loop than wire rivet hangers do, and therefore hang lower, they do not provide as much elevation gain. Wire rivet hangers primarily assist with upward progress and may not catch a fall, and rivets are generally considered body-weight protection only, so use careful judgment when relying on them as protection.

Regular and keyhole hangers are rivet hangers made from shaped pieces of metal (fig. 15-10c). They are especially useful for belay anchors and for fixed bolts that have no hangers. On a keyhole hanger, the metal between the bolt hole and the carabiner hole is filed out to allow placement over rivets and buttonhead bolts. When a regular or keyhole hanger is placed over a good bolt, it is considered protection that would arrest a fall. It is also wise to carry a few loose ¼-inch and ⅜-inch nuts in your pocket to screw onto bolts and rivets without hangers.

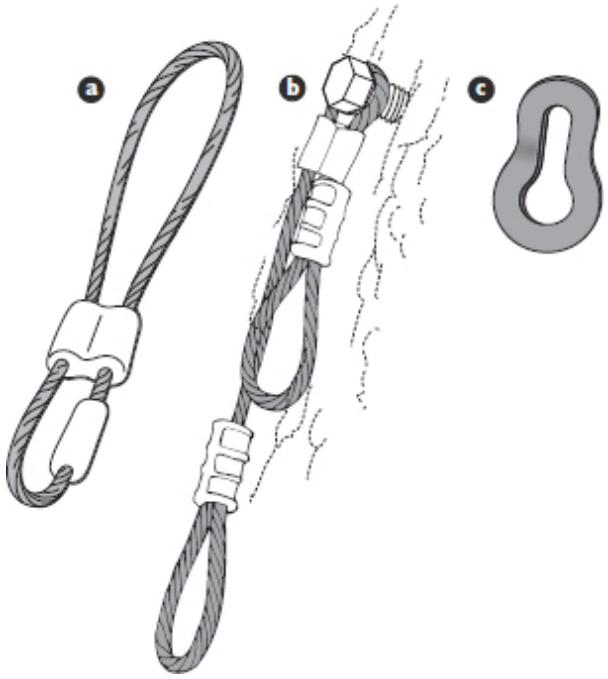

Fig. 15-10. Rivet hangers:
a, basic wire;
b, self-cinching wire;
c, keyhole.

IRON HARDWARE AND BOLTS

The full range of aid-climbing techniques can be mastered only with knowledge of pitons, malleable hardware, and bolts.

Pitons

Modern pitons—also called *pins*—are made of hardened chromium molybdenum steel or other suitable alloys such as titanium alloys. Rather than molding to cracks the way the older, first-generation malleable pitons did, modern pitons made of harder materials are more unyielding and force the crack to their form. The key to effective piton placement is choosing the piton that is the best size for the crack. To fit the diverse cracks climbers encounter on rock walls, pitons vary tremendously in size and shape.

Realized Ultimate Reality Piton. The RURP is the smallest piton—a postage-stamp-sized, hatchet-shaped pin (fig. 15-11a) used in incipient cracks. It will usually support only body weight.

Birdbeaks. Also called *beaks* and commonly known by the brand name Peckers, birdbeaks (fig. 15-11b) range from those close in size to RURPs to

larger units that fit in placements similar to those in which knifeblades or even wedge pitons (see below) fit. Beaks are particularly strong when they can be placed so that the long nose of the beak creates camming action inside the crack, which often makes them a more secure choice than knifeblades. In an excellent beak placement, the nose of the beak goes back into the crack away from the climber and also angles down into the crack toward the ground, so that when removing the beak, the follower must nail it not only up and down, as with a typical piton (see "Seconding" below), but also outward toward the follower. Thus, beaks can be especially difficult to clean. It is common to damage the cable on the beak when cleaning, so take care and consider backing up the cable with webbing.

Knifeblades. Also called *blades*, knifeblades are long and thin and have two eyes: one at the end of the blade and a second in the offset portion of the pin (fig. 15-11c). They come in different lengths and in thicknesses ranging from 1/8 to 3/16 inch (3 to 4 millimeters). They are commonly used to fit cracks that are too thin for tiny nuts. Many routes have plenty of fixed blades in place, but their use has become less common because beaks tend to be more secure in cracks of the same size.

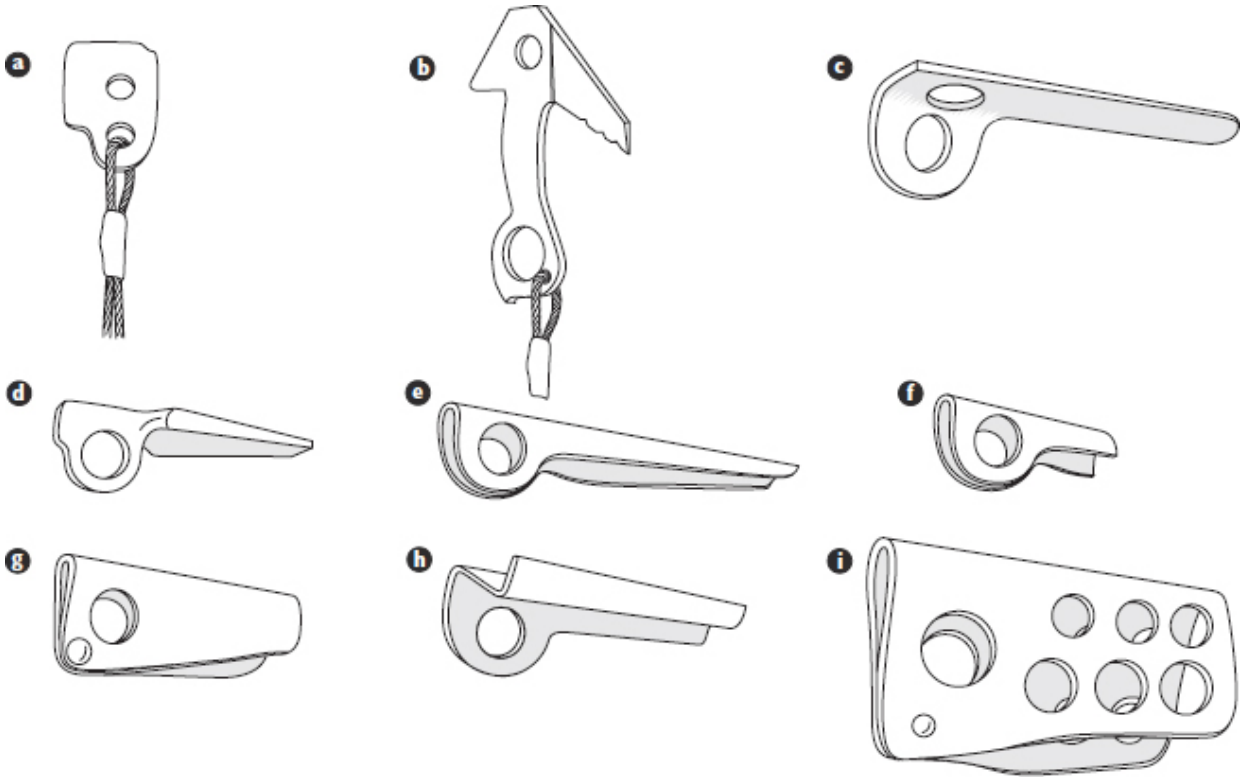

Fig. 15-11. Piton types: a, Realized Ultimate Reality Piton (RURP); b, Pecker (birdbeak); c, knifeblade; d, Lost Arrow (wedge piton); e, angle; f, sawed-off angle; g, large sawed-off angle; h, Leeper Z; i, bong.

Wedge pitons. Known commonly by the brand name Lost Arrows or just *arrows*, wedge pitons are one of the more commonly used versatile pins. They have a single eye centered and set perpendicular to the end of the pin (fig. 15-11d) and come in several lengths, in thicknesses ranging from 5/32 to 9/32 inch (4 to 8 millimeters). Among other uses, arrows are very good in horizontal cracks.

Angles. Pitons formed into a V shape are called angles (fig. 15-11e, f, and g). The V varies in height from ½ to 1½ inches (12 to 38 millimeters). The strength of these pitons is derived from the metal's resistance to bending and spreading. Angles are commonly used in angle pin scars, since oftentimes nothing else will fit in a pin scar except a pin. Otherwise, a crack large enough to accept an angle will normally accept clean climbing equipment if the crack has never been used for pin placements.

Leeper Z pitons. The Leeper Z piton has a Z-shaped profile (fig. 15-11h), as opposed to the V profile of an angle. These pitons often make very solid placements and work well for pin stacking (see "Stacking" later in this chapter). Sawed-off Leeper Z pins (see below) can work well in angle scars.

Bongs. Bongs are large angle pitons, varying from 2 to 6 inches (5 to 15 centimeters) wide (fig. 15-11i). SLCDs and other large gear options have generally replaced the need for bongs.

Sawed-off pitons. Angles and Leeper Z pitons with a few inches cut off the end (see Figure 15-11f and g) are useful for shallow placements. These sawed-off pitons are handy for protection on routes that have been heavily climbed using pitons, which leave shallow pin scars. Pins with the proportions of sawed-off angles are sometimes available commercially; otherwise, climbers saw their own pitons using a vise and a hacksaw. Angles of widths from 3/4 to 1½ inches (19 to 38 millimeters) are the most common size of angle to saw off.

Malleable Hardware

Generally called *copperheads* (even when not made of copper), or just *heads*, malleable hardware is designed to hold weight by melding the soft head of the piece to the irregularities of the rock, such as a small constriction or corner. The security of heads varies greatly, and it is difficult to gauge the strength of a copperhead when placed, making them last-resort equipment, generally capable of holding only body weight, although they may hold falls.

Copperheads. Copperheads have a sleeve, called a *ferrule*, of copper or aluminum, the "head," swaged to one end of a short cable that has a clip loop swaged at the other end (fig. 15-12a). They are placed by pounding the relatively soft metal head end into an irregularity in the rock. Copper forms well and is more durable than aluminum; aluminum copperheads (made of softer aluminum than that used in carabiners, et cetera) are not as strong but are more malleable, and because of that, they are generally easier to place correctly. Aluminum is the best choice for most placements; copper is generally used for only the smallest copperheads.

Circleheads. Circleheads consist of a wire loop with one or more copper or aluminum ferrules swaged on the loop (fig. 15-12b), one of which is pounded into the rock in the same manner as a copperhead. They are used in horizontal cracks, overhead placements, and other applications wherein the symmetry of the wire loop's attachment point is preferable to a regular head because of the anticipated direction of pull.

Bolts

Chapter 13, Rock Protection, includes a section on the use of existing bolts found on climbing routes. Proper bolt placement, including rivet placement, is a special skill beyond the scope of this book; bolt placement is best left to the judgment and skill of very experienced climbers. (See "Rock Protection Etiquette" in Chapter 13, Rock Protection.)

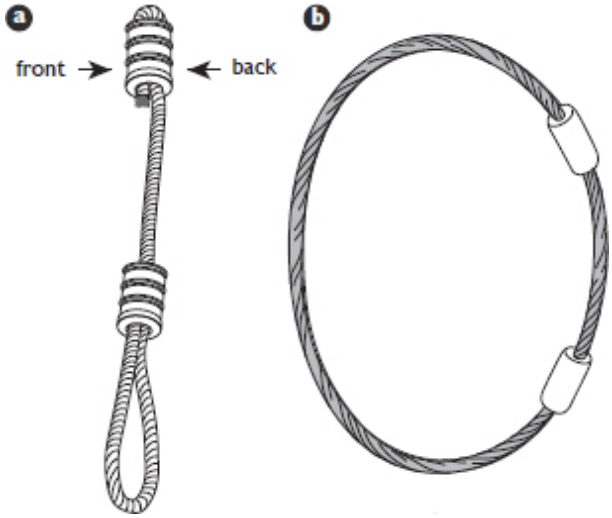

Fig. 15-12. Malleable hardware types: a, copperhead; b, circlehead.

BIG WALL EQUIPMENT

Climbers undertaking a big wall have other specialized equipment needs to consider. Safeguard important equipment taken on a big wall climb by using tie-in loops or lanyards to attach anything that might be dropped. Bring gear that will get the party through the worst possible weather, because there is not likely to be any easy way to retreat. Be sure all equipment is durable, and consider reinforcing equipment—with duct tape, when applicable—such as water bottles, portaledges, haul bags, and other items that can be protected from failure with some preventive maintenance.

Pulleys and Hauling Devices

Pulleys are necessary to ease the chore of hauling. They receive much abuse, so they must be durable. Pulleys with bearings and larger wheels operate more smoothly. Commercially offered hauling devices (which are pulleys with self-locking cams), also called *haulers*, are especially useful for extensive hauling and are used by most climbers (fig. 15-13a, b, and c). A large pulley combined with a locking carabiner, two slings, and one ascender

—all gear that is usually carried on an aid climb—can be assembled to form a basic hauling system (fig. 15-13d) if the hauling device is dropped. Some climbers prefer this type of noncommercial basic hauling system for heavy loads, since they can select larger pulleys and this type of system has fewer specialized parts that are subject to breaking (see "Hauling" later in this chapter for additional discussion on rigging this setup). It is a good idea to also carry simple pulleys for setting up mechanical advantage during a haul or for rescue situations (see Chapter 25, Alpine Rescue).

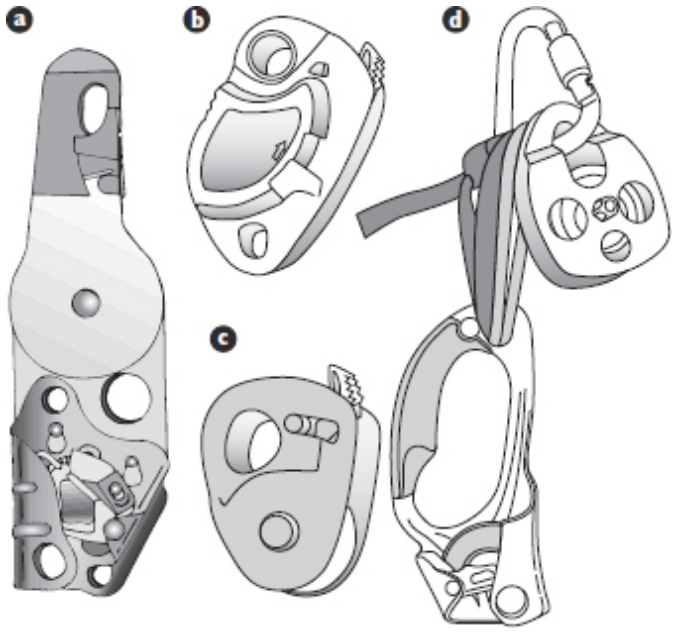

Fig. 15-13. Hauling devices (or haulers): a, Kong Block Roll; b, Petzl Pro Traxion; c, Petzl Micro Traxion; d, basic hauling system composed of an ascender, pulley, locking carabiner, and two slings.

Haul Bags

Haul bags carry clothing, water, food, sleeping bags, and other climbing and nonclimbing paraphernalia (fig. 15-14a). A good haul bag has adequate cargo capacity, a solid haul suspension, durable fabric, no snag points, and a removable backpacking harness system. A knot protector covers the knot connecting the haul bag to the haul line to protect the knot, and may reduce snagging problems during hauling. An effective knot protector can be fashioned from the top of a 2-liter plastic bottle and some cord (fig. 15-14b). Before leaving the ground, equip the haul bag with a docking cord, typically 20 feet (7 meters) of 8-millimeter cord. Attach the cord directly to the primary

haul strap of the haul bag with a rewoven figure eight (see also “Hauling” under “Big Wall Multiday Techniques” later in this chapter).

Cheater Sticks

Cheater sticks allow climbers to clip the rope or an aider in to a piece of hardware beyond their reach. The most important reason to carry some kind of cheater stick on a big wall is for use in down-aiding (making placements and clipping the rope in to them while rappelling) in the event of a retreat through steep terrain. If a fixed placement is missing or broken, using a cheater stick to reach another placement might provide an alternative to placing new pitons, copperheads, or bolts.

A tent pole or hiking pole can be fashioned into a cheater stick in an emergency by taping on a carabiner with duct tape or climbing tape. Cheater sticks as simple as a quickdraw reinforced and taped to be rigid may be mandatory for shorter climbers, especially when the gear is fixed and intermediate placements are not available.

Duct Tape

On big walls, duct tape is indispensable for repairing equipment, protecting gear, and climbing. Duct tape is used to tape down hooks, to tape the edges of hangerless bolts to prevent rivet hangers from sliding off, to attach rivet hangers to the aider carabiner to extend the climber’s reach to a rivet, or to tape the nut tool or hammer (or both) to aiders, hooks, or protection to reach an especially high placement. Duct tape can be stuck to the rock to pad sharp edges in order to protect the rope. Duct tape is also commonly used to repair gear and to fashion homemade aid-specific equipment. Small-diameter rolls can be slung with cord and carried on the harness.

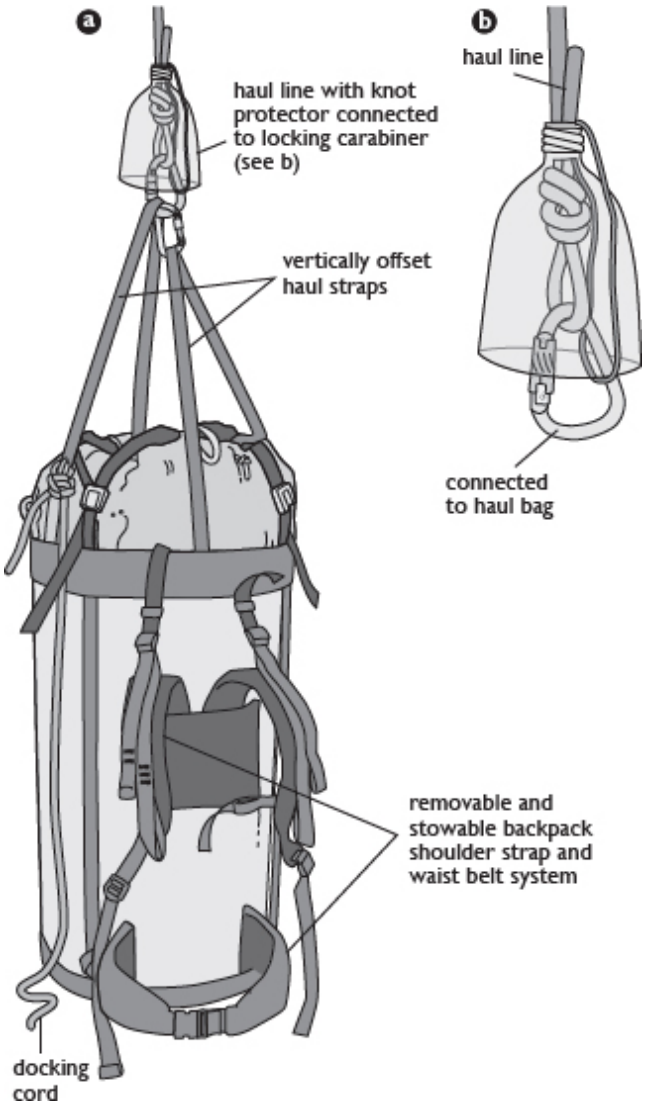

Fig. 15-14. Haul bag: a, features include solid haul suspension and removable backpacking harness system; b, protecting the knot.

Portaledges

A climber's sleeping platform, also called a portaledge (fig. 15-15), is a lightweight cot that provides a place for climbers to sleep reasonably well on a big wall without having to reach a natural ledge. Portaledges can be folded up and hauled with the haul bag. They can also be equipped with a rain fly to provide protection in a storm. Portaledges and rain-fly styles vary, and some rain flies are more suitable for big storms than others. An alternative to a portaledge is a hammock, which is significantly lighter and more uncomfortable. As with belay seats (see "Universal Aid-Specific Equipment"

earlier in this chapter), when using portaledges or hammocks, climbers must always be anchored directly to the rock, not to the portaledge or hammock.

Fig. 15-15. Portaledge anchored to a wall (climbers' individual anchors to wall and helmets not shown, for clarity).

Waste Containers

On big wall ascents, waste containers must be carried to haul and pack out human waste, and these containers are typically attached to and hauled below the haul bag. It is very important that the haul straps on the container are reliable and attached securely, so the container will not detach during the ascent. Such detachments not only leave the team without an appropriate waste container but they leave waste on the rock or at the base and can injure parties below. While homemade containers may survive the rigors of a big wall, commercial containers specifically designed for big wall climbing, such as the Metolius Waste Case, tend to be more reliable. Outer containers are usually used in combination with internal packaging of the waste. (See Chapter 7, Leave No Trace.) It should go without saying that it is never appropriate to toss waste off the cliff during an ascent.

AID PLACEMENTS

The general rule for aid climbing is to place each aid piece as high as possible. For example, making most placements at 4-foot (1.2-meter) intervals rather than at 3-foot (0.9-meter) intervals over the course of a 160-foot (approximately 50-meter) pitch saves more than 10 placements and much time.

Most of the techniques for placing free-climbing protection apply to aid climbing; however, unlike in free climbing, some aid-climbing placements are generally suitable to hold only body weight, not fall forces. Also more often used in aid climbing than free climbing is the practice of back-cleaning. *Back-cleaning* is when a leader climbs past a piece onto a new piece of protection and decides to remove the previous piece, in order to use it again higher on the climb (see the "Tips for Leading Aid Pitches" sidebar later in this chapter). It is important to keep in mind good basic protection skills and free-climbing concepts when back-cleaning and to leave quality protection at adequate intervals. Also, always keep in mind that if the follower will be jugging (climbing the rope using mechanical ascenders), the leader needs to leave protection close enough together that the follower will be able to clean the placements. When there is a change in direction or angle of the climb, removing too many pieces can create a problem for the follower jugging a rope under tension.

Using a solid cam hook placement rather than a nut or piton placement can save considerable time for both leader (placement is much simpler) and follower (because there is nothing to clean), but this provides no protection against the consequences of a fall.

Placing nuts during an aid climb is similar to placing them on a free climb, but because aid nuts take the weight of the lead climber, and because they may be smaller than the nut tool, they can be difficult to remove. Consider using nuts only for protection and not weighting nuts for upward progress if possible.

Evaluate fixed pins, bolts, and other fixed gear before using them (see Chapter 13, Rock Protection). Clip a carabiner directly to fixed gear left as protection whenever possible rather than clipping in to old fixed slings that might be attached to the fixed gear. For example, cut old slings from piton eyes when necessary so that the piton eye can accept a carabiner. If for some reason a carabiner will not fit in the eye—because the pin is bent or is too close to an obstruction, or because fixed webbing cannot be removed from the

eye—thread a full-strength tie-off loop through the eye and then either girth-hitch it or clip the two ends of the tie-off loop with a carabiner.

PITON PLACEMENT

A properly sized pin can be placed one-half to two-thirds of the way by hand; the remainder of the pin is then hammered into place. Select the correct pin to fit the crack. A pin that inserts smoothly, with good contact between the pin and rock and reasonably matches the shape of the crack, will do less damage to the rock when hammered in than a pin that is too large or the wrong shape. Using an ill-fitting pin causes more destruction to the rock. A sound piton rings with a higher-pitched ping with each strike of the hammer. After the pin is driven, bounce-test the piece (see "The Basic Aid Sequence" later in this chapter). Wellplaced pins or fixed pins can flex when weighted, but they should not shift. Knowing just how much to hammer a piton is a matter of touch and experience. Excessive hammering wastes energy, makes it harder for the second to remove the piton, and needlessly damages the rock. Underdriving a piton, however, increases the risk of its pulling out. If several pins are underdriven, the failure of one could result in a long fall as the series of pins zippers out. Here are additional guidelines for the sound placement of pitons:

- **Hand-place pitons, without any driving by the hammer,** if possible, to eliminate damage to the rock; use an existing scar and do not hammer the pin. Hand-placed pitons may be less secure for upward progress and are less likely to catch a fall than hammered pitons, but with practice some placements can be accomplished this way.
- **Try to determine what type of pin was previously placed** and how it was placed, since most piton placements now occur in pin scars, in order to use the scar in the same manner it was created.
- **Place pins in wider portions of a crack,** in the way nuts are placed. If the crack is thinner below and above the pin, the pin will be supported when it has to take your weight (fig. 15-16a).
- **Add a full-strength tie-off loop** to the piton if the piton's position causes the connecting carabiner to extend over an edge, to prevent cross-loading the carabiner across its sides (fig. 15-16b).
- **Keep the three points of the V in contact with the rock** when placing angles (fig. 15-16c). The back (the point of the V) must always be in contact with one wall, while the edges (the two tips of the V) are

in contact with the opposing wall. In a horizontal crack, put the back of the angle up and the edges down.

- **Stop hammering when a pin bottoms out in a crack**—that is, cannot be driven in all the way. The piton must be tied off around the shaft at the point where it emerges from the rock. A tie-off loop connected with an overhand slipknot, girth-hitched or clove-hitched to the pin, supports the climber's weight and reduces levering action (see Figure 13-9 in Chapter 13, Rock Protection). Loop a longer sling (or a second carabiner) through the eye of the pin and clip it in to the tie-off loop or its carabiner. This "keeper sling" does not bear weight but will catch the pin if it pops out.

STACKING

When no single pin, chock, or SLCD fits the crack at hand, aid climbers get very creative. Whether a climber has run out of proper-sized pieces or is facing a beat-out, pod-shaped pin scar, it is time to improvise by driving in two or more pins together, known as *stacking*. This can be done many different ways, depending on the size of the crack and the pins available, as shown in Figure 15-17.

Blades are stacked back to back and are usually driven together. If a third blade is necessary, the first two are inserted by hand, and then the third is driven in between them. Leeper Z pitons are especially useful for stacking, and Lost Arrows can also be stacked, either back to back or with a shorter arrow on top of a longer arrow. You can mix any pins together in a stack that nicely fill the crack and with good contact between the individual pins in the stack. Creativity is the key.

There is some disagreement about the best way to stack angles. Some climbers stack them by keeping the spines of both angles against each other and the edges of each piton into the rock, but any combination will work. Try to avoid stacking angles by simply placing one over the other, because these may be very hard to separate once they are removed.

When pins are stacked, girth-hitch the pins together with a tie-off loop (fig. 15-17a and c). It is typical to clip in to only one pin directly (fig. 15-17b), or if the eyes of the stacked pins are blocked (as in Figure 15-17a), it may be necessary to clip directly to the tie-off loop. In either case, using a tie-off loop ensures that if the stacked pins fail, you will not lose the pins that have not been clipped directly in to the rope.

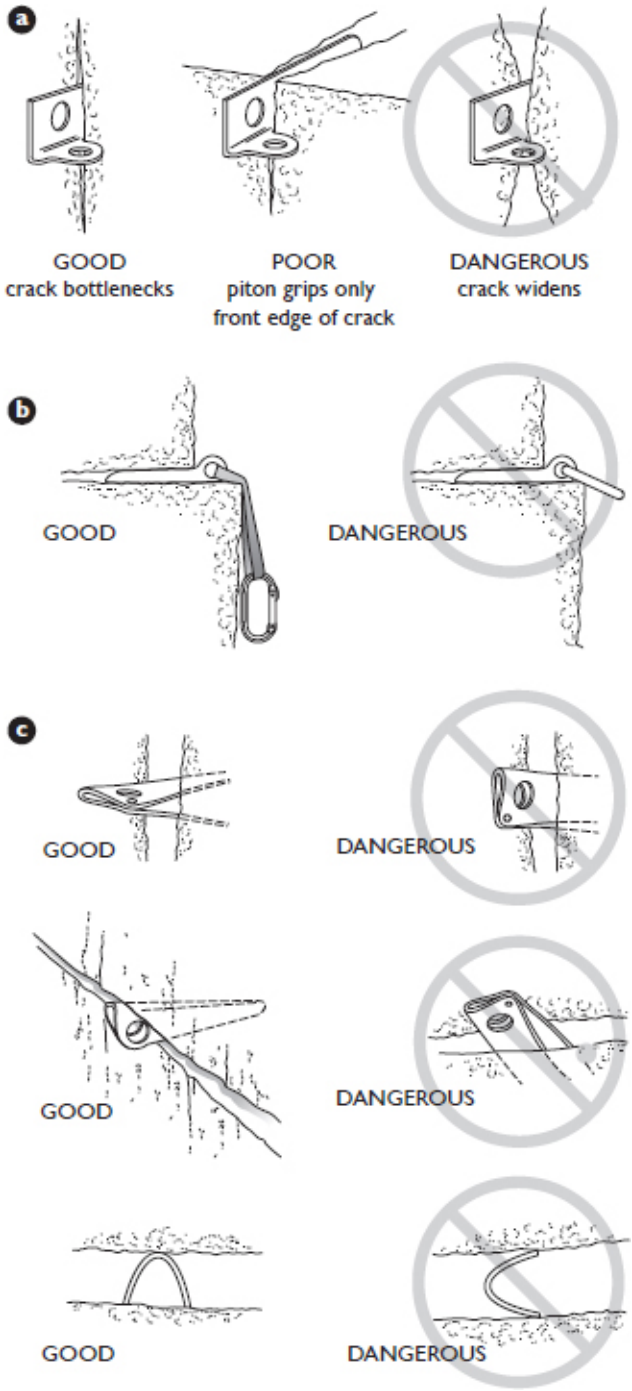

Fig. 15-16. Piton placements: a, placements are best if crack constricts above and below piton; b, safely extending a piton to avoid cross-loading the carabiner; c, angle piton placements should have all three points in contact with the rock.

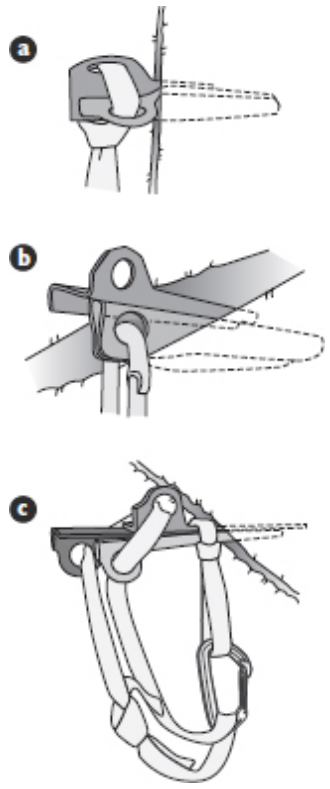

Fig. 15-17. Examples of pitons and angles stacked and nested (some keeper slings omitted for clarity): a, arrow and knifeblade stacked back-to-back; b, Leeper Z and angle, nested; c, two arrows and knifeblade, stacked.

HOOK PLACEMENT AND USE

To place a hook, set the hook on the ledge, flake, or hole where it will be used. When learning, try several hooks to see which one sits most securely in the feature. Move the hook around to try to find the most secure positioning by feel, and if the hooked feature can be seen, visually inspect the quality of the placement as well. Hooks can sometimes be placed on top of a fixed copperhead that has lost its wire (called a "dead head").

After selecting the hook and placement position, clip an aider and daisy chain to the hook. Test all hooks before applying full body weight (or gently "ooze" body weight onto the hook if it is off to the side or otherwise cannot be tested). Climbers usually start very low in their aiders so that their weight and stance are well below the hook before they move up the aiders one step at a time. Climbers should avoid standing with their face directly in front of the hook because it could pop out with a good deal of force. Once your weight is on the hook in one aider (or one pair), it can be helpful to "fifi in"—to hook in to the aider's carabiner and hang your body weight—just as with other pieces

of protection. Always keep constant downward pressure on the hook when standing in the aiders, especially when moving up in the aiders and switching weight from one foot to the other.

Cam hooks should be placed in the crack or pocket in a fashion that will make the hook bind up and rotate to cause a camming force on the rock. These placements rely on the force created by the torque (camming action) of the hook into the rock. With practice, cam hooks can be placed in many seemingly unlikely positions and orientations. The tighter the cam hook fits into the crack (in other words, the closer the width of the metal sheet is to the width of the crack), the more secure the placement and the less potential there is to do any damage to the rock. A cam hook can be hit once with a hammer to increase the placement's security when needed. Sometimes a hammer is needed to remove a cam hook, even when it has supported only body weight. Climbers generally agree that cam hooks should not be used in certain rock, such as sandstone, because they may damage the rock with their camming action.

MALLEABLE PLACEMENTS

Because climbers often cannot tell how secure the placements of malleable heads are, and because such heads damage the rock, do not use them except where other protection will not work. Heads are used like any other aid piece but have an inescapable weakness: inspection cannot guarantee that the head has been molded to the rock. Some heads may hold a short fall, others will support body weight only, and others might fail. All malleable head placements are suspect, and accepting this fact is inherent in their use.

Assuming that an adequate selection of heads is available, use the largest head the rock feature will best accommodate. Gently bounce-test all head placements (see "The Basic Aid Sequence" below), whether placed by you or a previous party. Do not get impatient when placing heads—spend as much time as needed to make the placement as good as possible. Consider using load-limiting runners on heads, since a well-placed head may arrest a fall.

Copperheads and circleheads take more practice to place than other types of aid gear, and placing them requires specialized tools. The hammer pick works for setting ("pasting") large heads, but small heads require hammering a striking tool such as a blunt chisel (fig. 15-18) or a punch—or, in a pinch, a Lost Arrow or nut tool. Hammering a striking tool rather than the piece itself reduces the likelihood of a missed hit, which causes undue damage to the rock.

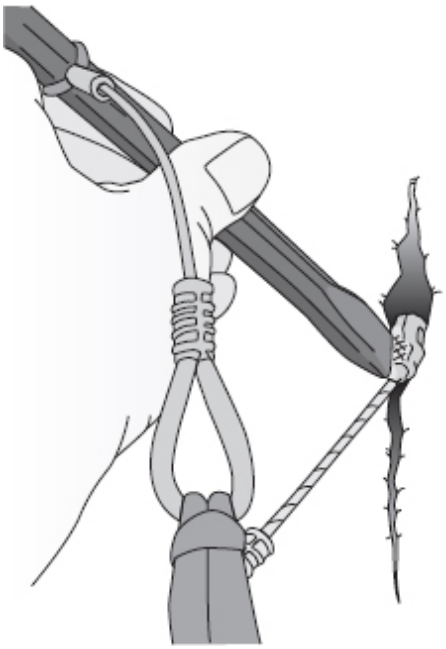

Fig. 15-18. Placing a copperhead by hammering directly on a chisel, rather than on the copperhead itself.

Before placing a head, examine it carefully. Note that, starting with the clip-in loop, the cable comes up through the "back" of the head, does a 180-degree turn, and ends at the bottom of the "front" of the head (see Figure 15-12a). Make sure the back of the head is placed against the rock and the frayed ends of the cut cable at the front of the head are visible, in order to minimize the cable's outward bending movement (or torque) on the head itself and to protect the cable when the head is being pasted.

Look for a placement option like a downward-tapered groove or crack that at least has parallel sides, similar to a nut placement, but that can't take a nut, possibly because it is too shallow. Practice head placement on the ground, perhaps in some boulders or other nonclimbable rock, to gain experience before placing heads on an established climbing route. Follow these steps when placing a head:

1. **Warm up the head** by hitting it on every surface with the hammer a few times. If needed, carefully shape the head slightly to match the intended placement by rotating the head while hitting it gently, approximately 10 to 20 times.
2. **Place the head** by positioning it similarly to a nut—in a narrowing portion of a flare or seam, making sure to orient the head correctly: with the back of the head placed against the rock.

3. **Seat the head** into the rock, preferably using a punch to hit it perhaps four to five times, over the entire head. If no punch is available, at this stage use the narrow tip of the wall hammer. At this point, the goal is simply for the head to stay in place in the constriction during additional pasting without the climber having to hold on to it.
4. **Pound the head in,** using a chisel to make many angled strokes that form an X pattern on the head, or simply hit the head repeatedly enough times to weld the head into the placement. Take care not to hit and damage the rock or the cable of the head. Hit the head all over—top, middle, and bottom. If the head rocks while being hit on its top or bottom, go back to hitting the middle of the head. If the metal starts separating from the cable, stop hitting, to avoid overpasting the head.
5. **Paste the head** on its edges by setting the chisel right on the edge of the head and pounding both sides to past the edges of the head.
6. **"Pin" the head** on the top and bottom with special care; this is the area of the head that often gets the best "bite" in the rock.
7. **Gently bounce-test the head** before committing your weight to ensure that it will hold. However, overaggressive bounce-testing can pull a good head placement, so try to generate only about twice the force of the body weight to be held (see "The Basic Aid Sequence" below).

BASIC AID TECHNIQUES

Before starting to lead any aid pitch, study the terrain and make a plan. Decide what gear the leader will need and what the second can carry. Generally, the leader should carry personal ascenders, belay device(s) including an assisted-braking belay device, and a nut tool, among other gear, as this gear—normally considered follower gear—may be needed when leading aid climbs. Figure out how to minimize rope drag. Spot any obstructions that might create hauling problems. Decide whether to save aid pieces of certain sizes for the end of the pitch.

RACKING

Racking varies greatly with personal style. It is common on aid routes to have more than one SLCD on each racking carabiner. Racking SLCDs on wire-gate carabiners is preferred because these carabiners are lighter.

A recommended racking system is to attach the SLCD's clip-in loop to the carabiner instead of clipping the SLCD in with its sewn sling as is done in free climbing. Face the gate of the carabiner out and away from the harness, with the opening of the gate at the bottom of the carabiner. This allows the climber to open the carabiner by flicking the rigid loop of the SLCD against the carabiner gate, removing just one SLCD from the carabiner with one hand. When racking multiple SLCDs on one carabiner, consider mixing sizes so that if one carabiner full of SLCDs is dropped, all of the pieces of that size are not lost. (Figure 15-5 shows how SLCDs are typically racked for aid climbing.)

Consider racking half of the SLCDs, nuts, pins, and slings of each size on each side of your body so that all sizes of gear are available from both sides. Typically, gear is racked from small to large or large to small. Some climbers rack all their slings on their seat harness and all their protection on their chest harness. Making "two-packs" of slings reduces the amount of space the slings take up on the harness (fig. 15-19a). Or rack single slings over a shoulder.

It is helpful to rack pitons on oval carabiners, because they allow pieces to rotate on and off the carabiner smoothly in either direction (fig. 15-19b); specialized oval wire-gate carabiners weigh less. Do not overload a carabiner to the point that gear is lost because the equipment cannot be accessed easily enough. Alternate the direction of angles and Lost Arrows for better nesting on the carabiner, which allows more pins per carabiner. Consider racking nuts and hooks onto traditional latch-style (nonkeylock) carabiners (see Figure 9-36e), which have a hook that makes it that much harder for the nuts or hooks to accidentally come off of the carabiner. Free carabiners are often racked as "footballs" in groups of five or seven carabiners, depending on the climber's preference, to make them easy to organize and to use minimal space on the rack (fig. 15-19c).

Often it is useful for the leader to have a nut tool for removing unsettled placements and for cleaning grass, dirt, and other debris out of cracks as necessary. Finally, check that the hammer, if one is being carried, is accessible, with its sling untangled.

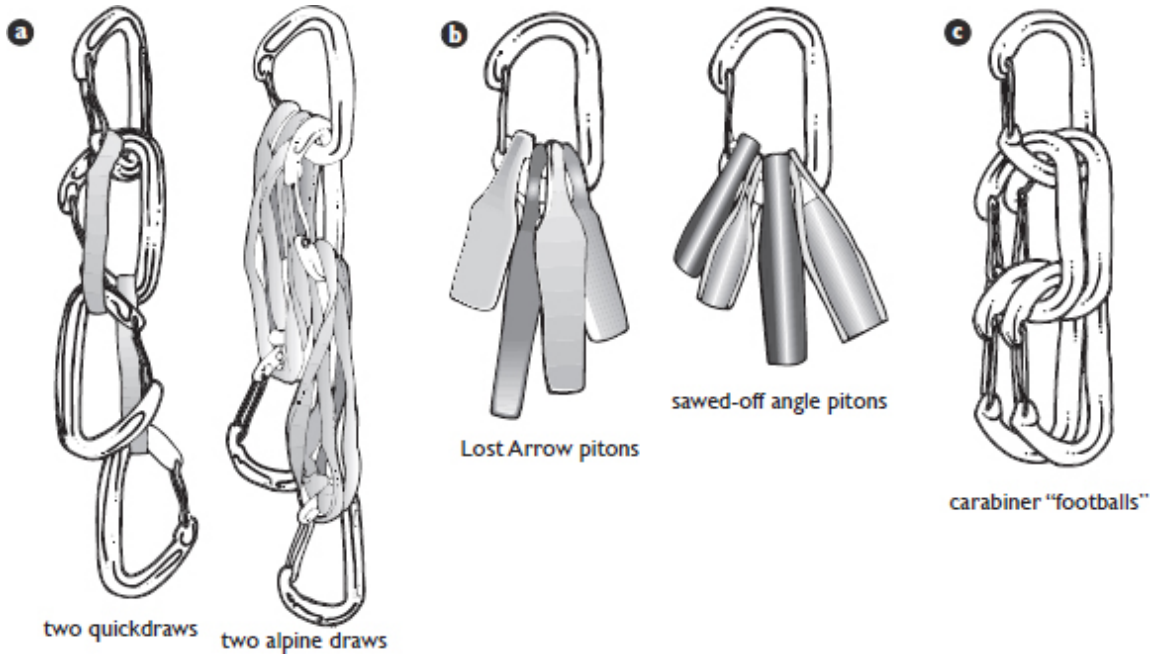

Fig. 15-19. Racking gear: a, quickdraw and alpine draw "two-packs"; b, pitons nested on oval wire-gate carabiners; c, carabiners racked in "footballs."

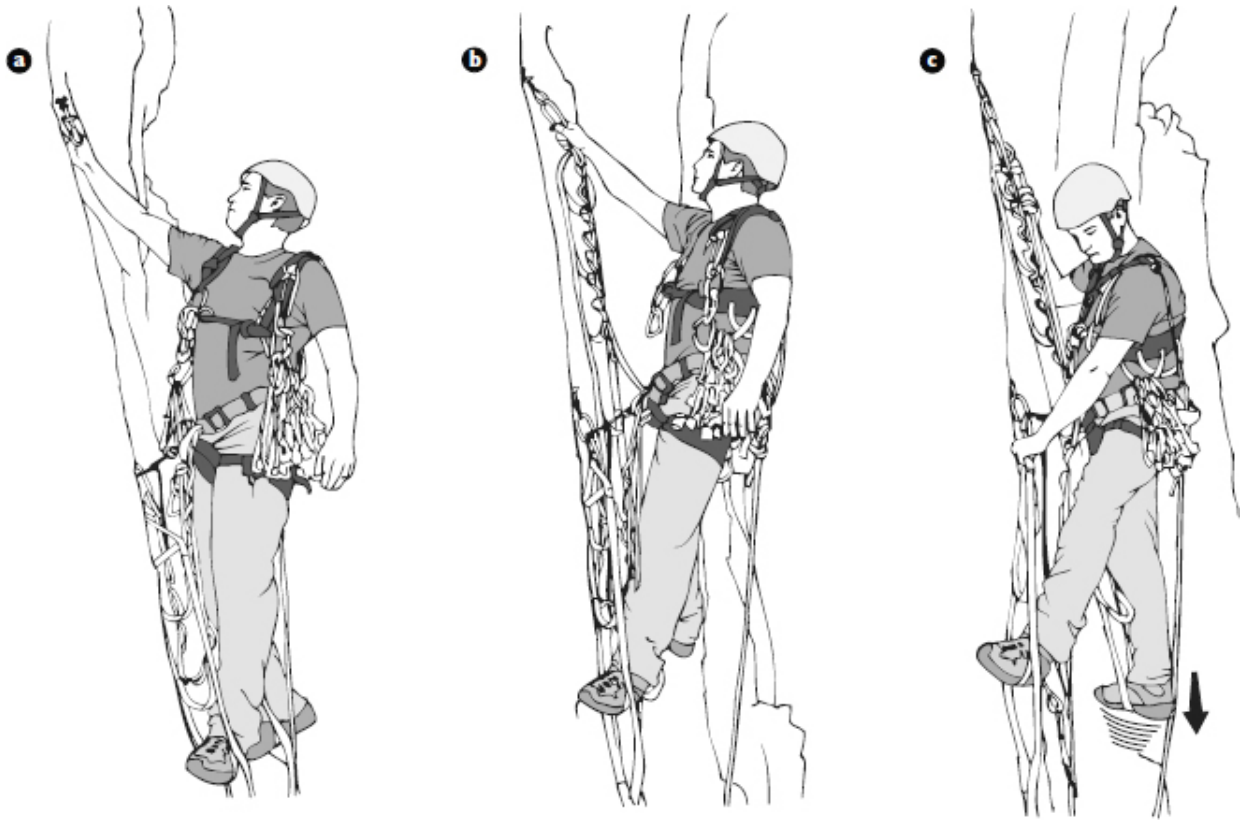

Fig. 15-20. The basic aid sequence (some equipment omitted for clarity): a, select and place piece of protection; b, clip aider-daisy to the protection; c, bounce-test the protection (continued on facing page);

THE BASIC AID SEQUENCE

The basic aid sequence is the same no matter where the leader starts: from the ground, a comfortable free stance, or the top step of the aiders. The following basic sequence assumes that the climber is using two aiders (see also the "Tips for Leading Aid Pitches" sidebar):

1. Look at and feel the terrain above, and select an aid piece to place at the highest suitable spot within reach (fig. 15-20a).
2. Place the piece and visually inspect it if possible. Clip the free aider and daisy chain combination in to the new piece with its dedicated oval keylock carabiner (fig. 15-20b).
3. Bounce-test the new piece in the typical sequence: (a) Tug down firmly one or more times on the aider with a hand; (b) step one foot into the aider and give a few solid, down-forcing "kicks" with that foot (keep all your weight supported on the previous piece during this first leg test); (c) transfer about half of your weight to the new piece and give a few

more vigorous hops (keep a hand on the aider of the previous piece and the other foot in that aider so that you can hold yourself upright and on the previous piece should the new piece fail during this step; if possible, stay fified in to the previous piece); and (d) transfer all of your weight to the new piece and give more vigorous bounces (fig. 15-20c).

If the new piece is questionable, is not intended for more than body weight, or is behind an expanding feature, some climbers may decide to avoid aggressive bounce-testing. Instead, (a) hand-set the placement (if appropriate) with a firm tug, and (b) simply "ooze" onto the new placement, applying your weight as gradually and smoothly as possible.

Some climbers rely on their experience and knowledge of the specific rock type to set good placements and forgo anything more than hand-setting the placement. Others believe that the only safe climbing method is vigorous bounce-testing. Warn the belayer when you are about to test or move onto a dubious placement.

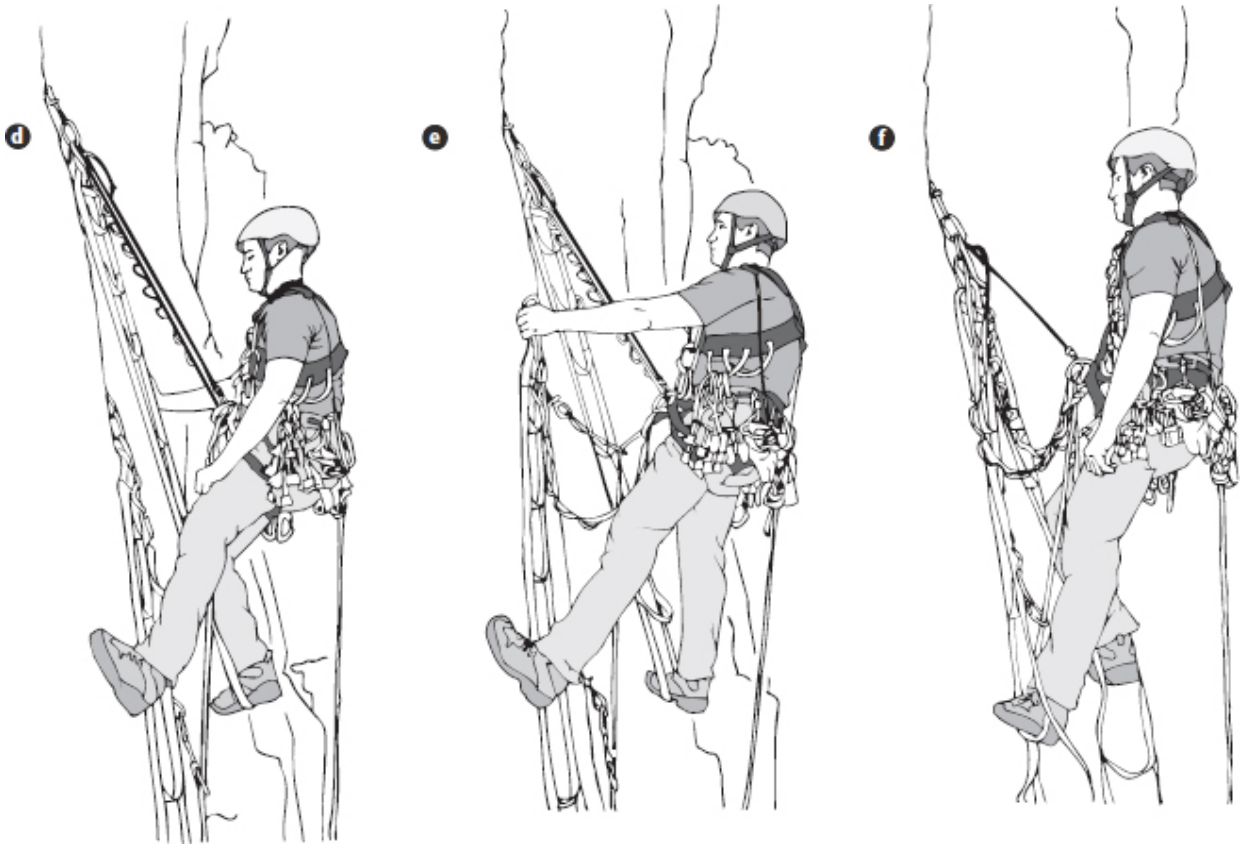

Fig. 15-20. (continued from facing page) d, shift weight to newly placed aider and protection and rest on fifi hook; e, clip rope to previous piece of protection and remove lower aider-daisy; f, clip lower aider-daisy to higher aider-daisy and prepare to climb high in aiders and repeat the sequence.

4. Once your weight is committed to the new placement, fifi in to the piece with the fifi hook, or clip in the adjustable daisy strap, and rest (fig. 15-20d). If not using an adjustable fifi hook or an adjustable daisy, climb up to the second or third steps in the aiders at this point in order to fifi in to the new piece. With a classic fifi hook, it is also possible to fifi in to one of the traditional daisy-chain loops.
5. While resting on the new piece, reach back to the previous piece. If clipping this piece for protection, add a carabiner, quickdraw, or sling and clip in the rope, then remove the aider and daisy chain combination (fig. 15-20e) and clip the oval keylock carabiner of this aider and daisy chain combination in to the oval keylock carabiner of the higher aider (fig. 15-20f). If removing this lower piece, rerack the piece.
6. Climb as high as possible in the aiders, possibly to the second or top steps, moving or adjusting the fifi or adjustable daisy while advancing higher (as shown in Figure 15-20f). Resist the temptation to look for

placements until you have climbed as high as you plan to climb in the aiders. This helps ensure that you do not get distracted by lower placement possibilities and increases efficiency of piece selection.

7. Repeat the process starting with step 1.

TOP-STEPPING

Moving onto the top step of the aiders can be unnerving, but being able to do so greatly improves the efficiency of aid climbing. The process is simple on low-angle rock, where the top steps are used like any other foothold and the climber's hands provide balance. Sometimes it is faster and less fatiguing to make multiple placements from steps lower than the top step, such as on very steep terrain or when aiding deep inside awkward cracks and corners. On such terrain, climbers may find that they can move faster by always placing from the second step. However, the ideal is to top-step as much as possible.

Vertical and overhanging rock can make top-stepping difficult because the climber's center of gravity moves away from the rock and above the point where the aiders are clipped to the aid placement. If the rock offers any features, use hands or an intermediate placement as a handhold to provide balance. If the rock is blank and the placement suitable, keep your weight on your feet while standing up and applying tension to the fifi hook or adjustable daisy strap between the harness and the aid placement. That tension provides the means of balancing yourself (fig. 15-21). If using a classic fifi, an alternative method is to clip a quickdraw in to the piece and use it as a handhold, pulling upward on the quickdraw with one hand and making the next placement with the other hand.

TIPS FOR LEADING AID PITCHES

- **Minimize rope drag**, as in free climbing. Consider each placement carefully, and extend slings when necessary to keep the rope running straight. If the follower will ascend using ascenders, pay attention to how the rope runs over edges, and set protection and slings so that the rope does not rub over sharp edges. If necessary, pad edges, usually with duct tape.
- **Think strategically while climbing** about what pieces can be left and what pieces should be removed as you go, known as back-cleaning, for reuse later on the pitch. Some pitches will require a large number of

pieces of the same size, or the leader may have only one or two of certain critical pieces, so these pieces will have to be back-cleaned often. Avoid back-cleaning low on the start of a pitch, and leave protection at close-enough intervals often enough to prevent serious falls.

- **Consider when to clip the rope**, which depends on personal preference and on the quality of the lower and higher pieces of protection. Some climbers prefer to clip the rope in to the lower placement before completing the final bounce-testing or before committing full weight to the new placement, so that if the new placement fails, the leader will not take a fall onto the lower piece caught only by the daisy chain and not the rope. Other climbers rely on bounce-testing to ensure that the new higher piece will hold their weight long enough for them to reach down and clip the rope to the lower piece. Generally, climbers do not want to pull up rope in order to clip to the highest piece before moving past it, as this increases the length of a potential fall. However, the more suspect the new higher piece, the more likely that the climber will clip the current piece as protection prior to moving onto the higher piece, rather than after moving onto the higher piece, as in the basic sequence. On pitches rated A1 or C1, where all placements should be secure, generally follow the basic sequence.

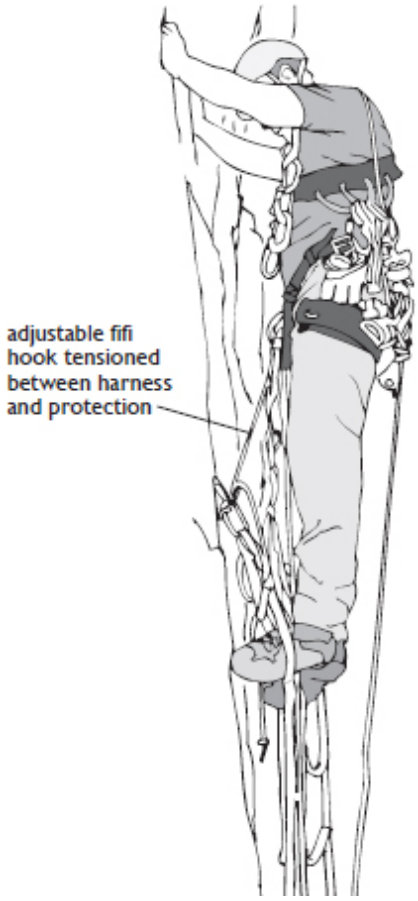

Fig. 15-21. Top-stepping.

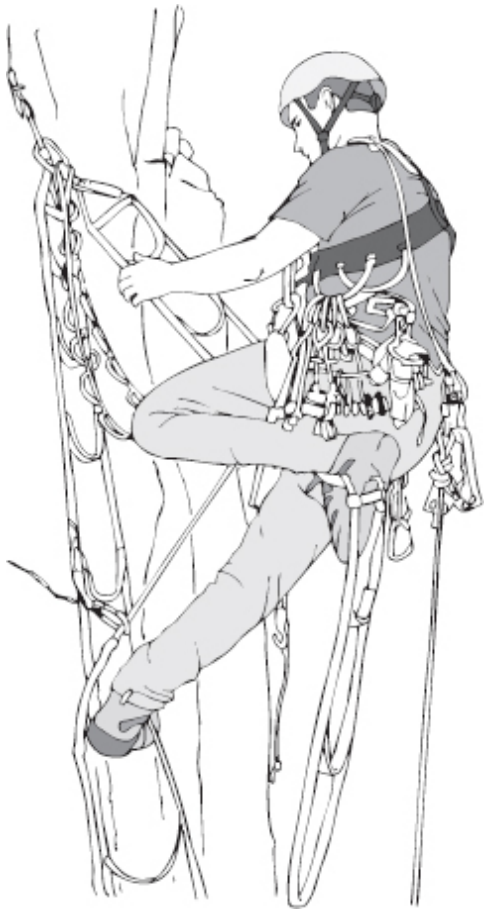

Fig. 15-22. Rest position.

RESTING

Do not wear yourself out. Climb in a relaxed fashion, taking rests as often as necessary to conserve strength or to plot the next series of moves. The best way to rest is to immediately clip in to a new tested piece with a fifi hook or adjustable daisy strap. Rest by fully weighting the fifi or adjustable daisy, freeing your feet completely before using the aiders to move up on the piece. This also allows you to switch feet between aiders as needed, to reach sideways to attach aiders to a new piece, or to execute whatever change of direction the next move may require. As you advance upward on pieces, move your classic fifi up or pull in your adjustable fifi or adjustable daisy, resting on this equipment as much as possible.

If not using a fifi hook or adjustable daisy, or if on lower-angle terrain, try this rest technique: With each foot in separate aiders and one foot one step below the other, bend the knee of the higher leg and bring that foot under you.

Most of your weight now rests over the bent leg. The outstretched leg takes minimal weight but maintains balance (fig. 15-22).

Another way to rest is to ask the belayer for tension and then rest on the climbing rope once it has been clipped in to the supporting piece. This is not an efficient method, however, due to stretch in the rope and the need for verbal communication.

Finally, relaxing stances can often be found in the aiders. Generally, the greatest stability is obtained by standing with heels together and toes spread apart against the rock. The heels-together position can be very helpful when standing high in the aiders and stretching up to make a difficult placement.

SWITCHING BETWEEN AID AND FREE CLIMBING

Stowing and deploying aiders as well as free climbing with aid gear, a large rack, and a haul line are some of the difficulties in switching between aid and free climbing during a big wall climb. For free climbers, reorienting to a totally different style and repurposing free gear into aid gear is the challenge. Weighting the first piece on aid after free climbing can be scary when the last piece of protection is far away or untested. Communicate clearly with your partner on transitions between aid and free.

From Free to Aid

Switching from free climbing to aid climbing is the easier transition, if the climb accepts rock protection, as the climber can simply call for tension or clip the belay loop directly in to a piece. If the climber has been free climbing because the rock did not accept protection, the last piece may be far below and the transition can be trickier. Whenever possible, start the transition at a piece of reliable protection and consider placing two pieces. Either way, test the first piece of aid protection carefully, especially with the first visual inspection and tests prior to weighting the piece. If using aiders to aid climb the section, release the aiders and daisy chains (see “Daisy Chains,” earlier in the chapter), which could already be rigged on the harness, and move into the basic aid sequence (see “The Basic Aid Sequence”). This is easy if the climber has anticipated changing to aid, but if the climber is not expecting to use aid and suddenly needs it, problems arise. When in this bind, prepare slings or quickdraws for improvised aiders by interconnecting several slings, and then use the improvised aiders to move through the aid section over the

blank area. If not using daisy chains on a short section of aid, take great care not to drop the improvised aiders.

From Aid to Free

A climber may wish to transition from aid to free climbing when encountering a section that cannot be aided (such as face climbing terrain where no rock protection is available) or when the climbing becomes easy enough that free climbing is faster and more efficient than aid climbing. Make sure your belayer knows you will be moving faster as you transition to free climbing. Two methods are commonly used to switch to free climbing:

1. **On easier or low-angle terrain,** it is often possible to move out of the aiders and onto the rock with all your weight on your hands and feet and still reach back to unclip the aiders to bring them along. If the transition occurs at a ledge or stance, simply clip aiders and daisy chains to the harness gear loops and start free climbing. Make sure that the aid equipment will not hinder your movement when free climbing.
2. **When the aid climbing is steep just before the transition to free climbing,** the preferred technique is to clip a single or double runner to the last piece of aid protection. Then stand in the runner, using this sling as an improvised aider. Remove the aiders and stow them on the harness. This enables the climber to make free-climbing moves and not have to reach down to retrieve the aiders. When possible, clip the rope to the sling before stepping in the sling and free climbing away—otherwise, the piece will not assist in catching a fall, and if it is not connected to the rope, the piece and sling might be out of reach for the follower to clean. If moving from a hook to free climbing, simply pull up on the aider or aiders from the first free moves, and the hook and the aider should release.

TENSION TRAVERSES AND PENDULUM SWINGS

Tension traverses and pendulum swings are used to move horizontally across unaidable territory into a new crack system. First ascensionists use these techniques to avoid placing bolt ladders to reach the new system.

The main difference between a tension traverse and a pendulum is that a pendulum requires the climber to run across the face in order to reach the new system, while during a tension traverse the climber does not run but uses

friction on small holds to work hands and feet sideways. Both pendulums and tension traverses can be difficult, and they pose special problems for the second climber, who must both follow and clean protection.

For both methods, the leader starts by placing a solid piece of protection at the top of the planned traverse and clipping the rope in to this protection or clipping in to fixed gear at this point. Usually the equipment used for the tension or pendulum point cannot be retrieved, unless it is possible to come back to it from above, so these points on most routes are equipped with fixed gear. Climbers might use a locking carabiner on a tension or pendulum point for extra security.

During a tension traverse, after clipping in the rope, the leader takes tension from the belayer, lowers some amount, and starts to move toward the new crack system, using hands and feet to move across the rock (fig. 15-23a). Some tension traverses require climbers to achieve a sideways or even nearly upside-down position as they move. Often during tension traverses, leaders will call for more slack as they make progress. Keep good communication with the belayer, with clear "Lower me," "Stop," or "Hold" commands. Once the final destination is reached, the leader may need to call for slack so that the tension ceases and climbing can continue in the new crack.

Fig. 15-23. Leading horizontally: a, tension traverse; b, pendulum.

For a pendulum, the leader clips in to the pendulum point with the rope and has the belayer take tension. Then the leader calls for a lower. The belayer lowers the leader until there is enough rope out for the leader to run back and

forth across the rock and swing into the new crack system (fig. 15-23b). When being lowered by the belayer, it is better to be lowered too little than too much, because if you are too low, it may be very difficult to correct the error. Stop early and try the pendulum. If necessary, lower again until the best position is reached. While running back and forth across the rock, start slow and increase speed on each back and forth. Stay in control to avoid spinning and hitting the rock.

Some pendulums and traverses are difficult due to length, angle of the face, or other factors. Climbers may want to attach an SLCD to their aider so that they can jam this piece into the new crack very quickly (see Figure 5-23b). If a climber has barely reached the new crack but has managed to bury the right piece into it, the piece and the daisy chain will catch the climber's weight before he or she swings back into the old plumb line. Once in the new crack system, climb as high as safety allows before clipping the rope in to aid pieces for protection. The higher a climber gets before placing protection, the easier it is for the belayer, who will second the pendulum (see "Seconding Tension Traverses and Pendulum Swings" later in this chapter).

A Grigri is helpful for the belayer to use for tension traverses and pendulums. In a tension traverse, it allows for a precise belay and perfect amount of tension as called for by the leader. In a pendulum, it allows the belayer to hold the leader in the exact position required.

OVERHANGS AND ROOFS

Overhangs and roofs can appear intimidating but often are easier than they look to aid through, especially because fixed gear tends to be prevalent in roofs. Keep ascenders handy, because if a piece pulls out and you end up hanging, you may need ascenders to climb back up to the last secure piece.

Under a steep overhanging wall or a roof, it may not be possible to place your feet against the rock. In this situation, start by hanging as far below the piece as possible and in the low steps on the aiders. To move up and reach the next placement, use the fifi hook or adjustable daisy strap to hang from the harness rather than trying to stand with your full weight in the aiders. After making the new placement, test it and clip in an aider, then step into the lowest possible step and fifi in.

When climbing very steep overhangs, placements will probably be made close together. Be careful not to remove gear during these sections, because the follower will need more gear left in place in order to successfully clean

the pitch. Or consider back-cleaning the entire section to allow the second to simply ascend the fixed line. As an overhang becomes horizontal, it will actually become easier to aid because the climber can stand fully erect in the aiders under the roof, possibly in the bottom steps, and aid sideways through the horizontal crack system.

Despite the difference in balance, for aiding over a roof climbers use the same basic aid sequence described earlier in this chapter. Reach up and over the roof to find the next placement. It may be necessary to feel the placement without getting a good visual inspection. When first moving onto the aider clipped to the piece above the roof, it may be difficult to pull yourself up to the piece and over the roof. Stepping into the lowest step on the aider and standing up in that aider can help you get started. Then, with an adjustable fifi or an adjustable daisy, it should be possible to fifi in to the piece above the roof.

Rope drag is a common side effect of overhangs. Try not to give in to the temptation to put long slings on these placements, because it will make cleaning very difficult for the follower. Some climbers pull along a second belay rope and start climbing on it after clearing the lip of the overhang, although this technique is not common.

Finally, try to relax when working out moves over a big roof. Have confidence in your pieces. Clutching at them will not keep them in place but will drain your strength.

ESTABLISHING BELAYS

Upon reaching the end of a pitch, the leader must establish an anchor. Many routes have bolts at the end of the pitches, but climbers may have to place their own gear. If hauling, the leader will typically set up an anchor with two main power points (see “Equalizing the Anchor” in Chapter 10, Belaying): one for fixing the lead line and supporting the weight and safety of the climbers, and one for the haul system. Carefully consider which side to put the lead line on versus the haul system. Generally, try to keep the haul system in a straight line, and position the haul anchor out of the path of the route so that the follower does not have to push past the haul bag(s). Other considerations in selecting the location of the lead-line and haul-system anchors are the quality of the protection and the weight of the haul bag(s). With these considerations in mind, the leader sets up an anchor upon completing the pitch (fig. 15-24a).

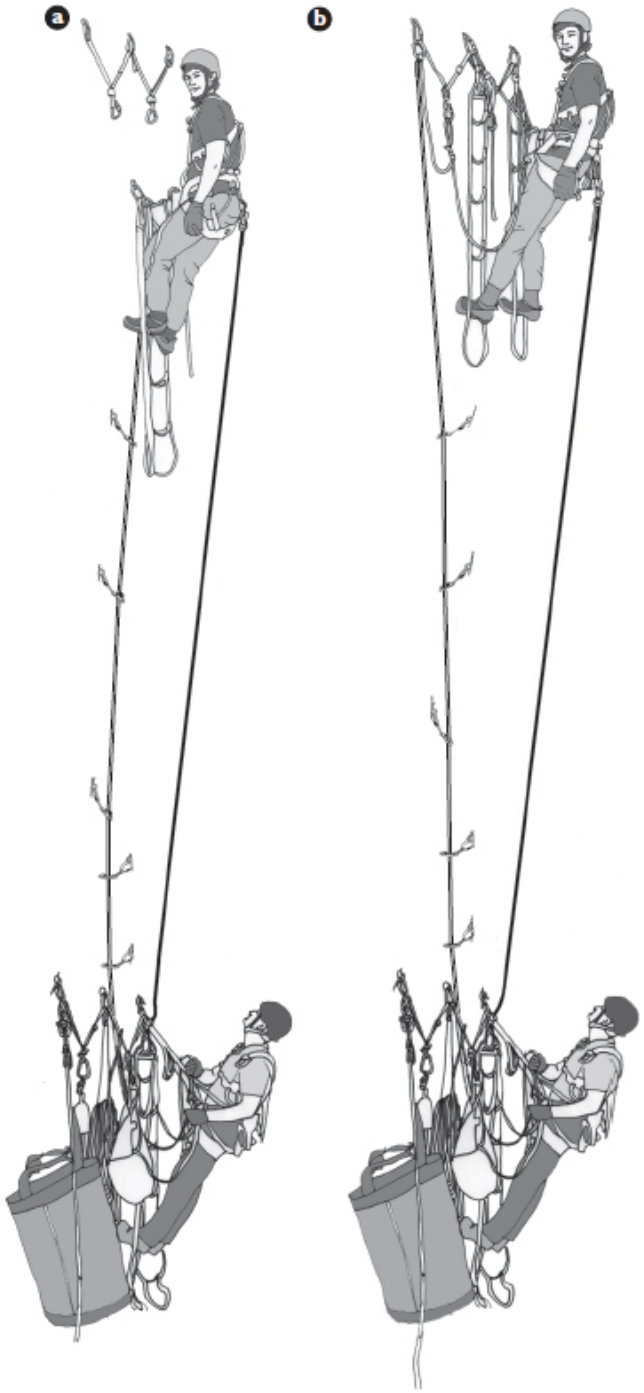

Fig. 15-24. Establishing a belay: a, leader builds anchor; b, leader fixes lead line; (continued on facing page)

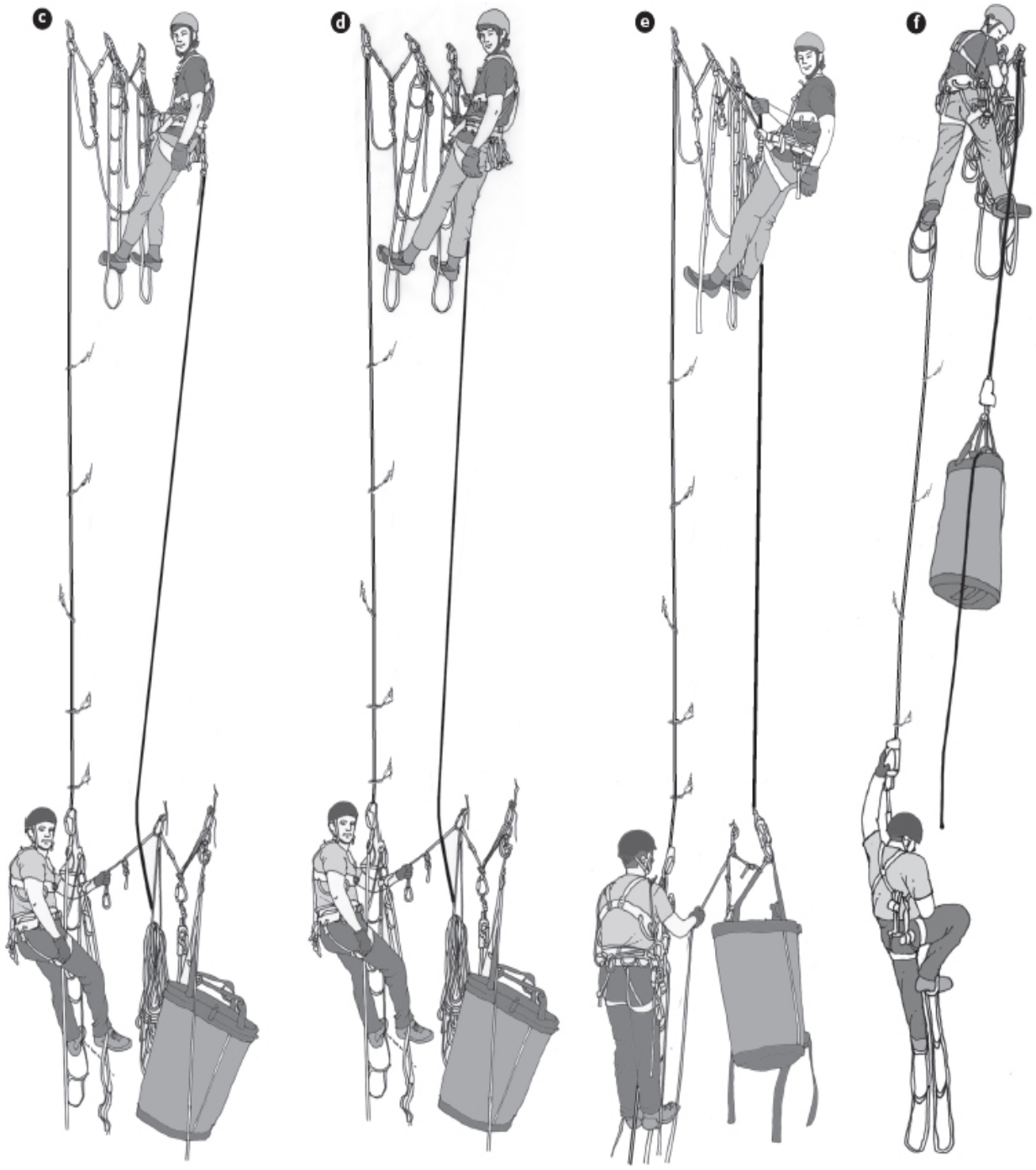

Fig. 15-24. (continued from facing page) c, second attaches to lead line and begins dismantling lower anchor; d, leader sets up the hauling system while second prepares to jug and clean; e, second releases haul bag; f, leader hauls while second jugs and cleans.

Lead-line anchor. Attach the lead line to the lead-line anchor first (fig. 15-24b). To do this, call for slack, pull up several armfuls of rope, and fix the line for the follower. Typically the rope is fixed by clove-hitching it to a

carabiner that is clipped to a solid piece of protection already used in the anchor, preferably a bolt. Use a clove hitch so that it can be easily untied after being weighted. Then back up this clove hitch with a figure eight on a bight. Clip this figure eight to the power point of the lead-line anchor. Make sure that there is enough rope between this figure eight and the leader building the anchor to allow the leader to perform the haul. As soon as the lead line is fixed with the clove hitch and backed up, the leader calls down to the follower that the lead line is fixed. This also tells the follower that the leader is off belay (or "Off belay" may be called separately).

The follower immediately attaches to the lead line with ascenders and a backup, removes most of the anchor from the belay station, and unties the backup knot in the haul line (fig. 15-24c). The only pieces that the follower leaves in place until the haul starts are those directly weighted by the haul-bag docking cord. This ensures that the follower will be ready to ascend as soon as the haul bag leaves the belay station.

Haul-system anchor. After fixing the lead line and while the second is preparing to jug and clean, the leader sets up the haul system (fig. 15-24d; see also "Hauling" under "Big Wall Multiday Techniques," later in this chapter). When setting up the haul-system anchor, the leader may use one of the points in the lead-line anchor as part of the haul anchor. This creates a backup for both of the anchors. As part of the hauling sequence, the follower releases the haul bag from the belay anchor so that the leader can haul (fig. 15-24e), then removes any pieces that the haul bag was directly weighting, and finally ascends the fixed lead line.

As the leader hauls, the haul line is stacked neatly so that it is ready to go for the next lead (fig. 15-24f). After the hauling is completed (or after the climbing rope is fixed, if the leader is not hauling), the leader sets up a belay seat, gets comfortable, and prepares to exchange leads by sorting the rack, organizing the ropes, preparing the belay system, and so forth.

TYROLEAN TRAVERSES

Tyrolean traverses may be used to move between two rock features, such as a main wall and a detached pinnacle. They are also useful for crossing rivers and other spans. Ropes are strung between points on each side of the span, allowing climbers to traverse through the air, attached to the rope. As an example, the instructions that follow are for a Tyrolean traverse between a

main wall and a detached pinnacle, such as the Lost Arrow Spire in Yosemite National Park, California.

1. After setting up a bombproof anchor on the main wall—one that can take both a horizontal and a vertical pull—**connect one end of a single-strand rappel line to this anchor**. Rappel this rope to the saddle between the main wall and the detached pinnacle. Note the rappel line must be greater than two times the distance of the span between the main wall and the detached pinnacle, with the extra length more than two times what is needed for tying two knots.
2. **Climb the pinnacle using an additional climbing rope** if needed. Build an anchor at the top for a horizontal pull (or, as in many cases—including this example of Lost Arrow Spire—use the fixed anchors that are provided). Note that after the traverse, the equipment used for the pinnacle anchor cannot be recovered. The follower brings up the free end of the rappel line if it was not used as the climbing rope (consider tying in to this line to avoid dropping it).
3. Once both climbers are atop the pinnacle and attached to the pinnacle anchor, **pull the rappel line** (which becomes the traverse line) **tight against the anchor on the main wall** and fix this rope to the pinnacle anchor. Feed the free end of the traverse line through the anchor just as would be done to set up a rappel (if using two ropes, untying and retying is best). If using the free end of the rappel line to initiate the traverse (see step 5 below), consider fixing the second rope to the pinnacle anchor for redundancy and to avoid passing a knot on the rappel.
4. **Select the gear to attach to the traverse line and use for crossing.** If the traverse line is mostly horizontal or if the destination is higher than the starting point, many methods can be used to cross the span on the traverse line: using a Micro Traxion clipped to the harness and one ascender, perhaps with an aider or foot sling attached to the ascender (fig. 15-25a); using two ascenders, with one ascender clipped to the harness, and again with perhaps an aider or foot sling clipped to the other ascender (fig. 15-25b); or using a combination of pulleys, carabiners, and prusik hitches. In addition to the two primary devices used for connecting to the traverse line, always rig a backup, such as a double runner girth-hitched to the harness tie-in point and clipped around the traverse line with a locked carabiner.

5. **The first climber connects to the tensioned traverse rope** and takes the free end of the traverse line with him or her (consider tying in to the end to ensure that it is not dropped). Depending on the terrain, span distance, elevation difference, rope stretch, and tension in the traverse line, a short lower-out, rappel, down-jugging, or down-prusiking may be necessary to start the traverse and prevent the climber from careening away from the detached pillar at an uncontrolled speed. Often, the first climber may rappel on the free, nontensioned end of the traverse line to initiate the traverse. Do not attach a rappel device to the tensioned traverse rope, because this device will likely become tensioned and stuck near the midpoint of the traverse. In this case of the Lost Arrow Spire where the destination is higher than the starting point, only a short rappel or lower-out is required before ascending comes into play.

   However, if the destination is lower than the starting point, a rappel will likely be required for the entire traverse for all climbers, and ascending equipment would be needed only for the final few feet and could be attached when needed. In this case, climbers attach themselves to the traverse line with a locking carabiner or a pulley and locking carabiner. They rappel on a separate line while suspended from the traverse line. Plan ahead to ensure that adequate equipment and lines are available to safely perform the traverse.

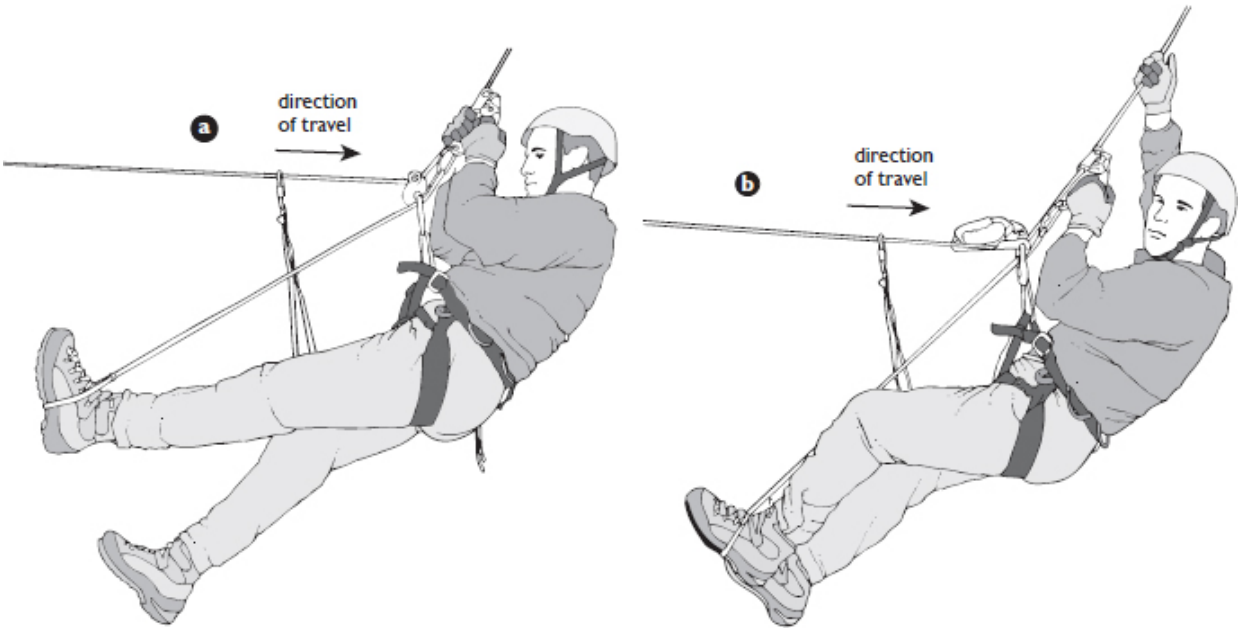

Fig. 15-25. Tyrolean traverse setups: a, using Petzl Micro Traxion and one ascender; b, using two ascenders.

6. After the first climber traverses from the pinnacle back to a new location on the main wall, **the second climber unfixes the first rope from the pinnacle anchor,** ensuring that the rope is threaded through the anchor; if two ropes are used, the second takes note of the correct rope to pull when the traverse is complete, just as when preparing a double-rope rappel. Then the first climber tightens and fixes the free end of the traverse line in to the new anchor at the new location on the main wall, which retensions the original line and tensions the free end for the first time so that now two tensioned lines cross the span.
7. **The second climber sets up for the traverse using the system of choice** (see steps 4 and 5 above); if two ropes are used, the second selects the strand of traverse rope without a knot so that no knot pass is required on the traverse.
8. Once both climbers are at the new location on the main wall, **they untie the ends of the traverse line** from the main wall anchor and pull the rope, taking care that the ends of the lines do not tangle.

SECONDING

On short sections of aid, the second climber usually follows the same sequence as the leader, except that the second is belayed from above. The second might use aiders for following a short section of aid, clipping these aiders to the protection left by the leader, or the second might just pull on the protection left by the leader and use the rock for counterpressure or stances. The follower's technique depends on how steep and smooth the short section of aid is that is being followed.

Long sections of aid and big walls call for a different strategy. The leader fixes the lead line to the anchor, and the second uses mechanical ascenders to ascend the fixed climbing rope and also cleans the protection left by the leader. If the team is hauling a bag, the second must release the bag for hauling before leaving the lower anchor (see Figure 15-24e). If the bag hangs up along the way, the follower can help to free it.

USING ASCENDERS

Each ascender (left and right) should have a dedicated locking carabiner. Smaller oval or D-shaped carabiners with a regular locking gate (not an auto-

locking gate) are usually most convenient. When ascenders are not in use, they reside on the harness or gear sling on their dedicated locking carabiner.

When preparing to follow a pitch, attach the locking carabiner to each aider and daisy chain combination. The ascender is always clipped in to the end of the daisy chain rather than in to one of its loops. Lock the carabiner to ensure that the ascender will stay attached to the daisy chain and aider, primarily to ensure that the attachment to the daisy chain is secure before weighting it. Place the ascender for your dominant hand above the other ascender on the rope (fig. 15-26a).

For most ascending, shorten the overall length of the daisy chain for the upper ascender. The amount that this daisy chain is shortened varies based on the steepness of the pitch and may change many times during an individual pitch. In general, the upper daisy chain should be adjusted so that it draws tight prior to or exactly at full arm extension.

To shorten the daisy chain, first place the ascender at approximately full arm extension. Pull up the daisy chain from the harness and find the loop that touches the locking carabiner attached to the ascender. Use a free carabiner (usually the dedicated oval keylock carabiner belonging to the aider and daisy chain combination) to attach this loop of the daisy chain directly to the locking carabiner. This method of shortening the daisy chain allows the climber to change the length of the daisy during the pitch without opening the locking carabiner (fig. 15-26b). Experiment with jugging with the daisy chain shortened to different lengths to find what is most comfortable and efficient. It is not necessary to shorten the daisy chain for the nondominant hand. Another option is to use an adjustable daisy strap.

When jugging, offset your feet in the aider steps: If the left hand is dominant and that ascender is higher, and if the left foot is in the fifth step from the top, the right foot would typically be in the fourth step from the top. This way, your feet are at roughly the same height, which is an efficient jugging technique.

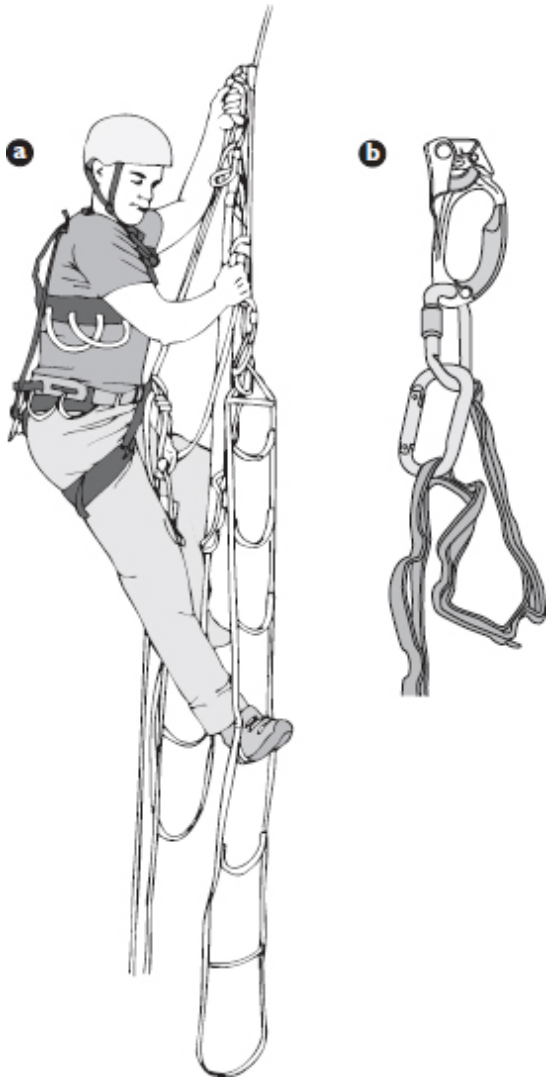

Fig. 15-26. Using ascenders: a, efficient jugging technique, with dominant left hand's ascender higher and right foot higher in its aider's ladder; b, proper method to shorten daisy chain for attaching to ascender.

When you move the ascenders up, the upper ascender will move easily while you stand with your weight on the lower ascender and aider, but the lower ascender may be more difficult to advance because there is no weight below that ascender. Resist the temptation to hold or pull down on the rope below the lower ascender in order to be able to move it up. Although this works, it is an inefficient and inadequate technique for covering long distances. Instead, practice "thumbing"—using your thumb to slightly open the cam on the lower ascender so that it will move upward. Most ascenders will open with thumbing without risk of opening fully and detaching from the fixed

line. Thumbing is very efficient, and it may be necessary to do it on every stroke.

Ascending Steep Terrain

When ascending very steep terrain, rather than fully weighting the aiders during the entire ascending process, the climber should drastically shorten the upper daisy chain, probably to about the third loop from the harness, and rest body weight directly on the upper ascender after moving it up. In this sequence, move up the upper ascender and then rest with all your weight by hanging in the harness from the ascender. Move up the lower ascender, stand up, and push up the upper ascender a few feet and hang again. Other variations of this technique exist, so climbers should experiment to find out what works best for them.

Backing Up Ascenders

As a rule, do not untie from the end of the climbing rope while ascending. Remaining tied in serves as a backup in case both ascenders fail. To further decrease the likelihood of a long fall, periodically "tie in short," using the climbing rope as the backup (as discussed below), or otherwise provide a backup on the rope below the ascenders. Tying in short or providing a backup below the ascenders is an easy precaution that has saved lives. Conversely, mistakes in attaching and backing up ascenders have led to many deaths.

As the second ascends, an ever-lengthening loop of climbing rope forms below the lower ascender, making for a long fall if the ascenders fail. A backup shortens this potential fall. One way to achieve this backup is to attach the Grigri directly below the ascenders. This not only provides a backup but also allows the Grigri to be employed in other simple and extremely efficient techniques for following pitches and cleaning gear (for example, the Grigri lower-out method, described later in this chapter).

To use the climbing rope as the backup, stop periodically and tie any knot, such as an overhand on a bight, just below the ascenders, and clip the loop in to your harness with a locking carabiner. This "ties you in short" to the climbing rope. Repeat this procedure as often as necessary, clipping new knots to the same one locking carabiner, to shorten the fall potential. Keep in mind that the ascenders are most likely to come off on a traverse and less likely to come off on simple jugging up a straight line. Most climbers using

this method keep all the loops clipped in to their harness until they reach the anchor.

Often while jugging, the climber may choose to remove the upper ascender from the rope and place it above a piece of protection that is under tension as the climber ascends. It is prudent to tie in short or make sure to use a backup method before removing the upper ascender from the rope.

Other Precautions While Ascending

Other precautions should be taken while ascending. First, carry a spare prusik sling just in case an ascender fails or is dropped. A Grigri is a much more effective and efficient lower ascender than a prusik, so this is the first backup to an ascender. And, as in all climbing, beware of sharp edges. Jugging places the rope under tension, and sharp edges can cut it. Ascend as smoothly as possible to minimize any sawing action on the rope running over an edge.

ROPE MANAGEMENT

Rope management while following is critical, especially when high winds or "rope-eating" cracks may foul or snag the rope. Popular methods of managing the rope include clipping a rope bag to some part of the harness, such as a leg loop, and stuffing the rope hanging below the ascenders into the rope bag while the climber is ascending; clipping in backup loops (see "Backing Up Ascenders" above); or making coils of the rope and clipping them to the harness. Leaving the rope hanging for the entire pitch is not recommended, but it can work when the pitch is overhanging or there is otherwise little risk of the rope hanging up. When the rope is hanging, eventually this weight makes moving the lower ascender easier as the climber ascends, and thumbing is not required (see "Using Ascenders").

CLEANING

Efficiency in aid climbing is directly linked to organization. While ascending and cleaning a pitch, the follower should take the extra time to rerack the equipment for leading, including reracking single slings into quickdraws. This makes belay transitions go faster. Keep specialized cleaning gear handy, including the nut tool and funkness.

TIPS FOR CLEANING PINS

- **First, tap the pin lightly** to get an idea of how much it moves initially. While pins may need to be hit many times to remove them, attaching a carabiner to the pin too early makes it harder to hit and slows the cleaning. For all pins except sawed-off angles, it should be possible to move the pin before the sling is attached. But be careful! If the pin flies out with no sling attached, the pin will probably be lost forever.
- **Attach either a carabiner with a sling or the funkness device** once the pin is loosened—or, for sawed-off angles, before hitting at all. Clip one end to the pin and one end to yourself, possibly to the aider or daisy chain. Continue to hit the pin back and forth until it comes out. Try not to hit the funkness carabiner, because it can break. Use one hand to hold the carabiner to the side while you make blows. It might be a good idea to use the pick side of the hammer when the funkness is attached. For sawed-off angles, err on the side of putting the sling on early. They do not visibly move much, and it is hard to know when they will come out.
- **Try clipping the free end of the funkness to the hammer** if the pin does not come out with back-and-forth hits. Then "funk" on the pin by making a big jerk out and up with the hammer (see Figure 15-7) and then another separate "funk" with a jerk out and down. "Funk" the pin multiple times, as needed, up and down to loosen it. Sometimes jerking straight out away from the rock is helpful, especially with angles. Protect your face when using the funkness.

When cleaning a pin, first hit it back and forth or up and down, along the axis of the crack. For pins placed in vertical cracks, try to favor the upward hits, which can create future nut placements. (See the "Tips for Cleaning Pins" sidebar.)

SECONDING TRAVERSES AND OVERHANGS

Seconding traverses when aid climbing can be both strenuous and technical. Some of the most common and useful methods are described below. These basic methods can often be applied to overhangs as well.

Re-aiding

When traversing horizontally, it may be more efficient to aid climb across the traverse, using aiders, as if leading (called re-aiding). Aiding in this fashion, the second can self-belay by using a Grigri as an attachment point to the rope to keep the rope tight from above or by attaching ascenders to the harness with slings and sliding the ascenders along the climbing rope. Make sure to back yourself up to the lead rope or tie in short from time to time, while of course always staying tied in to the end of the rope.

Seconding Short and/or Diagonal Traverses

The second can cross short traverses and sections of pitches that are more diagonal than horizontal by using normal jugging techniques. Two main techniques can be used to second a short diagonal traverse with normal jugging techniques, rather than re-aiding as described above:

Grigri lower-out method. The first technique is very easy and requires a Grigri. Jug up to the piece you plan to pass, moving both ascenders as close to the piece as possible (fig. 15-27a). Then bring the Grigri up under the lower ascender and rest all weight onto the Grigri (fig. 15-27b). Remove the top ascender and place it above the piece, and then repeat with the lower ascender (fig. 15-27c). Then open the handle of the Grigri and feed out rope, lowering yourself onto the ascenders and daisy chains (fig. 15-27d). Reestablish your weight in the aiders and reach back to clean the piece (fig. 15-27e).

Alternate method without a Grigri. Although the alternate method is a little trickier, it works if the climber does not have a Grigri. When approaching a piece of protection, leave the lower ascender some distance below the piece, about an arm's length or so, depending on the steepness of the terrain and the distance to and position of the next piece. With your weight on the lower ascender, remove the upper ascender and attach it as far as possible above the currently weighted piece. Then transfer your weight to the upper ascender; this will pull the lower ascender up toward the piece. If you have allowed enough space, the lower ascender will not jam into the carabiner of the piece, and it will be possible to remove the piece and move up the lower ascender.

Seconding Longer and/or Horizontal Traverses

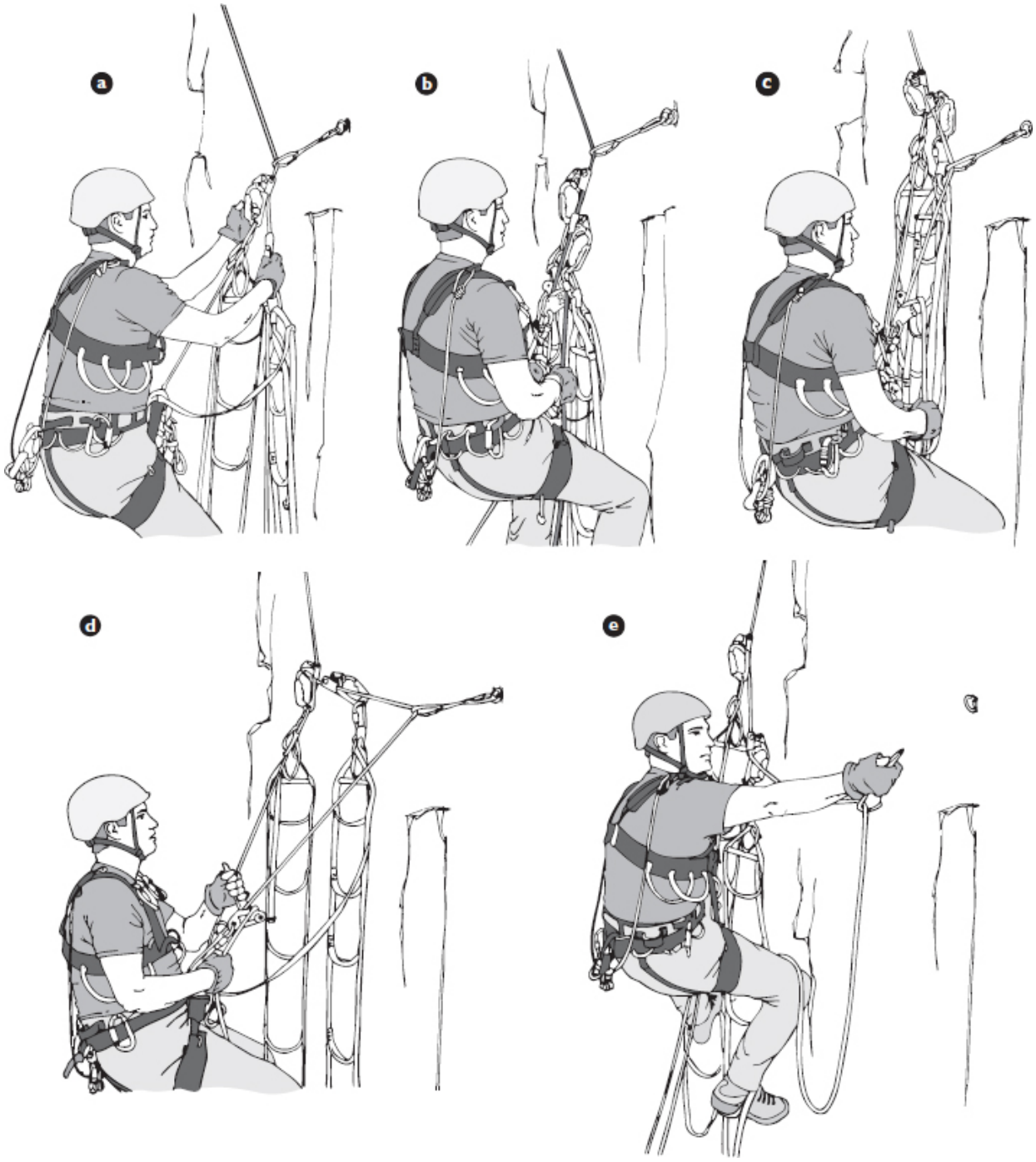

Fig. 15-27. Grigri lower-out method: a, move ascenders to just below protection; b, bring Grigri below lower ascender and transfer weight to it; c, remove ascenders—upper first, then lower—and reinstall above protection; d, lower with Grigri until weight is transferred to ascenders in new plumb line; e, clean the piece.

The best way to follow longer traverses, tension traverses, and horizontal traverses is often to do a "lower-out," using the methods described below. If the leader has left some kind of piece that is suitable to lower off of and then

cleans all of the traversing pieces, the second can lower from the beginning of the traverse to the next piece left by the leader. This method is often faster than other methods of following a traverse, but whether or not to use this method is largely up to the leader, who has to decide whether a piece of gear can be left fixed while he or she is protecting the pitch.

SECONDING TENSION TRAVERSES AND PENDULUM SWINGS

The best method for seconding a long, mostly horizontal span between gear, including spans resulting from the leader performing a tension traverse or a pendulum swing, depends on the distance to be traveled and the ropes available. As described in "Tension Traverses and Pendulum Swings" earlier in this chapter, the lower-off point is usually fixed and is often a carabiner, a rappel ring, or a piece (or pieces) of webbing. If the leader climbs a long distance without leaving gear, expecting the second to lower out to reach the new plumb line, the leader should ensure that there is adequate fixed gear left for the second to lower out from. The term *lower-out* is used to describe a variety of methods of lowering into a new plumb line, including the two techniques discussed below for following shorter and longer distances.

Short Pendulum Swings and Tension Traverses ("Stay Tied In" Method)

One clever and useful method of accomplishing a shorter lower-out is shown in Figure 15-28. The follower stays tied in to the climbing rope during the entire sequence, making this a safe and preferable method. This method requires the available rope to be four times as long as the distance to be traveled.

1. **Jug up to the fixed point.** If possible, fifi in to something without blocking the opening of the lower-out point (fig. 15-28a). Often, the leader will place protection near but separate from the lower-out point itself. Or, if using a Grigri as a backup, hold your weight on the Grigri.
2. **Clip a carabiner to the belay loop on your harness.** Then find the end of the rope that is tied in to the harness. Take this rope out to about arm's length from the harness tie-in knot and make a bend in it. Push this bight of rope through the lower-out point, and then bring the bight back toward the harness (fig. 15-28b).

3. **Clip the bight in to the carabiner attached to the belay loop.** Pulling on the free end that comes out of the lower-out point, cinch yourself up and hold your weight on the climbing rope through the lower-out point (fig. 15-28c). Retrieve all of the team gear before lowering out. Two additional optional steps are (1) clipping a carabiner as a backup around the rope and through the top hole of either (or both) ascender(s), to ensure that the ascender stays on the rope (see Figure 15-29), and (2) shortening the daisy chain on the upper ascender to reduce the overall lower-out distance.

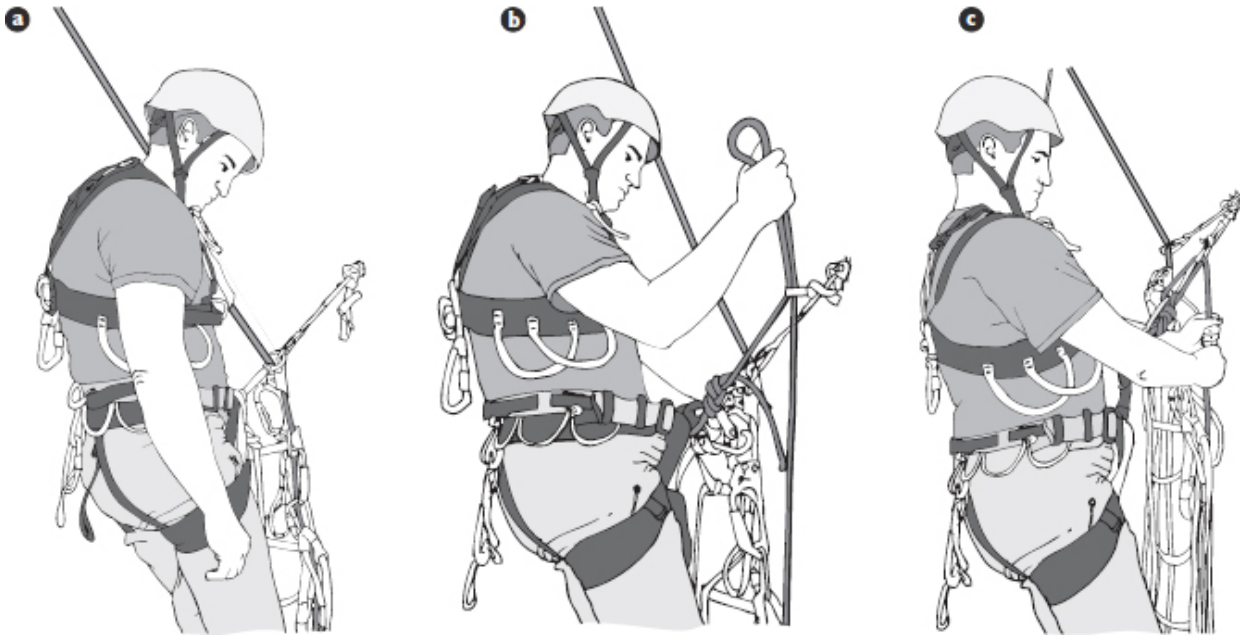

Fig. 15-28. Lower-out method for seconding short pendulum or traverse: a, jug until ascenders are just below protection at lower-out point, then fifi to protection (here, a quickdraw); b, clip a carabiner to harness belay loop, then pull a bight of rope through lower-out point; c, clip bight to harness belay loop and transfer weight to rope; (continued on facing page)

4. **To lower out, let the rope feed through your hand** (fig. 15-28d). At first, there will be considerable friction, but be diligent as you lower yourself to avoid dropping the rope and lowering too fast. As your weight comes onto the ascenders in the new plumb line, continue to feed rope through the lower-out system.
5. **Unclip the bight of rope from the carabiner on the harness belay loop** once you have all your weight on the ascenders in the new plumb line. Pull the ends of the rope so that the bight of rope that was clipped

to the harness gets pulled through the lower-out point (fig. 15-28e). The rope has now been freed.

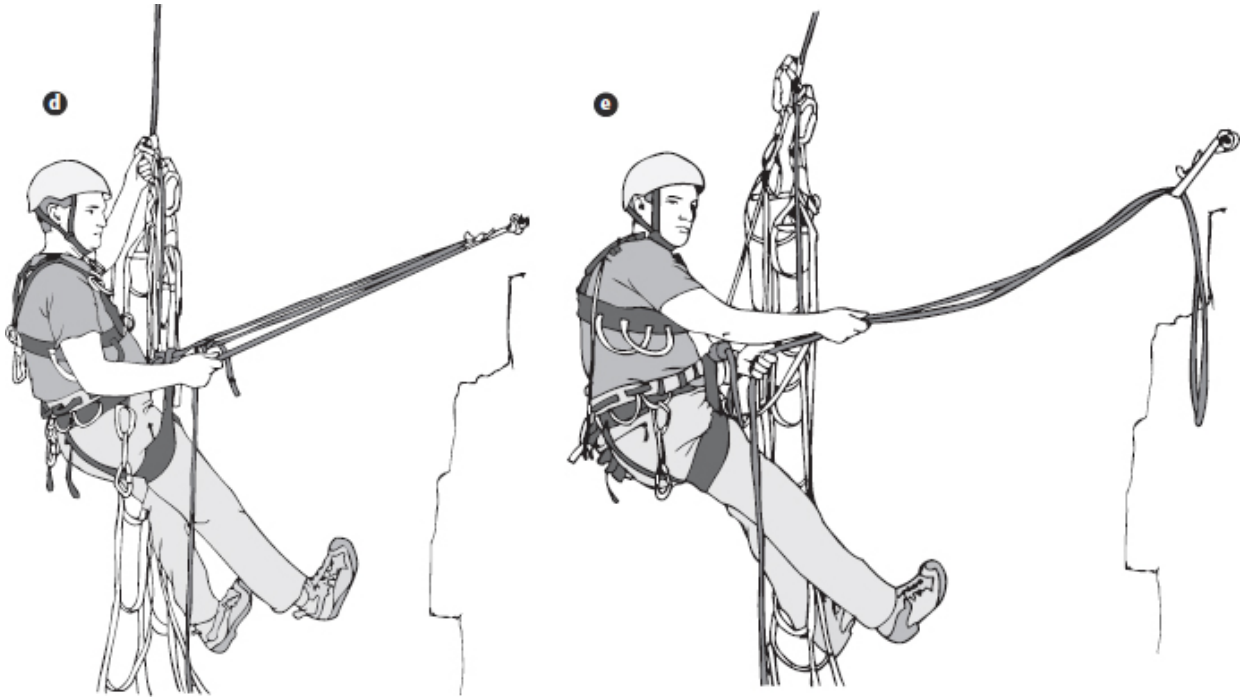

Fig. 15-28. (continued from facing page) d, feed the rope through the harness carabiner until ascenders are weighted; e, unclip the bight of rope from harness and pull it through the lower-out point.

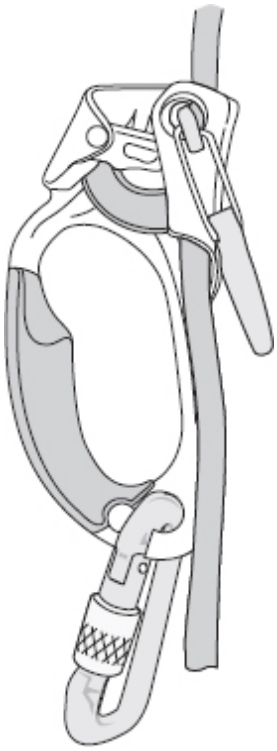

Fig. 15-29. Carabiner clipped through ascender top hole and around the rope to prevent ascender from detaching from the rope.

Sometimes distances can be seconded without actually lowering out, especially when the terrain is not steep. The follower moves up to the piece and finds a stance or a nearby crack or feature to hold on to, which takes the climber's weight off of the piece to be cleaned. Then the follower removes the piece and, with anticipation of a swing, lets go without lowering out, swinging into the new plumb line while hanging from the ascenders and daisy chains. When used with good judgment, this technique, sometimes called the "Rudy," can be a safe and fast way of following a short, low-angle pendulum swing.

Long Pendulum Swings and Tension Traverses ("Untie" Method)

The lower-out method discussed above requires the available rope to be four times as long as the distance the follower must span, so it works well for seconding short pendulum swings and tension traverses. For longer lower-outs, or when this length of rope is not available to the follower, a different method that involves untying from the climbing rope must be used. Since it is preferable to stay tied in to the climbing rope, this technique is used only

when the above technique suggested for shorter distances is not possible. For this alternative method, the available rope must be twice as long as the distance the follower needs to span.

1. After the leader indicates that the lead line is fixed, the follower prepares to untie from the climbing rope. Before untying, the follower makes sure their harness is attached to the anchor with at least two points of protection, such as the daisy chains. Pull up a bight of rope and tie in short to the harness. Check and double-check the attachment points, then untie from the lead line (fig. 15-30a).
2. Thread the end of the lead line through the lower-out point. For large lower-outs on established routes, the lower-out point should be fixed and is likely to be a sturdy metal rappel ring. Feed the entire length of the rope through the ring (fig. 15-30b).

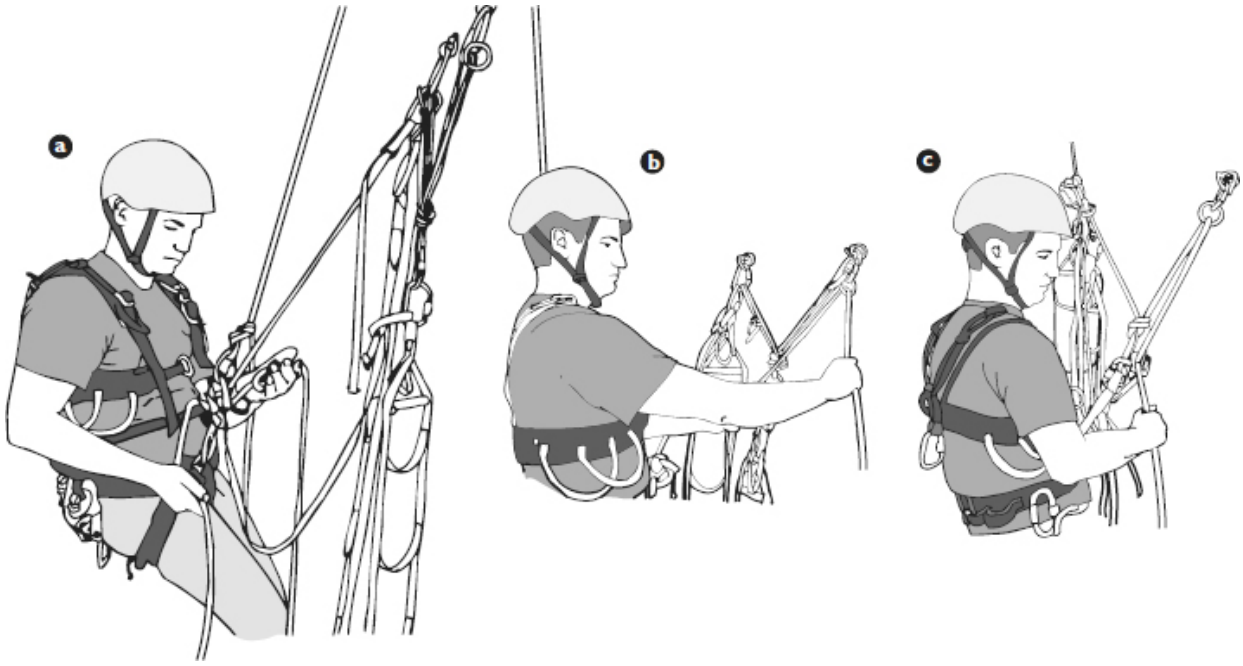

Fig. 15-30. Seconding a long pendulum: a, tie in short, attach daisy chains to two points of protection, then untie from the rope; b, feed the free end of the rope through the lower-out point (here, a metal rappel ring on fixed protection); c, rig rappel device, then attach both ascenders to rope; (continued on facing page)

3. Put yourself on rappel on the tail of the rope, in the manner of a single-rope rappel. Clip both of the ascenders to the lead line, above the rappel setup (fig. 15-30c), and shorten the daisy chains (optional). It is possible to make the lower-out much shorter by pushing the ascenders up the rope as high as possible. If desired, use a Grigri below the ascenders on the

end of the rope that goes to the leader, for another backup. Consider clipping a carabiner through the hole of the ascender and around the rope, for one or both ascenders (fig. 15-29).

4. Rappel the pendulum (fig. 15-30d).
5. Once all weight is on the ascenders in the new plumb line, remove the rappel device and pull the end of the rope through the lower-out point (fig. 15-30e). The rope has now been freed. Tie back in to the end of the rope before continuing to follow the pitch.

CHANGING LEADS

Unorganized belay stations can become a rat's nest of tangled ropes, twisted slings, and jumbled hardware. Basic organization keeps the belay station manageable and the team functioning efficiently. The following methods improve organization of the belay station:

- **Use ropes of a different color** when possible, to easily differentiate them.
- **Always stack the haul line** while hauling the bag, using rest intervals to stack the haul line in a rope bag or on a sling. After hauling, organize what remains of the rack and put it all on one side of your body or on a sling on the anchor so that the second can rerack for the next pitch without the leader's help, freeing the leader for other chores after the second arrives.
- **Plan where the second will come up,** and have a locking carabiner ready to clip the second in to the anchor, or ask the second for one as soon as he or she arrives. This allows the second to safely and quickly anchor in.

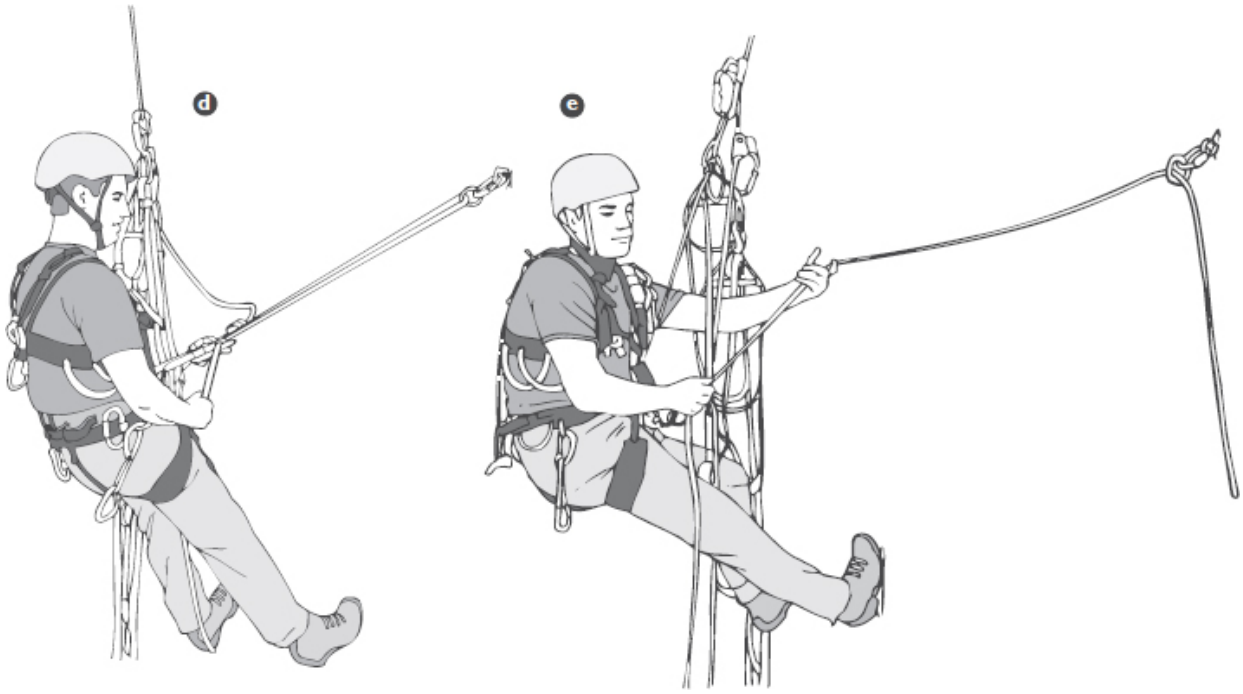

Fig. 15-30. (continued from facing page) d, rappel the pendulum; e, remove rappel device, pull rope through the lower-out point and tie back into the rope.

- **Focus on the needs of the new leader** when the second arrives. Get the weight of the lead rope off of the second as soon as possible. While the second reracks, pull up the lead line and restack it if necessary. Put the new leader on belay immediately, even if that climber is not ready to lead. Find out what the new leader needs in order to leave, and facilitate that. Accept from the new leader any gear not wanted for the next pitch, and offer food or water.
- **For a smooth belay transition,** all team members should at all times be doing some chore to advance the team, until the leader starts out on the next pitch. If you are the next belayer, try not to eat, drink, adjust your clothing, or take care of yourself when the new leader is still at the belay. These needs should be taken care of after you finish hauling and before the follower arrives, or while the new leader heads out on the next pitch. Watch the new leader attentively until he or she places protection on the new pitch. Then consider your needs while belaying the leader farther up the pitch.

BIG WALL MULTIDAY TECHNIQUES

For some climbers, only the reward of a big Grade VI wall could entice them to pick up ascenders and aiders and undertake the process of aid climbing. Big wall climbing is sometimes referred to as vertical backpacking, because the big wall climber hauls heavy bags with water, food, and camping supplies and typically covers ground very slowly, compared with free climbing. Climbing big walls is hard work, with endless chores of rope stacking, bag hauling, and ascending. Efficiency, organization, and proper conditioning are critical to success.

Big walls also call for a high degree of mental composure. Inexperienced wall climbers easily find themselves the victim of heightened fears brought on by prolonged and severe exposure. Climbers who are new to the game can perhaps soothe their fears by realizing that techniques for dealing with major walls are much the same as those needed for smaller climbs. Concentrate on the problem at hand, and work away at the objective one move at a time.

Guidebooks and other climbers are helpful sources of information in preparing for a big wall. Beware, however, of overdependence on climbing route topos and equipment lists. Routes do change over time, especially if pins are used regularly.

Solid, efficient aid technique is a prerequisite for completing a major wall within the time constraints dictated by reasonable food and water supplies. For success on big walls, develop competence in hoisting heavy haul bags up a route and in living comfortably in the vertical world for days at a time. Amazing journeys to seldom-visited places amid a sweeping sea of granite await those who accept this adventure.

Note: The anchor setup and hauling diagrams in this chapter assume anchors that include one or more bolts properly installed in good rock, which is the situation most likely encountered on well-traveled aid routes. In the event that climbers must construct their own anchors, they should carefully evaluate the strength of each piece of protection used in the anchor and consider fixing the lead line or attaching the haul device to the power point of the anchor rather than directly to one point of protection.

HAULING

The leader anchors in and fixes the climbing rope for the second, then begins hauling, using one or more of the techniques described below. Regardless of which methods the team uses, the climbers should always connect themselves to the anchor with the climbing rope.

1. **Load the hauling device with the haul line.** Tie an overhand knot on a bight in the end of the haul line and attach this to the locking carabiner on the hauling device. Clip this hauling device to the haul anchor. Prepare a sling or rope bag to stack the haul line into while hauling (fig. 15-31a). Pull up all the slack in the haul line, through the device, until the line comes tight. Your follower should then call out "That's the bag."

   If not using a hauling device, set up a haul system with a pulley and one ascender (see Figure 15-13d). Run the haul line through a regular pulley and clip the end of the haul line to the locking carabiner on this pulley. Clip this pulley to the haul anchor. Attach an upside-down ascender to the haul line on the haul-bag side of the pulley. Clip the upside-down ascender in to the anchor, near the pulley. It may be helpful to use a short sling, such as a full-strength tie-off loop, to connect the ascender to the pulley's locking carabiner so that it is positioned directly below the pulley on the anchor system. Consider using two slings for redundancy.
2. **Connect one ascender to the belay loop on the harness and lock the carabiner.** Attach this ascender to the haul line on the slack side of the rope coming out of the hauling device or pulley. Do a small amount of hauling, just a few inches at a time, as described in step 3 below, to unweight the bags off of the lower anchor (fig. 15-31b). Then the follower can free the haul bag from the anchor and call out, "Bags are free, haul away."
3. **Begin the regular hauling process.** Push back from the wall using legs and palms to raise the haul bag (fig. 15-31c). As the bag comes up, the climber's body lowers until the rope between harness and anchor tightens. Then stop, stand up (maybe in the aiders), move the ascender back up the rope toward the hauling device, and reset. Repeat. For heavy bags, it may be necessary to also pull up with one hand on the weighted haul line while pushing back with the legs. When you stop hauling, the cam in the hauling device or upside-down ascender acts as a brake to prevent the haul bag from slipping backward. Slack is needed in the climbing rope between yourself and the anchor to allow hauling movement—usually a few feet.

   You can also haul by allowing greater slack of 6 to 8 feet (2 to 3 meters) between the tie-in knot and attachment point to the anchor. Then walk down the wall 6 to 8 feet until the anchor rope tightens. Climb back

to your original position by jugging, possibly with one aider and daisy chain on an ascender and with one Grigri. Repeat the process. This method works best with lighter bags.

Counterweight hauling. A counterweight method can be used if two people are needed to lift a very heavy bag. The leader can stay at the anchor station and haul the bag normally, while the follower can attach his or her ascenders on the pulling side of the haul rope, about 6 to 8 feet (2 to 3 meters) below the leader. As the leader hauls, the follower hangs on the haul line to provide counterweight and walks down the wall while the leader hauls. The follower must use a longer tie-in to the anchor, about 12 to 16 feet (4 to 6 meters). To prevent the follower's tie-in to the anchor from becoming tight, the follower must jug periodically.

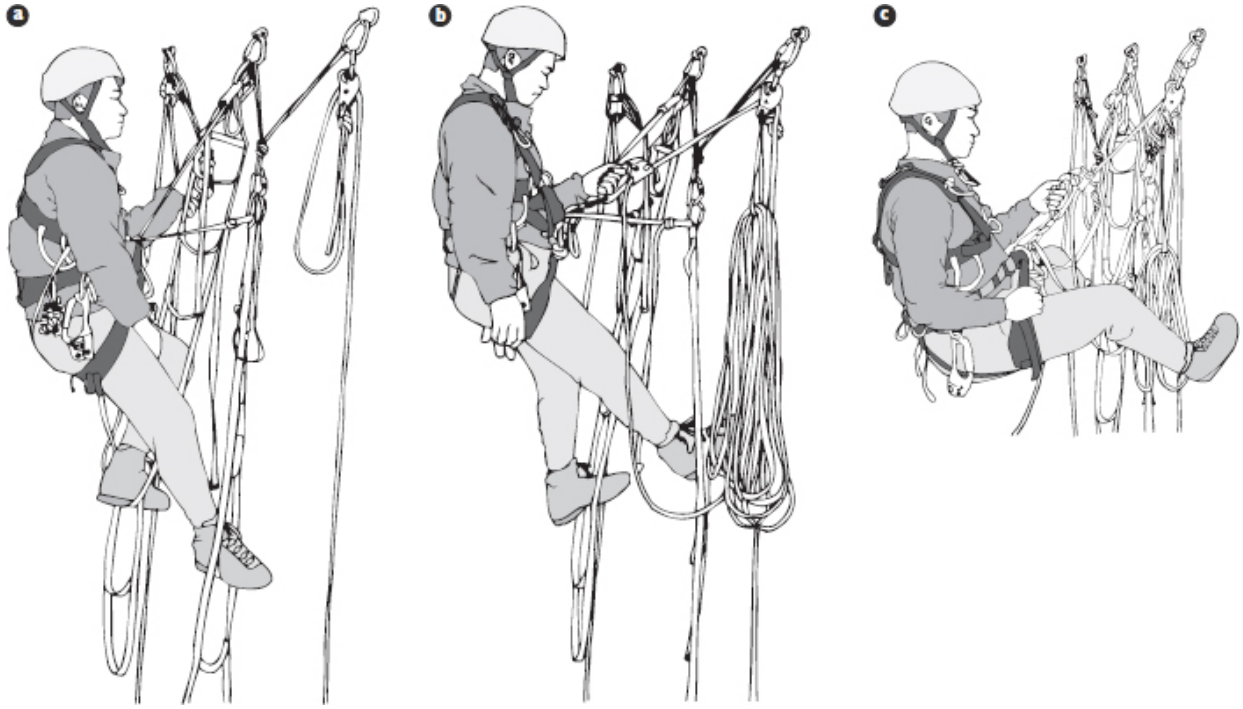

Fig. 15-31. Hauling: a, install haul rope in hauling device, then pull up and stack rope until rope is taut; b, use one ascender (clipped to harness belay loop) to haul rope until haul bag is lifted from lower anchor; c, haul away after the second releases the haul bag from the lower anchor.

Docking the bag. Once the leader has completed the haul, the haul bag must be "docked" in order to attach it to the wall and free the haul line for the next pitch. First, always be sure to stop hauling before the knot in the haul line that attaches the haul rope to the top of the haul bag reaches the haul device's pulley. This is critical—if the knot gets too close, it will be sucked into the hauling device, jamming it. Then select a spot in the anchor to dock the bag,

and attach a carabiner to this location. Pull the docking cord up from the top of the haul bag and tie the cord to the carabiner as close to the haul bag as possible, using a load-releasing hitch such as a munter-mule (see Figure 9-21 in Chapter 9, Basic Safety System). Back up the hitch with another knot in the docking cord (fig. 15-32a).

Then do a minihaul on the hauling system, raising the bag just an inch or so, to allow the cam of the hauling device or the upside-down ascender to be disengaged. Unlock the hauling device or upside-down ascender, then carefully lower the bag, using your weight and the ascender clipped to the harness belay loop, so that the bag's weight rests on the docking cord (fig. 15-32b).

It may be necessary to reengage the cam on the hauling device or upside-down ascender and repeat this minihaul process one or more additional times before the bag's weight completely rests on the docking cord, allowing the leader to fully disengage the hauling device or upside-down ascender from the haul line and remove it. With the bag free from the hauling system, also tie the haul line from the bag in to the anchor with a figure eight on a bight as a backup (fig. 15-32c) in case the docking cord should fail.

Dock the bag as high as possible on the anchor, so that less bag height is lost during the dock and so the bag can be accessed during the belay. If there is time, the leader can restack the haul line so the free end of the haul line is stacked on top. Or, more efficiently, just feed the haul line as it is while the leader is aiding the next pitch.

FIXING PITCHES

On long aid climbs, climbers often "*fix*" pitches: put up ropes and leave them in place so they can be climbed quickly with mechanical ascenders later to reach the previous high point. Climbers frequently fix one or two pitches above the ground or beyond the bivouac site, and at the high point they leave gear not needed for the bivouac. The lower end of each fixed rope is attached to the anchor of the previous pitch.

When fixing pitches, take care to protect the rope from sharp edges or abrupt contours by using duct tape or other material to cover the sharp feature. Intermediate anchor points, if available, should be used; they reduce rope stretch, contour the rope toward the direction of travel, and are useful in avoiding abrasion points. Leave enough slack in the rope when fixing it to the lower anchor to allow for reversal of rope stretch after rappelling, but not so

much that loops of rope can blow around when unattended. Make a tidy coil of any rope left on the ground.

Never ascend someone else's fixed rope without knowledge of its rigging and permission of the rope's owner. Close calls have occurred in ascending unknown "fixed ropes" not actually rigged for ascending.

RETREATING

Before a major aid climb, plan retreat lines in case of bad weather, an accident, or another emergency. Locate other easily reached routes that offer a speedier descent or fixed retreat lines.

If there is no retreat route, consider carrying a bolt kit for emergencies, to allow placement of rappel anchors. Also, as each pitch is climbed, consider how to descend it. On major walls, rescues may be slow and difficult, if they are possible at all. It may be up to the climbing team to get back down in an emergency. Rappelling the route for retreat with haul bags can be difficult, so practice this skill.

LIVING IN THE VERTICAL WORLD

Living for days on a vertical wall of rock brings some intriguing problems. Once gear is dropped, for instance, it is gone for good. All vital items must have clip-in loops and should be clipped in when not in use or not in the haul bag. Handoffs of gear between partners must be done with care, and "Got it" is a phrase used frequently so that both partners are sure when gear is secure during a handoff. Consider bringing duplicates of key items, such as knives for opening canned food, communication devices, an extra aider or two for the team, et cetera.

Learn about the gear so that it can be used confidently. Get acquainted with unfamiliar items, such as portaledges or hammocks, beforehand, preferably by testing them out in a hanging environment.

Big wall climbers must carry all their water with them. Each climber generally needs a minimum of 1 gallon (almost 4 liters) per day. For hot weather, especially if the route gets a lot of sun, carry even more. Often, climbers choose to bring food, such as canned food, with high water content; since water must be hauled anyway, the weight of this food is not a consideration. Canned soups, stews, fish, and fruit are favorite big wall fare. Bringing food that requires water to prepare demands accurate planning, since running out of water is bad, but running out of water when it is needed in

order to eat is even worse. Some climbers boil water on the wall, especially those who enjoy daily hot drinks. Stoves and cooking accessories must be usable in a hanging environment, and they add weight to the haul bag.

Waste disposal poses another challenge. Do not toss garbage down the wall. Haul it up and off the climb. Keep all bivouac sites clean and sanitary, with no sign of your passing. Use a waste container to pack out human waste. Whenever feasible, pack out garbage left behind by others, to leave the wall in better condition than you found it.

Generally, synthetic sleeping bags and clothing are the best choices for a big wall climb because they retain their insulating properties when wet. Inflatable pads are more compact and, thus, easier to pack in the haul bag, and they are warmer to sleep on in the portaledge. Just as in camping on the ground, consider backing up an inflatable pad with a closed-cell foam pad, in case the inflatable pad fails. Some climbers use foam pads to help pad the haul bag, but on the first days of a climb these are all but impossible to remove from the haul bag and then repack. The best plan is to always bring a bivy sack, no matter the weather forecast. Your sleeping bag can be stored in its bivy sack, and neither needs to be stuffed into stuff sacks—they provide great padding in the haul bag.

Consider that the air temperature, both day and night, may cool significantly during the ascent of a big wall, so bring extra clothing. Some clothing can be shared, such as a large insulated belay jacket (see Chapter 2, Clothing and Equipment). When selecting layers, consider the chore of hauling and try to wear clothing that will protect the skin from being rubbed by the harness.

Organization on the wall goes beyond climbing gear to include the items in the haul bag. Knowing the location of every item and having it accessible when needed will speed the climb and ensure that climbers can address their needs and any emergencies in a timely manner. Stuff sacks, often of different colors and sizes for identification, help greatly with organization inside the haul bag. Break up critical items, such as food for a long wall, into multiple bags to reduce the impact on the team if a bag is dropped. Use bags strong enough to stand up to wear and tear on the wall, and consider using bags with sewn-on full-strength webbing for clipping in to the wall. It is smart to know where storm gear, the first-aid kit, and human waste kits are located and to pack these items where they can be accessed quickly.

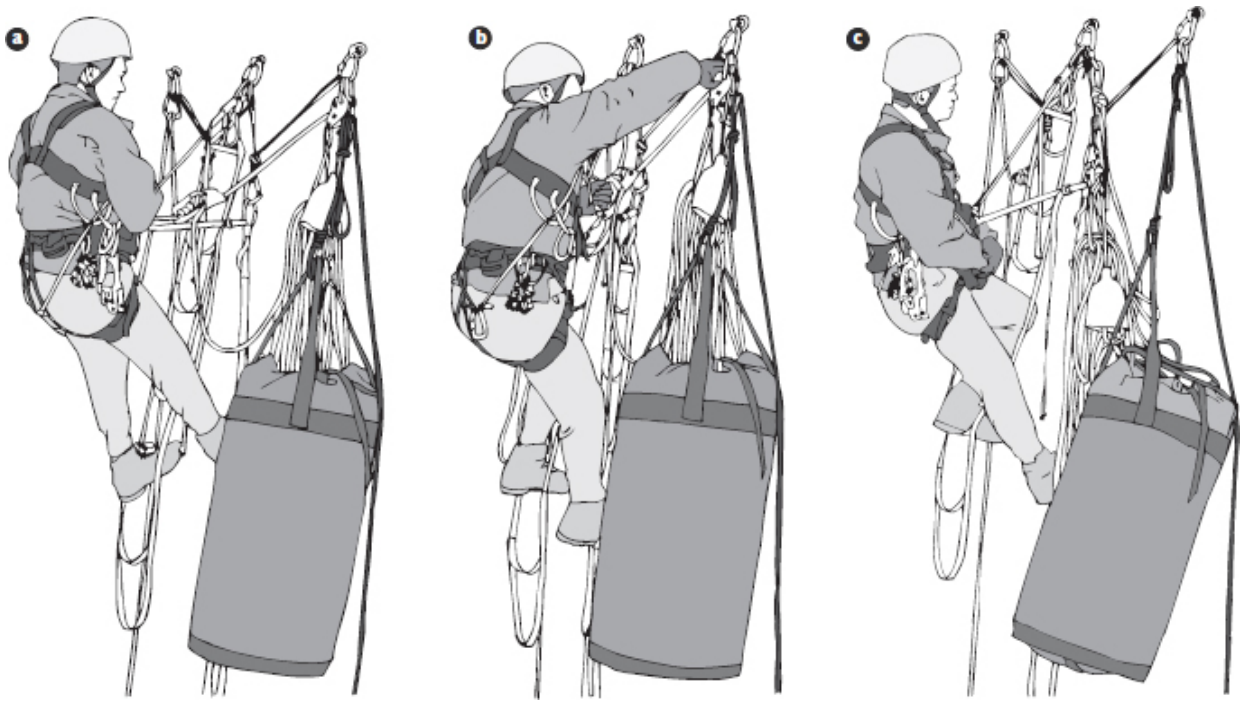

Fig. 15-32. Docking the haul bag: a, attach the haul bag's docking cord to the anchor with a munter-mule and an overhand backup; b, haul enough to release the hauling device and lower the haul bag onto its docking cord; c, remove the rope from the hauling device and back up the docking cord by tying a figure eight on a bight into the haul rope.

DESCENDING

After completing a major wall, climbers need to get their gear back down. Usually, they must hike or rappel off of the route with all their gear packed in haul bags. Before packing the haul bag, consider whether ropes need to be left accessible for rappelling; if rappelling, set aside all personal gear needed on the rappels before packing the bags.

Haul bags can be tossed off of walls and packed in such a way that all gear arrives intact, but this technique requires special training from an experienced tosser, as well as an improvised parachute for the haul bag. There are no guarantees that the bags will land where intended, and in some places this practice is illegal. Furthermore, many climbers have discovered that their gear has been stolen by the time they get back down. The safest, least stressful bet is to do the hard work of humping out all the gear.

Before packing the haul bag, make sure that the backpack harness is attached, or it will be necessary to unload the bag and pack it again to get the harness system in place. Pack haul bags with the heaviest items on the bottom for the hike out. Attempt to fill all the small spaces in the bag while packing it

from the bottom up so that the bag is packed compactly. Sleeping bags, bivy sacks, and clothing make good space fillers. Consider loading climbing gear into the haul bag loose, unclipping carabiners from protection and unclipping all gear from gear slings, to allow the bag to be packed much more compactly. A compact, tightly packed haul bag can be safely carried off a difficult descent much easier than a tall, floppy, top-heavy haul bag. If the team has to carry multiple bags, consider packing the smaller bag(s) with the heavier items and making any larger haul bags a little lighter to compensate for carrying a tall, bulky load.

As is true for all long climbs, the hike out can be a dangerous time, because the climbers are exhausted from the effort expended on the climb. Take your time, watch your step, and double-check your systems when rappelling or performing other technical maneuvers.

THE SPIRIT OF AID CLIMBING

Aid climbing offers high adventure in exchange for perseverance and hard work. The pioneers of rock climbing developed aid climbing to open up the vertical world and its fabulous summits, including legendary walls such as El Capitan and Half Dome in Yosemite National Park, California. In following the path of aid climbing's pioneers, you will reach locations visited by relatively few climbers and can imagine the great vision and dedication required by the first ascensionists to establish these routes.

Aid routes require technical skill in placing gear and boldness to climb thin cracks and steep walls while relying on the proper use of equipment. Keep aid climbing adventurous by resisting the temptation to alter established routes by adding bolts, drilling holes of any kind, nailing pitons, and even leaving behind excess fixed gear. Clean up routes when climbing them by removing old and tired fixed slings, and in general try to leave the route in better condition than you found it. Always practice Leave No Trace ethics on the wall. The rewards of all alpine trips are great, but most likely, your memories of long, multiday wall routes will stand out in a lifetime of climbing as unique and special experiences.