

Hardware



If you've ever tried lifting a heavy weight into the air, you know that even with a pulley, and especially without, this job is not for weaklings. By applying some basic technology, you too can be strong enough to lift your food supplies out of the reach of grizzly bears.

Pulleys and Blocks: A pulley is a wheel with a grooved rim. A pulley mounted in a frame is called a block. A block containing a single pulley is called a single block; one with two pulleys a double block, and so forth. Two blocks properly threaded or "reeved" with rope are called a block and tackle.

Blocks are a basic component of most hoists. They are readily available at hardware, sporting goods, and mountain-climbing supply outlets. While top-of-the-line equipment is not usually needed, neither should you buy the cheapest

blocks you can find. Cheap equipment has broken under stress. Small, lightweight pulley blocks used for mountaineering and heavier steel blocks available at hardware stores are dependable choices and are available for under \$10 each (Figure 4). Carabiners (Figure 4, left) are the preferred means of attaching blocks to other lines and are available for a few dollars each at mountain-climbing supply outlets. In a pinch, a carabiner by itself can serve to reverse the direction of pull. Match your rope to the size of the pulley block used. More elaborate equipment, such as safety cams to prevent rope backsliding, and blocks, carabiners, and ropes with extremely strong ratings, is also available. But, such equipment is expensive and much stronger than other components of these temporary systems, and therefore not needed for practical, affordable applications.



Figure 4.—Useful hardware for hoists.



Block and Tackle: A single block offers no mechanical advantage to the lifter. You end up lifting the entire weight, and just changing the direction of pull. However, by adding another block to this arrangement and creating a “single and single” block and tackle (Figure 5), you can reduce the force needed to lift a load by half. Adding another pulley increases your mechanical advantage to 3:1. Place the block with the most pulleys at the top, to serve as the immobile, or fixed block. This would enable you to lift a 100-pound load by applying 33 pounds of force. Blocks and tackle can be purchased in a wide variety of sizes and configurations, or you can make them up easily yourself from two blocks. Often one has a cargo hook attached to one end. A lightweight variation using 3/4-inch webbing and rollers instead of pulleys is also available for about \$20. It offers a 5:1 mechanical advantage and has an 800-pound capacity, but only 9 feet of lift with the length of webbing provided.

“Single and single” or “single and double” blocks and tackle should be adequate for most backcountry hoisting applications for up to 125 pounds or so. As more pulleys are added, the extra weight and length of rope needed may become a concern, even though making it possible to lift heavier loads. In field tests, a “single and single” block and tackle proved to be the least expensive, easiest to use, and overall best way to obtain mechanical advantage for weights up to 110 pounds.

Portable Pullers: There are many portable, compact pullers on the market. These devices (Figure 6) can be attached to the main haul line, tied off to a tree, and used to lift the load in the air. Some, such as a fence stretcher, can lift only a foot or two at a time. Others have 10-foot or longer cables. Most of these devices are too heavy (4 pounds for a fence stretcher, 6.5 pounds for one of the smallest pullers) for backpacking, but could be packed in a vehicle or on a pack animal. Tie off the haul rope before releasing the rope from the puller or fence stretcher. In limited field testing, portable pullers proved to be the least desirable way to obtain mechanical advantage. The 10-foot cable on the model tested was too short; the cable release mechanism was

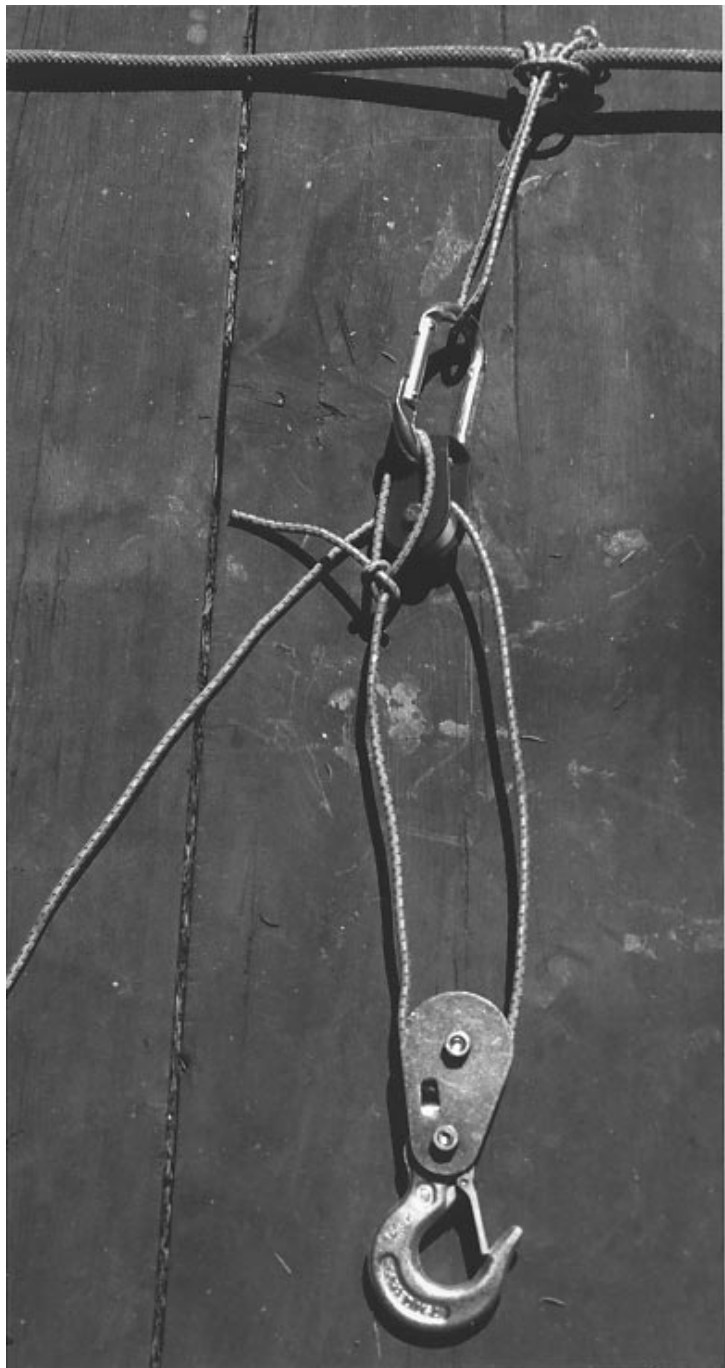


Figure 5.—“Single and single” block and tackle—recommended method for up to 110 pounds.



awkward and potentially finger-smashing, and lowering the load was extremely slow. Fence stretchers were not tested, but similar problems would be expected.

Winches: Compact hand winches (Figure 7), designed for all-terrain vehicles and snowmobiles, offer another possibility for attaching to your haul line. Tie off the winch to a tree. Depending on your system, use the cable or rope supplied with the winch as your main haul line or attach the cable to a nonslip loop in the haul line and tie off the haul rope to the tree before releasing it from the winch. The winch tested weighs 8 pounds. With a very low gear ratio (42:1 on the model tested), winches allow very heavy weights to be lifted with ease. At a cost of about \$100, specialty winches are the most expensive of the methods tested to obtain mechanical advantage.

Caution: Using any of these devices allows a person to lift heavy loads off the ground. Be sure the rest of your suspension system can handle the weight and give some advance thought to how to safely lower the weight once it is suspended. Do not allow the haul line to get wrapped around your hands, or legs, or nearby fallen tree limbs. Use a partial wrap around the tree if necessary to provide friction to the haul rope when lowering a suspended load. ***Wear gloves to prevent rope burn!***

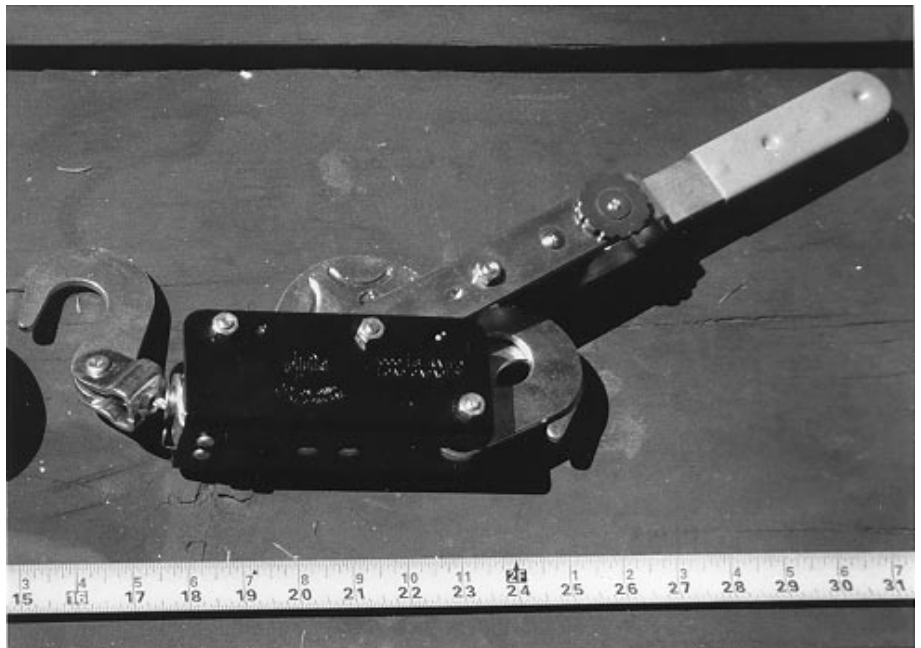


Figure 6.—Portable hoist/puller did not work well in field tests.

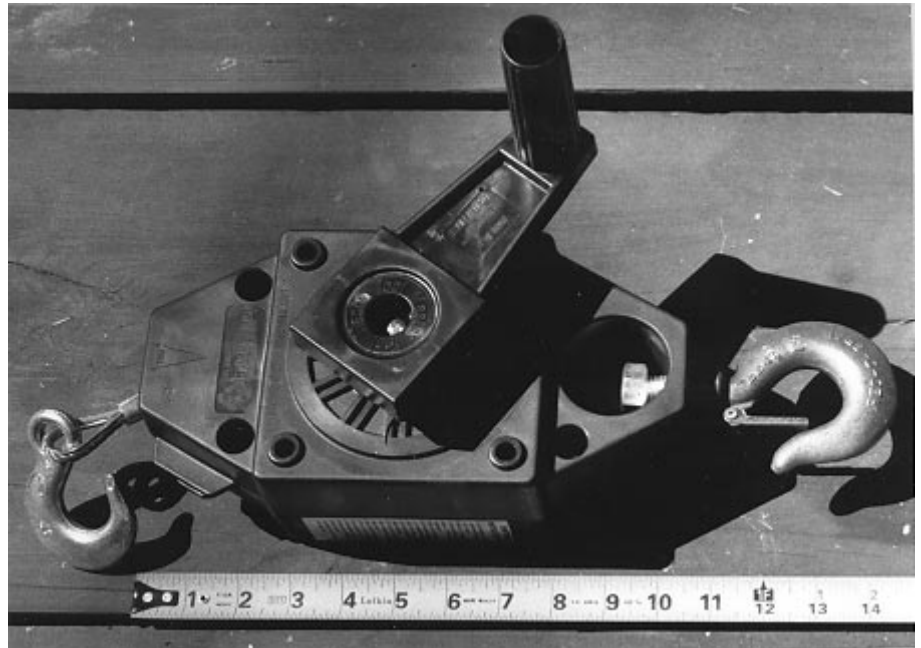


Figure 7.—Compact hand winch.