A Magnetic Point Frame[1]

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Highlight

The point frame has been improved by using pot magnets as a brake for pins. The pins can be pulled away and repositioned easily. This magnetic point frame is efficient, lightweight, and has proved to be durable.

The point quadrat is often used to sample composition of herbaceous cover. Developed about 35 years ago (Levy and Madden, 1933), this method is still a standard sampling technique.

A recent cooperative study by the Forest Service and the National Park Service in Sequoia National Park, California, included problems of sampling vegetation. One problem was how to sample cover composition in meadows. The point-quadrat method seemed the most suitable. The pin frame we used had to be efficient, lightweight, and rugged. We had only a short time to obtain a good estimate of composition. Personnel and equipment were to be carried into the study area by helicopter over 12,000-ft terrain. And there would be no time or facilities to repair equipment.

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Most pin frames are made of channel or angle steel. They contain 10 pins guided by pairs of holes drilled in the crossbars of the frame. The pins are free to slide to the ground. The operator must draw the pins up one at a time. Each pin is then lowered slowly until a hit is made. The operator must hold the pin while identification is made. The procedure is awkward and time-consuming.

Heady and Rader (1958) designed a ten-pin frame using a pin brake or drag made from metal strips cut from cans, oak blocks, and pieces of leather. The brake allows the operator to release the pin, and have it remain in position. Smith (1959) improved this design with an aluminum frame using sections of clock spring as drags.

Rader and Ratliff (1962) designed a frame that contains 10 pairs of notches and uses one pin. The operator must hold the pin in place and move it from one pair of notches to the next. Even though some time is lost moving the pin, this procedure may be more efficient than raising and lowering pins as in the earlier frames. The time the operator must spend moving the pin to the next position is greatly reduced.

We designed a frame for the study in Sequoia National Park by combining an aluminum frame similar to Smith's and a notch design like that used by Rader and Ratliff (1962). We added magnets to hold the pins in place and to provide braking. The notches allow one pin to be shifted from position to position with little lost motion. The magnets have proved to be smooth brakes. They hold the pin firmly, yet allow it to be pulled away and repositioned easily.

The heliarc-welded frame is constructed of 1 × 1 × ⅛ inch extruded aluminum angle (Fig. 1, 2). Each crossbar is 26

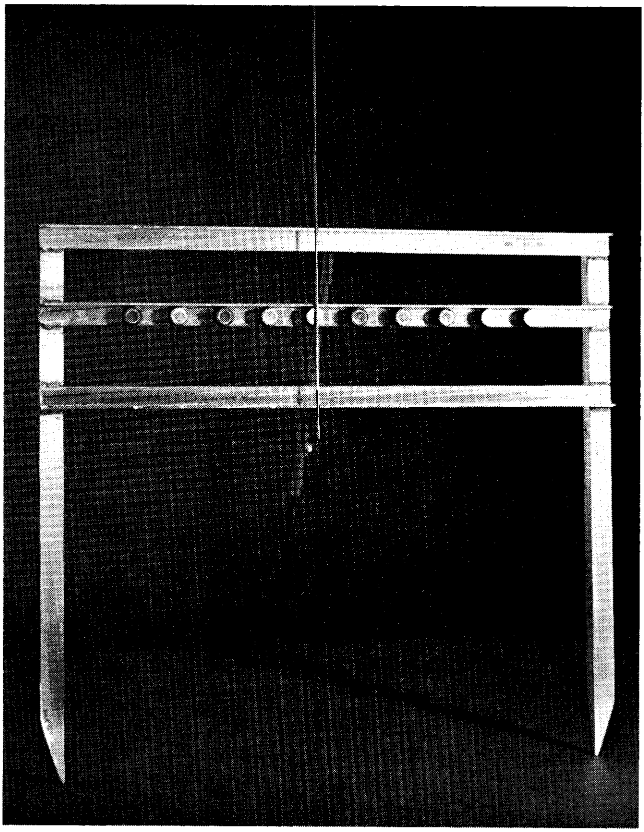

Fig. 1. The magnetic point frame set for 15-degree pin inclination.

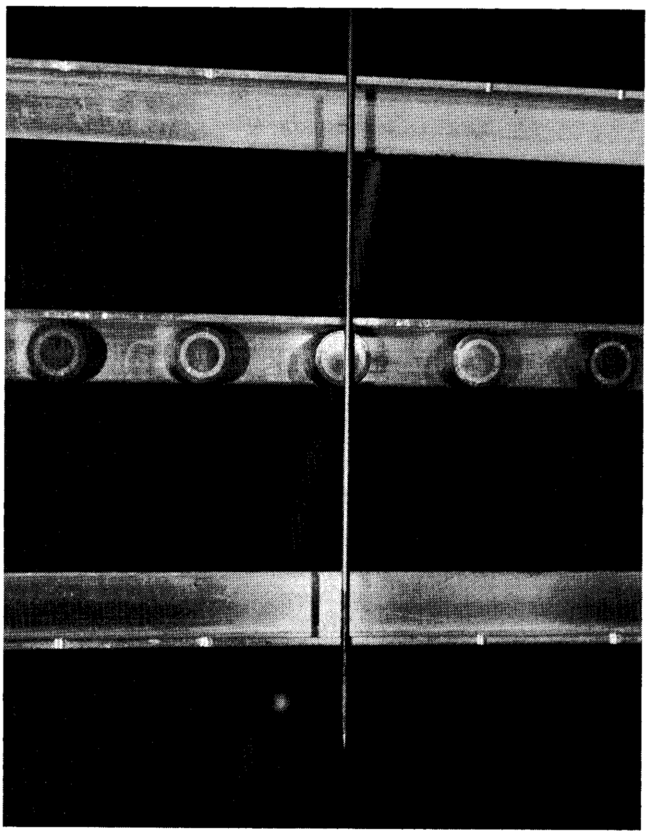

Fig. 2. Detail of magnet and notches holding pin.

inches long. Each leg is 24 inches long and pointed. The top and bottom crossbars are 8 inches apart and have ten 7/32-inch half-round notches spaced 2 inches apart. A middle crossbar holds the magnets (Fig. 2). We mounted the bar so the magnet faces are about 1/16-inch below the pin line. The magnets pull the pin into a slight bow to dampen the point vibration which has been a problem on previous frames. The pot-type magnets have proved ideal. The magnet material, mounted in an aluminum sleeve, is pressed into a mild steel pot. The pot configuration concentrates the field forward so that the back and sides are non-magnetic. This feature along with the face cover supplied makes the magnets easy to keep clean.

The Eclipse[2] No. 831B magnet, or its equivalent, with a 3/16-inch steel-rod pin is a good combination. The magnet measures 5/8-inch high by 11/16-inch diameter and weighs one ounce. It is drilled and tapped for a 10-NF screw on the back for mounting.

Smith's frame has a hinged third leg, slightly longer than the other two legs, to permit adjustment of pin angle. We also used a hinged, adjustable third leg. A 3/8-inch rod telescopes inside a 3/8-inch steel tube. A thumb set-screw keeps the rod in place. Therefore, a wide range of pin angle is possible.

These modifications of the point frame have more than satisfied our original requirements. The frame is efficient, lightweight, and has proved to be durable. Only one pin needs to be carried and kept sharp. Little motion is wasted in moving from notch to notch. Many different pin placement configurations are possible by using different combinations of notches and pin angle.

[2] Trade names and commercial products or enterprises are mentioned solely for necessary information. No endorsement by the U.S. Department of Agriculture is implied.

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