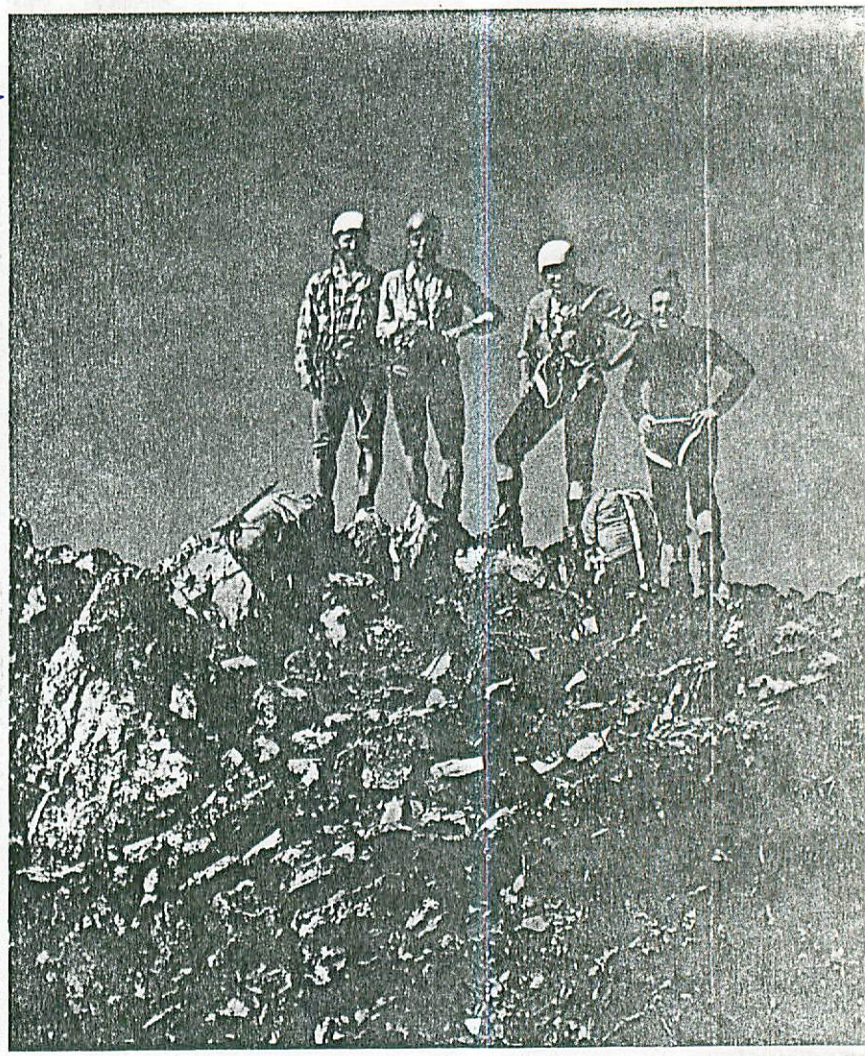
From Off Belay #25
February, 1976

C.C.C.P.

Spells

'FRIENDSHIP'



ALEX BERTULIS

On the summit of Bonanza.

SOVIET CLIMBERS IN AMERICA – SOME OBSERVATIONS BY ALEX BERTULIS

A revealing glimpse of "foreign" climbing techniques, capabilities and attitudes was offered during the recent "American Tour" of six Soviet climbers. Through this most recent exchange between the two countries, it can be confirmed that there is no essential difference between Soviet and American mountaineers in their subjective motivation for climbing and, when tied to the same rope, there is more than one bond that transcends language, culture and politics.

The Visitors

In 1974 a contingent of American mountaineers participated in an "International Camp" in the Pamirs. The American Alpine Club reciprocated by inviting a team of Soviet climbers to climb the mountains of the U.S.A. in 1975. The U.S.S.R. Mountaineering Federation sent six men representing the finest of Soviet climbers:

Vitaly Mikailovich Abalakov, 69, has an incomparable record of first ascents in the various mountain ranges of the U.S.S.R., spanning a period of three decades. In more recent years he has concentrated his efforts to furthering mountaineering fellowship, technology and safety through his contributions to mountaineering instruction and equipment design. His title of "Father of Soviet Mountaineering" can be appreciated more fully through a personal encounter at a "base camp," where his modest and humble attitude belies an unquenchable spirit.

Vladimir Nikolayevich Shatayev, 38, is an administrator of the Soviet Mountaineering Federation. "Vlioda" has dedicated his whole life to mountaineering and has a considerable climbing record in the Alps, England, and Poland as well as in his home ranges. He has also a particular interest in the fine arts and other cultural subjects.

Vyacheslav Petrovich Onishchenko, 39, was the climbing leader of the team. "Slava" is an extremely strong "alpine" climber with some of the hardest climbs of Europe and the U.S.S.R. under his hat. He is a physician in the field of sports medicine.

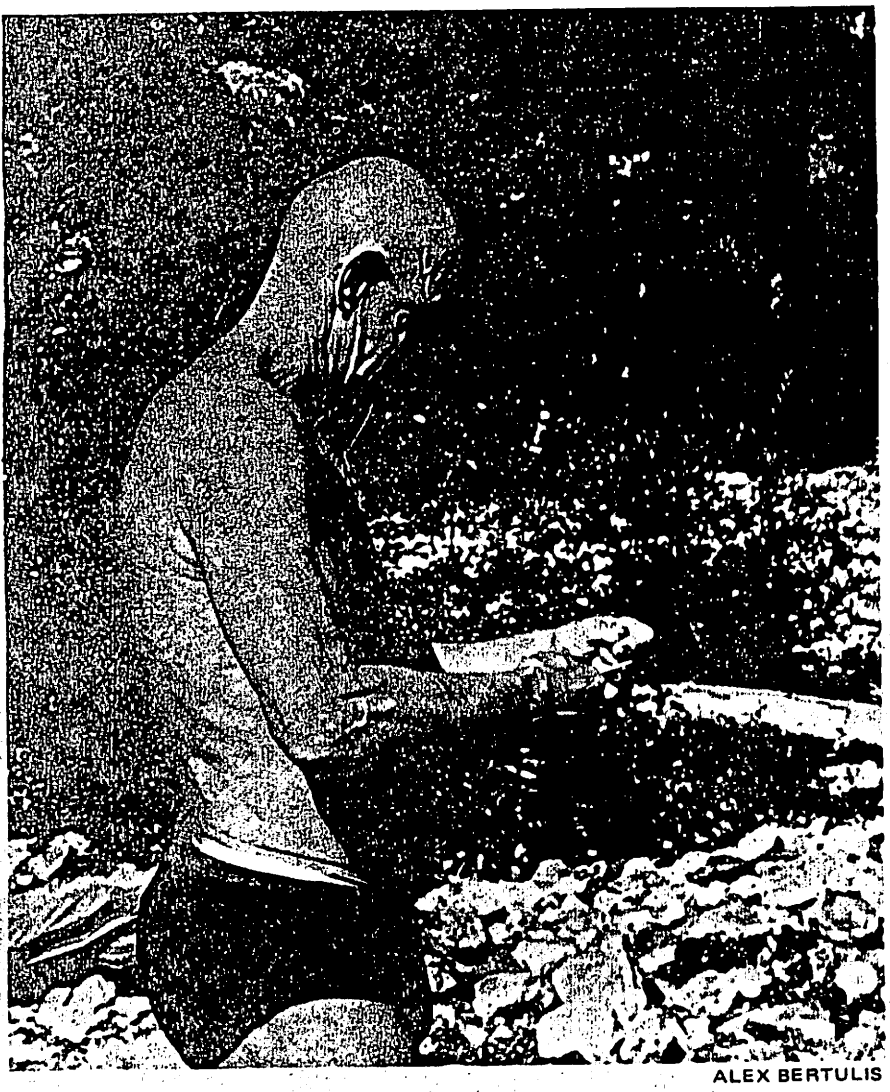
Valentin Fedorovich Grakovich, 36, is a physicist at the University of Moscow. "Valia's" specialization in avalanche studies allows him to bring his work into the mountains in the winter as well as in summer. His climbing record is among the best of the U.S.S.R. His free climbing ability on rock (as well as on ice) is impressive to observe.

Anatoly Vladimirovich Nepomnyashchy, 33, teaches electronics. "Tolia" is a phenomena in many ways. His grasp of English, considering his limited, "crash course" exposure, is remarkable. As interpreter for his team he was able to project, through his own remarkable personality, the nuances of dialoge between the climbers of two cultures that was not only informative but often entertaining.

Sergei Igoryevich Bershov, 28, is in building construction. Sergei, always ready with a gregarious smile or a humorous observation, appears to be serious only when on difficult rock. His climbing record in the U.S.S.R. and Europe is extensive. As national champion of speed (rock) climbing for four consecutive years his status (and ability) is becoming legendary.

To The North Cascades

When the Soviet team arrived in Seattle we met them, for the first time, at a "formal" luncheon in the Plaza Hotel.



ALEX BERTULIS

Vitaly Abalakov—the "Father of Soviet Mountaineering"—in fine physical condition at age 69.

ALEX BERTULIS

I arrived a little late and at first glance, I could not be sure which, of the fifteen persons at the table, were foreigners. A series of introductions by Pete Schoening and a round of handshakes quickly acquainted me with the Soviet guests and some of the Northwest hosts.

Their itinerary called for a considerable amount of "tourism," an ascent of Mount Rainier (our "holy mountain"), and if time permitted, an alpine rock climb in the North Cascades. About a week later, after a Northwest tour that included the ascent of Rainier, water skiing on Lake Washington, and a visit through 37 departments of the local Sears and Roebuck store, I was advised that as a finale our guests would be interested in a "hard first ascent" in the North Cascades but one that involved no more approach difficulties than driving up in a car and marching off the roadway to the first pitch! Well, accessibility is not exactly what the North Cascades are famous for, but when I showed them slides of a 2300 foot, nearly vertical buttress that was still unclimbed, they admitted that they would not object to the two hour hike required to get to its base. So our objective became the north face of the Southwest Peak of Bonanza at 9511 feet, the Cascades' highest non-volcanic mountain.

Anatoly Nepomnyashchy rigging his chest harness, which all the Russians used for tieing-in.

Early morning, September 10th, the "North Cascades team," composed of the six Soviet guests, Nina Cvetikovs (an independent and most helpful interpreter), Mike Helms, Jim Mitchell and myself, local Northwesterners, piled into three cars and drove over to the east side of the Cascades and north to Lake Chelan. There we caught a ferry and sailed about forty miles further north. By noon we arrived at a primitive landing called Lucerne and hired a "wilderness taxi" that took us ten more miles into the North Cascade Range. A three mile hike established us at "Bonanza base camp" on the north shore of Hart Lake, still early in the day. We pitched tents and cleared rocks for sleeping spots. Almost everybody took a dive into the ice cold waters of the lake. One of the distinguishing characteristics of our foreign guests was that they never lost an opportunity to "skinny dip" in any body of water that they happened to encounter.

The Russians, on Equipment . . .

The rest of the afternoon was spent sorting out food, gear and tactics for the climb. Our freeze-dried food, nylon and down gear, and "rip-stop" nylon tents, impressed the Soviets very much.

Our climbing hardware, however, seemed not so impressive. I was explaining to Sergei the virtues of "Jumar" ascenders but he remained unconvinced. He started criticizing Jumars while expounding the advantages of "Abalakov" ascenders. Mr. Abalakov came by and overheard Sergei's remarks. He interrupted Sergei and asked him:

"Sergei, have you ever used Jumars?"

Sergei: "No."

Mr. Ablakov: "Then don't knock them until you've tried them!"

I had brought my Jumars along for the Bonanza climb, but it was not until the Salathe climb on El Capitan later in their tour that Abalakov's advice rang home to Sergei.

The Soviet hardware collection included many interesting and innovative designs for both rock and ice climbing. Most of their pitons were titanium. Titanium is a metal that combines the strength of steel and the light weight of aluminum. Considering the prohibitively high cost of

The Southwest Peak of Bonanza in Washington's North Cascades. The North Face route follows the left skyline; the bivouac was on the step below the summit.

titanium (up to $25.00 per pound) it was very impressive "iron-mongery." The metal is equally prohibitive (to the average climber) in the U.S.S.R. but the government rewards its most deserving mountaineers with blank sheets of the rare metal which they can then machine into various forms with their own labor and design. Having used this exotic hardware, I can only envy the Soviets for it, but it is not a perfect substitute for chrome molybdenum steel pitons. The drawback of titanium pitons is that they are softer than steel and deform much quicker during repeated use.

The Soviets used a "swami belt" harness for their waist and legs, but as most European climbers do, wore a chest harness in addition. It was to the chest harness that they always secured their climbing rope. Internationally, there has been a long standing argument on what is the optimum tie-in point. Europeans contend that the chest area is a safer anchor point than the waist area. The chest harness also incorporated a "belay brake" device (the Abalakov brake) that allowed them to control belays without the "body wrap" conventional in this country. This may account for Mike Warburton's impression that Sergei belayed by gripping the rope "confidently in his hands." Mike accompanied the Soviets on the Salathe climb in Yosemite.

By far the most impressive item that the Soviets brought was the "Abalakov Cam." This "fantastic" anchor (to use Warburton's term) is as ingenious in design as it is simple to use. Almost every belay on our climb was safely and quickly secured by one "Abalakov" rather than several conventional nut and chock placements. The cam is easy to make and Mr. Abalakov expressed the hope that it would be produced in this country without patent restrictions.

Before the climb while doning our gear, I kept waiting for Slava and Sergei to take off their tennis shoes and put on boots like the rest of us. With their tennis shoes still on, both headed off across the scree slope to the base of the buttress. Here, as we roped up, I was startled to see Slava and Sergei put on petit goloshes that stretched tight over their bare feet!

The Bonanza Climb

Since I had previously reconnoitered the buttress, I anticipated a consider-

ALEX BERTULIS

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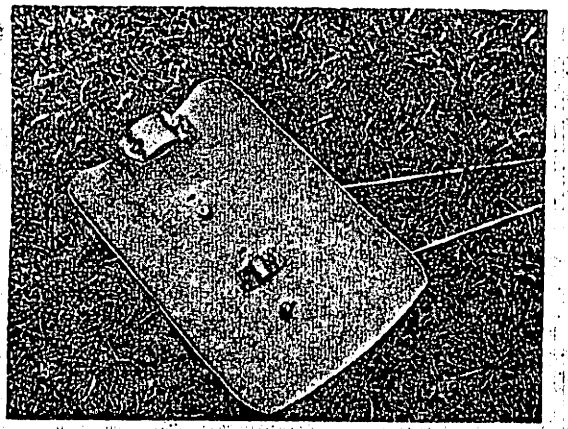
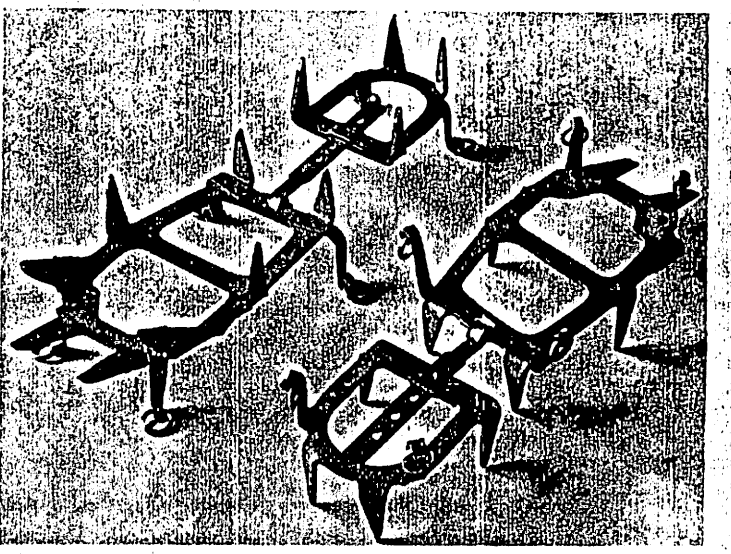
The bivouac high on the North Face.

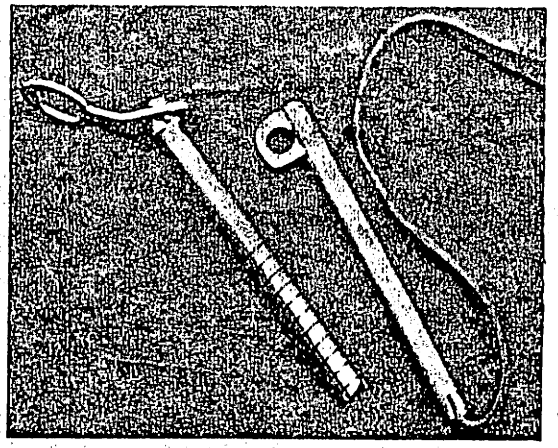
All Equipment Photo's by MIKE HELMS



Above— A snow shovel scoop designed to fit on an ice axe shaft. An auxiliary set of cables quickly converts it into a fixed angle fluke.

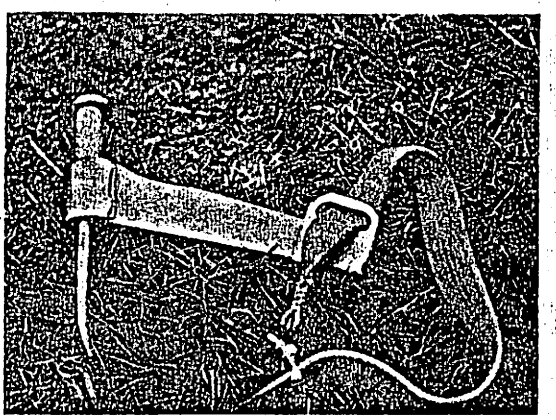
Below— Titanium crampons hand crafted from aircraft salvage material by Vitaly Abolakov.

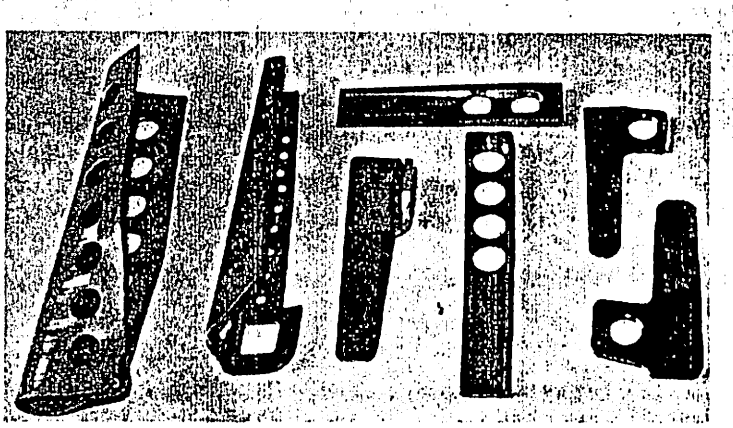




Left— Ice pitons. The screw hanger "ratchets" to the body for easier placement.. The piton at right goes into the hole left by an ice screw and is used for rappelling. A tug on a cord attached to the leather thong retrieves the piton.

Below— An ice dagger which belts onto the climbers wrist. A hammer blow on its head can be used to set the pick in extremely hard ice.





Above— Rock pitons improvised from titanium aircraft parts.

able amount of aid climbing over its many vertical headwalls and overhangs. I advised our guests that it would be advantageous to bring a hauling line along. After consulting with his teammates, Tolia informed me that in the Soviet Union they always climb with their packs on and would do the same on this climb. As it turned out, this approach worked well on our ascent. In Yosemite, Mike Warburton had the very same discussion and results with Tolia, but the Soviets soon found out that climbing the Salathe Wall with packs on is very inconvenient.

Early the next morning, Valia, Slava, Sergei, Tolia, Mike, Jim and I hiked up the steep rock and heather terraces that lead to the pass between North Star and Bonanza Peak. It was a perfect Autumn day. The north buttress of the Southwest Peak of Bonanza came into close view as we reached the pass. It was much more impressive than my slides had portrayed.

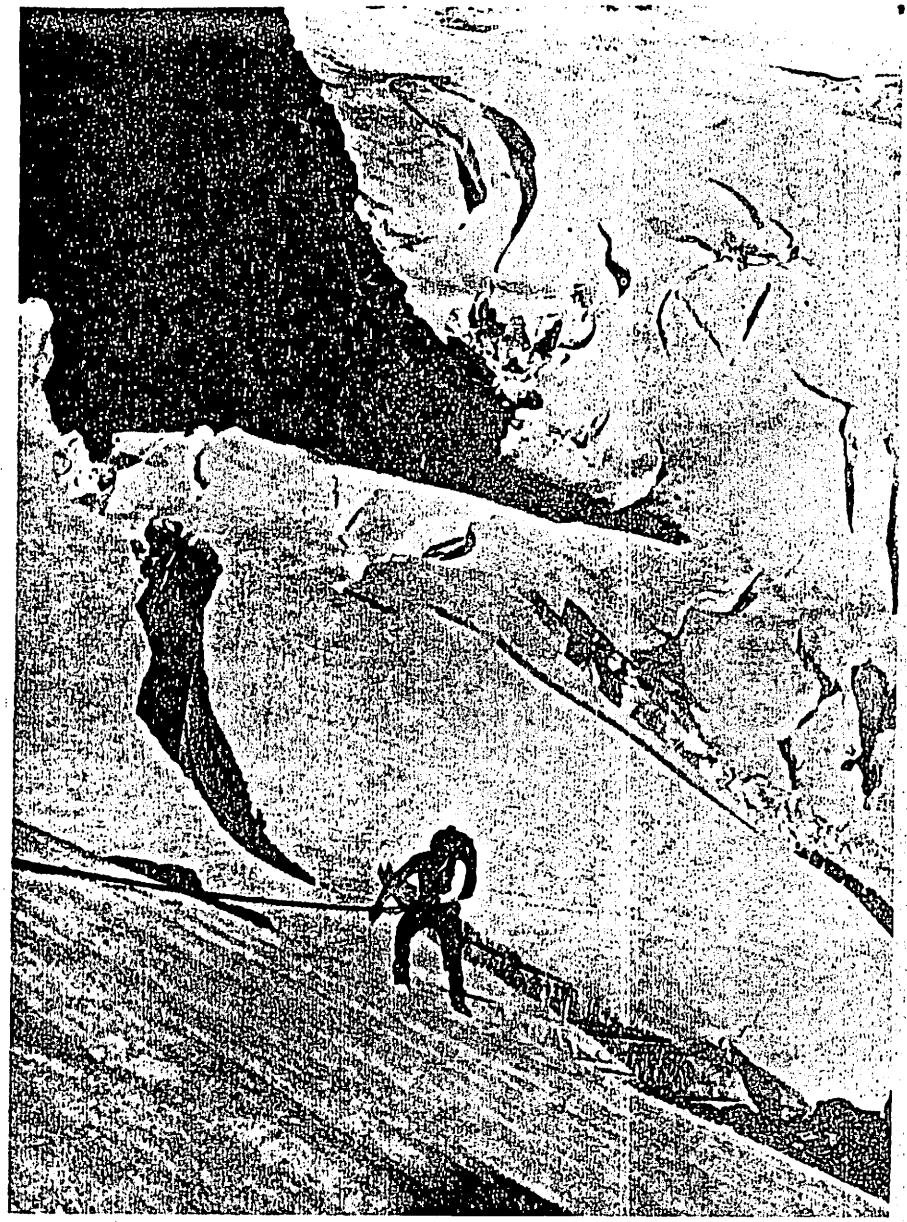
Slava studied the face for a while then gesturing, asked me where the route was? There was no apparent fault system that indicated that the buttress would even "go." I responded: "The route is where you make it. I wish you luck!" I gave them one more opportunity to make a team of four (Slava, Sergei, Valia and Tolia) but they all insisted that I must come with them.

Sergei took the first lead up a broken chimney while Slava belayed. Tolia informed me that I would be on the end of his rope with the privilege of cleaning all the pitches. Valia tied a Prusik near the middle of the rope and often climbed simultaneously, rarely asking for a belay, even on 5.9 moves!

Climbing on the lower pitches was never very easy and we often encountered 5.8 and 5.9 difficulties. Slava and Sergei began to increase the distance between us, while Tolia often commented that he wished he had his goloshes on rather than the conventional alpine boots he was wearing.

In cleaning the many pitches, 22 total, I was impressed at the profuse and expert use of chocks. Contrary to some reports, the Soviets are very much into "clean climbing." During the ascents, well over a hundred chocks, nuts, wedges, etc. were placed for protection while only six knife blade pitons were used. Two titanium pitons were placed in such difficult (desperate?) positions that I was unable to remove them, as future parties will be happy to discover.

A "secret weapon" in the Soviet arsenal was Sergei Bershov. That evening, we on the second rope caught up with Sergei and Slava at the bivouac ledge, three fourths of the way up. I had just followed (and cleaned) some of the hardest free climbing leads (under alpine conditions) that I have ever witnessed. Three consecutive leads I rated 5.10, with plenty of 5.9. I was even more astonished when told that Sergei did almost all the leading!



ALEX BERTULIS

Descending the Mary Greene Glacier after the ascent of Bonanza.

As the sun set over the Olympics, hot food and liquids were shared and songs, jokes and stories abounded late into the night. Though I could understand only a little Russian, the spirit was contagious and our communication did not suffer.

By late morning we had surmounted the final headwalls of the buttress and were all jubilating on the summit. I asked Slava, who had done some of Europe's most famous climbs, what his impression of the route was. He said that "some of the climbing was very hard and some not so hard, but if the weather were bad it would have been very unpleasant and difficult to escape the face." Having experienced some September blizzards in the North Cascades, our predicament on the face, if the weather had broken, would have been unpleasant, indeed. I informed my teammates that they had established a North Cascade classic: probably the hardest, free alpine route in the Cascade Range (Grade VI).

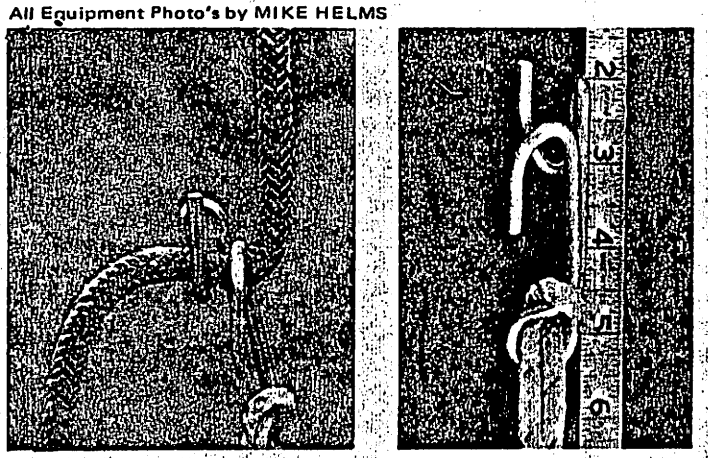
Retrospect

The Russians went on to complete their U.S. climbing tour in Yosemite. Earlier, they had visited the Shawangunks in New York and the Wyoming Tetons. The various combined American/Soviet climbs experienced during this historic international exchange exemplified how climbers, no matter what their national origin, speak the same "language" when given the opportunity to climb together.

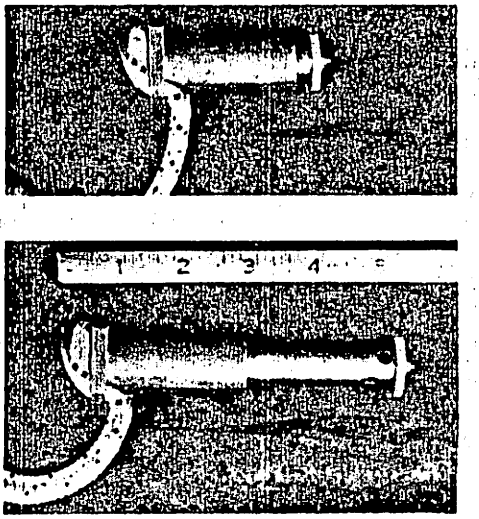
The American Alpine Club and the U.S.S.R. Mountaineering Federation should encourage and promote more exchanges on similar informal basis. Most climbers desire the freedom to climb the mountains of the world. Given this opportunity, cultural understanding and close friendships will follow naturally.

—Alex Bertulis
Seattle, Washington

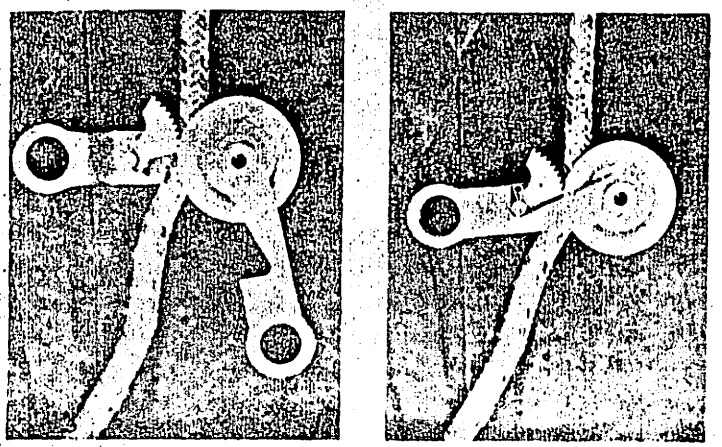
All Equipment Photo's by MIKE HELMS



Above— A rope ascender which works on icy and muddy ropes. Although based on the Hiebler Clamp, it will not twist off the rope as that device occasionally does.

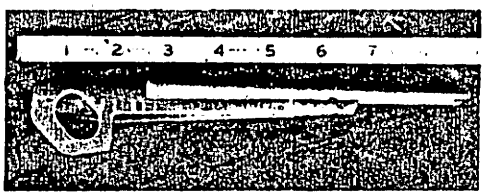


Above— An adjustable wedge for wide cracks. This miniature screw jack is made from aircraft surplus parts.

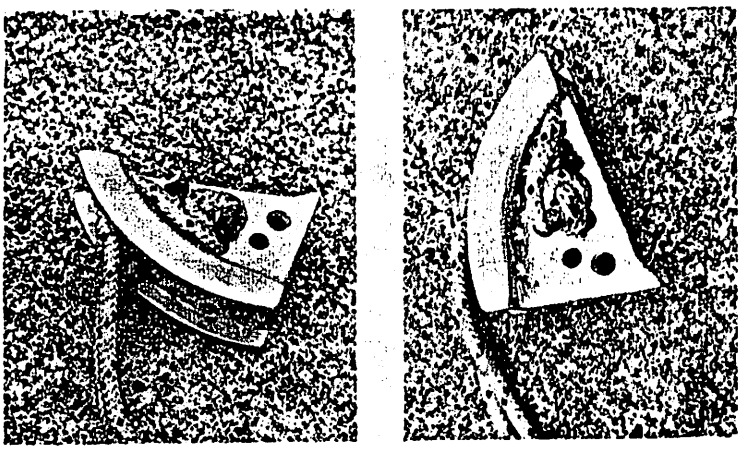


Above— A pulley fitted with a Jumar-type cam, intended for high angle load hauling.

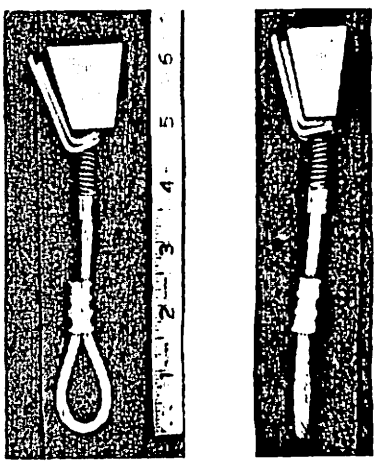
Below— A two piece titanium channel piton. The principle is similar to "nesting" pins.



Below— A cam nut designed to fit and lock in a wide range of crack sizes without adjustment. The cord produces a rotational force on the nut to lock it in the crack.



Below— A Forrest Foxhead nut fitted with plates for nesting. The plates make the nut useable over a wider range of crack sizes.



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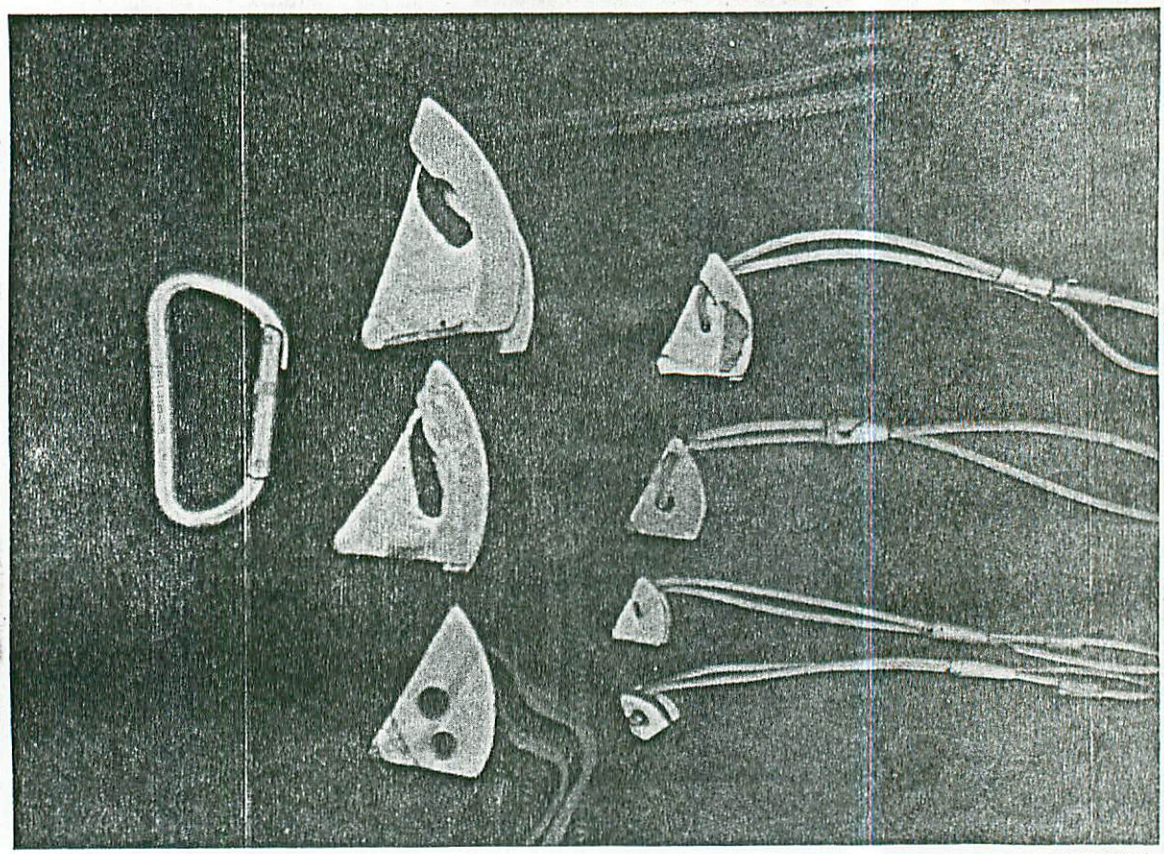
Off Belay #37
February, 1978



BOB DILL

Abalakov Cams

In his article, "C.C.C.P Spells Friendship" (OFF BELAY 25, February 1976), Alex Bertulis describes a cam nut designed by Vitaly Abalakov, the head of the Soviet Mountaineering Federation. From the picture which accompanied the article, Greg Shadel and I were able to figure out how the cam was designed and have made Abalakov cams ranging in size from ½" to 2¼". We have since climbed with them for two years, and have conducted a number of tests. They are very versatile nuts, although they do have some limitations. In this article, I will discuss their virtues and limitations, use, test results, design, and manufacture.

Design of the Cam

The curved surface of an Abalakov cam is a section of a logarithmic spiral. The spiral is described in polar coordinates by the equation

$$r = Ce^{\frac{t}{\tan A}}$$

Where r = radius coordinate, t = angular coordinate (in radians), A = cam angle, e = base value for "natural" logarithm, C = minimum crack size.

The cam angle (A) determines the crack-fitting range and is an important factor affecting the ability of the cam to jam, or lock itself into parallel-sided cracks. As the cam angle gets closer to 90 degrees, the crack-fitting range decreases, but the ability to lock increases. We chose a value of 70 degrees as a compromise between these two considerations.

In parallel-sided, vertical cracks, the nut will lock only when the friction between the nose and the rock exceeds the vertical force at the nose. To keep the force at the nose small, the pull must come as close to the curved surface as possible. To do this, we used the smallest sling practical, and made the groove no deeper than the sling. Generally, we used a sling size only 1/6 of the minimum nut dimension.

The shape of the nose should maximize the friction between it and the rock over the placement range of the nut. The Russians use a sharp, narrow nose. Since the vertical force at the nose is about 60% of the load on the nut, we felt that a sharp nose might simply shear off at the tip, although I am not sure that these fears are justified. We opted for a wider, more rounded nose with most of our nuts, but have not tried enough types to suggest an optimum shape.

The width of the nut is a compromise between two factors. If it is too narrow, it will tip easily when pulled from the side. If it is too wide, it will be unnecessarily heavy and too wide for shallow, vertical cracks. I have made nuts with widths ranging from 60 to 130 percent of the minimum crack-fitting dimension of the cam and they all work well.

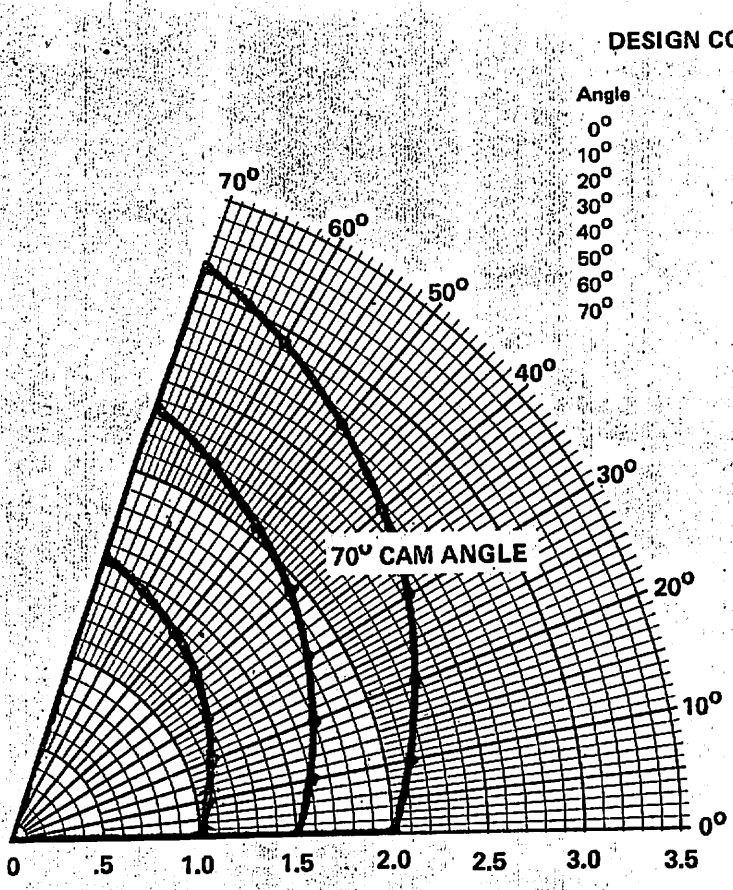
A more sophisticated approach to design can be taken if you wish. By doing a force analysis, you can calculate the theoretical lodgement potential of any cam design, enabling you to vary the cam angle to suit the particular sling and nut size.

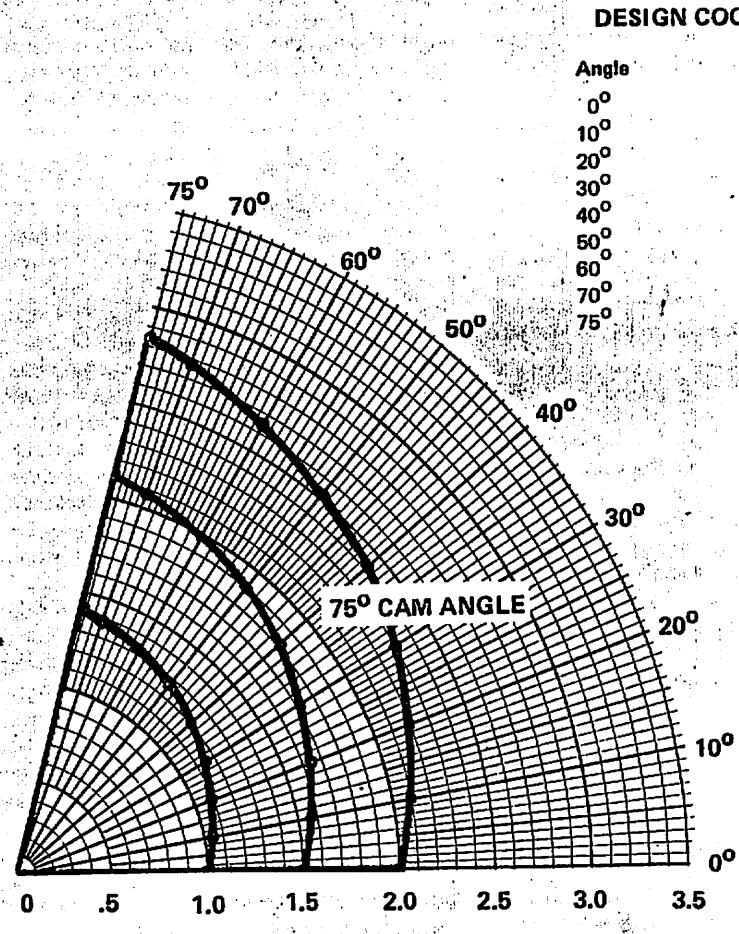
Materials and Manufacture

It would be difficult to set up a high production manufacturing operation to produce Abalakov cams, so it is unlikely that they will ever be available commercially. They are, however, easy to make given a bit of time, and do not require precision machining.

The cams should be made from a high-strength aluminum alloy. I have used both 6061-T651 and 2024-T351 alloys. These are generally the easiest strong alloys to find, although there are significantly stronger alloys available. Aluminum plate and bar stock can be bought from industrial metal suppliers for $1.50 or so per pound plus a cutting charge. Many machine, fabricating, or maintenance shops keep some in stock and might be willing to sell a little. Sometimes you can find pieces with the alloy designation marking still on them in a metal salvage yard. Be sure you know what you have or at least test the end product. We had a cam collapse in testing because it was made from cast tooling plate rather than a suitable alloy.

We made cams up to 1¼ inches by band-sawing them from ¾ inch thick plate using a paper pattern glued to the plate. The larger cams were band sawed from 2½ inch, 2024-T351 bar stock and trimmed to thick-





ness. The sling grooves were either hand filed or end milled, and the excess metal was removed with a vertical milling machine, leaving a minimum thickness of 3/8 inch where the sling passes through the web and flange and ¼ inch everywhere else. Our tests show this is conservative, but the nuts are not excessively heavy. The sling holes and all other sling contact points were rounded to avoid bending the sling any more tightly than necessary.

For the ½ inch and ¾ inch cams, I used 3/32 inch 7 x 19 cable; on the 1 inch and 1¼ inch cams, 1/8 inch 7 x 19 cable. Cable and nicopress sleeves can be obtained and installed at many marine supply outlets or boatyards. On one of the two 1½ inch cams I used 1 inch webbing. This nut is quite heavy for its size and was more difficult to make. On the other 1½ inch cam, I used a 7 mm sling. On the 1.9 inch and 2¼ inch sizes, I used 8 mm rope.

The weights of the cable slung nuts ranged from 1 to 3 ounces depending on size. The rope slung nuts ranged from 3.2 to 7.2 ounces making them a little lighter than the hexes which correspond to the upper part of their crack-fitting range. The cams could be made much lighter by making them thinner and drilling lightening holes as the Russians did, although careful testing should be done to verify that the nut is still strong enough.

Testing

Testing homemade climbing equipment is obviously important. We have made about fifteen tests of our Abalakov cams in parallel-sided cracks plus a couple more with a tensile-testing machine. Our field testing equipment consisted of a mechanical jack and a sling of known knot strength between the nut sling and the jack. A carabiner connected the two slings. This simple, crude system gives a good idea of how the nuts perform. The rock was dolomitic quartizite and the crack sides were clean and smooth. We tested for ability to lodge in parallel-sided cracks and the effect of angle of pull.

We found that four of the five 70° cams lodged repeatedly in parallel-sided cracks and would hold loads in excess of their sling strength. The one exception would not lodge unless placed with its nose in a depression or on a strong protrusion. The reason for its inability to lodge appears to be because we made the sling groove too deep.

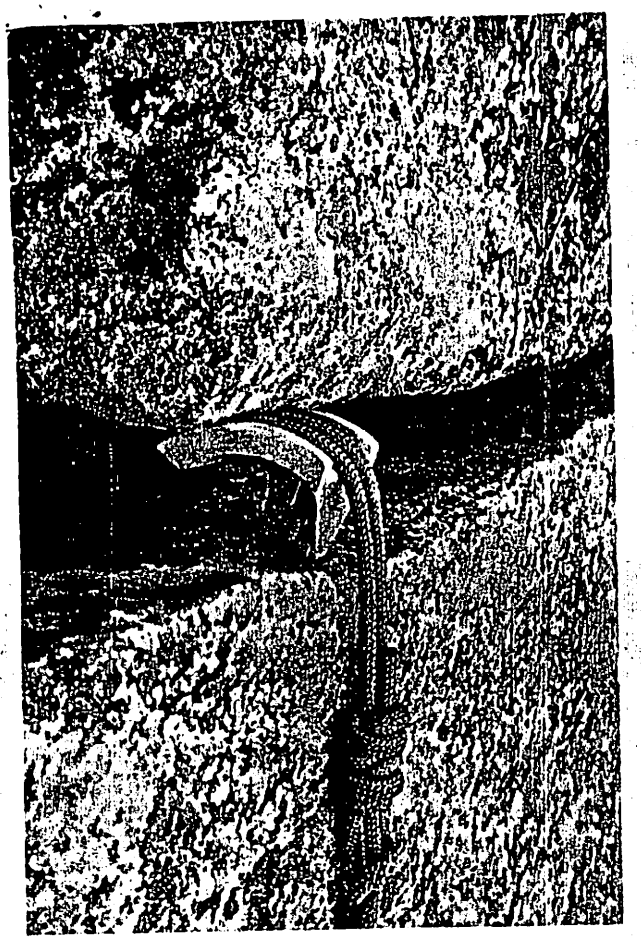
We tried pulling the cams at an angle to the direction in which they were placed. We did not dislodge any of the nuts at angles of pull of up to 60 degrees; the slings broke first.

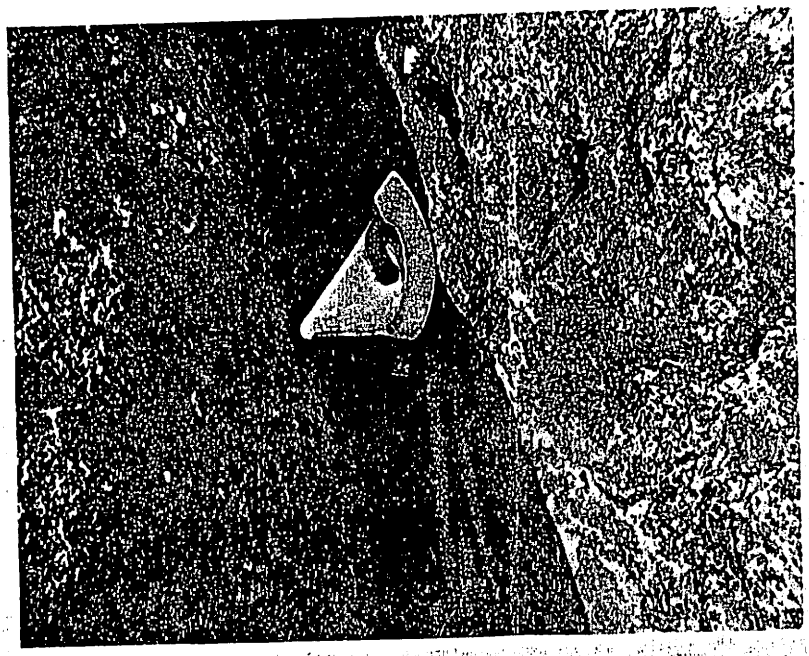
We measured the strength of a 1/8 inch, 7 x 19 cable sling in a ¾ inch cam on a tensile tester. The sling broke at the nut at a little over 3,000 lbs.

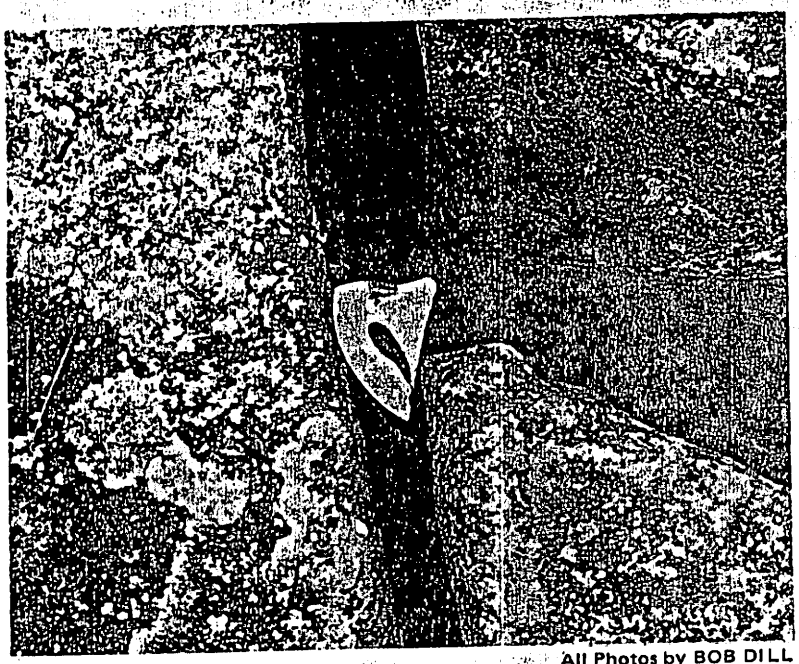
Our testing has been limited. If you make and use these cams, be sure you understand their strength and weaknesses. Alex Bertulis indicated the Russians used them for one-nut belays:*no nut is that good.*

Using the Cams

Abalakov cams lend themselves to a wide variety of situations. They are particularly well







Above—A cam placed in a horizontal crack.

Top right—An Abalakov cam placed conventionally in a mildly converging crack. Maximum stability is achieved by resting the nose on a protrusion.

Center right—On highly convergent cracks, it's best to invert the cam and use it as standard wedge.

All Photos by BOB DILL

suited to horizontal cracks and vertical cracks where nothing else works well.

They work very nicely in horizontal cracks, even in the flared ones that are so common at the Shawangunks. In horizontal cracks, they should be placed near the edge of the crack with the nose down.

The cams work well in converging vertical cracks, although they are not as easy to place as conventional nuts. In vertical cracks with moderate covergence, place them in their normal camming position. In abruptly converging cracks, turn them over and use them as a non-camming nut. This technique probably should not be used with cable-slung nuts since the repeated bending of the cable might fatigue the wire.

In perfectly parallel-sided vertical cracks, the nut may or may not lodge depending upon its design, and the frictional characteristics of the rock. In this situation, it is again best to position the cam so that its nose is held in place by a small depression or protrusion in the side of the crack. Since the nose carries most of the load on the nut, be sure the protrusion is a strong one.

Abalakov cams can be placed with one hand, although aligning the nut with the expected direction of pull often requires a little fiddling. The succeptability of placements to accidental dislodgement by rope motion varies. In vertical cracks and smaller horizontal cracks where the nuts are cable slung, security is generally good. In larger horizontal cracks, the nuts can be dislodged fairly easily by a pull from the side.

Other advantages we have found include a crack-fitting range of 1.5 times their minimum dimension, full holding power, in most cases, at angles of pull up to 60 degrees from the angle of placement, and, because they contact the rock at only three points, holding power in some flared, vertical cracks.

Abalakov cams, like all climbing equipment, have some limitations, and it is important, especially with homemade equipment, that these limitations be thoroughly understood. They are quite difficult to make in sizes below ½ inch, and in sizes below 1 inch, the 3/32 cable slings we used hold only about 1,300 lbs. The smaller, cable-slung nuts can be difficult to place and remove.

Based on our force analysis, Abalakov cams generate a lateral, crack spreading force of about 1.5 times the load on the nut. This is about twice the lateral force of a conventional nut, but should not be a problem except where detached flakes or blocks are involved.

Used within their limitations, however, we have found the Abalakov cam an extremely versitile piece of non-driven and hence non-damaging protection. —*Bob Dill*
Burlington, Vermont