NYLON HIGHWAY NO. 27

...ESPECIALLY FOR THE VERTICAL CAVER

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NYLON HIGHWAY

NO. 27

DECEMBER 1988

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THE MURPHY SYSTEM

By William Shrewsbury

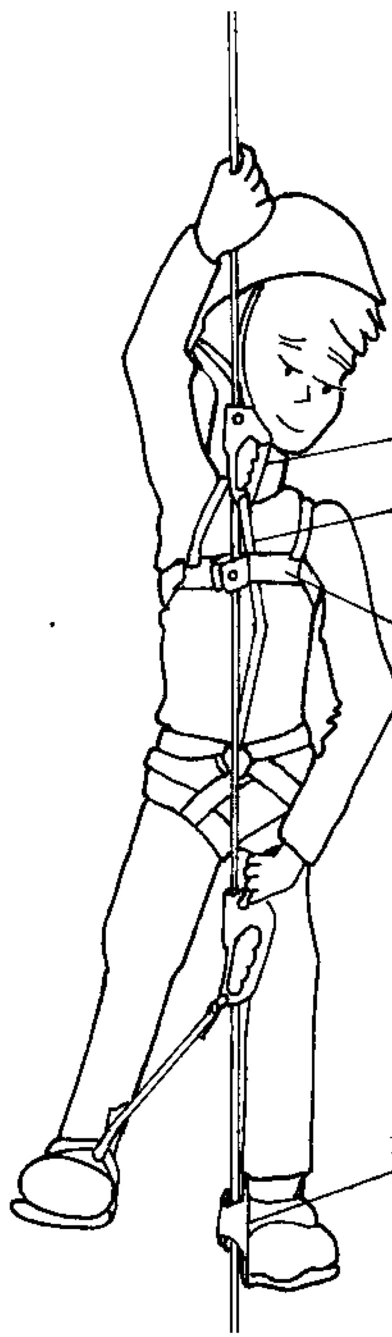
Everyone has their favorite climbing system, and I'm not trying to persuade you to change. I, however, will have a hard time finding a more comfortable method that allows me to get on and off rope so easily.

It all started on December 18, 1987 (my birthday) at about 9:45 that night. Dan Twilley and myself had just started a mad pace of pit bouncing. We were attempting to do 5280 ft. (1 mile) of ropework in just 48 hours, all in different pits. (By the way, we ended up with 5308 ft.!) Anyway, at the top of Incredible Pit in Ellison's we put on our climbing systems. I rappelled in first, quickly followed by Dan. As soon as Dan took his rack off the rope, he put on his ascenders (he climbs using the Mitchell system: two Jumars with a box, seat safety to rest).

"Oh no" he exclaimed, "I left my other Jumar up top, the one with the long sling". In his haste he had failed to pick up the Jumar he used above his box.

Looking at my own gear, I remembered that I had brought down my trusty foot Gibbs. You see, I had climbed the rope walking Gibbs method for years. Knowing that I would have to take my gear on and off rope quickly, with many different lips to climb over, I had switched to the same system as Dan except for using Petzl Handle-Jammers instead. Over those years, I fell in love with my foot Gibbs, using it for short one-legged climbs and ridge walking. Besides a couple of extra knots over my shoulder, I had carabinered that Gibbs to my seat.

"Here Dan" I said, "Use my long sling. I brought my foot Gibbs". He gratefully accepted, since otherwise it meant a long one-legged Texas-style prusik. Putting on my trusty foot Gibbs, with its new webbing (Paul Ballinger had recently sewn the perfect loop for me) I walked over to the rope and got on beneath Dan.



The chest box I use is a modification by two TAG cavers, Paul Ballinger and Dennis Lindsey. It had only one central roller, but used a longer backing plate that eliminated the side-pinching of a small box. Breathing is also much easier.

Deciding that I needed something over this single roller chest box, I attached my seat Petzl Jammer on rope with the rope passing behind the plate. With this supporting me upright, I next put on the foot Gibbs, followed by the lower Petzl Jammer. Through the top of the lower Petzl Jammer, I inserted a large steel locking D carabiner. Pulling the pin on my box and inserting the rope, I joined Dan about 40 feet off the floor.

For the next 420 feet we climbed, setting our pace and rhythm to the other. I began to notice that my legs were not fatiguing. It was then that I really examined my modified system.

You see, in a conventional Mitchell system, you raise your right leg and right hand at the same time, followed by the left leg, left hand. This produces a rocking motion (energy waste) and is not a natural method of motion. Dan mentioned that in the May '88 NSS News, there is a method referred to as the Cuddington Switch, where the hands and legs can move opposing to each other. This method causes the Jumar slings to abrade against the standing rope and should not be used for long periods.

Enter the foot Gibbs. I raised my left foot (the one with the Gibbs) and my right hand (it holds the seat Petzl above my box) at the same time. Stepping down on the foot Gibbs, I was able to also pull down on the upper Petzl. I could use my arm strength to climb! Next, I raised my right foot (short Petzl, just above the knee) and my left hand (looped through the locking D carabiner) at the same time. Great! This was just like marching! It didn't take long before a rhythm set in that dictated a smooth climb.

If I needed to rest, all I had to do was sit down. I even had two points on rope above my seat, as Bruce Smith recommends. But all good climbs must come to an end. (Editors note: Smith's two points of contact at or above seat refer to two points of attachment and a directional e.g. chest roller does not necessarily apply.)

Dan crossed the upper lip. Now, how do I get over this thing? The rope was rigged at about a 75 degree angle over the long lip. Removing my seat Petzl from the rope, I edged up to the lip. Let's see, clip the Petzl over the lip, pull the pin on my chest box, and voila, all the maneuvering room I would ever need! A couple of steps and I moved my lower Petzl over the lip. Reaching down I pulled the pin on my foot Gibbs. Now it was easy to walk on over to safety. Great climb!

Needless to say, the long slinged Petzl Jammer I had loaned Dan now became a backup. I climbed the entire 5308' that weekend on my 'new' rig, and have put in over 7000' on it since then. It will take a lot of talking and even more on rope testing to get me to change to anything else. Here are some of the advantages of this modified system:

1. A natural motion like walking (left foot & right arm, right foot & left arm).
2. By placing the seat Petzl sling behind my chest box, when I sit down I'm still held close to the rope.
3. When crossing lips, you can safely remove the upper Petzl Jammer, leaving two points on the rope. This Jammer can now be attached above the lip while the chest box maintains the upright position of the climber.
4. When you have the upper Petzl Jammer over the lip, you can remove your chest box from the rope, permitting a lot of elbow room to maneuver with three points of contact.
5. Crossing over knots or other people proves easy

There is a modification to this system that I am currently investigating. Instead of the foot Gibbs, Bill Bussey has been using a foot Petzl Croll. This allows the foot to also have the same ease of attachment/removal from the rope as all of your other gear. Either way, the foot unit combined with the knee, box and seat over the box proves to be a natural, easy and safe method to climb.

When Bill Bussey asked me what I called this system, fancy names crossed my head. Let's see, it was first used in Incredible Pit (the "Incredible System"? Naw, too corny...). It is a modification between the Mitchell and Rope Walking Gibbs system ("Mitchibb"?, "Gibbell"?, "Petzibb"?), it uses the crossover method that Cuddington uses, without the sling wear ("Mitchibbing"?, "Gibbelling"?, "Petzibbing"?) and it provides a redundant system ("Mitchibbithing"?, "Gibbellithing"?, "Petzibbithing"?). Well, needless to say, none of the above.

I decided to name it after its true creator, Murphy. After all, it was Murphy's law that Dan would forget a vital piece of equipment at such a critical time when speed was necessary. It was Murphy that prompted me to bring that extra foot Gibbs "just in case". It was Murphy that allowed me to loan Dan my long sling, forcing me to reconstruct an impromptu climbing system. It was Murphy that caused me to change from my old-faithful climbing system to something relatively new to me at the last minute.

Thus, "The Murphy System" has been born. May it never live up its name. □

SECRETARY'S REPORT

June 16, 1988

Number of Single Members	570
Number of Family Members	46
Number of **Nylon Highway** Subscribers	56
Number of **Nylon Highways** Gratis	7
Number of **Nylon Highways** Exchanged	24
Total number of **Nylon Highways** mailed	680

Members paid through 1988	269
Members paid through 1989	200
Members paid through 1990	106
Members paid through 1991	48
Members paid past 1991	26

AGING OF ROPES

Reprint From Summit Magazine, May-June '86

An article on the aging of Climbing ropes appeared in the C.A.F. (French Alpine Club) journal **La Montage et Alpinisme**, No. 2, 1985. The article was translated by N. Bendeli and summarized in the New Zealand Club Bulletin of December, 1985, from which the following is extracted:

The study on rope aging involved testing a sample of thirteen ropes. This is a relatively small sample, but the conclusions are sufficiently interesting to keep in mind.

The study concluded:

1. A well-protected new rope does not age. It keeps its characteristics even eight years after manufacture PROVIDED:
   a. It is stored in a cool, dry, light-proof area, preferably in its original packaging, and
   b. It has absolutely never been used. Once it has been handled (even once) it seems that an irreversible process of aging is started.
2. After two years, a rope does not conform to UIAA standards for falls, no matter what its appearance. A professional or keen amateur must be aware that he should change his rope every year, or at least every second year. An occasional climber must not keep his rope for more than eight years. □

-B.C. Mountaineering Club Newsletter

A CASE FOR COMMON SENSE

By David M. Doolin

This is a short reply to Mr. Robert Thrun's letter "The Case Against Using Bolts", Nylon Highway # 26.

Mr. Thrun gives a biased and somewhat emotional case against using bolts to rig pitches. He gives many examples he has personally encountered to support his argument. I will not attempt a detailed blow by blow defense of bolts or the people who use them, as this would probably bore the reader and would certainly bore me.

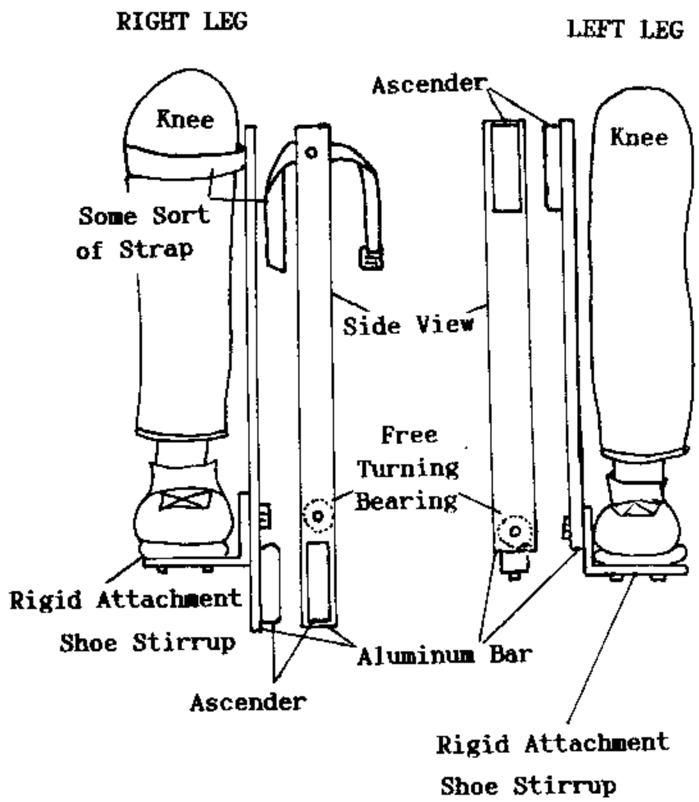
I simply ask the people who are against the use of bolts to accept the fact that bolts are necessary in certain situations and under certain circumstances.

Bolts and the people who use them are not going to go away. They are going to go into deeper caves. Those others opposed are free to rig the same cave "naturally" instead of criticizing bolters for "poor style" or "cave destruction" or whatever. Bolts, competently placed, are safe and convenient.

From the aesthetic and conservation angle, bolts suck. Perhaps, one day, deep caving will evolve to where the style of rigging is important. After all, anyone can "carry courage in a Rucksack". When these two camps stop feuding and work together to develop new techniques for more natural rigging, perhaps caves and cavers will benefit from fewer, better placed bolts. Until then, I will always have some in my rucksack. □

HATS OFF TO FREDDY

By Darrel Tomer



The last time I was at a convention (New Mexico), on leaving, I remarked to Bill Cuddington that I had devised a system of climbing rope-walker Gibbs without the necessity for a bungie cord. He expressed a bit of incredulity. Since then, I have never found time to either make the proposed device or to write it up. Now, on reading the latest **Nylon Highway** I am amazed to see the idea in print authored by Fred Baumann. So, for delaying so long to write it up, I get scooped. Actually, my system is a bit more sophisticated and is designed solely for speed trials. It is too bulky and heavy for anything but something like Golondrinas, where it would not be carried through the cave.

So my congratulations to Freddy for being a guy who thinks for himself and not being just a follower of what others have done.

Since I am still in my usual dither for time and into more things that I can handle, I will hastily describe what I had in mind. You have seen the type of climbers telephone and power linesmen used to strap to their legs. Nowadays, they just climb into a box and hydraulic power lifts them up to where they get electrocuted without making much of a climbing effort.

I would strap an aluminum bar about 3/8" by 1 1/4" by 18" to the inside of each foreleg (calf, shin). At the lower end, it would have an L-shaped stirrup hinged to the vertical piece, at ankle height or lower by a low friction bearing whose axis runs horizontally left-right, and the horizontal part of the stirrup would extend under the ball of the foot as a tread, which would be riveted to the shoe sole. On the right leg, the vertical piece would extend on down a few inches below the stirrup and would have an ascender rigidly affixed. The left ascender would likewise be rigidly fixed to the top of the upright piece.

The advantages of this system would be, first of all, the Freddy idea, of no bungie cord. Beyond that, it would eliminate most of the lost motion inherent in the common assemblages. It would also allow taking a long step. I realize that most climbers don't want to take a long step, but I believe in it as a further means of eliminating the lost motion that accompanies each step.

HATS OFF Continued on Page 30

THE GIBBS ASCENDER: A HEALTHY DINOSAUR

by John Ganter

The Gibbs ascender has been remarkably popular among US cavers since its introduction in the late 1960s. It was the initial building block for the 'Rope Walker' family of ascending systems, which give the caver an ergonomic climb while the back stays straight and the legs move in turn. But I will suggest that the Gibbs is obsolete in some respects, enjoying a declining popularity which is based more on tradition, nostalgia and naivete than an understanding of efficiency and challenge in caving. Nevertheless, the Gibbs is still well suited to certain styles of caving and to some specific applications. This article does not suggest that anyone rush out and replace their vertical equipment. Instead, it offers some thoughts to those who see their rigs as constantly evolving to meet new challenges and goals through a process of design and testing.

SOME GIBBS ANALOGIES

Like typewriters and steam engines the Gibbs is technology which has been superseded by newer alternatives. In no way does this suggest that any of these devices do not work; they all do work very nicely. But people, their needs, and their expectations evolve. Any technology can be assessed by a variety of criteria such as size, weight, speed, quality of output, reliability, etc. You can't have everything. So the weighing of these conflicting criteria is essentially a cost/benefit analysis. What do you want? Are you willing to give something else up for it? How much do you want to pay, be the price money, weight, time, reliability, etc.? The design process rocks back and forth between ways and means like a multivariate seesaw. The design that best satisfies the criteria established in the analysis is optimal.

I suggest that today the Gibbs is not optimal, because the criteria have changed. In the early days of caving it was enough to get up the rope. Then it was enough to get up the big México and TAG pits of the 1960s and 1970s very quickly. But today the frontiers of caving have receded and needs are different. Time, but in a much different sense than speed, is the dominant criteria.

THE FAST SLOW PARADOX

Using Gibbs is like driving a dragster. You take the dragster off its trailer, put its parts together, fuel it up, start it without explosion, point it in the right direction and it goes very fast... for a little while. You wouldn't want to go caving with it. The ideal caving ascender might be more like an economy car: turn the key and go. Slower, but it gets you there sooner.

This analogy occurred to me recently when I overheard two cavers talking about foot ascenders used in a rope walker system. The first had the strange idea that a Petzl Croll might be useful for this purpose. The second was appalled; he would straighten out this fool with some concrete, factual evidence. "Well, the Croll is running a good 10 seconds behind the Gibbs in the climbing contest!" he replied. Unfortunately I missed the rest of the conversation because at that moment I had to go synchronize the carburetors on my dragster, but H.L. Mencken (I think) said it well: For every complex problem there is a simple answer. And it is wrong.

Why does the Gibbs go fast? Because it can utilize, by virtue of a specific leverage arrangement, a smooth cam. The cam does not need to grab the rope; it is crushed into the rope. So it doesn't need teeth, and so the teeth don't drag, and so there is very little friction on the up-step. The climber can take more steps per unit of time, and each of the up-steps requires less effort.

THE LAB AND THE FIELD

But racing up trees and gyms is not caving. Caving, in the long, deep sense, requires pacing. The caver usually has many goals besides speed in mind, perhaps rigging, surveying, photography. Each task requires a ready body and an alert mind. So inevitably caving becomes a steady, controlled pace. Trying to move at a high velocity through the cave results in wasted energy through slipping and sliding, bloody shins, forgetting, misperceptions, hurried decisions, bad logic and accidents.

"Time is not a renewable resource" -- Fred L. Wefer

Let me emphasize some key points. The caver can't move at high velocity. The caver is often under heavy constraints to get specific things done in the shortest possible time. Yet this must be done while being very, very careful -- anticipating, avoiding and rectifying errors. What is the solution to this dilemma? The solution is that a good, smooth, brisk-yet-careful caving pace is made not by speed, but by the avoidance of the myriad little wasted motions, starts and stops that disrupt the caver's mental and physical flow through the cave.

Too often, the Gibbs ascender plays a key role in disruptions to this pace. Because while it's fast once on the rope, it's slow getting there. The central problem is that a Gibbs must be assembled for use. It's apart. To put it on you must: (1) Capture rope in shell; (2) Bring shell/rope and cam together; (2) Align cam with shell; (3) Insert cam into shell; (4) Align holes in cam and shell; (5) Insert pin into shell hole; (6) Depress pin button; (7) Drive pin through; (8) Release button; (9) Pull pin to insure that ball bearings have extended.

That's a lot of steps and both hands are required. Doesn't seem like much outside, but try it fatigued, with low, glaring lighting, while covered with mud, in spray, with all the aforementioned parts connected to things pulling in different directions. Now put that Gibbs way out on an extremity, at the knee or even the foot. Now stick that extremity 6 feet out over the drop, down over a lip, up in a crack or wedged in a fissure. Now do it two more times for the traditional 3-Gibbs Ropewalker. The pace is long gone, replaced by desperate thrashing and struggling. The rest of the team, now shivering, listens grimly, dreading their turn or else thoughtfully thumbing their Jammers open and closed. Open and closed.

These observations are not original. An anecdote from a pasture in north-central México. Standing before me is a British caver named Mike "Slug" Hale, pronounced "Sloooooog 'Ale." Slug is tall, muscular and tired. He has just walked in from a week of offroad caving to rebuild his gear, relax, and make a few bombs to amuse the camp. He is telling me about vertical caving in the real world. "...and the Gibbs! Bloody impossible!" He stoops to pick up a battered specimen of the infernal machine. Slug speaks with great agitation, "They're fiddly and they fall to bits!" With this he heaves the Gibbs into the sky. He is silent. We watch. The Gibbs falls in a graceful arc and strikes a large pig grazing on the other side of camp. The pig screeches in terror and runs away. Slug looks at me. "Right then."

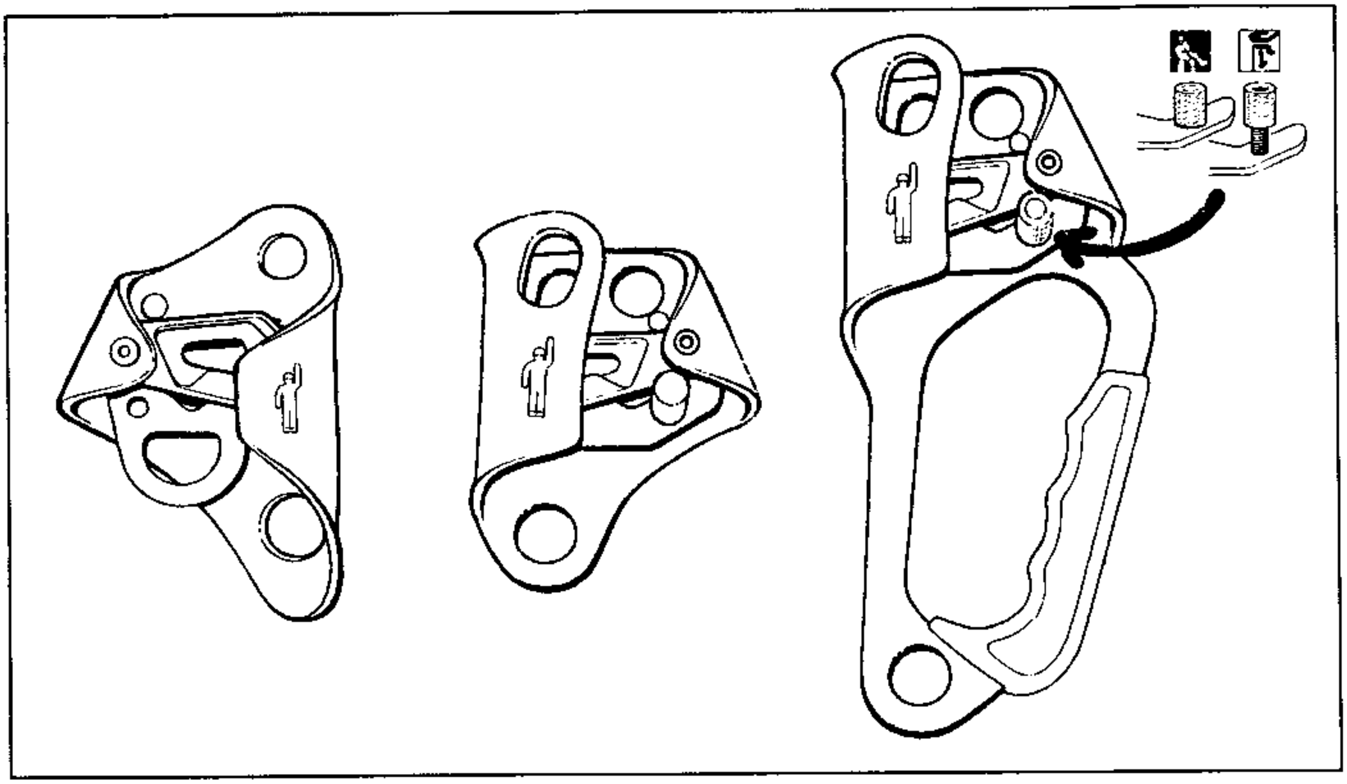
Why is the Gibbs fiddly? Why does it fall to bits?

CONSTRAINTS OF FABRICATION AND MATERIALS

The Gibbs is a simple and elegant machine. The design is clean and good, in the sense that it makes effective use of resources. But resources, composed of materials and fabrication, is the key to why the Gibbs is sub-optimal for modern caving; for keeping that pace. Back to cost/benefit. The Gibbs makes few demands on either builder or materials; a low cost is gained in this respect. But the price is paid later.

Making a Gibbs is not too difficult. For fun a friend of mine, Kirk Taylor, rustled up a few in his basement. Here's the recipe. Making the shell is like cutting out a Valentine without folding it first. You make 4 to 6 hacksaw cuts on a piece of aluminum sheet and fold with a vise around a 3/4-inch steel rod. Drill a hole for the pin. Buy an aircraft quick-release pin. [Kirk lathed and pressed his own perfect counterfeit, naturally, but refuses to discuss the origin of the ball-bearings.] Now make the cam. You can file it out of a chunk of aluminum. Or you can cast it in a sand mold. [But that would be too easy, so Kirk made a re-usable steel pot mold. He denies mining bauxite and refining the aluminum.]

So the Gibbs is easy to make from imperfect materials and is highly tolerant of faults. It does this by using a lever class (Load-Fulcrum-Rope) and arrangement which places little stress on any one component. Everything is nice and symmetrical; there are no complex stress states, just simple bending, shear, tension and bearing. The Gibbs is very strong, but it is topologically closed. To be placed on a continuous rope, it must be taken apart and then reassembled.



Petzl Croll, Jammer and Handled Jammer (from Petzl brochures).

AN OPTIMIZED CAVING ASCENDER

For contrast, let's take a look at a Petzl ascender. First you have to decide which one; there are three, the Basic Jammer, the Handled or Expedition Jammer and the Croll. Each is optimized for a specific position and geometry in a vertical system. Take the Croll, optimized for mounting between waist and sternum in the world's most popular vertical system: the Frog. (It works great for all kinds of other purposes, of course.)

The thing is rather impressive, something like a piece of modern art. The frame or shell is all graceful curves and flowing lines, cradling the rope in a precise arc. This open frame puts heavy constraints on both materials and fabrication, since the continuity of the frame is broken. As a result the frame is of a tough alloy, and it is stamped and bent three-dimensionally in an intricate and precise manner. It would be fairly difficult to fabricate using hand tools.

The cam must self-engage, pulling itself into the rope because of the Fulcrum-Load-Rope lever class. The frame does not completely constrain side-to-side movement, so the cam must resist twisting and have a strong fulcrum or hinge. To work in mud, it incorporates sophisticated teeth which angle into the rope and are cleaned out with each upward cycle. The latest models go even further; a slot down the center of the cam allows mud and water to be pushed through. To meet these physical demands, the cam is a complex die casting of steel, not aluminum.

Why? What is gained from all this effort? Click. A Jammer is now on rope, one-handed. Creak. The Jammer is off rope, again one-handed. It seems like such a small thing, but it is a key part of keeping the pace when complex SRT maneuvers begin.

The Petzl family of ascenders has grown out of a cost/benefit analysis which differs from the Gibbs. Monsieur Petzl decided that he was going to build an optimal ascender. This was the benefit, and he/we would pay the cost in expensive stamping and die-casting machines. (I understand that a die setup to make something like a Petzl cam can cost in the tens of thousands of dollars). Why was he able to do this? Because there are so many cavers and climbers in Europe and Britain to share the cost; the market is huge.

Thanks to this market, we now have the Petzl family of superb caving gear. There was a time when Gibbs were attractive simply because Petzl equipment was hard to get and relatively expensive. But Gibbs have rapidly closed the price gap, nearing $30. When you compare the devices side by side, you begin to understand the economy of mass production.

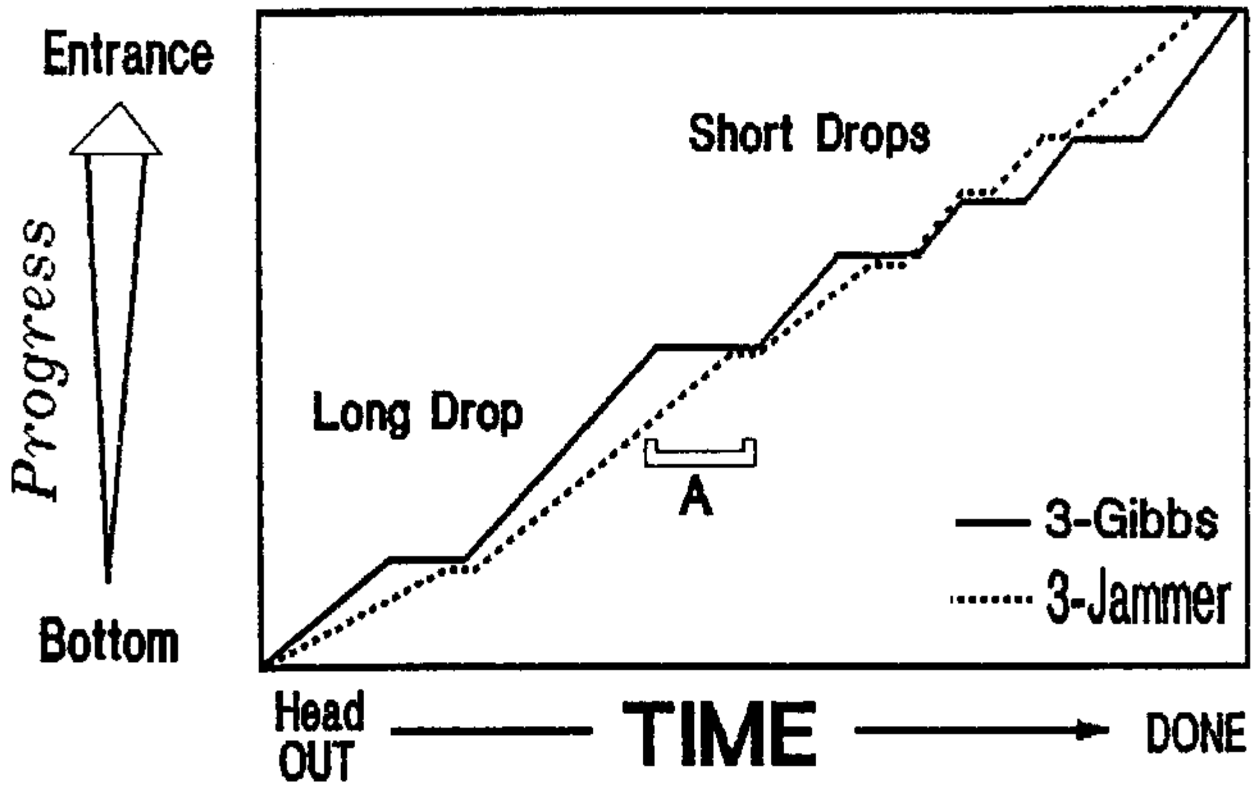
THE STRENGTH ISSUE

Have we gotten a free lunch at a French restaurant? A perfect ascender which meets all criteria? No. There is a price paid for the lever class, the teeth and the open frame of the jammer and other open-frame ascenders (Note 1). The Gibbs is probably about twice as strong. If you take a Gibbs and a Jammer, for example, put them each on an 11mm static rope and add weight until they fail, the Jammer cam will probably pull through at around 1300 pounds, while the Gibbs will hang on to over 2000 pounds (Note 2).

Both static strengths seem sufficient for SRT. More interesting is the issue of dynamic loading, where acceleration of the caver is involved. What happens if you are rigging in and fall while using your ascender as a safety? What happens if a main anchor fails and everything goes down the pit for 10 feet before being yanked to a stop by the backup? Will a Jammer stop your fall?

I think that I would rather fall on a Gibbs. But that's not the whole story. A Jammer seems to be fairly safe for a Fall Factor 1 journey of about 3 to 6 feet, assuming an 80 kg/176 pound caver (Note 3). Is this a reasonable expectation for a caver doing SRT, i.e. rigging drops on a safety, crossing deviations and knots, changing over to ascend or rappel, using a safety on a climb above a pitch? Personally, I've that decided it is.

The bottom line is that you should not fall on any ascender. Recognizing this, I'm going to use alternative belay techniques when this risk is encountered. The main alternative is being belayed



by another caver through a rappel device, and perhaps using a dynamic rope (Note 4).

EFFECTS ON SYSTEM PERFORMANCE AND CAVING

So the Gibbs is slow, fast and strong. The Jammer is very fast, a little slow, and weaker. We have seen that pace is important in caving, and that the Gibbs can seriously disrupt this pace. No amount of strength will outweigh the dangers of cavers going hypothermic while waiting for a knot to be passed or the frustrations of simply being unable to negotiate advanced rigging.

To summarize these ideas, let's do a short thought experiment. Let's put two cavers in identical physical condition and with equivalent experience six drops down at the bottom of a cave. The drops are very close together; let's say the cavers must walk 5 steps between each. They climb on parallel, identical rigging (see graph). Some of the top outs are a little interesting. One caver is using a classic 3-Gibbs system, perhaps a Davison rig or Butt Strap Harness. The other is using a hybrid with all Jammers. They take off, caving at a safe pace.

I'm making two assumptions. First, by virtue of the Gibbs low friction, the caver is able to ascend 10 to 15% faster once on rope (I think this figure is high). Second, the Gibbs caver takes twice as long to get on or off rope.

The graph more-or-less reflects these conditions. Notice that on the two long drops the Gibbs caver arrives before the Jammer caver, but loses this advantage in getting off of one rope and onto the next. Notice region 'A' on the graph; the Gibbs caver is fiddling or thrashing, while the Jammer caver is climbing along steadily and enjoying the scenery.

Now the cavers reach the short drops. Here things begin to change, because the cave demands lots of starting and stopping, and relatively little actual climbing. The Jammer caver pulls ahead, still maintaining the smoother pace.

What does this experiment help to suggest? To me it suggests hybridization; using the best aspects of each ascender while minimizing the effects of drawbacks. Put the strong Gibbs above a Simmons Roller, where it can be used as a safety to catch a fall. Here it is easily grasped with both hands in most situations, and can be peered at while fiddling is underway. Out on the extremities, put Jammers so that they can be quickly and easily operated when maneuvers are underway (Note 5).

APPLICATIONS

There is no doubt-- the Gibbs has its niches in vertical caving. Some of them are as follows.

1. **Racing:** When times are measured in tenths of seconds the Gibbs is unbeatable. It is difficult to imagine a faster ascender concept, although cam throw and geometry, hinge design, shell length and configuration, and the whole business of physiology and mounting location would be an interesting research area. Too bad the NSS Vertical Contest is not the Americas Cup.

2. **Fun caving:** Lots of people go caving for fun and relaxation. It's Caving Time. They throw a piece of 11mm rope down a couple of pits, bop on in and bop on out when they feel like it. Pace is the last thing on their minds. Pace, efficiency and time are Monday through Friday. Some use Gibbs, some use Prusik knots; it's all in fun. If it ain't broke, don't fix it.

3. **Ice or Extreme Mud:** On slick rope, the Gibbs is great. You can't beat that Load-Fulcrum-Rope mechanical advantage. Unfortunately, putting a Gibbs on in heavy mud can be quite a task.

4. **Rescue Hauling:** Hauling is not personal SRT. It involves much higher static loads, which may approach the breaking strengths of any ascender. When you have a dozen stout firemen giving the heave-ho on a Z-Rig hauling system and the litter hangs up on a ledge, it's a good thing a Gibbs is in use. This whole business is so slow anyway that the time required to put on a Gibbs is insignificant.

5. **Floating above Simmons Roller:** Can't be beat. Any open-frame ascender tends to hang up and pull the rope into the side of the roller. The friction is noticeable, but most can live with it. The Gibbs takes longer to put on and must be set by hand or spring-loaded to function reliably.

6. **Belay:** If you have to fall on an ascender, it's probably best to fall on a Gibbs. Don't fall on any ascenders.

CONCLUSIONS

The Gibbs is dated, a simple device built with simple technology. It works. It has certain attractive features, and certain serious drawbacks. In particular, it tends to interfere with the pace of caving, which seems vital to the physical and psychological efficiency of the cavers. The caver who is building or enhancing a vertical system should assess the pros and cons of available technology with an eye towards the style of caving that they enjoy.

ACKNOWLEDGEMENTS

Bill Storage checked my engineering and logic flow, making some astute editorial comments along the way. Bruce Smith gave me the idea for this article with a remark to the effect that it was time to break the news about Gibbs.

NOTES

(1) The Bonaiti ascender resembles a Petzl Handled Jammer, but also incorporates the Load-Fulcrum-Rope lever class of a Gibbs. Interestingly enough the breaking strength is quoted as only 650 kg or 1430 pounds (Caving Supplies 1987/88 Catalog. 19 London Rd., Buxton, Derbyshire, SK17 9PA. UK) I know of no literature on this device.

(2) Getting data on equipment strengths is an interesting business. See Gary Storrick's (1988) fourth synapse firing (**Nylon Highway** 26, May 1988, p. 12) for some thoughts on skepticism. These figures are from Andy Eavis (1981) 'The Weak Link,' (in **Proceedings of the 8th International Congress of Speleology** Vol. 1, Bowling Green, Kentucky. pp. 43-44. National Speleological Society) and the brief table in what appears to be the most recent Petzl Croll instruction sheet. I have a collection of these sheets, all undated, which show a steady progression in clarity and the number of assumptions stated. This suggests that Petzl and various French caving groups are studying the subject, but of course we have no contact with this civilization.

(3) Fall Factor 1 means that the mass starts from rest at the same height as the anchor point (see **On Rope**, p. 22). The Petzl Croll sheet (above) indicates that a 240 kg mass, Fall Factor 1, can travel 50 centimeters before being stopped by a Croll attached to an 11mm static rope, with the result being sheath damage but not breakage. These results seem to be vaguely similar to those given by Phil Brown of Caving Supplies Ltd. (letter dated 29 March 1985) in discussing some drop tests which he performed.

(4) These approaches to belaying are discussed in **On Rope**, Chap. 9. Another area, which should be investigated, is the use of shock absorbers between the caver and the ascender. One such device is the KISA (Kinetic Shock Absorber), which was

mentioned in **Nylon Highway #21**, March 1986. This device allows a limited slippage of the rope connecting caver to ascender, and Phil Brown's informal tests (above) show a dramatic reduction in the damage to the main rope when it is in place. The Air Voyager is another shock absorber used by rock climbers to protect delicate placements of protection. It is a webbing sling folded over with bar tack stitching. The tacks rip out under shock loads, dissipating energy. I would be interested in comparing notes with anyone studying, or thinking of studying about these devices, in order to avoid duplicate effort.

(5) The Simmons Expedition Ropewalker is such a hybrid, developed by Ron Simmons et. al. in the early 1908's (**Nylon Highway #15**). It originally used a foot Gibbs, but Bill Bussey (**Nylon Highway #22**, May 1986) gives an example of a foot Croll; Keith Goggin has also recently developed a related design. I have used a continuously evolving version of this system for 5 years. After some bad experiences with the waist/chest Jumar slipping under muddy conditions, I switched to a handled Jammer which is remarkable mud-resistant. Unfortunately, it does not float above the roller as nicely as the Jumar, and the Gibbs is even better. I use a Gibbs for long simple drops, a Jammer when expect to be doing maneuvers. □

++++++

CAM CAUTIONS

At Christmas 1987, I encountered a group of cavers who told about an interesting experience while doing some big drops in Mexico. They noticed that one of their new ropes seemed to be self-destructing with each use. Finally they tracked down the problem to one ascender on one caver's rig. Careful examination showed that there was a tiny depression in one tooth of the Gibbs cam; a cavity. This cavity seemed to be a bubble left over from casting, which had been exposed as the cam wore, and since the cam was hard-coated, the cavity had a sharp rim which was ripping the rope with each step. The moral of this story is that any casting, on any ascender which is exposed to abrasion, should be checked regularly for cavities, in addition to cracks, wear, etc.

---John Ganter □

LETTER TO THE EDITOR

By Frank Norris

In reference to Bruce Smith's article on 3 points of contact, **Nylon Highway #25**. If I may be so bold, there is a simple solution I use. A non-locking carabiner around the rope, clipped into your seat harness does two things. First, it prevents heel hangs, since you can sit on your knee cam/Jumar if the shoulder cam (chest harness) blows or is derigged. Second, it holds the climber closer to the rope. Smokey saw me do this the first time (way back) and traditionally wrinkled up his forehead, squinted, rubbed his beard and said "Hmm, that's the first time I ever saw anybody do that."

Frank Norris

FABRIC SOFTENER AND RESCUE ROPE

Originally By James A. Frank
A Summarization and Editorialization
By Bruce Smith

James Frank, a Wellington Puritan Rope dealer, recently published an article in **Response** magazine, Fall '88 somewhat in response to several statements made in Smith's article "Aging Rope", which appeared in both **Response** and **Nylon Highway #25**. Frank points out that Smith's tests don't support the conclusion that fabric softener is detrimental to a rope's strength. He goes on to quote outdated information from the first printing of **On Rope** and contrasts this outdated information with current data which appeared in Smith's two articles. The second printing of **On Rope** more accurately recommends not using fabric softener with nylon ropes.

Frank and his companions performed two tests to prove or disprove the benefits of fabric softener to restore a rope's softness and natural lubricant.

Test one tested Wellington Puritan Rhino Rescue Rope with Rhino Kote after being washed with the manufacturers recommended amount of softener (3 ozs. in 10 gallons of water). **"The conclusion drawn from this test was that the proper use of Downy in the rinse cycle, when washing a rope, does not adversely affect its tensile strength"**

Test two soaked new pieces of Wellington Puritan Rhino Rescue Rope with Rhino Kote in 100% or concentrated solutions of Downy fabric softener (test description does not describe how long). The ropes were allowed to dry for 48 hours and then tensile tested. **"The results of TEST #2 show that use of a small amount of Downy fabric softener is better than washing in water only. This supports the theory that the fabric softener replaces the lubricant removed by the water. The results also agree with Bruce Smith's test' showing that a 100% or heavy concentration of fabric softener will reduce a rope's performance. In both cases it appeared that the core remained effectively wet."**

"CONCLUSION. Test #1 used rope that had been in service for several years and had seen a lot of use. This tested for adverse effects of using Downy when washing the rope over a period of time. Test #2 used new rope for consistent samples so rope soaked in a small amount of Downy could be compared to rope soaked in water only and in 100% Downy. From the results of both tests, Wellington Puritan continues to recommend the use of a small amount of Downy in the rinse cycle when washing a rescue rope."

My thoughts regarding Frank's article are as follows:

1. Smith's tests dealt only with PMI rope which is a pure Dupont product. Wellington's Rhino Koted rope is also a Dupont product, but is coated with some unknown protectorant which, in my estimation, makes the tests somewhat non-comparable.

FABRIC SOFTENER Continued on Page 29

VERTICAL CAVING HARDWARE

1: Handleless Eccentric Cam Ascenders

By Gary D. Storrick

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Introduction

In 1971, Bob Thrun wrote his monograph "Prusiking". Since that time, numerous advances have been made in single rope techniques, but there have been no subsequent attempts to produce a comprehensive treatise on either ascending or descending. I recognize that several excellent books have addressed SRT, but their emphasis has always been biased towards presenting a compendia of practical approaches suitable for normal use. My preference, on the other hand, has tended to lie in the direction of completeness. Naturally, a complete work would include all the items mentioned in On Rope or Single Rope Techniques, as well as the plethora omitted for reasons of inefficiency, complexity, lack of safety, unavailability, rarity, author's unfamiliarity, and general absurdity. Such a complete work would, of course, be rather large. I suspect that a thorough discussion of ascenders alone (omitting their use) would be approximately the size of a copy of On Rope. Descenders would naturally fill a much larger volume. In general, writing the work I would like to read is probably impractical.

This series of articles is a much smaller version of what I would like to see. I intend to present some personal opinions on the ascenders and descenders I am familiar with. Familiarity cannot be obtained without frequent use, implying ownership, therefore all comments apply only to those device versions I personally own and use. This leads to an immense bias in the discussion, but I make no apologies. Those who feel that a different approach is more to their liking are welcome to pursue their preferences, and I encourage their doing so. Since my interest in vertical devices exceeds my income, anyone wishing to insure discussion of a particular device is welcome to donate a copy of the device to my collection, duplicates will be returned if desired. Finally, I welcome comments and corrections.

The order of the articles will follow no particular pattern, in fact, I will attempt to vary the subjects of consecutive articles as much as possible. The only priority I will try to maintain is to provide updated information on previous articles in preference to opening new discussions. At Bruce Smith's request, this first article is on small handleless eccentric cam ascenders.

Definition of a "Handleless Eccentric Cam Ascender

This article will consider mechanical ascenders consisting of a shell and an eccentric cam assembly attached to the shell at a single pivot point. The shell is open on one side to allow admittance of the standing rope. At least one sling attachment point is provided on the shell below the cam and no sling attachment points are provided on the cam.

General Comments

The ascenders considered in this article are generally compact devices. They do not have the bulk nor weight of handled ascenders such as the Jumar; conversely, they are not as easy to manipulate, particularly with gloved hands.

The cam is generally toothed and is spring loaded towards closing. The teeth are essential for proper operation (Thrun, 1971, p.17). Abrasion of the cam teeth is a problem, particularly with some of the softer cam materials. An ascender with worn cam teeth may not hold; neither will one whose teeth are caked with mud or ice. The teeth appear to have little or no effect on the life of the ropes the ascenders are used on.

As weight is applied to the ascender, the teeth provide the friction necessary to keep the cam from slipping down the rope. Since the shell tends to slide initially, the eccentric cam closes until further closure is prevented by the thickness of the now distorted climbing rope. At this point the ascender stops its downward motion and begins to support the load. Note that there is an inherent slippage in the operation of these ascenders. This creates some loss of climbing efficiency, although the loss is usually small.

These ascenders are asymmetrical and can be classified as left-handed and right-handed. Holding the ascender vertically, with the open side of the shell towards you, a left-handed ascender has the cam to the left of the rope channel while in a right-handed ascender, the cam lies to the right. The distinction is not as important in handleless ascenders as it is in handled ones, and some manufacturers produce only left-handed or only right-handed versions.

All my comments are oriented towards using these devices for their design purposes. Unless I specify otherwise, this is limited to a single person plus equipment ascending ropes within the 9 to 11 mm diameter range. Comments do not apply to ascender abuse, such as use in rescue hauling systems.

I am familiar with eccentric cam ascenders manufactured by five companies, and will discuss one version by Kong-Bonaiti, three versions by Clog, two versions and an option package by CMI, two versions of one product line and four of a second line by Petzl, and one version by Single Rope Technique

CLOG

Version A

Technical Details

I acquired this pair at Eiselin Sport, Bern, Switzerland in 1981, but they represent a much earlier product than version C. I'm not 100% sure about the relative ages of versions A and B.

The pair consists of a left-handed and a right-handed ascender. Each ascender is 103 mm high, 82 mm wide, 25 mm thick (with a post extending to 35 mm) and weighs 165 grams. The ascender shell is roughly a quadrilateral shaped piece of unfinished 4.2 mm thick aluminum bent to form a rope groove on one side and to hold the cam pivot on the other. The rope groove is 15.2 mm in diameter, but the sides of the groove are distinctly nonparallel. The main attachment point is a 15 mm hole located directly below the cam pivot. A second 15 mm hole, located above the cam, serves as an upper attachment point. The cam is solid aluminum and supports a post provided to make opening the cam easier. The 13 cam teeth are formed by milling transverse grooves across the rope bearing surface, creating a "z" shaped tooth profile. The cam radius, measured from the pivot, increases from 48 to 59 mm over an angle of 34 degrees. The cam and cam spring are mounted on a crude solid rivet. The pivot is centered 52 mm from the inside of the rope groove. There is no cam safety. The words "CLOG WALES" are stamped on the inner shell surface.

Comments

In general, this is a crude ascender, typical of many products of the 1960's, but not up to current workmanship standards. The cam tooth design is not as mud-tolerant as the conical design used on most eccentric cam ascenders. The ascender is easily opened with either hand. The ascender must be attached to the harness by a carabiner through the bottom attachment hole. Once attached, the carabiner obstructs the cam, preventing it from opening. This eliminates the need for an independent cam safety.

Clog eliminated carabiner attachment holes from their handled expedition ascenders because of two cases of carabiner failure. These were caused by sideways gate loading on carabiners lodged incorrectly in the attachment hole (D. Moorhouse, Clog Climbing Gear, Off Belay #30, Dec. '76, pp.54-55). This could happen with this ascender, as well as Petzl's, SRT's, handled CMI's, etc. I caution against using carabiners for attaching slings to ascenders.

Version B

Technical Details

I acquired this pair along with version A, and it too represents a much earlier design than version C. Each ascender is 103 mm high, 82 mm wide, 25 mm thick and weighs 153 grams. The ascender shell is identical to that in Version A only the cam assembly differs. The revised cam appears to be made of steel, the pin is eliminated and a finger hole serves to both lighten the cam and to ease operating the cam. The cam teeth are milled in the same "z" tooth design as version A. They are well made, but machining burrs at the edges were not removed. The cam radius, measured from the pivot, increases from 48 to 59 mm, over an angle of 34 degrees. The cam is mounted with a roll rivet, which is expanded into a counter sunk hole in the shell.

Comments

The comments made for version A, also apply here. The steel cam is more wear resistant than the aluminum cam in the previous version. This ascender is 12 grams lighter than version A and elimination of the cam pin reduces the thickness by 10 mm.

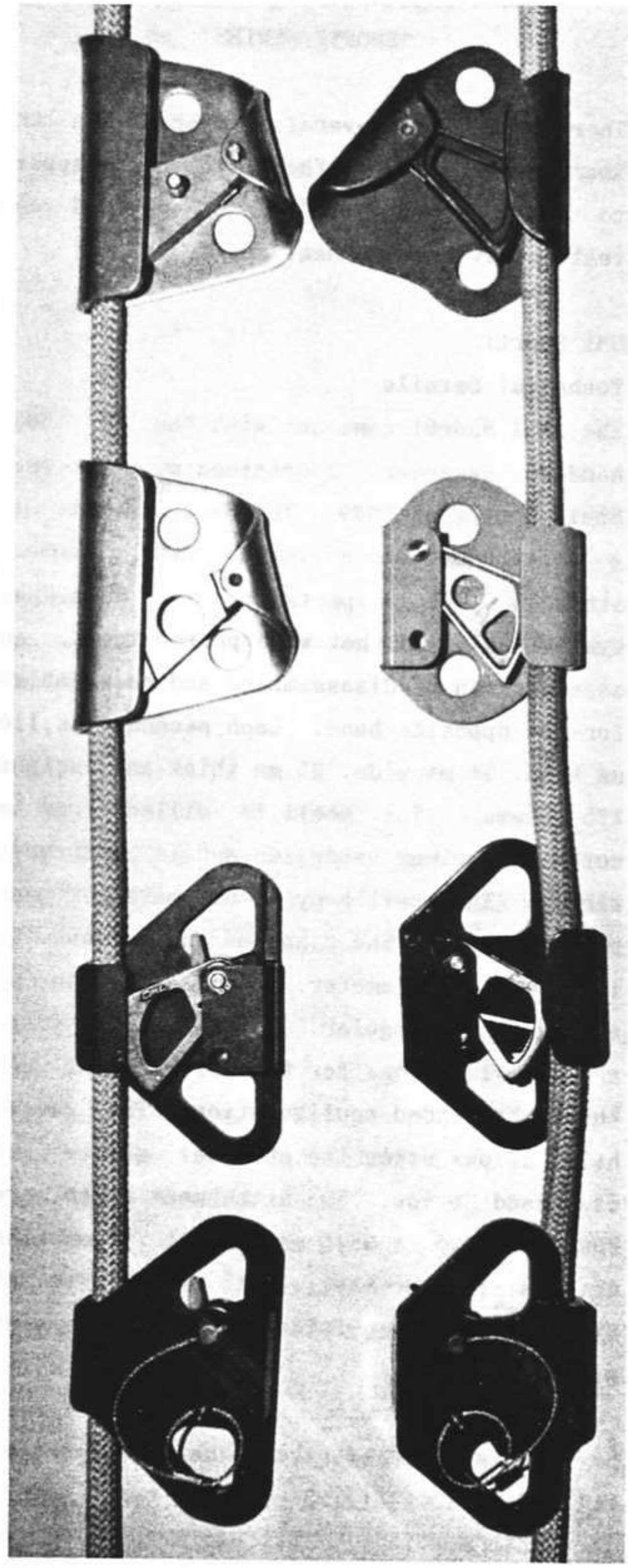
Version C

Technical Details

I acquired this pair in 1978 from Ligonier Mountain Outfitters, Ligonier, PA. The pair consists of a left-handed and right-handed ascender. Each ascender is 104 mm high, 98 mm wide, 25 mm thick and weighs 148 grams. The ascender shell is a roughly pentagonal shaped piece of blue anodized 4.4 mm aluminum sheet bent to from a rope groove on one side and to hold the cam pivot on the other. The rope grove is 15.4 mm in diameter and roughly square in cross section. The main attachment point is a 15.5 mm hole located well below the cam pivot. A second 15.4 mm hole, located above the cam, serves as an upper attachment point. The cam is a skeletonized steel casting is a $(4.5)^4(4.3)^4$ conical tooth pattern. The teeth axes are perpendicular to the cam face. The cam radius, measured from the pivot, increases from 45 to 59 mm over an angle of 38 degrees. The cam and cam spring are mounted on a roll rivet. The pivot is centered 57 mm from the inside of the rope groove. There is no cam safety. The word "CLOG" is cast in the upper cam surface.

Comments

The ascender has the best workmanship of the three Clogs discussed here. The cam is nicely made, but I question the use of a roll rivet expanded into countersunk holes in the shell; I would prefer to see round head rivets. The ascender is excessively wide, with about 25 mm of width outside the cam rivet serving no useful purpose. The comments on carabiner attachment made above also apply here. The relocation of the attachment point, closer to the rope channel, reduces ascender canting under load, thus improving climbing efficiency. The attachment holes are not rounded, nor are the top and bottom of the rope groove. The sharp edges at these points should be removed prior to use.



Clog Version A	Clog Version A
Clog Version B	SRT
CMI Shorti	CMI Shorti III
CMI Shorti with Safety Kit	CMI Shorti III with Safety Kit

COLORADO MOUNTAIN INDUSTRIES (CMI) "SHORTI SERIES

There have been several version of the CMI Shorti ascender, but the differences appear to be fairly minor so I have acquired and tested only two of them.

CMI Shorti

Technical Details

The CMI Shorti came out with the CMI 5000 handled ascender. I obtained my pair from Speleoshoppe in 1979. The pair consists of a left-handed and a right-handed ascender; although the parts are designed symmetrically so that with proper tools, an ascender can be disassembled and reassembled for the opposite hand. Each ascender is 116 mm high, 76 mm wide, 25 mm thick and weighs 175 grams. The shell is milled from a custom aluminum extrusion and is extremely strong. The shell body is 6.5 mm thick and gray anodized. The U shaped rope groove is 14.2 mm in diameter. The cam mounting groove is rectangular. Two cam pivot holes are provided; one for the left and one for the right-handed configuration. The unused hole allows using the optional safety kit discussed below. The attachment holes are rounded 28.6 x 28.6 mm, right triangular cutouts in the shell, with the resultant attachment lying outside the cam attachment point.

The cam is a skeletonized steel casting with a $(2)(5.4)^4(3.4)^2(3.2)^2$ conical tooth count. The teeth are fairly dull compared to those of other toothed ascenders. The cam radius, measured from the pivot, increases from 35 to 48 mm over an angle of 48 degrees. The cam pivot is a solid 6.4 mm pin held by an external retaining ring. The pivot is centered 49 mm from the inside of the rope groove. The cam safety is an elbow shaped lever mounted on a roll pin in the cam. A single spring serves as cam spring and safety spring. Normally, this spring holds the safety where it protrudes from both the top and bottom of the cam. The bottom protrusion interferes with the shell's cam channel and prevents opening the cam. When the top of the lever is pushed towards the cam teeth, the lower protrusion rotates into a recess in the cam, thus allowing the cam to open.

Comments

The shell on this ascender is very strong, but a competitor pointed out that the CMI cam was weaker than some of the competition's. Personally I feel the CMI cam strength is more than adequate for my purposes. The ascender can be opened with one hand, but the safety is awkward, particularly when used in the "wrong" hand. The location of the attachment points leads to substantial ascender canting each time it is loaded; this results in some efficiency loss while climbing. The ability to convert from left-handed to right-handed configurations is a nice feature, but I recommend that it not be done in the field since the small retaining ring tends to become airborne if the proper tools are not available.

CMI Shorti III

Technical details

The CMI Shorti III came out with the CMI 5003 handled ascender. I obtained mine from Speleoshoppe in about 1983. At first glance, it appears very similar to the CMI

Shorti, but there are several significant differences. The pair consists of a left-handed and a right-handed ascender; although the parts are designed symmetrically so that with proper tools, an ascender can be disassembled and reassembled to the opposite handedness. Each ascender is 120 mm high, 79 mm wide, 28 mm wide and weighs 194 grams. The shell is milled from a revised custom aluminum extrusion and painted black. The shell body is 6.5 mm thick and the rope channel is reinforced to 8.3 mm thick. The rope grove is larger (17 mm in diameter) and semicircular. The cam mounting groove is rectangular. Two cam pivot holes are provided; one for the left and one for the right-handed configuration. The unused hole allows for using optional safety kit discussed below. The attachment holes are rounded 28.6 x 28.6 mm, right triangular cutouts in the shell, but the cutouts are reversed from the Shorti so the resultant attachment point lies close to the main rope.

The cam is a plated skeletonized steel casting with an internal brace not found on the Shorti. The teeth are conical with a $(1)(2.3)^2(4.3)(2.3)^5 2$ tooth count. The teeth axes are parallel to the upper surface of the cam, and decrease in size towards the sides the the cam. The teeth are fairly dull compared to those of other toothed ascenders and the lower teeth had their points ground flat during manufacture, probably unintentionally. The cam radius, measured from the pivot, increases from 36 to 50 mm over an angle of 48 degrees. The cam pivot is a solid 6.4 mm pin held by an external retaining ring. The pivot is centered 47 mm from the inside of the rope groove. The cam safety is similar to the Shorti's and functions in the same manner. The safety is molded plastic and the enlarged actuating lever lies along the top of the cam, rather than sticking up from the cam. The roll pin is larger than the Shorti. A single spring serves as cam spring and safety spring.

Comments

The ascender is moderately well made, although the teeth were carelessly damaged by the manufacturer. Orienting the cam teeth axes parallel to the top of the ascender cam is an improvement. This design gives the teeth a slight downward alignment with respect to the climbing rope. This increases their grip, reduces tooth friction while raising the ascender and provides a small self cleaning action at the same time.

The ascender can be opened with one hand, but the safety is even more awkward than on the Shorti. I suspect that the new design was developed to reduce the risk of accidentally opening the ascender, but I don't find this to be a problem. In any case, the correct way to prevent accidental opening is to install the optional safety kit. The relocation of the attachment points reduces ascender canting to a minimum. CMI should have rounded the insides of the triangular attachment holes.

Optional Safety Kit

Technical Details

CMI manufactured an "Optional Safety Kit" for the CMI Shorti ascender. The kit adds 11 grams to each ascender and increases the width to 37 mm. I purchased one from

Pathfinder Sports in 1980 and installed it on one of my Shorti ascenders. More recently I modified one of my Shorti III's. The kit consists of two new cam pivot pins, each with a check pin attached by a 1.7 mm stainless steel cable. A simple, 6-step set of instructions describes how to replace the original cam pivot and replace it with one from the kit. Once installed, the check pin can be inserted through the unused pivot hole in the ascender shell from back to front. The pin will then prevent the cam from opening. A finger loop in the cable provides a means of gripping the pin firmly for removal.

Comments

The safety pin substantially reduces the chance of the cam opening accidentally. It does not interfere with the normal safety, so both must be overridden for the cam to open.

KONG-BONAITI "CAM-CLEAN ASCENDER

Technical Details

My Kong-Bonaiti ascenders were obtained from Bob & Bob in the summer of 1987. Both ascenders in the pair are left-handed. Each ascender is 117 mm high, 77 mm wide, 40 mm thick and weigh 153 grams. The ascender shell is a subtriangular, orange anodized, aluminum stamping 3.8 mm thick. The rope channel is formed by bending the right side of the ascender into a U. The rope channel is 15.5 mm in diameter. Two indentations in the stamping extend from the back of the ascender around the rope channel; these serve to strengthen the rope channel against unrolling. The main sling attachment point is located below the cam and behind the rope channel. A second attachment point is located above the cam and also behind the rope channel. The shell is bent backwards at both points to provide clearance between the attachment slings and the main rope. This accounts for the rather large thickness of this ascender. The attachment points appear to be circles distorted by the stamping and bending operation. The lower attachment point measures 20.5 x 18 mm and the upper 18 x 13.5mm. The left end of the shell is bent on an inclined axis to form another U. A hole drilled through both sides of the U accepts a rolled rivet. The cam, cam spring and a spacer washer are mounted on this rivet. The head of the rivet sits into a stamped depression on the back of the cam, while the roll is exposed on the open side. The pivot is centered 46 mm from the inside of the rope groove.

The cam is a skeletonized casting. The cam radius, measured from the pivot, increases from 38 to 58 mm over an angle of 36 degrees. The cam has a number of small conical teeth, all of which have their axes approximately parallel to the upper surface of the cam. In between the teeth rows are four oval holes which open to the central vacancy of the cam. The holes and teeth both decrease in size towards the toe of the ascender. The tooth/hole pattern is $(3.4)(0.3)^3(0.2.1)$; i.e., a row of 3 teeth, a row of 4 teeth, three sets of a hole followed by a row of 3 teeth, a hole, a row of two teeth and a single tooth. A spring-loaded manual safety bar is mounted on the bottom of the cam with a somewhat cracked steel roll rivet. The normal action of the spring holds the safety against the cam. When the cam is opened, the shell interferes with the safety bar, thus preventing full opening of the cam. If the safety bar is moved away from the cam (opposing the spring), it will clear the shell and the cam will open. At full open, the safety can be released and the spring will hold the safety against the back of the shell. This provides a means of locking the cam open. A cylindrical knob on the safety bar assists in operating the safety mechanism.

The back of the shell is stamped "STATIC ROPE","09 KG 420", "011 KG 500", and "KONG-BONAITI-ITALY". The front of the cam is stamped "CAM-CLEAN".

Comments

In general, I feel that this is a well made ascender. All sharp edges have been removed. The cam teeth are rather well done, though not quite as well as one of my older Petzl's. The shell reinforcing is a nice touch, though, of course, I can't quantify its strength benefit. Similarly, I am unwilling to destroy ascenders to verify manufacturer's strength claims, but I am satisfied that this ascender is strong enough for my own personal use.

The shell shape copies the Petzl Croll series, which was designed as a chest ascender for the Frog System and hence the Kong-Bonaiti is particularly applicable to this system. Most other applications are not so shell shape sensitive and hence, the Kong-Bonaiti could easily substitute for any other ascender in this article in almost any legitimate situation.

As with most ascenders under discussion, single handed operation of the Kong-Bonaiti is rather difficult. The better, handled ascenders are much easier to operate. I find right-handed operation particularly difficult, as might be expected for a left-handed ascender. Closing a locked open ascender is much easier than opening one, since the strong cam spring assists the user.

The attachment points are simply holes in the shell and although well rounded, I consider their small radius too sharp for directly attaching sling ropes. They are probably acceptably rounded for webbing, but considering the proximity of the attachment points to the main rope, I would recommend using a small maillon for most attachments in order to reduce the risk of sling abrasion.

Orienting the cam teeth parallel to the top of the ascender cam imparts a slight downwards alignment with respect to the climbing rope. This increases their grip, reduces tooth friction while raising the ascender, and provides a small self cleaning action at the same time. The holes in the cam are intended to reduce the risk of ascender slippage due to mud-caked cam teeth. This may be of some benefit under certain caving conditions, particularly with wet, silty muds, but my experience is that caves that have enough mud to clog ascender teeth usually have enough mud to stop a bulldozer. I suspect that most ropes muddy enough to stop other ascenders, will stop the Kong-Bonaiti too, despite the mud holes. Although I have not tried this ascender in the appropriate conditions, I suspect that the holes will not eliminate the icing problems common to other toothed cam ascenders.

PETZL CROLL SERIES

Version A

Technical Details

This Petzl Croll ascender was obtained from Speleoshoppe in about 1979. The ascender is left-handed, as are all Crolls I have seen. The ascender is 117 mm high, 76 mm wide, 38 mm thick and weighs 137 grams. The ascender shell is a subtriangular, gold anodized shape bent from 4.2 mm aluminum sheet. The rope channel is formed by bending the right side of the ascender into a U. The rope channel is 15.5 mm in diameter. The main sling attachment point is located below the cam and behind the rope channel. A second attachment point is located above the cam and also behind the rope channel. The shell is bent backwards at both points to provide clearance between the attachment slings and the main rope. This accounts for the rather large thickness of this ascender. The attachment points appear to be circles, distorted by the stamping operation. The lower attachment point measures 16 x 13.5 mm and the upper 17 x 13 mm. The left end of the shell is bent on an inclined axis to form another U. A hole drilled through both sides of the U accepts a roll rivet. The cam and cam spring are mounted on this rivet. The head of the rivet sits into a stamped depression on the back of the cam, while the roll is exposed on the open side. The pivot is centered 49 mm from the inside of the rope groove.

The cam is a plated, skeletonized steel casting. The cam radius, measured from the pivot, increases from 38 to 52 mm over an angle of 38 degrees. The cam has a number of small conical teeth, all of which have their axes approximately parallel to the lower surface of the cam. The tooth pattern is $(F)(3.4)^3(3.2)^2$. The F stands for a short flat area designed to allow the user to cant the ascender and slide it down the rope without opening the cam. A spring-loaded, manual safety bar is mounted on the bottom of the cam with a somewhat cracked steel roll rivet. The normal action of the spring holds the safety against the cam. When the cam is opened, the shell interferes with the safety bar, thus preventing full opening of the cam. If the safety bar is moved away from the cam (opposing the spring), it will clear the shell and the cam will open. At full open, the safety cam be released and the spring will hold the safety against the back of the shell. This provides a means of locking the cam open. A cylindrical knob on the safety bar assists in operating the safety mechanism.

The back of the shell is stamped "PETZL", "MAXI 400 KG", "BREVETTE" and "FRANCE".

Comments

The Croll can be used in almost any situation where other handleless cam ascenders are used. The croll was designed as a chest ascender for the Frog System and is particularly applicable to that system. It serves very well as a floating knee ascender in ropewalking rigs. The teeth are oriented more steeply than on the CMI Shorti III or the Kong-Bonaiti, so the advantages of inclined teeth discussed there are even more applicable here. See the discussion for the Petzl Jammer, version B, for comments on the flat area of the cam.

Single handed operation of the Croll is rather difficult. Closing a locked open ascender is much easier than opening, since the strong cam spring assists the user.

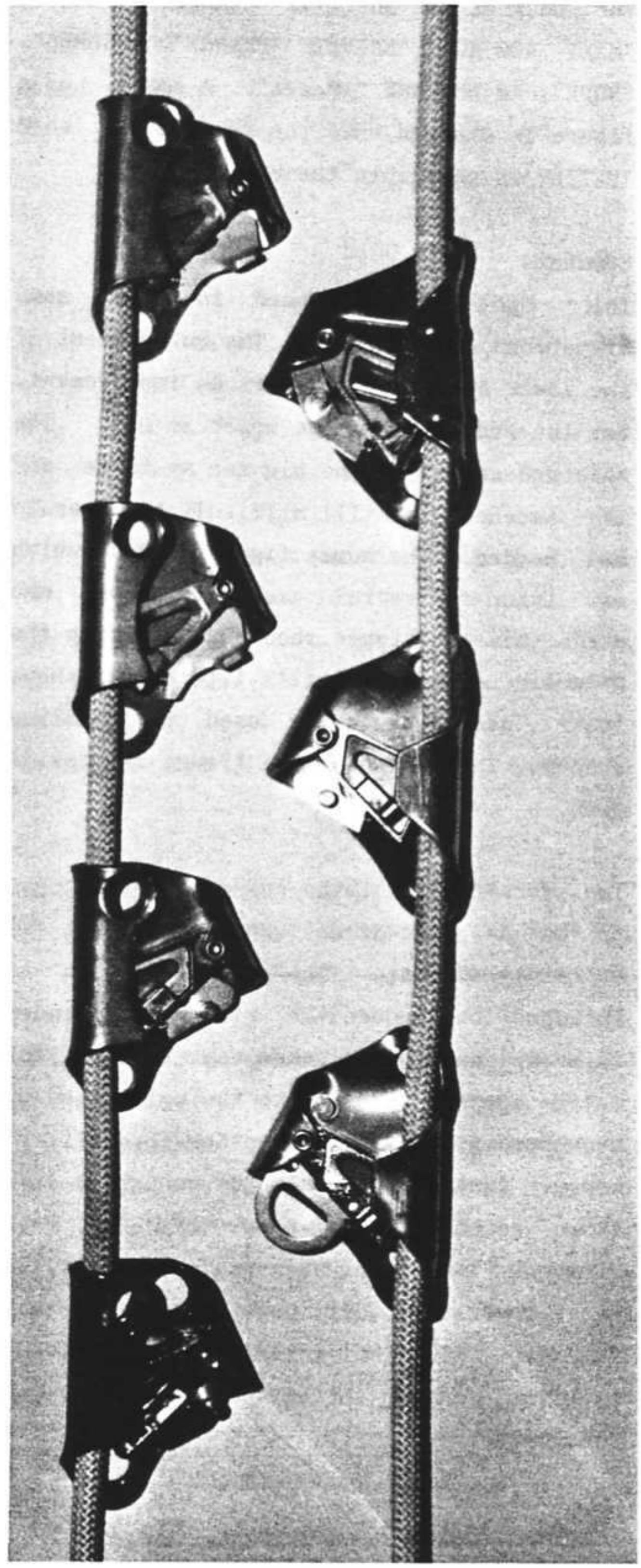
In general, I feel that this is a well made ascender. All sharp edges have been removed. The cam teeth are very well done. The attachment points are simply holes in the shell and, although well rounded, I consider their small radius too sharp for directly attaching sling ropes. They are probably acceptably rounded for webbing but, considering the proximity of the attachment points to the main rope, I would recommend using a small maillon for most attachments in order to reduce the risk of sling abrasion.

Version B

Technical Details

This Petzl Croll ascender was obtained from Bob & Bob at the 1988 convention. The ascender is left-handed. It is 119 mm high, 76 mm wide, 39 mm thick and weighs 138 grams. This ascender has only minor shell variations over version A. The lower attachment point measures 21 x 19.5 mm and the upper 15.5 x 13 mm. A small cylinder riveted to the shell acts as a cam closing stop.

The cam is a revised, skeletonized casting, plated as before. The cam radius, measured from the pivot, increases from 40 to 53 mm over an angle of 37 degrees. The cam has a number of small conical teeth, all of which have their axes approximately parallel to the lower surface of the cam. The tooth pattern is $(2.3)(2S2,1S1)^2(1S1)^3(1.2)$, where the "S"s stand for a single longitudinal slot designed for mud removal. The spring-loaded, manual safety bar has been enlarged to a 36 mm semicircle.



Petzl Jammer Version A	Kong-Bonaiti Cam Clean
Petzl Jammer Version AB	Petzl Croll Version A
Petzl Jammer Version B	Petzl Croll Version B
Petzl Jammer Version C	

The back of the shell is stamped "PETZL", "MAXI 400 KG", "BREVETE FRANCE", "CORDE", "ROPE", "0 MM" and "10 m/m". A small human figure is stamped onto the front. The word "PETZL" is cast into the cam.

Comments

This Croll can be used in the same situations as version A. The enlargement of the lower attachment hole is an improvement, but the reduction of the upper is not. The enlarged safety is too big for my taste and the ascender is still difficult to operate one handed. The human figure shows which way is up for certain uses but anyone who needs this assistance shouldn't be using the ascender anyhow. Petzl's literature shows their ascenders being used in hauling systems, in which case the figure is upside down.

The workmanship of the cam does not appear to be as good as on version A, but is certainly adequate. The slot in the cam is intended to reduce the risk of ascender slippage due to mud-caked cam teeth. The design appears superior to the holes used by Kong-Bonaiti, but like the Kong-Bonaiti, I suspect that most ropes muddy enough to stop other ascenders will stop this one too. Although I have not tried this ascender in the appropriate conditions, I suspect that the slot will not eliminate the icing problems common to other toothed cam ascenders.

PETZL JAMMER SERIES

Version A

Technical Details

This ascender was obtained from Speleoshoppe in about 1982. The ascender is right-handed, as are all Jammers I have seen. It is 100 mm high, 76 mm wide, 24 mm thick and weighs 122 grams. The ascender shell is a subtriangular, light blue anodized shape bent from 4.2 mm aluminum sheet. The rope channel is formed by bending the left side of the ascender into a U. The rope channel is 15 mm in diameter. The main sling attachment point is a beveled 13 mm hole, located below the cam near the rope channel. A second attachment point consists of two beveled 13 mm holes through the rope channel U and is located just above the cam. The right end of the shell is bent on an inclined axis to form another U. A hole drilled through both sides of the U accepts a roll rivet. The cam and cam spring are mounted on this rivet. The head of the rivet sits into a stamped depression on the back of the cam, while the roll is exposed on the open side. The pivot is centered 49 mm from the inside of the rope groove.

The cam is a plated, skeletonized aluminum casting. The cam radius, measured from the pivot, increases from 40 to 51 mm over an angle of 42 degrees. The cam has 12 "z" teeth cast into the cam, plus a single space between the fifth and sixth "z" teeth. A spring-loaded, manual safety bar is mounted on the bottom of the cam with a solid pin. The normal action of the spring holds the safety spring against the cam. When the cam is opened, the shell interferes with the safety bar, thus preventing full opening of the cam. If the safety bar is moved away from the cam (opposing the spring), it will clear the shell and the cam will open. At full open, the safety can be released and the spring will hold the safety against the back of the shell. A small tab fits into a drilled detent in the back of the shell cam

U and holds the cam open. A bent tab on the bottom of the safety bar assists in operating the safety mechanism.

The back of the shell is stamped "F. PETZL" and "FRANCE". The cam is stamped "ZEDEL".

Comments

This ascender dates from the 1960's. The shell is adequate but the cam is not. The soft cam wears quickly, the teeth are inadequate in the mud and in general the cam is poorly executed. Versions B and C are much better ascenders.

Version AB

Technical Details

I have a second ascender which has the cam assembly of version A, but a shell that is identical to version B's except that a drilled detent for the cam safety is provided. It was paired with ascender A. The ascender is 100 mm high, 76 mm wide, 24 mm thick and weighs 118 grams.

Version B

Technical Details

I acquired a pair of these ascenders from Speleoshoppe in 1979. The ascenders are right-handed, 100 mm high, 76 mm wide, 26 mm thick and weigh 138 grams. The shell is essentially identical to version A, except the anodizing is a darker blue and the upper end of the rope groove is flared to 17.5 mm. The back of the shell is stamped "PETZL", "MAXI 400 KG", "BREVETE" and "FRANCE". The cam assembly is the same as that on the same as that on the Petzl Croll, version A. The shell detent is omitted since the new cam safety design does not require it.

Comments

With the advent of the steel cam, the Petzl Jammer became a viable ascender. The ascender is well made and the cam teeth are among the finest in my collection. The only oversight is that the lower attachment hole is not beveled. Single handed operation of the Jammer is rather difficult. Left-handed operation is particularly difficult as expected for a right-handed ascender.

The flat area on the cam caused some confusion. Some cavers thought it was a design defect, but actually it was provided as a feature. The flat area allows one to cant the ascender and then slide it down the rope without opening the cam. This feature was later abandoned. The Jammer is a very popular ascender, particularly in Europe. Its light weight and small size certainly enhance its popularity.

Version C

Technical Details

I obtained this ascender from Bob & Bob at the 1988 NSS Convention. The ascender is right handed, 100 mm high, 76 mm wide, 26 mm thick and weighs 145 grams. The shell has a few minor improvements over version B. The upper attachment has been enlarged to a near vertical 19 x 13.5 mm oval. A second 15 mm upper attachment hole is provided. It goes through the back of the ascender only, missing the rope groove. A raised area is stamped into the back of the ascender, presumably to increase the rigidity of the device. A cylindrical cam closing stop is provided.

The cam is identical to the Croll version B, but the cam safety is shaped differently. The large semicircle is eliminated and a simple elbow shape is used. A cylindrical knob on the safety bar assists in operating the safety mechanism.

The back of the shell is stamped "PETZL", "MAXI 400 KG" and "BREVETE FRANCE". The front of the shell is stamped "CORDE", "ROPE", "0 MM" and "10 m/m". A human figure is also stamped onto the front. The word "PETZL" is cast into each side of the cam and "OIL" and an arrow are stamped on each side of the cam safety.

Comments

This version has a slightly more convenient shell design than the previous one. The extra hole may occasionally be useful and this time all holes are beveled. The comments on the Croll version B cam slots apply here as well. The cam safety design is more reasonable than that on the Croll. In general, this is a well made ascender suitable for a wide range of uses.

SINGLE ROPE TECHNIQUE (SRT) "G.P."

Technical Details

I obtained my G.P. from Inner Mountain Outfitters at OTR 88. My pair consisted of two left-handed ascenders, although a left and a right were supposed to be packaged together. Each ascender is 96 mm high, 76 mm wide, 26 mm thick and weighs 176 grams. The shell is milled from a custom aluminum extrusion which appears to be a direct copy of CMI's extrusion. The shell body is 6.5 mm thick and painted yellow. The rope groove is 14.2 mm in diameter and U shaped. The cam mounting groove is rectangular. Two cam pivot points are provided; one for the left and one for the right-handed configuration. The attachment points are 15.5 mm, beveled circular holes; one located below the cam and one above. Attachment is made using a carabiner as in the Clog designs discussed above. The inside of the shell is stamped "SRT", "AUSTRALIA" and "EQUIP.".

The cam is a plated, skeletonized, reinforced, stainless steel casting with a $(4.5)^3(4.3)^3$ conical tooth count. The teeth axes are perpendicular to the cam face. The cam radius, measured from the pivot, increases from 41 to 58 mm over an angle of 42 degrees. The cam, cam spring and cam housing are mounted on a 6.4 mm roll rivet. The cam pivot is centered 55 mm from the inside of the rope groove. A single spring serves as cam spring and safety spring. The cam housing is a piece of thin sheet metal bent to cover the top of the cam channel and serve as a spacer along the sides of the cam. The top of housing is indented; this limits cam closing so that the teeth do not hit the inside of the rope channel. There is no cam safety.

Comments

The SRT is a compact, well made ascender. The carabiner attachment eliminates the need for a cam safety in the same manner as that on the Clog. The extrusion is so similar to CMI's that the CMI Optional Safety Kit can be installed on the SRT, although it will allow the cam to open too far to prevent rope escape. The attachment points are located too far from the main rope channel, so ascender canting occurs, losing efficiency. The cam is very well made, reminiscent of Jumar's. I am not thrill with the rolled rivets for cam pivots, but at least the SRT's are not cracked. The cam housing is lightweight and crude and on one of my ascenders had been trimmed with pliers. The resulting sharp edges were not smoothed.

I was rather annoyed when I discovered that SRT had packaged two left-handed ascenders together. The orientation of the stampings on the ascender shells showed that one of the pair was assembled upside down, making a perfectly functional left-handed ascender out of a right. If SRT had used a pivot pin like CMI's, the cam could have been easily reversed. Fortunately, I had a set of extra CMI pivots, so I took the reversed ascender, drilled out the rolled rivet and reassembled the ascender as a right-handed model, using the CMI pin. This incident tarnished my opinion of SRT's quality control, because otherwise it would have appeared to be fairly good.

Conclusions

In many ways, this has been a very limited discussion of a single, very specific type of ascender. The discussion was kept short for reasons of space and much more could be said about each of the ascenders discussed. Undoubtedly, there are other ascenders omitted because I lack familiarity with them and I apologize to their manufacturers. I had not discussed the uses of short eccentric cam ascenders, nor do I intend to here. Instead, I urge anyone considering any of these devices to get proper instruction before doing so. □

Handleless Eccentric Cam Ascenders

Ascender	Height mm	Width mm	Thickness mm	Std. Volume ml	Weight grams
Clog, version A	103	82	35	296	165
Clog, version B	103	82	25	211	153
Clog, version C	104	98	25	255	148
CMI Shorti	116	76	25	220	175
CMI Shorti III	120	79	28	265	194
CMI Shorti III with pin option	120	79	37	351	205
CMI Shorti with pin option	116	76	37	326	186
Kong-Bonaiti Cam-Clean	117	77	40	360	153
Petzl Croll, version A	117	76	38	338	137
Petzl Croll, version B	119	76	39	353	138
Petzl Jammer, version A	100	76	24	182	122
Petzl Jammer, version AB	100	76	24	182	119
Petzl Jammer, version B	100	76	26	198	138
Petzl Jammer, version C	102	76	26	202	145
SRT G.P.	96	76	26	190	176

Note: Standard volume is height x width x thickness/1000

FABRIC SOFTENER Continued from Page 15

2. Information and technology change almost daily. I feel it is important to use the most current source of information and not pull outdated and disproven stuff from old documents and use them as a source or point of conflict.

3. Even with a coated rope, significant rope strength change occurred and the basic conclusions of both Smith and Frank were the same. Soaking nylon in concentrated stuff (even water) is detrimental to rope life and strength. □

IMPROVING THE PERFORMANCE OF THE FOOT GIBBS

By Ron Simmons

The following article contains some suggestions on how to modify a foot Gibbs for better performance. These modifications will make self starting and down climbing much easier, but at a cost. The cost (other than the expense of the modifications) is that one's climbing technique needs to be more exact.

SHELL MODIFICATIONS

The first modification to make to the Gibbs ascender will improve its efficiency and extend the life of the shell. This is the addition of small rollers to the top and bottom of the shell. The shell on a Gibbs ascender drags on the rope as it is raised on each cycle. This drag causes a loss in efficiency and also wears the shell. Depending on how much ropework one does and how dirty the ropes are, a shell can wear out in a couple of years.

Adding rollers will improve the efficiency and life of any of the Gibbs used in a ropewalker system. There are some added advantages to less drag on a foot mounted Gibbs. The reduced drag makes it possible to self start on a modified foot Gibbs much sooner than one that does not have rollers on its shell. It is also possible to down climb. It does take a bit of practice on exactly how to move the foot, but is not all that hard to learn.

This modification can be made with a few tools and is not overly hard. The shell must have ears cut and bent on each end of the shell (refer to Fig. 1). This is the hard part. On my old Gibbs shells, which I modified 12 years ago, I was able to bend the ears without cracking the aluminum. It may not be possible to do this without heat on the new Gibbs shells. The temper in the metal of the newer shells seems to be harder and the aluminum may crack if worked cold. The temper can be removed with heat to make bending the aluminum easier.

WARNING: By using heat on the Gibbs shell, you will be removing the temper and this will make the shell weaker. By weaker, I mean that the shell can be bent more easily. So if you step on it, you may press the it together so much that the cam will not fit. The metal in the shell still has more than enough tensile strength even without the temper, so it will still be plenty strong, it just will bend more easily. You should consider this before you use heat on the shell.

HATS OFF Continued from Page 5

I further plan to try to devise a system of strapping the left climbing assembly loose enough so the top end can swing in toward the body instead of being carried a bit away by the knee as it raises. This would save some energy lost in bending the rope and overcoming friction through the ascender. It would allow me to wear my Gossett block at the hip level, where I like it. The hinges at the ankle level would permit rising on the toes for a bit of added upward acceleration. I have observed that even when climbing a vertical step ladder, it is advantageous to rise on the toe at the end of the step. I have never liked the flat-footed type of step compelled by the usual sling around the instep.

After you have cut the shell as shown in Fig. 1, the ears must be bent out so that they are straight. To remove the temper, the aluminum must be heated to around 350 degrees F. This can be done with a propane torch, but will take a minute or two to get the metal up to temperature. Do not use an acetylene torch or mapp gas torch. They can get the aluminum hot enough to melt. By clamping the shell in a vise, a wedge of metal can be used to separate the ears and straighten them. If this takes very long, the aluminum will need to be reheated or continually heated in order to be workable. Check the aluminum continuously for possible cracking, which means that the aluminum is not hot enough in the area of the bend. You should be prepared to destroy the first shell that you try this procedure on. The usual problem will be that the aluminum is not hot enough. It will be hard to overheat the shell with just a regular propane torch. Be sure to file down all rough edges after bending out the ears.

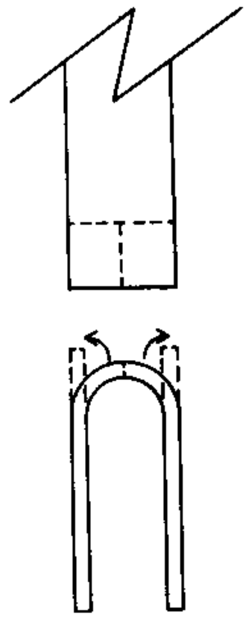


FIG 1

After you have the shell reworked, holes must be drilled for the roller shafts. If possible, use a drill press with the shell clamped in a vise. It is important that the holes for the shaft be drilled perpendicular to the sides of the shell. If they are not, the rope will be forced to one side or the other of the shell by the roller. Drill through both sides of the shell in one pass with it clamped in the same position. This will keep the roller aligned properly.

A two piece roller with an inner metal bushing can be constructed fairly easily. A one-piece roller wears out faster and produces more friction than a two-piece roller. The outer roller can be a nylon roller or spacer or other plastic rod, whatever you can find. Inside of this is a metal sleeve that will fit over a small bolt that holds the roller to the shell. This metal sleeve serves as a bushing. A copper, brass or aluminum tube will work for the sleeve. The roller with metal inner sleeve is held to the shell by a small bolt which serves as the roller shaft. This bolt should be strong and should not corrode easily; stainless steel would be best. You can either use a bolt and nut to hold the roller on the shell or you could tap out threads on one side of the shell. Either method should use Loctite or some other means to keep the bolt from coming loose.

At each end of the roller, a small metal washer can be used to serve as a thrust bearing. This will help keep the roller spinning when it is pushed to one side or the other. The bolt also should not be over tightened or the roller could be pinched by the ears on the shell. The idea is to have the roller and sleeve rotate freely, but with not too much play. This will give you a fairly good bearing roller. An effective diameter for the roller is 1/2 inch. Much smaller than this and the roller will not spin freely and may bind up.

CAM MODIFICATION

With the roller on the shell, there is another modification that will improve the performance of the foot Gibbs further. The modification is the removal of quite a bit of the metal from the cam. If this modification is used on any Gibbs other than the foot Gibbs, it should be used with care. You may not want a knee or other Gibbs to run quite as freely on the rope as the foot Gibbs. When the rollers are added to the shell, they push the rope out from the back of the shell. This will cause some problems with a normally shaped cam (refer to Fig. 2). With the rope moved out from the back of the shell, the cam now drags on the rope. You have removed the drag on the top and bottom of the shell, but added some on the cam. The cam must have some metal removed to give the rope a straight path through the Gibbs. In Fig. 2 the dashed lines show the modified cam and new rope path in comparison with that of the unmodified cam.

What I have done is remove part of the cam. Fig. 3 shows the area to be removed from the cam. I use a high speed metal sander but a wood belt sander or file can also be used. The unhardened cams are easier to work.

There is a trade off here concerning how much metal to remove. The Gibbs will work without any metal being removed from the cam, but there will be considerable drag. This will make self starting more difficult, as more rope weight is needed below the climber to overcome the drag and allow the Gibbs to slide up the rope. There is also the variable of how far the rollers on the shell push the rope out from the back of the shell. This will vary depending on the diameter of the roller and exactly where you drilled the holes for the axles. Also, the more metal you remove from the cam, the more easily it will slip if it is not set properly before full weight is applied. This is your trade off: how easy the Gibbs is to self start versus sureness of set on the rope. You will want to play with this to suit personal taste. Take off a little at a time and work up to the amount that suits you best. The dashed line on Fig. 3 shows what is probably the maximum you will want to remove.

CLIMBING TECHNIQUE

The technique of using the fully modified Gibbs (shell and cam) is a little more demanding than on a normal Gibbs, but the payoff in performance is worth it! No only can you self start much sooner than with an unmodified Gibbs, but you can also move the Gibbs down the rope for down climbing. Depending on the rope and its condition, I can usually self start without having to pick up the rope at all.

The basis for control is the attachment between the cam and the top of your foot. The foot Gibbs needs to be mounted so that the eye of the cam sits just to the inside of the center of the top of your foot and as close to the ankle as possible. The eye of the cam should rotate very freely in its attachment with the foot in an up and down direction. I find it easier to get the type of attachment that I prefer by sewing my foot harness.

The technique is more demanding in that you can't just lift your leg, stand up and

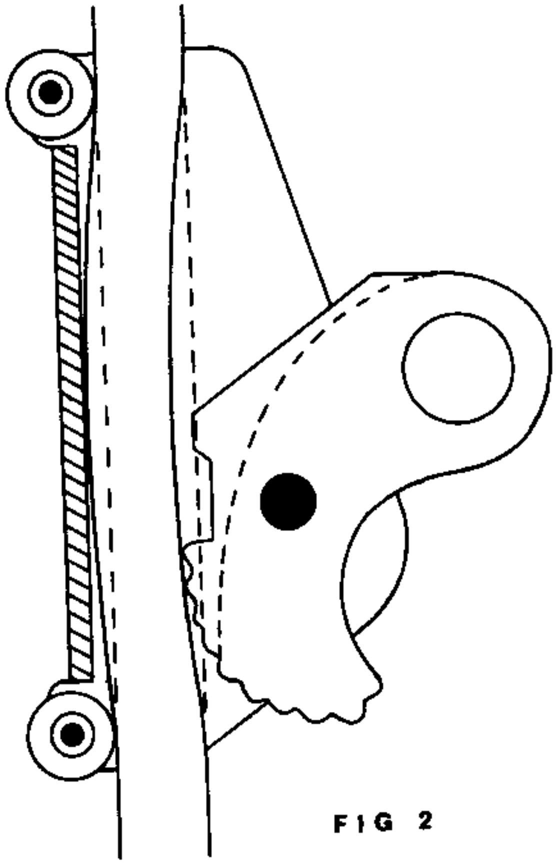


FIG 2

expect the Gibbs to work properly. The control of the Gibbs is in how the foot is tilted in relation to the Gibbs. To release the Gibbs, the top of the foot is tilted toward the Gibbs and the whole foot is raised. Then move the Gibbs up the rope while maintaining the angle that the top of the foot makes with the Gibbs. By tilting the foot toward the Gibbs, the cam is allowed to swing more open than with the foot level. This gives the rope as straight a path through the Gibbs as possible. To set the Gibbs, tilt the top of the foot away from the Gibbs and then step downward. It may also help if you point your toe downward. Tilting the foot away from the Gibbs causes the cam to swing upward more than when the foot is level and causes more drag on the rope. The extra drag that this causes will be needed to make the cam set easily. Remember that a lot of extra drag of the cam was removed by removing metal. Tilting the foot away from the Gibbs is what gives this extra drag back when it is needed to set the Gibbs.

While tilting your foot one way or the other, you will also be moving your foot in a forward cycling motion. The movement is very similar to that of riding a bike; in fact, cycling is a great complement to rope climbing in terms of the strength and motion requirements of both. On the back half of the cycle, your foot is tilted in toward the Gibbs to get it to move up the rope freely. On the front half of the cycle, your foot is tilted away from the Gibbs to get it to set properly. To keep the Gibbs from slipping, it is important to have your foot tilted away from the shell before applying downward pressure, something like easing up on the bike cranks while changing gears. You want to be in gear before applying power or you slip. With practice, this motion will become second nature and you shouldn't have any problems with slippage.

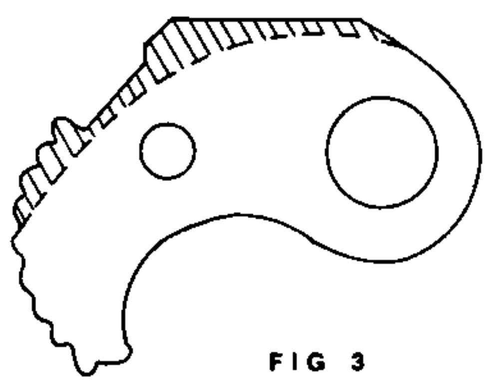


FIG 3

When it comes to self starting, the ankle is the key again. The idea is to tilt the foot in and raise it some to release the hold of the Gibbs on the rope. Holding your foot in this position, the rope should have a straight path through the Gibbs with little drag from the cam. Then you can guide the shell up the rope with your leg. This is easier on stiff or dirty rope. It can still be done with more limp rope, but is harder. With practice, it should be possible to self start most of the time without having to pick the rope up.

Down climbing is the same idea as self starting, only in reverse. The cam must be unlocked and kept unlocked while you move the shell. Keep the Gibbs unlocked by holding your foot in the correct tilted position and using your leg to guide the shell down the rope. This is also something that takes some practice, but could be well worth it.

I have found these modifications to my foot Gibbs very helpful over the years and hope that you will find them beneficial if you should decide to modify your foot Gibbs too. If you choose to try these modifications, you should be prepared to lose a shell or cam in the process. On your first try, there is always the chance of something going wrong. Also, I want to stress that AFTER ANY CHANGES such as these, please TRY THE GIBBS OUT ON A PRACTICE ROPE, and not on any "in-cave" drop. Better safe than sorry.

Some of the materials that you will need in modifying a Gibbs can be obtained from SMALL PARTS, INC.; P.O. BOX 381736; Miami, FL 33238. They carry small rollers, bushings and fasteners of all types and are willing to sell them in small quantities. □

TREASURER'S REPORT

NSS VERTICAL SECTION
June 16, 1988

Income:	
Memberships	$2553.00
Subscriptions	131.00
Back Issue Sales	1399.20
Symbolic Item Sales	1602.24
Vertical Techniques Workshops	270.00
Bank Interest	89.35
Donations	29.00
Other	22.42
Total Income	**$6096.21**
Expenses:	
Editor:	
Printing Nylon Highway #25	$890.00
Mailing Nylon Highway #25	138.07
Printing Nylon Highway #26	806.00
Mailing Nylon Highway #26	126.87
Carry-over from 1987	138.68
Typesetting	16.09
Other Postage	97.39
Bulk Permit	50.00
Mailing Envelopes	197.08
Supplies	8.62
On Rope Gratis Copies	41.42
Total Editor Expenses	**$2510.22**
Secretary/Treasurer:	
Postage	$261.27
Supplies	120.70
Vertical Techniques Workshop Expense	72.44
Advertisements	60.00
Symbolic Items Cost	2151.28
Rebuild Contest Foot Cam	44.00
On Rope Drawings Reimbursement	75.00
PMI Rope Testing	250.00
Sara Corrie Fund Contribution	20.00
Bad Check Expense	9.00
Editor Surplus 6/18/88	60.78
Other	4.80
Total Secretary/Treasurer Expenses	**$3129.27**
Total Expenses	**$5639.49**
1987-88 Net Income (Expense)	**$456.72**
Balance as of July 23, 1987	**$2108.61**
1987-88 Net Income (Expense)	**456.72**
Accounts receivable NSS	**1758.74**
FINANCIAL POSITION JUNE 16, 1988	**$4324.07**

1988 MEETING MINUTES

The 1988 meeting of the NSS Vertical Section was held Monday, June 27th, 1988 at the Hot Springs Civic Center. Executive Committee members present were Bill Bussey, Allen Padgett and Bruce Smith. E.C. chair Bill Cuddington was absent due to the death of his father. Scott Fee arrived late due to the NSS board meeting.

Secretary/Treasurer Bill Bussey chaired the meeting due to Bill Cuddington's absence. Bussey called the meeting to order at 12:30 PM.

Bussey explained Cuddington's absence and urged all members to sign a condolence card which was circulating around the room.

Corrections to minutes: Membership approved change of two to three as the number of stopwatches donated by Marion Vittetoe last year (Sec's note: This was correctly published in Nylon Highway)

Sara Corrie and Roberta Swicegood were remembered for their personalities and contributions. They are missed...

Secretary's Report: 616 voting members in the Vertical Section.

Treasurer's Report: $1980 is devoted to future years due to multi-year memberships. The NSS has repaid the Vertical Section for funds used in reimbursing Pandra Williams during her work with On Rope.

Editor's Note: Bruce says he was not pleased with Nylon Highway #26. Was pleased with Nylon Highway #25. Lots of neat ideas are being used or "in heads out there" which are not being published. Share it!

On Rope Report: Allen Padgett and Bruce Smith said On Rope was published last October. 5400 copies were sold out by May. 2nd Edition is now in print. On Rope is second only to membership dues as the biggest raiser of revenue the NSS has ever had. Successor to On Rope should be started now.

Vertical Session: Allen Padgett listed presentations to be given in session coming up after meeting.

Vertical Contest: Allen Padgett noted that existing rules will be enforced. Sign up and climb in order. No passing. (Sec's note: 151 climbs were completed - the most ever)

Amending the Constitution: Bull Bussey moved that Article III, Line 1 of the Constitution of the Vertical Section be ammended to add "an Editor," between "Secretary/Treasurer," and "and three Committee Members at Large." This would increase the size of the Executive Committee to six. After discussion, the amendment was voted on and passed with one abstention.

Bylaws: Bull Bussey stated that the Vertical Section has no written bylaws. A committee was created to go through old minutes of meetings to find and report any bylaws that exist or are assumed to exist in order to be placed in written bylaws. The committee will report to the E.C. before the next general Section meeting at Sewanee, TN. The committee consists of: Bill Bussey - chair, Shari Lydy, Gary Bush, Dick Desjardins and Bill Combs.

Vertical Techniques Workshop: David McClurg reports all set to go with 36 participants and 18 instructors.

Lesson Plan for Basic Vertical Course: Allen Padgett motioned:

"The Vertical Section establish a recommended standard written lesson plan for use in training novice ropework classes. An additional plan will be established for intermediate ropework classes. The Section directed the E.C. of the Section to appoint a project editor and project committee member. The committee will present the proposed lesson plan no later than the Section meeting at the 1989 NSS Convention.

Padgett noted that this was to give us an instrument to teach novice and intro level classes about vertical work with no degradation of knowledge through the generations. It would enhance the learning environment by giving training materials to groups. This detailed outline would be less than 10 Xeroxed pages and so would be of marginal expense to the Section.

After much discussion, a vote to establish a committee to look into this proposal passed with four opposed, rest in favor. After the meeting, the E.C. selected the following for the Vertical Training Committee: Jim Hall - Editor & Chair, Myrna Diaz, Bill Frantz, Dan Legnini, Allen Padgett, and Ed Sira.

Bruce Smith Announced:

1. NCRC Manual is out. Highly recommended.
2. Sewanee facilities are excellent. Be there in 1989
3. Discussed liability concerns. Even if you are a volunteer; if you set yourself up as a rescuer or expert in a rescue situation, and you screw up; you are liable. Homeowner's insurance policy riders often can cover this up to a certain point.

Caver Information Series: Shari Lydy questioned what had been done about updating old material in the Caver Information Series. Little done so far. A committee was appointed to look into this, suggest rewriting or writing articles, if needed. They will report to E.C. before the 1989 meeting. This committee is: Shari Lydy - Chair, Paul Smith, Jim Hall and Gary Bush.

The meeting concluded with elections. Those elected were:

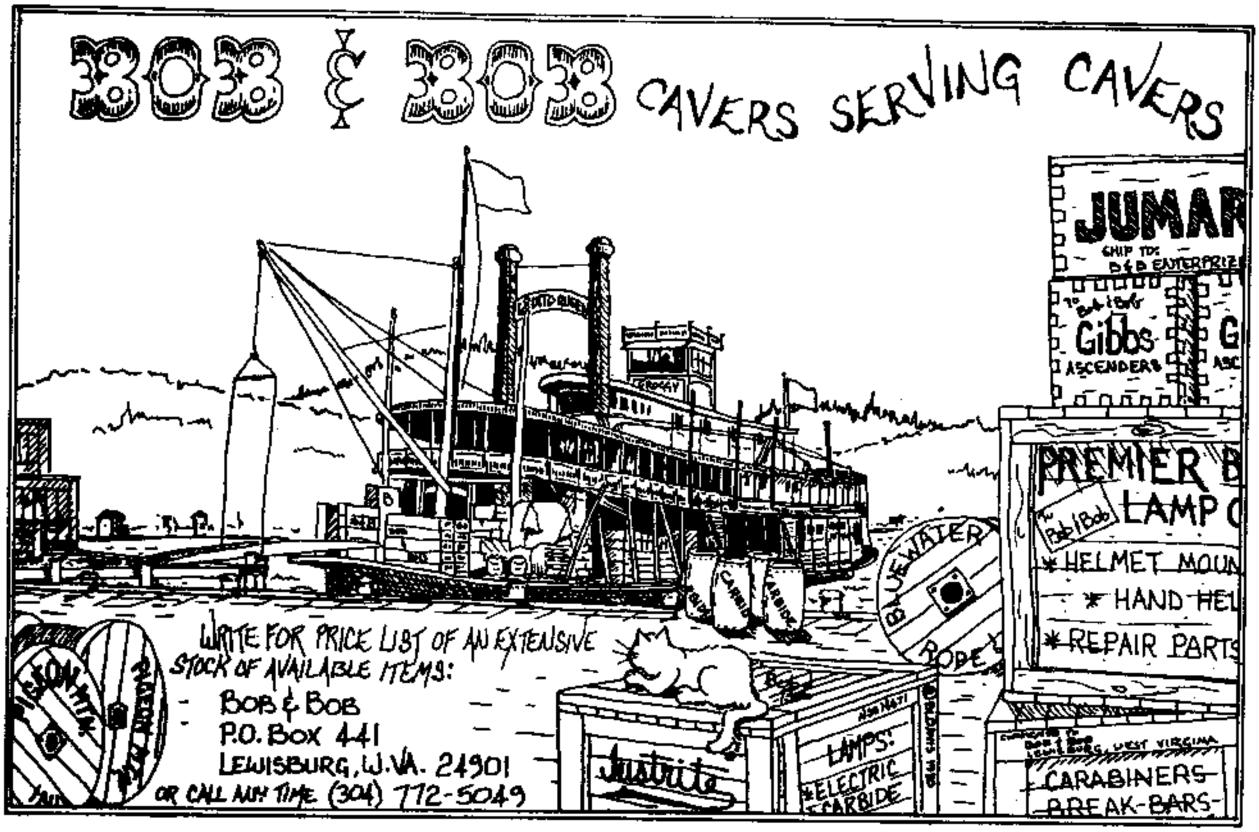
Bill Bussey	Secretary/Treasurer
Bruce Smith	Editor
Scott Fee	Executive Committee
Sara Gayle	Executive Committee
Jim Hall	Executive Committee
Allen Padgett	Executive Committee

The meeting adjourned at 1:41 PM.

Later that day, the Executive Committee met and selected Allen Padgett as Chairman and convention liaison. Sara Gayle will host the Vertical Session at the 1989 Convention.

Respectfully Submitted

Bill Bussey



ADMINISTRATIVE

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