

## 14. MOUNTAINEERING

### a. General

Despite the dangers and hardships of mountain training, the Germans believe that they can instill in soldiers a love of the mountains that will make them regard any other service as tame and uninteresting. The joy that the individual soldier derives from mountains and mountain climbing is a basis of training. The hard but rewarding task of officers in charge of training is to develop this love for the mountains and foster it. They are helped in this by the fact that most of the recruits come from Alpine country. To give the soldier self-confidence, officers set a patient, systematic pace in training. They raise the physical and technical requirements gradually so that the beginner unconsciously attains the calm self-confidence that he needs. As the fondness for mountains increases, officers will encourage the troops to climb mountains and to ski as a recreation, always, however, under the supervision of an Army mountain guide. The alert commander, staying close to his men on and off duty, quickly gets to know their worth, because service in mountains quickly tests their character. Thus he can have clearly in mind which men are best qualified as non-commissioned-officer replacements.

### b. Scale of Requirements

To systematize training in mountaineering, the Germans have worked out a graded series of requirements based on the degree of difficulty of the terrain and the duration of the march. Achievement in mountaineering is marked by a steady increase in physical endurance, as demonstrated in mountain marches, and by a corresponding improvement in mountain-climbing technique. While improving his performance the mountain soldier also gets the experience that he needs for the service.

For purposes of training, the Germans classify mountain terrain as follows:

(1) Easy walking terrain—pathless terrain, including ridges and slopes, over which men can walk without danger of falling.

(2) Difficult walking terrain—steep rock ridges and ragged slopes over which the men can move without using their hands if they choose the right route, but where they run the risk of slipping.

(3) Easy climbing terrain—exposed grass or rock ridges where even the trained mountain climber must at times use his hands to keep his balance and sense of security but has no trouble in choosing a route.

(4) Moderately difficult climbing terrain—ridges and faces of grass or rock with small but good handholds and footholds. This terrain requires no very special technique, but calls for acumen and experience in selecting a route that will avoid major difficulties.

(5) Difficult, very difficult, and extremely difficult climbing terrain—very steep, exposed ridges some parts of which can be climbed only with special equipment and technique.

Bad weather or a coat of ice increases the degree of difficulty of moving over roads, paths, and otherwise easy walking terrain. The Germans consider that moving under full pack and arms instead of merely with mountaineering equipment demands an increase in efficiency corresponding to one degree of increase in terrain difficulty, as classified above.

The Germans set out minimum standards of proficiency which all mountain soldiers must attain. They must practice until they can make any kind of ascent (*Steigen*)<sup>1</sup> on a road or path free of snow. They must also learn to walk on easy wooded, grass, and scree slopes, until they can master fairly difficult terrain which requires easy to moderately hard climbs. In the snow they are required to walk with snowshoes on roads, over easy and difficult terrain, and through woods and low, protected draws. They must also be able to get over icy stretches and make moderately hard climbs. The Germans teach that individual training in mountaineering attains its goal only when the regular mountain soldier under normal conditions of marching and combat

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<sup>1</sup> *Steigen* is used as the generic word for any kind of ascent. The Germans use *Kletterei* to denote moving up or down slopes on which the climber must use his hands.

can move about in all kinds of terrain in a quiet, orderly, confident way, without wasting time or unconsciously taking unnecessary risks.

### c. Technique

(1) *Marching*.—The first thing that a recruit in a German mountain unit is required to learn is mountain marching. Mountain marching means not only the ability to make ascents and descents on and off roads, but also the development of self-assurance and rooted habits of march discipline.

The German mountain soldier is taught to make ascents at a slow and rhythmic pace, and to develop an even stride which is not too long. He walks not on his toes and the ball of his foot but on his entire foot from toe to heel. When his forward foot is set, he puts his full weight on it so that he will not slip. He walks erect, not leaning into the slope; and he keeps his knees loose. He breathes deeply. The fundamental principle in marching as elsewhere in German mountain training is conservation of energy. So that they will be as fit as possible for combat, the German mountain soldiers are taught to avoid hasty ascents, long strides, stiff-kneed walking, straight uphill climbs, and steep paths, and to zigzag gradually up steep slopes wherever they can. Their training emphasizes march discipline; all marches are closely supervised. They are taught not to bunch up but to maintain their prescribed distances, and not to take short cuts or stop unless ordered. They learn to cut down on talking to save wind, and straggling is absolutely forbidden.

(2) *Climbing*.—The inexperienced German mountain recruit learns to climb by starting on easy rock so that he gradually acquires confidence and gets a feel for the work. He is taught to use his legs slowly and rhythmically, to use his arms to provide support and balance, and to pull his body up with them only when absolutely necessary. The Germans teach their mountain soldiers to pick handholds and footholds not too far apart, to grasp them slowly, test them, and always keep weight on three

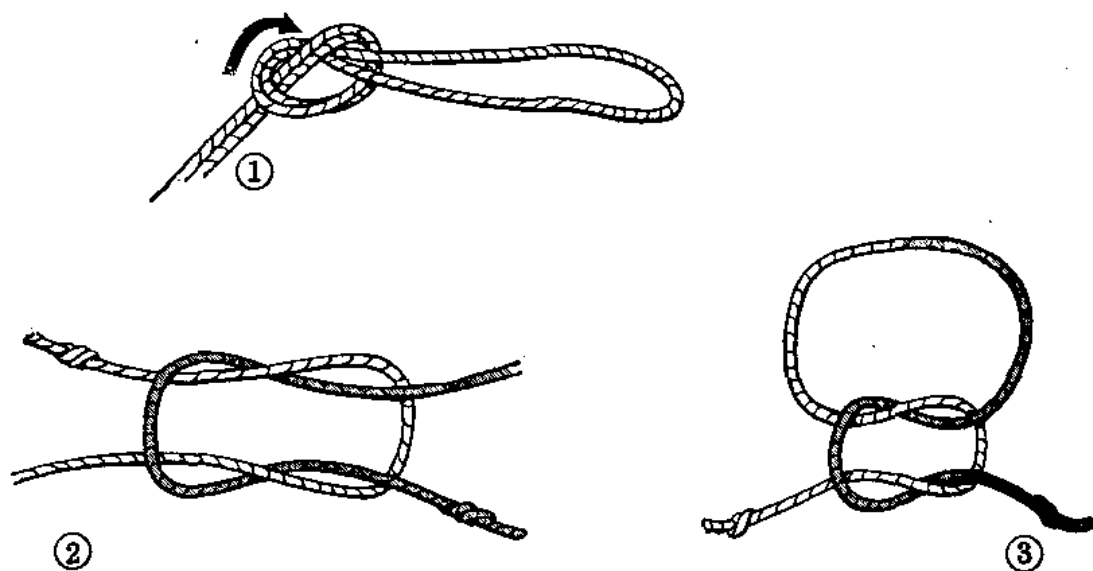
points in going up. When the German mountain soldier climbs, all his muscles work together, and he breathes quietly and easily and tries to achieve perfect balance. In descents he avoids sitting down, lest he slide too fast for control, and if the rock is not very steep and the footholds are good, he goes down with his back to the rock. He learns to be especially cautious on steep grass slopes, because they are treacherous. In traversing them he gets footholds on tufts, keeping the inner edge of his foot close to the slope. On straight descents he kicks his toe well into the grass. He never uses tufts as handholds for pulling himself up.

On steep snow and ice the German mountain soldier is instructed that he has to kick or cut steps for himself for safe climbing, unless he is using crampons. As on rock he takes short steps and usually zigzags to save his strength. When he can see the bottom of a snow slope from the top, it is permissible for him to glissade, or slide down on his feet. In glissading he learns to change his course, slow down, and stop with the aid of his ice-ax (see (3), below). He is warned against attempting to glissade with crampons on, or on a solid-frozen ice slope, or when he cannot see the full length of the slope.

(3) *Special climbing equipment.*—The special climbing equipment used by the German mountain soldier depends on the kind of surface he is going over. A basic principle is that the weight of it must be kept to the absolute minimum. On rocks he learns to use rock pitons, snaplinks, and rope- or felt-soled rock-climbing shoes (*Kletterschuhe*) (see fig. 24, p. 85); on grass, crampons; on snow, snowshoes (*Schneeriefen*); on ice and snow, snaplinks and ice pitons. On all three types of surfaces he uses his rope and his ice-ax.

The German mountain soldier regards his rope as his most important piece of climbing equipment, and he is taught to take good care of it. The rope consists of about 100 feet of twisted hemp of the highest quality, seven-sixteenths of an inch in diameter. He dries it in the open air, hangs it from a peg in loose loops

when not using it, and repairs it promptly. Before he makes use of the rope, he learns three simple knots: the overhand noose, the square knot, and the double overhand noose (figs. 17 and 18). The double overhand noose is made by dropping part of the loop of an overhand noose back through the knot and then passing the original loop through the small loop thus formed (fig. 18).



**Figure 17.—Basic knots used by German mountain troops.**

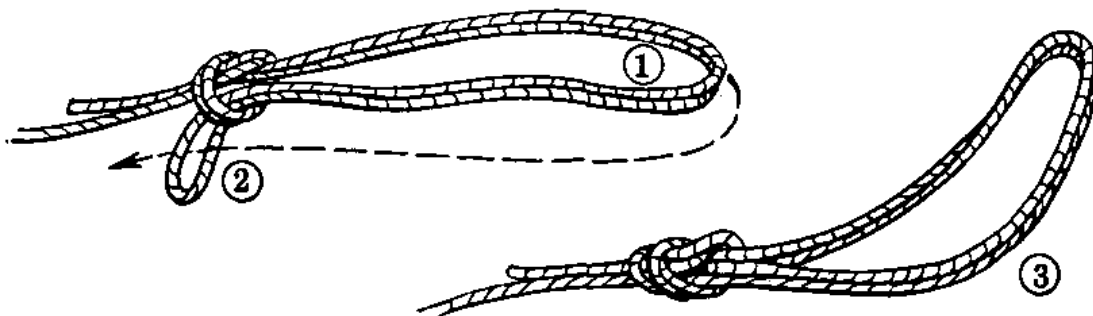
(① Overhand noose, for securing a man to the rope; ② square knot, for joining ropes together; ③ sling, for securing the rope to a projection for the purpose of belaying.)

German mountain soldiers are likely to climb three men to a rope with an Army mountain guide for rope leader. The men are secured in the rope with a noose around the body. They use the rope for all difficult climbing or whenever any of the men decide that it is necessary.

For difficult climbs the German mountain soldier learns how to rope down and belay. A belay is a turn on the rope around some secure point, usually a rock projection. A sling (fig. 17 ③) is often used with the belaying rope. The belay serves to pre-

vent a climber who slips from falling far. A climber can be belayed from above or below, on climbs up or down slopes. In his training in climbing the German mountain soldier learns how to pay out rope if the man he is belaying is climbing away from him, and to take up slack if the climber is moving toward him, always keeping the rope taut, but never pulling the climber off his holds. When he can find no suitable projection, he learns to use his ice-ax or a piton and a snaplink (see fig. 20, p. 74), or to get himself well set and use his own body as the belaying point, with or without the help of a piton and a snaplink.

The German mountain soldier is taught to use his rope to get down an otherwise impassable cliff, and even to negotiate an overhang where he cannot bring his body into contact with the face



**Figure 18.—Double overhand noose. (This is the preferred knot for roping up. The end of the simple overhand noose ① is inserted in the loop ②, and pulled through. The result is the noose ③.)**

of the cliff. In carrying out the most common German technique, he passes the rope between his legs, up across his chest, and over one shoulder. He holds the dangling part of the rope with one hand, the suspending part with the other. By raising the dangling part of the rope he can slide; by pulling it down over his shoulder he can stop. This is known as roping down (fig. 19, p. 72).<sup>2</sup> By means of the more complicated one-thigh and two-

<sup>2</sup>There are many other variations of technique in roping down. One of these is illustrated in fig. 24, p. 85.



Figure 19.—Roping down a rock face.

thigh rope seats he can take more weight off his arms and free one hand. His instructions do not allow him to shinny down a rope or go down hand over hand.

The German ice-ax is a 2½-pound 10-inch crosshead ax with a 3-foot wooden shaft. The crosshead has an adze end and a pick end and the base of the shaft is shod with a long iron point. The German mountain soldier uses the ice-ax as an extra support for ease and firmness in walking. He handles it with care to avoid injuring himself or his companions. In special emergencies on rock, where he has no other holds and where he can drive the ax

in securely, he is taught to use it as a handhold or foothold and to make a satisfactory belay with it on grass slopes where it can be thrust in deep. On ice and snow it offers him support during traverses, helps keep his body erect in descending steps kicked into the ice, and gives him handholds and footholds, and again in deep, firm snow it is used by him to make a good belay. When he glissades down a slope, the German mountain soldier uses his ice-ax to brake his slide and to stop himself. He tests the strength of snow crossings with it, and if a slope is too steep for crampons, he cuts steps with the pick end of his ax and clears them with the adze end when the ice is hard or cuts them with the adze end on softer ice or snow.

Whenever possible, the German mountain soldier uses crampons rather than the ice-ax as a climbing aid on icy slopes. German crampons are steel frames with twelve 2-inch iron spikes attached. They fit the bottom of the soldier's ski-mountain boot and strap on over the top. When the soldier climbs flat-foot over ice slopes, the spikes bite into the ice, giving him a secure foothold. They save him the labor and avoid the noise involved in cutting steps. He is taught that he may also use crampons on a difficult grass slope, but that he must remove them when he comes to rock.

Pitons and snaplinks help the climber when no natural belaying point is available and a body belay is unsafe. Rock pitons (fig. 20) are iron wedges, 5 or 6 inches long and of varying width and thickness. The German ice piton before the outbreak of the present war was a 10-inch barbed iron spike. All pitons have an eyelet near the top for inserting a snaplink. The snaplink is a smooth oval metal ring with a spring-closed hinged section (fig. 20, p. 74). To use the piton as a belaying point, the climber hammers it into the rock or ice with a piton hammer, snaps the snaplink into the piton eyelet, and the rope into the snaplink. Pitons are left behind as the men climb past them. Snaplinks are collected and used again in later belays. The mountain soldier may also use the piton hammer as a makeshift to cut a few steps in ice, or to knock out holds or crack off sharp edges on a rock face.



With special rope- or felt-soled rock-climbing shoes (see fig. 24, p. 85) the mountain soldier learns to move securely and silently over rock faces (fig. 21). He cannot, however, use this footgear on grass slopes, for there they do not grip.

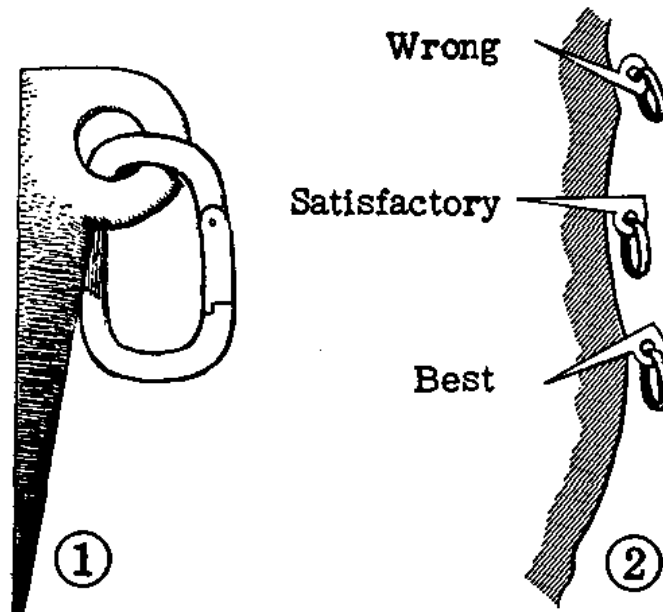


Figure 20.—German piton and snaplink ①, and ways of inserting pitons ②.

#### d. Bivouacs

The Germans emphasize the importance of training in bivouacking, because they feel that the combat efficiency of a mountain soldier, and sometimes his life, depend on his ability to get all the rest possible under difficult conditions. The German mountain soldier is taught to take care of himself at night in the mountains in all seasons and all weather. He learns how to set up a lean-to, using a rock ledge for the roof and one wall, and to dig snow holes and erect snow huts. He also learns that beds in shelters should be raised above the ground whenever possible in order to avoid dampness; that air holes must be punched into the walls of a snow hut with ski poles to prevent the air from fouling; and that care must be taken to set up bivouacs on slopes which are safe from avalanches and rockslides.



Figure 21.—Rock climbing.

German rules for mountain bivouacking are, to a considerable extent, the same as those for winter bivouacking, with added precautions against hazards like avalanches and landslides.<sup>3</sup>

#### **e. Self-preservation; Orientation**

The Germans are convinced that the cost in casualties which results from sending unguided soldiers without mountain training into high mountains is exorbitant, and that such soldiers suffer less from the enemy than from the difficult environment in which they find themselves. Consequently, the German mountain soldier is trained to take care of himself in the midst of natural perils.

Both the form and the height of mountains menace the mountain soldier. The special dangers in mountains are rockfalls, landslides, cornice fractures, snowdrifts, avalanches, glacial crevasses, icefalls, and ice slides. Avalanches are the most serious mountain danger; the Germans believe they are likely to cause more casualties than enemy fire among troops not trained for mountain service. To detect mountain dangers unerringly and to cope with them require technical knowledge, considerable training, and long experience. The rescue of the casualties that they cause is highly specialized work. The Germans place the main responsibility with respect to these dangers on the Army mountain guides (see sec. III, p. 79) rather than on the ordinary mountain soldier.

Every German mountain soldier is required to know something about self-protection against dangers presented by weather. Lightning is a particular danger on ridges and peaks. Rain, snowstorms, clouds, and cold are especially dangerous in mountains, because they occur suddenly. The mountain soldier is also subject to snow blindness, glacial sunburn, exhaustion, and exposure. Because the weather changes sharply, the Germans train mountain troops in the fundamentals of forecasting. They are

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<sup>3</sup> For the results of the German examination of the problem of survival in cold weather based on the Russian campaign, see "German Winter Warfare," *Special Series*, No. 18 (15 Dec 1943).

taught the following simple weather omens. A ring around the moon, unusual twinkling of the stars toward morning, rising clouds, bright red sunrise, early morning warmth, and the sun shining through mist presage bad weather. A red sunset, evening clouds in the valleys, lack of wind in clearing weather, heavy morning dew, and cold nights promise fair dry weather. If the mountains look clear and especially close and the woods blue, rain is usually in the offing, while a down-valley wind at night and an up-valley wind during the day are also signs of good weather. In warm months, early morning cloud layers between 6,500 and 10,000 feet that soon disappear are a 12-hour advance notice of lightning. Towering thunderheads precede lightning by 2 hours; a crackling hum in metal objects and a glow in the dark immediately precede lightning. Low, dark, rapidly moving clouds mark the approach of a snowstorm in cold weather.

As safeguards against lightning, the German mountain soldier is instructed to clear out of high places and off ridges, to avoid wire cable and metal, and to refrain from huddling with his companions. He learns that snowstorms and clouds make it hard to judge whether nearby terrain slopes up or down, and that light reflected from the snow produces glacial sunburn and snow blindness. The German mountain soldier uses lanolin or a special salve to prevent glacial sunburn, and goggles to prevent snow blindness. Mountain sickness is a physical reaction to heights, and dizziness is a psychological reaction. The Germans believe that men easily prone to either of these ailments are ill-suited for mountain service.

As the soldier moves about in the mountains, he always risks suffering from the cold. Insufficient protection from cold results in frostbite, exhaustion, and sometimes death from exposure. The Germans say that while clothing must be warm, it must not make the soldier sweat, since moisture on the body can be disastrous in severe cold. The German mountain soldier wears rather light clothing while moving and puts on heavier apparel during rests and bivouacs. He learns to use paper as body insula-

tion. Because the extremities suffer most in cold weather, he is taught to take every precaution to keep his feet and hands dry. In a very cold bivouac, where there is danger of freezing to death, he should not sleep, and he is taught to use every available means to overcome sleepiness. If as a result of lack of sleep and strenuous climbing a German soldier suffers exhaustion, he and his comrades are expected to recognize the symptoms and apply proper first-aid measures.

German mountain soldiers ordinarily will not separate from their unit unless they are accompanied by an Army mountain guide to maintain direction in the mountains. Getting lost in the mountains, however, presents such perils that all German mountain soldiers receive training and field experience in the use of the compass, maps, and the clinometer. In addition, they must be able to describe exactly and clearly, both orally and in writing, any mountainous terrain or any path that they have gone over. Their memory, which the complicated mountain terrain will tax severely, is thoroughly trained and developed.

## **Section III. ARMY MOUNTAIN GUIDES**

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### **15. GENERAL**

The German High Command is convinced that for success in mountain operations it needs a certain number of specialists who are more skilled in mountaineering than are regular mountain troops. These experts are called Army mountain guides (*Heeresbergführer*), and they include all officers of mountain divisions and a portion of their enlisted personnel, the staffs of the mountain training centers, and training groups used to encourage interest in mountaineering among German youth. The entire personnel of the so-called high-mountain battalions are also trained to qualify as Army mountain guides. Certification as a guide carries no increase in pay and no special rating. But high proficiency in mountaineering is prerequisite for many of the noncommissioned grades, and, therefore, certification as a guide opens the way to promotion.

### **16. GUIDE TRAINING**

Men who show promise of making good mountain guides during ordinary mountain training are segregated after tests on snow in the autumn. Then they are put through a tougher training schedule as a preparation for taking the special Army mountain guide course.

After selecting prospective Army mountain guides, the officers in charge organize them into special squads and platoons for rigorous training. They make climbs of the utmost difficulty and act as rope leaders. The rope leader is the front man on the rope in ascents and the last in descents. For this work the guides are required to become very proficient climbers; they also receive intensive training in selecting the route for a climb, a responsibility

which may fall on any rope leader. German doctrine emphasizes the importance of accurate judgment in choosing a route, since a single mistake may jeopardize the success of a military mission. The guides undergo long systematic training in orienting themselves in a strange area of which they have only a partial view, relying only on memory, a description, or a sketch. They go out on such difficult orientation problems in bad weather and at night.

Guide candidates must have had some previous skiing experience; in training they learn special military skiing technique similar to the best civilian technique but with modifications made necessary by the soldier's heavy pack. When the men have learned to execute an exercise without pack, they start practice on the same exercise with full field pack. The instructor tries to select a different kind of terrain and a different snow cover each day so that the candidate gets experience under all conditions. Since each group is limited to 15 men, the instructor can give individual attention to each candidate. A former instructor in one of the German Mountain Training Schools attributes its success to this individual instruction. The training program is divided into six grades. The more intricate ski turns are not emphasized, the Germans having found that the simpler turns usually have a greater practical value. The Germans insist that the instructors always keep in mind that they are training mountain soldiers, not racing skiers. The mountain soldier is taught to avoid speed that involves any unnecessary risk. At the end of ski training most of the guides take up their regular assignment in the various units of the mountain division. They are assembled again only for special Army mountain-guide training.

The guide candidates and all mountain-unit officers undergo two periods of this special training during the year. The Germans believe that longer periods are not necessary. The first period comes in winter; the second, as a rule, between the company-training phase and maneuvers of larger forces. The aim of this training, as stated in German doctrine, is "to make use of the outstanding mountaineering aptitude of individual mountain soldiers of

all grades for special missions in mountain warfare." In the special course, candidates and officers train in battalion units, while special troops such as signal personnel are trained in small units which are attached to larger organizations.

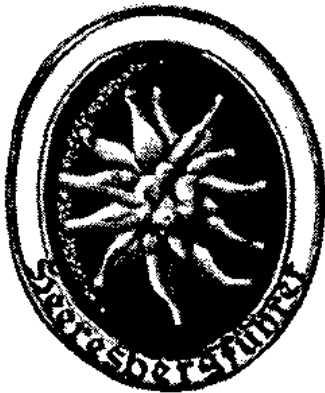
Training takes place on snow-covered as well as bare mountain terrain. German mountain-unit officers and guide candidates get identical training in the difficult and technical work of leading troops through mountains without getting lost and with a minimum of casualties from mountain dangers. This part of the course deals primarily with map reading, terrain sketching, orientation and the use of instruments for orientation, and the selection of routes. The guide candidates learn to read maps and to judge terrain on the basis of their reading. In a typical exercise, an area including difficult terrain with rocks is selected from a map for a reconnaissance mission. On the basis of a study of the map the men reconnoiter the terrain for suitable combat positions. They learn to march and take bearings from a compass as they go, and to use the altimeter for orientation by checking their altitude against a contoured map. Besides learning to select the easiest—and sometimes the only—route over difficult climbing terrain, the German Army mountain guide must acquire sound technical knowledge of mountain dangers so that he will not take troops within reach of rockfalls, landslides, breaking cornices, and avalanches, or over soft bridges across crevasses. In case of accidents he is required to know certain fixed rules for rescue; otherwise the rescue effort is likely to cause more casualties than the initial accident or to impede or delay rescue until too late.

Army mountain-guide candidates who fail to attain the required standard in military aptitude, mountaineering, or character are dropped from the course, but may be readmitted. On the recommendation of the director of guide training, based on the reports of the instructors, certificates and special insignia (fig. 22, p. 82) are awarded to the men who finish the guide course. A guide may be deprived of his certificate for a serious military or civil offense or for misconduct. Certifications of the guides are recorded on their service records and on the cadre roll.



## 17. MISSIONS OF GUIDES

The Germans use their Army mountain guides for several different purposes. Some are formed into high-mountain battalions (*Hochgebirgsbataillone*), which are rifle battalions whose entire personnel are required to have guide certificates. These units are employed to fight in sectors which present particular mountaineering difficulties, or to carry out a mission which calls for rapidity of movement beyond the capabilities of an ordinary mountain unit. It is not known whether the high-mountain battalions are different in organization or armament from the regular mountain infantry battalions.



**Figure 22.—Badge of Army mountain guides. (This badge may be worn on the left breast pocket of the coat.)**

In peacetime all officers of mountain divisions were required not only to qualify as Army mountain guides, but also to return annually for additional guide training. Besides the officers, almost all enlisted personnel in certain units, such as the signal battalion and unit communication detachments, must qualify in the guide course. Finally all other units need a proportionate number of mountaineering experts to serve as squad or rope leaders, to carry out reconnaissance missions, and to lead patrols. The Germans estimate that in every mountain unit at least one man in three should be an Army mountain guide.

In mountain divisions the German Army mountain guides, both commissioned and noncommissioned officers, perform special missions in their particular branch of the service. Guides who are engineers join in the reconnaissance of routes and plan

the repairs and improvements necessary for the movement of the march column, and they estimate the time, personnel, and equipment needed for this work. In the mountain infantry units Army mountain guides are the assault troops. They are chosen for the harder patrol missions, for surprise movements, and for attacks over terrain of great or extreme difficulty. Whether the ordinary mountain rifle company has a separate platoon or squad of Army mountain guides for carrying out difficult missions, or whether the guides are grouped for such missions as the situation demands, is not known. In machine-gun, mortar, infantry-howitzer, and artillery units, certain noncommissioned officers who are qualified as mountain guides, as well as officers, observe and adjust fire from observation posts which can be reached only by difficult climbing.

Sometimes it may be necessary for units without much training in mountain warfare to pass through high mountain terrain to reach their battle sector in medium mountains or valleys. Also, no matter how undesirable it may be from the German point of view, such units may have to fight in high mountains. In either case they must have expert help. The Germans believe that officers trained only for warfare in the flat will not be able to cope efficiently with logistic and tactical problems which arise in mountain operations. To meet this situation, Army mountain guides are attached as advisers to unit commanders when the solution of technical problems of mountaineering has a direct bearing on plans and decisions. The Germans direct that officers without mountain training should accept the advice of their attached guides, whatever their rank, on technical mountaineering questions, and that they must accept full responsibility if they disregard such advice. Another function of Army mountain guides attached to units deficient in mountain training is to improve the routes for units advancing through mountains. The guides cut steps, lay planks, drive spikes into rock faces for climbing, and perform other duties that will facilitate movement.