Werbung

The catastrophic rainfalls in the spring of 1965 caused very extensive damage to the slopes. Closed-off areas on highways everywhere show the slipped slopes (illustration 1) where the road often had to be rapidly cleared from the earth and rubble that had been loosened.
New slopes constitute major problems in modern road building. Years will pass before natural growth achieves its full stabilizing effect. Technical and biological strengthening methods must therefore be sought which ensure particularly an immediate safeguard against slipping, not only one which becomes operative with the passage of time.
In this context, many new discoveries have been made and applied in practice in the field of technical and biological strengthening. One of the most significant innovations in this field is the vertical strengthening by means of reinforced twig fascines.
Upon the most careful examination, the Austrian Patent Office issued to us the Patent No. 230805 covering this method. Developed as early as 1962 in the construction of highways on slopes subject to slipping, the method was subjected to extensive and rigorous tests in practice, which it passed most impressively well.
The charcteristic external feature of this method of immediate improvement is that strengthening is effected in parallel with the lines of steepest gradient (illustration 4). Iron reinforced twig fascines (illustration 2) pegged in comparatively shallow trenches (illustration 5) by their tensile strength thus prevent the breaking of the slope face. In addition, this type of strengthening was employed in most cases where steep gradients (1 : 1) were already slipping, and all were successfully stabilized.
A very justified urgent requirement of the men responsible for road-building in respect of biological stabilization can thus be met: namely the wish that steep slopes are not only planted with verdure so as to be attractive to the eye but that measures are taken to ensure depth action.
We are now actually in a position, using stabilization by means of reinforced twig fascines, or ropes, to guarantee freedom from slipping down to a depth ot 2 m for a full two years!
The cost of such strengthening is on an average lower than conventional stabilization having a comparative effect—their effectiveness is a multiple thereof.
Indeed, despite being protected by a patent, it has so far been the most inexpensive and at the same time most effective technical and biological stabilization method altogether.
The heavy rainfalls in the spring of 1965 have given the most tangible proof:
In the past year the acutely endangered portion of a cut slope at kilometer 86 of the Semmering North ramp of the newly built Trieste Federal Highway was stabilized by means of reinforced twig fascines. The heavy rainfalls did not greatly affect the slope. The strengthening has held while a new break formed immediately adjacent thereto.
The rapidly applied strengthening has protected the slope against further damage.
A particularly successful practical test has been undergone by the vertical strengthening by means of reinforced twig fascines during the heavy rainfall on the Lower Austrian Highway in the W1 lot at kilometer 279.250 to 279.500. Here, at the "Steinhartsberg Süd", one half of the slope was stabilized by this modern strengthening method.
Particularly slopes subject to the danger of slipping owing to the escape of spring water or to their unstable structure additionally require suitable measures for the prevention of slipping. In the search for more effective stabilization methods, the vertical strengthening by means of reinforced twig fascines was evolved.
Willow twigs capable of budding are connected by incorporation of barbed wire into high tensile strength fascine-type chords (illustration 2). These so-called willow ropes are inserted in shallow trenches along the line of steepest gradient from the crown of the slope down to its foot and anchored in the soil by means of pegs spaced about 50 cm. Anchoring is particularly secure at the top end (illustration 6) which as it were is the point of suspension that has to withstand the maximum tensile stress. The parallel chords spaced from 1 to 4 metres as may be required are covered with soil only to the extent preventing them from drying out so that they are free to bud (illustration 3).
This stabilization method evolved from the practical observation that a slip of a slope is first indicated by a fissure extending normally to the line of steepest gradient. The slip thus originates somewhere in the slope surface where the material has become so heavy, e.g. by emerging water, that it overcomes frictional resistance and begins to move downward. The material is compacted and thus gains more and more potential energy and moves additional material as it extends to the sides. The slope above the fissure then commonly crumbles away after a short while. It is well known that the triggering forces in such avalanche-type phenomena are very small in comparison with those operative at an advanced stage. If it is thus possible to harness the relatively weak intitial forces, damage of a major order is avoided. This is where the vertical strengthening system described has proved successful in practice. The tensile strength has so far always sufficed to stop incipient fissures or, if applied as a precaution, to prevent the occurrence of the same. Since the area of the slope is subdivided into strips, the forces promoting slips are subdivided as well. In order to emphasize the efficacy of this method, mention may be made of the fact that it provides complete draining properties. Observations have revealed that water courses forming in the slope will almost immediately end in the fascines and be rapidly conducted away. The arrangement of slope channels and gravel soakaways becomes therefore superfluous. Emerging water is also largely rendered harmless. The effect of vertical strengthening is accordingly highly economical. The protracted effect of his anti-slip stabilization is secured in that it will bud and grow fast.
Advancing technology will further be forced to mould the landscape to suit its requirements. Man must however continue to recognize that his interference with nature must not affect it more and longer than absolutey necessary and that it must in no event be left to nature to heal its wounds or he will in the end have to bear the consequences.