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METHOD OF RESECURING SLIPPED SLOPES OF CUTS AND DAMS.

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Fig. 1.

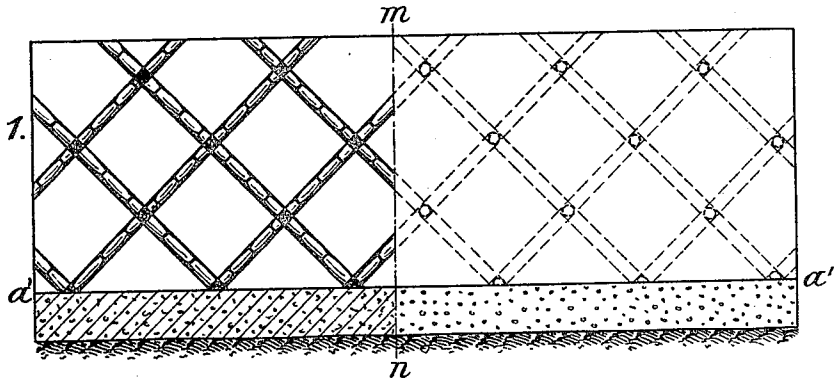


Fig. 2.

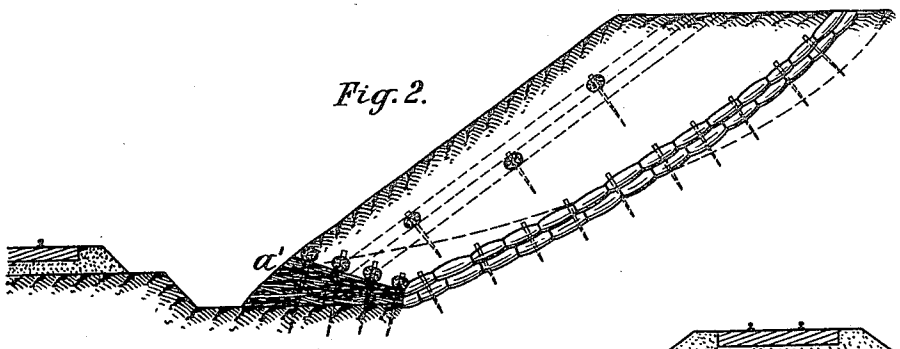
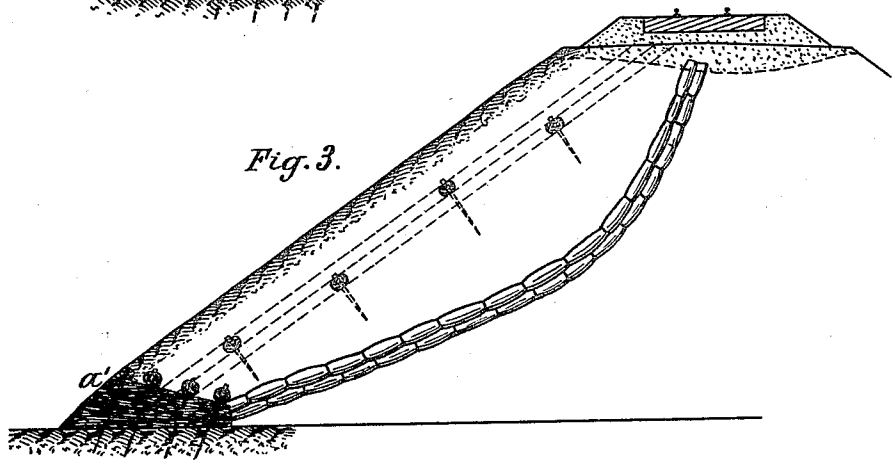


Fig. 3.



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METHOD OF RESECURING SLIPPED SLOPES OF CUTS AND DAMS.

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To all whom it may concern:

Be it known that I, OTTO PAECH, a subject of the King of Prussia, and a resident of the town of Thorn, in the German Empire, have invented new and useful Improvements in Methods of Resecuring Slipped Slopes of Cuts and Dams, of which the following is a specification.

The invention relates to an improved method of resecuring slipped slopes of cuts and dams that consist mainly of dead sand layers, or of loamy and marly soil.

The improved method forming the subject matter of this application is particularly to be applied where besides various kinds of loam and clay, occurring in spreading form, great quantities of quicksand are present zonewise or at the bottom of the trench. The method is just as well applicable for embankments consisting of a mixture of the above soils.

The method consists essentially in a special application of fascines which hitherto have only been used at the surface of slopes for securing and draining the latter. According to the new method these fascines are embedded into the interior of the slopes deeply enough to reach the slipping area. It is preferable to have the continuous lines of fascines arranged in diagonal direction thus intercrossing each other net-work-like. To effect a thorough draining and drying of the dam a wedge of fascine work is inserted into the slope at the foot of the latter in such a way that the back of the wedge is in constant communication with the surrounding air while its side is connected to said system of fascines embedded into the slope and exposed to the air at the top of the dam.

The fascines may be arranged within the dam or cut to be drained and dried in one layer or in two superposed layers and are interconnected and secured to the ground by means of stakes of sufficient length pushed through the crossing points of the system of fascines. In places where springs and wetness are to be expected the fascines are embedded deeply enough to reach the place where water accumulation may occur, thus insuring a thorough and effective draining and drying by means of the net-work-like system of fascines in coöperation with the wedge of fascines at the foot of the slope. Hitherto fascines have been used for the surface protection of the native soil of railway cuts, and for surface drainage generally; the new method, however, differs from the old one in that the embedded net-work of fascines, no matter whether the cuts are deep or shallow, or the dams high or low, in cooperation with the wedge of fascines at the foot of the slope form effective drain channels and air conduits.

In the annexed drawing some examples are given showing how the improved method for resecuring slipped slopes may be applied.

In the accompanying drawing: Figure 1 is a face view of a slope reinforced according to my invention, with the soil removed from the left hand side. Fig. 2 a cross section on line *m*, *n* Fig. 1 showing the invention applied to a cut, and Fig. 3 a similar section showing the invention applied to a dam.

Slips frequently occur with cuts through loamy soil containing water conducting layers, as well as with cuts through loamy sand, or sandy clay, or quick sand. To protect slopes given to slips a wedge of fascines is erected at the foot of the slope along the entire length to be protected, as illustrated in Figs. 1 and 2. This wedge of fascines being combined with fascines about 30 centimeters thick placed side by side in numbers varying from 1 to 4, and inserted far enough into the ground to reach the water conducting layers. In addition, a net-work of fascines is arranged in some depth parallelly to the surface of the slope and kept in position and secured to the earth by means of stakes of a length of 2 meters which stakes are driven through the crossing points of the net-work of fascines. This system of fascines combined with the wedge of fascines at the foot of the slope, water-drains and airs the earth and keeps the latter dry. This effect is obtained on the one hand by agency of the wedge of fascines at the foot of the slope, and on the other hand by means of the upper ends of the rods of fascines terminating at the surface of the earth and communicating with the air. Thus, the wedge of fascines does not only serve as a foundation for the dam but effects by its very construction and shape an air circulation through the slope and adjacent regions of the ground. That is the reason that makes it possible to reuse wet slippery ground which formerly, at considerable costs, had to be removed and substituted by earth that will not dissolve in water.

Fig. 3 illustrates the application of the improved method with dams. Although slips occur on dams for different reasons than on cuts—in the latter case the firm soil slips if resting on water conducting layers, while with dams the soil if consisting of soluble matter gradually softens under the influence of the water penetrating through the ballast with the result that the dam gives way at the foot; still, the effect of the improved method of resecuring slipped slopes is the same with dams as with cuts and consists in drying the interior of the ground. The surprising drying effect is partly due to the fact that by the circulation of air some of the water is evaporated, for otherwise the water the loamy soil is soaked with is only very slowly absorbed and conducted off by the fascines.

Having thus described my invention I declare that what I claim is:—

1. A method of resecuring slipped slopes of cuts and dams, consisting in temporarily removing the soil down to the slipping area, embedding fascines into the slipping area, and covering said fascines with said soil, and thereby restoring the slope, substantially as set forth.

2. A method of resecuring slipped slopes of cuts and dams, consisting in temporarily removing the soil down to below the slipping area, embedding into the ground one or more superposed layers of a network-like and continuous system of fascines in such a manner that said system of fascines crosses the slipping area and exposes its upper ends to the air, and embedding a wedge of fascines into the foot of the slope so that the back of said wedge is exposed to the air while its inner side is connected to said continuous system of fascines, whereupon the slope is restored by means of the soil that had been temporarily removed, substantially as set forth.

3. A method of resecuring a slipped slope which consists in embedding into the bottom of the slipping area, a fascine base which is wedge-shaped in cross section, the back of the wedge being exposed at the surface of the slope, while the edge of the wedge projects inwardly from said surface, and embedding into the soil of the slope, a reticulated layer of fascines that is supported at its lower end upon the upper side of the wedge-shaped-base, and communicates at its upper end with the atmosphere.

4. A method of resecuring a slipped slope which consists in embedding into the bottom of the slipping area, a fascine base which is wedge-shaped in cross section, the back of the wedge being exposed at the surface of the slope, while the edge of the wedge projects inwardly from said surface, embedding into the soil of the slope, a rear reticulated layer of fascines, that extends into the water-conducting layer of the slope, and a front reticulated layer of fascines arranged parallelly to the surface of the slope, anchoring the fascines of the front layer, both the front and rear layers being supported at their lower end upon the upper side of the wedge-shaped base, and communicating at their upper end with the atmosphere.

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."