A. STRAUSS.

METHOD OF PROVIDING WATER TIGHT VERTICAL LAYERS IN DAMS, DIKES, &c., AND IN SIMULTANEOUSLY COMPRESSING PORTIONS OF GROUND ADJACENT THERETO.

APPLICATION FILED NOV. 19, 1908.

922,207. Patented May 18, 1909.

Fig. 1.

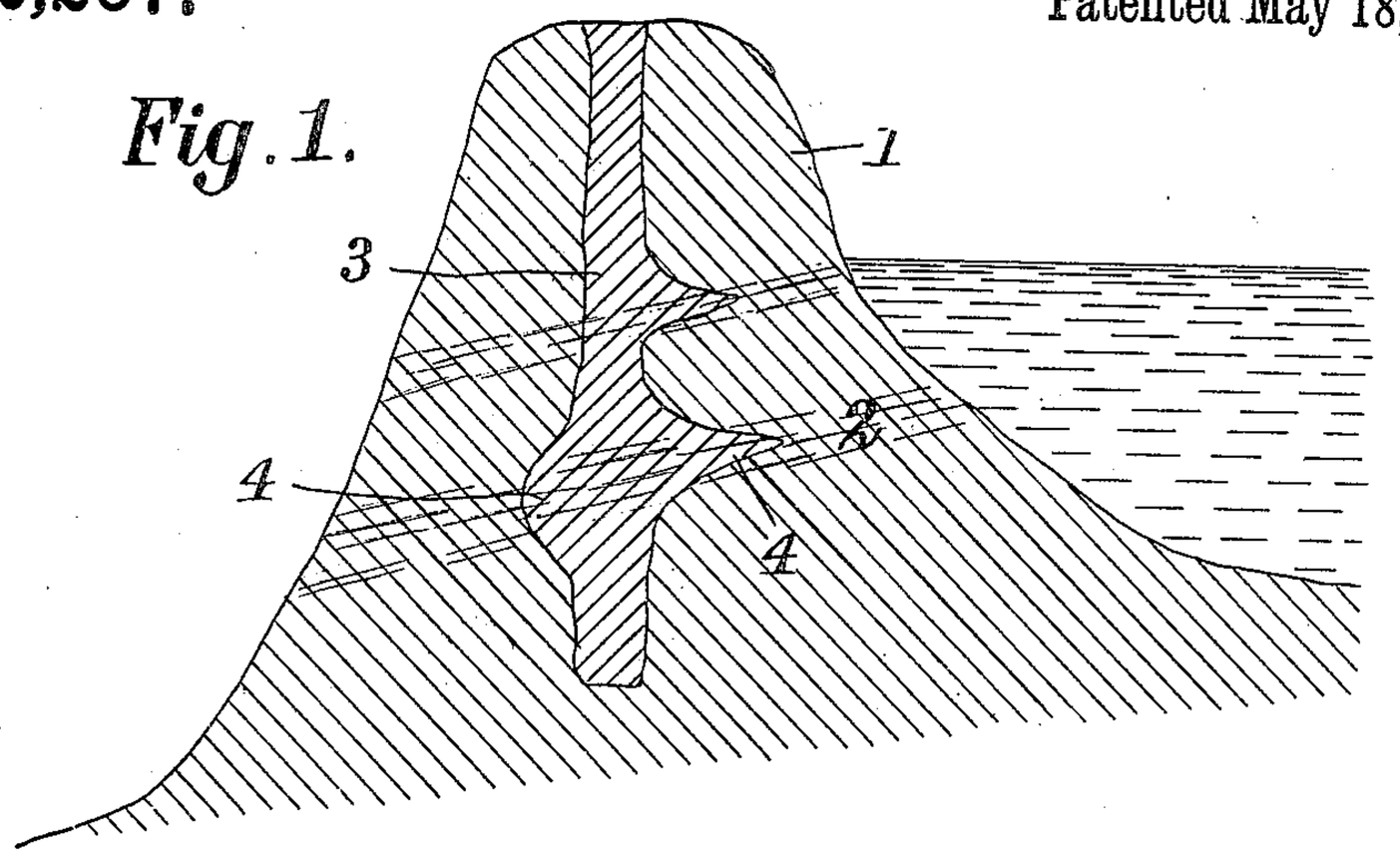
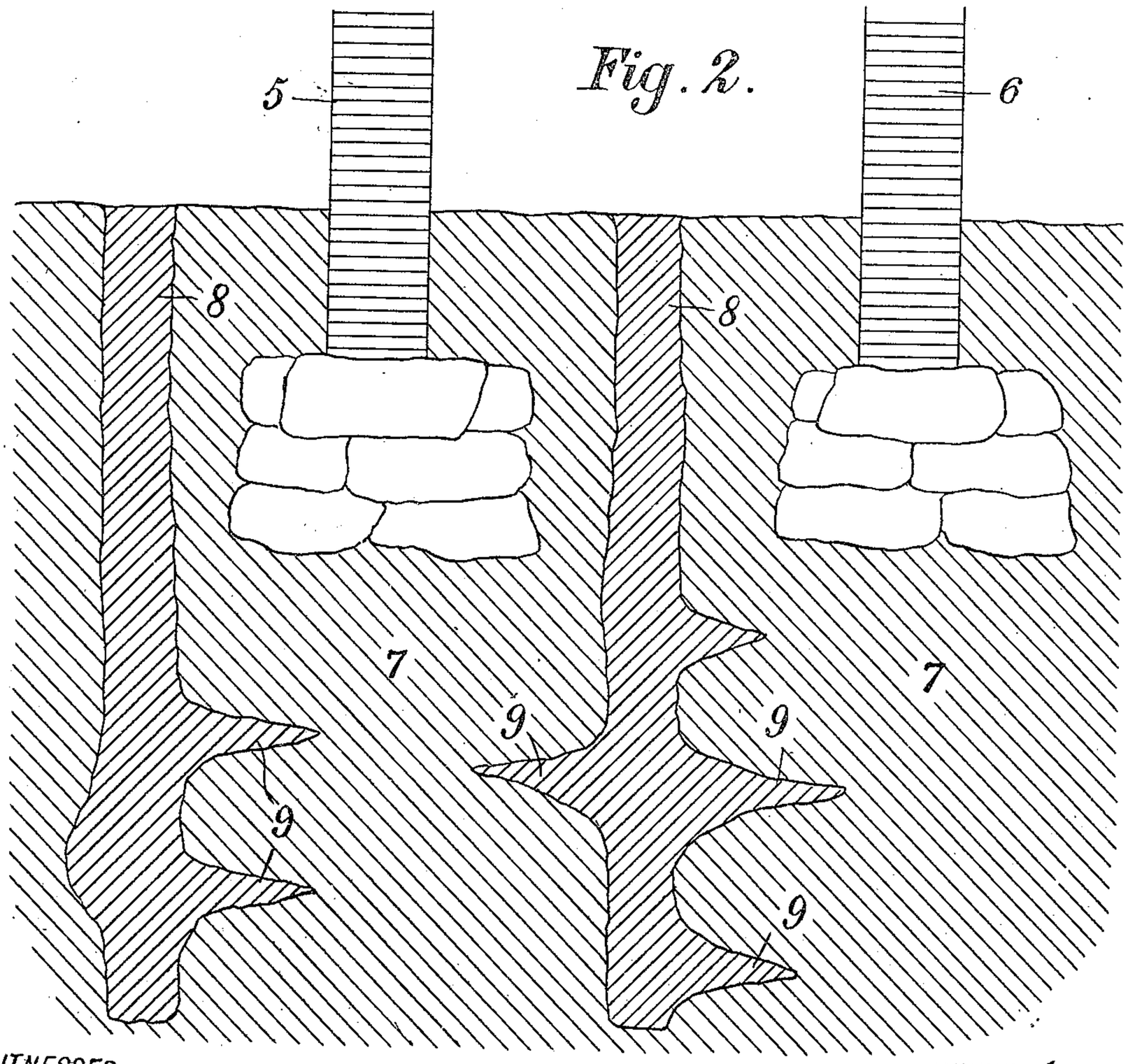


Fig. 2.



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METHOD OF PROVIDING WATER-TIGHT VERTICAL LAYERS IN DAMS, DIKES, &c., AND IN SIMULTANEOUSLY COMPRESSING PORTIONS OF GROUND ADJACENT THERETO.

No. 922,207. Specification of Letters Patent. Patented May 18, 1909.

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To all whom it may concern:

Be it known that I, ANTON STRAUSS, a subject of the Emperor of Russia, and residing at Kiew, Russia, have invented an improved method of providing a water-tight vertical layer in dams, dikes, and in like structures or in the ground and in simultaneously compressing portions of ground adjacent to the layer, of which the following is a specification.

The subject-matter of the present invention is an improved method of providing a water-tight vertical layer in dams, dikes and in like structures or in the ground and in simultaneously compressing portions of ground adjacent to the layer, and important objects are to render dams and dikes impermeable to water, to support building-ground and to turn springs from their natural courses in an improved manner.

A method of producing concrete piles is already known which consists in dumping concrete masses into holes bored to the desired depth and provided with a lining pipe, and in ramming the concrete, the lining pipe being raised from time to time, namely the concrete is rammed the whole depth of the pile until the concrete is no longer measurably compressed. The consequence is that the exteriors of the piles are irregularly shaped according to the nature of the surrounding earth, and portions of the concrete piles penetrate laterally into the surrounding layers of earth. The sole purpose of these thickened portions and bulges and the increase in the surface of the pile thus brought about, as well as the compression of the ground in dependence thereon, was to increase the carrying capacity of the concrete pile.

In accordance with the present invention this known method of constructing concrete piles is used for rendering dams, dikes and other building land impermeable, for turning off springs from their natural courses, and for like purposes, piles of suitable material, for example firm loam, firm clay, asphalt, concrete or other impermeable materials or mixtures of such being constructed within the dams, dikes or the like which are to be rendered water-tight, or around the spring which is to be turned off from its course; the piles are constructed beside one another or at suitable intervals from one another, or lastly in several rows behind one another, and are thickened out and have bulges at definite places in the known manner, these thickened portions or bulges of the individual piles being located just at these places where the ground yields or is permeable, consequently where it may be taken that the earth is not water-tight. In this manner on the one hand the ground is compressed at the permeable place by the thickened parts and bulges of the pile, and in addition a wall which is actually impermeable to water is produced owing to the pile consisting of suitable material, so that the dams and dikes are rendered impermeable, springs are turned off from their natural courses, and like ends are obtained in this very simple manner without any great preparation, since these thickened portions and bulges only occur, in consequence of the peculiar mode of ramming, where the ground is more porous or yielding and consequently requires to be compressed.

In order that the invention may be clearly understood reference will be made to the accompanying drawing in which:

Figure 1 is a vertical section through a dam which has been rendered impermeable to the passage of water, and Fig. 2 is a like view through the foundation walls of a building, the building ground of which has been compressed by means of piles.

Referring to the drawing, and firstly particularly to Fig. 1, 1 is a dam for example, which at 2 has a loose permeable layer of earth which is to be rendered water-tight. Just as in the above described known method and with like means, in accordance with the present invention a pile 3 is constructed of suitable material, for example firm clay, firm loam, asphalt, concrete, and the like; by ramming the material it is pressed out of the lining pipe which is raised from time to time in such manner that the material penetrates laterally into the surrounding layers of earth. Consequently thickened portions or bulges are produced on this pile corresponding to the softness of the ground, namely particularly in the neighborhood of the permeable layer 2, which is very yielding, bulges or projections 4 of considerable size are produced which project more or less from the pile and penetrate into the earth according to the yieldingness in each instance. In this manner firstly the layer 2 is compressed and simultaneously a layer impermeable to water

is formed by the mass of the pile 3, which layer in connection with the compressed layer of earth 2 prevents any water passing through the dam.

Now in accordance with the invention such piles are constructed beside one another at definite intervals depending on the nature of the ground and on the degree of permeability which is to be counteracted, and these piles compress the permeable layer 2 of the dam along its entire length and simultaneously form a core which certainly prevents water percolating through the dam. If the permeability of the earth is very great, the piles may be so close together that at least their projections 4 contact. If necessary a plurality of rows of such piles may also be arranged behind one another in the direction of flow of the water. When the permeability is not so great a certain interval may be left between the piles and even between the enlarged parts of the same, since then the compression of the ground produced by the bulges projecting laterally into the same perfectly suffices for the desired purpose. An important advantage of the present invention consists in an absolutely reliable tightness of the dam, dike, or other erection being obtained with comparatively simple means, without it being necessary to run off water from the reservoir or other basin.

If it is a matter of preventing springs flowing in a certain direction, piles of the above described kind are driven into the ground around the spring, if necessary in several concentric rows, so that it is impossible for the spring to flow away within the earth but it is compelled to rise above ground.

Whereas in the form of the invention represented in Fig. 1 it is solely a matter of protecting a dam, dike or similar structure from the admission of water, the same method can also be used for improving other sites by compressing the ground. Such a constructional form of the invention is represented by way of example in Fig. 2. Referring to the latter figure, 5 and 6 are two foundation walls of a structure in which the building-ground 7 may have become unsafe owing to any influences. In order to improve this building-ground by compressing the same, just as above described piles 8 are constructed either only between the foundation walls or at both sides of the same; these piles may in this case also consist of optional material, for example clay, loam, concrete, asphalt, and the like, and owing to their having been suitably rammed they are thickened or have bulges 9 at the looser places of the building-ground, owing to which thickened parts or bulges the building-ground must become correspondingly compressed and more solid. Here also the piles 8 have nothing to do with the support of the structure or with the foundation-masonry of the building and act solely on the ground itself by means of their thickened parts by compressing the ground. In like manner, in accordance with the present invention, a number of other constructional forms can be made, in which the pile does not act as a supporting pile but solely compresses the building-ground in order to make the latter better and safer for the structure, without departing from the spirit and scope of the invention.

What I claim as my invention and desire to secure by Letters Patent is:

1. Method of providing a water-tight vertical layer in dams, dikes and in like structures or in the ground and in simultaneously compressing portions of ground adjacent to the layer, consisting in making a plurality of holes in a row in the dam or ground, in inserting lining pipes into said holes, in dumping material impermeable to water into the pipes, in ramming the material in the pipes and causing some of the material to spread below the pipe and compressing part of the adjacent ground, in lifting said pipes, in dumping another charge of material impermeable to water into the pipes, in again ramming the material in the pipes and so on repeating the cycle of operations, and in finally removing the pipes.

2. Method of providing a water-tight vertical layer in dams, dikes and in like structures or in the ground and in simultaneously compressing portions of ground adjacent to the layer, consisting in making a plurality of holes in a plurality of rows in the dam or ground, in inserting lining pipes into said holes, in dumping material impermeable to water into the pipes, in ramming the material in the pipes and causing some of the material to spread below the pipe and compressing part of the adjacent ground, in lifting said pipes, in dumping another charge of material impermeable to water into the pipes, in again ramming the material in the pipes and so on repeating the cycle of operations, in finally removing the pipes and in ramming the rammed material in the dam or ground.

In testimony, that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

ANTON STRAUSS.

Witnesses:
HENRY HASPER,
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