A. L. HARTNAGEL.

EMBANKMENT.

APPLICATION FILED JULY 30, 1908.

918,046. Patented Apr. 13, 1909.

Fig. 1

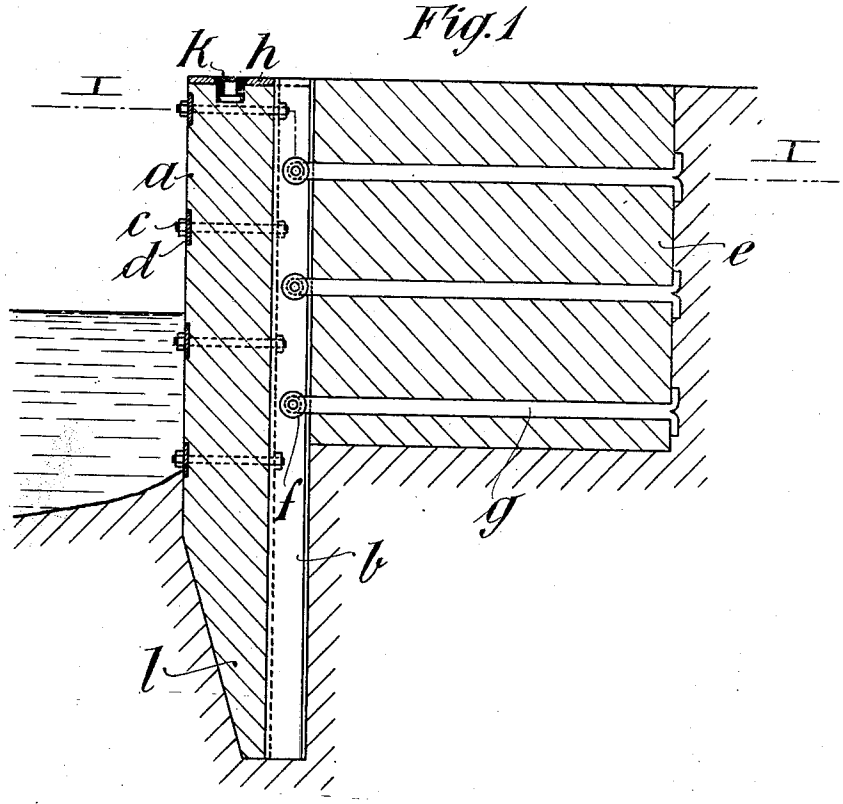
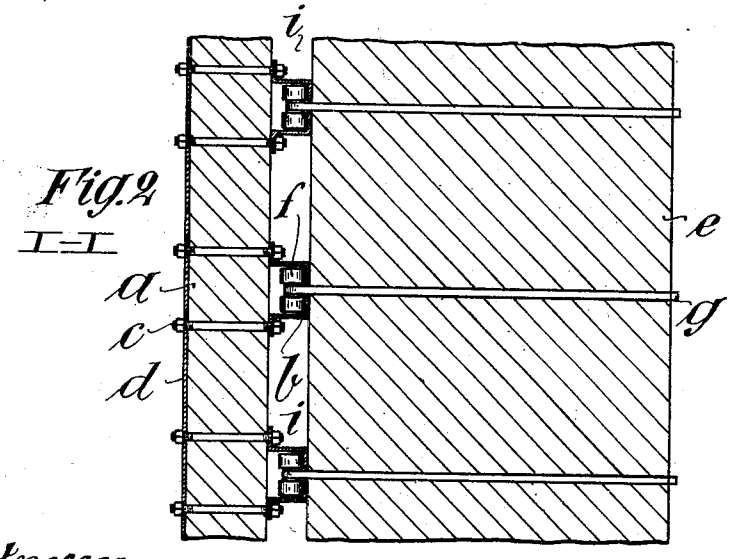


Fig. 2



Witnesses

Aug. F. Wenk

L. Veltmeijer.

Inventor

Albert Leonhard Hartnagel

THE NORRIS PETERS CO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ALBERT LEONHARD HARTNAGEL, OF ROTTERDAM, NETHERLANDS.

EMBANKMENT.

No. 918,046. Specification of Letters Patent. Patented April 13, 1909.

Application filed July 30, 1908. Serial No. 446,189.

To all whom it may concern:

Be it known that I, ALBERT LEONHARD HARTNAGEL, a subject of the German Emperor, and resident of 116 Boomjes, Rotterdam, Netherlands, have invented certain new and useful Improvements in and Relating to Embankments, of which the following is a specification.

The present invention relates to embankments especially for harbors and its object is to prevent the frequent collapsing of such embankments *e. g.* during the building of harbors or during the regulation of rivers or during the building of canals. This effect is attained by the selfacting vertical downward motion of the embankment caused by its own weight and by guiding bars engaging guiding rollers fastened in the rear support. This motion ends as soon as the embankment has reached solid or transportable ground.

In the accompanying drawing in which I have illustrated my invention like letters of reference refer to like parts throughout the different views.

In said drawings, Figure 1 shows a cross-section of my improved embankment. Fig. 2 shows a section according to line I—I of Fig. 1.

To the back of the wall *a* made of any suitable material I fasten by means of screws *c* guiding bars *b* preferably made of U-shaped iron bars. On the front of the wall I mount longitudinal bars *d* through which the screws *c* have to pass. Bedded in the rear support *e* are the anchoring irons *g* providing at their front ends guiding rollers *f*. By means of a covering plate *h* the wall *a* and also the empty space *i* between the wall *a* and the rear support are overbridged. This plate *h* can be fastened to the wall *a* by means of a suitable screw connection *k*.

The lower-cone shaped part *l* of the embankment considerably improves the self-acting sinking down of the embankment so that only in exceptional cases a help by dredging is made necessary. If such help is necessary the same can be made on the rear of the embankment in the space *i* between the embankment *a* and the rear support *e*. A washing away of the ground as it often occurs during the dredging at the water side of the embankment can not take place. This washing away of the ground is mostly the first cause that causes the embankment move or begin to incline. Even if later on deepenings of harbors, rivers or canals are made necessary my improved embankment self-actingly sinks down as soon as the dredging reaches the foot of the same and by dredging the ground behind the embankment the same can be further sunk and anchored in the fast underground of the water. But the most important feature of invention consists in the fact that the embankment is always forced to move vertically as the guide rails and the anchored rollers do not permit any other direction. Raking up of the harbor or river by strong beating of the waves or by the rotation of a ship's screw are without influence to the stability of this present construction.

My improved embankment can be made of any suitable material and pressed into molds which are removed after the placing of the embankment in the water. This way of manufacturing offers a great advantage specially if the embankment is made of beton.

What I claim as new and desire to secure by a United States Letters Patent is:—

1. An embankment consisting of a wall (*a*) made of any suitable material and placed a certain distance (*i*) apart from the rear support (*e*), the cone shaped lower part (*l*) of said wall (*a*), and means to movably fasten said wall to the rear support (*e*) in order to allow a selfacting sinking of the same if necessary, substantially as described and for the purpose set forth.

2. An embankment consisting of a wall (*a*) made of any suitable material and placed a certain distance (*i*) apart from the rear support (*e*), the cone-shaped lower part (*l*) of said wall, guiding rails (*b*) fixed by means of screws (*c*) to the rear side of said walls, guiding rollers (*f*) anchored in the rear support (*e*) and engaging said guiding rails adapted to allow only a vertical motion of the embankment substantially as described and for the purpose set forth.

3. An embankment consisting of a self-actingly vertically movable wall (*a*) made of any suitable material and placed a certain

distance (*i*) apart from the rear support (*e*), and a covering plate (*h*) fastened to said walls by means of screws (*k*) in order to cover the space between said wall and the rear support (*e*) substantially as described and for the purpose set forth.

In testimony whereof I have hereunto signed my name this 16 day of April 1908, in the presence of two subscribing witnesses.

ALBERT LEONHARD HARTNAGEL.

Witnesses:
AUG. F. W. BAUCK,
L. VELTMEYER.