SYSTEM FOR PROTECTION AGAINST HIGH WATERS

Abstract

System for protection against high waters is constructed from assembled protective walls, fixed on the ground/dam and interconnected between them selves, each to another. Each protective wall 1 contains, in its body, a first edge 1.1 and second edge 1.2, that are positioned under right angles, lying from the both sides of the guiding plates 2. The guiding plates 2 stands forward, over the body, with the edge 1.1, whereby it forms first gap S1 in the U-shape in the form of slot, and two other guiding plates 2, formed the second edge 1.2 that creates second gap S2 in the form of slot. The third edge 1.3 is extended from the upper side, while the fourth edge 1.4 is parallel with the second edge 1.2 while in the gap S2, between guiding plates 2, the protective wall is attached as a slider. The guiding plates 2 are arranged on the first edge 1.1, appropriately distanced from the fourth edge 1.4, by means of that, the inserting of the protective walls each to another over the stilt for forming the series, is provided. The fixing element 3 sits in the middle of the fixing part 4, whereby it built main plate in T-shape. The protective walls 1 are in clutch with assembled fixing element 3 in the area of the gap S1. The fixing part 4 is fixed by means of not shown connecting elements on the ground B, on the dam or on the fundament. By this invention is created one secure, complete, flexible and, in the case of need, fast and simple assembling structure for protection against high waters.
SYSTEM FOR PROTECTION AGAINST HIGH WATERS

DESCRIPTION OF THE INVENTION

[0001] The field on which the invention is related to The invention is related to the system for protection against floods (high waters and water levels) and especially will be acceptable to the fields with changeable water level, where often, there’s a need of building dams.

PRIOR ART OF THE TECHNIQUES

[0002] From the patent DE 2013118 U1 it can be recognized a mobile metal wall against unexpected floods, which is placed in profile sheets metals, providing that the wall could be placed and fixed with fast intervention The elements, placed over a whole area should prevent against water permeability. The disadvantage of placing the sheet metal wall is relating to the creation of heavy weight that, also, will provoke difficulties during transportation and assembling. The another disadvantage is in relation to the insufficient sealing of the ground part and mutual opening by means of one plane, which fixation (under the conditions of bad weather and wind) is very hard to be achieved. Damages can be caused in the case of high level of waters.

TECHNICAL PROBLEM THAT IS RESOLVED

BY THE INVENTION

[0003] The task of this invention is to develop a system for protection against high waters (water levels) based on wall protection. When there’s a need, it can be simply and fast assembling, with successfully fulfilling the requirements for sealing. This task is related primary to the solving the protection requirements, too. The features of placing will be given on additional demand.

DESCRIPTION OF THE ESSENCE OF THE INVENTION

[0004] The system for protection against floods with high waters is placed primary as a wall protection, and it is supplemented with other requirements, whereas, in direction ground/dam, the protective wall should be spread on the whole length by assembling elements. Fixing is carried out on such a way that lower edge of each protective wall is elongated and fixed on the ground/dam, thereby, each of the fixed elements is adjoined to the next one.

[0005] There are different possibilities for fixing. It is possible, for example, to apply the method, where the lower edge of every protective wall towards ground/dam is elongated and fixed on the previous known surface. The extended cams lay, fixed on the fixing elements on the ground/dam and they are suitable for fast interventions.

[0006] Alternatively, every protective wall can be connected, in direction to the ground/dam on whole length, with fixing element toward placed elements.

[0007] Further, it is possible to be connected by first elongated elements for adaptation, towards ground/dam and in the direction to the lower edge of each protective wall. Preferred way is the one in which adaptive element is always in direction to the fixing element, while, in direction to the protective wall it is put in the clutch with one slot in which, these two constructive elements are connected with the appropriate edge.

[0008] The fixing element can, also, by one fixing part, be directly fixed into and/or on ground/dam.

[0009] The fixing element and the fixing part can be line up each to another in T-shape. There’s an opportunity, the fixing part to be upgraded on such a way that it can be opened or closed from above by building one vessel, while the fixing elements are arranged into vessel or vessels. The vessels are made up in literal section, preferably in U-shape and in direction to the ground in continuation where two parallel outer walls are placed each to another. Each of the vessels has cams on its front side in which is included an appropriate part of the front sides of the closed vessels, consecutively placed in defined fixed position, providing that the desirable sealing is achieved. Moreover, it is possible, between walls (vessels) the water sealed profile made of elastomer to be placed.

[0010] The advantage of this kind of fixing is that there was performed pre-assembling of the fixing parts with elements for fixing into ground or into dam. It is desirable for fixing element to have a cover. In the case when the fixing element is into the vessel, it is already covered with one cover, which in the case of flood with high waters can be placed in short time, and the protective walls can be fast assembled on the fixing element.

[0011] The lateral edges, placed each to another near to protective walls are connected through the slot/spring connection, wherein the slot or respectively the hole from the both sides on the lateral edges build up with the protective wall one connected leading main plate. In every slot, respectively in every gap, a gum seal is placed for obtaining the sealing of every connected constructive part. Alternatively, it is possible to locate the lateral edges, placed each to another, right on the protective walls and which are connected through second adaptable element that is desirable to comprise appropriate longitudinal slot.

[0012] In the same time, it is desirable, the adaptive elements to comprise gum seal elements.

[0013] It is desirable, also, the protective wall and/or guiding plate and/or fixing element and/or fixing part and/or first or second adaptive element to be composed of artificial materials, for example polyethylene because of lowering the weight and simplifying the manual operations.

[0014] The bracing elements are arranged from the back side (where there’s no contact with water) to guarantee successful stabilization of the system for protection against high waters (floods).

[0015] On the back side of every protective plate, at least two bracing elements, are line up, and/or, on the back side of the second adaptive element, there is placed at least one bracing element. The bracing elements can be placed, from the back pivotal position in twisted position, with possibility of folding.

[0016] There from, at least two of them are horizontally placed on the back side of every protective wall and are lined up on the certain distance from the transversal parts on which the bracing elements are inclined placed. The axe of inclination of each bracing element lies under right angle in regard to the longitudinal axe of the transversal part. It is desirable for the bracing parts and bracing elements to be made of warm zinc steel tubes.
Further, it is possible, the position of the particular elements to be fixed by means of conjunctions.

With this invention it is created secure, complete, and flexible, so, if there’s a need, fast and simple assembly performance for the protection against high waters.

In case of necessity, protective walls are assembling and disassembling quickly, completely and safely as it was described earlier, with that they are connected to the ground with three ways well known to the technique. It is desirable for protective walls to be constructed from PE-HD providing that, down and aside, there are performed closing overlaps. These closing overlaps are made of double arranged guiding plate.

The protective walls will be insured, in the first variant, through one fixing element and through one easy-up cover. It is made in the kind of plate form to the lower side, reaching the ground. In the same time, it is fixed into the ground or into the fundament. The fixing element can be protruding through the ground in regard to the fundament or it can be connected through its upper edge. There here, it must be mentioned that fundament (or concrete base) is lean on the back side, on the safe distance, secured by bracing elements.

The second variant is applied for the areas with already prepared walls against high waters, which height, from optical reason, cannot exceed some minimal ratios, so, when the water level increases, there’s no any other protection. The fixing element is combined and constructed from fixing part in T-shape. The fixing part is placed on the top of the wall and it is tightened with fixing element. The bracing element is placed under the wall, at/and behind the wall, using a thorn, subsequently fixed on the ground. The thorn can be stabbed in the ground to the some limited depth.

In the third variant, the fixing element is applied, there is one vessel in U-shape which-for one moveable cover is anticipated, and, which is normally locked. The vessel is placed into the body or fundament and is closed with cover on the height equal to the level of the ground. The incoming water will open the cover and protective wall will be assembled, while all of the elements, each to another, will be put under lock by easy-up cap. The bracing elements overlapped on the open cover, and central hole is made around the range of the ground or the concrete.

The invention will be described in details in further text with examples of its construction.

The particular parts of this system are shown on the picture.

System for protection against high waters, with each to another assembled protective walls, fixed with the fixing element,

System for protection against high waters, with protective walls connected with fixing element by first adaptive element, and, one under the other placed second adaptive element,

Cross-sectional view of one protective wall in the area of two subordinated guiding plates, separated across protective wall, and U-shaped sprout with fixing element having adequate edge, wherein, the gum seal is placed in the sprout,

Cross-sectional view of the system for protection against high waters, constructed by means of walls with height “H” and with square cross-section, with fixing elements elongated in the fundament as well as with bracing elements,

Cross-section as in FIG. 4, with protective walls with lower height H,

Fixing element in connection with FIG. 4 or FIG. 5 with cover,

Cross-section of the system for protection against high waters with protective walls with height H, wherein in the cross section it is lifted squared fixing element, which is connected toward the vertical sheet-wall that is bent and fixed over a T-shaped fixing part, fixed into the vertical area of the wall,

Cross-section of the system for protection against high waters with protective walls for smaller heights H, and squared fixing element that is lifted in the area of fixing to the protective wall, placed over a T-shaped fixing part on the horizontal area of the wall,

Cross-section as in the FIG. 8, wherein protective walls are with smaller height,

The fixing part in the form of vessel is placed into the ground or in the dam, in which the fixing element is vertically placed, wherein, toward the protective wall that is not shown, the square cross-section is presented that sticks out over the vessel’s body,

Fundament of the vessel with the vertical fixing element, covered above with lid,

Vessel as in the FIG. 11, with open lid on which the fixing element and cross-section of the protective wall are placed,

The fixing part in the form of vessel that is set in concrete into the ground or in the dam, in which, the fixing element is placed under an acute angle α, wherein, toward the protective wall, which is not shown, the square cross-section is presented, that seats on the body of the wall,

Fundament of the vertical vessel, with built up fixing element under an acute angle α, which is covered by lid,

Vessel as in the FIG. 14, with opened lid and with fixing element on the fixed protective wall in cross-section,

Protective wall as in the FIG. 13, with two closed bracing elements in the background,

Protective wall as in the FIG. 16, with two closed bracing elements in the background,

Front view of the “System for protection against high waters” with higher number of protective walls,

“System for protection against high waters” with higher number of protective walls viewed from above,

FIG. 1 shows the arranging of the protective walls 1, each to another, in the whole system for protection against high waters. Every protective wall contains into the body a first edge 1.1 and, placed under right angle one second edge
The guiding plate 2 sticks out over the body with the edge 1.1 for size X1, wherein it is formed first gap S1 in U-shape, in the form of slot, while the other two guiding plates 2, form the second edge 1.2 with size X2, creating the second gap S2 in the form of slot. The third edge 1.3 is placed from the upper side, while the fourth edge 1.4 is parallel on the second edge 1.2, while in the gap S2, between guiding plates 2, the protective wall is attached as a slider. The guiding plates 2 are arranged on the first edge 1.1, which they are distanced from the fourth edge 1.4 in a size of X2 providing that the solution of the problem of the one in another insertion of the protective walls over the shaft for forming series. Further, a fixing element 3 that is in the form of cross section is provided for crossing through the gaps S (here it's in the form of rectangle). The fixing element 3 is put in the middle of the fixing part 4 wherein it creates main plate in T-shape. The protective walls 1 are in clutch with the assembled foxing element 3 in the area of the gap S1. The fixing part 4 is fixed by means of the non showed connecting elements on the ground B of the dam or of the fundament. Moreover, it is possible the fixing part 4 to be poured into the fundament, insomuch only the fixing element 3 sticks out. Protective walls 1 are fixed subsequently by means of non showed bracing elements.

**FIG. 2** represents the system for protection against high waters, with protective walls 1, connected with the fixing element 3 by means of the first adaptive element 5, one below the other and over the second adaptive element 6. The fixing element is placed as it is shown in **FIG. 1**, vertically on the fixing part 4. First adaptive element 5 has, respectively, in the direction to the fixing element 3 and to the protective wall 1, one slot H, so these two constructed elements 1 aid 3 are encompassed. The second adaptive element 6 has also, in the direction to the limited walls 1, slot H, so these two protective walls are encompassed. The connected elements 7 connect each of both limited first elements 5, one to each other, as well as with the protective wall 1 and connected element 3. The connecting elements 9, from the second adaptive element 6 are connected the adaptive element 6 with its protective walls 1, on which are placed the appropriate connected elements 10. It is desirable for the connected elements 7 and 9 to be built as easy-up elements, so that, it will be possible their quick connection and unlocking.

The cross section of the one protective wall 1 in the area of the two-sided arranged guiding plates 2, for limiting the area of the slot in U-shape with size S1/S2, as well as, the fixing element 3 with appropriate emborder, is showed in **FIG. 3**. In each gap S1 and S2 there is placed seal, preferably, made of polymer DE. In the assembled condition, the fixing element sealed with its edge using the seal element DE. The fixing element (fixing part 4) is placed through the main plate (fixing part 4) that lies parallel to the ground on which with one part 3, it intrudes into fundament F. There's a break 3.2 through to the part 3.1 and the penetrated material in the fundament secures the fundament of the fixing element 3. The main plates are used for securing of the vertical position on the fixing elements 3 wherein they will be subsequently anchored into the fundament. The fixing element 3 is preferably welded with the main plate 4.

In **FIG. 4** it is shown the cross section of the system for protection against high waters with protective wall 1 with height H and with cross section placed under right angle, so that the fixing element 3 is extended into the fundament F, and at that encompassing the gap S1 with the guiding elements 2, while the bracing elements 11 are fixed on the protective wall 1 by means of three crossing members (supports) 12.

The same construction, wherein the protective wall 1 is carried out with lower height H and with only two crossed members 12, which are fixed on the back side of the protective wall 1, is shown in **FIG. 5**.

In **FIG. 6**, it is shown the cover 13 of the located fixing element 3 (common in the **FIG. 4** and **FIG. 5**). That is the way on which, it is provided limitation of depth T. In **FIG. 7** it is shown the cross section of the system for protection against high waters with protective wall 1 and with height H, as well as with the area of the connection of the protective wall 1, given in side view, placed under right angle relative to the fixing element 3, which is bent and merged under right angle relative to the direction of the vertically constructed wall 14, while over an one fixing part 4 in T-shape, fixing part 4 is placed on the vertical area from the wall 14. Also, the supporting of the wall 1 is carried out, by bracing elements 11, which are connected on the walls from inside to the outside placed on the crossed support 12, which on the ground B is put by means of the thorn 11.1.

In **FIG. 8** it is shown the cross sectional view of the system against high waters with protective walls 1 with small height H, while on the area of the connection to the protective wall 1, under the right angle, it is placed the fixing element 3 which have squared cross section and which overlap on the fixing part 4 in T-shape of the horizontally area of the wall.

In **FIG. 9** it is shown the cross section as in **FIG. 8**, where the protective walls are with smaller height H. The bracing elements 11 are grounded in the ground B by two thorns 11.1.

Furthermore, it is possible in the state of the art, the fixing element 4 to be built with cross section that form U-shape of the vessels where there's a need for more lids 4.1 for covering, and the fixing element 3 is placed in the vessel (fixing element 4). The vessel can slide in the ground or in the dam (in the fundament) and can be closed with one or more lids. On high levels, the lids are opening and then the protective walls are assembling on the fixing element. In the picture 10 it is shown one variant with vessel (fixing part 4) vertically placed, with fixing element in the form of plate, which enters in the body vessel 4.2 into area 3.1 (because of safer fixing into fundament F or ground B). The gate valve-elements 7 are provided on the fixing element 3 for the fixing on the protective wall, not shown in the figure. Besides lid 4.1 and body 4.2, the vessel (fixing part 4) comprises side walls 4.3 that are placed parallel each to another. It is desirable for the fixing element to be welded with the vessel 4. The inter walls are not provided. The vessel sealed with its front sides by the sealing element that are not shown in the picture.

In **FIG. 11**, it is shown a fundament F in which vessel (fixing part 4) shown on the picture 10 in cross section is sunk, wherein the fixing element 3 is vertical and sunk downward into the fundament of the area 3.1, while it is closed with lid 4.1 from the above side.
In the FIG. 12, it is shown vessel with the open lid 4.1, and on the fixing element 3 is placed protective wall 1 into cross section. Protective wall 1 and the fixing element 3 are secured by gate valve element 7. The protective wall 1 is inclined by bracing element 11, and using the thorns 11.1 is anchored in the fundament 11.1.

On the FIG. 13 it is shown the fixing part 4 in the form of vessel, that sunk into the body or dam, wherein the fixing element 3 is placed under the acute angle A, whereby it lie on the body vessel 4, which cross section is under right angle relative to the wall who is not showed on the figure.

FIG. 14 shows anchored vessel in the body of the fundament F, closed with lid 4.1, while the FIG. 15 shows system for protection against high waters with angle A on the assembled wall 1. Also, the protective wall is secured with bracing elements 11 which are fixed on the fundament F using the thorns 11.1.

FIG. 16 shows two protective walls in clutch one to another (according to FIG. 13) locked with the bracing element 11 with back view.

FIG. 17 shows two protective walls 1 in clutch one to another (according to FIG. 15) locked with the bracing element 11 with back view.

The crossed members Sq for fixing the back sides of the walls 1, which are fastening as well as stabilizing the walls by fixing of the bracing elements 11, are visible here.

FIG. 18 shows one system for protection against high waters with high number of constructed protective walls 1 in frontal view, while the FIG. 19 shows the same system with view from above. The protective elements can be seen from the FIG. 18, arranged each to another over the guiding elements 2 forming the plate. The fixing element, which is sunk into the ground B, can not be seen.

At the other view, supplemented elements are visible, the bracing elements Sq, where they are turned from inside to outside and lay on the ground B where they are anchored.

The visibility of the gate valve elements on the showed picture is partial. It is desirable for the guiding elements 2 not to be welded or adhered on the wall.

Except the showed examples of construction, there are possibilities with elements for passage the flow between coasts defam, for example, angular and flexible elements. In that case, the protective walls, fixing elements and fixing parts would have been in appropriate form. Further, it is possible to use other materials who fulfill appropriate requirements for solidity and sealing and lower weight. For example, it is possible, the protective wall and/or guiding plates to be made of fibrous reinforced artificial materials in laminar for, with or without the said structure (for example, aluminum structured net). The applied fibrous reinforced artificial materials are reinforced glass fiber or reinforced fibers made of carbon artificial materials. In any case, there is possibility that on the crossed members to be applied the process of laminating. Also, the same thing is possible for crossed holders of bracing elements, laminated directly on the back side of the protective wall. Analogously, there is possibility fixing elements and/or fixing parts to be made of fiber and reinforced artificial materials. Furthermore, there is possibility for the gate valve elements to be laminated in purpose of achieving closer connection between screwed gate valve elements.

1. The system for protection against high waters that is made of protective plates arranged next to each other is characterized by that towards the direction of the ground/dam are directed the lower edges of each protective plate, while, in the same time, they are extended with determined length into the ground/dam as well as fixed and connected with fixing elements.

2. The system for protection against high waters, in accordance to the claim 1 is characterized by that towards the direction of the ground/dam, they are directed lower edges of each protective plate wherein, along the protective wall, it has first overhang on the plate, in which, on the determined length, it is extended an attachable fixing element comprised by the ground/dam.

3. The system for protection against high waters, in accordance to the claim 1 is characterized by that in the direction to the ground/dam, they are directed lower edges of each protective plate that has fixing element comprised by ground/dam along the overhang.

4. The system for protection against high waters, in accordance to the claim 1 is characterized by that in the direction to the ground/dam, they are directed lower edges of each protective plate by means of first adaptive element, which is connected to the fixing element.

5. The system for protection against high waters in accordance to the claim 4 is characterized by that the fixing element is attachable into, and/or to the, ground/dam by means of fixing part.

6. The system for protection against high waters in accordance to the claim 1 is characterized by that the fixing element and the fixing part are ordered one over another creating T-form.

7. The system for protection against high waters in accordance to the claim 7 is characterized by that the fixing element is attached with the body of the vessel or through the body of the vessel it reaches the ground/dam.

8. The system for protection against high waters according to the claim 7 is characterized by that the fixing element is attached with the body of the vessel or through the body of the vessel it reaches the ground/dam.

9. The system for protection against high waters according to the claim 1 is characterized by that the fixing element and the fixing part are previously assembled on/into ground/dam.

10. The system for protection against high waters according to the claim 10 is characterized by that the fixing element has lid.

11. The system for protection against high waters according to the claim 1 is characterized by that the connection of the side edges of the two adjacent protective walls is performed through connecting slot/spring, whereby the spring enters into slot, with that the slots are built up on the side edges on the guided plate which is connected with the protective wall on the both sides.

12. The system for protection against high waters according to the claim 1 is characterized by that the shown side edges of the two adjacent protective walls are connectable between themselves by means of second adaptive element.

13. The system for protection against high waters according to the claim 12 is characterized by that the protective
plate and/or the guiding plate and/or fixing element and/or fixing part and/or first or second adaptive element are made of artificial material.

14. The system for protection against high waters according to the claim 13 is characterized by that the polyethylene can be applied as an artificial material.

15. The system for protection against high waters according to the claim 1 is characterized by that the protective walls are sealed between, in the same way as the connection between protective walls and fixing elements.

16. The system for protection against high waters according to the claim 15 is characterized by that on the gaps S1 and S2 on each of the protective walls or in the slot of the first or the second adaptive element, there are placed gum seal elements.

17. The system for protection against high waters in accordance to claim 1 is characterized by that on the back side of the each protective plate encompassed with water they are placed, at least two bracing elements and/or on the back side on the second adaptive element is placed, at least one bracing element, whereby the bracing elements, placed from the back side in the setup stage, have possibilities to rotate in another position.

18. The system for protection against high waters, in accordance with the claim 17 is characterized by that on the back side of the protective wall are placed at least two horizontally stretched, each to another distanced cross-section support elements on which there are fixed rotating bracing elements.

19. The system for protection against high waters in accordance with the claim 17 is characterized by that the axis of rotation of the protective wall is under the right angle related to the longitudinal axis of the cross-section support elements.

20. The system for protection against high waters according to the claim 17 is characterized by cross-section support elements and supporting elements are made of warmly zinned steel tubes.

21. The system for protection against high waters according to the claim 17 is characterized by the protective wall with fixing element, and/or the protective wall with fixing part, and/or, the protective plates one to each other, and/or, the vessels one to each other, and/or the first adaptive element with protective plate and fixing element, in other words fixing part, and/or, the second adaptive element with limited protective plates, that is/are connected on the principle of gate valve (slide-rule).