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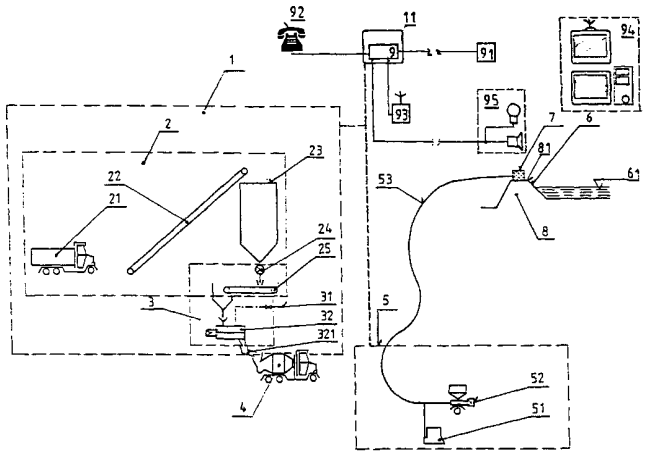

(57) Abstract: Facilities for performance of the method herein with the containers and the transport set consist of the preparation station (1) with the control dispatching (11), controlling the hopper system (2). Said system is connected to the mixing plant (3) for agitation of the charging mixture transported by the transport (4), transport pump (52, 52') and the pipeline main (53, 53') to the endangered embankment (6) of the watercourse (61). Mixture is charged in the large cubic capacity bag (7), and/or double and/or multiple bags (71,72). Control dispatching (11) benefits from fitting with one processor at least (9), enabling except of partially automated operation at least the connection to minimum one sensor (91), as well. Dispatching will be fitted with a mean (92) for automated telecommunication connection establishment, with a mean (93) for automated transmission of the state message. Also a mean (94) of electronic communication and/or with a mean (95) for transmission a direct warning/alarm signalizing, especially into the immediately endangered territory situated nearby the watercourse (61) will be included.

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METHOD FOR CREATION OF THE FLOOD-PROTECTION SYSTEM AND INSTALLATION TO ITS REALIZATION

Technical Field

Invention herein covers a construction method of levee-flood system, being utilized for consolidation and/or elevation of existing protective levees and/or seepage and leak prevention of afflux water to the territory adjacent to the watercourse. Furthermore the invention herein describes facilities necessary for application said construction method, as well.

Background Art

Watercourses flowing thru the countryside have their riverbeds that have arisen mostly spontaneously during a period of many years. Riverbeds of watercourses were treated and river realignments (regulations) were done in certain locations. Protective levees of both earth dams and/or of different type of consolidation were built alongside one or both riverbanks where it was considered as needed. However these levees underwent in the course of time diverse repairs and treatments. Nevertheless free course was left to the rivers, brooks and streams in mountain and foothills areas, especially upon spontaneous establishment of new routes and riverbeds. But their flow thru towns and municipalities is rather controlled. In case of increasing the water level due to higher rain activities the existing levees often are not capable to face the power of raised water flow. That is why they are unable to prevent flood of adjacent countryside as well as large damages, which took place the overall territory of Moravia in 1997, great part of Poland and Germany as well as Northern Bohemia in 1998, respectively.

Different facilities for construction and/or elevation of existing levees or other artificial anti-flood barriers belong among solution, demonstrating contemporary state of technique within said sphere. Technical solution described in the document No.

WO 95/06169, regarding to the packing the outside surface of which was fitted with small hooks, whereas other surface was fitted with matched connecting elements may be listed as an example. When the packages filled with a special medium are located upwards and/or mutually each on the other, the hook elements at the surface of one of packages hereof are inserted in connecting elements located at the surface of one of other packages at least.

The patent application No. WO 95/24531 involves an intention, concerning the structure of formwork, especially for utilization in occupation of areas situated horizontally and/or of inclined ones. Formwork structure is shaped principally as a flat beg made from PVC and/or other suitable textile fabrics, consisting of the layer of upper fabric as well as that one of bottom fabrics, connected mutually via a weld seam and/or zip fastener. Several span pieces are located between the upper and bottom fabrics.

The invention described in the file No. WO 97/29246 concerns the soft package, consisting predominantly from textile fabrics, fitted with on hole for filling with bulk and/or partially consolidated material at least. Sand and soils are applied for construction of a body, used as the insert and/or levee foundation, embankment, bank consolidation, bulkhead or breakwater, for filling the holes or reservoirs, e.g. in the bed of a watercourse and/or for packing and storage of contaminated substances. Container is fitted with one filling hole at its upper side at least. Stitched seam or weld seam standing out longitudinally is arranged at the upper side of the container herein, interconnecting the textile fabrics face areas of top edges.

British patent application No. GB 2 299 606 A involves a barrier withstanding the action of the sea and/or other watercourse at the surface, consisting of a set of containers, located lines and fitted with the means for mutual securing the adjacent containers as well as surface reinforcement, e.g. of a seabed. Containers are perforated and fitted as whole or partially with suspendable substances, e.g. with sand, suspended concrete being located in container out of the earth, e.g. being pumped to

the containers. Containers may be located at the surface and filled from the vessel, or filled on vessels and lowered to the bottom.

Levee bags for flood protection, well known from the application No. DE 44 02 458 A1 are based on the principle of over-dimensioned empty bags filled with rather heavy substance to achieve a capability of their sunk as well as small bags filled with a super-absorbent, being capable to absorb water in the amount of 100 fold of their own weight. However this small bag is of large volume type so that due to the change of its own volume extends the levee bag from its center causing this way self-sealing of the gaps. Water is here utilized so that that it self-seals the flood-levees simultaneously with raising water level at the site of location.

Concerning the method and facilities for construction of levee-flood dams made from the matter being enclosed in the fabric container, as per the file No. DE 44 17 672 A1 is assumed that several empty, parallel textile reservoirs are located to the guidance of the protective dam, at least. Such textile reservoirs hereof are simultaneously joined together into fabric tube, having one end enclosed and the other opened, that are filled with a substance inside, starting from enclosed end and step-by-step up to the opened one.

Subject matter of the invention as per the file No. DE 197 38 216 represents a levee module, needed for reinforcement, elevation and/or new construction of protective levees and dams. To establish such levee module hereof, the levee/dam would be reinforced, elevated and/or newly constructed via a simple method, using standard machinery, e.g. excavators, trucks, etc. Otherwise quite new protective levee may be built up, where open flexible container for trapping the filling substance is located on the considerably oblong skeleton. Said container is to be made from textile fabrics, rupture resistant, especially from geo-textile, non-woven textile, woven, knitted and/or fibrous material, e.g. from canvas fabrics and/or foil, reinforced with plastic fibers.

File No. WO 97/39192 describes inflatable body, made from parts enabling change of their volume, like blowing pipe part fastened to the bottom so that may become blown up very during a short time on condition of jeopardizing.

Invention as per No. EP 0 721 028 A2 relates to the emergency weir fitted with certain number of flexible hoses, which may be filled with a fluid, whereas the hoses hereof are interconnected during the state of being filled with a fluid. In case that those hoses are located in layers put each on the other, at least two of the hoses herein are interconnected mutually at the longitudinal side. During the non-filled state the above hoses are fastened especially in depressions of the bed and may be covered with a lid.

Bag as per the published description to the patent application No. GB 2 297 343 A for an arrangement of the levee would filled with sand and stones. This bag involves a tube body, fitted with the inlet and outlet. Two surrounding loops ensure both inlet and outlet to achieve the above inlet and outlet flowing to the tube elements. Inlet is adapted for filling with sand and stones to the bag while the outlet is ready for draining the water from the bag.

Invention as per the file No. DE 197 54 340 A1 concerns the flood-protective facility applied in the backwater areas. This facility consists of waterproof hoses of different size, which remain filled in the water and by means of insignificant overpressure are stable from the point of view of their shape. This fact enables them to serve as temporary tide barriers.

Facility described in the file connected with the patent application No. EP 0 636 748 A1 secures the slopes endangered with bank sapping as well as maintenance of bound bank sappings up to the total low grain size soils. Said facility consists of one complete hole drilled from the top, or from the bottom, and/or from the side of sliding slope. Hole would be of controlled course type, being bored first at one site at least, out of the area of slope endangered with sapping and/or out of the sapping

area. Subsequently a complete borehole of controlled type would be drilled out at previously chosen site, thru the sliding surface susceptible to the sapping and after its completion the borehole would be injected with a suitable injection agent to consolidate the surrounding earth area.

Patent file No. US 5,669,732 describes a bag, closing automatically based on the pressure of the substance filled in it. Bag herein consists of openable, overlapping elastic structure, where the elastic material is arranged, enabling complete covering of the bag hole.

Facility for flood and erosion damages prevention, published within the file No. EP 0 952 259 consists of one or more closing compartments in the upper area of which a hose like part with a cubic capacity body would be fastened at its upper part. Above body, a closing apron is located on it, consists of compartments for caught of the load. Closing compartments may be connected either separately, either within a bundle at the dam crest and/or embankment part flooded with water and are anchored via the fastening piles. This way the dam crest and/or grass at the embankment are effectively prevented from the underwashing.

Above mentioned examples for solution of crisis states during the floods shown, that except from the proper solutions of particular bodies, establishing and/or reinforcing, consolidating, or elevating existing levees does not exist any uniform technical-organizational system, enabling immediate reaction to arisen flood disaster and inundation situations.

Disclosure of the Invention

Above-mentioned disadvantages overcome a method for creation of the flood-protection system based on the invention herein. The matter of the invention has been founded on the principle, that based on the hydraulic engineering model of flood protection, where minimum one preparation station, joined via a transport

system with the protective means and their components, would be established in the center of endangered area. Especially large cubic capacity bags and/or filling mixture for them belong among the protective means. Above- mentioned transport system subsequently transports these protective means, especially large cubic capacity bags, to the jeopardized watercourse embankments for establishment and/or reinforcement of the protective flood-levee.

Method of construction the flood-protection system herein may be performed advantageously so that the preparation station would be controlled automatically with respect to the monitored value of minimum one physical variable measured in the time course and chosen in advance. Such variable may represent; e.g. height of the water level within monitored area, varying of that one is considered to be more advantageous. Other workmanship may be modified so that amount of atmospheric rainfalls in the territory of the upper river catchment area represents a chosen physical variable, measured in dependence on time, as well. Combination of measurement minimum two different physical variables is allowed, e.g. level of atmospheric rainfalls upstream the endangered territory and height of water level of one watercourse, being situated within that area herein at least. Combination of measured variables may be monitored and evaluated advantageously, based on previously determined algorithm with respect to the course of variances of their values in time dependence, as well.

Essence of the facilities as per the invention herein for performance of the levee-flood system construction would be based on a fact, that the facility consists of one preparation station at least, being interconnected with the control dispatching. Such a dispatching controls the pouring system being connected with the agitating plant making the filling mixture, transported via a transport system to the endangered embankment of minimum one watercourse within the jeopardized territory. In the same time the pouring system consists of mobile chargers, e.g. trucks, and/or minimum one charging conveyor at least. Charging conveyor and/or mobile charger are focused to the minimum one hopper, underneath of which is located one discharging conveyor at least, allocated to minimum one agitator, located at the mixing plant.

Water main is advantageously connected to the mixing plant having its outlet into one agitator with a hopper, at least.

Minimum one mobile conveyor is connected to the mixing plant, e.g. a truck and/or one transport station, at least. Transport station consists of minimum one transport pump connected to the main pipeline, headed for an endangered watercourse embankment, having its outlet to minimum one large cubic capacity bag. Large cubic capacity bag herein is anchored especially to the ground basement, embankment and/or bottom of the watercourse or to the bank dike. Above-mentioned large cubic capacity bag is advantageously partially filled and embedded longitudinally at the protective dam crest.

Large cubic capacity bag was advantageously made as longitudinally limited and closed tube, manufactured especially from elastic material, fitted with minimum one both filling and discharging hole. Other workmanship of large cubic capacity bag as per the invention herein was made as double and/or multiple bags, consisting of mutually located parallel tubes. Doubled and/or multiple bags consist advantageously of the tubes, kinematical bound mutually thru minimum one coupling. Another advantage ensues from the fact, that the bag has been made from one piece of material the tube and/or couplings of which are limited and mutually separated via closing mean, especially thru stitching or welding a seam. Large cubic capacity bag may be optionally manufactured in the shape of prism and/or mattress, as well.

Pipeline mains may be advantageously joined together with minimum one pressurized air generation aggregate.

In case that the preparation station involving the mixing plant has been situated at a bigger distance from the watercourse a minimum of one conveyor and/or mobile charger would be guided to the mobile mixing plant, where the agitator fitted with a hopper and water mains had been located. In the same moment at least one transport station would be connected to the hopper. Minimum one transport pump

would be connected to the transport station; one pipeline main would be joined together with the transport pump. Pressurized air generation aggregate is to be connected to the pipeline mains advantageously.

Controlling dispatching as per the invention would be connected with its inputs to one sensor at least, located in the endangered territory and/or in the upstream river catching, monitoring minimum one preset physical variable. Controlling dispatching involves advantageously a mean of automated operation control, involving having a benefit from one processor at least. Measuring sensor of minimum one preset physical variable would be connected to one input at least, indicate by minimum of one of sensors. Automated means of the control dispatching operation furthermore benefit from the means for automatic establishment of telecommunication connection with at least one predetermined individual phone number of stationary and/or wireless telephone network. Other workmanship of this part of facilities herein involving the control dispatching would include the means for automated transmission of at least one status message into minimum one mean of electronic communication medium. Means of mass communication represent especially the facilities of radio and/or TV broadcasting, wireless, cable transmissions, public address system and or a computer network being connected to them, advantageously the Internet. Means of automated operation control of the control dispatching may benefit from involving the means for transmission of direct, acoustic and/or optical warning/alarm signaling into the directly jeopardized territory.

Systematic solution of the control and the domain of organizing the protection of human dwellings and backwater areas against the undesirable flood impacts. This system utilizes a quite new technology and technical means, ensuring a high efficiency of flood-preventive measures upon minimizing the share of human work as well as high operability and rapidity of their performance.

Brief Description of Drawings

Substance of the method and facilities as per the invention herein are furthermore explained in detail via the description of their exemplary workmanships, represented in their simplified fashion on the enclosed drawings, where

Fig 1 shows a schematic diagram of the preparation station with the control dispatching and pouring systems. Above systems, connected to the mixing plant as well as the transport system utilizing the mobile agitation truck and the transport system, are ensuring the haulage of filling mixture to the site of destination, i.e. to endangered embankment of the watercourse;

Fig. 2 presents a schematic diagram of mobile mixing plant for receiving the filling material together with the transport system ensuring the haulage of filling mixture to the site of destination;

Fig. 3 shows the schematic axonometric projection of exemplary workmanship of the large cubic capacity bag in a form of simple, longitudinally unlimited and closed tube;

Fig. 4 shows simplified axonometric projection of the exemplary workmanship of the large cubic capacity bag in a form of double tube, whereas -

In Fig. 5, there has been drawn in the same projection the exemplary workmanship of the large cubic capacity bag as a triplet of mutually kinematical bound tubes;

Fig. 6 represents a schematic axonometric projection of the multiple large cubic capacity bag the central part of which was made in the shape of block and if compared with the side tubes, it is considerably bigger; and

Fig. 7 represents schematic axonometric projection to a part of stationary levee, consisting of several kinds of large cubic capacity bags, being mutually kinematical bound.

Mode for Carrying Out of the Invention

Facilities as per the Fig 1 consists of the preparation station 1 connected with the control dispatching 11, which controls the pouring system 2 and the transport station 5 via the connection marked with dashed line. Pouring system 2 consists of mobile chargers 21 and/or of charging conveyor 22. Charging conveyor 22 and the mobile charger 21 are subsequently guided to the hopper 23, fitted with the dosing equipment 24. Underneath the hopper 23 is located the discharge conveyor 25. Mobile charger 21 and charging conveyor 22 are both predetermined for supplying with the components of the filling mixture, which is not represented here, transported to the agitator 32, which is located at the mixing plant 3. To the agitator equipment 32 would be furthermore connected a water main branch 31 and the hopper 321. For transport of ready filling mixture are incorporated to the hopper 321 the mobile conveyors 4 and/or the transport station 5. Transport station 5 than consists of the transport pump 52, to which is connected the pipeline main 53. To this pipeline main 53 is furthermore connected the aggregate for generation of the pressurized air 51. Above-mentioned pipeline main 53 outlets to the large cubic capacity bag 7, located at the flat dam crest 81 of the protective levee 8, which in the same time establishes the inclined embankment 6 of the watercourse 61.

In Fig. 2 is shown a mobile mixing plant 3' with the equipment of agitator 32', which is filled with mobile chargers 21. To the agitator 32' is than connected the water main 31' and the hopper 321'. For transport of ready filling mixture is arranged to the hopper 321' the transport station 5'. Transport station 5' furthermore consists of the transport pump 52' and of the aggregate 51' for generating the pressurized air, which are connected to the pipeline main 53'. Filling mixture would be transported to the endangered embankments 6 of the watercourse 61 for filling the large cubic capacity bags 7 and for the construction and/or reinforcement of the protective dam/levee 8.

Filling would be done either directly from the transport station 5 or from the transport station 5', whereas the large cubic capacity bags 7 may be anchored in the bank 6 and/or to the bottom of the watercourse 61, or to the embankment protective dam/levee 8, as well. At least one of the large cubic capacity bags 7 would be than partially filled at least and located longitudinally at the dam crest 81 of the protective levee 8.

To the input of control dispatching 11 as per the Fig. 1 and 2, pertinently to the input of their processors 9 would be linked an output of the sensor 91, located at the endangered area. This area was not drawn here or specified in detail, of the watercourse 61, e.g. in the territory of its upper stream with respect to the territory, where are disposed and/or embedded large cubic capacity bags 7. First output of the processor 9 is linked via the conductive connection with the mean 92 for automatic telecommunication connection establishment, which is represented here with the sign of stationary extension phone. Another outlet of the processor 9 is linked with the mean 93 for automated transmission of the status message. Such a mean, which in described example involves the equipment for wireless transmission, enables the connection with at least one of terminals 94 for electronic communication. Such a mean may be represented with e.g. facility for radio and TV transmissions, cable, data communications and transmissions as well as transmissions via the Internet and/or other computer network. (Represented here with a TV set and a computer, receiving the data signal via a data transmission network unspecified and non-represented here in detail.) Third output of the processor 9 is linked with the means 95 for transmission of direct alarm signalizing, especially into the immediate territory of the protective levee 8 at the embankment 6 of the watercourse 61 within the jeopardized territory. This signalizing would be performed predominantly thru the means for optical and/or acoustic signalizing of the critical state, as is represented in the scheme at described Fig. 1 and 2. Except of the above-mentioned parts the control dispatching involves another means, non-described here in detail, enabling manual and/or automated control of the operation of preparation station. 1, mobile conveyors 4 and/or of transport stations 5, pertinently of mobile mixing plant 3' and the transport station 5'.

As per the hydraulic engineering model of flood protection in the center of the endangered area would establish at least one preparation station 1 with the control dispatching 11. Dispatching herein reacts to the requirements of the flood control center. Dispatching ensures the aid to the territories jeopardized with flood and backwater by means of production and haulage of the filling mixture to be charged in large cubic capacity bags 7. These bags would be utilized for reinforcement and/or construction of the protective dam/levee 8 at endangered embankment 6 of the watercourse.

Particular components of the filling mixture, non-represented here, are transported during the operation of facilities, as indicated in the Fig. 1, to the agitator 32 of the mixing plant 3 and here are they mixed and agitated either by means of mobile chargers 21 and/or via the charging conveyor 22. To acquire the paste-like state of the filling mixture the water would be added to the agitator, by means of connected water main branch 31. Filling mixture is subsequently transported to the endangered embankment 6 to fill out the large cubic capacity bags 7 and to construct and/or consolidation of the protective levees 8 by means of transport pump 52 pipeline main 53. In case of bigger distance of the jeopardized embankment 6 of the watercourse, simultaneously accessible for the mobile chargers 21, would be established an independent mobile mixing plant 3', indicated in the Fig 2. This mixing plant 3' would involve the water main branch 31', as well, connected to the equipment of agitator 32'. Agitator 32' would be charged up with the components of filling mixture by means of mobile chargers 21. Filling mixture will be subsequently transported to the endangered embankments 6 of the watercourse 61 to fill the large cubic capacity bags 7 and to construct and/or reinforce the protective dams/levees 8 by means of transport pump 52' and an independent branch of the pipeline main 53'. At the jeopardized embankment 6 of the watercourse 61 would the filling mixture be charged into the large cubic capacity bags 7 by means of which the protective dam/levee 8 is constructed and/or consolidated.

Fig. 3 represents simplified axonometric projection of the large cubic capacity bag 7, worked in the shape of simple, longitudinally limited and closed tube, made

from elastic material, e.g. from non-woven geotextile, and involving the filling hole 711 and the discharge hole 712 opposite to it.

Fig. 4 represents exemplary workmanship of the large cubic capacity double bag 71, established as the parallel pairs of cinematic mutually bound, longitudinally limited and enclosed tubes, joined mutually alongside with the coupling 75. Overall double bag was made from one elastic unit, whereas both parallel tubes and the intermediate coupling 75 are mutually separated via stitching and/or weld seam. Each of tubes is furthermore fitted with one filling hole 711 and opposite located discharge one 712.

Fig. 5 shows exemplary workmanship of the multiple bags 72, made as a triplet of mutually parallel located, longitudinally limited and enclosed tubes. Tubes are made from elastic material. Their mutual position with centers of longitudinal axes located at the vertexes of equilateral triangle is secured with intermediately seated and fastened coupling 75, made with the cross section of "T" shape, turned by 180°. Each of the tubes of multiple bag 72 manufactured such a way, would be fitted with a filling hole 712. The said filling hole 712 herein would allow e.g. filling of each of the tubes with a filling mixture in a different period, especially with respect to the development of the flood and/or other dangerous situation. Pertinently each of tubes may be charged with a mixture of other material composition.

Fig. 6 shows other example of the multiple bag workmanship 72, consisting of a triplet of mutually connected, longitudinally limited and enclosed tubes, whereas the central one, dominating thru its dimensions, is of block shape 73. Each of the tubes is fitted with one filling hole 711 and one discharging one 712, as well. Particular tubes are separated thru stitching with at least one seam, parallel to the longitudinal axis of the multiple bags 72.

Fig. 7 shows simplified axonometric projection of the cross section thru the compartment of protective levee 8. Said cross section is established with inclined

embankment 6 of the watercourse 61 one surface, on which seats a system, represented with large cubic capacity bag 7, large cubic capacity bag 71 and intermediate seated mattress bag 74. Large cubic capacity bag 7, shown in detail in the Fig 3, is seated in the lower part of inclined surface of the sidewall of protective dam/levee 8 at the water level of the watercourse 61. This bag 7 is fitted with a filling hole 711 and a discharge one 712. On the flat horizontal dam crest 81 of the protective dam/levee 8 seats large cubic capacity double bag 72, fitted with the filling holes 711 and discharge ones 712, as well. Both tubes of the bag are kinematic bound via the coupling 75, and as it was mentioned above within the part of description workmanship example of the invention herein in the Fig. 4. Mattress bag 74 is kinematic bound seated between the large cubic capacity double bag 72 and a large cubic capacity bag 7 by means of the elements non-indicated here. This bag 7 is fitted with an inner labyrinth of compartments 741 marked with a dashed line. Said labyrinth either guides the direction of flowing the filling mixture during the filling operation, represented by the arrows, either prevents from pertinent shape deformations, resulting from the pressure being generated by the filling mixture and effecting to the inner surfaces of the walls. Mattress bag 74 is furthermore fitted with a filling hole 711 and a discharging one 712. Thickness of the above mattress bag 74 may be in some cases of the invention workmanship considerably lower, if compared with the diameter of the large cubic capacity bag 7 hoses and a double bag 71 ones. Reason is that the mattress bag 74 may have a task to prevent from water leakage from the watercourse 61 thru the levee 8, especially for earth dams, non-compacted ones, and/or partially mechanically disturbed levees 8. That is why in such cases the demands for its mechanical ruggedness are not put higher. Otherwise the mattress bag 74 may be applied as a support plate the task of which covers leveling of the terrain excrescencies underneath other large cubic capacity bags 7, pertinently large cubic capacity multiple 72.

Industrial applicability

Method of construction the flood-protection system may be utilized advantageously everywhere takes place a need to reinforce and/or to elevate existing

embankments and levees of the watercourses and/or for building of new ramparts and barriers. Utilization of the method herein is advantageous especially in case of acute danger overtopping the dam and/or flood levee with the flood wave as well as in case of threat danger of their break.

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PATENT CLAIMS

1. Method for creation of the flood-protection system, **characterized by the fact**, that according to the hydraulic engineering model of the flood protection at least one preparation station and/or disposal would be established in the center of endangered territory when the said preparation station and/or disposal would be connected thru their transport systems with their components, especially with large cubic capacity bags, where the transport system carries the filling mixture into large cubic capacity bags to endangered embankments for construction and/or consolidation of the protective levee.

2. Method as claimed in Claim 1, **characterized by the fact**, that preparation station is controlled based on at least one preset physical variable, measured in the jeopardized area and/or in a part of the river catchment area upstream the endangered territory, when the said preparation station benefits advantageously from an automated control.

3. Method as claimed in Claim 2, **characterized by the fact**, that the height of the water level within the monitored territory represents the chosen physical variable, advantageously measured as a time dependent variable.

4. Method as claimed in Claim 2, **characterized by the fact**, that chosen physical variable represent the amount of atmospheric rainfalls within the upper catchment area of the endangered territory, advantageously the amount of atmospheric rainfalls measured as time dependent.

5. Method as claimed in any least one of Claims 2 to 4, **characterized by the fact**, that the preparation station is controlled based on previously determined algorithm, evaluating the values of two variables, incoherent mutually.

6. Installation to the performance of the method herein by at least one of Claims 1 to 5, **characterized by the fact**, that consists of one preparation station at least (1), involving the pouring system (2), connected to the mixing plant (3) of the filling mixture, when the said filling mixture would be subsequently transported to the endangered embankment (6) of the watercourse, whereas the said preparation station (1) would be interconnected with the control dispatching (11).

7. Installation as claimed in Claim 6, **characterized by the fact**, that the said pouring system (2) consists of one mobile charger at least (21) and/or of minimum one charging conveyor (22).

8. Installation as claimed in Claim 7, **characterized by the fact**, that the said charging conveyor (22) and/or said mobile charger (21) are guided into one hopper (23), at least when underneath of the said hopper would be located minimum one discharging conveyor (25), allocated to at least one agitator (32) when the said agitator (32) is located in the mixing plant (3).

9. Installation as claimed in Claim 6, **characterized by the fact**, that into the mixing plant (3) is implemented a water main (31), connected to the agitator (32), fitted with a discharging hopper (321).

10. Installation as claimed in Claims 6 to 9, **characterized by the fact**, that to the agitator (32) is connected minimum on mobile conveyor (4) and/or one transport station (5) at least.

11. Installation as claimed in Claim 10, **characterized by the fact**, that the transport station (5) includes at least one transport pump (52) connected with at least one pipeline main (53), being guided to the endangered embankment of the watercourse (6) and the said pipeline main would have its outlet into at least one large cubic capacity bag (7).

12. Installation as claimed in Claim 11, **characterized by the fact**, that a large cubic capacity bag (7) is anchored especially to the ground base, bank (6) and/or bottom of the watercourse or protective levee (8).

13. Installation as claimed in Claim 11 or 12, **characterized by the fact**, that at least one large cubic capacity bag (7) is partially filled and longitudinally seated on the dam crest (81) of the protective levee (8).

14. Installation as claimed in whichsoever of Claims by 11 to 13, **characterized by the fact**, that a large cubic capacity bag (7), is made as enclosed and longitudinally limited tube, made especially from elastic material and fitted with one charging hole at least (711) and minimum of one discharging hole (712).

15. Installation as claimed in Claim 14, **characterized by the fact**, that a large cubic capacity bag (7) is made as a double bag (71) and/or multiple bag (72), consisting of tubes seated mutually in a parallel way.

16. Installation as claimed in Claim 15, **characterized by the fact**, that double bag (71) and/or multiple bag (72) consist of tubes, mutually kinematic bound with at least one coupling (75) and the said bag (71, 72) is made advantageously from one piece of material when its particular tubes and/or couplings (75) are mutually separated thru closing mean, especially with stitching and/or weld seam.

17. Installation as claimed in Claim 15 or 16, **characterized by the fact**, that a large cubic capacity bag (7) is made as prism (73) shaped one or mattress (74) one

18. Installation as claimed in Claim, **characterized by the fact**, that to the pipeline main (53) is connected at least one aggregate (51) for generation of pressurized air.

19. Installation as claimed in Claim 6, **characterized by the fact**, that one conveyor and/or mobile charger at least (21) are guided to the mobile mixing plant (3') when the said mixing plant (3´) contains an agitator (32') and a hopper (321') together with water main (31') connected to the mixing plant (3´), whereas at least one transport station (5') is arranged to the hopper (321').

20. Installation as claimed in Claim 14, **characterized by the fact**, that to the transport station (5') is connected at least one transport pump (52') when the said transport pump (52´) is connected at least to one pipeline main (53').

21. Installation as claimed in Claim 20, **characterized by the fact**, that to the pipeline main (53') is connected an aggregate (51') generating the pressurized air.

22. Installation as claimed in Claim 6, **characterized by the fact**, that the control dispatching (11) is via its inputs connected with minimum one sensor (91).

23. Installation as claimed in Claim 22, **characterized by the fact**, that the control dispatching (11) involves the means of automated operation control, especially includes one processor (9) at least, when one input of the said processor (9) at least is connected with an output of minimum one sensor (91).

24. Installation as claimed in Claim 23, **characterized by the fact**, that the means of automated operation control of the control dispatching (11) involve the means (92), as well, for automatic telecommunication connection establishment with at least one, predetermined phone subscriber's line of stationary and/or wireless phone network.

25. Installation as claimed in Claim, **characterized by the fact**, that means of automated operation control of the control dispatching (11) involve also means (93) for automated transmission of the state message into at least one mean (94) of mass electronic communication.

26. Installation as claimed in Claim 25, **characterized by the fact**, that means (94) of mass electronic communication represent especially equipment for radio transmission, TV wireless transmission, cable transmission, public address system and/or a computer network, advantageously the Internet.

27. Installation as claimed at least one of Claims from 23 to 27, **characterized by the fact**, that the means of automated operation control of the control dispatching (11) involve the means (95) for transmission of direct warning/alarm signalizing into the endangered territory.

(-7 Fig./4 drawings-)

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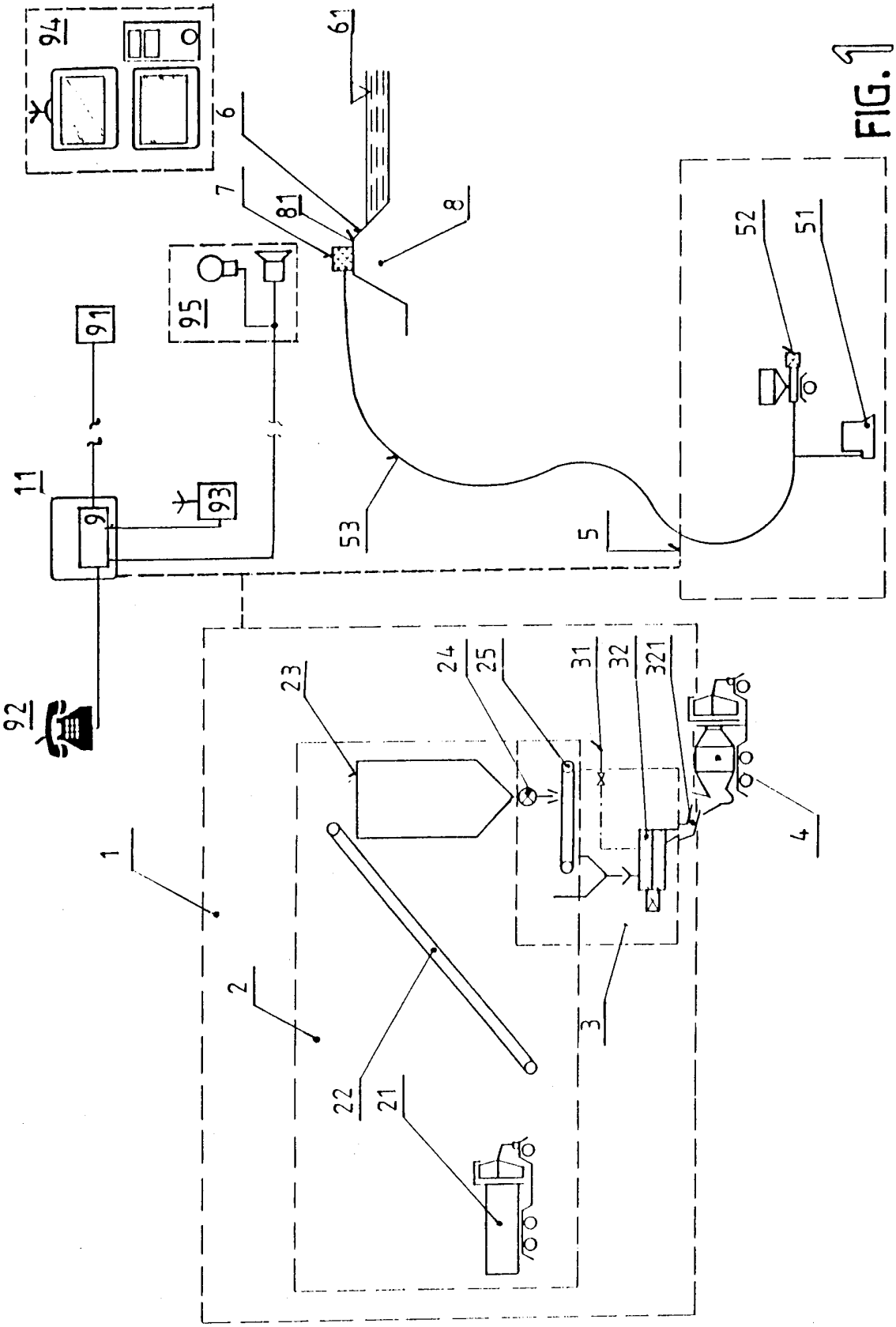

FIG. 1

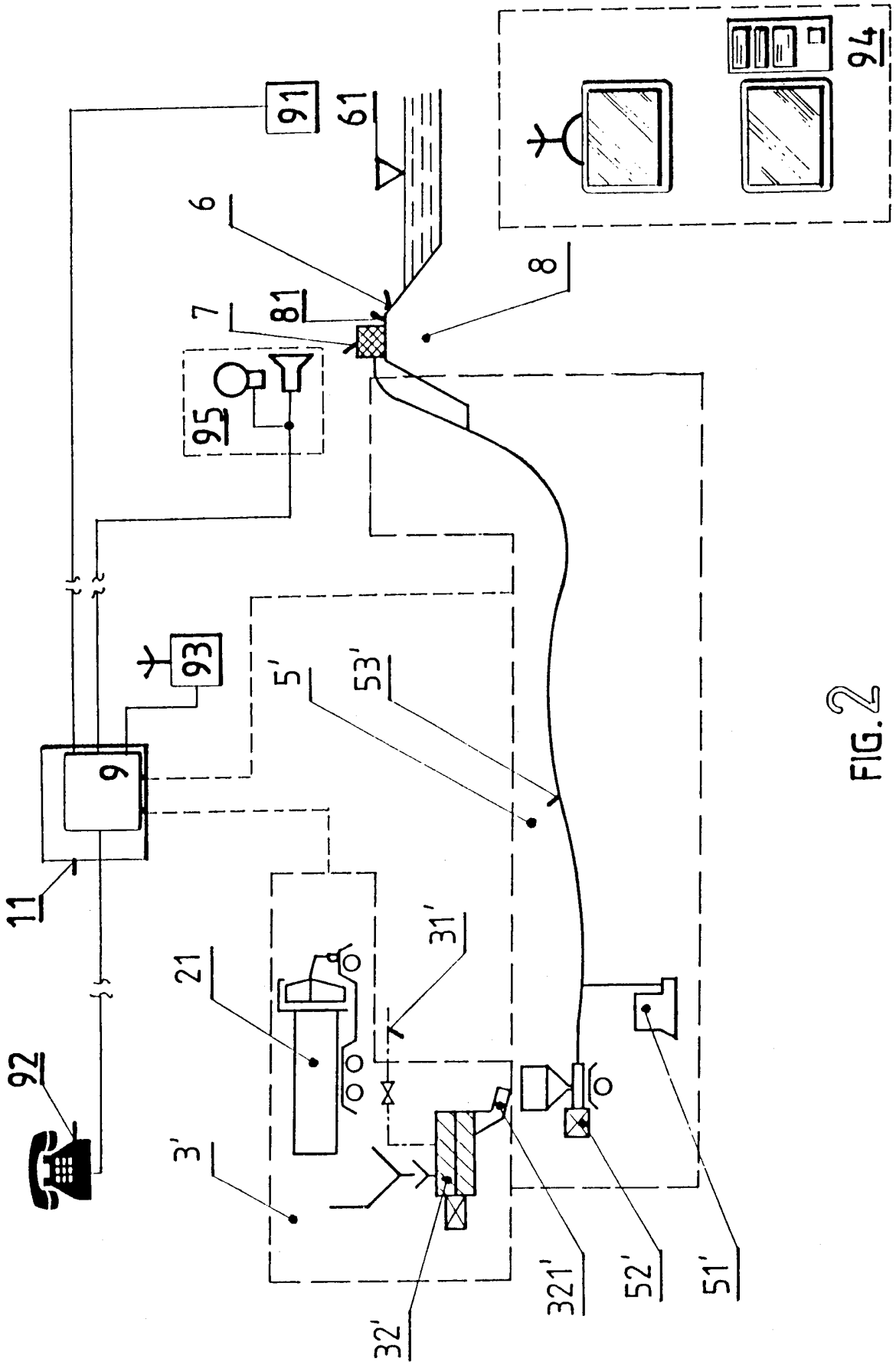

FIG. 2

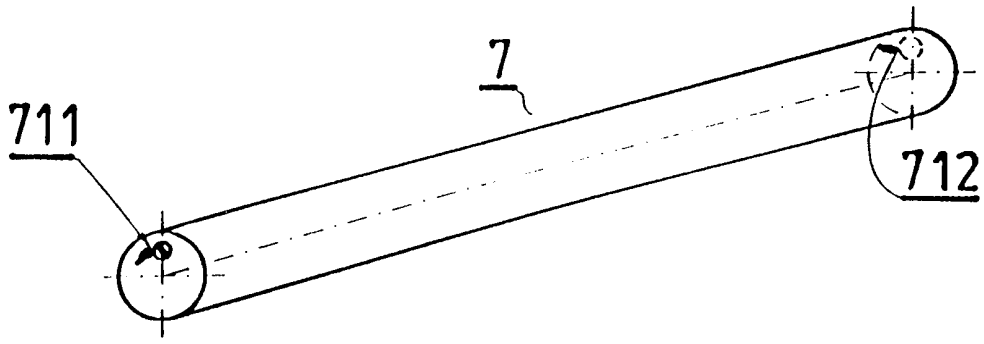

FIG. 3

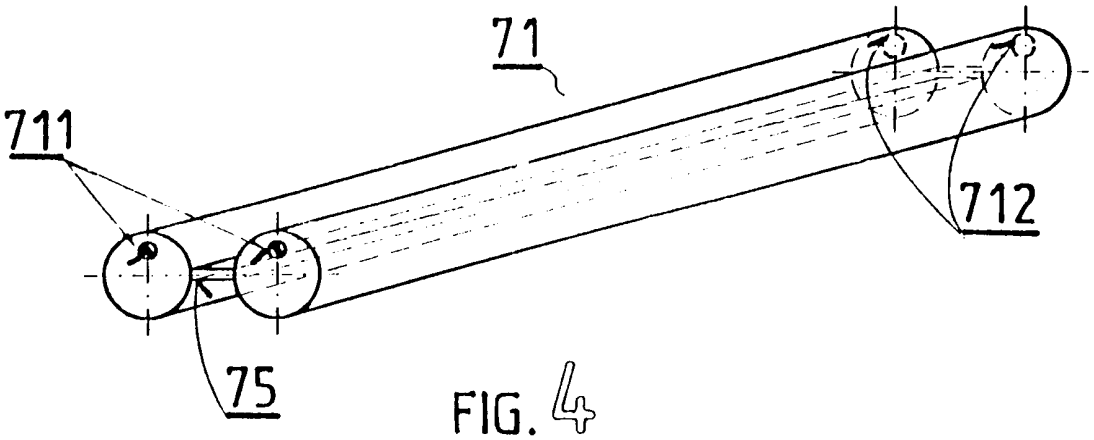

FIG. 4

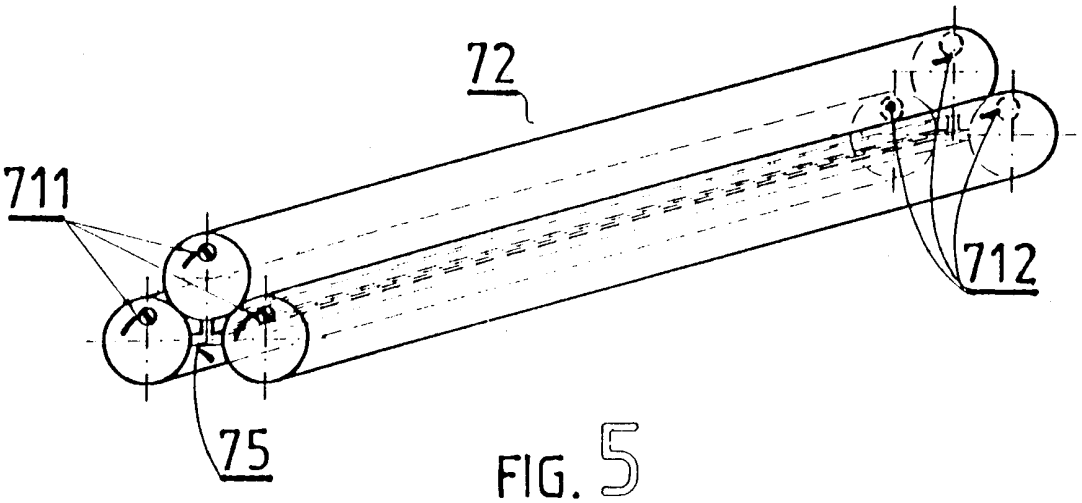

FIG. 5

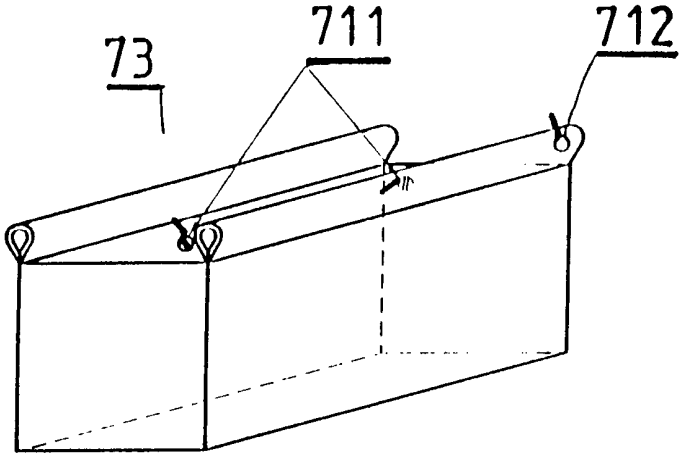

FIG. 6

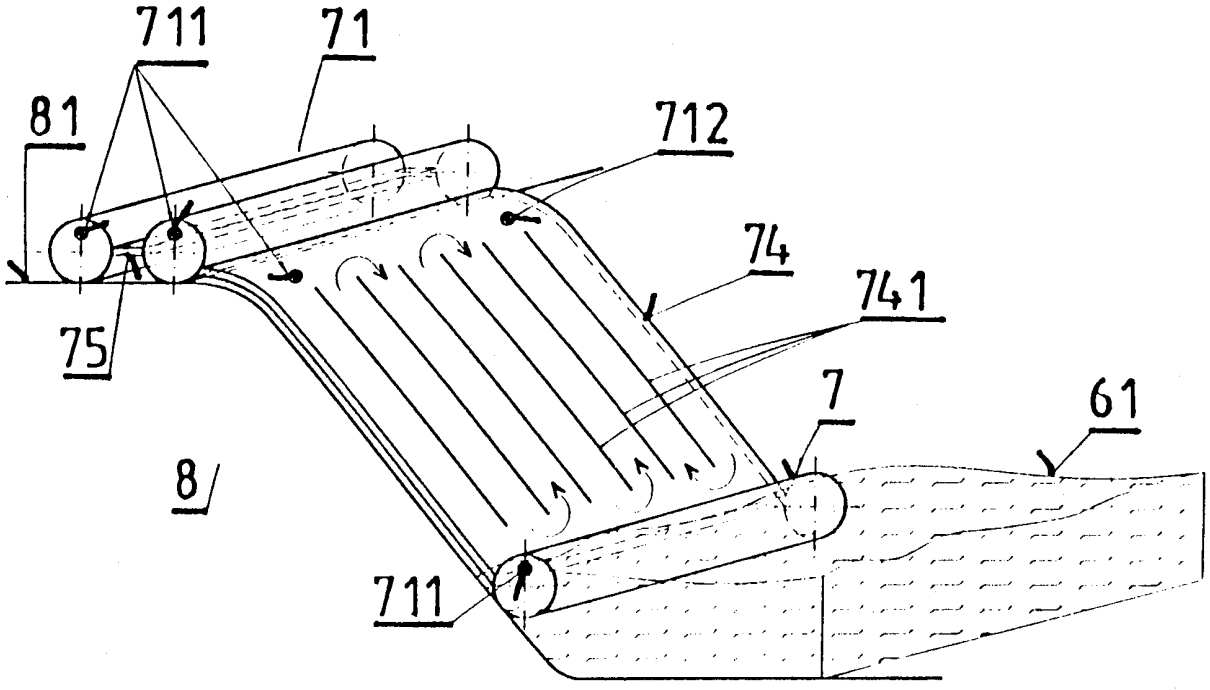

FIG. 7

INTERNATIONAL SEARCH REPORT

Int. ..tional Application No
PCT/CZ 00/00086

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 E02B3/12 E02B3/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 E02B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	US 4 728 221 A (TSUJI YOSHIOMI ET AL) 1 March 1988 (1988-03-01) column 3, line 43 - line 50 column 4, line 16 -column 48 figures 3A,3B,4	1-3 4,5
Y	US 4 153 881 A (PERMUT ALAN R ET AL) 8 May 1979 (1979-05-08) abstract	4,5
A	DE 34 12 300 A (ROTHENPIELER ARNE DR ING) 8 November 1984 (1984-11-08) page 5, last paragraph; figures	1-3
A	US 5 669 732 A (TRUITT WILLIE W) 23 September 1997 (1997-09-23) cited in the application column 4, line 19 - line 40; figures 5,6	1,10,11, 13,18

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
13 March 2001	26/03/2001

Name and mailing address of the ISA	Authorized officer
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 592 675 A (SCALES JOHN M ET AL) 3 June 1986 (1986-06-03) column 5, line 29 - line 49; figures 3,8-10	11-13, 15-17
A	WO 99 20844 A (HOEH MARKUS) 29 April 1999 (1999-04-29) page 5, paragraph 3 page 10, last paragraph figures 1,5	1,10,11, 13,18
A	CH 674 783 A (RENE WALTER HAENGGI;BARBARA ESTHER GUTHERZ HAENGGI) 13 July 1990 (1990-07-13) abstract	25,26
A	CH 683 041 A (SIREL AG) 31 December 1993 (1993-12-31) abstract	27

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INTERNATIONAL SEARCH REPORT

Information on patent family members

In ational Application No
PCT/CZ 00/00086

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4728221 A	01-03-1988	JP 61169512 A	31-07-1986
		AU 585302 B	15-06-1989
		AU 5244386 A	24-07-1986
		KR 9006382 B	30-08-1990
US 4153881 A	08-05-1979	US 4155042 A	15-05-1979
DE 3412300 A	08-11-1984	NONE	
US 5669732 A	23-09-1997	NONE	
US 4592675 A	03-06-1986	US 4449847 A	22-05-1984
		CA 1226743 A	15-09-1987
		US 4502815 A	05-03-1985
WO 9920844 A	29-04-1999	DE 29816044 U	14-01-1999
		AU 1154299 A	10-05-1999
CH 674783 A	13-07-1990	NONE	
CH 683041 A	31-12-1993	NONE	