

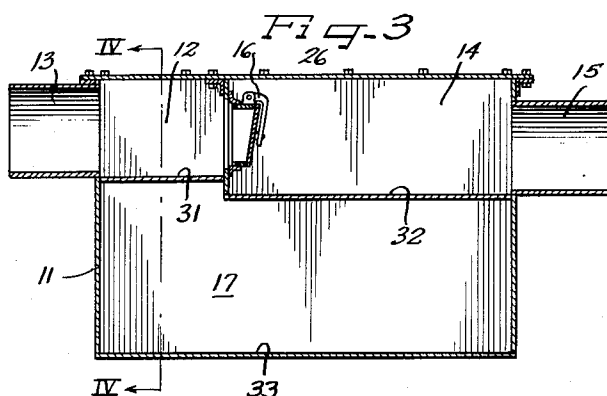
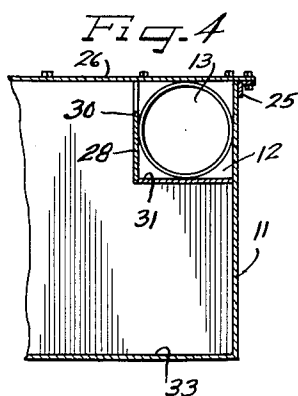
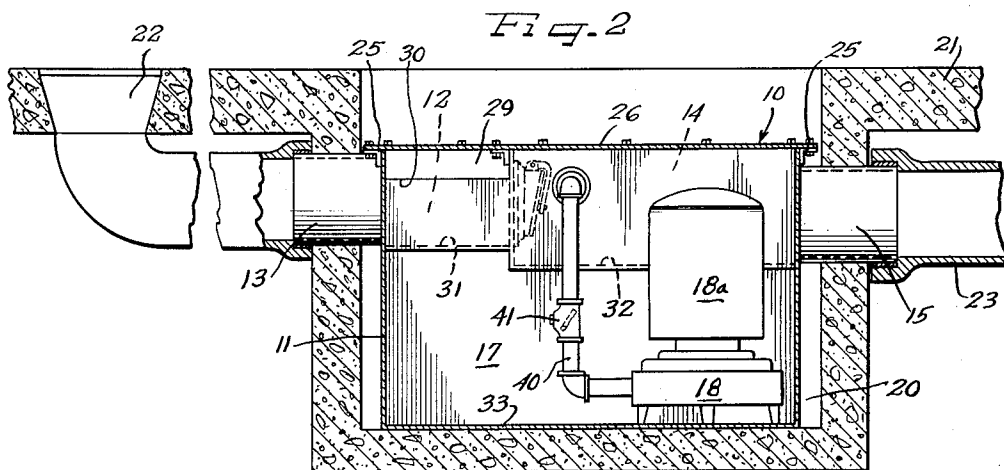
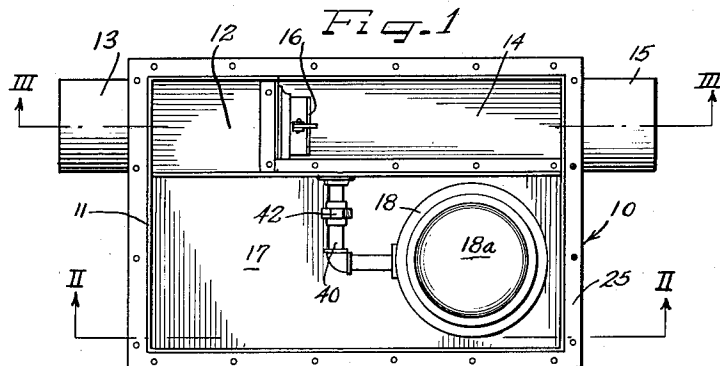
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FLOOD CONTROL UNIT

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3,020,922
FLOOD CONTROL UNIT
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This invention relates generally to a flood control unit, and more specifically to an automatic unit for preventing basements and other low levels from being flooded by reason of a backing up of the drainage system.

Heretofore known devices of this general type have typically included screens which, with extended usage, clog and therefore require servicing. Further, heretofore known units have either extended a substantial distance below the floor level, or have extended a substantial distance above the floor level. In every known instance when the sewer is disposed close to the floor, it has been necessary for the sewer to be relocated or for the control device to extend upwardly of the floor surface. Still further, sediment and the like has frequently collected along the bottom of various portions of such devices, particularly at points where the sewage velocity is decreased because of an expansion of the sectional flow area of the unit.

In accordance with the principles of the instant invention, a new and novel arrangement of the elements has been provided wherein a unit may be connected to sewer conduits which are disposed immediately adjacent the lower surface of a floor without any portion of the device extending above the floor surface or extending for any excessive distance below the surface. Further, in lieu of a screen, a damming arrangement has been provided to collect insoluble material before it reaches the pump inlet, doing so only when the street sewer is attempting to flow in a reverse direction. Also, by a novel arrangement of parts, a unit has been provided wherein any collection of sediment or insoluble materials is washed away by the normal flow of sewage through the device, thereby eliminating or at least minimizing the amount of service required by the unit.

Accordingly, it is an object of the present invention to provide a flood control unit of a new and improved structure.

Another object of the present invention is to provide an improved flood control unit which does not employ screens or strainers, but wherein any valving and pump parts are protected against clogging by solid materials.

Yet another object of the present invention is to provide a flood control device wherein the inlet and outlet are disposed immediately below a floor without any part of the device projecting upwardly from the floor.

Still another object of the present invention is to provide a self cleaning flood control unit.

A still further object of the present invention is to provide a method for controlling both normal direction sewer flow and reverse direction sewer flow simultaneously.

Many other advantages, features and additional objects of the present invention will become manifest to those versed in the art upon making reference to the detailed description and the accompanying sheet of drawings in which a preferred structural embodiment incorporating the principles of the present invention is shown by way of illustrative example.

On the drawings:

FIGURE 1 is a top plan view of a flood control device provided in accordance with the principles of the present invention and with its top cover removed;

FIGURE 2 is a sectional view, partially in elevation, taken along line II—II of FIGURE 1 and showing the device typically installed;

FIGURE 3 is a sectional view taken along line III—III of FIGURE 1; and

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FIGURE 4 is a fragmentary sectional view taken along line IV—IV of FIGURE 3.

As shown on the drawings:

The principles of this invention are particularly useful when embodied in a flood control device such as illustrated in FIGURE 1, generally indicated by the numeral 10. Generally speaking, the device includes a housing 11 having side and bottom walls and which is provided with dividers defining a group of internal compartments including an upper compartment 12 communicating with an inlet 13 to the housing 11 and another upper compartment 14 communicating with an outlet 15 of the housing 11, a normally closed check valve 16 disposed intermediate the upper compartments 12 and 14, a lower compartment 17, and a pump 18 disposed in the lower compartment 17.

Referring to FIGURE 2, the device 10 is typically installed in a well 20 disposed in a concrete floor 21 through which a sewer conduit passes, such as from a house to a street sewer. Thus a floor drain 22 may join with or represent the sewage drainage system of a house and communicates with the inlet 13, and a sewer tile 23 may joint with the outlet 15 and communicates with the street sewer.

In the instant embodiment, the housing 11 is made in a rectangular form or shape and each of the inlet 13 and the outlet 15 are disposed immediately adjacent to the upper periphery or flange 25 extending about the top of the housing 11. The housing 11 is also provided with a cover 26 which is of one or more pieces and which is preferably removable. The cover 26 closes and seals each of the compartments 12, 14, and 17. In the instant embodiment, a single cover of a flat configuration may be used to lie in a single plane to close each of the above identified compartments.

One end of the upper compartment 12 communicates with the inlet 13 for receiving sewage therefrom. Another end of the compartment 12 is closed by the check valve 16 through which the sewage is normally discharged.

One of the side walls 28 of the upper compartment 12 is provided with an elongated opening 29, thus defining a weir or dam having an upper edge 30 extending horizontally in vertically spaced relation from the bottom 31 of the compartment 12. Thus the compartment 12 may be termed a trough since the upper edge 30 is a free edge.

The check valve 16 which closes or dams up the discharge end of the compartment 12 is gravity actuated or biased to a normally closed position as shown in FIGURE 2. The valve is carefully balanced so that a slight water pressure on the side of the movable part adjacent to the compartment 12 will cause the valve to open easily. The structural details of the valve are known and do not comprise a part of this invention.

The second upper compartment 14 communicates the discharge side of the check valve 16 with the outlet 15. The compartment 14 has a bottom 32 which is disposed at a level lower than the bottom 31 of the compartment 12. The bottom 32 is also provided a substantial vertical clearance with respect to the check valve 16.

The lower compartment 17 has a bottom 33 which is disposed lower than the upper edge 30 of the weir or dam 28 of the compartment 12.

The details of the pump 18 are well known in the art and do not form a part of the instant invention. The pump 18 has an inlet which is disposed within the chamber 17 and preferably includes an integral motor within the pump. The pump 18 is preferably disposed wholly within the chamber or compartment 17 as shown. The particular pump illustrated has a cap 18a which serves as a float to actuate an electric switch whereby to control the operation of the pump 18. The pump 18 is

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provided with a discharge line 40 which communicates with a region downstream of the check valve 16. This region is the zone which is subject to the pressure of reverse flowing sewage. In the instant embodiment, the discharge line 40 communicates with the compartment 14. When a back pressure is applied through the line 40 to the pump 18, certain pumps, when stationary, will not allow a reverse flow therethrough. However, many pumps do allow a reverse flow, leakage, or seepage therethrough. To minimize the amount of running which such pumps do, a second check valve 41 may be provided in the line 40, the check valve 41 permitting free flow from the pump 18 to the chamber 14, and blocking flow in an opposite direction. To facilitate installation and removal, a conventional union coupling 42 may be provided in the line 40. It is to be understood that the line 40 is shown more or less diagrammatically in these views. Also, the provisions for waterproof wiring leading to the pump have been omitted since the details do not form a part of the instant invention. It is also to be understood that the exact mode of attachment of the cover 26 to the housing 11 is diagrammatic and may be altered as may be convenient.

Sewage normally flows from the sewer 22 in the house through the inlet 13, into the chamber 12 where both the check valve 16 and the weir 28 slightly dam up the flow. When a slight fluid head is developed therein, the carefully balanced check valve 16 opens and allows sewage to pass into the compartment 14, and thus out through the outlet 15 and the sewer tile 23.

It will be observed that under this condition, no sewage will overflow the weir 28 and the pump 18 will not be called upon to operate. Should the pump be heard to operate at times not under storm or other sewage backflowing conditions, the householder is warned that the check valve 16 may be in need of cleaning.

However, the lower disposition of the bottom 32 with a substantial clearance from the discharge end of the check valve 16 assures that there is ample space for a relatively large amount of sediment to collect before it can interfere with the operation of the check valve 16, such collection of sediment or solids being thereafter ordinarily washed away by any substantial flow of sewage through the check valve, such as may occur when draining tubs or flushing toilets.

In the event that sewage flows reversely from the street sewer through the outlet 15 and into the compartment 14, the closed position of the check valve 16 will prevent further ingress of such reversely flowing sewage. As the height of sewage builds up in the compartment 14, a proportionately larger head of sewage is needed in the compartment 12 to open the check valve 16. Thus when the height of sewage in the compartment 14 approaches or is in the vicinity of the height of the free edge 30 of the weir or dam 28, the head of fluid in the compartment 12 can no longer open the check valve 16 and will, upon reaching the free edge 30 of the weir 28, overflow the weir 28, such flow passing into the lower compartment 17. The lower compartment 17 collects such fluid until such time as the float switch in the pump 18 is actuated, whereby the pump 18 draws such fluid through an inlet around its legs and forces it through the discharge line 40 into the compartment 14, the discharge pressure of the pump 18 being greater than that in the compartment 14 so that the sewage from the house 22 is transferred into the street system even though the check valve 16 be closed.

The dam or weir 28 causes a reduction in the velocity of incoming sewage whereby any solid or insoluble particles are collected behind the dam and only liquid is allowed to flow over it and to reach the pump 18. Thus the use of screens has been avoided to keep such material away from the pump 18. When the water pressure in the upper compartment 14 has receded, the solid particles collected behind the weir 28 are thereafter washed

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through the check valve 16 for flow through the outlet 15.

By novel arrangement of the elements of this invention, it is apparent that the inlet and the outlet may be provided immediately adjacent the lower surface of the floor without projecting upwardly through the floor. By disposing the pump adjacent to the compartments, a minimum depth of well 20 is required.

It is apparent that many other forms of this invention may be constructed wherein the principles of this invention are employed. Thus the instant invention includes the novel operation wherein normal sewage flow is dammed up a predetermined height by the weir 28 and the check valve 16. Thereafter the sewage from the house is allowed to overflow the weir 28 and to pass to the sump 17. Thereafter the sewage in the sump is pumped into a region which is subject to the reverse sewer pressure whenever the check valve 16 is closed.

Although various minor modifications might be suggested by those versed in the art, it should be understood that I wish to embody within the scope of the patent warranted hereon all such embodiments as reasonably and properly come within the scope of my contribution to the art.

I claim as my invention:

1. A flood control unit comprising in combination: a housing having bottom and side walls and an inlet and an outlet disposed immediately adjacent to the upper periphery thereof for connection in a sewer conduit; a pair of upper compartments in said housing and in communication with each other and with the inlet and outlet respectively; a check valve operatively intermediate said upper compartments and arranged to be securely closed by sewage entering one of said upper compartments from the outlet and to permit sewage flow from the inlet to said one upper compartment when no sewage is entering said one upper compartment from the outlet; the other of said upper compartments having an elongated horizontal opening in a side wall thereof defining a weir having an upper edge vertically spaced from the bottom of said other upper compartment; a lower sewage compartment in said housing and having a bottom disposed lower than said upper edge and communicating therewith for receiving any overflow sewage therefrom; a motorized pump wholly disposed in said lower sewage compartment and connected to transfer any overflow sewage from said lower compartment of said one upper compartment and closure means on said housing, lying in a plane, and comprising the top of said housing immediately adjacent to said inlet and said outlet; the various elements of said unit being located in said housing below the plane of said closure means.

2. A flood control unit comprising in combination: a housing having bottom and side walls and an inlet and an outlet disposed immediately adjacent to the upper periphery thereof for connection in a sewer conduit; a pair of upper compartments in said housing in communication with each other and with the inlet and outlet respectively; a check valve operatively intermediate said upper compartments and arranged to be securely closed by sewage entering one of said upper compartments from the outlet and to permit sewage flow from the inlet to said one upper compartment when no sewage is entering said one upper compartment from the outlet; the other of said upper compartments having an elongated horizontal opening in a side wall thereof defining a weir having an upper edge vertically spaced from the bottom of said other upper compartment; a lower compartment having a bottom disposed lower than said upper edge and communicating therewith for receiving any overflow sewage therefrom; said housing having removable means lying in a common plane sealably defining the top of each of said compartments; and a pump connected to transfer any overflow sewage from said lower compartment to said one upper compartment.

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3. A flood control unit comprising in combination: a housing having bottom and side walls and an inlet and an outlet disposed adjacent to the upper periphery thereof for connection in a sewer conduit; a pair of upper compartments partially defined by said housing and being in communication with each other and with the inlet and outlet respectively; a first check valve operatively intermediate said upper compartments and arranged to be securely closed by sewage entering one of said upper compartments from the outlet and to permit sewage flow from the inlet to said one upper compartment when no sewage is entering said one upper compartment from the outlet; the bottom of said one upper compartment being lower than the bottom of the other of said upper compartments and having at all times a substantial vertical clearance with respect to all the movable parts of said check valve; the other of said upper compartments having an elongated horizontal opening in a side wall thereof defining a weir having an upper edge vertically spaced from the bottom of said other upper compartment; a lower sewage compartment defined by said housing and having a bottom disposed lower than said upper edge and communicating therewith for receiving any overflow sewage therefrom; said housing having removable closure means lying in a common plane sealably defining the top of each of said compartments; a motorized pump, wholly disposed in said lower sewage compartment, having a discharge line communicating with said one upper compartment for transferring any sewage which overflows said weir to said one upper compartment; and a second check valve in said discharge line to prevent reverse flow of sewage there-through, the various elements of said unit being located in said housing below the plane of said closure means.

4. A flood control unit comprising in combination: a

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housing having bottom and side walls and an inlet and an outlet disposed immediately adjacent to the upper periphery thereof for connection in a sewer conduit; a pair of upper compartments partially defined by said housing, said compartments being in communication with each other and with the inlet and outlet respectively; a check valve operatively intermediate said upper compartments and arranged to be securely closed by sewage entering one of said upper compartments from the outlet and to permit sewage flow from the inlet to said one upper compartment when no sewage is entering said one upper compartment from the outlet; the other of said upper compartments having an elongated horizontal opening in a side wall thereof defining a weir having an upper edge vertically spaced from the bottom of said other upper compartment; a lower sewage compartment defined by said housing and having a bottom disposed lower than said upper edge and communicating therewith for receiving any overflow sewage therefrom; said housing having a removable flat cover sealably closing the tops of each of said compartments; and a pump connected to transfer any overflow sewage from said lower compartment to said one upper compartment.

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