Sept. 20, 1938. H. S. GERKEN 2,130,346

APPARATUS FOR SEPARATING MATERIALS

Filed Sept. 26, 1935 3 Sheets-Sheet 1

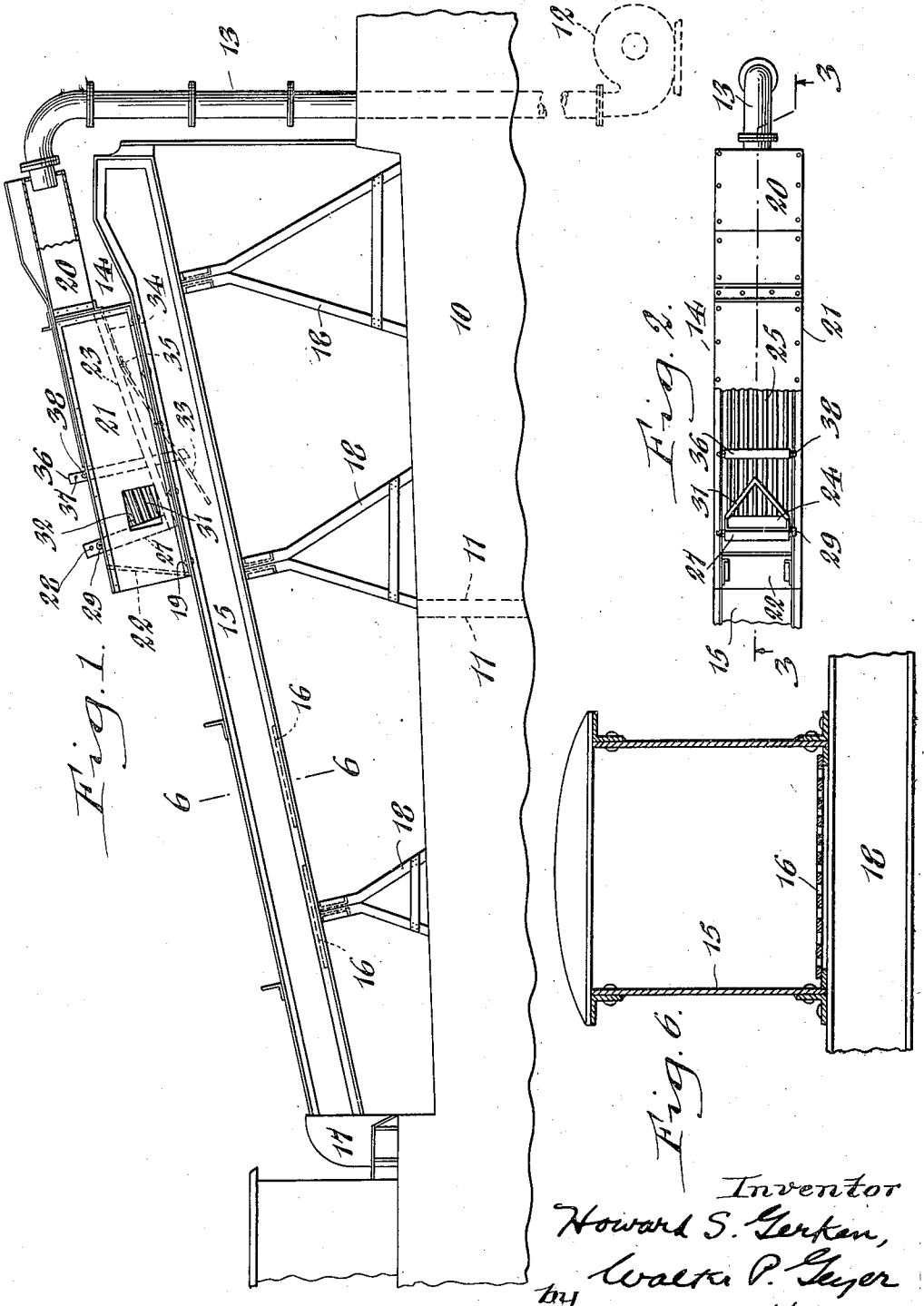


Fig. 1.

Fig. 2.

Fig. 6.

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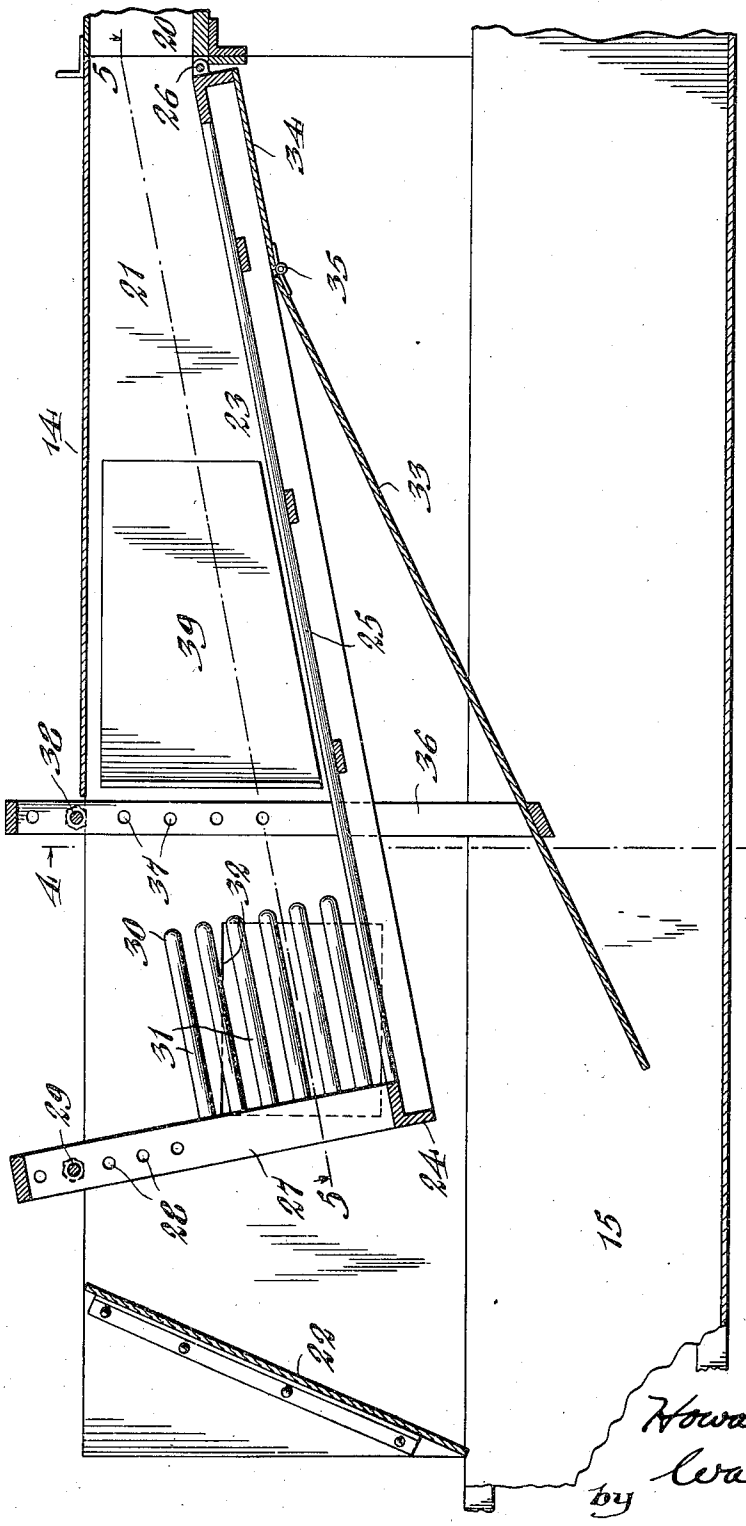


Fig. 3.

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Fig. 4

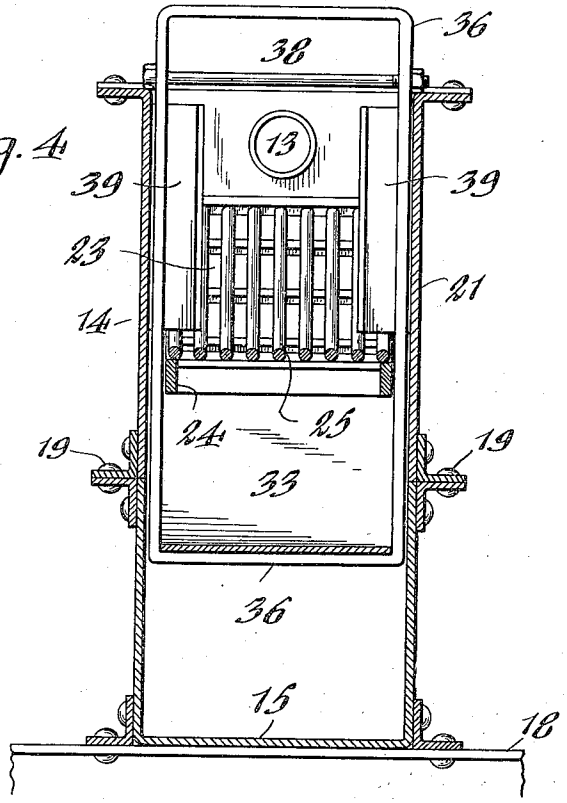
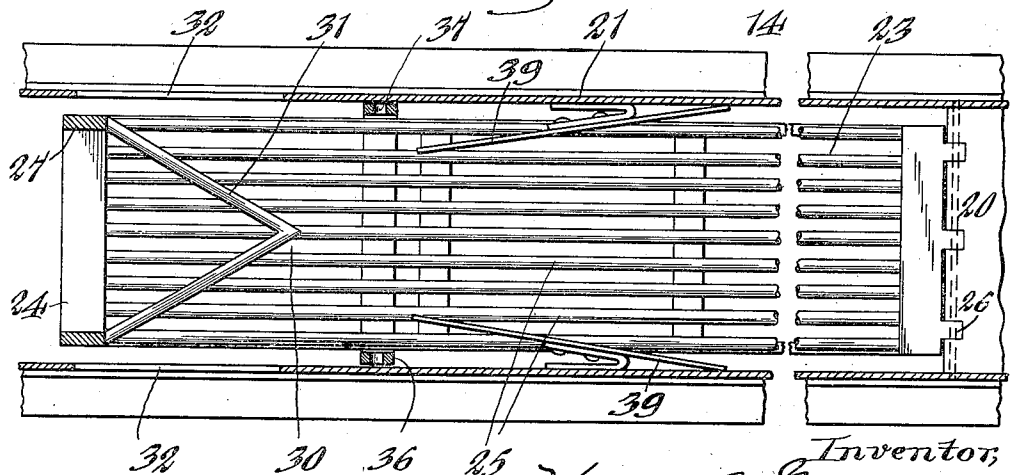


Fig. 5.



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UNITED STATES PATENT OFFICE

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APPARATUS FOR SEPARATING MATERIALS

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Application September 26, 1935, Serial No. 42,300

5 Claims. (Cl. 209—250)

This invention relates to certain new and useful improvements in apparatus for separating and sizing or grading materials, such as sand, gravel and the like, from waterways.

One of its objects is the provision of an efficient apparatus of this character which has been designed to utilize the water pumped with the material to effectually control and expeditiously separate sand, gravel and the like as it is pumped from the beds of lakes and rivers, and deliver the materials in a graded and clean condition to bins or receptacles provided for receiving them.

Another object of the invention is to provide a separating apparatus which is so designed and constructed as to first effect the separation of the desirable positive material-content such as the maximum size stone or gravel, from the fines or negative material, such as sand and smaller size stone and gravel, and thence discharge such maximum size material at the first stage of the operation practically free from water and foreign matter to a receiving bin.

A further object is the provision of a separating apparatus particularly adaptable for use on boats equipped to pump the materials to be separated from the bottoms or beds of waterways, which is simple, compact and durable in construction, and whose combination and arrangement of parts is such as to increase to a maximum the tonnage of material handled without increasing the capacity of the pumping mechanism and to effect the material separation without blinding or plugging of the apparatus and permit the desired material to be discharged into the bin or hold of the boat in a de-watered condition.

A still further object of the invention is the provision of adjustable means for controlling the flow of water through the apparatus to in turn govern the effective separation of the material.

Other features of the invention reside in the construction and arrangement of parts hereinafter described and particularly pointed out in the appended claims.

In the accompanying drawings:—

Figure 1 is a side elevation of my improved separating apparatus showing the same installed for operation on a boat. Figure 2 is a top plan view thereof. Figure 3 is an enlarged fragmentary longitudinal section thereof taken substantially in the plane of line 3—3, Figure 2. Figure 4 is a cross section taken on line 4—4, Figure 3. Figure 5 is a horizontal section taken substantially on line 5—5, Figure 3. Figure 6 is an enlarged cross section taken on line 6—6, Figure 1.

Similar characters of reference indicate corresponding parts throughout the several views.

In the preferred embodiment of the invention shown in the drawings, the same has been illustrated by way of example as installed on a boat 10 having bins or hatch-ways 11 therein and equipped with a pump 12 adapted to suck sand, gravel and water from the bed of a lake or other body of water, and deliver these materials under pressure through a pipe or passage 13 to my improved separating unit indicated generally by the numeral 14. This separating unit operates to intercept and remove, at the beginning of the separating operation, the maximum size of the material-content pumped from the lake-bed, such, for example, as the large size stone and gravel, and discharge it in a comparatively clean and de-watered condition into one of the bins of the boat, while the remaining smaller size material-content flows on undisturbed through the separating unit from which it is thence discharged for further separation and sizing through one or more similar units arranged in communicating series, or dumped back into the lake. During the flow of the water and the solid material-content through the separating unit, the latter is so designed as to properly and effectually control the velocity of the water to utilize its resultant power to release the intercepted material and carry it along through the separating unit to the point of discharge, the water and smaller size material flowing in a straight uninterrupted course while the desired separated material, such as gravel, ultimately takes a different course from the water and is discharged separately in a deflected course directly into the boat bin.

As shown, for example, in Figures 1 and 3, this separating unit may be disposed over and in communicating relation with an inclined flume or trough 15 which extends lengthwise of the boat over its bins 11 and receives from the separating unit 14 the water and ungraded or smaller sized material-content. If desired, this flume may be provided in its bottom over the companion bin 11 with a plurality of screen decks 16 which may be of any suitable and well known construction and which are shown by dotted lines in Figure 1 and by full lines in Figure 6. Any water or material not passing through these screen decks flows on through the flume and is discharged from the lower end thereof into a suitable hopper 17 and thence is conducted overboard. This flume may be supported over the boat bins by suitable frames 18.

A plurality of separating units 14 may be ar-

ranged in series to communicate one with another and thereby separate and grade the material-content as desired and discharge it into companion boat-bins. For the purposes of this application, however, only one separating unit has been depicted and is disposed over the upper end of the flume 15 in substantially parallel relation thereto and may be directly supported thereon and secured thereto by rivets 19 or like fasteners. In its preferred construction, this separating unit is in the form of a conduit or trough-like body, including an inlet-section 20 into which the water and solid material is discharged from the pipe 13 and a communicating separating sizing and discharge section 21 which is substantially box-like in form to provide a watercourse and is closed on all sides with the exception of a portion along its bottom which is left open to communicate directly with the flume 15 to discharge the water and smaller size material into the same. The front end of the separator-section 21 is preferably closed by a downwardly-inclined wall 22 which deflects and directs any surplus water and minus material-content into the flume.

Extending lengthwise through the separator-section 21 from its inlet end to a point preferably short of the end wall 22 and disposed somewhat below its top side, is an inclined screen deck or separating platform 23 preferably consisting of a substantially rectangular frame 24 and spaced longitudinal screen-bars or rods 25 through which the water and small size material are adapted to pass and over which the intercepted or large size material, such as stone and gravel, is conveyed and dumped into the boat-bin 11 immediately beneath the separating unit. This screen deck is so mounted as to be capable of adjustment to vary its inclination to suit different working conditions and materials operated upon, and for this purpose its upper or feed end is preferably hinged at 26, while its lower or front end is provided with a supporting yoke 27 having rows of holes 28 to receive a cross bar or bolt 29 which is adapted to rest upon the top edges of the separator-section 21 in the manner shown in Figure 3 and thereby support the screen deck in a set position of adjustment. Rising from its front end, this screen deck has a combined deflector and separating element 30 which is substantially plow-like or V-shaped in plan with its apex facing the inlet end of the separator-section 21, as seen in Figures 2, 3 and 5, and which is preferably composed of a series of vertically spaced screen-bars or rods 31 suitably anchored as a unitary structure with the screen deck 23. The spacing of these bars 31 is the same as that of the bars 25 of the screen deck 23 so as to intercept the maximum size material-content and at the same time permit the water and smaller size material to pass through the combined deflector and separating element and thence find its way into the flume 15. In its side walls the separator-section 21 has discharge ports or openings 32, these ports being preferably positioned transversely in line with the combined deflector and separating element 30, whereby the desired material impinges against the bars 31 and is deflected laterally and outwardly in a de-watered condition through these ports and thence drops by gravity into the boat-bin 11 disposed immediately beneath the separating unit. While this plow-like deflector effects the discharge of the gravel, it does not in any way interfere with the straight through course of the water through the separating unit.

Means are provided in the separating-section 21 of the separating unit for effectually controlling the flow of water therethrough and utilizing the velocity of flow of the water to augment the discharge of the desired material through the ports 32 and also to use the water to effect the release of any excess load on the screen deck 23 by lifting the gravel or other desired material from the screen deck and propelling it forwardly against the deflector 30. As shown in Figures 3 and 4 of the drawings, this water control means is preferably in the form of a vertically-adjustable chute, watercourse or platform 33 disposed beneath the screen deck 23 for adjustment toward and from the same, and including a fixed wall or section 34 secured to the underside of the rear or feed end of the deck-frame 24. This adjustable chute or watercourse is hinged at its rear edge at 35 to the adjoining ends of the fixed wall 34 and adjustment thereof is provided by a yoke 36 rising from said chute adjacent its front end and having rows of openings 37 therein to receive a cross bar or bolt 38 which is adapted to rest upon the top edges of the separator section 21 in the manner shown in Figures 3 and 4. It will also be noted from Figure 3 that the adjustable chute 33, together with the wall 34, constitutes a bottom wall for the separator section 21 and thereby controls the level as well as the velocity or speed of flow of the water in the separating unit, the lower end of the adjustable chute preferably extending somewhat into the adjoining portion of the flume 15 and directing the water and small size material-content into such flume. By adjusting the pitch or inclination of the water chute 33, the water may be controlled as desired depending upon the number of gallons of water pumped per minute by the pump 12.

Applied to the opposite inner sides of the separator-section 21 rearwardly of its discharge ports 32 are deflector walls or panels 39 which converge forwardly and direct the water and material-content in a substantially central, straight course through the separating unit and by their degree of convergence assist in controlling the velocity of flow of the water. Furthermore, these walls function to direct the water inwardly from the sides of the separator-section adjacent the ports 32 and reduce to a minimum the spilling of water therethrough and into the bin of the boat.

I claim as my invention:—

1. In an apparatus of the character described, the combination of a conduit through which water and solid material are adapted to flow, a screen deck arranged lengthwise of said conduit and having a member rising from one end thereof for intercepting the solid material and permitting the water to travel on through the conduit, the latter having a discharge port in its side located substantially above the screen deck for the discharge of the intercepted material, a wall disposed beneath the screen deck and adjustable relatively thereto toward and from the same to different inclinations to control the flow of water through said conduit, and means for adjustably supporting said wall in predetermined positions of inclination relative to the screen deck.

2. In an apparatus of the character described, the combination of a conduit through which water and solid material are adapted to flow, said conduit having an inlet at one end and a lateral discharge port adjacent its opposite end, means in

said conduit between its inlet and discharge port and including a substantially horizontal screen deck and a substantially upright screen deck for separating the larger size material-content from the water and smaller size material-content, the upright screen deck directing the larger material laterally through the discharge port, a flume disposed below said separating means for receiving the water and smaller size material-content introduced into the conduit, means extending generally lengthwise between said separating means and said flume and adjustable at different inclinations to the horizontal toward and from the separating means for controlling the flow of water through the conduit to carry the larger size material-content over and release it from the separating means, and means for adjusting the inclination of said water control means.

3. An apparatus for separating solid materials from water, comprising a trough-like body through which the water and materials are adapted to flow and having an inlet at one end and a discharge at its opposite end, upright screening means disposed obliquely of said body for intercepting the larger material and directing it through said discharge, a bottom wall for said body beneath said intercepting means and adjustable toward and from the same to different inclinations to the horizontal to control the flow of water and material through the trough-like body and said upright screening means, and means for adjustably supporting said wall in a given position of adjustment.

4. An apparatus for separating solid materials from water pumped under pressure, comprising a substantially box-like structure adapted for attachment to a flume and having an inlet at one end for the introduction of water and material and a lateral discharge adjacent its opposite end, screen means disposed lengthwise of said body below said inlet and said discharge for intercepting the larger material and provided at that end thereof adjoining the discharge with a screen-like deflector for directing the larger material through said discharge, said screen means having a pivotal connection at one end to vary its inclination to the horizontal, means for adjustably supporting said screen means in a given position of adjustment, a bottom wall in said box-like structure beneath said screen means and adjustable toward and from the same to different inclinations to the horizontal to control the flow of water and material through the same, and means for adjustably supporting said wall in a given position of adjustment.

5. In an apparatus of the character described, the combination of a conduit through which water and solid material are adapted to flow, a screen deck arranged lengthwise of said conduit and having a member rising from one end thereof for intercepting the solid material and permitting the water to travel on through the conduit, the latter having a discharge port in its side located substantially above the screen deck for the discharge of the intercepted material, a wall disposed beneath the screen deck and adjustable relatively thereto toward and from the same to different inclinations to control the flow of water through said conduit, means for adjustably supporting said wall in predetermined positions of inclination relative to the screen deck, and deflecting means applied to the opposite sides of said conduit in advance of said material-intercepting member and converging forwardly for directing the water and material in a substantially straight central course through the conduit.

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