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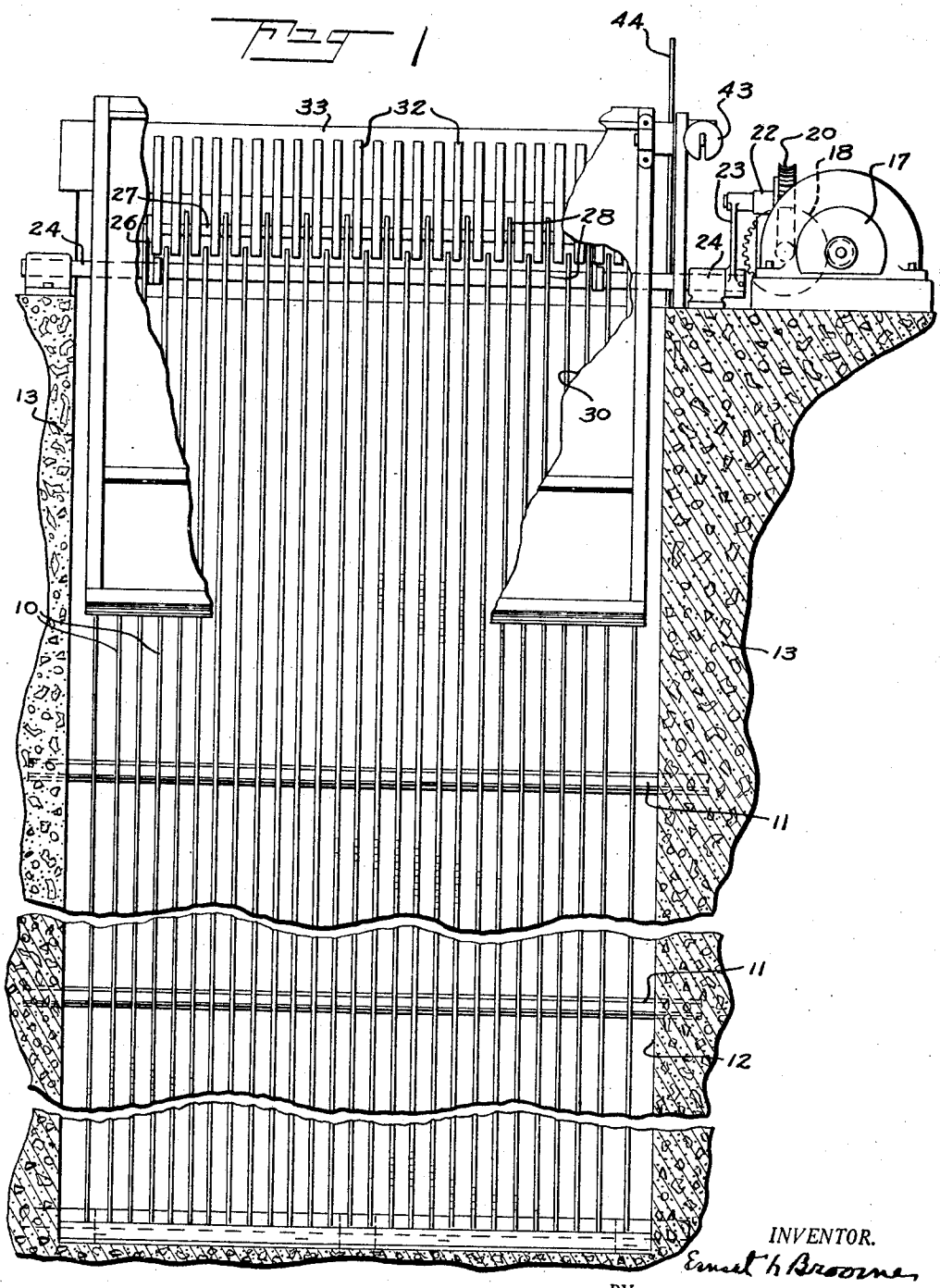
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E. L. BROOME

CLEARING DEVICE FOR WATER RACKS

Filed April 2, 1927 4 Sheets-Sheet 1

Fig 1



INVENTOR.
Ernest L. Broome

BY
Clarence O'Kerr
ATTORNEYS.

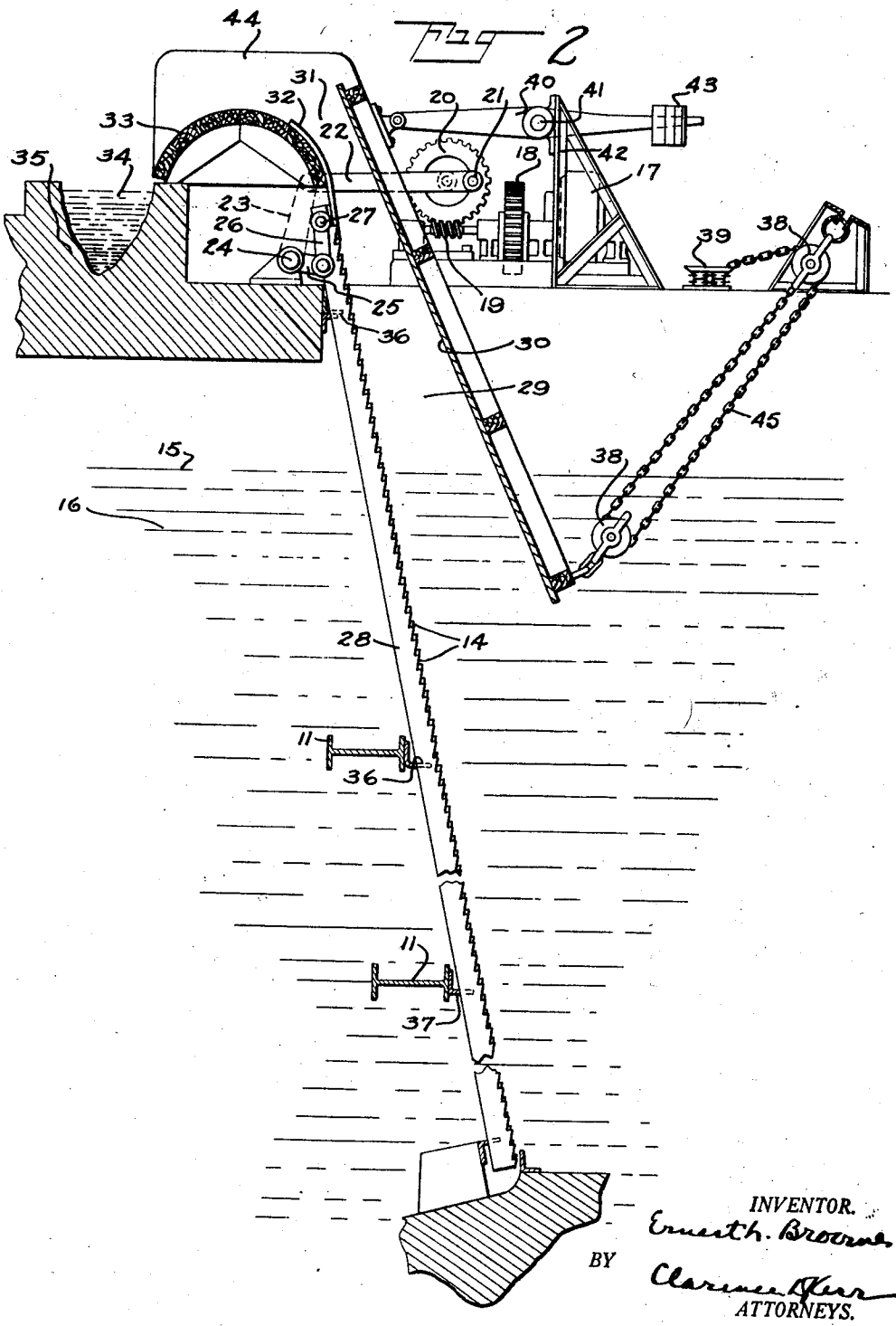
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E. L. BROOME

CLEARING DEVICE FOR WATER RACKS

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Fig 2



INVENTOR.
Ernest h. Broome
BY
Clarence A. Keer
ATTORNEYS.

Jan. 8, 1929. 1,698,387

E. L. BROOME

CLEARING DEVICE FOR WATER RACKS

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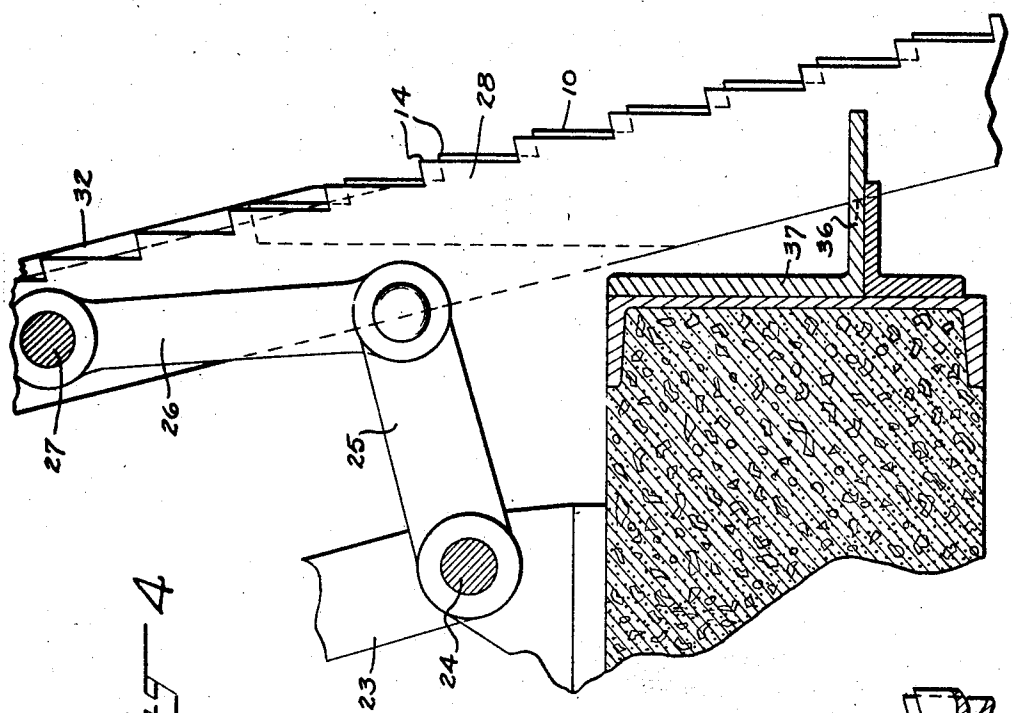


Fig. 4

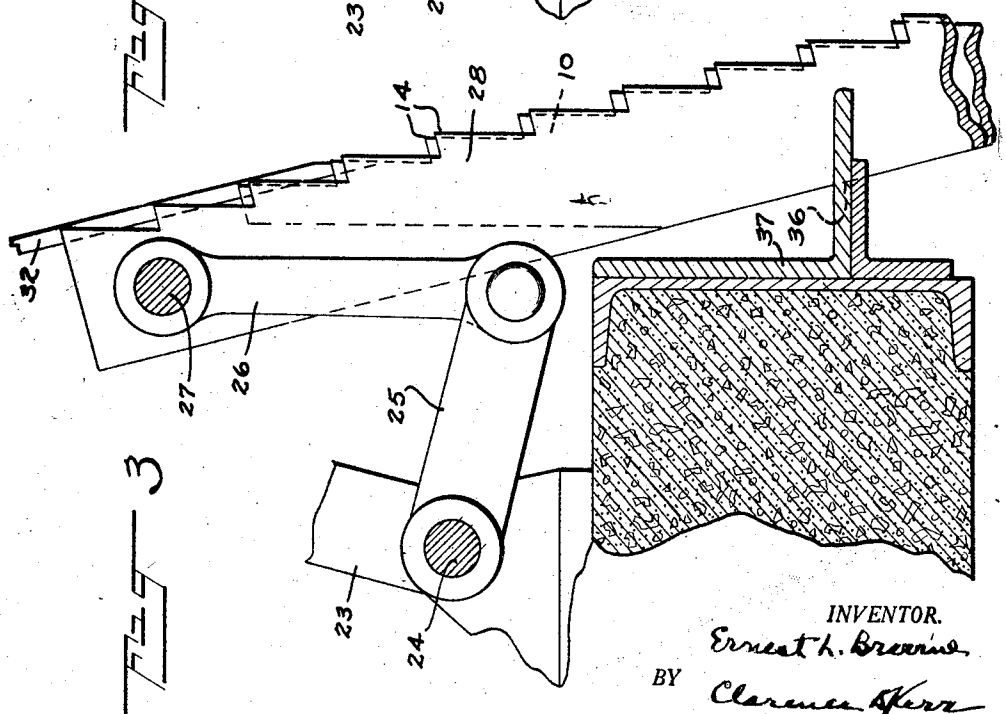


Fig. 3

INVENTOR.
Ernest L. Broome
BY Clarence O'Brien
ATTORNEYS.

Jan. 8, 1929. 1,698,387

E. L. BROOME

CLEARING DEVICE FOR WATER RACKS

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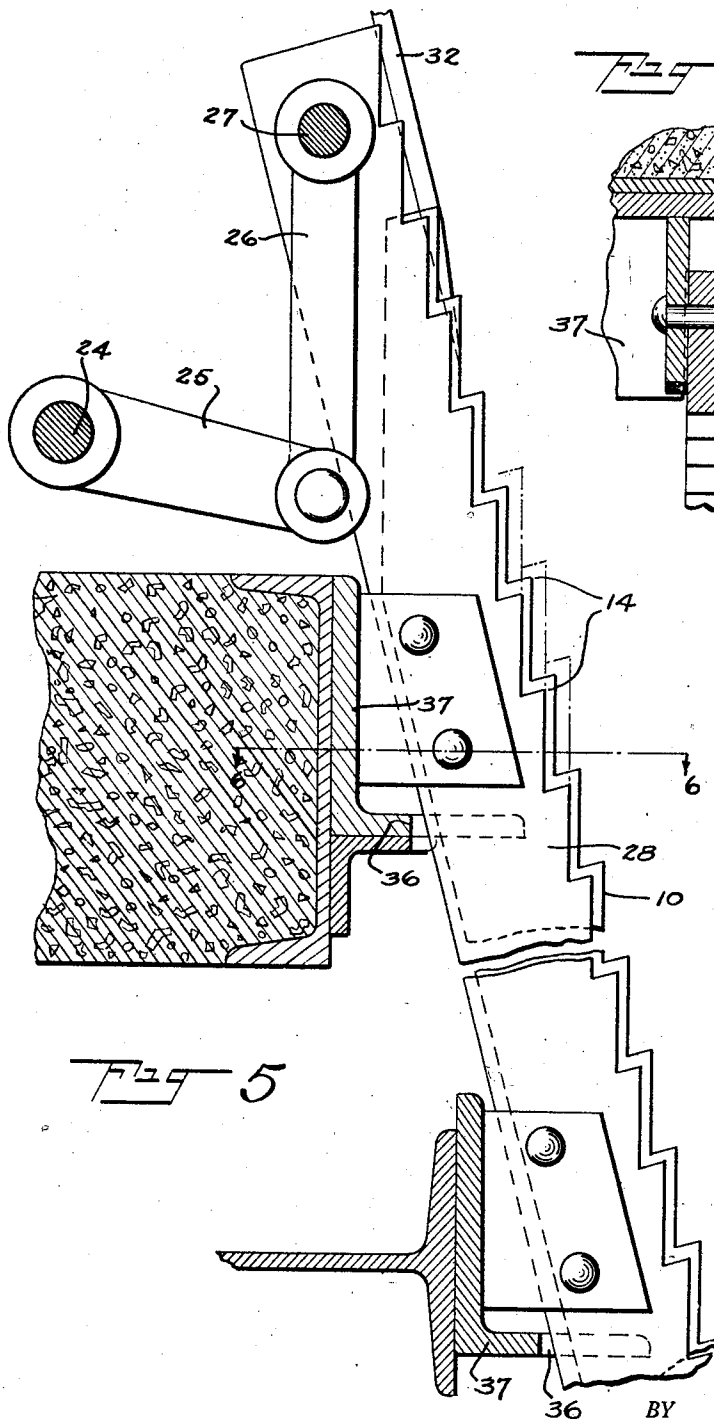


Fig 5

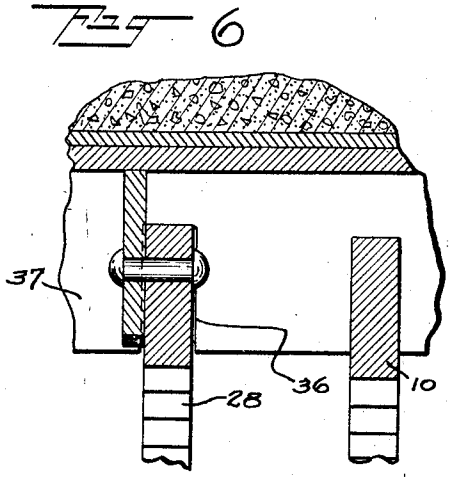


Fig 6

INVENTOR.
Ernest L. Broome
BY
Clarence O'Brien
ATTORNEYS.

Patented Jan. 8, 1929. 1,698,387

UNITED STATES PATENT OFFICE.

ERNEST L. BROOME, OF TARRYTOWN, NEW YORK.

CLEARING DEVICE FOR WATER RACKS.

Application filed April 2, 1927. Serial No. 180,404.

Fig. 1 is a view in front elevation of a device for preventing the accumulation of litter at the upstream side of a grate or rack placed at a water gate or in a sluiceway; Fig. 2 is a view in vertical section of the device shown in Fig. 1; Fig. 3 is a sectional view on an enlarged scale of a detail of the mechanism of the device shown in Fig. 2; Fig. 4 is a view similar to Fig. 3 showing the operating parts in another position; Fig. 5 is a view similar to Fig. 4 showing a modified form of the invention; Fig. 6 is a view in horizontal section taken on the line 6—6 of Fig. 5.

My invention relates generally to a trash removing device for use in connection with screens or gratings mounted across hydraulic gates or sluiceways. The accumulation of trash, carried by a water current against the upstream side of a screen or rack not only impedes the flow of water through the grating but it also produces a damming effect on the water and causes the building up of head or pressure which may seriously injure the rack or its supporting structure. It has heretofore been the practice to station men at the racks to remove the accumulating trash from the bars through the use of hand rakes having long handles. My invention has for an object the provision of power actuated means for removing or preventing the accumulation of trash or litter on the upstream side of a screen or rack placed across the supply opening through which water flows to a water wheel or the like. The invention comprises the use of toothed bars included in the grate or rack structure with power driven means for providing a vertically reciprocating motion of the toothed bars to produce an upward travel of the collected material and to cause it to be elevated and deposited over the upper extremity of the grating from where it may be carried away by a stream of water, or by other suitable means. A feature of the invention includes the use in alternation, singly or in groups, of stationary and movable bars, both the stationary and movable bars being provided on their upstream edges with projecting teeth, the relative movement of adjoining bars being particularly useful in preventing the adherence of ice to the rack. Other features of the invention will be hereinafter described and claimed.

Referring to the drawings for a more detailed description of the invention, a grating or rack made up of substantially vertically arranged bars 10 is shown. The bars 10 are supported on horizontally arranged supporting beams extending transversely across a water gate or opening 12 formed in the wall or body of a dam structure 13. Racks of this general character are universally used in connection with a supply of water from a running stream to water wheels or other devices through which the head or pressure of the water is converted into power for any purpose. The moving stream of water flowing through the gate carries with it trash and litter which, if left undisturbed, would in a relatively short period of time so clog and obstruct the flow of water through the grating as to greatly cut down the volume of flow. In addition, the weight of the accumulating litter tends to injure the grating and its supporting parts.

In order to prevent the accumulation of trash against the upstream side of the rack bars 10, the bars 10 or a portion of them are provided with projecting teeth 14. The toothed bars or a portion of the toothed bars are given a vertically reciprocating movement such that material deposited on and held in engagement with the toothed edges of the bars 10 is caused to travel upwardly until it has emerged above the level or surface 15 of the body of water 16. The material thus conveyed to the surface of the water is disposed of in any suitable manner. The clearing action, which is thus provided by the vertical reciprocation of certain of the rack bars 10, results, as will be seen, in the maintenance of a substantially cleared condition of the rack so that no accumulation of material thereon can be produced.

The means provided for producing a reciprocation of the rack bars 10 in a substantially vertical direction or along their longitudinal axes includes a motor 17 which, through a reducing gear connection 18 and a worm 19, drives a gear 20 which is provided with a crank pin 21 having an operating connection with a link 22 which is in turn connected to a crank arm 23 carried on a shaft 24. The shaft 24 carries a pair of crank arms 25 which, through link members 26, connect with a shaft 27 extending across the rack structure and in a journaled relation to the upper ends of such rack bars 28 as are to be reciprocated.

While for the sake of providing an illustration I have shown in Fig. 1 alternate rack

bars 28 connected to the shaft 27 for reciprocation therewith, I contemplate the connection of the operating shaft 27 to rack bars other than those arranged in alternation to the stationary bars 10. The reciprocating bars may be arranged in groups as well as singly and where the circumstances of the work require, all of the rack bars in the structure may be connected for operation by the actuating shaft 27. I may also so connect the reciprocating bars that certain of them move in one directon while others simultaneously move in an opposite direction.

By thus providing a vertically reciprocating movement of certain of the toothed rack bars 28, a progressive upward movement of trash or litter which engages the toothed upstream edges of the bars is produced so that the material is gradually moved to the surface of the water and into a tapering or constricting space or channel 29 formed between the edges of the rack bars 10—28 and the confronting surface of a compressing or compacting member 30 which acts to produce a compacted condition of the trash and litter which facilitates handling of the material as it emerges through the constricted outlet 31 at the upper end of the tapering channel 29.

In order to facilitate the complete removal of the accumulated litter as it travels through the constricting channel 29, fingers 32 are provided which are attached at their upper ends to a guard or directing member 33 and extend downwardly between the upper ends of the rack bars 10 and 28. The directing finger members 32 cause the litter emerging through the throat or constricted space 31 of the channel 29 to pass over the rounded upper surface of the guard member 33, the material eventually finding its way into a running stream of water 34 in a gutter or channel 35 along which the litter finds its way to a disposal station.

In the form of the invention shown in Figs. 1, 3 and 4, the path of movement of the movable bars 28 is along the longitudinal axes of the bars. This structural arrangement and mode of operation is adequate for the purpose and the upwardly moving teeth of the movable bars carry upwardly the engaged material which is then held by the teeth of the alternately arranged fixed bars so that, step by step, the engaged material is progressively elevated toward the point of disposal.

In Fig. 5 of the drawings, an alternative form of the invention is shown in which the movable rack bars 28 are moved vertically or at an angle to their longitudinal axes so that the teeth of the movable bars are moved outwardly beyond the plane of the adjacent teeth of the stationary bars. This movement results in a lifting of the engaged material outwardly from the stationary teeth and then upwardly to a higher position for engagement with a more elevated set of stationary bars. This structural arrangement and mode of operation is under some circumstances more effective than that produced by the structure shown in Figs. 2, 3 and 4. An example of a situation where this structure is employed to advantage is when the accumulating litter and trash includes relatively rigid objects, such as sections of logs or the like.

In the structures shown in Figs. 1, 2, 3 and 4 the movable bars are mounted in slits 36 provided in the horizontal flanges of a set of angle irons 37 attached to the upstream faces of the structural beams 11 already referred to. The slits 36 serve as guides for the rack bars 10 and 28 and prevent the buckling or sidewise movement of the bars from their normal positions.

The compacting of the material as it passes through the converging channel 29 is most effective when the collected material is of a flexible and elastic nature, as is usually the case. However, when the trash or litter contains material of a more rigid and bulky character, such as pieces of plank or logs, the compacting member 30 is so suspended as to yield under the pressure of the more bulky material and for this purpose is suspended at its lower end by means of a chain tackle structure passing over sheaves 38 and anchored to the tie-block 39. The upper end of the member 30 is attached at one end of an arm 40 pivotally supported at 41 on a standard 42. The other end of the arm 40 is provided with a weight member 43 by which any degree of resistance desired to the yielding of the member 30 under the pressure of the material passing through the channel 29 can be provided. It will be seen that the counterweight structure produces a desirable balance of the compacting member 30 which will permit bulky material, such as limbs, branches, or log sections to push the member 30 away from its normal position to permit the passage of the bulky material over the upper surface of the guard member 33.

If desired, a shield member, such as is shown at 44, may be provided to prevent material from falling over the upper end of the member 30 into the moving stream.

The terms and expressions, which I have employed, are used as terms of description and not of limitation, and I have no intention, in the use of such terms and expressions, of excluding any mechanical equivalents of the features shown and described, or portions thereof, but recognize that various structural modifications are possible within the scope of the invention claimed.

What I claim is:

1. In a device for preventing the accumu-

lation of trash on the upstream side of a grating through which a stream of water flows, substantially vertically extending bars associated with the grating and provided with projecting teeth on their upstream edges, means for holding trash against the bars, and means for reciprocating the bars substantially along their longitudinal axes to thereby elevate the trash out of obstructing relation to the grating.

2. In a device for preventing the accumulation of litter on the upstream side of a grating through which a stream of water flows, said grating being formed of substantially vertically extending bars provided with projecting teeth on their upstream edges, means with which said bars cooperate to lift accumulated litter, and means for reciprocating certain of said bars substantially along their longitudinal axes to thereby elevate the litter out of obstructing relation to the grating.

3. In a device for preventing the accumulation of litter on the upstream side of a rack through which a stream of water flows, said rack being formed of substantially vertically extending bars provided with projecting teeth on their upstream edges, means for holding litter against said bars, and means for reciprocating alternate bars in said rack substantially along their longitudinal axes to thereby carry litter upwardly out of obstructing relation to the rack.

4. In a device for preventing the accumulation of litter against a grating through which a stream of water flows, said grating including substantially vertically disposed bars having projecting teeth on their upstream edges, means for vertically reciprocating certain of said bars to thereby move the litter upwardly out of obstructing relation to the grating, and a directing member including guiding fingers inserted between the upper ends of the bars to direct accumulated material to a place of disposal.

5. In a device for preventing the accumulation of litter against a grating through which a stream of water flows, said grating including substantially vertically disposed bars having projecting teeth on their upstream edges, means for vertically reciprocating certain of said bars to thereby move the litter upwardly out of obstructing relation to the grating, and a yieldingly supported pressure member mounted in such relation to the upper end of the bars as to provide a converging channel through which the material passes to thereby provide a compacted condition thereof.

6. In a device for preventing the accumulation of litter against a grating through which a stream of water flows, said grating including substantially vertically disposed bars having projecting teeth on their upstream edges, means for vertically reciprocating certain of said bars to thereby move the litter upwardly out of obstructing relation to the grating, and a compressing member pivotally mounted at its upper end and flexibly suspended at its lower end in a position to provide a converging channel adjacent the upper ends of the bars through which the material passes to thereby provide a compacted relation thereof.

7. In a device for preventing the accumulation of litter on the upstream side of a grating through which a stream of water flows, said grating being formed of substantially vertically extending bars provided with projecting teeth on their upstream edges, means for reciprocating certain of the bars substantially along their longitudinal axes thereby to elevate litter lodging thereagainst, means at the upper end of the grating for compressing the litter as it is received, and means for conveying the compressed litter to a disposal station.

8. In a device for preventing accumulation of trash against a grating through which a stream of water flows, the combination of a plurality of toothed bars, means for guiding said toothed bars to permit longitudinal reciprocating movement thereof comprising a number of supports distributed along the length of said bars, and means for imparting a straight line reciprocating movement to said bars.

ERNEST L. BROOME.