Jan. 11, 1938. H. A. STELLEY 2,105,101

APPARATUS FOR WASHING AND GRADING SAND AND LIKE MATERIALS

Filed May 15, 1937 2 Sheets-Sheet 1

Fig. 1.

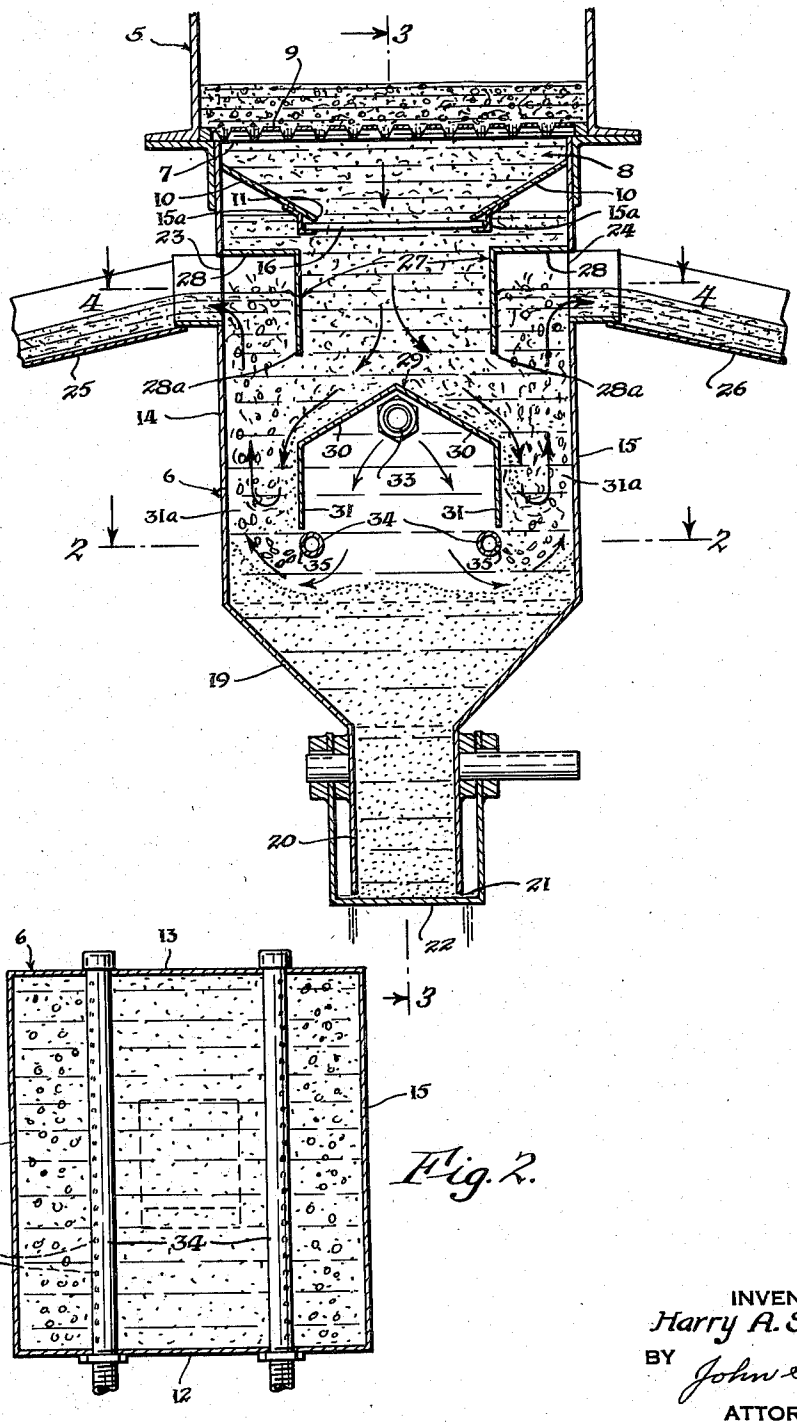


Fig. 2.

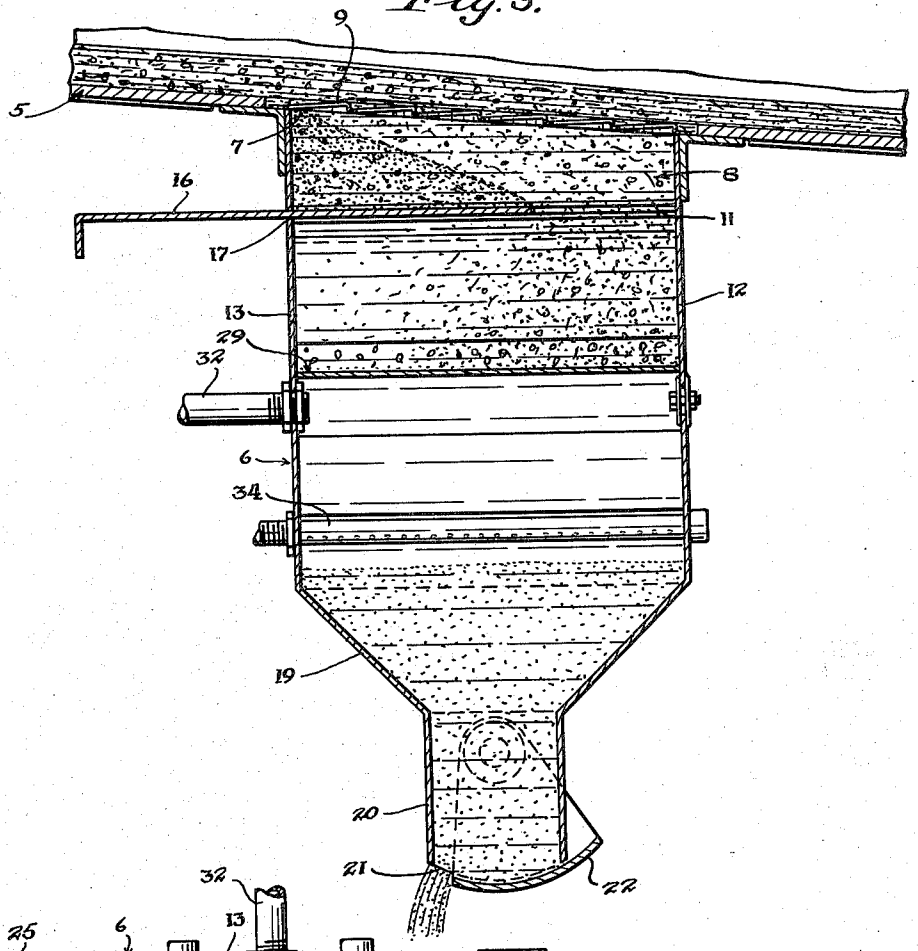
INVENTOR
Harry A. Stelley
BY John S. Powers
ATTORNEY

Jan. 11, 1938. H. A. STELLEY 2,105,101

APPARATUS FOR WASHING AND GRADING SAND AND LIKE MATERIALS

Filed May 15, 1937 2 Sheets-Sheet 2

Fig. 3.



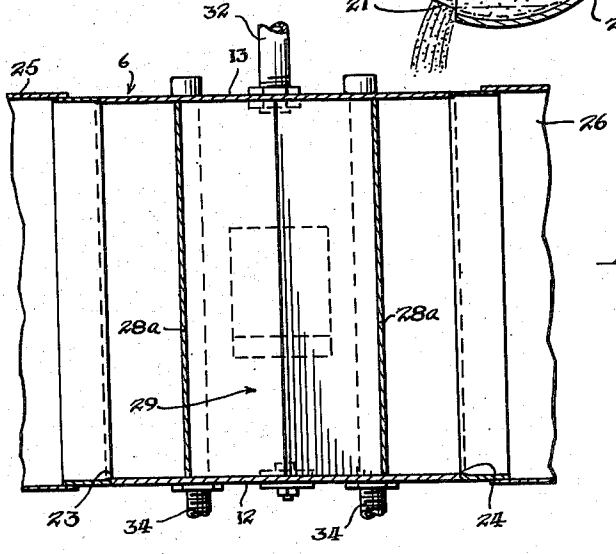


Fig. 4.

INVENTOR
Harry A. Stelley
BY John S. Powers
ATTORNEY

Patented Jan. 11, 1938 2,105,101

UNITED STATES PATENT OFFICE

2,105,101

APPARATUS FOR WASHING AND GRADING SAND AND LIKE MATERIALS

Harry A. Stelley, Buffalo, N. Y.

Application May 15, 1937, Serial No. 142,834

3 Claims. (Cl. 209—158)

This invention relates to apparatus for washing and grading sand and like materials and although not necessarily limited to such use is characterized by features which adapt it particularly for association with the equipment of hydraulic dredges, whereby to enable washing and grading of the sand as an incident to the operation in which it is obtained from the bed of a river or other body of water.

One object of the invention is to provide apparatus which is so designed that thorough washing and accurate grading of the sand are insured.

A further object is to provide apparatus which is available for use in connection with conventional hydraulic dredging equipment.

A still further object is a novel design and arrangement of the parts of the apparatus, whereby simplicity and economy in construction are obtained.

The invention is illustrated in the accompanying drawings in which:

Figure 1 is a vertical section through apparatus in which the features of the invention are incorporated.

Figure 2 is a horizontal section taken along line 2—2 of Figure 1.

Figure 3 is a vertical section taken along line 3—3 of Figure 1.

Figure 4 is a horizontal section taken along line 4—4 of Figure 1.

The apparatus is described, by way of example, in connection with conventional hydraulic dredging equipment, the latter being sufficiently illustrated by a showing of the flume 5 down which the sand to be washed and graded is carried in a stream of water. A box 6 embodying the features of the invention is arranged beneath an opening 7 which is formed in the bottom of the flume 5, the said opening communicating with a hopper 8 which is provided in the top of the said box. A screen 9 is preferably arranged across the opening 7 so that gravel and other oversize materials will be prevented from entering the hopper.

The box 6, as illustrated, is rectangular in cross-section and is of substantially the same width as the flume 5. The bottom of the hopper 8 is provided by inclined plates 10 which extend between the end walls 12 and 13 of the box, the said plates defining an opening 11 which extends lengthwise of the flume and which is located substantially midway between the side walls 14 and 15 of the box. The lower marginal edges of the plates 10 carry angle members 15*a* which provide guideways for a gate 16 which is adjustable across the outlet 11, one end of the said gate extending through an opening 17 (Figure 3) which is formed in the end wall 13 of the box. The lower ends 19 of the side and end walls of the box converge toward an extension 20. The latter provides an outlet 21 and carries a valve 22 which is adjustable across the said outlet.

Overflow openings 23 and 24 (Figure 1) are formed in the side walls 14 and 15 of the box just below the hopper. The said openings extend the full width of the said side walls and communicate with downwardly inclined troughs 25 and 26, respectively. Angular baffles 27 are arranged between the end walls 12 and 13. The said baffles are formed with horizontal sections 28 which fit against the side walls 14 and 15 along the upper marginal edges of the openings 23 and 24 and with vertical sections 28*a* which are spaced from the said side walls and which extend below the lower marginal edges of the said openings. A deflector 29 is arranged below and between the baffles 27. It is mounted between the end walls 12 and 13 of the box and includes oppositely inclined top walls 30 and depending vertical sides 31 which are spaced from the walls 14 and 15 substantially the same distance as the vertical sections of the baffles 27 thereby to provide passages 31*a*. The ridge provided by the top walls of the deflector extends lengthwise of the flume 5 and is located substantially midway between the side walls 14 and 15 of the box and hence, although in a lower plane, substantially midway between the longitudinally extending edges of the hopper outlet. A water supply pipe 32 communicates with the interior of the box 6, the outlet 33 of the said pipe being located beneath the ridge of the deflector 29. Air supply pipes 34 are arranged alongside the lower edges of the sides 31 of the said deflector. The said pipes are mounted between the end walls 12 and 13 of the box and each is formed with a series of perforations 35 through which air is directed outwardly so that it will rise in the passages 31*a* to escape through the overflow openings 23 and 24.

The sand to be washed and graded is introduced into the flume 5 with the proper amount of water. A predetermined amount of the sand and water (which amount depends upon the position of the gate 16) passes through the screen 9 and enters the hopper 8, the gravel or other oversize materials passing over the screen and continuing toward its lower end. As the water and sand flow through the outlet 11 of the hopper they are divided by the ridge of the deflector 29 into two streams, one of which enters each of the

passages 31a. The two streams thus provided encounter the clean water which is flowing upwardly through the said passages and are turned and guided by the latter to the overflow openings 23 and 24. The upwardly flowing streams of water carry the silt, fine sand and similar materials and are discharged with them into the troughs 25 and 26. The sand which is to be recovered, on the other hand, settles to the bottom of the box, being thoroughly washed as it descends by the rising streams of clean water. In order to more thoroughly agitate the water and suspended materials in the passages 31a compressed air may be introduced into the box through the pipes 34. The air bubbles thus provided rise rapidly to the surface and hence accelerate the upward movement of the silt and fine sand. Separation of these and similar materials from the sand to be recovered is thus facilitated.

In the use of the apparatus the sand which is recovered may be permitted to accumulate in the box until the water which discharges into the chutes 25 and 26 begins to carry sand of the grade which is to be recovered. The valve 22 is then opened to permit the charge to be released and then closed until a succeeding charge accumulates. Preferably, however, the sand which is washed and graded is permitted to discharge continuously from the box at a rate substantially equal to that at which it accumulates. When the apparatus is employed in this manner the sand is first permitted to accumulate in the box in substantially the amount indicated in Figure 1. The bed thus provided seals the outlet 21 to prevent discharge of the water through it. The valve 22 is then adjusted to a position which will permit the sand to discharge at a rate which will maintain the bed of sand at substantially the level shown.

From the foregoing it will be apparent that the gate 16 is adjustable to control the volume of water, and hence the amount of sand, which is permitted to pass through the hopper 8. The rate of flow of the water through the passages 31a determines in a large measure the grade of the sand which is recovered. As such rate may be regulated either by adjustment of the gate 16 or by varying the amount of clean water introduced into the box, or both, recovery of the desired grade of sand is insured.

It will be noted that the division into two streams of the water and sand which discharges from the hopper 8 is insured throughout the entire range of adjustment of the gate 16 owing to the location of the ridge of the deflector longitudinally of and substantially midway between those edges of the plates 10 which define the outlet 11, one of the said streams being subjected to the action of the clean water which flows upwardly from under one of the sides of the deflector while the other stream is subjected to the action of the clean water which flows upwardly from under the other of the sides of the said deflector. The two upwardly flowing streams thus provided move at substantially the same rate. Thus not only is the sand to be recovered dispersed so as to be subjected to a thorough cleansing action by the clean water but separation of the silt and fine sand is effected in such a manner that the material recovered is of a uniform grade.

Although the apparatus is described as being characterized by features which adapt it particularly for association with hydraulic dredging equipment it is to be understood that the invention is not limited to such use but is also available for the washing and grading of sand and like material on land.

I claim as my invention:

1. Apparatus for washing and grading materials of the character of sand including a box having side and end walls which terminate at their bottoms to provide a discharge outlet, a hopper in the top of said box, a flume along which said materials are conducted in a stream of water, said flume having an opening in its bottom wall through which portions of said water and materials pass to enter said hopper, said hopper having an outlet which is located substantially midway between said side walls, a gate which is adjustable in the direction of said end walls across said last named outlet to regulate the amount of material which is permitted to pass through said hopper, a deflector arranged under said hopper and being of a length such that its ends abut the end walls of said box, said deflector having oppositely sloping top walls and depending sides which are spaced from the side walls of said box to provide passages, the ridge provided by the top walls of said deflector extending in the same direction and being located below and substantially midway between the longitudinally extending edges of said hopper outlet, whereby to divide the water and entrained materials into two substantially equal streams, one of which is directed into each of said passages, overflow openings formed in the side walls of said box above said deflector, angular baffles which fit against the side walls of said box above said overflow openings, said baffles having depending sections which are spaced from said side walls and which extend below said openings and means for introducing water into said box in such a manner that it is caused to flow upwardly through said passages to said outlet openings, the rate of flow of said water through said passages being regulated so that foreign materials are carried out through said openings while the materials to be recovered settle to the bottom of said box over said discharge outlet.

2. Apparatus for washing and grading materials of the character of sand including a box, a flume along which said materials are conducted in a stream of water, said flume having an opening in its bottom wall through which portions of said water and materials pass to enter said box, said box having side and end walls which terminate at their bottoms to provide a discharge outlet, a deflector arranged between the end walls of said box, said deflector having oppositely sloping top walls and depending sides which are spaced from the side walls of said box to provide passages, the ridge provided by the top walls of said deflector extending lengthwise of said flume and substantially midway between the longitudinally extending edges of said opening, whereby to divide the water and entrained materials into two substantially equal streams, one of which is directed into each of said passages, overflow openings formed in said side walls and means for introducing water into said box in such a manner that it is caused to flow upwardly through said passages to said overflow openings, the rate of flow of said water through said passages being regulated so that the foreign materials are carried out through said openings while the materials to be recovered settle to the bottom of said box over said discharge outlet.

3. Apparatus for washing and grading mate-

rials of the character of sand including a box having side and end walls which terminate at their bottoms to provide a discharge outlet, a hopper in the upper part of said box, a flume along which said materials are conducted in a stream of water, said flume having an opening in its bottom wall through which portions of said water and materials pass to enter said hopper, screening means in the bottom of said flume for directing oversize materials across said opening, said hopper having an outlet, a gate for said outlet which is adjustable in the direction of the end walls of said box to regulate the amount of material which is permitted to pass through said hopper, a deflector arranged under said hopper, said deflector having oppositely sloping top walls and sides which are spaced from the side walls of said box to provide passages, the ridge provided by the top walls of said deflector extending lengthwise of said flume and being located below and substantially midway between the longitudinally extending edges of said hopper outlet, whereby to divide the water and entrained materials into two substantially equal streams, one of which is directed into each of said passages, overflow openings formed in the side walls of said box and means for introducing water into said box in such a manner as to cause it to flow upwardly through said passages to said overflow openings, the rate of flow of said water through said passages being regulated so that the foreign materials are carried out through said openings while the materials which are to be recovered settle to the bottom of said box over said discharge outlet.

HARRY A. STELLEY.