H. S. DOWNERD.

WASHING SYSTEM.

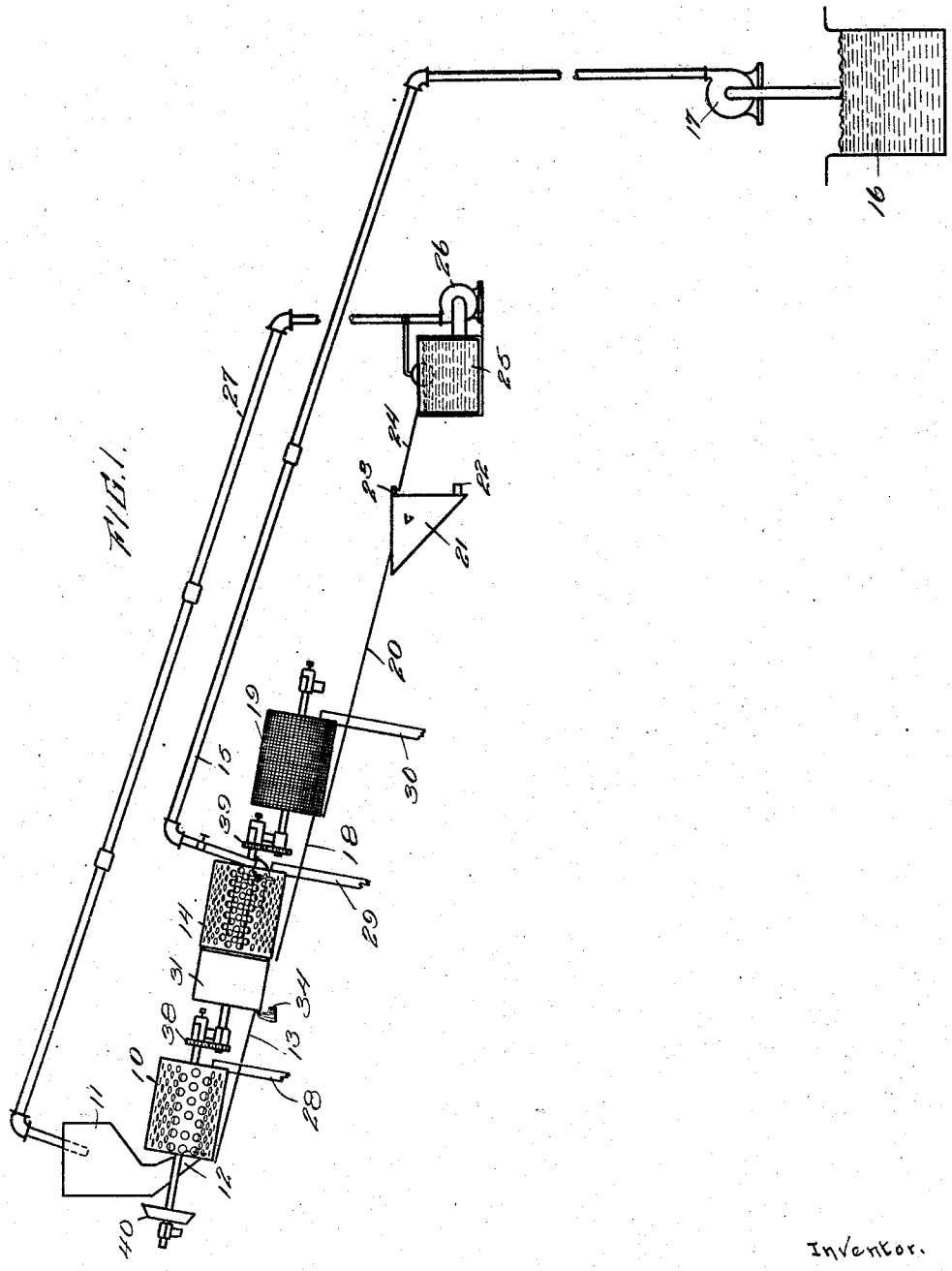
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1,183,805.

Patented May 16, 1916.

2 SHEETS—SHEET 1.

FIG. 1.



Witnesses

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2 SHEETS—SHEET 2.

FIG. 2.

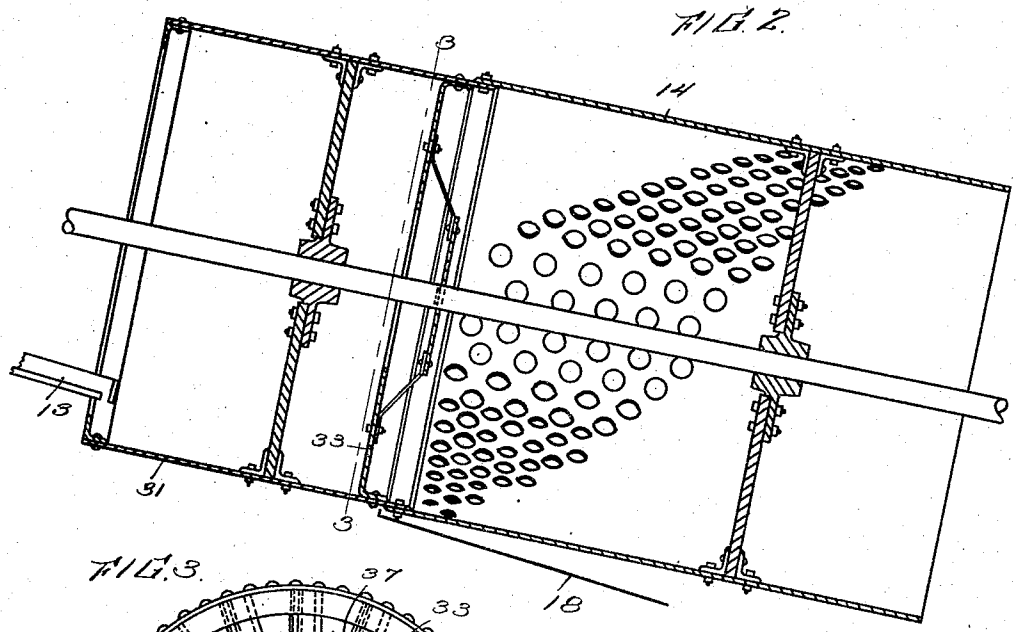


FIG. 3.

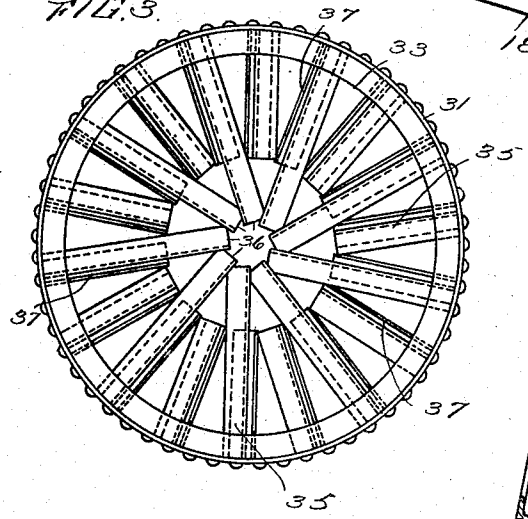


FIG. 4.

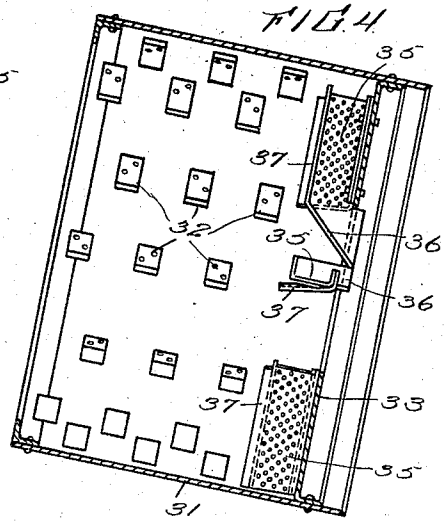


FIG. 5.

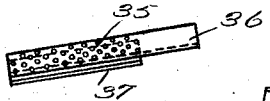
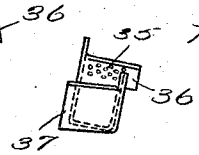


FIG. 6.



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WASHING SYSTEM.

1,183,805. Specification of Letters Patent. Patented May 16, 1916.

Application filed February 4, 1915. Serial No. 6,196.

To all whom it may concern:

Be it known that I, HIRAM S. DOWNERD, a citizen of the United States, residing at Richmond, in the county of Wayne and State of Indiana, have invented certain new and useful Improvements in Washing Systems; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to washing systems, and especially systems intended for washing sand, gravel, or the like, although it is to be understood that the utility of this system is not confined to washing such materials.

An object of the present invention is the conservation of the water employed in washing the materials thereby insuring economy in power for pumping the requisite wash water. This object is carried out in my system which comprises a set of washers arranged in series, the last of the series delivering to a settling tank, a reservoir into which escapes the used water overflowing from said tank, means for conveying this water back to the first washer of the series where the material is dirtiest, means for supplying clean water to the second washer of the series, and a de-watering device between the first and second washers by which the soiled water used in the first washing is drained out of the material as it passes to the second washer in which it is treated with clean water.

The invention also contemplates the use of screens of successively smaller mesh in the respective washers of the series, and spouts at the outlet ends of these screens whereby the stones and gravel in successively decreasing sizes may be graded out of the material, leaving the screenings to pass along through the series.

In carrying out these general ideas the invention consists in certain constructions, combinations and arrangements of parts as will be hereinafter more fully described and claimed.

In the drawings:—Figure 1 is a view in side elevation somewhat diagrammatic of a system embodying the present invention. Fig. 2 is a longitudinal sectional view through an intermediate washer, omitting the lifters and agitators. Fig. 3 is a sectional view taken on line 3—3 of Fig. 2. Fig. 4 is a sectional view showing the de-watering element of the washer, herein called the "drain." Fig. 5 is a view of one of the de-watering lifts shown in edge elevation. Fig. 6 is a view of one of the de-watering lifts shown in end elevation.

Like characters of reference designate corresponding parts throughout the several views.

The improved washing system which forms the subject-matter of this application comprises a series of washers shown at Fig. 1 as three in number, although it is to be understood that the number is wholly immaterial to the present invention.

At 10 is shown the initial washer, here shown as a rotary screen with a hopper 11 into which the material to be washed is introduced and from which it is discharged into the initial washer 10 through the spout 12. Under the washer 10 a deck 13 is constructed in position to receive material screened out and discharged through the perforations of the washer 10, and to discharge such material or coarse "screenings" into the upper end of the second washer 14. In the washer 14 the material is subjected to washing by fresh and clean water supplied through the pipe 15 from any convenient source of supply, shown diagrammatically at 16, any means of raising such water being employed as the pump shown conventionally at 17. The water supplied through the pipe 15 and such material as is of small enough size to constitute fine screenings, pass through the perforations of the washer 14 are discharged upon the deck 18 and pass thence into a third washer 19. The water and such material as is fine enough (probably sand) to pass through the mesh of the washer 19 are discharged upon a deck 20 and into a settling tank 21, where the material is discharged through a spout 22, and the water rising to the top overflows through a spout 23 upon a deck 24 and into a reservoir 25, from which reservoir it is raised by any convenient or desirable form of pump as shown conventionally at 26, through the pipe 27 and is carried into the hopper 11 to enter the initial washer 10 with the material in its unwashed condition. It will be apparent, therefore, that the fresh or clean water introduced into the second washer removes from such material only the dirt remaining after the initial washing, and that the water so employed in the initial wash-

ing is raised and passed through the first washer in a somewhat dirty condition to remove from the fresh material the greater bulk of the dirt adhering thereto or conducted therewith. Incidentally spouts 28, 29 and 30 are positioned to receive the material which is graded out and passed over from the screens of the washers 10, 14 and 19 respectively.

It is desirable that the dirty water from the initial washing do not enter the second washer, and that as much of such water as is possible be removed from the material before it is subjected to the clean water in the second washer. To accomplish this, the second washer 14 is provided with a de-watering section or drain 31 into which the screened material from the initial washer 10 is first discharged, and from such de-watering section is next discharged into the washer 14. This drain is simply a cylinder preferably substantially a continuation of the cylindrical screen 14 and rotating therewith, provided with a plurality of agitators 32, shown particularly at Fig. 4. The screenings discharged from the washer 10 together with the water discharged through the screen of such washer are introduced into this drain and are subjected to agitation by the agitators 32 which preferably are composed simply of angle-irons one side of each of which is riveted to the shell of the cylinder. Between the cylinder and the washer 14 an annular head or dam 33 is erected, the annulus being of such width that the water contained within the dam flows over the upper edge of the inclined cylinder and is discharged through the spout 34 without flowing over the inner edge of the annulus.

To lift the material in the de-watering section and transfer it to the washing section of this intermediate washer, a plurality of lifters or buckets are secured to the annulus 33, the same comprising shelf-like radial wings of perforate formation as shown more particularly at 35 having at their inner ends forwardly inclined chutes 36 which permit the material to slide off as it is lifted and to pass through the annulus as shown more particularly at Fig. 4. Beneath each wing is a radial plate 37 inclined rearwardly to catch the water dripping through the perforations of the shelf-like wing and carry it backwardly into the de-watering section. It will therefore be apparent that the water passing through the washing member 10 together with the screened material passing through its perforations is conducted into the de-watering section where it is agitated by the agitators 32 to remove any dirt still adhering to the particles or pieces of the material, and that the water carrying such impurities is removed or drained from such material by the de-watering device, and discharged to waste through the pipe 34. Only the partially cleansed material therefore is discharged into the washing section of the second washer 14 and subjected to the fresh water supplied thereto, which, after acting upon the material in all the subsequent washers, is reconveyed to the initial washer to begin the cleansing process therein.

The several washers are mounted upon shafts as shown, and driven in any approved manner, preferably (though not necessarily) by means of gears 38 and 39 introduced between the several washing elements and by a gear 40 located at any convenient point to which the initial power is applied.

I claim:—

1. In a washing system, a series of washers, means to pass material to be washed successively through the members of the series, means to introduce fresh washing water to a member following the first in the series, means to convey the water employed in said member to and use it in subsequent members of the series, and means finally to pass it back to and use it in the initial washer.

2. In a washing system, a series of washers, means to pass material through the series, a reservoir, means to conduct water from the reservoir to the initial washer, means to drain the water from the material passing to the second washer, means to conduct water from a source of fresh supply to said second washer, and means to conduct the water from the last washer of the series to the reservoir.

3. In a washing system, a series of washers, a source of water supply, means to conduct water from the source of supply to the initial washer and introduce it therein along with the material to be washed, means to conduct the material to the second washer and to simultaneously drain out and discharge the water to waste; a second source of water supply, means to conduct the water from the second source of supply to the second washer, and means to conduct it from said second washer to the first-mentioned water source.

4. In a washing system, the combination with a number of washers arranged in series and delivering washed material from one to the next, a settling tank into which the last washer delivers, a reservoir into which the soiled water from the last washer and tank flows, means for conveying this water to and using it in the first washer, and means for feeding the soiled material initially into this washer; of means for feeding clean water to and using it in the second washer, and a drain carried by the inlet end of this washer and receiving the material and water from the first, said drain having means for removing the soiled water from

the material and passing the material into the second washer where it is subjected to clean water.

5. In a washing system, the combination with a number of washers arranged in series and delivering washed material from one to the next, a reservoir into which the soiled water from the last washer flows, means for conveying this water to and using it in the first washer, and means for feeding the soiled material initially into this washer; of means for feeding clean water to and using it in the second washer, and a drain between the inlet end of this washer and the outlet end of the first, said drain comprising a cylinder rotating on an inclined axis and having an annular dam at its lower end rising to a higher level than the upper end of the cylinder so as to eject the soiled water, and lifters within the cylinder for raising the drained material and passing it over the dam into the second washer.

6. In a washing system, the combination with two washers including rotary screens, means for feeding water to them, and means for handling the screenings and the material graded out; of a drain interposed between the washers and comprising a cylinder co-axial with the screen of the second washer and receiving the screenings from the first, an annular dam within said cylinder causing the water from the first washer to be drained off, and lifters within said cylinder for carrying the material over the dam into the second washer.

7. In a washing system, the combination with two washers including rotary screens, means for feeding water to them, and means for handling the screenings and the material graded out; of a drain interposed between the washers and comprising a cylinder co-axial with the screen of the second washer and receiving the screenings from the first, an annular dam within said cylinder causing the water from the first washer to be drained off, radial perforated wings on the inner side of said dam having means for delivering the material over it into the second washer, and radial plates beneath the wings inclined away from the dam for turning back the water dripping through said perforations.

8. In a washing system, the combination with two washers including rotary screens, means for feeding water to them, and means for handling the screenings and the material graded out; of a drain interposed between the washers and comprising a cylinder co-axial with the screen of the second washer and receiving the screenings from the first, an annular dam within said cylinder causing the water from the first washer to be drained off, agitators within the wall of said cylinder, radial shelf-like wings of perforate formation carried inside the dam and having chutes at their inner ends for conveying the material into the second washer, and radial imperforate plates beneath the wings inclined in a direction opposite to said chutes for turning back the water dripping through said perforations.

In testimony whereof I affix my signature in presence of two witnesses.

HIRAM S. DOWNERD.

Witnesses:
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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."