April 9, 1935. W. H. ALLSWEDE 1,997,030

APPARATUS FOR SCRUBBING AND TREATING GRAVEL

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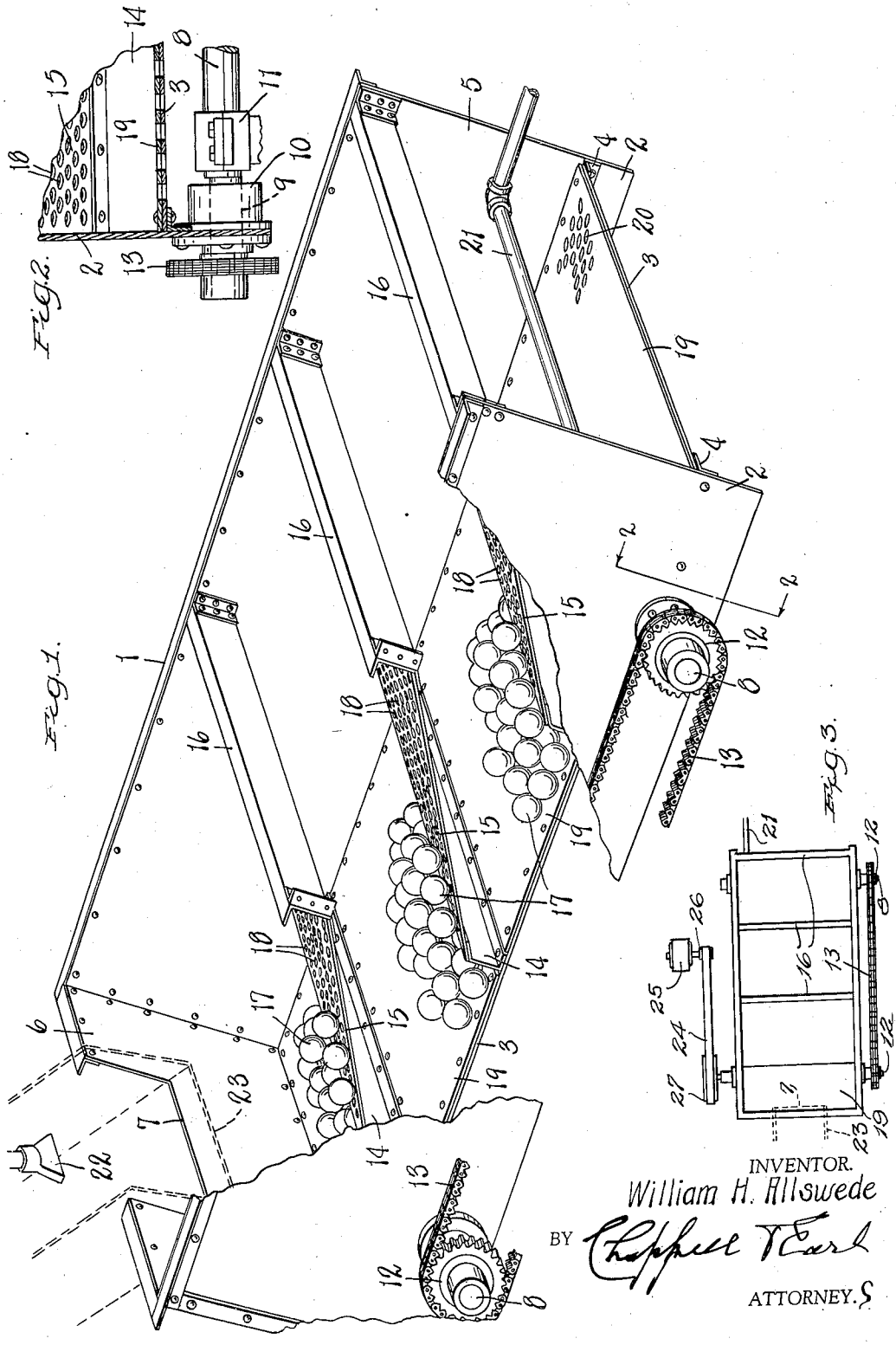


Fig. 2.

Fig. 1.

Fig. 3.

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APPARATUS FOR SCRUBBING AND TREATING GRAVEL

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5 Claims. (Cl. 209—6)

The objects of this invention are:

First, to produce an improved and cheap apparatus for treating gravel in order to free it from rotten stone, hard clay lumps, agglomerates, or the like which are present in gravel even after washing and which greatly interfere with the value of gravel for use as an aggregate in concrete work.

Second, to provide such an apparatus that will treat gravel which has been screened to size and will, by the crushing action of the balls, agitate it with the gravel, and remove the objectionable material referred to.

Third, to provide such an apparatus in which the gravel to be treated is fed continuously at one end of the machine to come out free from the objectionable material.

Fourth, to provide such an apparatus for carrying out the method disclosed in my copending application for Letters Patent Serial No. 721,268 filed April 19, 1934.

Other objects and advantages of my invention will appear from the description to follow. The invention is defined and pointed out in the claims.

A structure which is a preferred embodiment of my invention is illustrated in the accompanying drawing, in which:

Fig. 1 is a perspective view of my apparatus with portions broken away to show the construction thereof.

Fig. 2 is a detail sectional view taken on line 2—2 of Fig. 1, showing the means for agitating the device.

Fig. 3 is a conventional plan view of my apparatus showing the driving means.

Referring to the drawing, 1 is a box preferably constructed of metal and adapted to receive gravel from a hopper, the discharge of which is shown at 23.

In carrying out my invention, the gravel to be treated has been screened to size and the apparatus is used merely to remove the objectionable rotten stone, hard clay lumps and the like that are not removed by washing. The box 1 is preferably of metallic construction and consists of side plates 2, a bottom plate 3 supported on angle pieces 4 positioned near the bottom of the side plates 2 and fixed thereto with rivets or bolts or the like. One end of the box is open as at 5 and the other end is provided with an end plate 6 cut away as at 7 to receive the hopper discharge 23 which projects through the opening 7.

The box 1 is approximately twelve feet long by six feet wide and is mounted at an angle of about 20 degrees to the horizontal, sloping away from the hopper discharge 2. The box is mounted for agitation by any suitable shaker mechanism. The shaker mechanism disclosed is illustrated in detail in Fig. 2. A pair of eccentric shafts 8 extend transversely of the box. The shafts have eccentric portions 9 fitted in bearings 10 fixed to the side plates 2 of the box 1. The shafts are mounted in bearings 11 which are mounted on any suitable support and are provided at their outer ends with sprockets 12 connected by a silent chain 13 which synchronizes the operation to insure proper operation of the shaking mechanism. One shaft is driven by any suitable means and the other shaft is driven through the sprockets 12 and chain 13.

In Fig. 3 I show a plan view of the apparatus showing the box 1, the synchronous chain 13, a belt pulley 27 mounted on one of the shafts 8 connected by belt 24 to an electric motor 25 having the driving pulley 26 thereon. It will be understood that instead of using a belt and pulley arrangement for driving one of the shafts, a chain drive or direct drive for the shaft could be used and instead of an electric motor any suitable driving means could be employed.

I have illustrated the device without indicating any spring supports for the box although these might be used, it being only necessary that the box be agitated sufficiently to move the balls therein which will be later described. I prefer to run the mechanism at from 150 to 300 revolutions per minute depending upon the work to be done and provide eccentric shafts 8 which give a throwing stroke of from 1 to 2 inches. It will be understood that this construction can be departed from without interfering with the operation of the device materially.

Extending transversely of the box are partition members 14 which divide the box into compartments or sections and extending from the top of the partition 14 upwardly and at an angle are foraminous elements 15. The elements 15 are supported at their tops by cross members 16, one of which is located at the open end 5 of the box and serves also as a stiffener.

In each compartment formed by the partition members 14 are a plurality of balls 17. These balls may be of any suitable material, and also, in referring to them as balls, it will be understood that they can be of any suitable shape other than round, it being only essential that they be adapted to crush the objectionable material in the gravel as it is agitated with them.

The foraminous elements 15 can be of any desired type but I have illustrated a plate having

holes 18 therein. These holes are of a larger size than the gravel to be treated so that the gravel can pass freely therethrough, and the balls 17 are of a larger size than the holes so that the balls are retained in the separate compartments to act upon gravel as it is fed through the machine.

The foraminous elements 15 slope in a direction opposite to the slope of the box and at a greater angle, it being necessary that the slope be such that the balls, during the agitation, climb up on the foraminous element and tend to roll back into the compartment.

In construction of the box 1, I prefer to provide wear plates 19 in the bottoms of the compartment so that wear on the surfaces will not destroy the machine, and the plates can be removed when worn and others substituted. Such plates could also be provided on the sides if desired.

In the bottom plate 3 at the open end 5 of the box, I provide a series of openings 20 which serve as a gravel screen and I provide a water sprayer 21 for spraying the gravel as it comes from the machine to wash the broken stone and clay through the screen. The gravel is passed to suitable collecting means. If desired, the holes 20 may be left out and a separate grading screen may be provided. At the hopper discharge 23, I may also provide a water spray 22 to spray the gravel before it is fed to the machine, or the spraying may be done in the hopper. In operation, it is important that the gravel be moistened before it is treated.

In operation of the machine, the gravel to be treated is first screened to size and is then moistened to a muddy consistency and is fed continuously from the hopper discharge 23 into the apparatus which is being agitated by the driving means mentioned. The shaking of the machine is sufficient to cause the balls and gravel to be thoroughly mixed and agitated together and the crushing action of the balls is such that the rotten stone and clay lumps or the like are broken up and the gravel passed through the screen. The mixture of the gravel and balls rides up on the foraminous element 15 and the crushing action of the balls forces the gravel through the screen and assists in breaking up the objectionable material. The angle of the foraminous element 15 is such that the balls are kept down at or near the compartment and the crushing action of them is assured. I have shown three compartments but it is obvious that if desired more compartments could be supplied, or if the work is light, fewer compartments would do. As the gravel passes over the openings 20 the spray of water 21 washes the gravel and it is passed out in cleaned and graded condition, ready for shipment or immediate use.

It will be appreciated that this machine is of a very cheap and simple construction and can be transported and operated on the job if necessary.

I have illustrated and described my invention in an embodiment which has proven highly satisfactory. I have not attempted to illustrate and describe various other adaptations or embodiments which I contemplate as it is believed that this embodiment will enable those skilled in the art to embody or adapt the same as may be desired.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In an apparatus for treating gravel to remove rotten stone, hard clay lumps and the like, the combination of gravel feeding means, a box to receive gravel from said feeding means tipped downwardly from said feeding means, means for agitating said box comprising transverse eccentric shafts, sprockets on said shafts, a chain connecting said sprockets, and means for driving one of said shafts to impart a shaking motion to said box, a plurality of transverse partitions extending upwardly from the bottom of said box to form compartments in the bottom thereof, a plurality of slanting foraminous elements having holes therein larger than the gravel to be treated and each sloping upwardly from the partitions in a direction opposite the slope of said box and at such an angle that balls rolled up on said foraminous element will roll back into the bottom of the compartment, a plurality of balls in each compartment larger than the holes in said foraminous elements and adapted to crush the rotten stone and clay lumps when agitated with the gravel to be treated and to force the gravel through the holes, and a gravel sorting screen to remove the disintegrated rotten stone and clay lumps.

2. In an apparatus for treating gravel to remove rotten stone, hard clay lumps and the like, the combination of gravel feeding means, a box to receive gravel from said feeding means tipped downwardly from said feeding means, means for agitating said box, a plurality of transverse partitions extending upwardly from the bottom of said box to form compartments in the bottom thereof, a plurality of slanting foraminous elements having holes therein larger than the gravel to be treated and each sloping upwardly from the partitions in a direction opposite the slope of said box and at such an angle that balls rolled up on said foraminous element will roll back into the bottom of the compartment, a plurality of balls in each compartment and larger than the holes in said foraminous elements and adapted to crush the rotten stone and clay lumps when agitated with the gravel to be treated and to force the gravel through the holes, and a gravel sorting screen to remove the disintegrated rotten stone and clay lumps.

3. In an apparatus for treating gravel to remove rotten stone, hard clay lumps and the like, the combination of gravel feeding means, a box to receive gravel from said feeding means tipped downwardly from said feeding means, means for agitating said box, a plurality of transverse partitions extending upwardly from the bottom of said box to form compartments in the bottom thereof, a plurality of slanting foraminous elements having holes therein larger than the gravel to be treated and each sloping upwardly from the partitions in a direction opposite the slope of said box and at such an angle that balls rolled up on said foraminous element will roll back into the bottom of the compartment, and a plurality of balls in each compartment and larger than the holes in said foraminous elements and adapted to crush the rotten stone and clay lumps when agitated with the gravel to be treated and to force the gravel through the holes.

4. In an apparatus for treating gravel to remove rotten stone, hard clay lumps and the like, the combination of gravel feeding means, a box to receive gravel from said feeding means tipped downwardly from said feeding means, means for agitating said box, a plurality of slanting foraminous elements having holes therein larger than

the gravel to be treated and each sloping from the bottom of said box upwardly in a direction opposite the slope of said box to form a series of compartments and at such an angle that balls rolled up on said foraminous element will roll back into the bottom of the compartment, a plurality of balls in each compartment and larger than the holes in said foraminous elements and adapted to crush the rotten stone and clay lumps when agitated with the gravel to be treated and to force the gravel through the holes, and a gravel sorting screen to remove the disintegrated rotten stone and clay lumps.

5. In an apparatus for treating gravel to remove rotten stone, hard clay lumps and the like, the combination of gravel feeding means, a box to receive gravel from said feeding means tipped downwardly from said feeding means, means for agitating said box, a plurality of slanting foraminous elements having holes therein larger than the gravel to be treated and each sloping from the bottom of said box upwardly in a direction opposite the slope of said box to form a series of compartments and at such an angle that balls rolled up on said foraminous element will roll back into the bottom of the compartment, and a plurality of balls in each compartment and larger than the holes in said foraminous elements and adapted to crush the rotten stone and clay lumps when agitated with the gravel to be treated and to force the gravel through the holes.

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