

(No Model.)

3 Sheets—Sheet 1.

G. W. ROBERTS.  
PHOSPHATE WASHING MACHINE.

No. 472,820.

Patented Apr. 12, 1892.

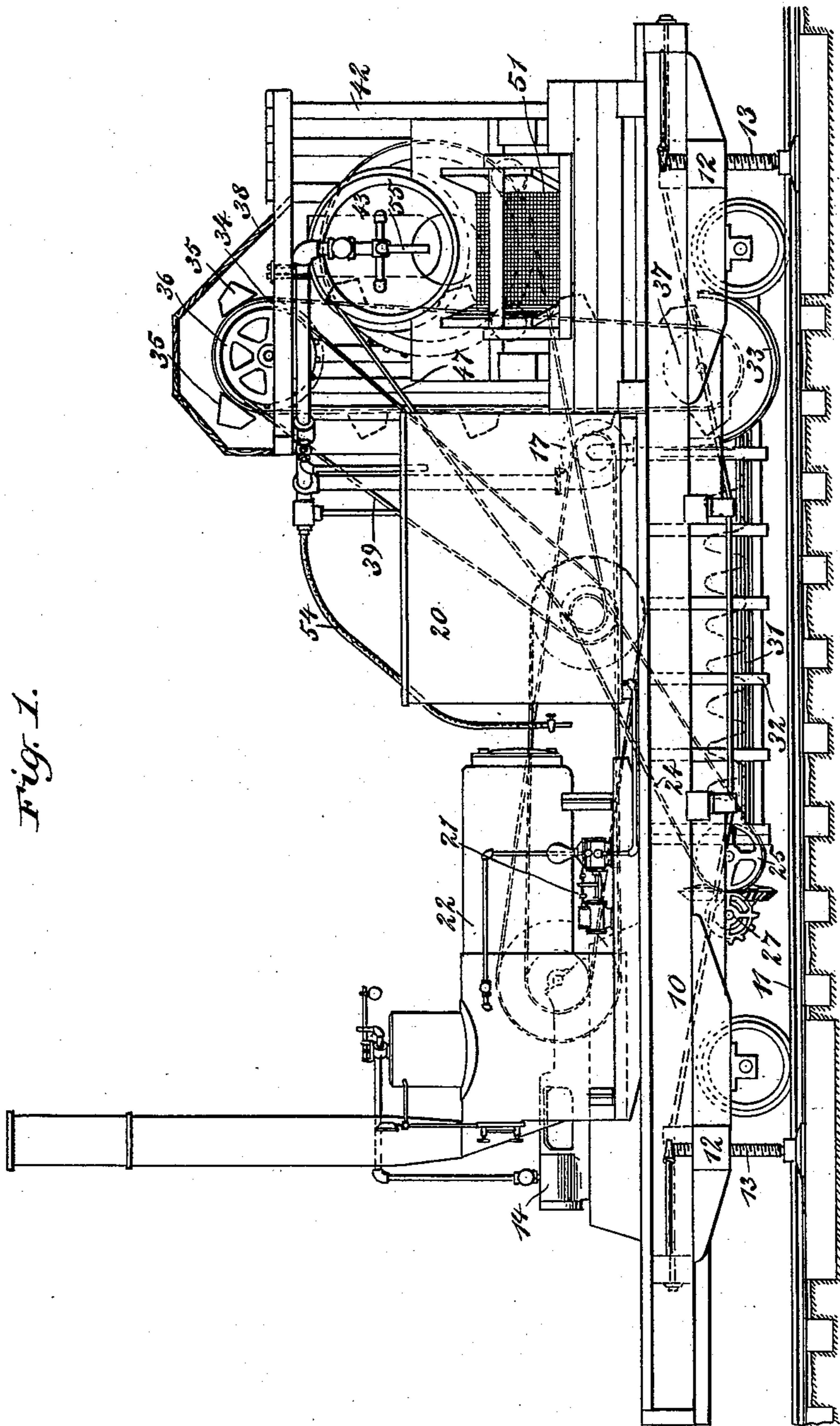


Fig. 1.

WITNESSES:

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C. Sedgwick

INVENTOR:

G. W. Roberts  
BY Munn & Co.  
ATTORNEYS

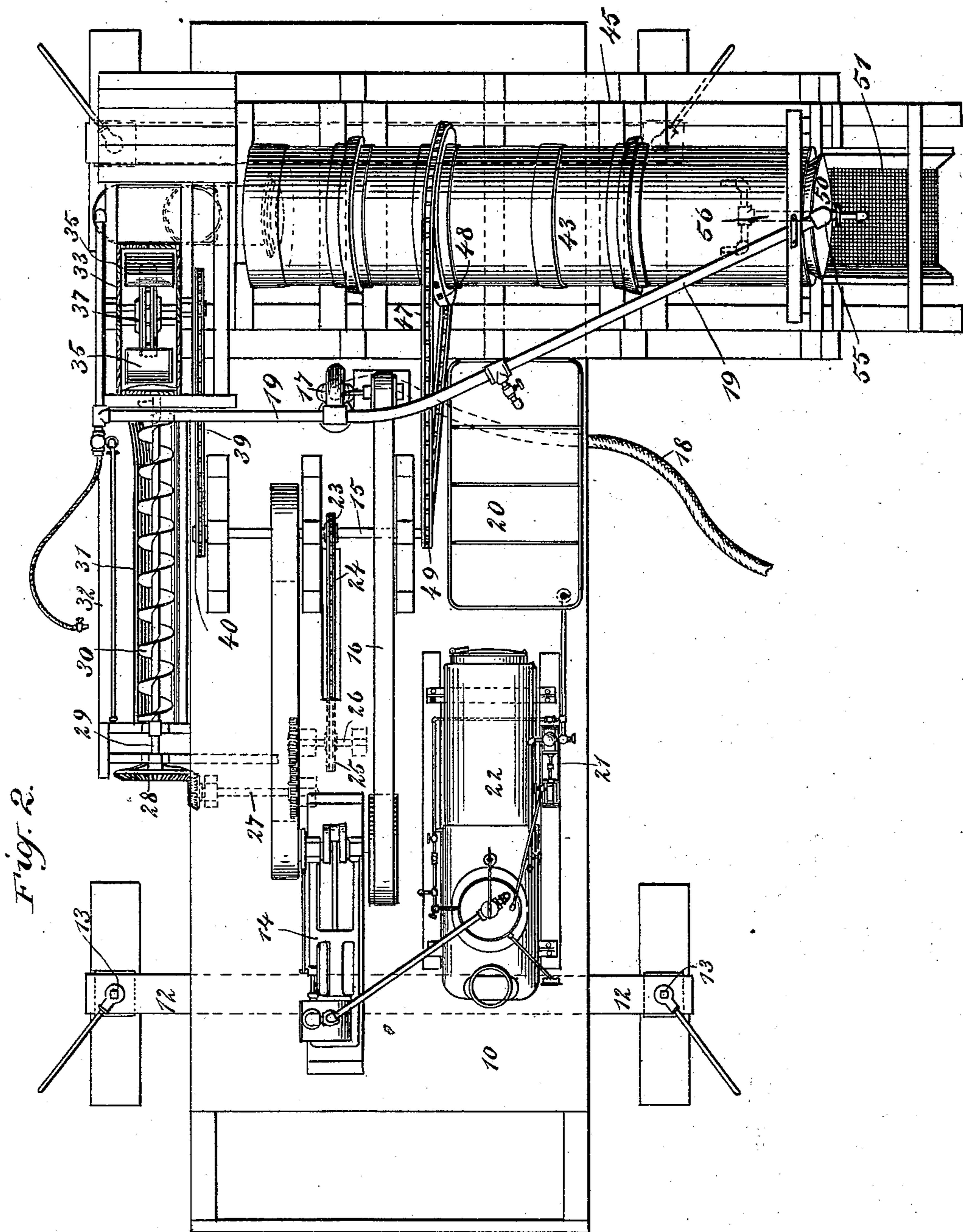
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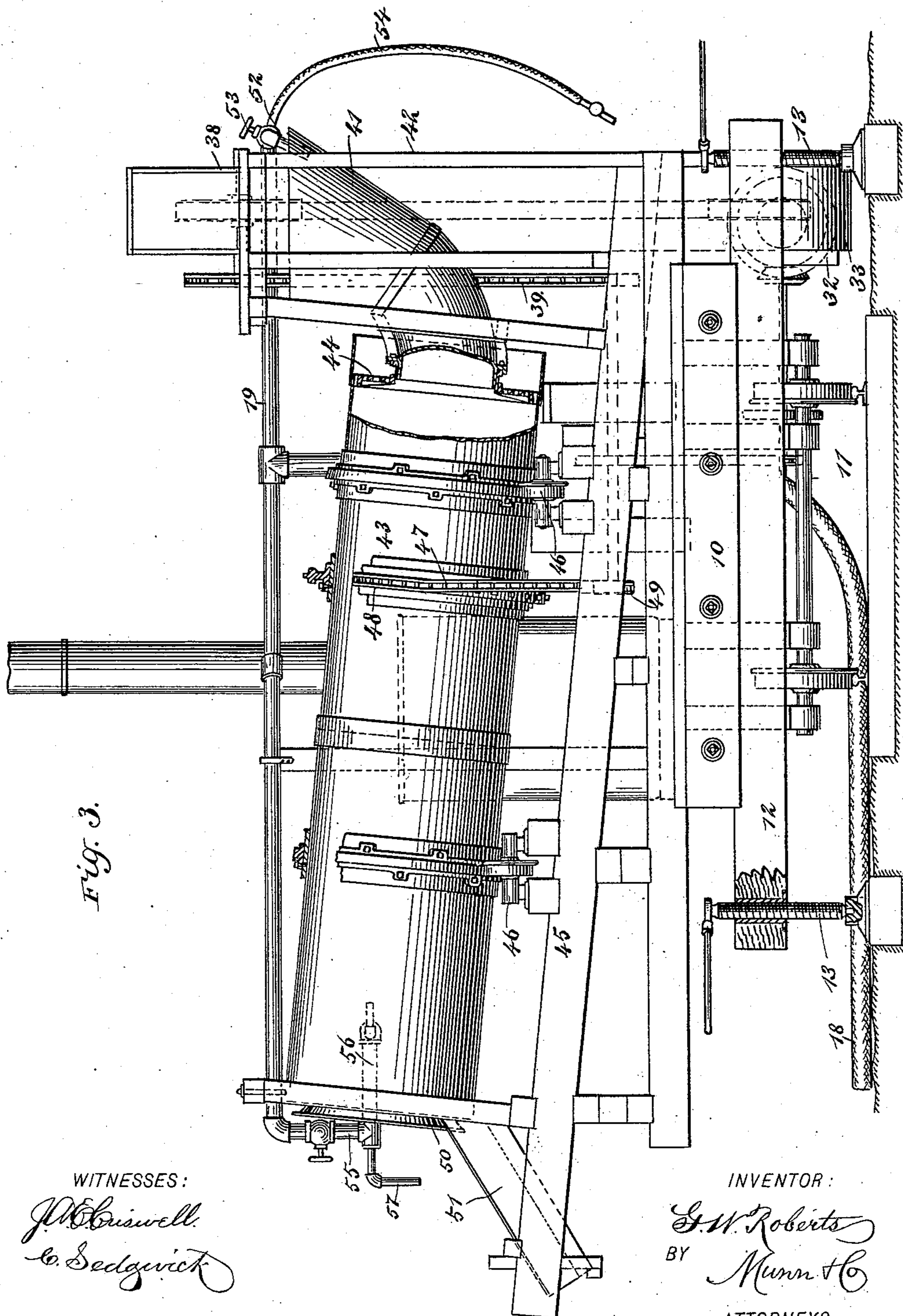
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# UNITED STATES PATENT OFFICE.

GEORGE W. ROBERTS, OF CHISHOLM'S ISLAND, SOUTH CAROLINA.

## PHOSPHATE-WASHING MACHINE.

SPECIFICATION forming part of Letters Patent No. 472,820, dated April 12, 1892.

Application filed December 21, 1891. Serial No. 415,761. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE W. ROBERTS, of Coosaw P. O., (Chisolm's Island,) in the county of Beaufort and State of South Carolina, have  
5 invented a new and Improved Phosphate-Washing Machine, of which the following is a full, clear, and exact description.

My invention relates to improvements in machines for washing phosphate rock, and,  
10 while the machine is primarily intended for washing rock of the kind named, it is also applicable to the washing of various kinds of ore.

The object of my invention is to produce an efficient machine for washing phosphate rocks  
15 or ores, which may be conveniently moved from place to place, and which is adapted to receive the crude rock or ore from adjacent cars and deliver the washed material into other cars, thus obviating the necessity of carrying a load of waste material away with the  
20 rock or ore to be washed.

To this end my invention consists in certain features of construction and combination of parts, which will be hereinafter described and  
25 claimed.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar figures of reference indicate corresponding parts in all the views.

30 Figure 1 is a side elevation of a machine embodying my invention. Fig. 2 is a plan view of the same, showing the elevator in section; and Fig. 3 is an enlarged end view, partly in section.

35 In the drawings, I have not shown in detail the construction of the various parts of the machine, as I do not claim the detail construction of any of the parts; but the invention consists in the general arrangement of  
40 the mechanism hereinafter described, which arrangement renders it possible to produce the results which I wish to obtain.

The machine is portable, and to this end the entire apparatus is supported upon a platform-car 10, which is mounted to run upon a  
45 railway 11. The car is provided at opposite ends with cross-beams 12, which project from the sides of the car, and the beams are provided at each end with a jack-screw 13, and  
50 when the machine is to be operated the jack-screws may be turned up, so as to support a

greater part of the weight and hold the machine in a rigid position.

The car carries a suitable steam-engine 14, which drives a main shaft 15, and from this  
55 shaft power is taken to operate the various parts of the machine. The engine also drives, by means of a driving-belt 16, a rotary pump 17, although any other kind of pump may be  
60 used, if desired; and this pump is supplied with water by means of a pipe 18, and forces the water into a main pipe 19, which extends above the top of the machine, as best shown  
in Figs. 2 and 3, and which supplies various  
65 parts with water. Among other things supplied with water by the main pipe is a tank 20, and water is taken from this tank and forced by a feed-pump 21 into a boiler 22, from which steam is taken to drive the engine.  
70

Near the center of the driving-shaft 15 a sprocket-wheel 23 is located, and a chain 24 extends downward from this sprocket-wheel through the car-floor and drives a sprocket-wheel 25 on a shaft 26, which shaft is geared  
75 to another counter-shaft 27, and the latter is geared to a beveled gear-wheel 28 on the end of a shaft 29. This latter shaft is arranged horizontally along one side of the car and is provided with a spiral flange 30, thus forming  
80 an Archimedean screw, which turns in an open-topped casing 31, which is supported in a suitable frame-work 32. I do not limit myself to the use of this screw conveyer, as a belt conveyer or any other well-known apparatus of  
85 the kind may be substituted for it.

The screw conveyer above described delivers into a casing 33, which is supported upon the car, and the material fed by the screw is raised by an elevator comprising an  
90 endless belt 34, carrying suitable buckets 35 and the wheels 36 and 37, arranged at the upper and lower ends of the belt to carry it. The elevator is driven by a sprocket-chain 39, connecting with a wheel on the upper elevator-  
95 shaft and with a sprocket-wheel 40 on the main driving-shaft. The elevator is housed in by a suitable casing 38, and it delivers into a curved hopper 41, which hopper is supported in a suitable frame-work 42, mounted  
100 on the car. The lower end of the hopper is journaled in the perforated end 44 of the main

washing-cylinder 43. This cylinder is provided on the inside with a spiral feed, which carries the rock delivered into it from the lower to the upper end; but this interior construction of the cylinder is not shown, as the cylinder is of common construction and forms no part of my invention, except in combination with the feeding mechanism.

The cylinder is inclined, as best shown in Fig. 3, and is supported upon a suitable framework 45, which is blocked up on the car 10, the cylinder turning on the rollers 46, which are arranged beneath it, as best shown in Fig. 3. The cylinder is revolved by means of a sprocket-chain 47, which extends around a sprocket-wheel 48, formed on the body of the cylinder and which connects with a sprocket-wheel 49 on the main driving-shaft 15; but the cylinder may be revolved by any common gearing. The upper end of the cylinder 43 is provided with a funnel-shaped outlet 50, and this outlet delivers into an inclined screen 51, which extends to one side of the car 10, so as to deliver into an adjacent car, which may be brought alongside of the car 10 in a manner hereinafter described.

The main water-pipe 19, above referred to, is arranged to deliver at one end into the hopper 41, so that the ore may be washed into the cylinder, if desired, and the outlet at this point is controlled by a valve 53. This end of the pipe is also provided with a hose 54, so that the water may be directed to any desired point. The pipe also extends to the upper end of the cylinder 43, is bent downward opposite an end of the cylinder, as shown at 55 in Fig. 3, is provided with a branch pipe 56, which extends into the cylinder and delivers in two jets, as best shown in Fig. 2, and is also provided with another branch pipe 57, which delivers upon the screen 51.

It is understood that it is always necessary to have a good supply of water in washing phosphates or ores of any kind, and it will be seen that the arrangement of the water-pipe above described enables water to be supplied freely to all parts of the machine, so that the washing operation is greatly facilitated.

The machine is operated as follows: The car carrying the apparatus is drawn to a point where there is a good water-supply. A car to be loaded is then drawn alongside of it and placed in a position so as to receive the washed rock or ores, as the case may be, from the screen 51, and the cars bearing the crude rock or ores are brought along on the opposite side of the car 10, and the ore to be washed is dumped upon the feeding-screw in the case 31. The engine is then started, so that the feed-screw, the elevator, and the cylinder are all simultaneously operated, and the crude ore or rock is carried forward to the elevator, is raised by the buckets 35, and delivered into the hopper 41, and it passes from the hopper into the main cylinder 43. A copious supply of water is then caused to flow into the cylinder, and the ore is carried by the feeding

mechanism inside of the cylinder toward the upper end of the cylinder. The water which flows through the cylinder will naturally pass to the lower end, and will carry the sand and other debris out through the perforations in the lower end of the cylinder. If desired, a carrier may be employed to carry this waste material to a convenient point for dumping. As the cylinder 43 revolves, the ore or rock is carried forward and finally delivered into the screen 51 and upon an adjacent car. It will be noticed that the arrangement of the water-supply pipe permits the ore or rock to be washed even after it strikes the screen 51, and consequently the washed material will be extremely clean when it is finally delivered into the car.

As hereinbefore stated, I do not claim the details of the construction shown, and, if desired, the parts may be somewhat differently arranged, and a different form of feeding apparatus may be used to supply the crude ore or rock to the elevator.

Any well-known form of elevator may be used, and the construction of the washing-cylinder may be changed, if desired, without departing from the spirit of the invention.

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

1. A machine of the character described, comprising a main washing-cylinder mounted upon a portable support, a conveyer arranged at one side of the support, and an elevator adapted to receive material from the conveyer and deliver it into the cylinder, substantially as described.

2. A machine of the character described, comprising a revoluble washing-cylinder, an elevator arranged to deliver into the cylinder, a conveyer to supply the elevator, and a motor to drive the cylinder, the elevator, and conveyer, the whole apparatus being mounted upon a portable structure, substantially as described.

3. A machine of the character described, comprising a portable structure, an inclined washing-cylinder mounted thereon, said cylinder having an inlet-hopper at its lower end and a delivery-screen at its upper end, an elevator arranged to deliver into the hopper, a conveyer arranged at one side of the portable structure and adapted to deliver into the elevator, and a motor mounted upon the portable structure and adapted to run all the movable parts of the machine, substantially as described.

4. A machine of the character described, comprising a car, a revoluble inclined washing-cylinder mounted thereon, a hopper arranged to deliver into the cylinder, an elevator mounted at one side of the car and adapted to deliver into the hopper, a conveyer supported on one side of the car and adapted to supply the elevator, a pump and water-pipes for furnishing water to the cylinder, and a motor mounted on the car and adapted to run

the movable parts of the machine, substantially as described.

5 5. A machine of the character described, comprising a car, a revoluble washing-cylinder mounted thereon, an elevator arranged to deliver into the cylinder, a conveyer mounted on the car and adapted to supply the elevator, water-pipes adapted to deliver water to the cylinder, and means for holding the car in a  
10 rigid position, substantially as described.

6. The combination of a car, a revoluble

cylinder mounted thereon, a fixed hopper having one end journaled in the lower end of the cylinder, an elevator, to supply the hopper, and a conveyer supported on the side of the car 15 and arranged to feed the elevator, substantially as described.

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Witnesses:

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