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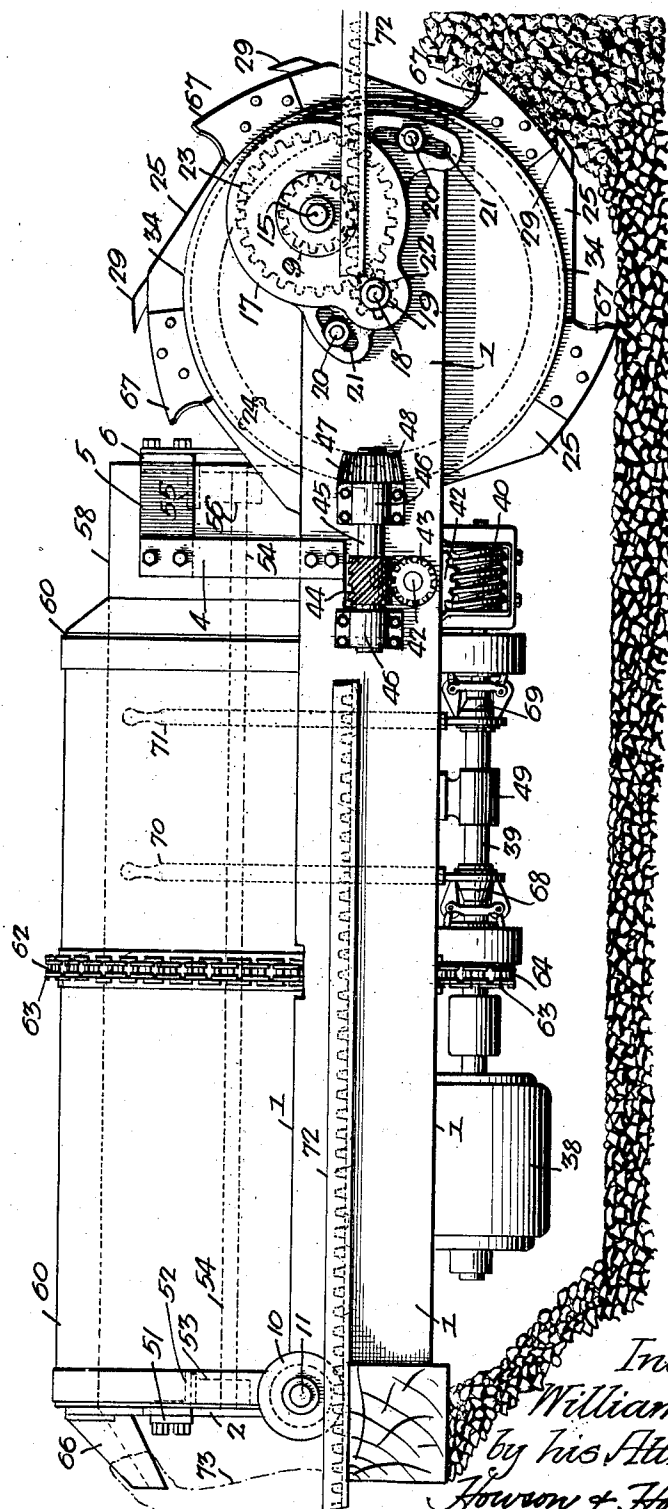
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1,743,833

BALLAST CLEANING MACHINE

Filed June 2, 1925

5 Sheets-Sheet 1



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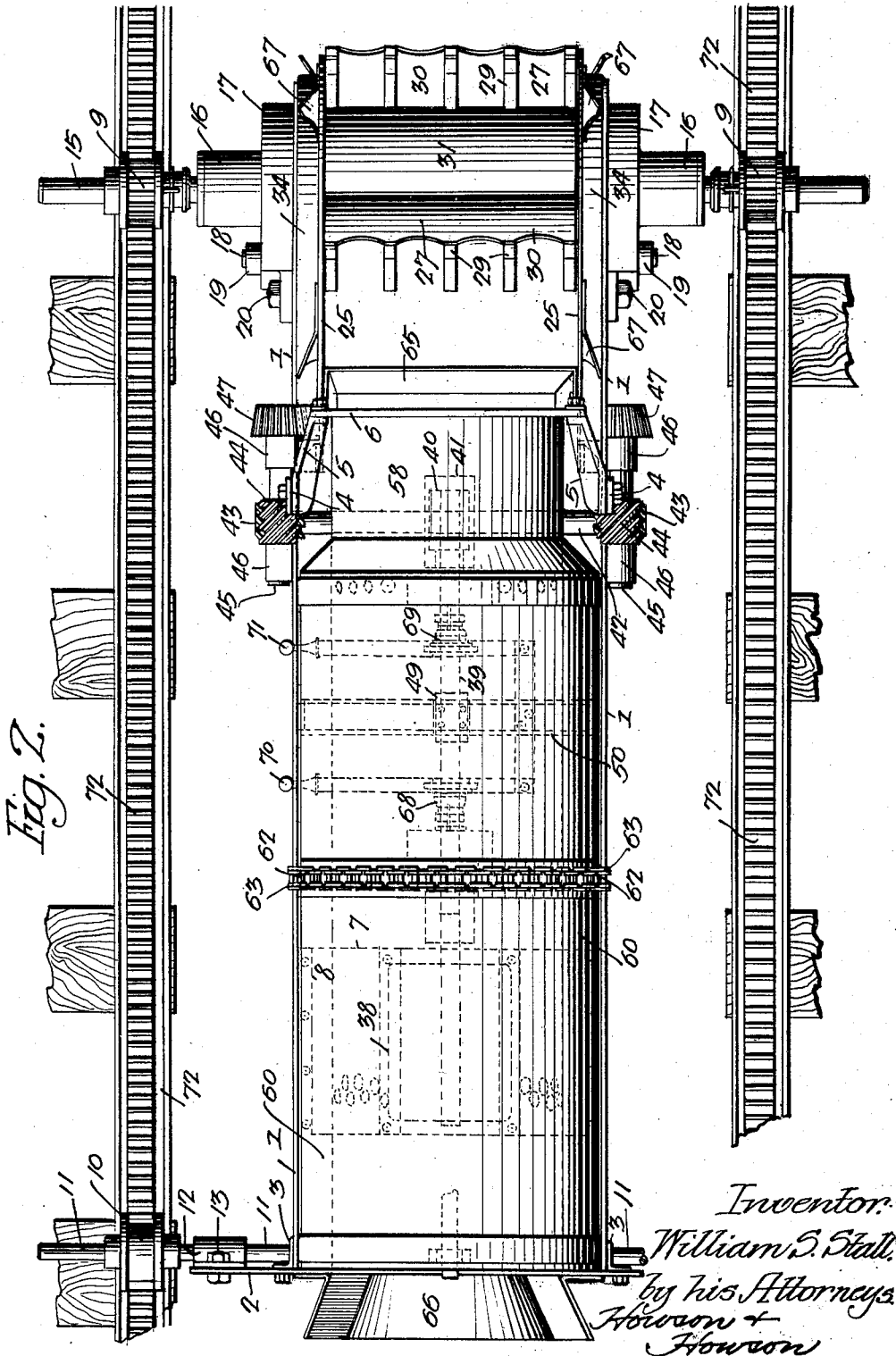
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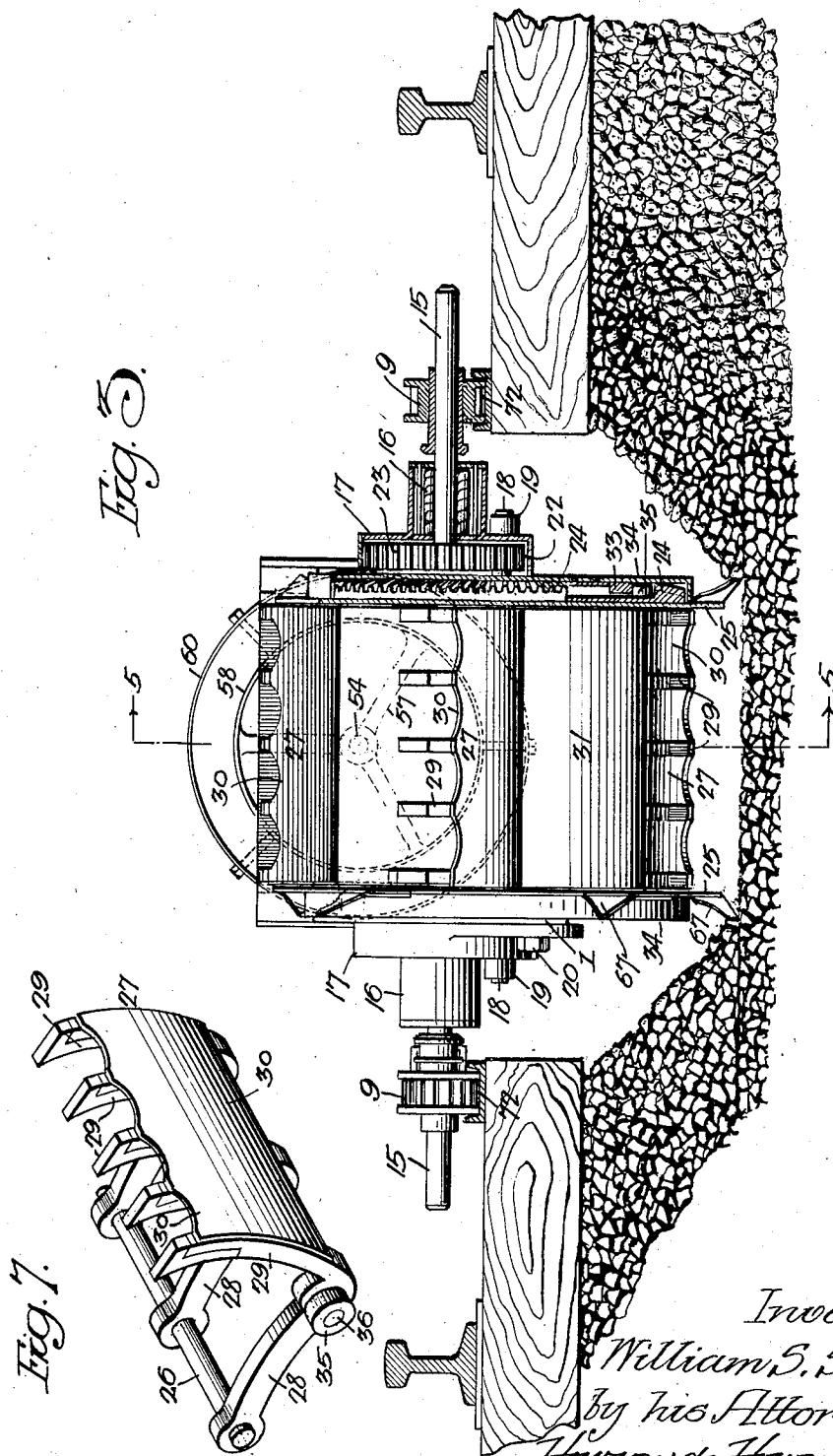
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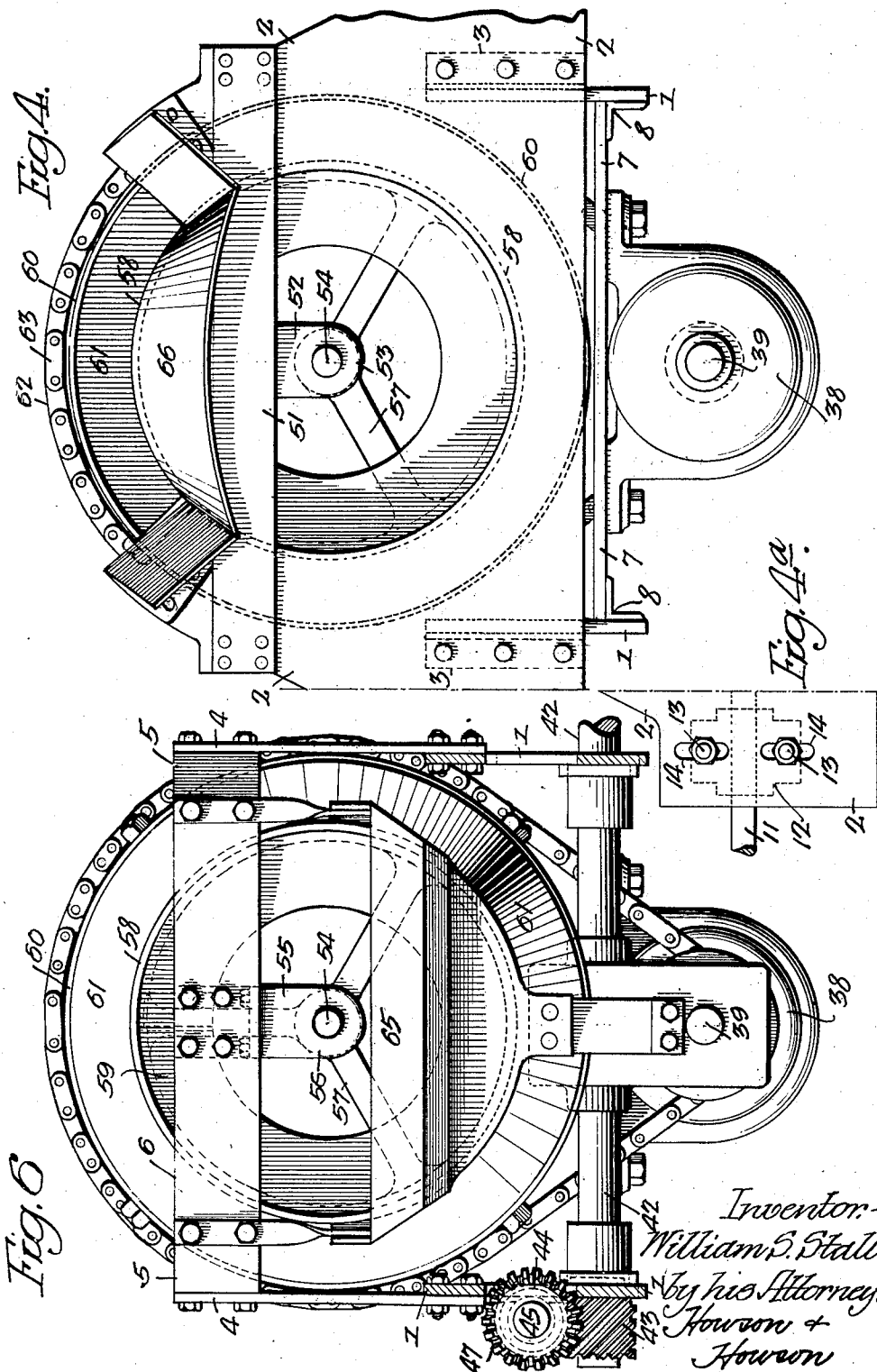
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BALLAST CLEANING MACHINE

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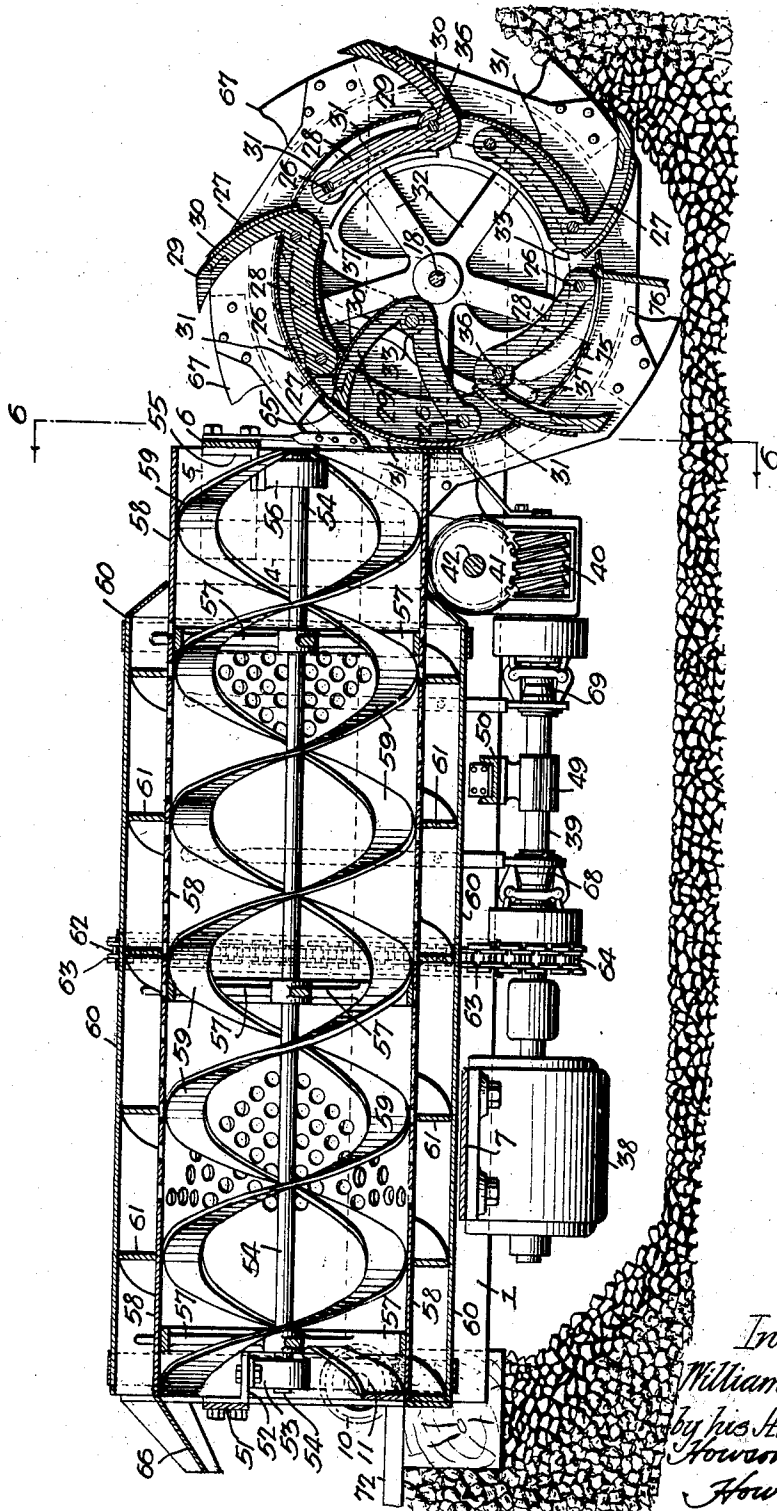
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BALLAST CLEANING MACHINE

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Fig. 5.



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BALLAST-CLEANING MACHINE

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This invention relates to ballast cleaning machines, and the principal object of the invention is to provide an improved automatic machine adapted, when set between the tracks, to pick up the ballast, clean it, and re-deposit it upon the roadbed, the machine also advancing under its own power and requiring no attention from the operator other than to remove and replace the containers provided for receiving the dirt removed from the ballast.

A more specific object of the invention is to provide a machine of the stated type including a novel self-cleaning rotary scoop for picking up the ballast.

Another object of the invention is to provide a machine of the stated type having adjustment means providing for the operation of the device in a substantially upright position regardless of transverse inclination of the roadbed at the point at which the machine is operating.

The invention further resides in certain novel and advantageous features and details of construction as hereinafter fully described and as illustrated in the attached drawings, in which:

Figure 1 is a side elevation of a machine made in accordance with my invention;

Fig. 2 is a plan view of the machine;

Fig. 3 is a front elevation of the machine;

Fig. 4 is a rear elevation of the machine;

Fig. 4^a is a fragmentary elevation illustrating one of the side wings or extensions of the rear plate shown in Fig. 4, to which wings the bearings supporting the rear wheel shaft of the machine are secured;

Fig. 5 is a longitudinal section on the line 5—5, Fig. 3;

Fig. 6 is a transverse section on the line 6—6, Fig. 5, and

Fig. 7 is a view in perspective of one of the scoops.

With reference to the drawings, the machine comprises a frame consisting of two vertical side plates 1, 1, connected at the rear by a transverse back plate 2 secured to said side plates by angles 3, 3. Toward the front the side plates 1, 1, support and are connected by a yoke consisting in the present in-

stance of two uprights 4, 4, from the upper ends of which two horizontal arms or beams 5, 5, extend diagonally forward and are connected at their forward ends by a transverse beam 6. The side plates 1, 1, are also connected intermediate their ends by a transverse horizontal plate 7 connected to said side plates by angles 8. This frame is normally supported at its front end upon shrouded gear wheels 9 and at its rear by flanged plain faced wheels 10, said wheels being carried by short transverse shafts 11, 11, at the rear journaled in bearings 12, 12, secured to wings or extensions of the rear plate 2, see Figure 4^a. The bearings 12 as well illustrated in Fig. 4^a are adjustably secured to the end plate 2 by bolts 13 which pass through vertical slots 14, 14, in the said plate whereby the bearings may be adjusted vertically in the latter. The front wheels 9, 9, are carried on independent jack shafts 15, 15, at opposite sides of the frame, which shafts are journaled in bearings 16 in brackets 17 pivotally mounted on a transverse shaft 18 journaled on the side plates 1, 1, there being provided on the said brackets 17, journals 19, 19, for the ends of the said shaft, as shown in Fig. 3.

As shown in Fig. 1, the bracket 17 is adapted to be secured in adjusted position to the side plates 1, 1, of the frame by means of studs 20, 20, secured in the side plates and projecting through slots 21, 21, in the bracket 17 drawn on an arc whose center is the axis of the shaft 18. The transverse shaft 18 carries outwardly of the side plates and within the bracket 17, which latter also constitutes a housing, pinions 22, 22, which mesh with gears 23 on the inner ends of the shafts 15, 15.

It will be noted that the aforescribed construction provides for independent vertical adjustment of any and all of the supporting wheels 9, 9, and 10, 10, the rear wheels 10 being adjustable by releasing the nuts of the bolts 13 whereby the said bolts are movable in the vertical slots 14 and the forward wheels by releasing the nuts on the bolts 20, 20, which permits an adjustment of the brackets 17 with the wheels 10 around the shaft 18 as a center, the geared connection be-

tween the latter shaft and the wheel shafts 15, 15, being maintained in this adjustment.

The transverse shaft 18 also carries at each side one of a pair of bevel gears 24, and to the inner faces of these gears are secured the side plates 25 of a scoop drum. Extending transversely between these plates 25 and secured in the gears 24 are a series of evenly spaced transverse bars or shafts 26, see Figs. 5 and 7, which support a series of scoops 27 clearly illustrated in Fig. 7. These scoops comprise arms 28, through one end of which extends the shaft 26 and which carry at their outer ends the scoop proper consisting of a plurality of arms 29 pointed at their outer ends and having secured to their under sides a plate 30. The outer pointed ends or tips of the arms 29 are preferably detachably secured to the said arms so that they may be replaced when worn. The arms 29 project through transverse slots between segmental drum plates 31, 31, supported on the arms of a pair of spiders 32 secured to the shaft 18 intermediate the side plates 25, the said plates 31, 31, forming together what in effect is a drum having transverse slots through which the said arms are adapted to project. The scoops are adapted, as clearly illustrated, to be drawn inwardly so that the ends of the arms 29 lie within the outer circumference of the drum formed by the segmental plates 31.

In order to provide for an automatic movement of the scoops to the retracted and extended or operative positions as the said cylinder revolves with the shaft 18, I provide, at each side of the drum and outwardly of the gears 24, a cam 33, said cams being secured in each instance to a housing plate 34 suitably secured to the side plates 1, 1. The scoops 27 are provided at each side and at the outer ends of the arms 28 with a cam roller 35 mounted on a spindle 36 projecting from the outer sides of the outer arms 28. The spindles 36 project through slots 37 in the side plates 25, and the webs of the gears 24 and the rollers 35 lie within a cam groove in the said cam 33. The cam groove is so shaped as to provide for retraction and subsequent projection of the scoops 27 in a manner hereinafter described.

As shown in Figs. 1, 5 and 6, the gears 24 are rotated from an electric motor 38 suspended from the under side of the plate 7 shown in Fig. 4, and the motor is coupled to a shaft 39 extending forwardly and longitudinally of the frame and having at its forward end a worm 40 which meshes with a worm wheel 41 on a transverse shaft 42 journaled as shown in Fig. 6 on the side plates 1, 1. The shaft 42 also carries at each end a spiral gear 43, each meshing with a spiral gear 44 on a jack shaft 45 journaled in bearings 46, 46, on the side plates 1, 1, respectively. Each of the shafts 45 carries at its forward end a bevel pinion 47 which projects through

a slot 48 in the side plates 1, 1, and meshes with the respective bevel gears 24. The shaft 39 is supported intermediate its length in a bearing 49 carried by a transverse beam 50 extending between the side beams 1, 1.

As shown in Fig. 4, the rear plate 2 has a substantially circular opening, and extending across this opening near the top of the plate is a cross plate 51, from which is suspended a bracket 52 which carries a bearing 53 for a longitudinal shaft 54. A similar bracket 55 depending from the cross beam 6 near the front of the machine as previously described carries a second bearing 56 for the said shaft 54. The shaft 54 carries three spiders 57 which support an inner cylindrical drum 58 extending from the rear of the scoop drum to the rear of the supporting frame. The drum 58 has on the inside a pair of spiral fins 59 extending from one end to the other, and the rear end of the cylinder is open to provide for discharge of material fed into the front end of the cylinder by the scoops 27, as hereinafter described. Mounted outwardly of the drum 58 is an outer drum 60 secured to and spaced apart from the drum 58 and provided also with a spiral fin or similar device 61 for advancing material towards the rear of the machine.

As shown in Fig. 5, the outer cylinder 60 stops short of the forward end of the cylinder 58, and the central portion of the latter cylinder lying within the cylinder 60 is perforated whereby the cylinder 58 constitutes in effect a sieve, as hereinafter further described.

In order to provide for rotation of the double cylinder 58—60, the outer cylinder is provided with a sprocket 62 which is connected through a chain 63 with a sprocket 64 on the shaft 39.

Suspended from the cross bar 6 at the forward end of the cylinder 58 is a receiving chute 65, which as shown in Figs. 5 and 6 lies close to or against the outer periphery of the drum formed by the segmental plates 31 hereinbefore described, the said chute 65 neatly filling the space between the side plates 25 of the scoop drum. Also as shown in Figs. 4 and 5, the lower part of the space between the cylinders 58 and 60 at the rear end is closed by the plate 2, and extending away from the rear plate 2 at the top where the said space between the cylinders 58 and 60 is open is a delivery chute 66. Any material collecting therefore in the outer cylinder 60 is passed rearwardly by the spiral fin 61 as the cylinder revolves and is eventually discharged from the top of the cylinder into the chute 66.

As clearly shown in Fig. 5, the cam 33 is such that as the scoops 27 reach the top of the cylinder and approach the receiver chute 65, they are retracted, thereby avoiding the chute and at the same time depositing their contents into the chute. Following retraction, they are immediately again extended to the opera-

tive position to receive a new load, as herein-
after described. It will be noted that when
in the retracted position, the outer ends of the
arms 29 lie well within the periphery of the
drum formed by the segmental plates 31.
It will further be noted that the slots between
the plates 31 in which the scoops are operated
extend close to the scoops so that they have a
scraping and cleaning action as the said
scoops are drawn into the cylinder. Further,
the close fit between the receiver chute 65 and
the outer faces of the segmental plates 31
prevent accumulation of mud and dirt on the
latter and insure that substantially all the
contents of the scoops are deposited in the
cylinder.

As clearly illustrated, the side plates 25 are
not of actual circular form, but are more or
less polygonal, and at one end of each of the
flat edges of the plate I provide a wing or
vane 67 which when the entire drum, with the
plates 25, are rotated tend to direct the ballast
inwardly into the path of the scoops.

In order to provide for disconnection of the
sprocket 64 from the shaft 39 and of the worm
40, I preferably provide clutches 68 and 69
through which these elements are operatively
connected with the shaft, and operating levers
70 and 71 provide for manual operation of
the clutches.

The aforedescribed machine is adapted to
travel on suitably racked tracks 72 which are
laid on the outer ends of the ties of adjacent
tracks so that the machine is in position to
operate upon the ballast between the tracks.
Preferably the wheels 9 are splined to their
shafts so as to provide for variations in the
distance between the tracks 72, 72, and ir-
regularities in their spacing. Initially suffi-
cient of the ballast between the tracks is dug
away, as shown in Fig. 5, to provide room for
the depending portions of the machine, and
thereafter the motor is set in motion to op-
erate through the shaft 39 and intermediate
transmission parts the shaft 15 whereby the
machine is advanced along the tracks 72. At
the same time, the scoop cylinder is rotated in
a counter-clockwise direction, see Fig. 5, and
as the machine advances, the scoops pick up
ballast and deposit it in the rotary cylinder
58. This ballast is passed back by the fins 59
through the cylinder, and the dirt and dust
in the ballast passes through the aper-
tures in the cylinder 58 and into the cyl-
inder 60, the clean ballast passing back
through the cylinder 58 and being re-de-
posited upon the roadbed. The dirt accu-
mulating in the cylinder 60 is fed back by
the fins 61 to the rear of the cylinder and is
discharged, as previously described, into the
chute 66. As indicated in broken lines in Fig.
1, a bag or other suitable receptacle 73 is se-
cured at the back to receive the dirt dis-
charged therethrough. As the bags become

full, they are removed and new ones re-in-
serted.

The depth of the ballast taken up by the
scoops 27 may be regulated by adjustment of
the forward wheels of the machine in the man-
ner previously described, and any transverse
inclination of the tracks upon which the ma-
chine travels may also be compensated for by
adjustment of the wheels on the opposite sides
of the machine.

To prevent an accumulation of fine dirt in
the rotary drum I divide one of the segmental
plates 31, one portion 75 thereof remaining
stationary and the other portion 76 being
loosely pivoted in the side plates 25 that it
may open by gravity when approaching its
lowermost position of rotation, to permit free
discharge of any fine particles of dirt that
may have entered the interior of the drum,
which prevents clogging of the movable parts
of the drum.

It will also be noticed that the weight of
the machine is supported upon the flanged
sides of the gear wheels 9 and the plain faced
wheels 10, which bear upon the web of the
channel beams intermediate the sides of the
racks 72 and the upright flanges of the said
channel beams, it being understood that the
racks 72 are secured to those channel beams as
shown in the drawings.

I purposely form the machine very com-
pactly so that this machine in operation will
not interfere with the normal running of the
trains upon the road, thus eliminating the ne-
cessity for removing the machine to permit a
train to pass by.

I claim:

1. In a ballast cleaning machine, the com-
bination with a wheeled frame, adapted to be
positioned between the ends of the ties of ad-
jacent railway tracks, of a rotary scoop at one
end of said frame, a rotary drum extending
longitudinally of the frame adapted to re-
ceive material taken up by said scoop, the
scoop being of such diameter as to discharge
above the bottom of the drum, and means for
separating the dirt from the material fed to
said drum and for discharging said material
and dirt independently from the rear of said
drum the material being discharged between
the ends of the ties of the adjacent tracks.

2. In a ballast cleaning machine, the com-
bination with a wheeled frame adapted to be
positioned between the ends of the ties of ad-
jacent railway tracks, of a rotary scoop at one
end of said frame, a double walled cylinder
adapted to receive within the inner cylinder
material taken up by said scoop, the scoop be-
ing of such diameter as to discharge above the
bottom of the drum, said inner cylinder being
foraminous, means for passing the material
to the back of the cylinder and discharging
it therefrom into the space between the ends
of the ties of the adjacent tracks, and means
for passing the dirt accumulating in the outer

cylinder rearwardly and discharging the said dirt at a point other than the point of discharge for the cleaned ballast.

3. A ballast cleaning machine comprising
5 a frame, a transverse shaft journaled at one end of the frame, a bracket secured to each side of the frame and movable pivotally about the axis of said shaft, a rotary scoop member carried by said shaft, wheels on said
10 bracket adapted to support the frame, gears interconnecting the said shaft and the wheels, means for adjusting the bracket to elevate or lower the said wheels with respect to the frame, and motor means for driving the
15 wheels and operating the said scoop.

4. A ballast cleaning machine comprising a frame, adapted to lie between the ends of the ties of adjacent railway tracks, wheels for said frame, a cleaning cylinder mounted
20 for rotation upon said shaft, a rotary scoop adapted to take up ballast and deposit it in said cleaning cylinder as the machine is advanced on said wheels, the discharge level of the scoop being above the bottom level of the
25 drum, and means in said cleaning cylinder for separating the ballast from the dirt and for collecting and discharging the ballast and the dirt at independent points.

5. A ballast cleaning machine comprising
30 a frame, wheels supporting the frame, a motor carried by the frame, a longitudinal shaft journaled in the frame and connected with the motor, a transverse rotary scoop journaled at one end of said frame and operatively connected with the said shaft, and
35 a rotary cleaning cylinder extending longitudinally of the frame also operatively connected with said shaft and adapted to receive material taken up by said scoop.

40 6. A ballast cleaning machine comprising a frame, a transverse shaft at one end of said frame, a rotary scoop mounted on said shaft, wheels supporting said frame and operatively connected with said transverse shaft,
45 a rotary cleaning cylinder adapted to receive material taken up by the scoop, a motor carried by the frame, and means operatively connecting said transverse shaft with the motor.

50 7. In a ballast cleaning machine, the combination with a mobile frame, of a rotary drum mounted on the frame and comprising a perforated cylinder, means carried by the frame for taking up ballast and for depositing it in said perforated cylinder, motor
55 means mounted on the frame directly below the cylinder for rotating the latter and for operating said ballast take-up and depositing means, and means for collecting the dirt and
60 small particles passing through the apertures in said cylinder and for discharging the cleaned ballast from the drum.

8. In a ballast cleaning machine, the combination with a mobile frame adapted to be
65 advanced over a ballast bed, of a rotary drum

mounted on said frame, means carried by the frame for taking up ballast from the bed and for depositing it in the drum, motor means mounted on the frame below the drum for rotating the latter and for operating the ballast take-up and depositing means, and means within said drum for separating the ballast from the dirt and small particles therein and for collecting and separately discharging the ballast and the dirt from the drum.

9. In a ballast cleaning machine, the combination with a mobile frame of a rotary member supported on the frame, a scoop carried by said rotary member, a screening device adapted to receive by gravity material dug by the scoop, and means for oscillating the scoop so as to move it into operative position when the scoop is adjacent the material to be dug and for retracting the scoop when it is adjacent the screening member so as to permit of the screening member lying in close proximity with the drum without interference by the scoop.

10. In a ballast cleaning machine, the combination with a mobile frame of a rotary drum arranged transversely of the frame, a screening device having a feed chute extending into proximity with the periphery of the drum, the drum having an opening formed in the periphery thereof, a scoop member, and means for projecting the scoop member through the opening so as to effect digging of ballast in the path of the machine and for withdrawing the scoop into the opening when the opening is in proximity with the feed chute.

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