Feb. 17, 1931. W. ELMER 1,793,389

BALLAST CLEANING APPARATUS

Filed July 7, 1928 7 Sheets-Sheet 1

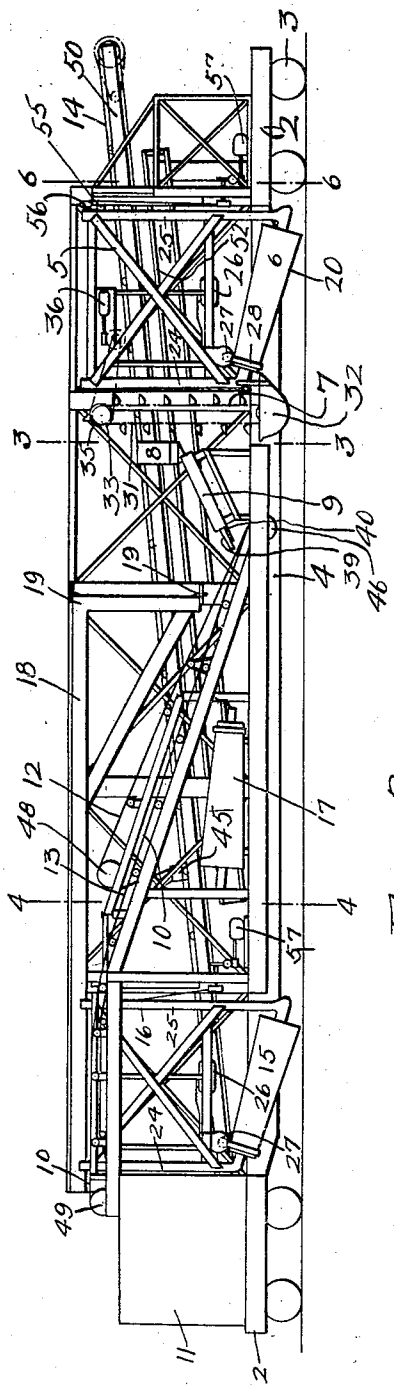


Fig. 1.

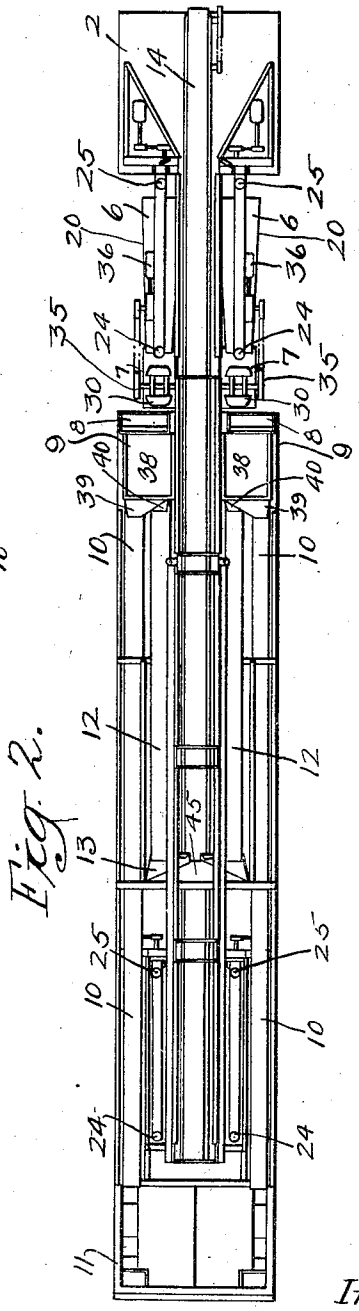


Fig. 2.

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BALLAST CLEANING APPARATUS

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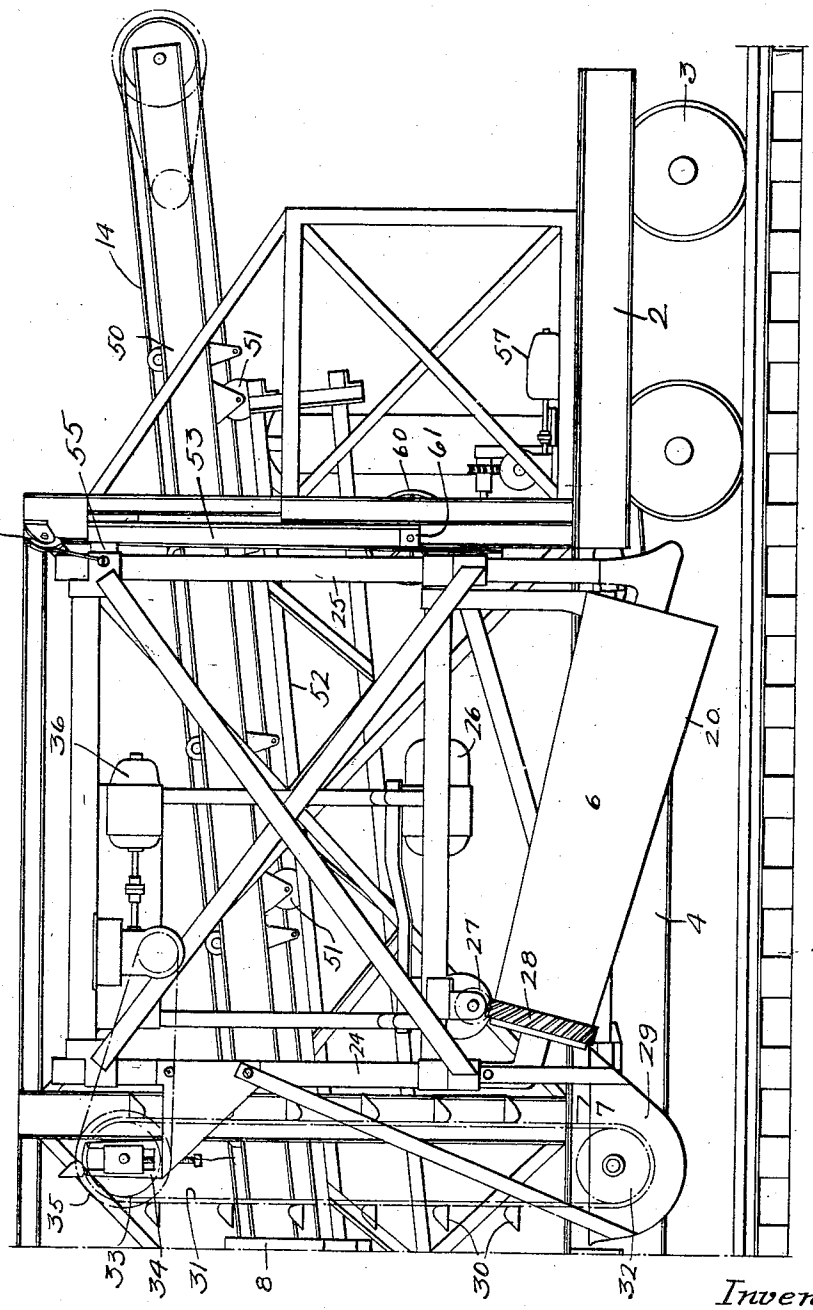


Fig. 3.

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BALLAST CLEANING APPARATUS

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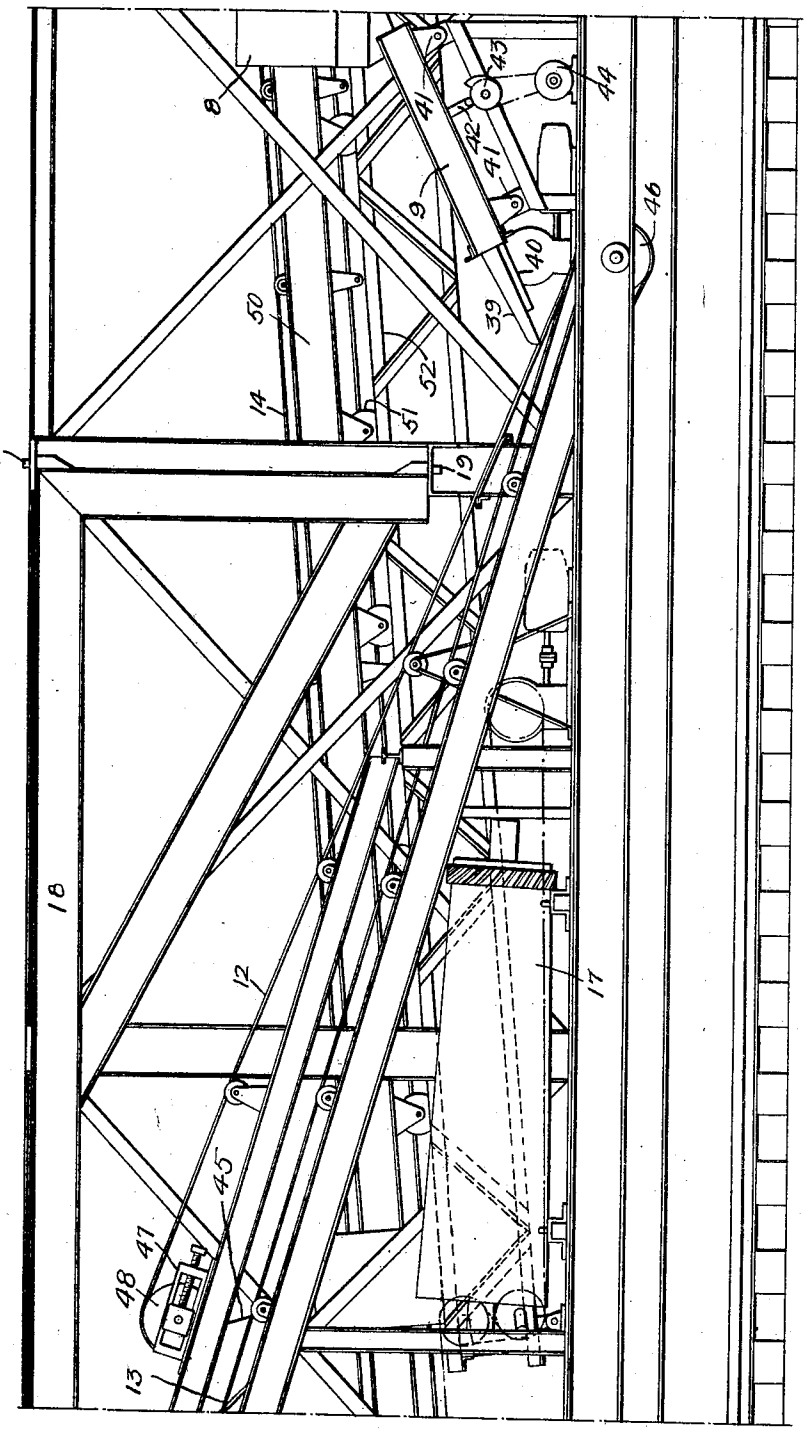


Fig. 4.

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BALLAST CLEANING APPARATUS

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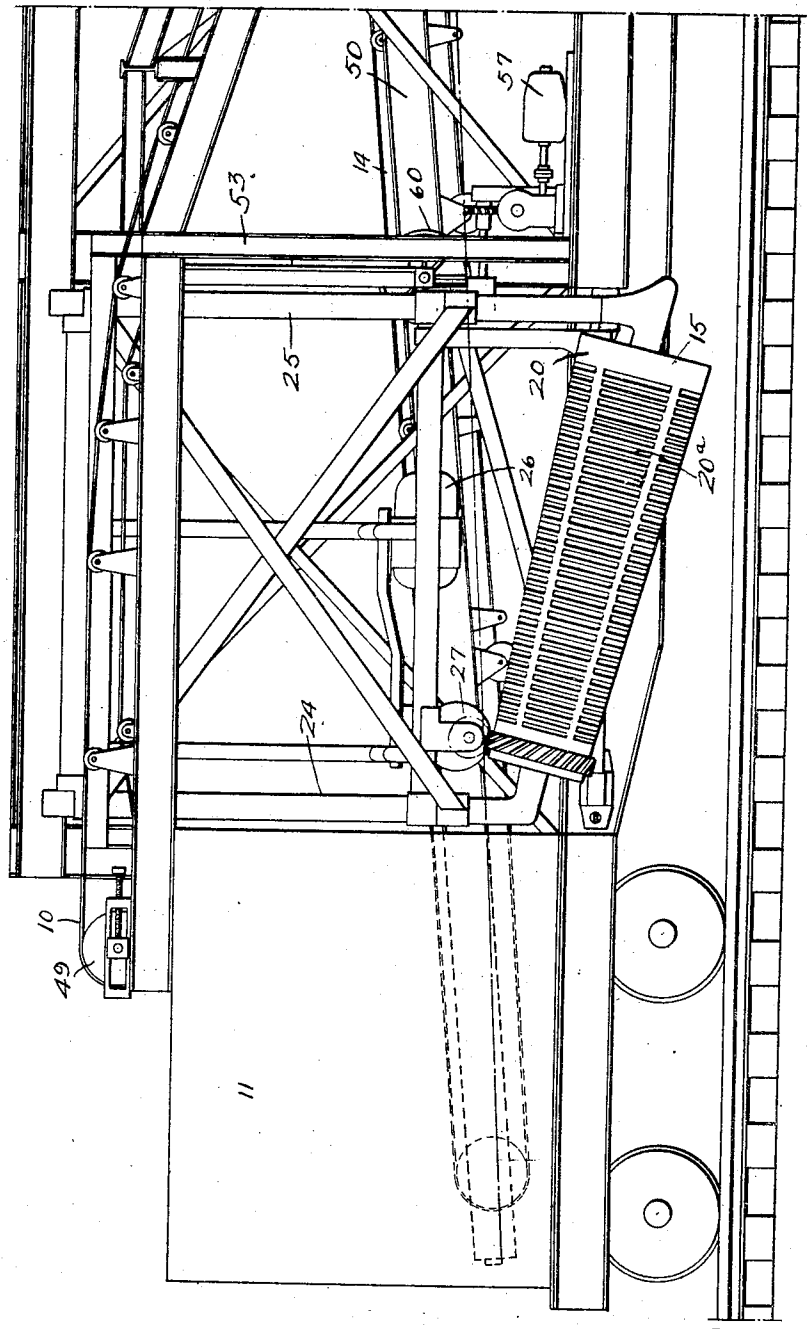


Fig. 5.

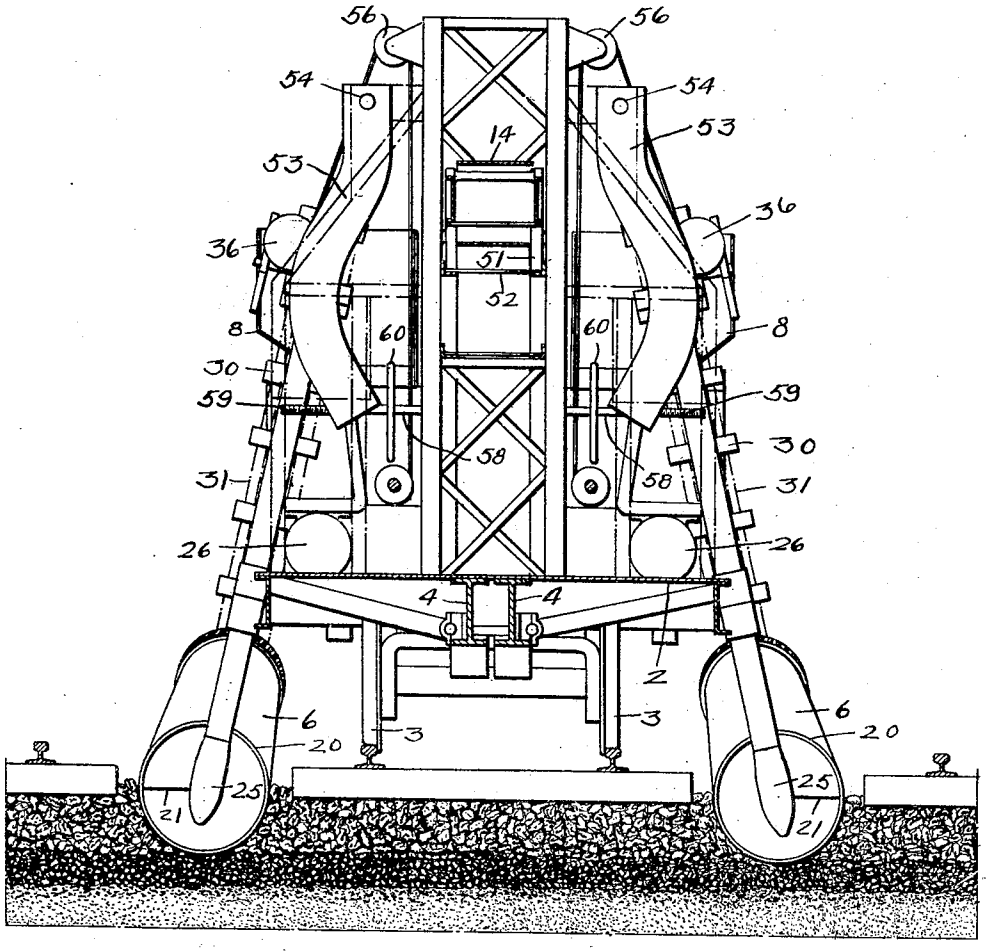
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BALLAST CLEANING APPARATUS

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Fig. 6.



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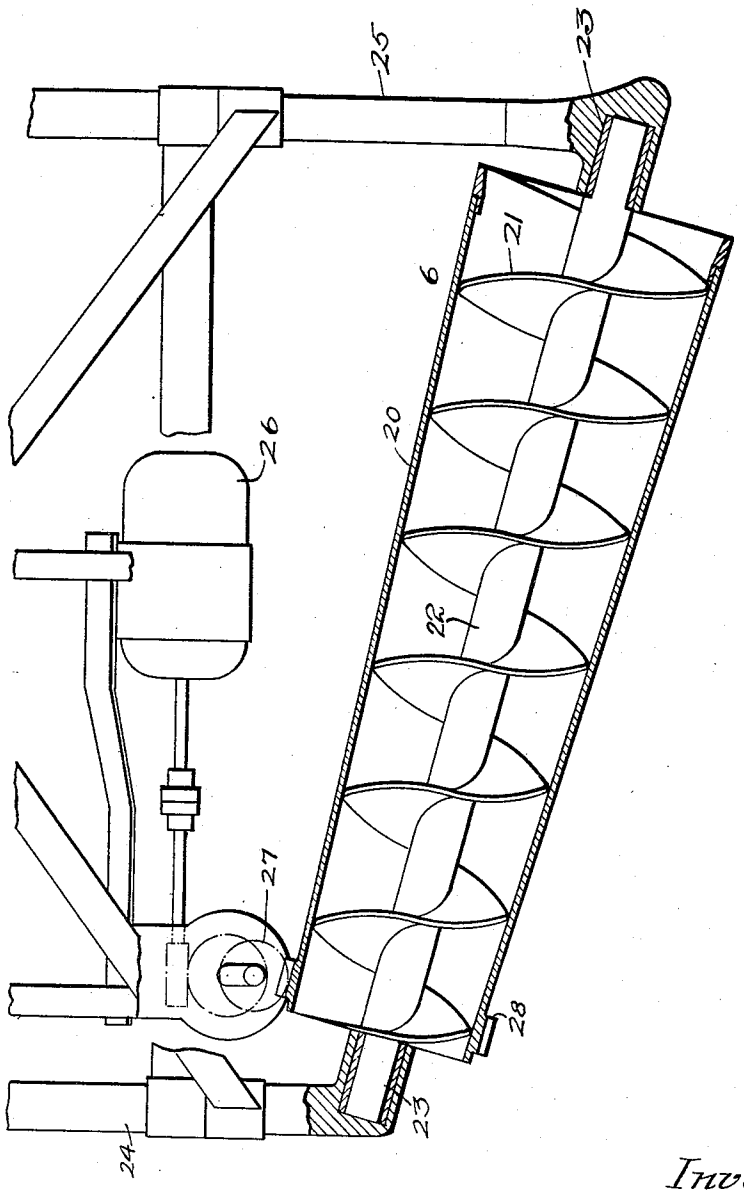


Fig. 7.

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Feb. 17, 1931. W. ELMER 1,793,389

BALLAST CLEANING APPARATUS

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Fig. 10.

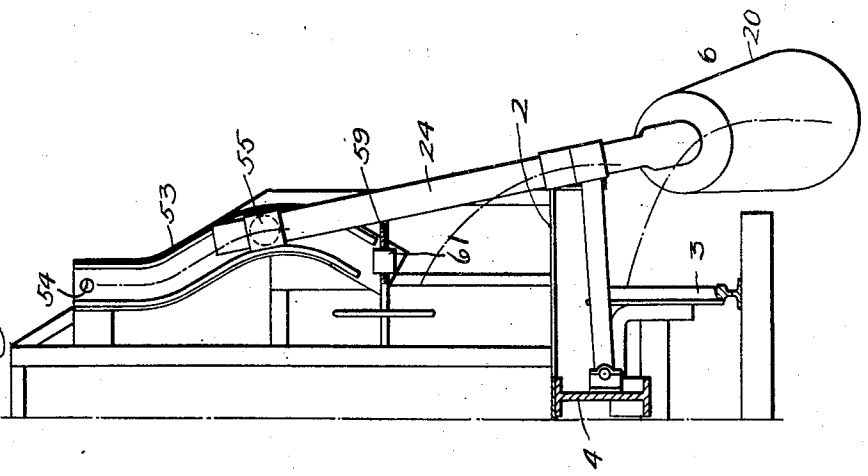


Fig. 9.

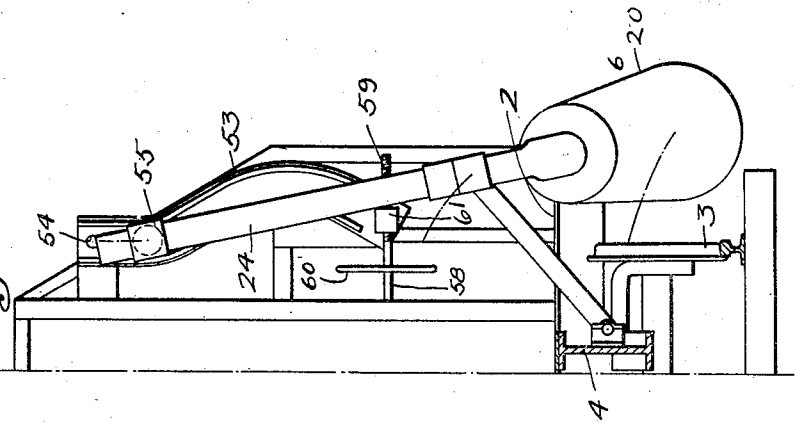
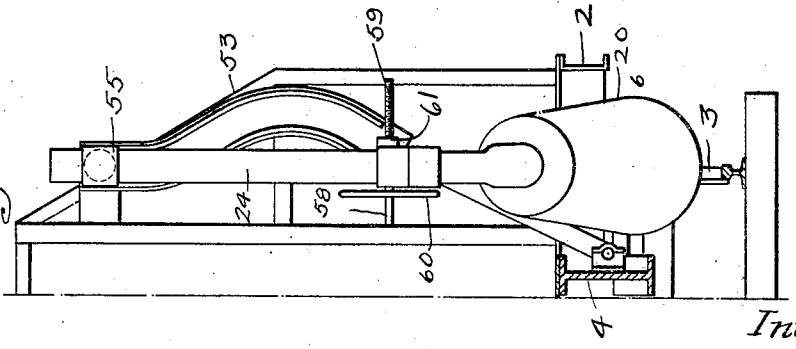


Fig. 8.



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Patented Feb. 17, 1931 1,793,389

UNITED STATES PATENT OFFICE

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BALLAST-CLEANING APPARATUS

Application filed July 7, 1928. Serial No. 291,100.

This invention is directed to cleaning the ballast of railroad tracks.

As is well known, such ballast gets covered and clogged up with cinders, dirt, etc., resulting in inefficient drainage.

By my invention the ballast is picked up, screened, replaced, and the dirt removed from the track.

An object of my invention then, is to provide new and useful means for screening ballast.

Another object is to provide a rotary drum or cutter for picking up the ballast.

Another object is to provide a combination of means for picking up ballast, screening it, restoring the cleaned ballast, and removing the dirt.

A further object is to provide a movable carrier for disposing the dirt removed from the ballast into a conveyance in front of the ballast cleaner.

Other objects will present themselves as the description of the invention proceeds.

Referring more specifically to the preferred form of my invention shown in the accompanying drawings:

Fig. 1 is a side elevation of my assembled ballast cleaner, placed on suitable trucks, while

Fig. 2 is a top plan view thereof;

Fig. 3 is a detailed side elevation, on a larger scale, of so much of Fig. 1, as is shown from line 3—3 to the right;

Fig. 4 is a similar view between the lines 3—3 and 4—4; while

Fig. 5 discloses that part of Fig. 1 from line 4—4 to the left;

Fig. 6 is a vertical transverse section taken on line 6—6 of Fig. 1;

Fig. 7 shows detailed side elevation of one of the front cutters, parts being broken away;

While Figs. 8–10 show respective rear elevations of the cutter raising mechanism in raised, partly lowered and lowered positions.

As shown in Fig. 1, the invention broadly comprises a platform 2, 2 carried on trucks having wheels 3. Carried by the trucks are two sills of any suitable section, one of which is shown at 4.

The car as a whole will be seen to be braced by suitable framework, substantially similar in design to bridge trusses.

On each side of the car near the front end thereof, a movably mounted frame supports a cutter. One of such frames is shown at 5 supporting the cutter 6.

When lowered into operative position these cutters 6 will dig up the ballast from the road bed and discharge it into carriers 7, from whence it is discharged into the hoppers 8 of shaker and screening mechanisms 9.

From the screens the clean ballast is carried rearwardly over belts 10, one of which is provided for each cutter 6, and is then discharged into a bunker 11.

The dirt from the screen mechanism is carried by belts 12 to a chute 13, from whence it is fed to a forwardly traveling belt 14, by means of which it is discharged into a car arranged ahead of the ballast car.

The belt 14 is mounted on a movable framework 50 arranged at a slight angle to the horizontal, and which is designed to be moved forwardly by any suitable mechanism.

At 15 is shown one of two rearwardly mounted cutters, the ballast being screened in this case, through openings in the conical frame of the cutter, and discharged directly from the rear end into the trough formed between adjacent tracks. The cutters 15 are mounted on frames 16 similar to frames 5.

At 17 is shown one of two replacement cutters. If one of the cutters normally in service becomes inoperative for any reason, all that is necessary is to bring either of two cranes 18, pivotally mounted at 19, into operative position, to remove the defective cutter, and to properly position the replacement cutter.

Referring more particularly to Figs. 3 and 7, it will be seen that the cutters 6 comprise a conical shell 20, of metal, having fixed therein a screw-feed member 21, the shell 20 and member 21 being rotatable as a unit.

Centrally located with respect to screw member 21 is a shaft 22, by means of which

the drum 6 is journalled at 23, 23 in arms 24, 25 of framework 5.

From a motor 26 suspended in the frame 5, power is transmitted by suitable means to a spiral gear 27 operating an annular spiral gear 28 secured to the exterior of the upper and smaller end of the cutter 6.

From the cutters 6 the ballast and dirt are discharged into containers 29, from which the material is scooped up and carried upwardly by means such as buckets 30, mounted on chains or belts 31 passing over sprockets or pulleys 32, 33. The sprockets or pulleys 32, 33 may be vertically adjustable by means shown at 34, in order to maintain proper tension on belts 31.

Affixed to the same shaft as sprocket or pulley 33 is a sprocket or pulley 35, driven through any suitable means from a power source, such as motor 36.

From the buckets 30 the material is dumped into hopper 8, from whence it is fed onto the screening mechanism 9, comprising a screen 38 provided with upper and lower spouts 39, 40, preferably trough shaped.

The screen 38 is loosely mounted at 41 so that it may be rocked by any desirable means, such as a rod 42 extending downwardly from the screen and contacting with a rotary cam 43, operated through suitable connections by a convenient power source such as a motor 44.

The screen by its vibrating motion, shakes the dirt from the ballast, discharging the ballast onto a conveyor, which here takes the form of a belt 10, by which it is carried upwardly and backwardly to the top of hopper 11, into which it is discharged.

The dirt is carried from nozzle 40 to belt 12 up to hopper 13, where it is loaded through spout 45 onto a forwardly traveling belt 14, from where it is carried to a dump-car (not shown) located forwardly of the ballast-cleaning car.

As will be seen from Fig. 4, the belts 10 and 12 may be actuated by a common drive pulley 46, supplied by any suitable power source. The pulley 46 is preferably journalled in the floor of the car.

At its other end, belt 12 may be properly adjusted by a tensioning device 47 which adjustably supports pulley 48.

Belt 10 travels over pulley 49, also provided with adjusting means, and discharges into bunker 11.

Suitable power means may be employed to operate belt 14.

The framework 50 on which the belt 14 is supported, may be movably mounted by means of rollers 51 to slide upwardly and outwardly on track 52, which terminates just beyond the replacement cutter, as shown in Fig. 4. The frame 50 may be operated by any suitable windlass construction.

In Fig. 5 is shown one of the rearwardly located cutters 15. This cutter is quite similar to cutter 6, except that its conical frame has a plurality of slots 20*a*. The ballast coming up the screw threaded interior will be relieved of its dirt which sifts through the slots 20*a* back into the roadbed.

The cutter further differentiates from cutter 6 in that its ballast thus cleaned is discharged from the rear end directly onto the track.

In Figs. 8–10 are shown the details of an unique arrangement for raising and inwardly swinging or for lowering and outwardly swinging the cutter. Referring particularly to these figures and to Fig. 7, an irregular S-shaped track 53 is pivoted to the frame at 54, and accommodates a follower 55 mounted on the front arm 25 of the frame of the cutter 6.

This track 53 guides the cutter frame into its proper lowered or raised position. To raise the frame of the cutter a pulley 56 is shown in Fig. 3, over which a cable is passed, connected at one end to the upper portion of post 25, and to its other end to a suitable windlass, operated by motor 57.

The pivoted track may be pushed inwardly or outwardly by any suitable means which here comprises a rotatable shaft 58 threaded at one end 59 and having a hand wheel 60 near the opposite end.

A bearing is provided in the frame of the ballast car for that end of the shaft near the hand wheel, while a lug 61 on the end of track 53 through which the shaft is threaded, provides the other bearing.

As will be seen, if the track 53 is shoved outwardly, the frame 5, pivoting about follower 55 as a center, will swing the cutter 6, so that its position between adjacent tracks may be accurately adjusted.

The operation is as follows:

The car in the present instance is approximately 80 feet long, and is pushed along by a locomotive or under its own power, as the case may be. The cutters are lowered into the road-bed outside the tracks, and motors 26 operated to cause the cutters to operate.

As the car moves forwardly the front cutters will dig up the ballast, discharging it from their rear ends into containers 29, where it is hauled upwardly by buckets 30 and discharged onto screens 9, where it is oscillated to shake down the dirt.

The clean ballast is then passed upwardly and backwardly to container 11, from whence the ballast is fed back to the road-bed through orifices in the bottom of the tank.

At the same time the dirt from the screen 9 is passed rearwardly and upwardly to a point where it is discharged into a hopper 13, from whence it is fed forwardly and upwardly on belt 14, to a car carried in front of the ballast cleaning car. The movable frame 80 on which the belt 14 is carried is arranged to dump the dirt into the front

part of the dump car, and is then moved rearwardly so that the rear part of the car will be loaded.

After the front cutters pass over the passage-way the rear cutters 15 will cut slightly deeper or to one side, and the ballast so picked up will be sifted by means of openings 20*a* of the drums, the dirt forming a porous bedding. On this bedding the clean rock from the rear of the cutters 15 will be deposited. By this time, the ballast from the front cutters will have been properly screened, passed rearwardly into the reservoir 11 and will begin to deposit on the bedding on top of the rock from cutters 15.

In this way the passage way will have been reballasted, the dirt having been removed, and the remainder packed down as a bedding on which the clean ballast will be deposited.

The position of the cutters in the road-bed may be accurately adjusted by means of a hand wheel 60, thus insuring ample clearance from the adacent tracks. When coming to an intersection or cross over the cutters may be raised by mechanism previously described, through operation of motor 57. At this time there will be enough ballast in the buckets 30, screen 9, on belts 10, and in hopper 11 to insure the remainder of the trough up to the intersection being properly ballasted.

By these means the ballast can be removed to a distance as great as 30 inches below the level of the ties.

By using a continuously operating rotary cutter, the hills and valleys in the road-bed resulting from the operation of the clam shell bucket mechanism of the prior art is avoided, and a smooth, evenly packed passage providing excellent drainage, results from the use of my invention.

I claim:

1. In a ballast cleaning machine, a movable frame for a ballast-cutter, a ballast-cutter mounted in said frame, an irregular sinusoidal track for said frame, a follower for said track journalled on said frame, and means for moving said frame to swing it in a path defined by the said track, to properly position said cutter.

2. In a ballast cleaning machine, a frame for said machine, a movable frame for a ballast-cutter, a ballast-cutter mounted in said movable frame, an irregular sinusoidal track pivotally mounted at its upper end on said first-mentioned frame, means adjacent the lower end of the track for moving it about its pivot point, a follower on said movable frame and engaging said track, and means for moving said movable frame to swing it in a path defined by said track to properly position said cutter.

3. In a ballast cleaning machine, a frame, a ballast cutter supported at the lower end thereof, means for substantially vertically moving the frame, and means for guiding the frame including a link pivoted at one end to said frame upon a horizontal pivot disposed intermediate the ends of the frame and at its opposite end to a fixed support, and a cam track engaging the upper end of the frame whereby as the frame moves downwardly and has its lower end forced outwardly by the link it is shifted about its pivotal connection with the link to provide an initial substantially horizontal movement and a subsequent substantially vertical movement.

4. In a ballast cleaning machine, a frame, a ballast cutter supported at the lower end thereof, means for substantially vertically moving the frame, and means for guiding the frame including a link pivoted at one end to said frame upon a horizontal pivot disposed intermediate the ends of the frame and at its opposite end to a fixed support, and a cam track engaging the upper end of the frame whereby as the frame moves downwardly and has its lower end forced outwardly by the link it is shifted about its pivotal connection with the link to provide an initial substantially horizontal movement and a subsequent substantially vertical movement whereby the cutter is brought into operative engagement with the ballast, the cam track being pivoted at its upper end to said fixed support and being adjustable at its lower end whereby the frame may be caused to swing about its pivotal connection with the link to adjust the ballast cutter transversely.

5. In a ballast cleaning machine, a frame for the machine, an irregularly-shaped track pivoted at its upper end to swing in a substantially vertical plane, and a connection between the track and the frame for swinging the track about its pivot.

6. In a ballast cleaning machine, a frame for the machine, an irregularly-shaped track pivoted at its upper end to swing in a substantially vertical plane, a connection between the track and the frame for swinging the track about its pivot, a ballast cutter frame mounted for substantially vertical movement and operatively pivotally connected with the machine frame intermediate its ends and a follower on the upper end of said ballast cutter frame and operating on said track.

7. In a ballast cleaning machine, a frame movable over a railway right-of-way, longitudinally-spaced ballast cutting means adapted to operate in the same path at different depths carried by said frame, a separating means, means for delivering the ballast from the foremost cutting means together with the dirt contained therein to said separating means, the other of said ballast cutting means constituting a separator whereby the dirt contained in the ballast cut thereby

is immediately returned to the trough formed by the removal of the ballast.

8. In a ballast cleaning machine, a frame including a ballast receptacle, ballast cutters carried by the frame and adapted to operate in the same path at different levels, a separator, means for delivering ballast and dirt excavated by the foremost ballast cutter to said separator, means for delivering the cleaned ballast received from the separating means to said receptacle and means in the other of the ballast cutters for separating the dirt from the ballast, the ballast from the second cutting device being delivered therefrom to the trough formed by the ballast cutting devices.

9. In a ballast cleaning machine, a frame adapted to move over the right-of-way, a ballast cutter carried thereby, means for separating the dirt from the ballast and for delivering said dirt to a suitable receptacle, a second ballast cutter arranged rearwardly of the first-named ballast cutter and adapted to operate in the trough formed thereby, said second ballast cutter separating dirt from ballast cut thereby and successively delivering the dirt and cleaned ballast into the trough, and means for delivering the cleaned ballast from the first-named ballast cutter into said trough upon the cleaned ballast deposited by said second-named ballast cutter.

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