Mar. 20, 1923. 1,449,075.

J. WALKER.

ROAD CLEANING MEANS.

FILED APR. 24, 1922. 5 SHEETS—SHEET 1.

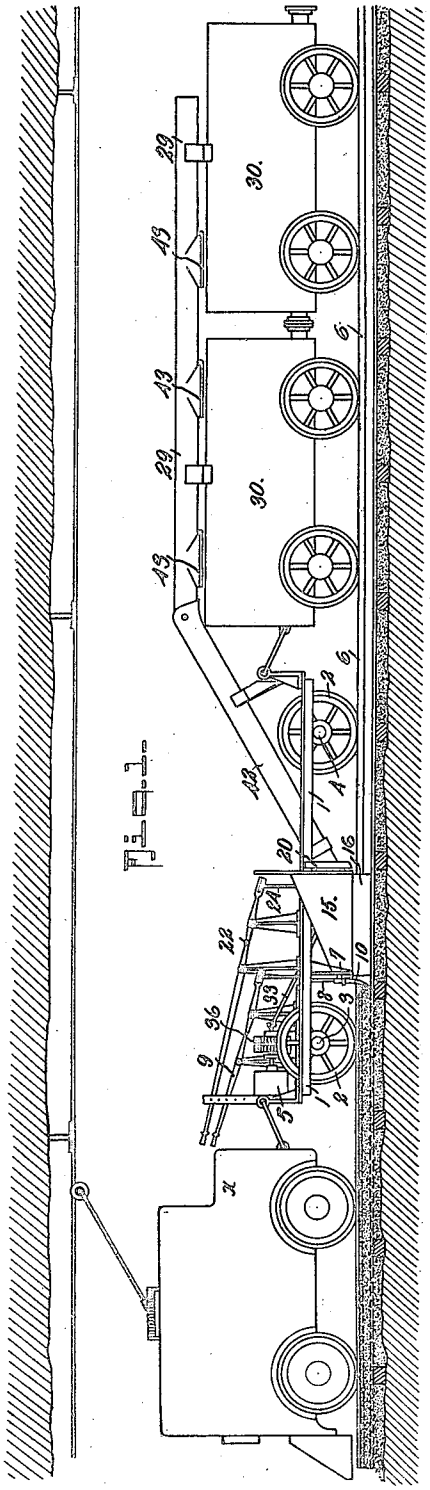


Fig. 1.

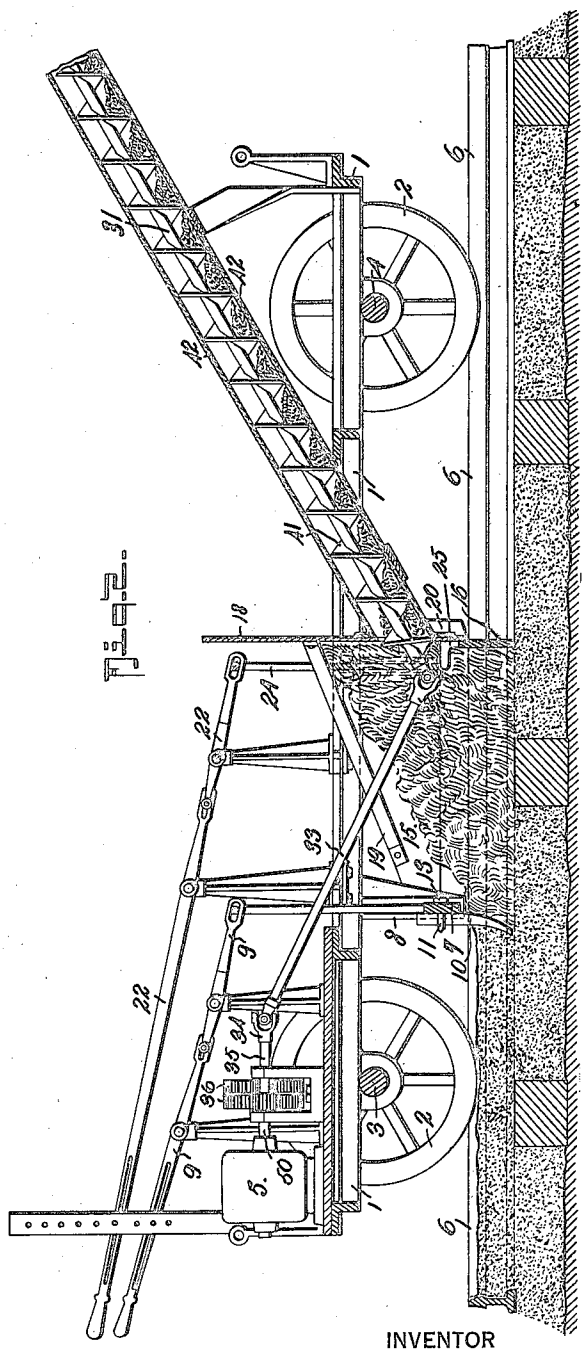


Fig. 2.

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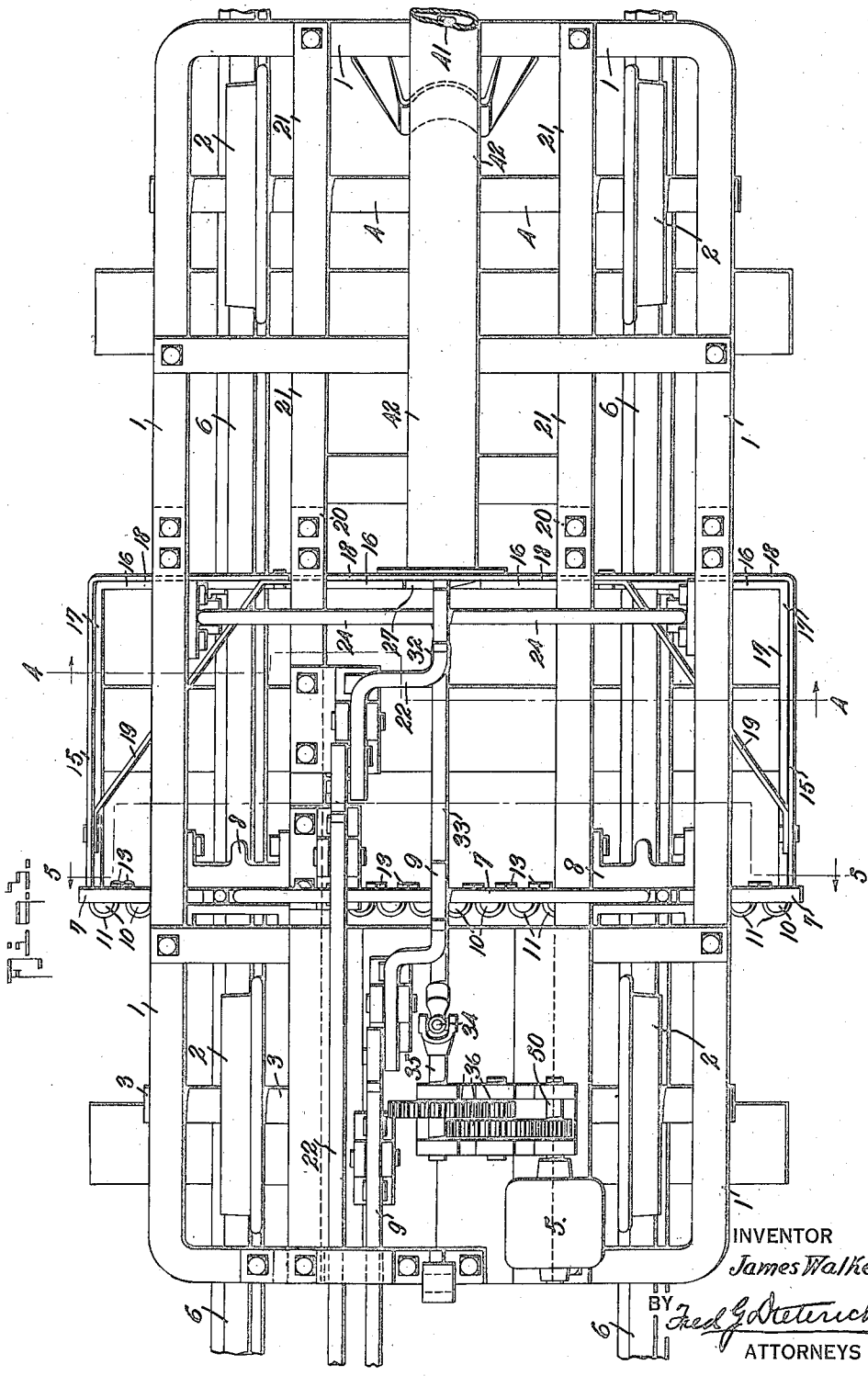
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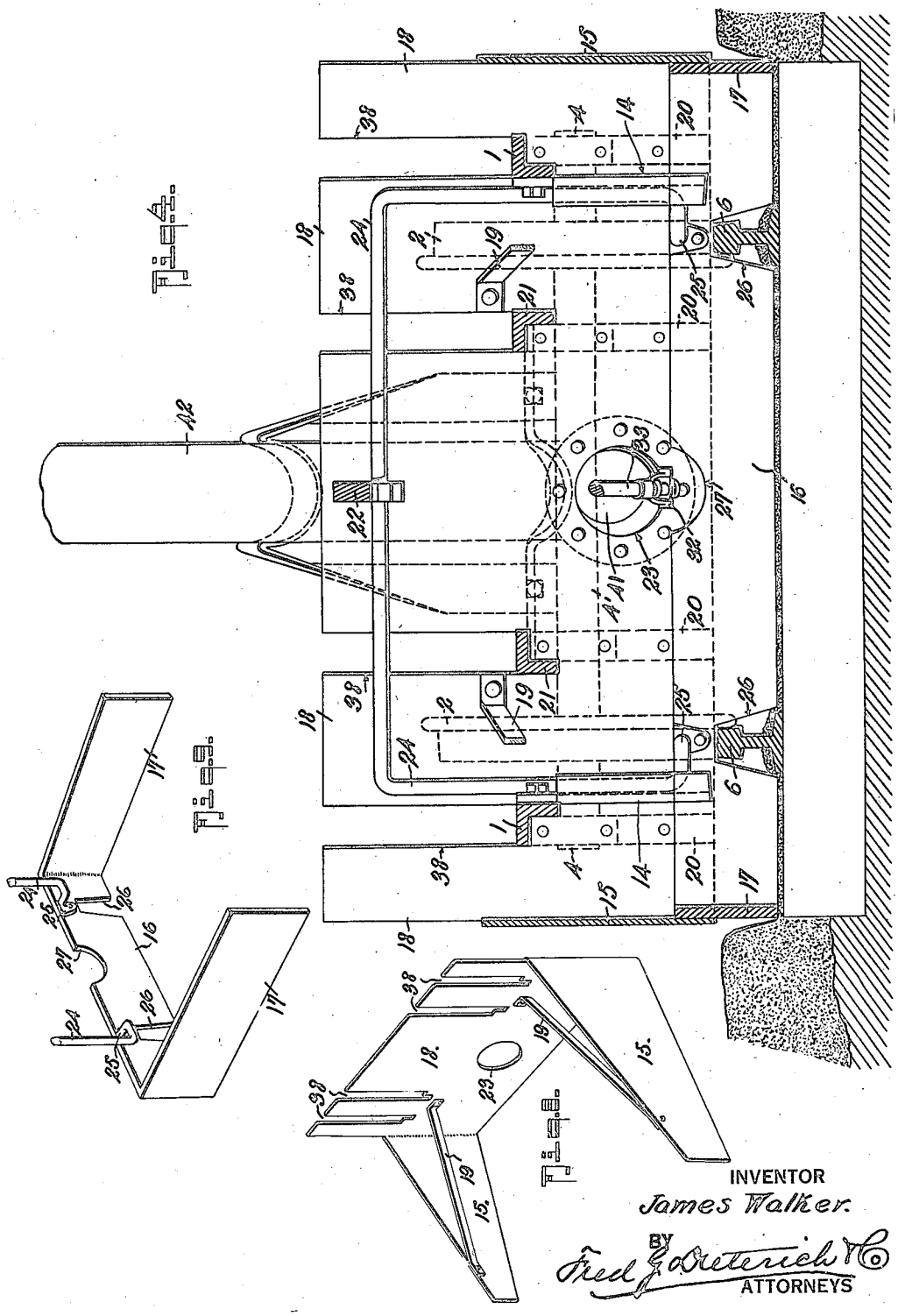


Fig. 4.

Fig. 5.

Fig. 6.

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ROAD CLEANING MEANS.

FILED APR. 24, 1922. 5 SHEETS—SHEET 4.

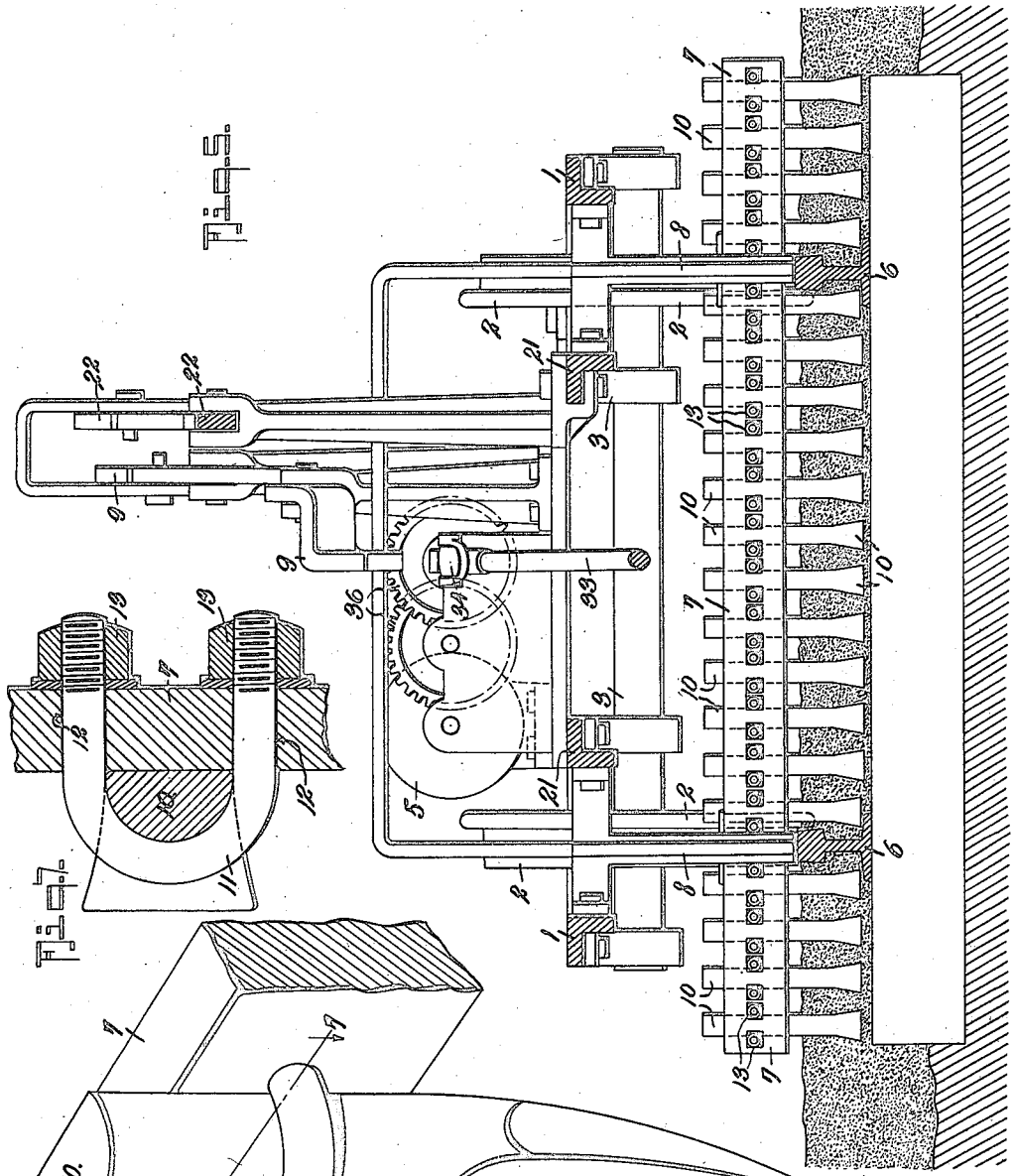


Fig. 5.

Fig. 7.

Fig. 6.

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ROAD CLEANING MEANS.

FILED APR. 24, 1922. 5 SHEETS—SHEET 5.

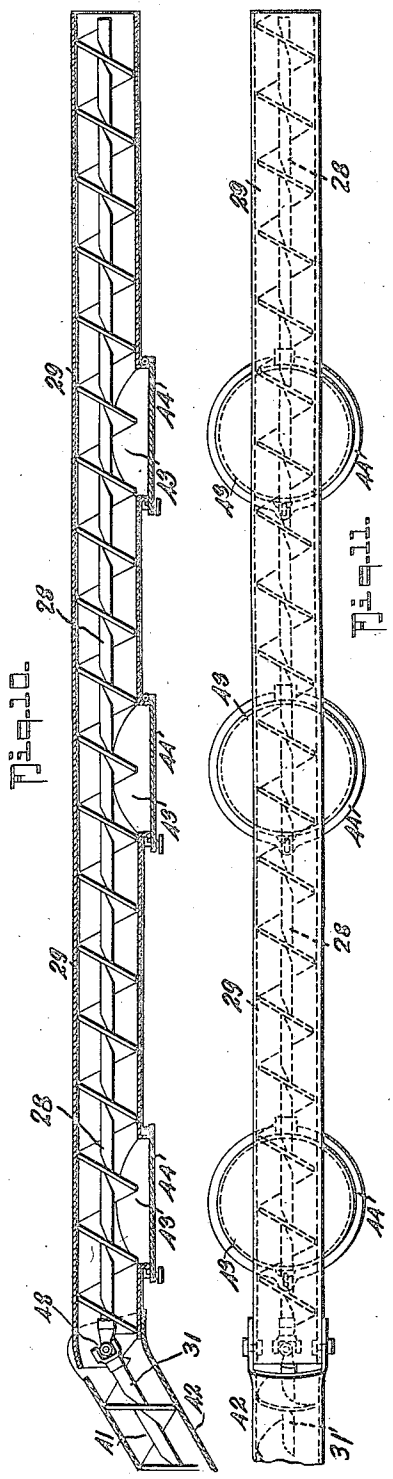


Fig. 10.

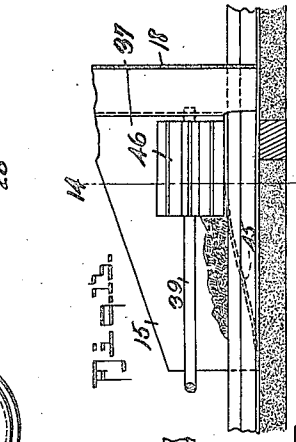


Fig. 11.

Fig. 14.

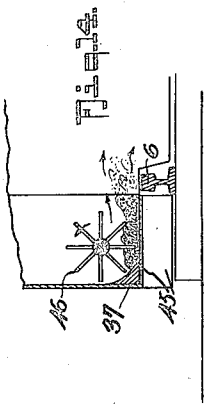


Fig. 13.

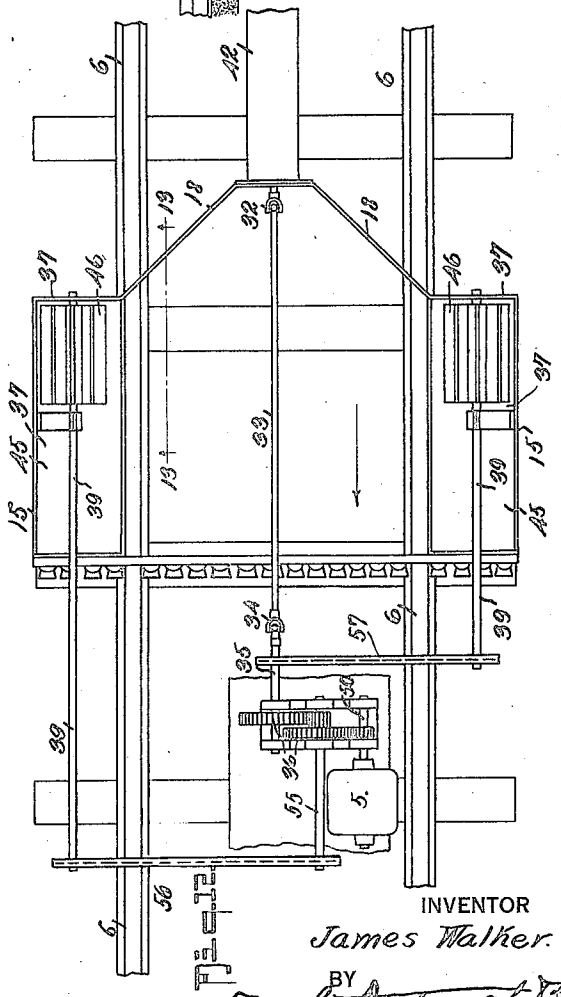


Fig. 12.

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Patented Mar. 20, 1923. 1,449,075

UNITED STATES PATENT OFFICE.

JAMES WALKER, OF NETTLETON, PENNSYLVANIA.

ROAD-CLEANING MEANS.

Application filed April 24, 1922. Serial No. 556,263.

To all whom it may concern:

Be it known that I, JAMES WALKER, a citizen of the United States, residing at Nettleton, in the county of Cambria and State of Pennsylvania, have invented a new and useful Road-Cleaning Means, of which the following is a specification.

The object of this invention is to provide a new and useful means or mechanism for road cleaning purposes and while it is generally operable for cleaning roads of loose surface material by gathering such material and conveying it into cars or discharging it at points away from the roadway, the said invention is more especially designed for cleaning mine roads and loading the cleanings into mine cars for being conveyed outside of the mine or in such places within the mine where it may be conveniently dumped.

As is well known to those familiar with coal mining, coal dropped from overhead or off the cars, onto the roadbed, as the cars are drawn along by draft animals, becomes very compact at times, due to men and animals tramping over the same, and to such extent that it usually requires much labor to dig up the compact mass and loosen it into a condition for being loaded into cars, by manual labor, with ordinary shovels.

Primarily, this invention seeks to provide a relatively simple and mechanical means whose operative parts are so combined, and are adapted to so coact, that the said mechanism performs every operation incident in cleaning mine roads or tracks of any kind.

In its more complete nature, my system of mechanical means for cleaning mine roads embodies a portable machine for simultaneously digging or loosening up the tramped roadbed, scraping the loosened bed portions in position for being constantly gathered by conveyor devices that carry off the material gathered from the road, and discharging such material into cars that trail along, the digging, scraping, gathering and the conveying of the gathered material and the loading thereof into the cars, being a continuous operation, as the second and third units of my mechanism are being pulled along by the hauling power applied to the digging, scraping, gathering and conveying mechanisms.

Another and important feature of my invention exists in the manner in which the control devices for govering the action of the roadbed digging and scraping elements are arranged, so that the motorman, who has charge of the locomotive, or other hauling power, can observe the mechanism that governs the operation of the digging devices so that when the machine is gathering road coal faster than the conveyor will load it into the trailing cars, the hauling power can be readily slowed down or brought to a stop, while the conveyor mechanism continues to elevate the loose coal gathered in front of the entrance end of the conveyor.

With the above objects and other objects in view, that will hereinafter appear, my invention comprehends a mine road cleaning means which embodies the peculiar features of construction and novel arrangement of parts, all of which will be fully stated in the following description, specifically set out in the appended claims and illustrated in the accompanying drawings, in which:

Figure 1 is a diagrammatic side elevation of the complete arrangement of my road cleaning means.

Figure 2 is a longitudinal section of the machine upon which is mounted the digging, scraping and combined gathering and conveying mechanism hereinafter specifically referred to.

Figure 3 is a top plan view of the mechanism shown in Figure 2.

Figure 4 is an enlarged cross section, taken substantially on the line 4—4 on Figure 3.

Figure 5 is a similar view, taken on the line 5—5 on Figure 3.

Figure 6 is a detail perspective view of a part of the solid digging bar with one of the digger bits operatively attached thereto.

Figure 7 is a detail horizontal section taken substantially on the line 7—7 of Figure 6.

Figure 8 is a detail perspective view of the rigidly held gathering member.

Figure 9 is a similar view of the vertically movable scraping and gathering member.

Figure 10 is a detail longitudinal section of the horizontal conveyor.

Figure 11 is a plan view of the parts shown in Figure 10.

Figure 12 is a diagrammatic plan view illustrating a modified construction of the gathering member.

Figure 13 is a detail section on the line 13—13 on Figure 12.

Figure 14 is a transverse section taken on the line 14—14 on Figure 13.

In the present showing of my invention, the same is especially constructed for use within coal mines and in the said showing of my invention the complete assemblage thereof comprises essentially three units, a hauling power, cars into which the gathered material is conveyed and loaded and a main unit which embodies the essential features of my invention since such main unit is in the nature of a machine composed of mechanical elements that operate for digging or breaking up the compact roadbed ore or coal into a loose mass, scraping up the loosened mass and piling the scrapings in condition for being lifted by a gathering conveyor which elevates the loosened material and loads the said material, gathered by the scraping elements, into cars that trail behind the said machine.

In the accompanying drawing I have shown a mechanical hauling power in the nature of a common type of mine locomotive, but such power, when conditions admit it, may be animal power, the locomotive engine being the preferred draft means since by joining the front end of the main operating mechanism to the locomotive with a high hitch and similarly hitching the rear end of the said operating mechanism or machine to the trailer car, the said machine will be constantly pulled down and held to the road rails and in proper condition for doing the desired work of digging the coal that is often embedded along the road, between and outside of the rails in a compact manner, as before mentioned.

Referring now specifically to the structural arrangement of my invention, that is, the main unit thereof, hereinafter termed the combined digging, scraping and gathering machine, the same includes a truck frame, in practice, made of stout angle iron well trussed and braced to stand the required stresses. The bed frame 1 of the truck is mounted on the common type of twelve inch or fourteen inch diameter spoke wheels, designated 2, mounted on the ends of the front and rear axles 3 and 4, and upon the forward end of the truck frame is mounted an electric motor 5 which furnishes the necessary power for keeping in action the gathering mechanism, hereinafter specifically referred to.

At a suitable position on the forward end of the truck is mounted the digging mechanism whose function is to constantly break up and loosen the coal surface compactly embedded along the road between and to each side of the track rails 6—6, and the said digging mechanism, the construction of which is best indicated in Figures 2, 3, 5 and 6 of the drawings, includes a main bar 7 which is transversely mounted upon the truck frame and is of sufficient length to extend across and beyond the opposite track rails 6—6, as shown.

The bar 7, hereinafter termed the trigger bar, is pendently supported from the truck frame at its ends in strong stout guides 8 which are pendently attached to the opposite side beams of the truck frame and the said bar 7 is held within its guides 8—8 for being raised and lowered to suit the height of the track rails 6—6 and for enabling the lifting of the digger elements high enough to permit the passage thereof over switches or for being held up out of action when conditions make such adjustments necessary or desirable.

9 designates a compound lever that is projected within convenient reach of the motorman in charge of the complete train or system and which is connected to the digger bar 7 in any suitable manner for controlling the vertical adjustment of the said bar.

In the construction shown, the digger bar, is equipped with digging bits 10 and these are shaped and attached to the bar in the manner best shown in Figures 5, 6, and 7 of the drawings, by reference to which it will be seen the shanks of the bits are half round to provide for conveniently clamping them to the bar 7 by U shaped clip bolts 11 whose ends pass through apertures 12 in the bars 7 and are secured by the nuts 13 which engage the threaded ends of the clip bolts 11. The lower ends of the bits 10 are flattened and are forwardly curved and tapered, as is clearly shown in Figure 6.

Any number of bits, depending on the particular character of the roadway or track gauge, may be attached to the digger bar. In the drawings, I have illustrated twelve bits fitted to the said bar 7 for working between the opposite rails 6—6 and four of such bits fitted to each end of the bar 7 that project beyond the rails 6—6 it being understood the bits between the rails break and loosen the road surface between such rails, while the end sets of bits dig up the surface just outside of the rails, as is clearly shown in Figure 5.

By referring more particularly to Figures 2, 3, 4, 8 and 9 of the drawings, it will be noticed that the scraping elements comprise a scraper bar 16, preferably of steel, and integrally formed with side extensions 17—17, which constitute guides for assisting in the retention of the loosened coal within the confines of the gathering mechanism, and the said bar is vertically adjustable, in a manner presently explained to permit the necessary lifting of the said bar

high enough to pass over switches or up out of active position when its use is not needed, as when the truck upon which the scraping and digging elements are mounted is being conveyed from place to place within the mine.

The scraper bar 16 cooperates with a means for gathering the scraped material that is loosened by the digging elements as they are pulled along the roadway, and the said means comprises a metal frame of substantially U-shape in plan view, whose relation to the truck upon which it is supported and the roadbed is best shown in Figure 3 of the drawings, from which it will be seen that the side members 15—15 of the said frame project forwardly from the back member 18 of such frame and extend practically to the back face of the digger bar 7, and to add rigidity to the said members 15—15, brace rods 19—19 are provided, as shown.

The scraper frame, the construction of which is shown in detail in Figure 8, has its back wall or member 18 fixedly connected to hangers 20—20 that are bolted upon the intermediate angled beams 21 of the truck frame and to permit making the back member 18 of the frame high enough to keep the gathered road material from passing over the said member, back onto the roadbed, such member 18 has vertical slots 38 to provide for conveniently fitting the same onto the truck frame. Near its lower end and midway thereof the back member 18 has an opening 23 for the passage therethrough of the receiving end of the combined conveyor and loading means presently explained.

To provide for a proper fitting of the adjustable scraper bar 16, such bar has cut out portions 26 for fitting over the track rail 6—6 (see Figure 4) and midway its length it has a semi-circular notch 27 in its upper edge, that fits around the lower end of the conveyor shaft when the said bar 16 is lifted high enough to be out of operative position, when such adjustment therefor is required.

Any suitable means may be utilized for raising and lowering the scraper bar 16. For the purpose of illustration, I have shown a compound lever 22 which extends forwardly to near the motorman's seat X on the motive power unit. The members of the lever 22 are fulcrumed on standards and the rear end thereof has an elongated slotway for receiving the lifting bail 24 whose opposite or pendent ends are fastened to the front face of the bar 16, as at 25—25 on Figure 9. The bail 24 is vertically movable in guide members 14—14.

It should be stated that in the practical development of my road cleaning mechanism, the scraping elements, before mentioned, follow along with the truck, as the road surface is being loosened up by the digging devices, and the said scraper frame drags along the loosened material and constantly gathers it into a mass or pile high enough to cover the receiving end of the pick up conveyor, as is clearly indicated in Figure 2 of the drawings.

As before stated, my invention includes a mechanical means for constantly gathering the scraped up road material and which conveys it rearwardly and loads the same into a car or cars which trail behind the truck 1.

The said gathering or offtake means comprises a main spiral conveyor 41 which works within a main tube 42 that extends rearwardly and is supported, at an upward incline upon the truck and discharges the lifted material into a supplemental horizontally disposed spiral conveyor 28 operable within a separate tube 29 which is held in a horizontal plane and extends back over the car or cars 30—30, which cars are loaded from the supplemental conveyor in the manner presently explained.

The main or spiral conveyor 41 includes a drive shaft 31, whose lower end extends beyond the mouth of the conveyor and is connected by any suitable power transmission mechanism 32, 33, 34 with a driving shaft 35, to which power is transmitted through reducing gears 36 from the motor or engine shaft 50, as is clearly shown in Figures 2 and 12, it being understood that when the conditions of the gathered mass in advance of the scraping element is such that the accumulations are more rapid than the conveyor can take them off, the traction power may be held from further forward movement as the conveyor mechanism continues to lift the gathered mass and load it back into the car.

At this point, it should be mentioned that for some work the digging and scraping mechanism may be used without the conveyor mechanism, and the gathered mass, when the said mass is of sufficient qantity, may be removed from between the digging and scraping elements by laborers with ordinary shovels.

When, however, my mechanism is in the complete form, best shown in Figure 2, the said mechanism automatically performs every operation incident to cleaning mine roads or trackways of any kind.

The main conveyor tube 42 and the supplemental conveyor tube 29 are so joined as to provide sufficient flexibility at the joint for the proper feeding of the material, as it passes from the upper end of the upwardly inclined conveyor 41, and for the proper working of the universal connection between the main and supplemental conveyor shafts.

By providing means, in the nature of a

frame with a back portion 18 and side members 15—15, as shown and described, the back member 18 of the scraper elements extends high enough to prevent the material going over the top of the said back member 18, while the loosened material at the outside of the rails is held from flowing away, laterally as it is caught up and massed with the other gathered material.

When two cars are to be loaded, as shown in Figure 1, the supplemental conveyor need not extend over the rear end of the rear car since it can stop short of such car end and in such arrangement the supplemental conveyor, when the several loading gates (presently referred to) are closed, will discharge into and load the rear half of the rear one.

Any suitable construction of gates may be employed for controlling the outflow of the material as it is being conveyed through the supplemental conveyor tube 29, for progressively filling the cars, beginning with the rear end of the rear car.

Power is transmitted to each of the shafts 39 in any suitable manner, for example, as diagrammatically shown in Figure 12, which illustrates a shaft 55 driven by the transmission gearing operated by the motor 5 and from which power is transmitted, through an endless sprocket chain connection 56, to one of the shafts 39; the other shaft 39 being driven through a sprocket and chain connection 57 that joins with the driving shaft 35.

The advantages of my invention will be readily apparent to those skilled in the art to which such invention relates. The entire mechanism is relatively simple and such that it can be readily kept in order and while the arrangement of the parts as shown and described illustrates an operative embodiment of my invention, it is to be understood that I do not limit myself to the exact details of the combinations and arrangements of the parts as illustrated, since many changes in the detailed assemblage and cooperative connection of the said described and shown parts may be made, without departing from the scope and spirit of my invention as defined by the claims.

For example, instead of lifting the material gathered on the roadbed by the digging and scraping elements, by screw conveyors as shown, the said gathered material may be removed and elevated, either to the rear of the machine or laterally thereof, by any of the well-known types of elevating mechanisms used in elevating road cleanings.

What I claim is:

1. In a mechanism for loosening roadbeds and lifting and conveying the loosened material into a car, a truck, a hauling power attached to the front of the truck, a load receiving car hitched to the rear end the truck, drag devices on the truck mounted transversely of the car for digging and loosening the roadbed, means on the said truck for gathering the material as it is loosened by the drag devices into a mass, a conveyor mounted on the truck that picks up the gathered mass and deposits it in the load receiving car, a motor on the truck, power transmission gearing that connects the motor driven shaft with the combined conveyor and lifting mass, the said drag devices including digger members that work between the rails of the roadbed on which the truck travels and other digger members that engage the roadbed outside the opposite rails, the scraping mechanism including back and side portions that engage the material loosened between and outside the track rails and move such material into a mass before the receiving end of the gathering and lifting conveyor.

2. A means for cleaning mine roadbeds comprising a hauling power, a load receiving car, a truck located between and hitched to the hauling power and the car, digger elements pendent from the truck, the said elements including digger teeth for engaging the roadbed between the rails and other teeth for digging and loosening the material at each side of the said rail and scraping mechanism supported upon and movable with the truck for gathering the road material as it is loosened between and outside the rails into a mass between such rails and the scraping and digging elements in position for being removed.

3. A means for cleaning mine roadbeds comprising a hauling power, a load receiving car, a truck located between and hitched to the hauling power and the car, digger elements pendent from the truck, the said elements including digger teeth for engaging the roadbed between the rails and other teeth for digging and loosening the material at each side of the said rail and scraping mechanism supported upon and movable with the truck for gathering the road material as it is loosened between and outside the rails into a mass between such rails and the scraping and digging elements in position for being removed, the said scraping elements including a back member, forwardly extending side members adapted for crowding the loosened material in a compact mass in advance of the back member and an offtake conveyor whose lower or receiving end projects through and in advance of the said back member, the said conveyor being upwardly and rearwardly inclined to discharge the gathered material, and a load receiver into which the said material is discharged, said receiver being coupled to and movable with the aforesaid truck.

4. A means for cleaning mine roadbeds comprising a hauling power, a truck hitched to the hauling power, digger elements pendent from the truck, the said elements including digger teeth for engaging the roadbed between the rails and other teeth for digging and loosening the material at each side of the said rail and scraping mechanism supported upon and movable with the truck for gathering the road material as it is loosened between and outside the rails into a mass between such rails and the scraping and digging elements in position for being removed, the said scraping elements including a back member, forwardly extending side members adapted for crowding the loosened material in a compact mass in advance of the back member, and an offtake conveyor whose lower or receiving end projects through and in advance of the said back member, the said conveyor being upwardly and rearwardly inclined to discharge the gathered material.

5. In a mechanism for loosening roadbed surfaces of mines and lifting the loosened material and conveying the same to a place of discharge, a hauling power, a truck hitched to said power, a digging mechanism mounted on the truck, said mechanism comprising a digger bar that extends across and beyond the opposite rails, a set of digger bits attached to and pendently supported on the bar for loosening the bed between the rails, other digger bits attached to the opposite ends of the bar for loosening the roadbed portions along the outside of and adjacent the said rails, and scraping elements on the truck frame which follow the digger elements and drag the loosened material in a confined mass along between the rails and back of the digger elements.

6. In a mechanism for loosening roadbed surfaces of mines and lifting the loosened material and conveying the same to a place of discharge, a hauling power, a truck hitched to said power, a digging mechanism mounted on the truck, said mechanism comprising a digger bar that extends across and beyond the opposite rails, a set of digger bits attached to and pendently supported on the bar for loosening the bed between the rails, other digger bits attached to the opposite ends of the bar for loosening the roadbed portions along the outside of and adjacent the said rails, scraping elements on the truck frame which follow behind the digger elements and drag the loosened material in a confined mass along between the rails and back of the digger elements, a conveyor mounted on the track whose entrance end is projected beyond the front of the scraping elements and is adapted to remove the gathered mass and which is rearwardly projected from the said scraping elements, a motor on the truck and means for transmitting the motor power from the motor to the conveyor.

7. In a mechanism for loosening roadbed surfaces of mines and lifting the loosened material and conveying the same to a place of discharge, a hauling power, a truck hitched to said power, a digging mechanism mounted on the truck, said mechanism comprising a digger bar that extends across and beyond the opposite rails, a set of digger bits attached to and pendently supported on the bar for loosening the bed betweeen the rails, other digger bits attached to the opposite ends of the bar for loosening the roadbed portions along the outside of and adjacent the said rails, scraping elements on the truck frame which follow behind the digger elements and drag the loosened material in a confined mass along between the rails and back of the digger elements, a conveyor mounted on the track whose entrance end is projected beyond the front of the scraping elements and is adapted to remove the gathered mass and which is rearwardly projected from the said scraping elements, a motor on the truck, means for transmitting the motor power from the motor to the conveyor, guides pendent from the truck frame in which the opposite ends of the digger bars have vertical movement and other like guides in which the ends of the scraper bar are mounted and separate lever controlled devices for raising and lowering the said digger and scraping elements and holding them to their adjusted positions.

8. In a road cleaning mechanism, a hauling power and a car into which the road cleanings are deposited; in combination with a truck the said truck having a high hitch at one end with the hauling power and a like hitch at the other end with the car, a series of digger elements pendent from the truck adapted for breaking up and loosening the roadbed surface as the truck travels forward, scraping elements on the truck that follow the digger elements and gather the loosened material into a mass on the roadbed between the scraping and digger elements and an elevating conveyor whose entrant end projects into the said gathered mass, said conveyor including a section that projects over and discharges into the car behind the truck, a motor on the truck and power transmission gearing that joins the motor shaft and the conveyor for imparting rotation to the said conveyor.

9. In a road cleaning mechanism of the character stated, the combination with a truck adapted for being drawn along the road rails, a digger bar disposed transversely over the roadbed and pendently supported on the truck frame, the opposite ends of the bar extending outside of the roadbed, a series of digger bits vertically disposed along the front face of the bar and along

that portion of the bar between the road rails, other bits pendent from the front face of the bar at the ends that extend beyond the said rails, and means on the truck to the rear of the digger bar that gather the material loosened by the digger bits into a mass ready for being removed from the said roadbed.

10. In a road cleaning mechanism of the character stated, the combination with a truck adapted for being drawn along the road rails, a digger bar disposed transversely over the roadbed and pendently supported on the truck frame, the opposite ends of the bar extending outside of the roadbed. a series of digger bits vertically disposed along the front face of the bar and along that portion of the bar between the road rails, other bits pendent from the front face of the bar at the ends that extend beyond the said rails, means on the truck to the rear of the digger bar that gather the material loosened by the digger bits into a mass ready for being removed from the said roadbed, means for constantly effecting the removal of the said material as it is being gathered by the scraping elements and a further means for applying motion to the said mechanism to cause such mechanism to remove the said material from between the track rails.

11. In a roadbed cleaning mechanism of the character described, a truck for engaging the roadbed rails, means on the truck for digging and loosening the roadbed while being dragged along the said roadbed, means on the truck that follow the roadbed digging and loosening means and which scrapes the loosened material into a massed pile, a combined pick up and conveying mechanism on the truck that gathers the mass, conveys and discharges it back of the truck and further means for actuating the combined pick up and conveyor devices as they are pulled along with the truck.

12. In a roadbed cleaning mechanism of the character described, a truck for engaging the roadbed rails, means on the truck for digging and loosening the roadbed while being dragged along the said roadbed, means on the truck that follow the roadbed digging and loosening means and which scrapes the loosened material into a massed pile, a combined pick up and conveying mechanism on the truck that gathers the mass, conveys and discharges it back of the truck, further means for actuating the combined pick up and conveyor devices as they are pulled along with the truck, the said material scraping means including members operable along the outside of each rail for gathering the material loosened at the outside of the rail and depositing such material laterally between the rails, and transmission gearing for imparting power from the motor to the said last mentioned devices.

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