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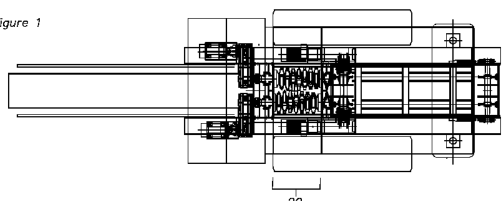
(54) Title: MOBILE MINERAL SIZER RIG

Figure 1



(57) Abstract: A mobile rig comprising a feeder including a reception hopper for receiving mineral and a feeder conveyor arranged to convey mineral; a main chassis supporting a mineral breaker; and a discharge conveyor, the mineral breaker having an entry zone region via which it receives mineral and a discharge zone via which it discharges mineral after processing in the mineral breaker, the feeder conveyor being such as to convey mineral from a mineral receiving point where mineral is received from the feed device to a mineral discharge point where mineral is discharged to the entry zone of the mineral breaker and the discharge conveyor being such as to convey mineral from the discharge zone of the mineral breaker, wherein the mineral discharge point of the feeder conveyor is generally at the same height as the entry zone of the mineral breaker.

WO 2010/094950 A2

MOBILE MINERAL SIZER RIG

This invention concerns improvements in or relating to mobile rigs and, in particular, to mobile rigs for processing and sizing dug mineral in an opencast mine.

In a typical opencast or surface mining operation, mobile shovels dig up mineral and deposit the dug mineral into dumper trucks. The dumper tracks then transport the dug mineral to a mineral processing plant located in the mine.

The mineral processing plant breaks down the dug mineral to ensure that it contains no lumps above a desired size, and so enables the processed mineral to be conveyed out of the mine either in a dry state on a conveyor belt or as a slurry in a pipeline.

Typically the mineral processing plant is a massive structure, which is purpose-built in a specific location, i.e. it is located at a fixed location within the mine.

The use of a static processing plant in an opencast mine requires the use of a fleet of dumper trucks to transport the dug mineral from the shovels to the processing plant. As mining proceeds, the shovels move further away from the static processing plant. More dumper trucks are therefore required to transport the dug mineral to the processing plant if the same rate of feed to the plant is to be maintained. Eventually an economic point may be reached where it becomes more economical to build a new mineral processing plant at a different location in the mine.

Furthermore the use of large dumper trucks is becoming less and less attractive both because of the large amounts of fuel they consume while working; and also because there is a worldwide shortage of tyres for the dumper trucks. Even when available the tyres can cost tens of thousands of dollars. As a result it is desirable to provide a mobile processing rig that is able to move around the mine as mining proceeds. In order to ensure a maximum throughput of processed mineral it is necessary to maintain a continuous supply of dug mineral to the mobile processing rig such that the time it spends idle is reduced to a minimum.

Therefore it can be desirable to provide a mobile rig, for processing mineral material in such a situation. For example WO2008032057 describes such a mobile rig comprising a feeder including a feed device for receiving mineral and a feeder conveyor arranged to convey mineral; a main chassis supporting a mineral breaker; and a discharge conveyor, the mineral breaker having an infeed region via which it receives mineral and a discharge region via which it discharges mineral after processing in the mineral breaker, the feeder conveyor being such as to convey mineral from the feed device to the infeed region of the mineral breaker and the discharge conveyor being such as to convey mineral from the discharge region of the mineral breaker, wherein the rig includes a primary transport carriage on which the main chassis is supported.

The provision of a primary transport carriage as described in WO2008032057 effectively enables the rig to form a mineral processing plant for processing mineral in an opencast mine which can be moved from location to location within the mine. This allows the mineral processing plant to be continuously located at relatively short working distance from the shovels, and thereby reduce the need for dumper trucks to a minimum or dispose of them altogether in situations where it is appropriate for the shovels to deposit dug mineral directly into the feed device.

As described in WO2008032057 the feeder conveyor conveys mineral from a first end where it receives mineral from the feed device or a material reception hopper to a second end discharge point where it discharges mineral to the infeed region of the mineral breaker. Typically, the first end is elevated significantly below the second end, so that the feeder conveyor conveys mineral up an incline. Typically, the discharge point is above the mineral breaker so as to give a discharge height above the entry zone of the mineral crushing device, typically not less than a metre by means of which mineral falls into the breaker in the infeed region. Thus the breaker devices in the art are essentially gravity fed.

In accordance with the invention in a first aspect, a mobile rig comprises a feeder including a reception hopper for receiving mineral and a feeder conveyor arranged to convey mineral; a main chassis supporting a mineral breaker; and a discharge conveyor, the mineral breaker having an entry zone region via which it receives mineral and a discharge zone via which it discharges mineral after processing in the mineral breaker, the feeder conveyor being such as to convey mineral from a mineral receiving point where mineral is received from a feed device to a mineral discharge point where mineral is discharged to the entry zone of the mineral breaker and the discharge conveyor being such as to convey mineral from the discharge zone of the mineral breaker, wherein the mineral discharge point of the feeder conveyor is generally at the same height as the entry zone of the mineral breaker.

The entry zone of the mineral breaker comprises the zone wherein mineral is received and mechanically worked by the mineral breaker. For example, in the typical case where a breaker comprises toothed structures on rotating shafts the entry zone might be understood as constituting the zone beginning at the elevation at which the crusher teeth are at their uppermost point of their arc in the vertical dimension and for example extending to include all of the area generally where the mineral may come into contact with the crusher teeth above the centreline of the breaker shafts.

The discharge point is generally level with this entry zone when compared with prior art systems, in the sense that there is no substantial discharge height, such as the discharge height typically in excess of one metre known in the art whereby the mineral breaker is in effect gravity fed by mineral falling freely into the breaker entry zone. Rather, in the present invention, any discharge height is small enough that the mineral does not reach free fall before it comes into contact with the crusher teeth during normal operation. Thus, the material is in practice pushed horizontally into the breaker. It will of course be appreciated by the skilled person that this fundamental difference does not require that the feeder conveyor discharge is at exactly the same elevation as the entry zone of the mineral breaker provided the discharge height is small enough relative to the general scale of operation to ensure that feed is via a substantially horizontal pushing action rather than via a substantially vertical fall under gravity.

The benefit of the proposed arrangement is that material is pushed horizontally into the mineral breaker, without the requirement of having to elevate the material first. This reduces the feeder conveyor power requirements as well as structural complexity (and hence weight) of the mobile rig.

Preferably additionally, in contrast to the prior art, the mineral receiving point of the feeder conveyor where mineral is received from the feed device is not disposed at a substantially lower elevation than the mineral discharge point where mineral is discharged to the entry zone of the mineral breaker. For example the mineral receiving point of the feeder conveyor is at substantially the same elevation as the mineral discharge point. In this arrangement it can be envisioned that the main chassis beams also perform the structural function and hence replace the main feeder beam structure. Alternatively the mineral receiving point of the feeder conveyor can be at a lower elevation than the mineral discharge point, in which case a separate feeder structure may be required.

The feeder conveyor may be provided with means to vary the relative elevation of the mineral receiving point and the mineral discharge point and/ or means to separately vary the elevation of the mineral receiving point and the mineral discharge point within these general constraints.

The discharge end of the feeder conveyor may be fixedly mounted relative to the mineral breaker such that its position relative to the mineral breaker remains the same irrespective of the orientation of the main chassis relative to the ground. This ensures that dug mineral is consistently transferred from the feeder conveyor to the mineral breaker.

The mineral reception area of the feeder may take the form of a hopper formed by hopper side walls mounted above the feeder conveyor, for example on a support chassis of the feeder conveyor to define a mineral deposit area. The feeder conveyor is preferably adapted to be loaded from both a rear end of the feeder conveyor or along either of the sides of the feeder conveyor.

Alternatively the mineral reception area of the feeder may take the form of an in-ground feeder hopper formed by walls of, for example, compacted mineral erected to surround the sides and end of a mineral deposit end of the feeder conveyor.

Preferably the mineral breaker comprises at least one breaker drum having a plurality of breaker teeth projecting generally radially therefrom, the breaker drum being rotatably mounted for rotation in a given direction to effect breakage of mineral.

Preferably the mineral breaker comprises at least two such breaker drums. Preferably the at least two such breaker drums are rotatably mounted with axes in parallel. Preferably the teeth on each drum follow a helical path along the drum and so define relatively deep helical channels extending along each drum.

Preferably the mineral breaker includes a frame having journalled therein two or more rotatable breaker shafts each supporting at least one breaker ring including a plurality of breaker tips, the dimensions of the frame being such that on rotation of the breaker shafts each breaker tip protrudes above the frame while moving along an arc corresponding to a portion of 360º rotation of the associated breaker shaft.

The mineral breaker can be orientated with its shaft axes either generally in the same direction in which material is conveyed by the feeder conveyor, or in a cross-wise orientation. In the normal case, wherein the shaft axes are horizontal, the shaft axes may thus be disposed either parallel or perpendicular to the horizontal component of the direction in which material is conveyed by the feeder conveyor. The parallel configuration would draw material away from the entry zone because of the helical scrolls of the breaker drum teeth. Equally the cross-wise configuration would have an inwardly rotating drum as the first contact point between the mineral and the breaker drum and hence it would mechanically draw the material into the intermeshing zone between adjacent shafts.

The mineral breaker may be positioned, according to either of the orientations described above, such that it fits substantially in between the main chassis beams. In this case it may be useful to use the inner walls of the main beams as the inner case walls of the mineral breaker. This will expose the chassis beams in this location to some of the breaking forces from the mineral breaking process, and as such some additional protection may be required such as reinforcing of the beams or provision of sacrificial wear plates, or both.

The mineral breaker may include a gearbox or a journal bearing and a frame defining an upwardly facing reject shelf overlying the gearbox, journal bearing or side wall of the mineral breaker and onto which, during use of the mineral breaker, rejected mineral passes, the reject shelf declining downwardly from a location corresponding generally to the lateral extent of the gearbox or journal bearing relative, to the frame. The foregoing features assist to define a reject chute at either end or a side of the mineral breaker that is more efficient than prior art reject chutes.

The rig is adapted to be mobile.

For example the rig includes at least a primary transport carriage on which the main chassis is supported.

The provision of a primary transport carriage effectively enables the rig to form a mineral processing plant for processing mineral in an opencast mine which can be moved from location to location within the mine. This allows the mineral processing plant to be continuously located a relatively short working distance from the shovels, and thereby reduce the need for dumper trucks to a minimum or dispose of them altogether in situations where it is appropriate for the shovels to deposit dug mineral directly into the feed device.

The main chassis may be supported on the primary transport carriage so as to be pivotable relative to the primary transport carriage to enable raising and lowering of the feeder relative to the ground.

The ability to raise and lower the feeder relative to the ground allows the feeder to be supported on the ground while dug mineral is deposited into the feeder, and selectively spaced from the ground to allow the rig to move to a new digging location. Preferably in such embodiments, the feeder hopper, feeder conveyor, main chassis, mineral breaker and discharge conveyor are arranged such that their combined centre of gravity lies over the primary transport carriage throughout the range of pivotal displacement of the main chassis relative to the primary transport carriage.

Maintaining the centre of gravity over the transport carriage throughout the range of pivotal displacement of the main chassis relative to the primary transport carriage ensures that the rig remains stable while moving to another digging location. As a result the time taken in moving the mobile rig to a new digging location is reduced, thereby minimizing any downtime during which the rig is unable to process mineral.

The feeder also preferably includes a rigid frame structure projecting downwardly from the chassis such that a lower end of the feeder structure is lowered to seat on the ground or raised to clear the ground solely by pivoting of the main chassis relative to the primary transport carriage.

The rigid frame is able to support the feed assembly during loading of the feeder with dug mineral and therefore reduces the likelihood of the rig failing through overloading of the feeder.

In other embodiments, the rig may include an auxiliary transport carriage arranged to support the feeder conveyor and the hopper.

The provision of an auxiliary transport carriage means that it is not necessary to support the feeder on the ground while mineral is deposited into the feed device. As a consequence it is not necessary to provide for pivotal movement of the main chassis relative to the primary transport carriage.

The provision of an auxiliary transport carriage also means that the feeder conveyor can be made longer than in prior art rigs and plant without the conveyor being over-stressed in use. This means that at any given time during use the feeder may accommodate a large throughput of mineral without the need for e.g. an over-sized hopper at the infeed end of the feeder. As a consequence the feed device may be of an essentially conventional hopper design, which has cost advantages. As a result of the aforesaid arrangement, the feeder is able to receive a large amount of dug mineral from shovels working close by and therefore is able to act as a reservoir of dug mineral. This allows time for the shovels to dig more mineral and load it into the feeder without the supply of dug mineral to a downstream processing element becoming interrupted.

Optionally the feeder conveyor and hopper are pivotally supported on the auxiliary transport carriage to negotiate ground undulations without significantly altering the orientation of the feeder conveyor and the hopper. Self-evidently such an arrangement is beneficial since the floor of an opencast mine is rarely level or flat.

Such pivotal support may be provided by supporting the feed conveyor and hopper on the primary transport carriage via a spherical joint mounting.

Preferably the primary transport carriage includes a pair of parallel, driven, ground-engaging tracks and the rig includes one or more control devices for selectively driving the respective said tracks at different speeds so as to effect steering of the primary transport carriage.

In such embodiments, the orientation of the ground-engaging tracks relative to the main chassis may be fixed in a transverse direction. This arrangement allows the rig to move alongside the shovels and/or an overland conveyor in a mine whilst maintaining the feeder adjacent the shovels for deposit of dug mineral directly into the hopper, and/or maintaining the discharge region of the discharge conveyor adjacent the overland conveyor for discharge of mineral onto the conveyor.

Alternatively the orientation of the ground-engaging tracks relative to the main chassis may be fixed such that the tracks are parallel to the longitudinal feeder conveyor axis.

Preferably the feeder and for example the secondary transport carriage supporting the feeder includes stabilisation means selectively engageable with a ground surface in use to stabilise the feeder during loading. For example there may be provided a stabiliser beam towards the rear end of the feed conveyor and/ or pairs of stabiliser pads on each side of the rear end of the feeder conveyor adapted to cause a large surface area pad to bear down onto the ground surface in use, for example by hydraulic means. This reduces the ground-bearing pressure in the region of the feeder, and for example the ground-bearing pressure on any secondary transport carriage or rear tracks during loading of the feeder.

In an alternative embodiment the rig includes first and second transport carriages on which the main chassis is supported.

The provision of first and second transport carriages allows the main chassis to be made longer to support the feeder and the discharge conveyor. This in turn means that the feeder conveyor can be made longer providing the associated advantages outlined above.

Each of the first and second transport carriages may include a single, driven, ground-engaging track, the first and second transport carriages being arranged in a spaced, parallel configuration and oriented relative to the main chassis in a fixed transverse direction. In such embodiments, the or each single, driven, ground-engaging track may be bolted directly to the main chassis. The use of single, driven, ground-engaging tracks provides a relative high load carrying capacity. However such tracks are expensive and relatively time consuming to build. Consequently, in other embodiments, the first and/or second transport carriage may be replaced by a pair of parallel, driven, ground- engaging tracks.

The use of a pair of parallel, driven, ground-engaging tracks means that each individual track is considerably smaller than the track which would otherwise be required of a single, driven, ground-engaging track carrying the same load. As a consequence the overall cost and time required to build each track is considerably less, thereby rendering the use of a pair of parallel, driven, ground-engaging tracks cheaper than a single, driven, ground-engaging track.

Regardless of whether the first and/or second transport carriage includes a single, driven, ground-engaging track or a pair of parallel, driven, ground-engaging tracks, in such embodiments the rig preferably includes one or more control devices for selectively driving the transport carriages at different speeds so as to effect steering of the rig.

To resist movement of the ground-engaging track towards either frame element on either side of each pivot joint, a buffer assembly is preferably provided on each side of each pivot joint on each side of the ground-engaging track of the first transport carriage.

This arrangement helps to resist twisting movement of the ground-engaging track between the frame elements. It thereby minimizes the otherwise damaging effects to the mechanical integrity of the pivot joints in circumstances where rotational turning moments are applied to the ground-engaging track of the first transport carriage.

Each buffer assembly may include a buffer element extending from a respective side of the ground-engaging track and a corresponding buffer element extending from a respective frame element such that buffer faces on the buffer elements abut each other.

Cooperating buffer faces are preferably shaped to maintain abutting contact therebetween during the range of pivotal movement of the ground-engaging track of the first transport carriage relative to the carriage.

This may be achieved, for example, by providing elongated buffer faces on the buffer elements extending from the frame elements. In such arrangements, the buffer face on each of the buffer elements extending from the ground-engaging track slides along the length of the buffer face of the corresponding buffer element extending from the respective frame element during pivotal movement of the ground-engaging track relative to the chassis. It is envisaged that such an arrangement could be reversed and that elongated buffer faces could be provided on the buffer elements extending from the ground- engaging track.

One or more control devices is preferably provided to selectively drive the ground-engaging tracks of the respective transport carriages at different speeds and in different directions, as required, so as to control movement of rig and effect steering thereof.

The or each control device may include a gearbox associated with each ground- engaging track. In such embodiments, the gearboxes are preferably fixedly mounted relative to the chassis and a drive shaft extending from the gearbox associated with the ground-engaging track of the first transport carriage is coupled to a drive shaft provided to drive the ground engaging track of the first transport carriage by means of a gear coupling having a floating outer sleeve.

The gear coupling having a floating sleeve maintains driving engagement between the drive shafts, accommodating both angular and radial misalignment between the ends of the shafts during pivotal movement of the ground-engaging track relative to the chassis.

The second transport carriage may include a single, driven, ground-engaging track or a pair of parallel, driven, ground- engaging tracks, the use of a pair of parallel, driven, ground-engaging tracks providing the associated advantages outlined above.

In yet further embodiments according to any of the aspects of the invention outlined above, the discharge conveyor may be a fixed conveyor extending at a single and uniform angle between the discharge region of the mineral breaker to the discharge section of the discharge conveyor. The discharge conveyor conveys mineral from the discharge region of the mineral breaker to a discharge section of the discharge conveyor where mineral is deposited onto a downstream device such as an overland conveyor.

In another embodiment a mineral receiving end of the discharge conveyor may be located below a discharge chute of the mineral breaker to receive and convey mineral from the discharge region of the mineral breaker towards a mineral discharge end, the discharge conveyor being pivotable to permit adjustment of the angle of inclination of the discharge conveyor relative to level ground.

In other embodiments, the discharge conveyor may include a transfer section fixed generally parallel to level ground below a discharge chute of the mineral breaker to receive and convey mineral from the discharge region of the mineral breaker towards a discharge section of the discharge conveyor which is pivotable relative to the transfer section of the discharge conveyor to permit adjustment of the angle of inclination of the discharge section of the discharge conveyor relative to level ground.

The provision of a transfer section fixed generally parallel to level ground below the discharge chute of the mineral breaker enables a better seal to be created between the discharge chute and the discharge conveyor. It also provides greater clearance for the deposit of mineral onto the discharge conveyor when compared with arrangements in which the discharge conveyor extends at an angle to level ground below the discharge chute. This increase in clearance below the discharge chute helps to eliminate the compaction of mineral between the discharge chute and the discharge conveyor. This in turn allows a longer mineral breaker to be used having a comparatively larger discharge chute.

The ability to pivotally adjust the discharge section of the discharge conveyor allows the rig to accommodate variations in ground terrain while ensuring that the discharge section of the discharge conveyor is positioned as desired relative to a downstream element, such as an overland removal conveyor.

In yet further embodiments according to any of the aspects of the invention outlined above, the discharge conveyor may include a transfer section extending from the discharge region of the mineral breaker to convey mineral from the discharge region of the mineral breaker to a transfer region where it transfers mineral to a discharge section of the discharge conveyor, the transfer section of the discharge conveyor being fixed at a predetermined angle relative to level ground and the discharge section of the discharge conveyor being pivotable relative to the transfer section of the discharge conveyor to permit adjustment of the angle of inclination of the discharge section of the discharge conveyor in relation to level ground.

In such embodiments, the discharge section of the discharge conveyor is preferably hingedly mounted on the main chassis to permit rotation of the discharge section relative to the main chassis. This allows the discharge section to slew relative to the main chassis in the horizontal plane and may include a slewing motor, or preferably hydraulic rams, to effect selective, powered rotation of the discharge section of the discharge conveyor relative to the main chassis.

The invention is illustrated by way of example only with reference to figures 1 to 4 of the accompanying drawings which represent different embodiments of the rig of the invention, in each case in side elevation and plan view.

A mobile rig 10 according to these embodiments of the invention is shown in figures 1 to 4, and in each case includes a main chassis 12 mounted on a primary transport carriage 14. The mobile rig also includes a feed device in the form of a hopper 16 and a feeder conveyor 18 arranged to convey mineral deposited in the hopper to an infeed region of a mineral breaker 20 mounted on the main chassis.

The feeder conveyor 18 is preferably of a plate type having a continuous chain of flights. A feeder conveyor is disposed horizontally and with a discharge end at the same height as the infeed region of the mineral breaker 20.

In figures 1 and 3 a stabiliser beam 21 is provided towards the rear end of the feed conveyor adapted to cause a large surface area pad 23 to bear down onto the ground surface in use, for example by hydraulic means. This reduces the ground-bearing pressure in the region of the feeder conveyor during loading.

The hopper is preferably defined by hopper side walls mounted on a support chassis 24 of the feeder conveyor so as to extend along the sides of the support chassis and across the feeder conveyor at a mineral deposit end of the feeder conveyor. The support chassis 24 may mechanically engage with or be integral with the main chassis 12.

The mineral breaker 20 may be of any suitable type, but is preferably a mineral breaker of the type having a plurality of breaker drums such as, for example, one of the mineral breakers disclosed in European patents nos. EP0167178, EP1725335 or EP1809422.

In the embodiments shown, the breaker drums of the mineral breaker extend along the length of the main chassis. In other embodiments the breaker drum may extend laterally across the width of the main chassis, or at another angle relative to the length of the main chassis.

A discharge conveyor is also provided and arranged to convey mineral from a discharge region of the mineral breaker to a downstream element, such as an overland removal conveyor (41 in figures 1 and 2, not shown in figures 3 and 4).

Transport means are provided including a pair of parallel driven, ground-engaging tracks 28 and the mobile rig includes one or more control devices (not shown) for selectively driving the respective said tracks at different speeds so as to effect steering of the primary transport carriage.

In the embodiments shown in figures 1 and 3, the ground-engaging tracks are in a longitudinal orientation relative to the main chassis. In the embodiments shown in figures 2 and 4, the ground-engaging tracks transverse orientation relative to the main chassis. In other embodiments, the main chassis may be supported on the primary transport carriage to permit rotation of the main chassis relative to the primary transport carriage.

In the embodiments shown in figures 1 and 3 a primary carriage 14 carries a pair of longitudinal parallel tracks 28 and the feeder conveyor end is secondarily supported by the pad 23. In the embodiment shown in figures 2 and 4 a primary carriage 14 carries a single track 28, and a secondary carriage 15 carries a single track 28 to support the feeder conveyor end. Other combinations are possible.

The main chassis may be supported on the primary transport carriage so as to be pivotable relative to the primary transport carriage to raise and lower the hopper relative to the ground.

The main chassis may for example be pivotally mounted to the primary transport carriage via a pivot shaft and is moved about the pivot shaft by an associated hydraulic ram assembly.

A first end of the discharge conveyor is located below a discharge chute of the mineral breaker to receive mineral discharged via the discharge region of the mineral breaker.

The discharge conveyor extends at an angle from the first end to a second end, and is preferably pivotally connected to the main chassis such that an operator is able to luff the discharge conveyor to accommodate changes in ground terrain while ensuring that the second end of the discharge conveyor remains able to discharge onto a downstream element, such as an overland removal conveyor. Luffing cylinders may interconnect the discharge conveyor and the main chassis for this purpose.

The embodiments of figures 3 and 4 are particularly adapted for this purpose. The discharge conveyor differs from the discharge conveyors of the embodiments shown in figures 1 and 2 in that it includes a transfer section 48, a first part of which is located below a discharge chute of the mineral breaker 20 to receive mineral discharged via the discharge region of the mineral breaker 20.

The transfer section 48 extends at an angle upwardly therefrom to an upper end which overlies a first end of the main discharge conveyor 26.

The main discharge conveyor section 26 extends at an angle upwardly therefrom to a second discharge end, and is pivotally connected to the main chassis such that an operator is able to luff the main discharge conveyor section 26 to accommodate changes in ground terrain while ensuring that discharge end remains able to discharge onto a downstream element, such as an overland removal conveyor (not shown).

The transfer section 48 is hingedly connected to the main chassis 12 via hinges to permit slewing of the discharge conveyor 26 relative to the main chassis 12 through a range of 120 degrees. Slewing of the discharge conveyor relative to the main chassis through ranges larger or smaller than 120 degrees is also possible.

In use the hopper 16 of the feeder is then loaded with dug mineral, which is discharged from the hopper onto the feeder conveyor 18 for conveyance to the infeed region of the mineral breaker 20.

Following introduction into the mineral breaker via the infeed region of the mineral breaker, the mineral is processed to ensure that it contains no lumps over a desired size before being discharged via the discharge chute in the discharge region of the mineral breaker onto the first end of the discharge conveyor or transfer conveyor.

The mineral is then conveyed to the second discharge end of the discharge conveyor for discharge onto a downstream element.

CLAIMS

1. A mobile rig comprising a feeder including reception hopper for receiving mineral and a feeder conveyor arranged to convey mineral; a main chassis supporting a mineral breaker; and a discharge conveyor, the mineral breaker having an entry zone region via which it receives mineral and a discharge zone via which it discharges mineral after processing in the mineral breaker, the feeder conveyor being such as to convey mineral from a mineral receiving point where mineral is received from the feed device to a mineral discharge point where mineral is discharged to the entry zone of the mineral breaker and the discharge conveyor being such as to convey mineral from the discharge zone of the mineral breaker, wherein the mineral discharge point of the feeder conveyor is generally at the same height as the entry zone of the mineral breaker.

2. A mobile rig in accordance with claim 1 wherein the mineral receiving point of the feeder conveyor is at substantially the same elevation as the mineral discharge point.

3. A mobile rig in accordance with claim 1 wherein the mineral receiving point of the feeder conveyor is at a lower elevation than the mineral discharge point.

4. A mobile rig in accordance with any preceding claim wherein the reception hopper comprises a hopper formed by hopper side walls mounted with the feeder conveyor, for example on a support chassis of the feeder conveyor to define a mineral deposit area,

and the feeder conveyor is adapted to be loaded from both a rear end of the feeder conveyor or either of the sides of the hopper.

5. A mobile rig in accordance with any preceding claim wherein the reception hopper comprises an in-ground hopper formed by walls of, for example, compacted mineral erected to surround the sides and end of a mineral deposit end of the feeder conveyor.

6. A mobile rig in accordance with any preceding claim wherein the mineral breaker comprises at least one breaker drum having a plurality of breaker teeth projecting generally radially therefrom, the breaker drum being rotatably mounted for rotation in a given direction to effect breakage of mineral.

7. A mobile rig in accordance with claim 6 wherein the mineral breaker comprises at least two such breaker drums rotatably mounted with axes in parallel.

8. A mobile rig in accordance with claim 7 wherein the teeth on each drum follow a helical path along the drum and so define relatively deep helical channels extending along each drum.

9. A mobile rig in accordance with any one of claims 7 to 8 wherein the mineral breaker includes a frame having journalled therein two or more rotatable breaker shafts each supporting at least one breaker ring including a plurality of breaker tips, the dimensions of the frame being such that on rotation of the breaker shafts each breaker tip protrudes above the frame while moving along an arc corresponding to a portion of 360° rotation of the associated breaker shaft.

10. A mobile rig in accordance with any one of claims 7 to 9 wherein the mineral breaker is orientated with its drum axes parallel to the horizontal component of the feeder conveyor direction.

11. A mobile rig in accordance with any one of claims 7 to 9 wherein the mineral breaker is orientated with its drum axes perpendicular to the horizontal component of the feeder conveyor direction.

12. A mobile rig in accordance with any preceding claim including at least one transport carriage on which the main chassis is supported.

13. A mobile rig in accordance with claim 12 wherein the transport carriage includes a pair of parallel, driven, ground-engaging tracks.

14. A mobile rig in accordance with claim 13 wherein the rig includes one or more control devices for selectively driving the respective said tracks at different speeds so as to effect steering of the transport carriage.

15. A mobile rig in accordance with claim 13 or 14 wherein the orientation of the ground-engaging tracks relative to the main chassis is fixed in a transverse direction.

16. A mobile rig in accordance with one of claims 12 to 15 wherein the rig includes first and second transport carriages on which the main chassis is supported.

17. A mobile rig in accordance with one of claims 12 to 16 further including an auxiliary transport carriage arranged to support the feeder conveyor and/or the reception hopper.

18. A mobile rig in accordance with any preceding claim including stabilisation means selectively engageable with a ground surface in use to stabilise the feeder conveyor during loading.

19. A mobile rig according to any preceding claim wherein a mineral deposit end of the discharge conveyor is located below a discharge chute of the mineral breaker to receive and convey mineral from the discharge region of the mineral breaker towards a mineral discharge end, the discharge conveyor being pivotable to permit adjustment of the angle of inclination of the discharge conveyor to level ground.

20. A mobile rig according to any of Claims 1 to 18 wherein the discharge conveyor includes a transfer section fixed generally parallel to level ground below a discharge chute of the mineral breaker to receive and convey mineral from the discharge region of the mineral breaker towards a discharge section of the discharge conveyor which is pivotable relative to the transfer section of the discharge conveyor to permit adjustment of the angle of inclination of the discharge section of the discharge conveyor to level ground.

21. A mobile rig according to any of Claims 1 to 18 wherein the discharge conveyor includes a transfer section extending from the discharge region of the mineral breaker to convey mineral from the discharge region of the mineral breaker to a transfer region where it transfers mineral to a discharge section of the discharge conveyor,

the transfer section of the discharge conveyor being fixed at a predetermined angle relative to level ground and the discharge section of the discharge conveyor being pivotable relative to the transfer section of the discharge conveyor to permit adjustment of the angle of inclination of the discharge section of the discharge conveyor to level ground.

22. A mobile rig according to Claim 21 wherein the discharge section of the discharge conveyor is hingedly mounted on the main chassis to permit rotation of the discharge section relative to the main chassis.

23. A mobile rig according to Claim 22 wherein a driving means is provided to effect selective, powered rotation of the discharge section of the discharge conveyor relative to the main chassis.

1/4

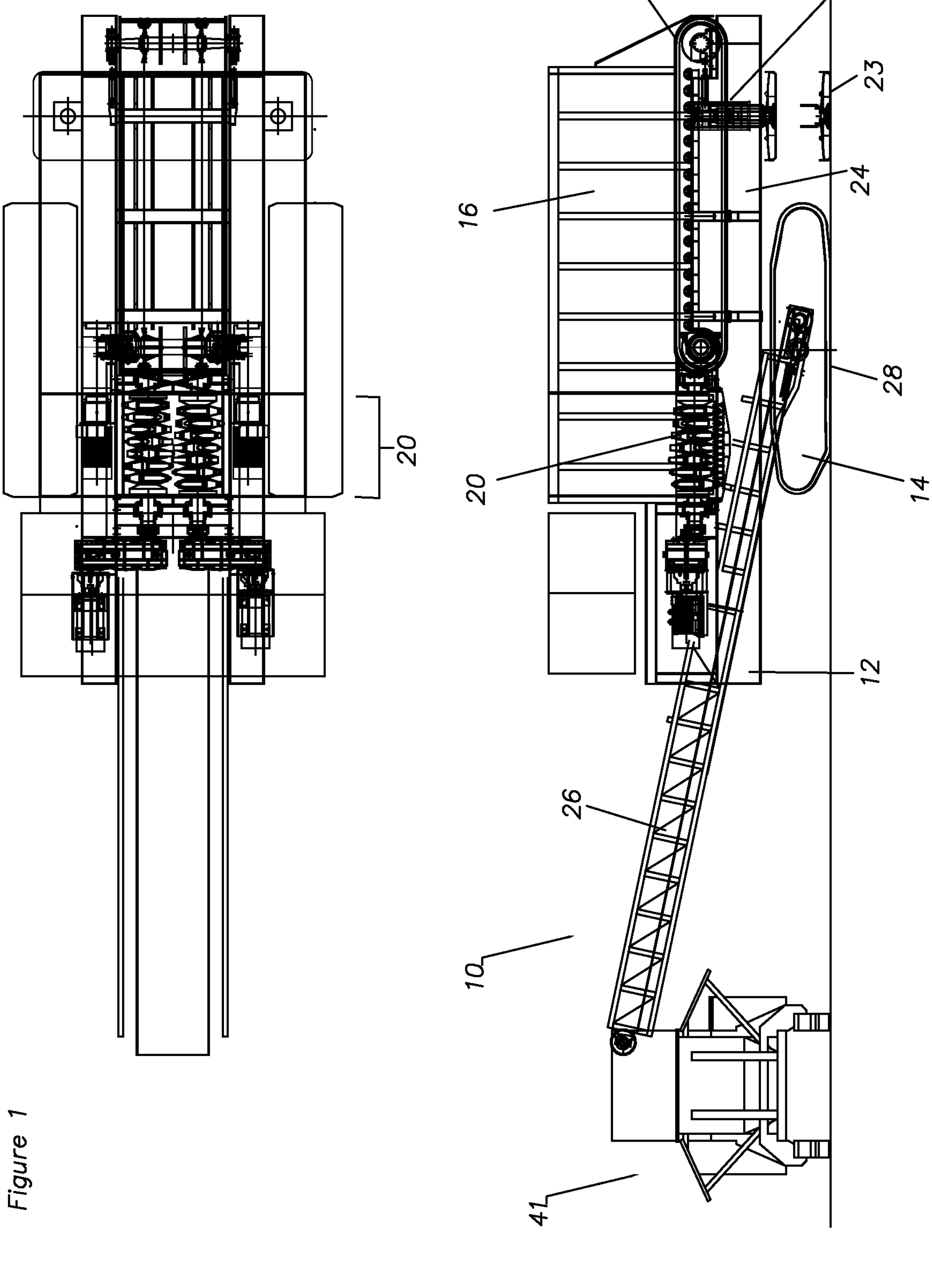


Figure 1

2/4

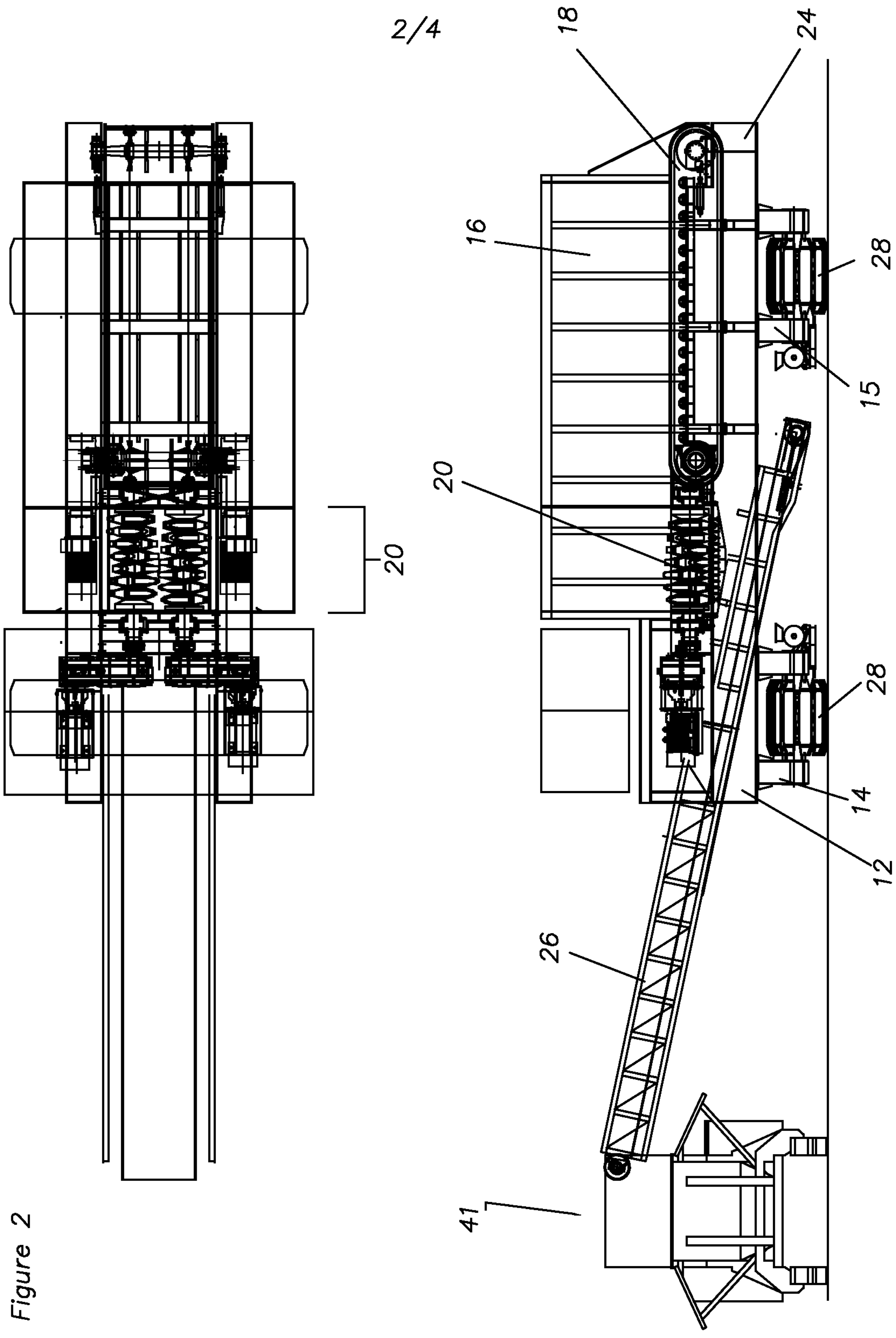


Figure 2

3/4

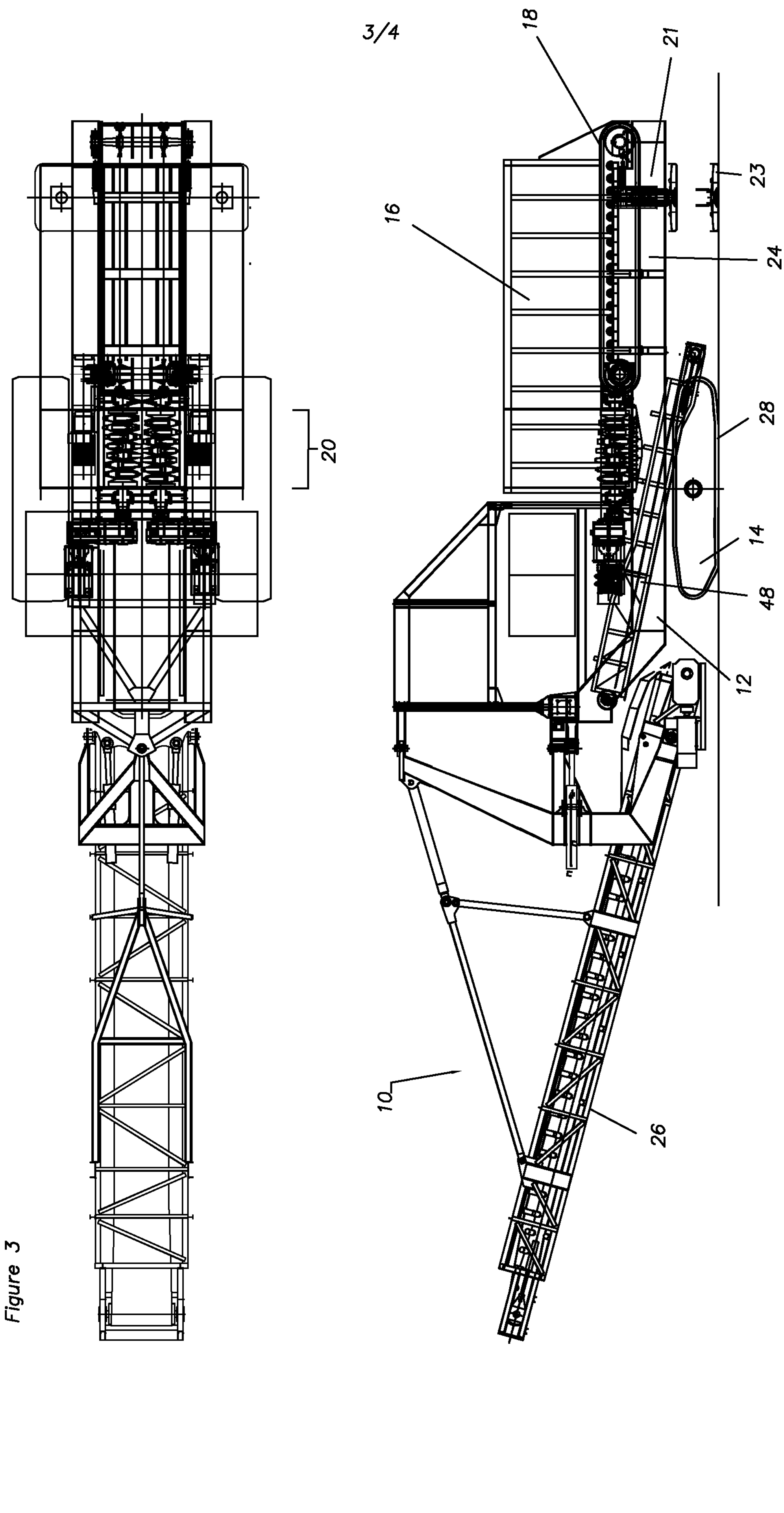


Figure 3

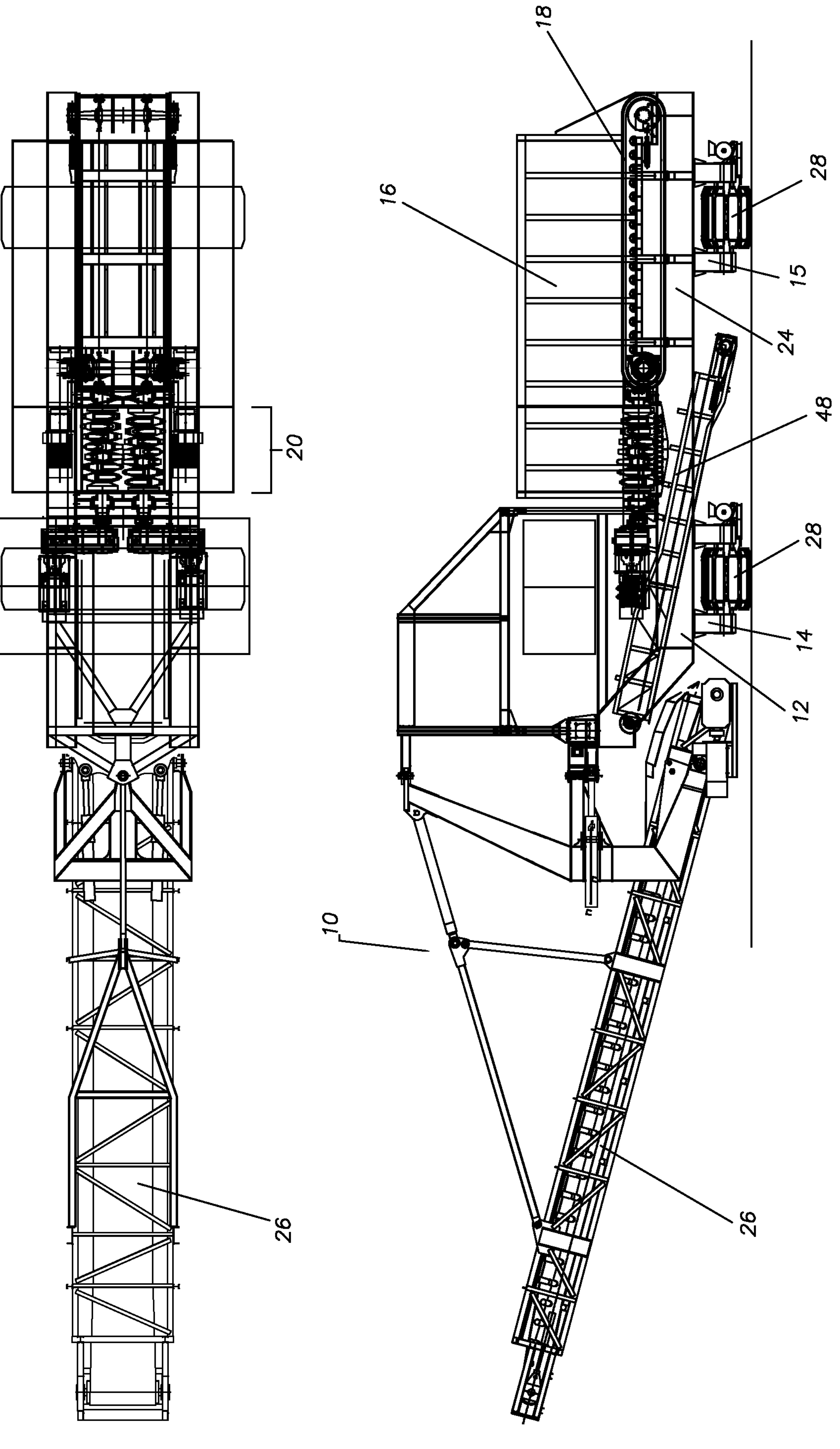


Figure 4