

[54] MINING MACHINE WITH CHAIN DRIVEN
PROPULSION

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[58] Field of Search 299/32, 34, 43-46,
299/47

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[57] ABSTRACT

A mining machine movable along an armoured flexible conveyor each pan of which is provided with a rigid longitudinal guide rod for the machine, the machine having a winch-driven chain guided into a run alongside the guide rods, and each guide rod having a series of pockets housing pegs reciprocable towards and away from the run of the chain, each pocket being open to the chain and at the end remote from the chain open to a longitudinal slot along which a shoe carried by the machine is movable, and the shoe having tapering ends, so that as the shoe moves with the machine in either direction along the guide rods the pegs are urged to project from the pockets into engagement with the links of the chain in the run alongside the guide rods, to effect the driving of the machine along the conveyor.

14 Claims, 3 Drawing Figures

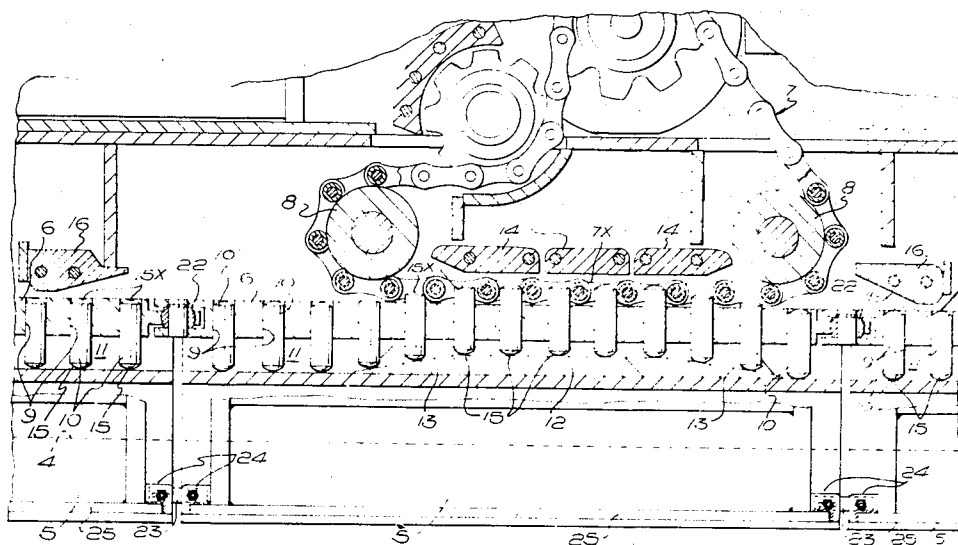


FIG. 1

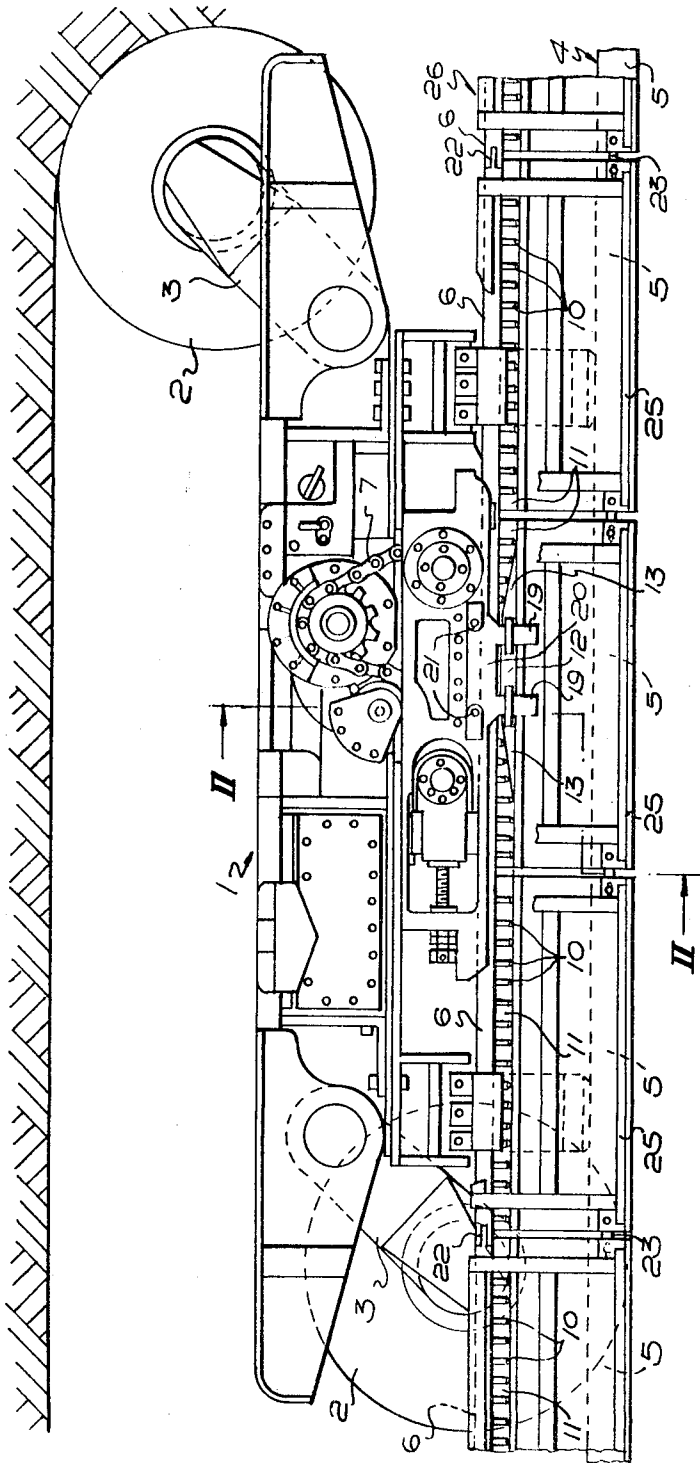
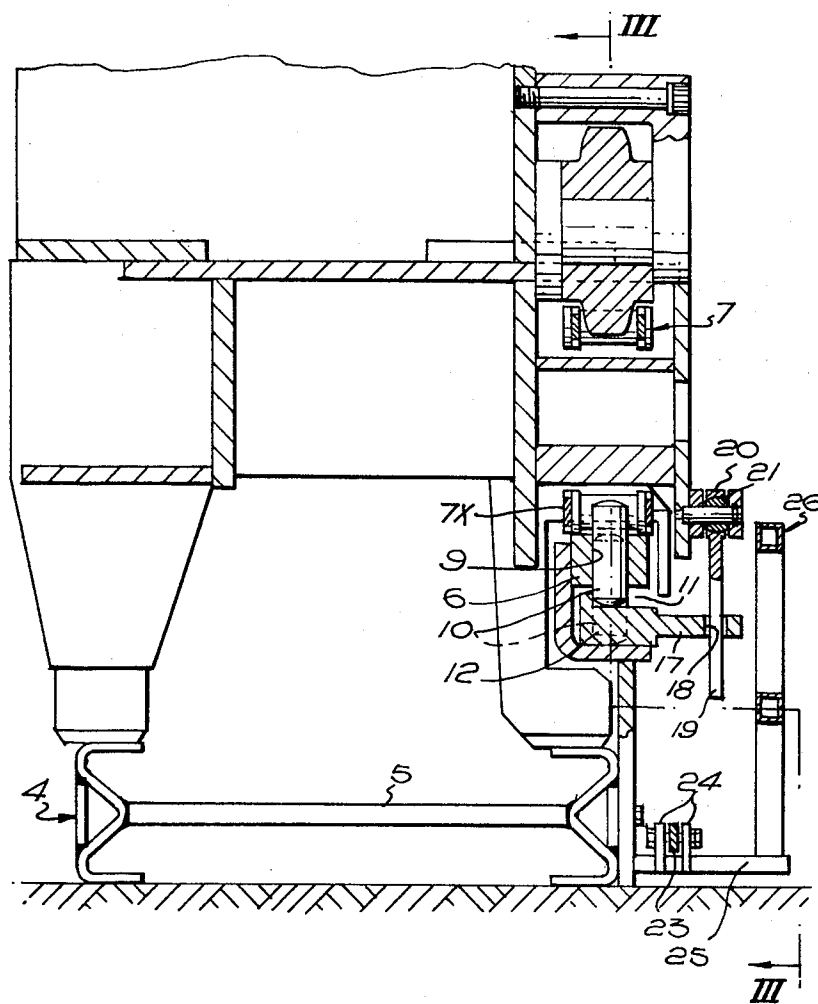
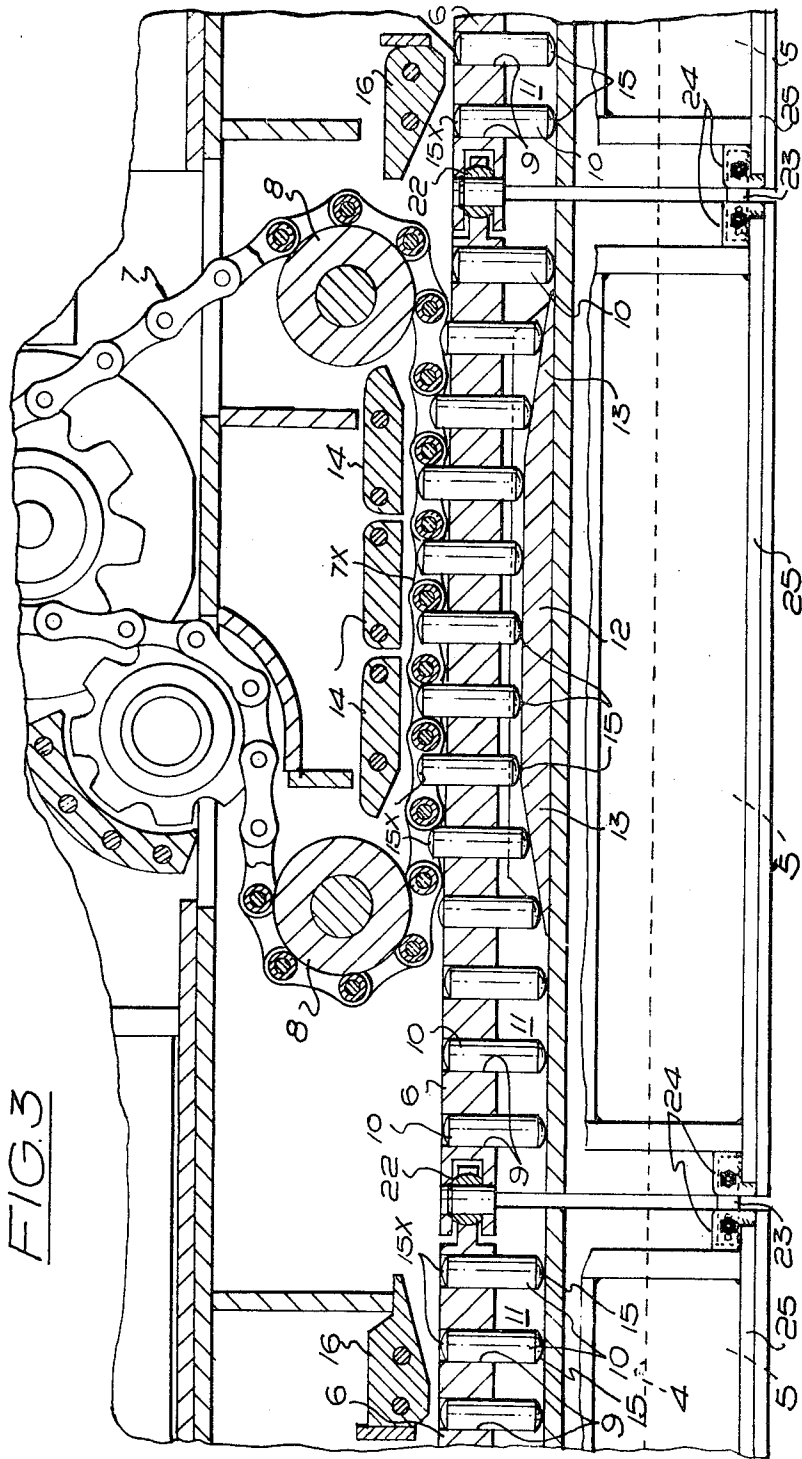


FIG. 2





MINING MACHINE WITH CHAIN DRIVEN PROPULSION

This invention relates to mining machines of the type carried by and movable along or guided by a conveyor extending along a cutting face, and is particularly concerned with means for moving the machine along the cutting face.

It is known to draw the machine by a chain winding on a winch located at one end of the cutting face, or to provide the machine itself with a winch operating on a chain stretched along the cutting face, but in either case there is a considerable danger of breakage of the chain, with consequent risk of injury to life or limb, expense of replacement of the chain and repair of any other damage, and loss of mining time.

It is also known to drive the machine along by a rack-and-pinion, but in view of the length of a cutting face the provision of a rack along the full length proves very expensive and, in addition, a rack is difficult to protect against damage and to keep free from dirt so that undue wear does not take place. Again, the expense of replacement of the rack and the repair of any damage can prove costly, both as regards the cost of the replacement and repairs, and as regards loss of mining time.

Yet again, it is also known to move the machine by effecting a drive off the conveyor, advantage being taken of the provision on an armoured flexible conveyor of rigid longitudinal guide rods adequately secured to the pans of the conveyor so that forces on the guide rods are distributed along and absorbed by the pans, and the drive being effected by hydraulic jacks connected to gripping devices operable alternatively to grip the guide rods and to move along the guide rods to establish a fresh length of operation of the cutting means. However, such a drive is intermittent and introduces complexities by way of the control for the hydraulic jacks and mechanisms for operating the gripping devices.

The object of the present invention is to enable a mining machine having a winch to be driven continuously along an armoured flexible conveyor having rigid longitudinal guide rods secured to the pans of the conveyor.

According to the present invention, a mining machine is movable along an armoured flexible conveyor each pan of which is provided with a rigid longitudinal guide rod for the machine, the machine having a winch-driven chain guided into a run alongside the guide rods, and each guide rod having a series of pockets housing pegs reciprocable towards and away from the run of the chain, each pocket being open to the chain and at the end remote from the chain open to a longitudinal slot along which a shoe carried by the machine is movable, and the shoe having tapering ends, so that as the shoe moves with the machine in either direction along the guide rods the pegs are urged to project from the pockets into engagement with the links of the chain in the run alongside the guide rods, to effect the driving of the machine along the conveyor.

The machine preferably also carries a counter-support for the chain in its run alongside the guide rods, to ensure that the pegs do not deflect the chain but are urged into full engagement with the links of the chain, and the counter-support and the shoe may be combined in a saddle carried by the machine and embracing

ing the guide rods and the run of chain alongside the guide rods. The chain may be of the plate link and roller type, and the rollers may be engaged by the counter-support.

The pegs may have rounded ends remote from the chain or they may have rollers at their ends remote from the chain, to afford easy running over the shoe.

With the chain guided into the run alongside the guide rods by a pair of sprockets (one of which may be the winch sprocket), the teeth of the trailing sprocket serves to push the pegs at least partially back as the chain leaves the run alongside the guide rods, but a pair of auxiliary shoes are preferably carried by the machine, one beyond each end of the run of the chain alongside the guide rods, to complete the pushing back of the pegs or to effect the full operation in the case where the chain is guided by rollers into the run alongside the guide rods.

The chain may be of the single-link type, or the double-link type in which case each guide rod may be provided with two series of pockets and pegs side-by-side and with longitudinal slots opening to opposite sides of the guide rod for entry of shoes from opposite sides of a saddle carried by the machine.

Conveniently, the pockets and pegs extend vertically, and the longitudinal slot (or slots) is below the pockets and the chain runs alongside above the pockets, which may be holes drilled in a solid rod. For use with a double-link chain each guide rod may be formed of a vertical plate, with spaced blocks welded (or otherwise secured) between the vertical plate and longitudinal side portions, to form the two series of pockets, and with two bars lengthwise below the pockets, to the longitudinal slots; the profiles of the longitudinal side portions determine the overall cross-sectional shape of the guide rods, and may be arcuate bars of rectangular plates according to whether a generally circular or rectangular (including square) cross-sectional shape is desired.

To facilitate cutting in both directions, with a double-ended machine, the pans of the conveyor are preferably connected together by ball-joints minimising the extent to which the pans can separate to no more than is absolutely necessary for snaking-over to a new alignment adjacent a newly-cut face. By this means the linear length of the conveyor can be fixed even though flexibility is afforded for snaking-over, and upon reversal of the machine the pull on the conveyor is substantially immediately distributed along the entire length of the conveyor, so that no one pan is required to sustain all the load.

One embodiment of the invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

FIG. 1 is a semi-diagrammatic side elevation of a mining machine and armoured flexible conveyor in accordance with the invention;

FIG. 2 is an enlarged fragmentary section taken from the line II—II of FIG. 1; and

FIG. 3 is a section taken from the line III—III of FIG. 2 but to a smaller scale.

In the Figures a mining machine 1 has a rotary cutting head 2 on an arm 3 at each end to enable the machine to cut in both directions of movement along an armoured flexible conveyor 4, each pan 5 of which is provided with a rigid longitudinal guide rod 6 for the machine, the machine having a winch-driven chain 7 guided by rollers 8 into a run 7X alongside the guide

rods, and each guide rod having a series of pockets 9 housing pegs 10 reciprocable towards and away from the run 7X of the chain between the rollers 8, each pocket 9 being open to the chain and at the end remote from the chain open to a longitudinal slot 11 along which a shoe 12 carried by the machine 1 is movable, and the shoe having tapering ends 13, so that as the shoe moves with the machine in either direction along the guide rods 6 the pegs 10 are urged to project from the pockets 9 into engagement with the links of the chain in the run 7X alongside the guide rods, to effect the driving of the machine along the conveyor.

The machine carries a counter-support for the chain 7 consisting of three bars 14 over the run 7X alongside the guide rods 6 to ensure that the pegs 10 do not deflect the chain but are urged into full engagement with the links of the chain.

The pegs 10 have rounded ends 15 remote from the chain to afford easy running over the shoe 12, and the other ends 15X of the pegs are similarly rounded so that it does not matter which way round they are inserted in the pockets 9, which are holes drilled in solid rods 6.

A pair of auxiliary shoes 16 carried by the machine (one for each direction of movement of the machine) push back the pegs 10 in the event that dirt in the pockets or in the slot 11 prevent them falling back under gravity as they leave the shoe 12. The shoe 12 does, however, serve very well to keep the slot 11 clear of dirt, while little dirt can enter the pockets 9 because they remain substantially filled by the pegs 10, even when the latter are in their lowest position. The shoe 12 has a pair of arms 17 with slots 18 into which extend fingers 19 on a plate 20 secured to the machine 1 through ball joints 21, so that the shoe can ride easily along the bottom of the slots 11 regardless of relative horizontal and/or vertical movement between the machine 1 and the conveyor 4.

The pans 5 of the conveyor 4 are connected together by ball-joints 22 between the ends of the guide rods 6, thus minimising the extent to which the pans can separate to no more than is absolutely necessary for snaking-over to a new alignment adjacent a newly-cut face. By this means the linear length of the conveyor can be fixed even though flexibility is afforded for snaking-over, and upon reversal of the machine 1 the pull on the conveyor is substantially immediately distributed along the entire length of the conveyor 4, so that no one pan 5 is required to sustain all the load. Slotted links 23 loosely bolted between brackets 24 welded to the ends of bottom plates 25 of a cable trough 26 limit the extent to which the pans 5 can incline to each other, due to undulations along the mine floor, so that the ball-joints 22 cannot be damaged.

What I claim is:

1. A mining machine movable along an armoured flexible conveyor each pan of which is provided with a rigid longitudinal guide rod for the machine, the machine having a winch-driven chain guided into a run alongside the guide rods, and each guide rod having a series of pockets housing pegs reciprocable towards and away from the run of the chain, each pocket being open to the chain and at the end remote from the chain

open to a longitudinal slot along which a shoe carried by the machine is movable, and the shoe having tapering ends, so that as the shoe moves with the machine in either direction along the guide rods the pegs are urged to project from the pockets into engagement with the links of the chain in the run alongside the guide rods, to effect the driving of the machine along the conveyor.

2. A mining machine and conveyor as in claim 1, wherein the machine also carries a counter-support for the chain in its run alongside the guide rods, to ensure that the pegs do not deflect the chain but are urged into full engagement with the links of the chain.

3. A mining machine and conveyor as in claim 2, wherein the counter-support and the shoe are combined in a saddle carried by the machine and embracing the guide rods and the run of chain alongside the guide rods.

4. A mining machine and conveyor as in claim 3, wherein the chain is of the plate link and roller type and the rollers are engaged by the counter-support.

5. A mining machine and conveyor as in claim 1, wherein the pegs have rounded ends remote from the chain.

6. A mining machine and conveyor as in claim 1, wherein the pegs have rollers at their ends remote from the chain.

7. A mining machine and conveyor as in claim 1, wherein the chain is guided into the run alongside the guide rods by a pair of sprockets, the teeth of the trailing sprocket serving to push the pegs at least partially back as the chain leaves the run alongside the guide rods.

8. A mining machine and conveyor as in claim 1, wherein the chain is guided by rollers into the run alongside the guide rods.

9. A mining machine and conveyor as in claim 8, wherein a pair of auxiliary shoes are carried by the machine, one beyond each end of the run of the chain alongside the guide rods, to push back the pegs.

10. A mining machine and conveyor as in claim 1, wherein the chain is of the single-link type.

11. A mining machine and conveyor as in claim 10, wherein the pockets are holes drilled in solid rods.

12. A mining machine and conveyor as in claim 1, wherein the chain is of the double-link type and each guide rod is provided with two series of pockets and pegs side-by-side and with longitudinal slots opening to opposite sides of the guide rod for entry of shoes from opposite sides of a saddle carried by the machine.

13. A mining machine and conveyor as in claim 12, wherein each guide rod is formed of a vertical plate, with spaced blocks welded between the vertical plate and longitudinal side portions, to form the two series of pockets, and with two bars lengthwise below the pockets, to the longitudinal slots.

14. A mining machine and conveyor as in claim 1, wherein the pans of the conveyor are connected together by ball-joints minimising the extent to which the pans can separate to no more than is absolutely necessary for snaking-over to a new alignment adjacent a newly-cut face.

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