

[54] MINERAL MINING INSTALLATIONS
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[22] Filed: **July 8, 1971**
[21] Appl. No.: **160,636**

[30] **Foreign Application Priority Data**
July 8, 1970 Germany..... 2033807
[52] U.S. Cl..... **299/32, 299/14, 299/34**
[51] Int. Cl..... **E21c 27/35, E21c 37/16**
[58] Field of Search..... 299/14, 31, 32, 34, 1

[56] **References Cited**

UNITED STATES PATENTS			
910,500	1/1909	Case	299/14 X
1,284,398	11/1918	McKinlay.....	299/14 X
1,554,723	9/1925	Hamilton	299/14 X
3,357,742	12/1967	Dommann et al.....	299/32
3,759,575	9/1973	Boyd et al.....	299/14

FOREIGN PATENTS OR APPLICATIONS			
942,137	11/1963	Great Britain	299/34

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Zinn & Macpeak

[57] **ABSTRACT**

An installation for mining non-carbonaceous minerals which has a longwall conveyor as used in coal mining workings, support chocks connected to the conveyor via shifting rams and a plough guided for movement along the conveyor. Each support chock has allocated thereto a heating device which is displaceable in relation to the conveyor. The heating devices are collectively used to heat a mineral face which is to be mined and the devices are moved from a position adjacent the face in order to allow the plough to proceed along the conveyor to detach the pre-heated mineral in known manner. Various measures are adopted to enable the installation to cope with the high ambient temperatures produced by the heating devices.

32 Claims, 5 Drawing Figures

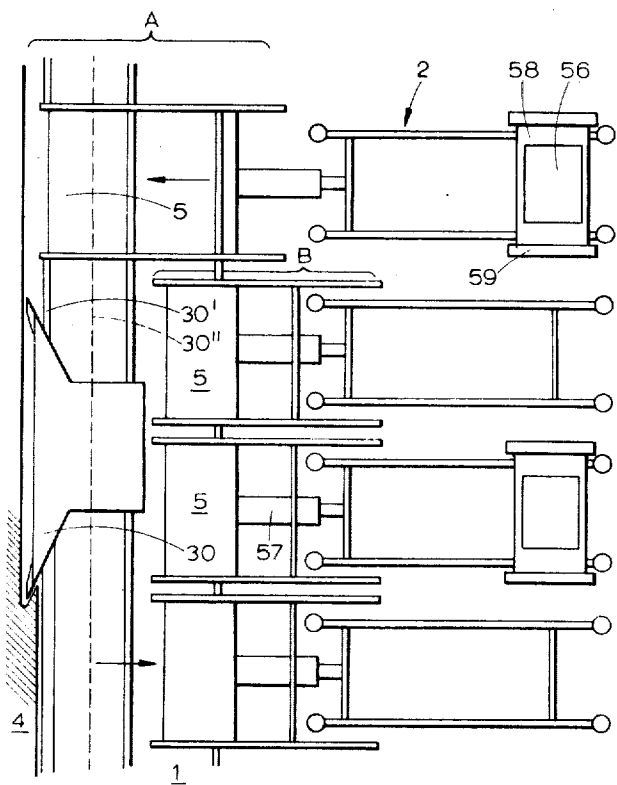


FIG. 1.

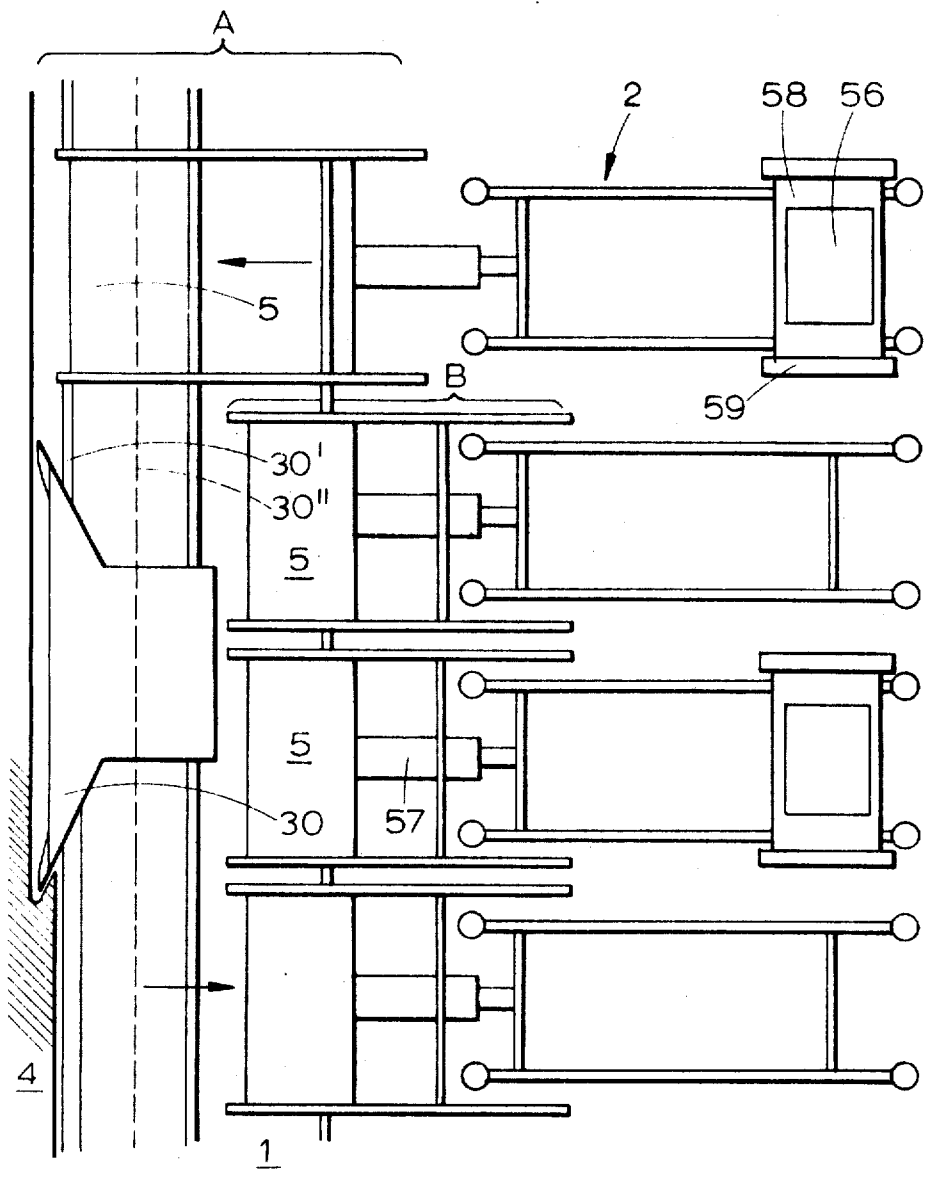


FIG. 2.

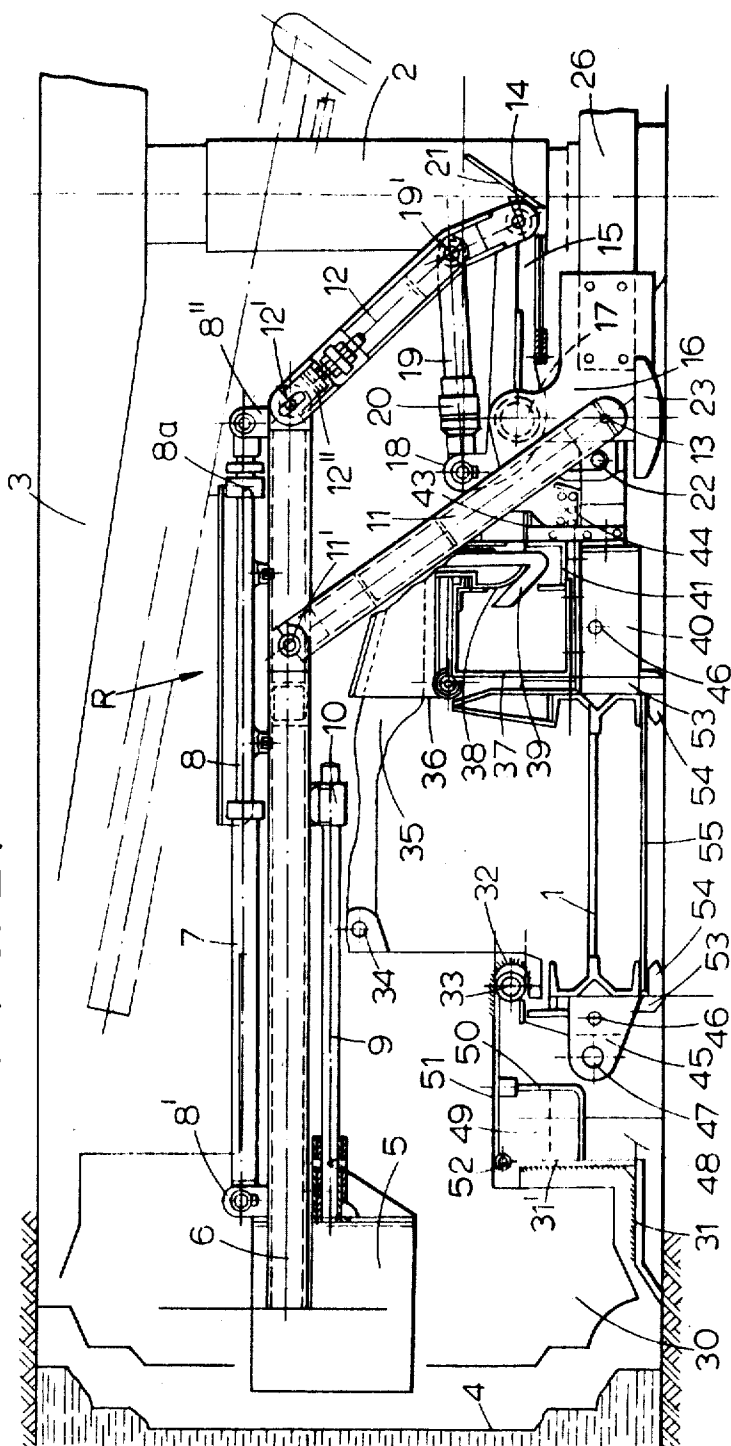


FIG. 3.

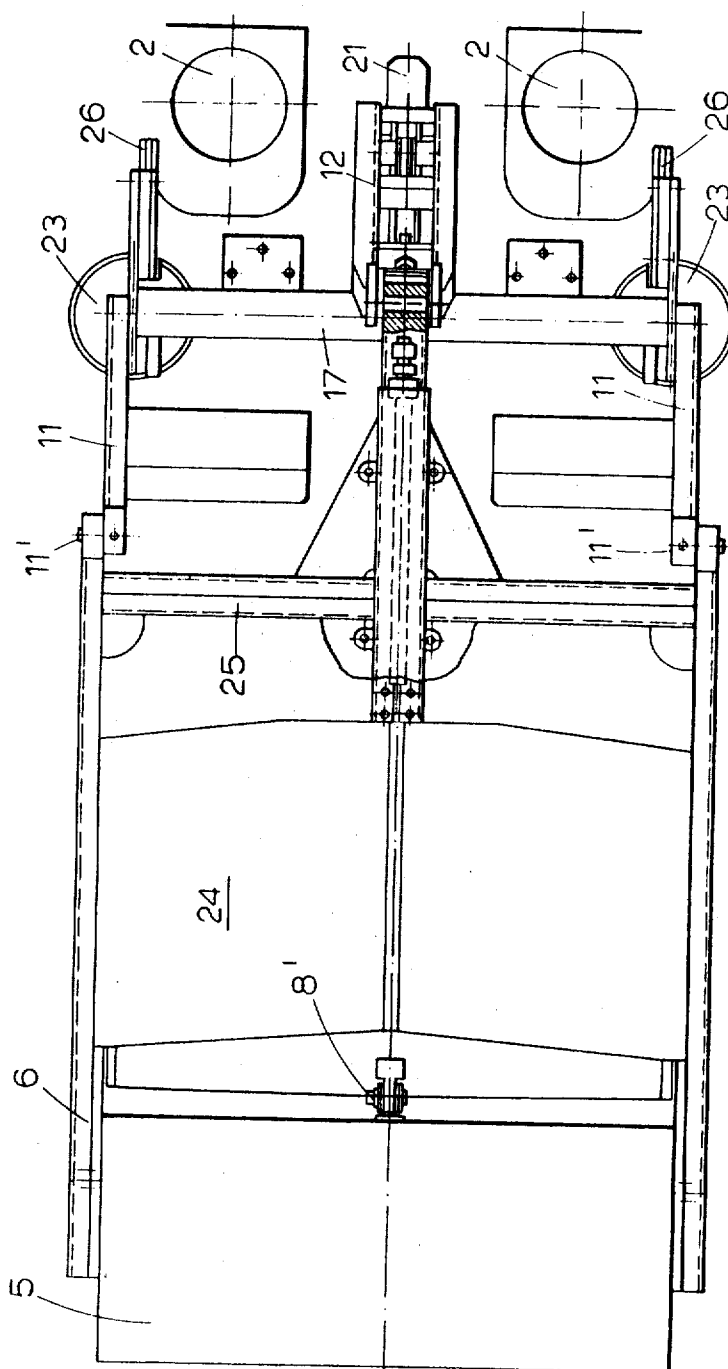
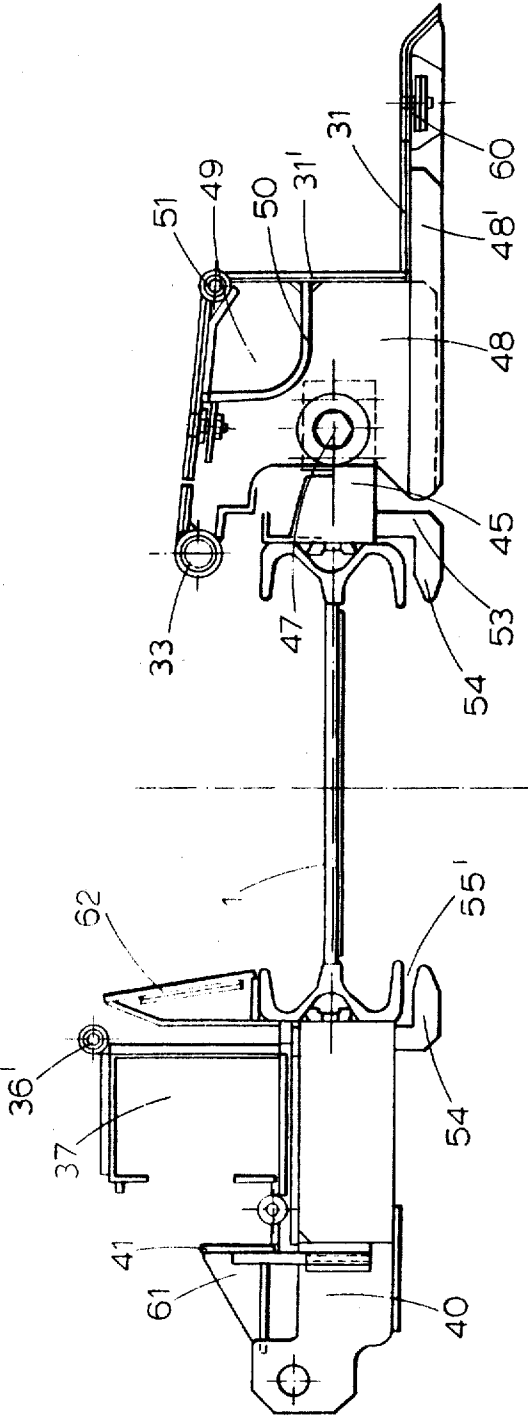
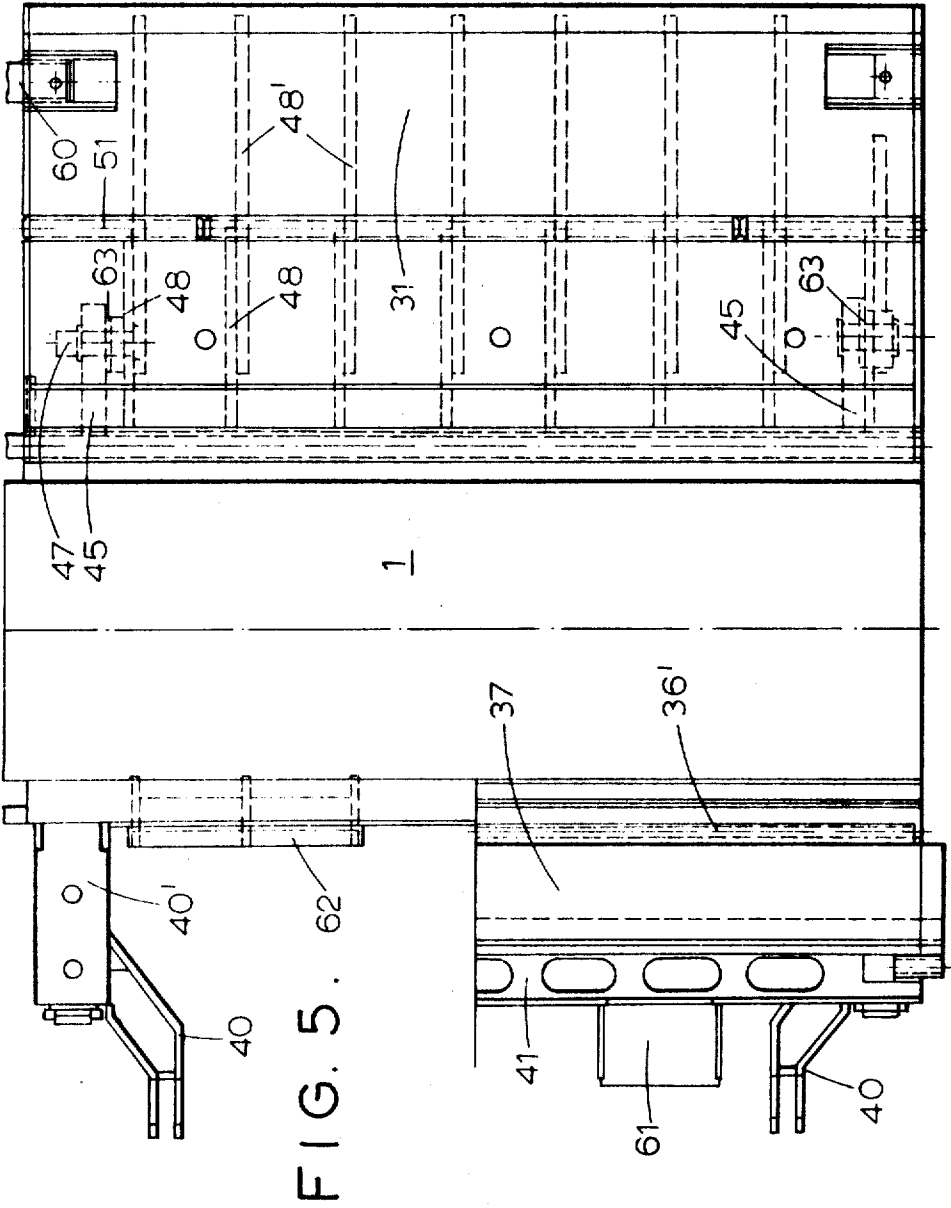


FIG. 4.





MINERAL MINING INSTALLATIONS

BACKGROUND TO THE INVENTION

The present invention relates to a mineral mining installation and to a method of mining minerals.

It has hitherto not been possible to generally mine non-carbonaceous minerals e.g., copper schist with the longwall installations developed for coal. This applies particularly to the mining of ores which are too hard to be detached from the working with a mining machine performing a stripping or cutting action.

An object of the invention is to provide a method of, and installation for, mining non-carbonaceous minerals in a fully mechanized manner.

SUMMARY OF THE INVENTION

In its broadest aspect the invention provides a method of mining minerals comprising heating a mineral face and cutting the mineral from the heated face.

Further according to the invention there is provided a mineral mining installation composed of a longwall conveyor arranged alongside a mineral face, cutting means guided for movement along the conveyor, and heating means displaceable relative to the conveyor to selectively heat the mineral face.

In accordance with the invention the mineral face is heated, to a very high temperature in the case of copper schist, and the mineral is automatically detached from the heated mineral face by a cutting appliance, such as a plough as employed in coal mines. The heating of the face results in stresses which crack the in-situ mineral, and this causes the mineral to loosen to a sufficient extent for subsequent removal by the cutting appliance.

The heating of the face necessitates an installation which will withstand the adverse conditions arising from the high temperatures involved and as will become apparent hereinafter various measures can be adopted to this end.

The heating means is preferably in the form of a plurality of heating devices, each device being movable laterally of the conveyor between a working position adjacent said face and a retracted position permitting the passage of said cutting means. One such heating device can conveniently be allocated to each support chock. This ensures that the face can be more or less continually heated to maintain the required temperature over its entire length. The heating devices should accordingly be brought as close to the mineral face as possible but the devices must nevertheless not impede the movement of the cutting means. A control system can be provided to ensure that the heating devices are only retracted along the section of the face over which the cutting means is moving at any one moment. As soon as the cutting means has moved away from the device in question the device is again moved forward to the face.

It is desirable for each heating device to be set to two different heating levels, the change-over being carried out automatically in accordance with the distance between the heating device and the mineral face. Thus, according to a further feature of the invention there is provided means for energizing each heating device and means for controlling said energization so that the heat generated by said device when at its working position is greater than that generated by said device when at its retracted position. This not only saves energy but over-

comes the disadvantage of de-energizing the heating devices altogether, which would lead to excessive cooling and heating cycles.

Owing to the high temperatures occurring at the face, care must be taken to ensure that the heating devices are guided reliably and that their mobility is not impeded by heat-induced deformation in their guide means. To this end each heating device can be guided for movement along guide rails of a frame, said frame being pivotable in relation to said conveyor, the means for moving the heating device being in the form of an hydraulic piston and cylinder unit arranged to displace the heating device along the guide rails and a further hydraulic piston and cylinder unit arranged to effect pivoting of said frame. This construction is also advantageous since it enables the entire guide means for each heating device to be moved away from the face with the device itself to provide passage for the cutting means.

To ensure that each heating device can be brought up as close as possible to the mineral face but without actually touching the latter and at the same time to compensate for the fact that the face may take an uneven course, the guide rails and frame provide an adequate amount of reserve travel for the devices. It is desirable to provide feeler elements for each heating device, these elements being adapted to contact the mineral face to thereby initiate a control operation to halt the advance of the heating device towards the face.

Preferably the installation has a number of shock absorbing members to protect the heating device from vibration and shock.

In accordance with a preferred construction the frame for each heating device has two parallel rods each with one end pivotally attached to the guide rails and the other end pivotable in relation to the conveyor, a transverse yoke interconnecting said rods and a further rod of shorter length than the first-mentioned rods with one end pivotally attached to the yoke and the other end pivotable in relation to the conveyor, the first-mentioned piston and cylinder unit being operably disposed between the heating device and the guide rails and the further piston and cylinder unit being operably disposed between the further rod and a rigid abutment. This arrangement ensures that when fully retracted the heating device is also raised to increase the space above the conveyor. This is advantageous when mining hard minerals which require a particularly heavy mining machine, which occupies a considerable amount of space.

The cutting means can take the form of a plough moved along the conveyor with the aid of an endless chain the plough being guided on a longitudinal guide member and having one or more claws which slidably engage a guide tube disposed above the mineral face side of the conveyor. The design of the plough guide system should prevent the plough from cutting into the mineral face at an excessive depth or height and should ensure a stable position for the plough without the necessity of making the guide member of excessive width.

With minerals particularly difficult to mine, the usual type of plough is incapable of mining the mineral even after heating. The invention therefore also provides that the plough be fitted with an "imbalance drive" i.e., means to impart vibration to the plough as the latter moves along the conveyor. This vibration means causes the plough to oscillate in a horizontal plane and necessitates that an electric motor be mounted on the plough.

It is thus necessary to provide means for conveying electrical energy to the plough. Such means can take the form of a channel member containing electrical contact strips and open towards the goaf side of the conveyor affixed to the goaf side of the conveyor. A carriage which is moved along the channel member by an overhanging arm attached to the plough connects with a contact slide member which makes electrical contact with the strips.

The subdivision of the electrical-energy conveying means into interconnected parts enables shock absorbing and damping members to be utilized.

In order to ensure that any movements which the plough may perform about a horizontal axis parallel to the working face will not affect the electrical energy conveying means, the over-hanging arm preferably extends in telescopic fashion into the carriage. In contradistinction to the mining of coal the sections of the conveyor are preferably interconnected in a comparatively rigid manner, in order to form as great a mass as possible to damp the vibrations transmitted by the vibrating plough.

It is also necessary to adapt the conveyor to cope with the particular conditions pertaining to this invention.

For example in a preferred construction the guide member is generally of L-shaped cross section with an upright portion spaced apart from the mineral face side of the conveyor and a further portion extending towards the mineral face and wherein stiffening plates are disposed between said upright portion of the guide member and the conveyor. The stiffening plates can be recessed to form a channel extending in the longitudinal direction of the face and for accommodating the return run of the endless chain used to drive the plough. The chain channel is preferably provided with a hinged cover.

To enable the installation to cope with uneven floors the guide member is preferably connected with the conveyor in such a way as to be pivotable about a horizontal axis and the conveyor preferably rests on stands which keep the conveyor at a certain distance above the floor. Between the upper edge of the supports and the lower end of the side of the conveyor channels cover plates can be sealed off. The stiffening plates mentioned before can have rib-like projections which pass underneath the horizontal portion of the guide member to maintain the guide member at a short distance above the floor.

After each passage along the face the plough would be inoperative while the heating of the mineral face is continued. During this interval the conveyor together with its connected parts is moved up to the face by a certain distance. The plough would then commence a fresh passage.

The invention may be understood more readily and various other features of the invention may become more apparent from consideration of the following description.

BRIEF DESCRIPTION OF DRAWINGS

An embodiment of the invention will now be described, by way of example only, with reference to the accompanying drawings, wherein:

FIG. 1 is a schematic plan view of a mineral mining installation made in accordance with the invention;

FIG. 2 is a part sectional end view of part of the installation depicted in FIG. 1;

FIG. 3 is a plan view of the part of the installation shown in FIG. 2;

FIG. 4 is a sectional end view of another part of the installation depicted in FIG. 1, the view being taken in the opposite direction to that of FIG. 2; and

FIG. 5 is a plan view of the part of the installation shown in FIG. 4.

DESCRIPTION OF PREFERRED EMBODIMENT

As shown in the drawing, particularly in FIG. 1, a conveyor 1 is disposed alongside a mineral face 4. The conveyor 1 is preferably of the double-chain type.

The scrapers used in the conveyor 1 are preferably each provided in its centre with a gantry-like opening which opens downwards and which is necessary for constructional reasons. To prevent fine material from remaining behind in the central part of the conveyor it is desirable for central bars, corresponding to the cross section of the gantry-like opening to be affixed at the centre of the conveyor channel sections.

A plough 30 is mounted on the side of the conveyor 1 for movement back and forth along the conveyor 1 in order to detach mineral from the face in a known manner. An endless chain 30' 30'' is used to move the plough 30 along the conveyor 1. To enable tensioning of the conveyor chains and the plough chain 30' 30'' the sprocket wheels for the chains can be displaced with hydraulic piston and cylinder units. Emergency switches are used to disable the installation in the event of a chain breakage.

Roof support chocks 2 are disposed on the goaf or stowage side of the conveyor 1. Each chock 2 has four telescopic props disposed between floor rails and roof caps and is connected to the conveyor 1 by means of a shifting ram 57.

A movable frame denoted R in FIG. 2 is allocated to each of the chocks 2 and the conveyor 1. The frames R support heating devices denoted by reference numeral 5. By means of the frames R the devices 5 can be advanced up to a working position close to the face 4 and the devices 5 serve to heat the face 4 in order to facilitate the extraction of the mineral. In their advanced working position the heating devices 5 are disposed in the path of movement of the plough 30 and the devices 5 are successively moved away from the face 4 to allow the plough 30 to pass along the face 4. When the plough 30 has moved beyond a particular heating device 5 the device 5 is again advanced up to the face 4 so that the heating can continue. Control means is provided to automatically control the movement of the devices 5 in the above described manner. In FIG. 1, the working position and retracted position of the carriages are denoted 'A' and 'B' respectively. The heating devices 5 are electrically energized and their energization is controlled so that the heat generated by each device 5 when at its working position is greater than that generated by said device when at its retracted position. The heating devices 5 are at all times kept as close as possible to the face 4 in order to bring the latter to as high a temperature as possible. The devices 5 are only retracted when the plough 30 is moving past the face 4 and the optimum approach of the heating devices 5 to the face 4 is preferably controlled by feeler elements mounted on the housings for the devices 5 and capable of engaging the face 4. This

arrangement ensures that even if the face 4 takes an irregular course a short distance between the heating devices 5 and the face 4 can be preserved. To simplify the control operation two adjacent devices 5 can be moved simultaneously.

To provide power for the heating devices 5 each alternate support chock 2 is provided with a transformer 56 which serves to supply energy to the heating elements 5 forming part of the associated devices 5. To enable the transformers 56 to be replaced in case of need each transformer 56 is supported on a slip 58 provided with rails 59 which engage on the floor of the mine working laterally outside the floor rails of the associated chock 2. In the event that a transformer 56 is to be replaced the slip 58 must be moved towards the conveyor 1 and the heating device 5 located in front of the transformer 56 must be moved to the face 4. The width of the chocks 2, i.e., the distance longitudinally of the working face 4, allows the transformer 56 in question to pass between the props disposed nearest the face 4 when the slip 58 has reached its endmost position.

FIGS. 2 and 3 show in more detail the construction of the frame R for one of the heating devices 5. The construction described ensures a sufficiently rigid construction to maintain the guidance of the device 5 even when the entire construction is subjected to high temperature. As shown in FIG. 2, the frame R is located between the conveyor 1 and the working face side props of one of the support chocks 2 of which the roof cap is denoted 3. The frame R is connected through joints 22 to two brackets 40 extending outwardly from the goaf side of the conveyor 1. The frame R has two parallel guide rails 6 extending towards the working face 4 and these rails 6 are interconnected through a transverse yoke 25 and one or more plates 24.

The frame R is movable between the position shown in FIG. 2 and the position indicated diagrammatically at the right of FIG. 2. The heating device 5 is mounted between these guide rails 6. Each of the guide rails 6 is of U-shaped cross-section and is open towards the inside of the assembly. Guides or rollers affixed to the side walls of the housing of the heating device 5 engage in the rails 6 to render the device 5 mobile. The device 5 is moved in the guide rails 6 by means of a hydraulic piston and cylinder unit 7 located at the upper side of the frame R. The piston rod 8 of the unit 7 extends outwards from the face 4 and is hinged to a bracket 8'' attached to a member of the frame R. The cylinder of the unit 7 is likewise hinged to a bracket 8' attached to the housing of the heating device 5. A shock-absorber 8a is provided to protect the device 5 from vibrations and impact. To ensure that the heating device 5 will be guided along the rails 6 without jamming, a guide rod 9 is provided underneath the unit 7 and the rod 9 is affixed to the rear wall of the housing of the heating device 5 and guided in a sleeve 10 mounted on the frame R.

Besides the rails 6 the frame R has two parallel rods 11, which are affixed at their upper ends 11' to the rails 6. A further cranked rod 12 has its upper end articulated as at 12' to the yoke 25 used to interconnect the rails 6.

Each rod 11 has its lower end connected to a pivot joint 13 on a fixed bracket 16 supporting the frame R and the rod 12 similarly has its lower end connected to a pivot joint 14. The joint 14 is carried on an arm 15

attached to a transverse yoke 17 interconnecting the brackets 16. The rod 12 is shorter than the rods 11, so that when the rods 11, 12 are pivoted clockwise the guide rails 6 not only move back in relation to the conveyor 1 but also assume a position inclined rearwardly away from the face 4. The rod 12 is provided with an adjusting device 12'', such as a threaded spindle, so that the length of the rod 12 and hence the working position of the heating device 5 can be altered.

Generally beneath the joints 13 there are provided slidable feet 23 which are attached to the brackets 16 and engage the floor of the working. A further bracket 18 is connected to the yoke 17 and extends upward therefrom. Between this further bracket 18 and a pivot joint 19' provided at the lower part of the rod 12 there is located a hydraulic piston and cylinder unit 19 which serves to adjust the position of the frame R. The piston rod of the unit 19 extends to the bracket 18 and a shock absorber 20 is provided to again protect the heating device 5 from vibration and shock when the frame R is pivoted towards the face 4. In order to reduce the effect of vibration or impact which may occur when the frame R is pivoted away from the face 4 the arm 15 supports a leaf-spring 21 which can engage the lower end portion of the rod 12.

The shifting ram 57 connected between the associated chock 2 and the conveyor 1 enables the conveyor 1 and the frame R to be moved relative to the chock 2. Guide members 26, in the form for example, of leaf springs, extend outwardly from the brackets 16 of the frame R and slide in guide channels provided on the support chock 2 to ensure the correct guidance of the frame R. The chock 2 is also guided in respect of the conveyor 1 by means of a leaf-spring which is mounted horizontally underneath the shifting ram 57. This spring is affixed to the conveyor and engages in a guide provided on the support chock 2.

Referring back to FIG. 2 and to FIGS. 4 and 5 the plough 30 is guided by a guide member 31 which is generally of L-shape and composed of sections joined end to end with connecting devices 60. The member 31 has a vertical portion 31' spaced from the mineral face side of the conveyor 1. The member 31 is supported on the conveyor by means of brackets 45. On the conveyor side the plough 30 is fitted with two guide claws 32 which pass underneath a guide tube 32 mounted above the mineral face upper side edge of the conveyor 1. This guide system ensures that the plough 30 will be reliably guided along the conveyor 1 to maintain a substantially constant position in relation to the face 4.

The plough 30 is equipped with means which imparts vibrations to the plough 30 in a horizontal plane parallel to the face 4. This means can take various forms such as eccentric masses and is often referred to in the art as an "imbalance drive." In this example this means is powered by an electric motor and electrical energy therefore has to be supplied to the plough 30. For this purpose the plough 30 is fitted with an overhanging arm 35 mounted on a pivot joint 34. The overhanging arm 35 extends over the conveyor 1 in the direction of the goaf or stowage side and on this side of the conveyor 1 there is a channel member 37 which is open towards the goaf side and contains electrical contact strips. The channel member 37 rests via intercalated damping springs on brackets 40 attached to the conveyor 1. Side plates 62 are affixed to the stowage side of the conveyor 1 to protect the channel member 37

from material conveyed by the conveyor 1. The overhanging arm 35 engages in telescopic fashion with a carriage 36 which can slide on the upper side of the channel member 37 so that the carriage 36 slides along the channel 37 as the plough 30 moves along the conveyor 1. A tubular guide piece 36' is provided on the upper side of the conveyor 1 for guiding the carriage 36. The carriage 36 is flexibly connected to an arm 39, which in its turn is affixed to a contact slide member (not shown) running in the channel 37. This slide member slides along the aforesaid strips in electrical connection therewith. The channel member 37 is fitted with a suspended shield 38 which engages the arm 39 and serves to protect the interior of the channel member 37 from contamination by material transported on the conveyor 1.

The above-described construction makes it possible for a number of shock-absorbing members to be utilized to protect the electrical-energy transmission means from the vibration caused by the plough 30.

The electrical motor on the plough 30 is preferably cooled by a special system since its intrinsic temperature rise is aggravated by the additional heat produced by the heating devices 5. The cooling of the stator can be effected by a cooling jacket which surrounds the stator and cooling water can circulate through this jacket. The water is drawn from a tank carried by the plough 30 and an air compressor generates compressed air above the level of the water in the tank. The water is conveyed from the tank through a piping system to the cooling jacket and is thereafter sprayed outwards to cool the mineral loaded in the conveyor 1. The water tank would be periodically refilled.

On the stowage side of the conveyor 1, close to the channel member 37, there is a further channel member 41, provided with a perforated floor so that any material conveyed into this channel 41 falls onto the floor of the mine working. Limit switches actuated by the arm 39 are carried by brackets 43, 61 affixed to the channel member 41 and the switching operation performed by these limit switches serve to control the movement of the plough and/or the movement of the devices 5 etc. On the stowage side of the channel member 41 there is a conduit 44 which is open at the top and receives the various supply cables and control lines.

On the mineral face side of the conveyor 1 bolts 46 passing through the brackets 45 serve to interconnect the mutually adjacent sections of the conveyor 1. The brackets 45 are connected by strong bearing bolts 47 with corresponding vertical plates 48 attached to the member 31. The plates 48 serve to stiffen the construction and ensure that the conveyor 1 and the member 31 do not become deformed as a result of the heat generated by the devices 5. Cup springs 63 are located on the bolts 47 to enable the structure to yield to some extent when high stresses induced by heat should occur. The plates 48 are recessed to form a channel 49 for receiving the return run of the plough chain 30'30''. To enable the chain 30',30'' to be supported more satisfactorily, wear plates 50 are attached to the plates 48. The chain channel 49 thus formed is provided on its upper side with a cover 51 which is pivotably supported on a hinge 52.

As shown in FIG. 4 the plates 48, also pass underneath the horizontal part of the guide member 31, to form ribs 48' which support the member 31 at a certain

distance above the floor. This construction presents considerable resistance to longitudinal displacement and the ribs 48' owing to the considerable weight of the plough 30, press into the fine material on the floor of the mine, so that the plough 30 always tends to cut at the desired height and does not tend to climb.

The conveyor 1 is likewise mounted in a position in which it is slightly raised from the floor and to this end the side walls of the conveyor 1 are fitted with support stands 53 having feet 43, extending inwardly of the conveyor 1. The support stands 53 are affixed to the side walls 1 of the conveyor in such a way that gaps 55' are formed between the lower flanges of the conveyor side walls and the feet 54 and the gaps 55' receive plates 55 covering the lower part of the conveyor 1.

The entire installation as depicted is shifted over its entire length at the same time, when the plough 30 has completed its travel. To ensure that no damage is suffered by the components when a particularly great resistance is encountered during the shifting movement, the shifting rams 57 are preferably equipped with pressure-limiting valves.

The driving station for the plough 30 and for the conveyor 1 is situated in a roadway adjoining the working. The conveyor 1 and the guide members 31 can rest on a baseplate which is preferably supported on hydraulically adjustable legs in the roadway. The baseplate is perforated so that when the plough 30 reaches the end of its travel and can no longer load mineral into the conveyor 1 the material passes through the baseplate.

I claim:

1. A mineral mining installation composed of a long-wall conveyor arranged alongside a mineral face, cutting means guided for movement along the conveyor, roof support chocks, shifting rams interconnecting the chocks and the conveyor and a plurality of heating devices movable laterally relative to the conveyor between a working position adjacent the face and a retracted position permitting passage of said cutting means.

2. An installation according to claim 1, wherein said cutting means is a plough moved back and forth along the conveyor.

3. An installation according to claim 2, wherein there is provided means to impart vibration to the plough as the latter moves along the conveyor.

4. An installation according to claim 2, wherein there is further provided means for conveying electrical energy to said plough, said means including an arm attached to the plough and extending over the conveyor.

5. An installation according to claim 4, and further comprising a channel member disposed alongside the side of the conveyor remote from the mineral face, said channel member containing electrical contact strips, a carriage movable along said channel and connected to said arm in telescopic fashion and a contact slide member attached to said carriage and adapted to make electrical connection with said contact strips.

6. An installation according to claim 5, wherein shock-absorbing and damping members are incorporated between the components of the electrical energy conveying means.

7. An installation according to claim 1, and further comprising means for moving each of the heating devices substantially perpendicularly of said conveyor, and control means for controlling the movement of the

device in accordance with the position of the cutting means.

8. An installation according to claim 7, and further comprising feeler elements provided for each heating device, said elements being adapted to contact the mineral face to thereby initiate a control operation to halt the advance of the heating device towards the face.

9. An installation according to claim 7, wherein each heating device is guided for movement along guide rails of a frame, said frame being pivotable in relation to said conveyor, the means for moving the heating device being in the form of an hydraulic piston and cylinder unit arranged to displace the heating device along the guide rails and a further hydraulic piston and cylinder unit arranged to effect pivoting of said frame.

10. An installation according to claim 9, wherein the frame has two parallel rods each with one end pivotably attached to the guide rails and the other end pivotable in relation to the conveyor, a transverse yoke interconnecting said rods and a further rod of shorter length than the first-mentioned rods with one end pivotably attached to the yoke and the other end pivotable in relation to the conveyor, the first-mentioned piston and cylinder unit being operably disposed between the heating device and the guide rails and the further piston and cylinder unit being operably disposed between the further rod and a rigid abutment.

11. An installation according to claim 10, and further comprising means for adjusting the length of the further rod.

12. An installation according to claim 10, wherein the frame is carried on a structure composed of brackets connected to the side of the conveyor remote from the mineral face, a yoke extending between the brackets and substantially parallel to the conveyor and feet attached to the brackets and slidable along the floor of the mine working, and wherein the first-mentioned rods are pivotably attached to said brackets and there is provided an arm which interconnects the further rod and the yoke extending between the brackets.

13. An installation according to claim 10, wherein there is provided a number of shock absorbing members to protect the heating device from vibration and shock, and one of said shock absorbing members take the form of a leaf spring engageable with the further rod when the latter is pivoted away from the mineral face.

14. An installation according to claim 9, and further comprising a guide rod affixed to the heating device and guided in a sleeve attached to the frame.

15. An installation according to claim 9, wherein the frame is carried on a structure composed of brackets connected to the side of the conveyor remote from the mineral face, a yoke extending between the brackets and substantially parallel to the conveyor and feet attached to the brackets and slidable along the floor of the mine working.

16. An installation according to claim 15, wherein the brackets connect with guide members which are slidably received in guide channels connected to the associated support chock.

17. An installation according to claim 9, wherein there is provided a number of shock absorbing members to protect the heating device from vibration and shock.

18. An installation according to claim 17, wherein one of said shock absorbing members is provided for each piston and cylinder unit.

19. An installation according to claim 7, wherein the control means includes limit switches mounted on brackets attached to the conveyor and there is provided an arm engageable with said limit switches and movable with said cutting means.

20. An installation according to claim 1, and further comprising means for energizing each heating device and means for controlling said energization so that the heat generated by said device when at its working position is greater than that generated by said device when at its retracted position.

21. An installation according to claim 20, wherein each support chock has four telescopic props interconnected by floor rails and roof caps, some of said support chocks each accommodating an electrical transformer forming part of said energizing means, said transformer being capable of displacement between the props of the chock and towards the conveyor.

22. An installation according to claim 21, wherein said transformer is supported on a slip which has rails slidably engaging the floor of the mine working laterally outside the floor rails of the associated chock.

23. An installation according to claim 1, wherein said cutting means is in the form of a plough moved along the conveyor with the aid of an endless chain, the plough being guided on a longitudinal guide member and having one or more claws which slidably engage a guide tube disposed above the mineral face side of the conveyor.

24. An installation according to claim 23, wherein there is provided means to impart vibration to the plough as the latter moves along the conveyor.

25. An installation according to claim 23, wherein there is further provided means for conveying electrical energy to said plough, said means including an arm attached to the plough and extending over the conveyor.

26. An installation according to claim 25, and further comprising a channel member disposed alongside the side of the conveyor remote from the mineral face, said channel member containing electrical contact strips, a carriage movable along said channel and connected to said arm in telescopic fashion and a contact slide member attached to said carriage and adapted to make electrical connection with said contact strips.

27. An installation according to claim 26, wherein shock-absorbing and damping members are incorporated between the components of the electrical energy conveying means.

28. An installation according to claim 23, wherein the guide member is generally of L-shaped cross-section with an upright portion spaced apart from the mineral face side of the conveyor and a further portion extending towards the mineral face and wherein stiffening plates are disposed between said upright portion of the guide member and the conveyor.

29. An installation according to claim 28, wherein the stiffening plates are recessed to form a channel for receiving one of the runs of the endless chain and a hinged cover extends over said chain channel.

30. An installation according to claim 28, wherein the stiffening plates are affixed to the further portion of the guide member and are pivotably connected to

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brackets arranged along the mineral face side of the conveyor.

31. An installation according to claim 28, wherein the stiffening plates have portions in the form of ribs which extend beneath the further portion of the guide member to support the guide member on the floor of the mine working.

32. An installation according to claim 1, wherein the

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conveyor has support stands at each of its sides, the support stands having feet which project inwardly of the conveyor and engage the floor of the mine working, said feet being spaced from the lower part of the conveyor side walls to form gaps capable of receiving cover plates.

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