United States Patent [19]

Agnew

[11] **3,897,110**

[45] **July 29, 1975**

[54] **MINING EQUIPMENT**

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[22] Filed: **June 18, 1974**

[21] Appl. No.: **480,512**

[30] **Foreign Application Priority Data**

July 11, 1973 United Kingdom 33043/73

[52] **U.S. Cl.** **299/45;** 299/12; 299/81

[51] **Int. Cl.** **E21c 35/20**

[58] **Field of Search** 299/12, 18, 43, 81, 46, 299/45, 64

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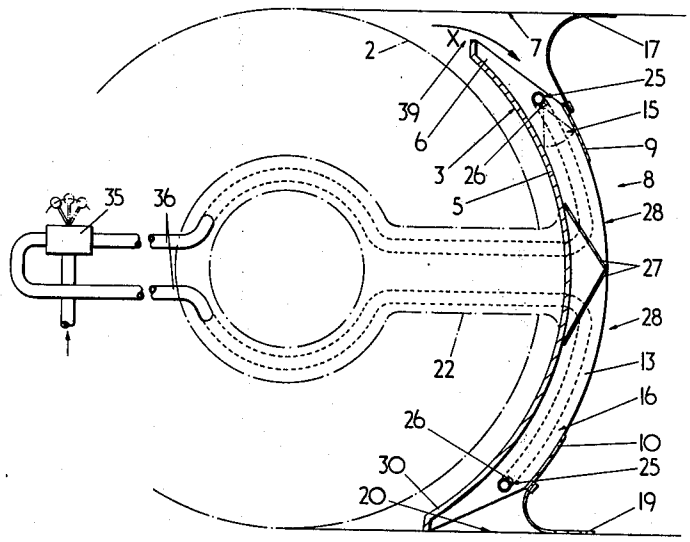
The "Bi-Di-Cowl," Brochure Mining Supplies Limited.

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[57] **ABSTRACT**

The loading cowl for a mining machine having a rotary cutter has air flow inlets positioned adjacent to the upper and lower margins of the loading or working surface of the cowl, respectively. Each inlet leads to a passage including nozzle means for directing an air flow inducing spray along the passage. Control means are provided for the fluid flow to the nozzle means.

10 Claims, 3 Drawing Figures



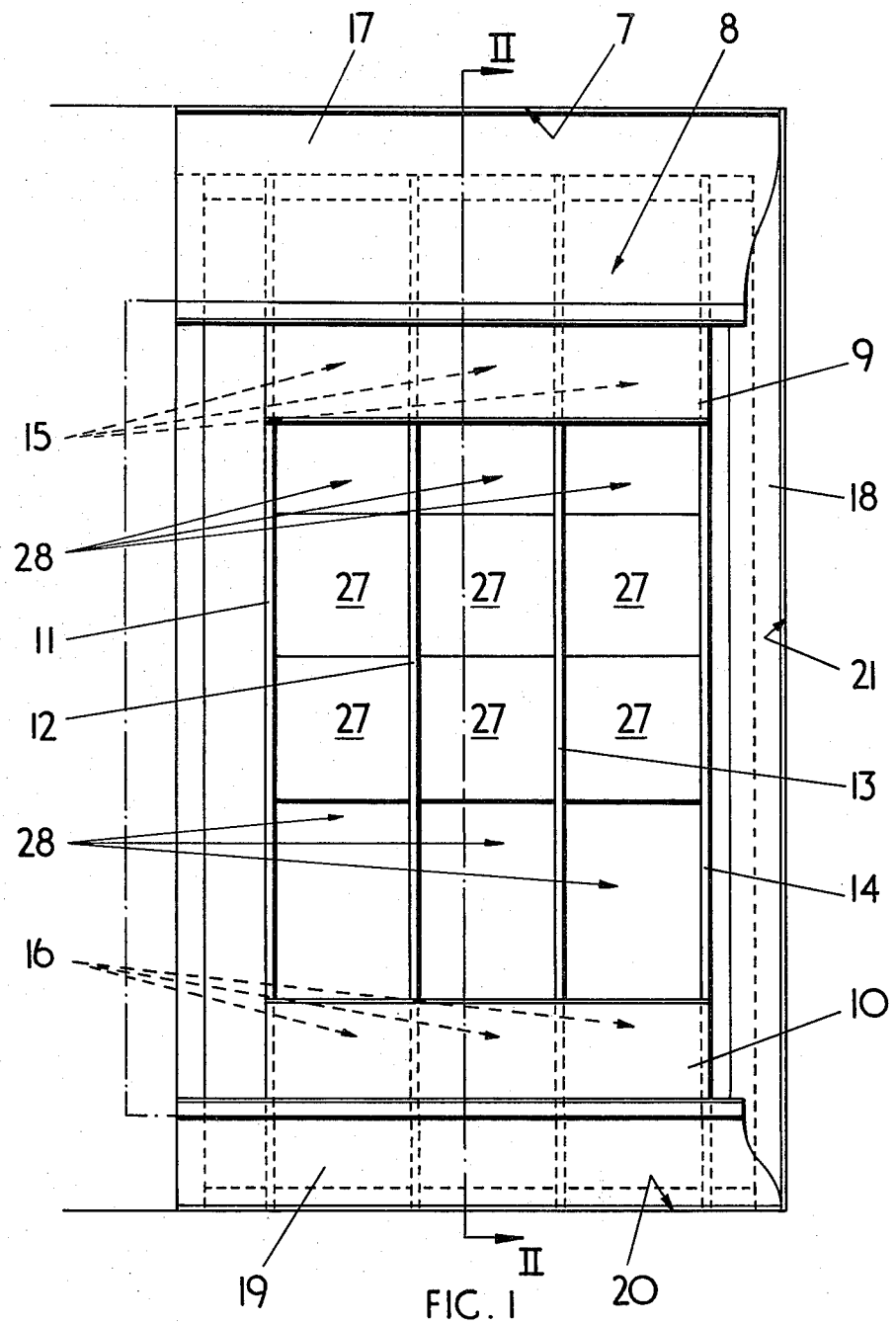


FIG. 1

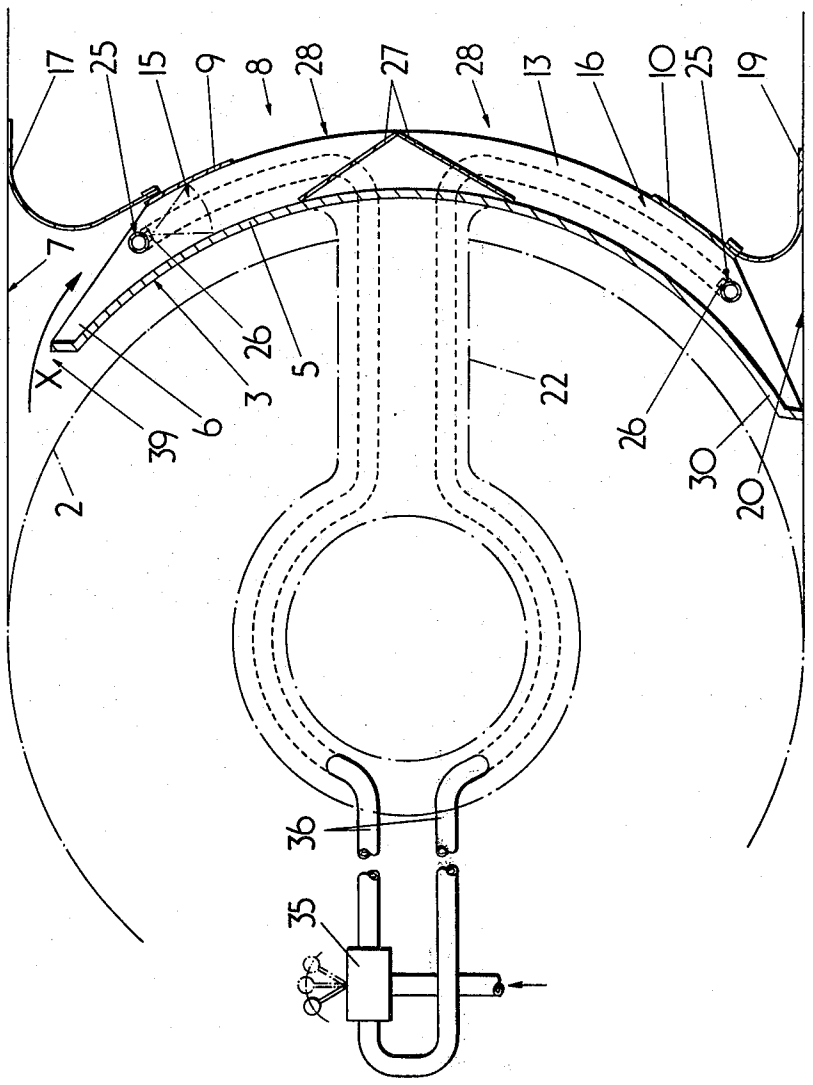


FIG. 2

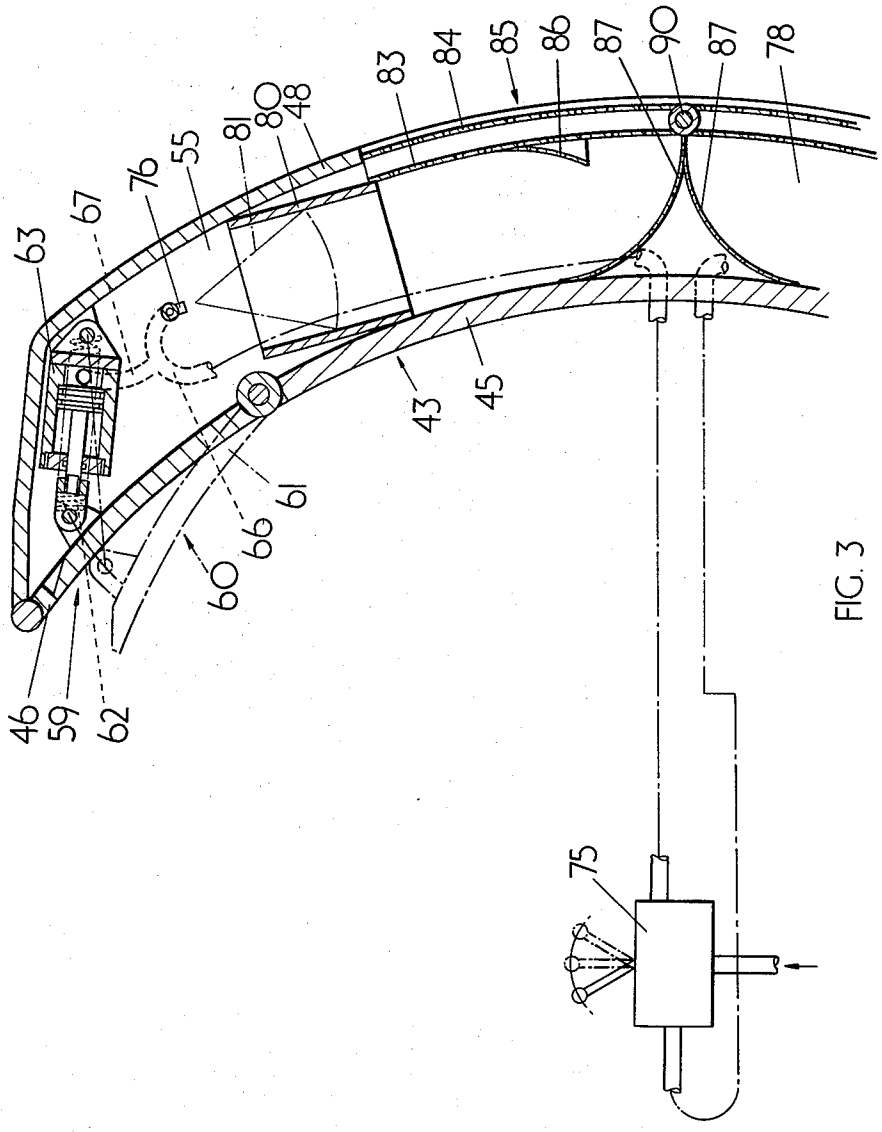


FIG. 3

MINING EQUIPMENT

This invention relates to mining equipment and in particular to loading members which are positioned adjacent to the rear of cutters arranged to extract rock or mineral from the working face and which are provided with means for inducing air flows adjacent to the cutters.

It has been proposed to provide a loading cowl mounted adjacent to the rear of a rotary cutter of a shearer type mining machine with a driven fan device to induce an air flow away from the rotary cutter and through a filter material to remove dust particles entrained in the air flow before discharging the air flow into the main ventilation air flow along the working face. Such prior proposed mining equipment has the disadvantage that the fan device is bulky and has to be fed with a power supply through cables or hoses which have to be accommodated in a zone where limited space is available. In addition at the end of each traverse of the machine along the working face the loading cowl has to be re-positioned at the opposite side of the rotary cutter to allow the cutter to excavate mineral in both directions of travel along the working face and the fan device and associated equipment tend to make movement of the loading cowl more difficult. Thus such mining equipment has never been widely adopted.

A further disadvantage of such prior proposed mining equipment is that the filter material requires frequent attention in order to remove the arrested dust particles which requires the mining machine to be halted and results in a consequential loss of production from the working face. Thus, the filter material tended not to be cleaned as frequently as desirable for efficient operation of the equipment.

An object of the present invention is to provide mining equipment which tends to reduce or eliminate the above-mentioned disadvantages.

According to the present invention a loading member for mounting adjacent to a cutter on a mining machine comprises a component having a loading or working surface which in use when the loading member is mounted on the machine is adjacent to the cutter, an air flow passage having an inlet positioned adjacent to one margin of the component, and air flow inducing means including a fluid nozzle adapted to direct an air flow inducing fluid spray along the passage.

Preferably, two air flow passages are provided, each having air flow inducing means, the passages having air flow inlets positioned adjacent to two margins of the component, respectively.

Advantageously, the two margins are at opposite edges of the loading or working surface.

Preferably, control means are provided to control the flow of fluid to the nozzles so that fluid is sprayed along only one of the passages at any one time.

Advantageously, door means are provided for selectively closing the air flow inlets.

Preferably, the door means includes two doors associated with the two air flow inlets, respectively, each door being urged open by the fluid supply to a nozzle.

Conveniently, the doors are biassed towards a closed position.

Advantageously, the fluid is liquid and means are provided for separating liquid from the induced air flow discharging from the passage.

Preferably, the means are baffle means in the form of a wire mesh screen assembly.

The invention also provides a loading member as defined above in combination with a mining machine having a rotary cutter.

By way of example only, two embodiments of the present invention will be described with reference to the accompanying drawings in which:

FIG. 1 is a rear view of a first embodiment of loading cowl constructed in accordance with the present invention and mounted adjacent to a rotary cutter;

FIG. 2 is a section along the line II—II of FIG. 1; and

FIG. 3 is a sectional view taken through a portion of a loading member constructed in accordance with the present invention, the drawing being on a larger scale than FIGS. 1 or 2.

In the FIGS. 1 and 2 of the drawings, the loading cowl is shown mounted adjacent to the rear of a rotary cutter 2 (only the outline of which is shown) of a shearer type mining machine (not shown) which in use traverses to and fro along a longwall coal face. The coal excavated by the cutter 2 is urged axially of the cutter by helical loading vanes provided on the cutter which as the cutter rotates pass adjacent to the loading or working surface 3 of the loading cowl, the coal being loaded onto a conveyor (not shown) arranged along the longwall coal face.

The loading cowl comprises a first component 5 which is formed by a curved plate and which provides the previously mentioned loading or working surface 3. As can be seen in FIG. 2 the vertical extent of the loading or working surface 3 is less than the vertical extent of the excavation formed by the cutter 2 so that the upper margin 6 of the first component is spaced from the upper boundary 7 formed by the cutter.

The loading cowl also comprises a second component 8 which comprises two horizontal plates 9 and 10 connected to the first component by four vertical plates 11, 12, 13 and 14 and which defines six parallel passages between the two components 5 and 8, the passages being made up of three upper passages 15 and three lower passages 16.

Flexible elements 17, 18 and 19 are secured to the second component 8 to provide seals between the upper 7, lower 20 and side 21 boundaries formed by the cutter 2 and the loading cowl.

The loading cowl is mounted on the mining machine by an arm 22 which is free to pivot around the cutter support housing (not shown).

Air flow inducing means 25 are provided within the passages 15 and 16. Each air flow inducing means comprises two fluid outlet nozzles 26 arranged to direct an air flow inducing spray along the associated passage. At any one time fluid is fed to only the outlet nozzles associated with the passages 15 or, alternatively, with the passages 16. In FIG. 2 only the nozzles associated with the upper passages 15 are being fed with fluid. The reason for this will be made clear later in the specification.

The loading cowl also comprises air flow deflecting plates 27 for guiding the air flow induced along the passages 15 or 16 towards the passage discharge 28.

In use, the loading cowl is mounted adjacent to the rear of the cutter 2 as shown in FIGS. 1 and 2. Since the arm 22 is free to pivot about the cutter support housing the lower margin 30 of the component 5 of the loading cowl abuts the lower boundary 20 formed by the cutter, the flexible element 17 deflecting suffi-

ciently to allow the lower margin **30** to engage the boundary **20.** The horizontal plate **10** is sufficiently clear of the boundary **20** to permit any broken rock material which passes under or around the first component to pass beneath the plate **10.** Thus there is little tendency for broken rock material to be scooped into the lower passages as the machine traverses along the longwall face. Although the lower margin **30** of the first component **5** is shown in engagement with the boundary **20** it will be appreciated that as the boundary **20** is formed by the cutter it is in practice uneven and thus relatively small pieces of broken rock material can pass beneath the first component.

When the loading cowl is in position on the desired side of the cutter as shown in FIG. **2,** pressure fluid, usually water, is fed from control means **35** mounted on the mining machine via feed pipes **36** to the three outlet nozzles **26** associated with the upper passages **15.** The nozzles **26** direct an air flow inducing spray along each of the passages **15** so that an air flow is induced (as indicated by arrow X in FIG. **2**) through an air flow inlet **39** formed between the upper margin **6** of the first component and the upper boundary **7** towards the passage outlets **28.** The deflector plates **27** guide the induced air flow towards the outlets from where the air is discharged into the main ventilation air flow along the longwall face.

As the air flow is induced into the air flow inlet **39** of the passage it tends to carry dust particles away from the cutter. These particles tend to become wetted by the fluid spray as the induced air flow passes through the spray and upon reaching the passage discharge **27** fall onto the mine floor i.e. the boundary **20.** Thus a large proportion of the dust particles in the vicinity of the cutter is removed from the air flow before it is discharged into the main ventilation air flow.

Upon the mining machine reaching the end of its traverse the loading cowl is repositioned on the opposite side of the cutter i.e. the left hand side of the cutter as seen in FIG. **2.**

In this position the margin **6** of the first component engages the lower boundary **20** and the margin **30** defines an air flow inlet (similar to air flow inlet **39** previously discussed) between the loading or working surface **3** and the upper boundary **7.** Thus, the three passages **16** are now open or through passages and the control means **35** are actuated so that the outlet nozzles **26** associated with these passages **16** are fed with pressure fluid to induce air flows through the newly formed air flow inlet and into these passages in similar manner to that previously described with reference to the passages **15.** The pressure fluid supply to the outlet nozzles associated with passages **15** is cut off by the control means **35.**

The actuation of the control means **35** can either be controlled by the position of the loading cowl and/or manually.

From the above description it can be seen that the first embodiment of the present invention provides a loading cowl which is provided with extraction equipment for ventilating and/or removing dust particles from the vicinity of the cutter which is simple, compact and easy to maintain and operate.

Referring now to FIG. **3,** this shows a sectional view of the upper part of a loading cowl constructed in accordance with the second embodiment of the present invention.

The loading cowl comprises a first component **45** which is formed by a curved plate and which provides a loading or working surface **43.** A second component **48** extends behind or over the first component **45** and is spaced from the first component **45** so as to define a passage **55** having an air flow inlet **59** adjacent to the upper margin **46** of the first component **45.** The air flow inlet **59** can be closed by door means **60** including a pivotally mounted door **61** which is biassed towards a closed condition by a coiled spring **62.** The door **61** is opened against the action of its biassed loading by a ram **63** which is supplied with pressure fluid via feed pipes **66** and **67.** Feed pipe **66** (only parts of which are shown) simultaneously feeds fluid, typically water, from control means **75** (similar to control means **35** of the first described embodiment) to nozzle **76** and to the ram **63.** This ensures that when an air flow inducing spray is directed along the passage **55,** the ram **63** is actuated to urge the door **61** to open the air flow inlet passage **55.**

The control means **75** also ensures that when water is fed to the nozzle **76** it is "cut off" from the nozzle (not shown) associated with the currently lower passage **78.** When water is cut off from the nozzle the associated door (not shown) is urged by its resilient bias towards a position in which it closes the associated air flow inlet.

The second embodiment of loading cowl also includes a tube **80** into which the air flow inducing water spray **81** is directed and a wire mesh screen assembly comprising two parallel screens **83** and **84** constituting baffle means **85.** As the induced air flow passes through the baffle means **85** the water mixed with the air tends to be separated from the air flow by impaction with the screen and tends to form relatively large drops which fall out of the air flow towards the bottom of the loading cowl. Guide screens **86** and **87** are provided to increase the baffle effect of the baffle means **85.**

The screens **83** and **84** are pivotally mounted by a pivot arrangement **90** to facilitate cleaning of the passages **55** and **78.**

The lower margin (not shown) of the loading or working surface **43** is similar to the upper margin shown in FIG. **3** so that when the mining machine reaches the end of its traverse along the face and the loading cowl is re-positioned on the opposite side of the cutter (as described with reference to the first described embodiment) the door associated with the now upper margin of the loading or working surface **43** is now opened when water is fed to the associated nozzle from the control means **75.** The air flow inlet **59** associated with the now lower margin **46** is closed by the door **61** which moves under its resilient bias when the water supply is "cut off" from the nozzle **76** by the control means **75.** Irrespective of the side of the cutter upon which the loading cowl is mounted the currently lower air flow inlet is closed by its associated door acting under its bias and the currently upper air flow inlet is open, the associated door being urged open by the associated ram which is fed with pressure fluid simultaneously with the associated air flow inducing nozzle.

Thus the air flow inlet associated with the nozzle currently directing an air flow inducing spray is open and the air flow inlet associated with the currently lower margin of the loading or working surface is closed. This tends to ensure that the upper passage is open for the free flow of induced air while the lower passage is

closed to prevent broken rock material from entering the passage.

The control means **75** may be actuated manually and/or by movement of the loading member.

In other embodiments of the invention only one passage having an air flow inlet and air flow inducing means is provided.

In modifications the invention, the loading member may be in the form of a plate hinged to the machine. In this case a plate may be provided at each side of the cutter.

From the above description it will be seen that the present invention provides convenient equipment for extracting and cleaning dust laden air from the vicinity of a mining machine cutter which can be accommodated in the limited space available. The equipment is also mobile and efficient.

I claim:

1. A loading member for mounting adjacent to a cutter on a mining machine, including a first component assembly having a loading surface which in use when the loading member is mounted on the machine is adjacent to the cutter, a second component assembly associated with the said first component assembly to define an air flow passage having an air flow inlet positioned adjacent to one margin of the said first component assembly, and air flow inducing means including a nozzle for directing an air flow inducing spray along the said passage.

2. A loading member according to claim **1,** in which the said second component assembly defines two air flow passages each having air flow inducing means, the passages having air flow inlets positioned adjacent to two margins of the said first component assembly, respectively.

3. A loading member according to claim **2,** in which the said two margins are at opposite ends of the loading surface.

4. A loading member according to claim **3,** comprising control means to control the flow of fluid to the nozzles so that fluid is sprayed along only one of the said passages at any one time.

5. A loading member for mounting adjacent to a cutter and mining machine, including a first component assembly having a loading surface which in use when the loading member is mounted on the machine is adjacent to the cutter, a second component assembly associated with the said first component assembly to define two air flow passages having air flow inlets positioned adjacent to two margins of the said first component assembly, the two margins being at opposite ends of the said first component assembly, air flow inducing means including nozzle means for selectively directing air flow inducing sprays along the said passages, control means for controlling the flow of fluid to the nozzle means so that fluid is sprayed along only one of the said two passages at any one time, and door means for selectively closing the air flow inlets.

6. A loading member according to claim **5,** in which the door means includes two doors associated with the two air flow inlets, respectively, each door being urged open by the fluid supply to the associated nozzle means.

7. A loading member according to claim **6,** in which the doors are biassed towards the closed position.

8. A loading member for mounting adjacent to a cutter on a mining machine, including a first component assembly having a loading surface which in use when the loading member is mounted on the machine is adjacent to the cutter, a second component assembly associated with the said first component assembly to define an air flow passage having an air flow inlet positioned adjacent to one margin of the said first component assembly, and air flow inducing means including a nozzle for directing an air flow inducing liquid spray along the said passage, and means for separating liquid from the induced air flow discharged from the said passage.

9. A loading member according to claim **8,** in which the said means are baffle means in the form of a wire mesh screen.

10. A mining machine having a rotary cutter and a loading member mounted adjacent to the said rotary cutter, the loading member including a first component assembly having a loading surface which in use when the loading member is mounted on the machine is adjacent to the cutter, a second component assembly associated with the said first component assembly to define an air flow passage having an air flow passage having an air flow inlet positioned adjacent to one margin of the said first component assembly, and air flow inducing means including a nozzle for directing an air flow inducing spray along the said passage.

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