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[54] **MINE VENTILATION CONTROL SYSTEM**

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[52] **U.S. Cl.** **98/50,** 160/330, 299/12

[51] **Int. Cl.** **E21f 1/00,** E21f 3/00

[58] **Field of Search**.....160/DIG. 9, 330; 98/50; 299/12

[56] **References Cited**

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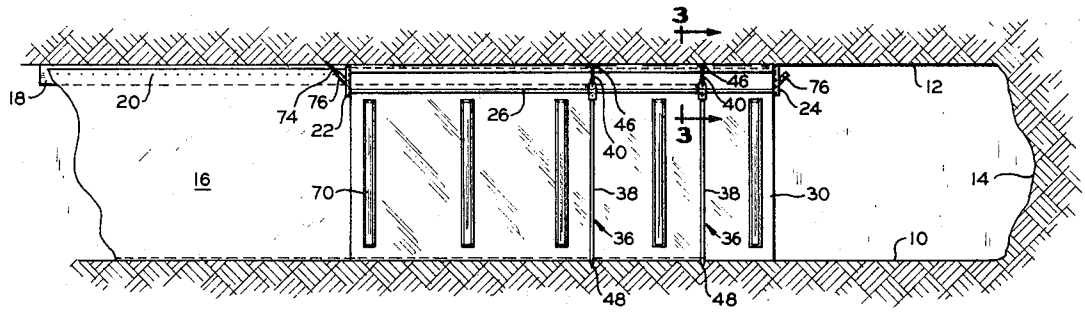
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Assistant Examiner—P. D. Ferguson
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[57] **ABSTRACT**

A mine ventilation control system for directing air flow in the immediate region of the working face of a mine, including an extensible curtain assembly which can be readily mounted adjacent the end of a line curtain and advanced toward the working face of the mine at a rate commensurate with the removal of the material being mined.

10 Claims, 5 Drawing Figures



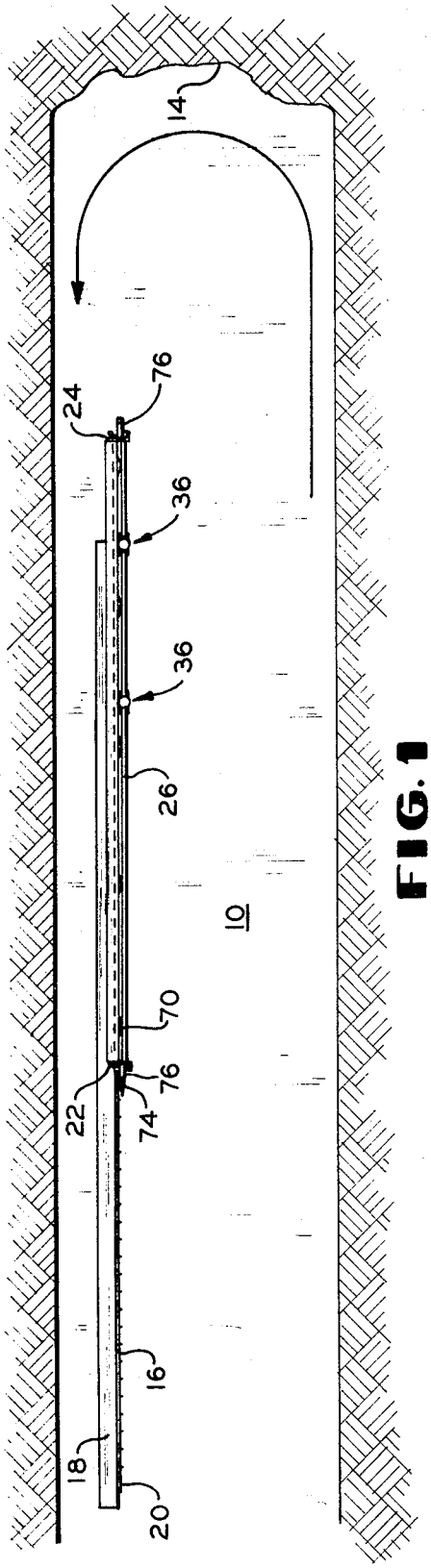


FIG. 1

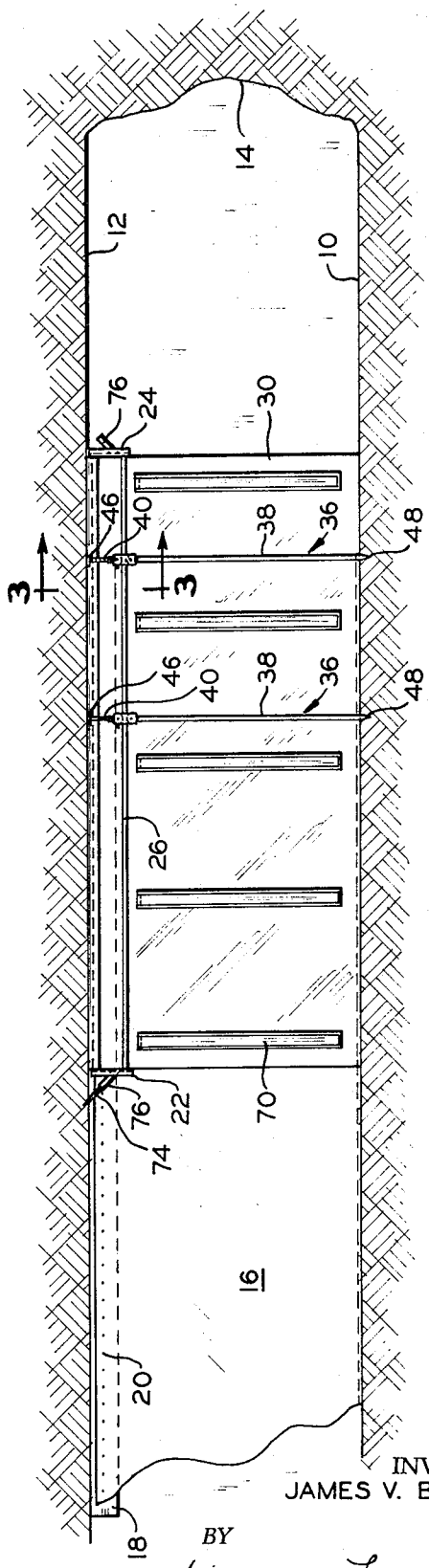


FIG. 2

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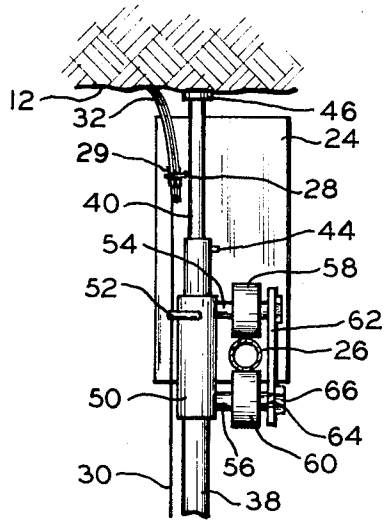


FIG. 3

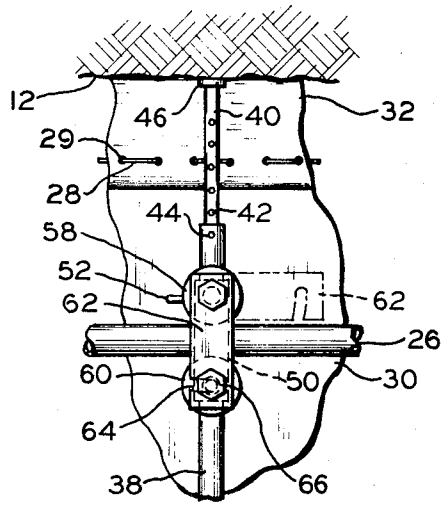


FIG. 4

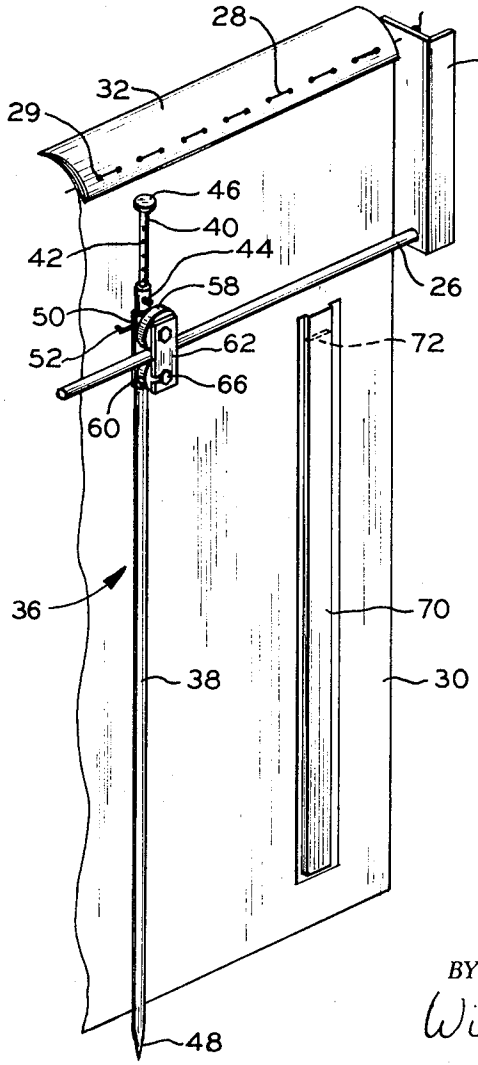


FIG. 5

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MINE VENTILATION CONTROL SYSTEM

BACKGROUND OF THE INVENTION

In the present systems of ventilating underground mines, one of the problems not adequately solved is the presence of dangerous gas and dust immediately adjacent the working face of the mine. The present ventilating systems do not have the inherent ability of continuously diverting the clean air from the end of the line curtain assemblies to the working face which is continuously advancing as the mining machinery and operation removes the material being mined. It is readily apparent to those knowledgeable in the art of mining operations that with the modern, fast, and continuous mining operations, it has become of paramount importance to provide adequate air circulation at the working face area of the mine to continuously remove dangerous gases and dust to thereby insure proper ventilation for the safety of those working underground.

Presently, to attempt to provide the desired ventilation within the working areas of the mine, line curtains are employed along the length of the mine working to, in effect, provide an inlet conduit for clean air and an outlet conduit for the exhaust of dangerous gases which are typically laden with a high degree of dust particles. Clearly, the gases and dust contamination is injurious to the respiratory system of the miners, as well as the principle cause of explosions within the mines. As the mining operation continuously advances away from the end of the line curtain, the flow of ventilating air at the working face becomes less and less effective. Accordingly, the actual mining operations must be periodically stopped and an additional length or section of line curtain must be erected.

It is an object of the present invention to produce a ventilation control system for use in mining operations which overcomes the aforesaid problems and provides an efficient and economically feasible means for achieving air circulation control immediately adjacent the working face of the mines to effectively remove the dangerous gases and dust content therein as the mining operation continues.

SUMMARY

The above objectives of the invention may typically be achieved by a mine ventilation control system for use in a mine working having a roof and a floor in association with line curtain comprising an extended surface web of flexible substantially gas impervious sheet material having a leading, a trailing, an upper, and a lower edge portion; a first support means for supporting the upper edge portion of the sheet material; a second support means supporting the first support means to position the upper and lower edge portions of the sheet material adjacent the roof and the floor of the mine working respectively in adjacent substantially parallel relation with the line curtain; and means providing longitudinal movement of the first support means and the associated sheet material relative to the second support means whereby the leading edge portion of the sheet material may be advanced toward the working face of the mine working and the trailing edge portion of the sheet material advanced toward the end of the line curtain most adjacent the working face.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects and advantages of the invention will become readily apparent to those skilled in the art from reading the following detailed description of an embodiment of the invention when considered in the light of the accompanying drawings, in which:

FIG. 1 is a fragmentary top plan view of a mine working provided with a ventilation control system incorporating the features of the invention;

FIG. 2 is an elevational view of the system disclosed and illustrated in FIG. 1;

FIG. 3 is a sectional view taken along line 3—3 of FIG. 2;

FIG. 4 is a fragmentary elevational view of the roller mechanism interconnecting the supporting elements of the invention; and

FIG. 5 is a fragmentary perspective view of the first and second supporting elements of the invention and the associated extended surface web of flexible gas impervious sheet material.

DESCRIPTION OF PREFERRED EMBODIMENT

Referring to the drawings wherein like reference numerals designate similar parts throughout, there is illustrated an underground mine working having a floor **10**, a roof **12**, and a working face **14**. A line curtain **16** typically formed of an extended sheet of flexible substantially gas impervious material, is suspended within the mine from a header member **18** which is secured to the roof **12** of the mine and extends longitudinally along the mine toward the working face **14**. The upper edge portion of the line curtain **16** is provided with a series of spaced apart grommets **20** through which suitable fastening means are employed to adequately secure the line curtain **16** in place. It will be observed that the lower edge portion of the line curtain **16** is in intimate contact with the mine floor **10**, while the upper edge portion is in sealing relationship with the roof **12** of the mine through the header **18** to thereby provide an elongate seal extending along the mine terminating short of the working face **14**. Thus, the structure assumes a substantially continuous ventilation control system to effectively remove dangerous gases and dust in the region of the working face **14** of the mine and create an air flow in the direction of the arrow in FIG. **1**. It will be understood, that the fresh air is directed along one side of the line curtain, while the undesired gases and dust laden air is caused to travel in an opposite direction along the opposite face of the curtain **16**. The line curtain **16** is installed in the mine after the mining operation has advanced a predetermined distance. In order to assure proper ventilation and therefore the safety of the miners, it is necessary to constantly be certain that the leading edge of the line curtain **16** is within approximately 10 feet of the working face **14**. It will be appreciated that it is extremely difficult and time consuming to stop the mining operation and mining machinery every so many feet of travel to install additional lengths of line curtain.

To assure an effective continuous ventilation control system to remove the dangerous gases and dust in the region of the working face **14** of the mine, the present invention provides a cooperating longitudinally extending line curtain assembly which comprises a first sup-

porting frame including a pair of spaced apart end brackets **22** and **24**. The lower portions of the brackets **22** and **24** are coupled together by a generally horizontally extending rod member **26**. The opposite ends of the rod member **26** may be secured to the respective brackets by any of the known manners such as for example by welding, threaded fasteners, or the like. The upper portions of the brackets **22** and **24** are typically provided with apertures to receive opposite ends of a cable **28** which is woven through spaced apart grommets **29** of an extensible line curtain **30**. In order to impart a certain additional strength and rigidity to the upper edge portion of the line curtain **30**, the material forming a line curtain **30** is folded upon itself to produce an upper mine roof engaging heading **32**. It has been found desirable in certain instances to cause the cable **28** to be drawn tightly to prestress the rod **26** and produce a slight bow therein which when mounted in the operative position illustrated in the drawings is caused to return to its normal substantially straight form by the load imposed thereon by the weight of the curtain material **30**. The curtain **30**, as well as the line curtain **16**, may be formed of a large number of plastic sheet film materials whether made of polymerizates, condensation products, or cellulosic derivatives. However, it is considered preferable to use sheets of fire resistant or fire retardant material such as those containing chlorine in their composition, for example, vinyl chloride polymers and copolymers, polyvinylidene chloride, vinyl chloride-vinylidene chloride polymers, and the like, or those containing fire-retardant compounds, such as tricresyl phosphate or chlorinated compounds, because of the greater safety provided by such materials. In many instances, it may be found desirable to also provide an integral reinforcing material, in a woven or non-woven condition, to impart greater strength thereto without adding a considerable weight factor.

After the cable **28** has been threaded through the grommets **29** in the heading **32** of the line curtain **30** and drawn tight, the ends thereof are suitably secured to the upper portion of the brackets **22** and **24** by any of the known manners.

Next, a second supporting assembly is positioned within the mine. The second supporting assembly illustrated in the drawings consists of a pair of spaced apart supporting columns **36**. Since each of the columns **36** is of the same structure, only a single one will be explained in detail. The supporting columns **36** include a main supporting tubular member **38** and a cooperating upper tubular member **40** which is adapted to slide therewithin. The total overall length of the supporting columns **36** may be varied by causing the tubular member **40** to slide within the tubular member **38**. The desired length may be fixed by aligning one of the holes **42** of the tubular member **40** within a hole in the upper portion of the tubular member **36** so that a pin **44** may be inserted therein to militate against any relative movement therebetween.

The uppermost end of the upper tubular member **40** is provided with a mine roof engaging pad **46** adapted to be placed into snug engagement with the roof **12** of the mine; while the lowermost end of the tubular member **38** is provided with a spike-like extension **48** which is adapted to be inserted into the floor **10** of the mine. Clearly, the pin **44** is removed when the supporting column **36** is to be installed in a mine. When the pin **44** is removed the tubular members **38** and **40** are positioned relative to one another such that the pad **46** snugly contacts the roof **12** of the mine and the spike-like extension **48** penetrates the floor **10** of the mine and then the pin **44** is reinserted.

The aforementioned second supporting assembly is employed to support the first supporting assembly is such fashion that the curtain **30** may be moved longitudinally toward the working face of the mine and provide, in effect, an operable extension of the line curtain **16** while not requiring the stopping or cessation of the mining operations and, at all times, provide adequate ventilation in the region of the working face **14** of the mine. To accomplish these objectives, a tubular sleeve **50** surrounds the tubular member **38** of column **36** and may be vertically positioned thereon and secured at the desired position by a set screw having an operating handle **52**. Projecting radially outwardly of the sleeve **50** are a pair of vertically spaced apart shafts **54** and **56** for rotatingly supporting rollers **58** and **60**, respectively. The rollers **58** and **60** may be provided with suitable bearing means such as ball bearings to enable them to roll freely under specified load requirements.

Pivotally mounted at the outermost end of the upper shaft **54** is a locking plate **62** having a notch **64** formed in the opposite end adapted to receive the outer end of the lower shaft **56**. The locking plate **62** may be locked in the position shown in full lines in FIG. **3**, **4** and **5** by an internally threaded nut **66**. By loosening the nut **66**, the locking plate **62** may be swung upwardly about the shaft **54** to the dotted line position illustrated in FIG. **4** to enable the roller assembly to receive the rod **26** of the first supporting assembly. After the rod **26** is thus inserted into the space between the rollers **58** and **60**, the locking plates **62** are swung downwardly and locked in position by tightening the fasteners **66**.

The curtain **30** may be rigidized by the addition of spaced vertically extending batten pockets **70** adapted to receive suitably formed batten strips **72**. In typical installations, the batten pockets **70** are positioned at approximately four foot centers and commence just below the vertical height of the rod **26** and terminate approximately one foot from the mine floor **10**. The typical height of the curtain **30** is slightly more than the distance from the floor **10** to the roof **12** so that the stiffened upper heading **32** will be slightly bent over in the installed operative position to form a sealing relation with the roof **12** of the mine while the lower edge of the curtain **30** would be in contact with the floor **10**, again for the purpose of providing a seal therebetween.

When the assembly is in the assembled position illustrated in the drawings, the curtain **30** may be manually advanced toward the working face **14** of the mine as the mining operations progress constantly maintaining the desired interval between the leading edge of the curtain **30** and the working face **14** to, at all times, maintain effective mine ventilation control without having to close down or impair the mining operation.

To militate against any retrograde movement of the first supporting assembly and the associated curtain **30**, there is provided an angularly extending spike **74** adapted to be received within a tubular socket **76** secured to the brackets **22** and **24** at a substantially 45

degree inclination. As the rod 26 of the first supporting assembly is moved between the rollers 58 and 60 in the direction of the working face 14 of the mine, the spike 74 inserted in the socket 76 as illustrated in FIGS. 1 and 2 will slide along the roof 12; however, any reverse movement of the first supporting assembly is substantially prevented.

In accordance with the provisions of the patent statutes, I have explained the principle and mode of operation of my invention and have illustrated and described what I now consider to represent its best embodiment. However, I desire to have it understood that the invention may be practiced otherwise than as specifically illustrated and described without departing from its spirit or scope.

I claim:

1. In a mine ventilation control system for use in a mine working having a roof and a floor in association with an air directing curtain comprising:

an extended surface web of flexible substantially gas impervious sheet material having a leading, a trailing, an upper, and a lower edge portion;

a first support means supporting said sheet material near the upper edge portion thereof;

a second support means supporting said first support means to position the upper and lower edge portions of said sheet material adjacent the roof and the floor of the mine working respectively in adjacent substantially parallel relation with the air directing curtain; and

means providing movement of said first support means and said sheet material relative to said second support means whereby the leading edge portion of said sheet material may be advanced toward the working face of the mine working and the trailing edge of said sheet material will be advanced toward the end of the air directing curtain most proximate said working face.

2. The invention defined in claim 1 wherein the upper edge portion of said sheet material is in intimate contact with the roof of the mine working.

3. The invention defined in claim 2 wherein said upper edge portion of said sheet material is folded upon itself to form a stiffened heading therefor.

4. The invention defined in claim 1 wherein said first support means includes a cable interwoven through suitable apertures in the upper edge portion of said sheet material.

5. The invention defined in claim 4 wherein said first support means includes a substantially horizontally extending rod and a pair of brackets spaced on said rod and connected to spaced sections of said cable.

6. The invention defined in claim 5 wherein said rod is prestressed by the tension of said cable between said brackets.

7. The invention defined in claim 1 wherein said second support means includes roller means for supporting said first support means.

8. The invention defined in claim 5 wherein said second support means includes roller means for supporting said rod of said first support means.

9. The invention defined in claim 5 wherein said second support means includes spaced apart vertically extending columns.

10. The invention defined in claim 9 wherein said second supporting means includes roller means for supporting said rod of said first supporting means and means for selectively adjusting the vertical position of said roller means.

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