

[54] MINE VENTILATION CONTROL SYSTEM

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[58] Field of Search 98/50; 160/350, 351; 135/8, 15; 273/29 BD

[56] References Cited

UNITED STATES PATENTS

1,444,344	2/1923	Gourley.....	273/29 BD
2,371,789	3/1945	Batten.....	61/45 C
2,621,725	12/1952	Schacikoski	98/50

3,118,363	1/1963	Burgess.....	98/50
3,206,187	9/1965	Cagley.....	98/50

FOREIGN PATENTS OR APPLICATIONS

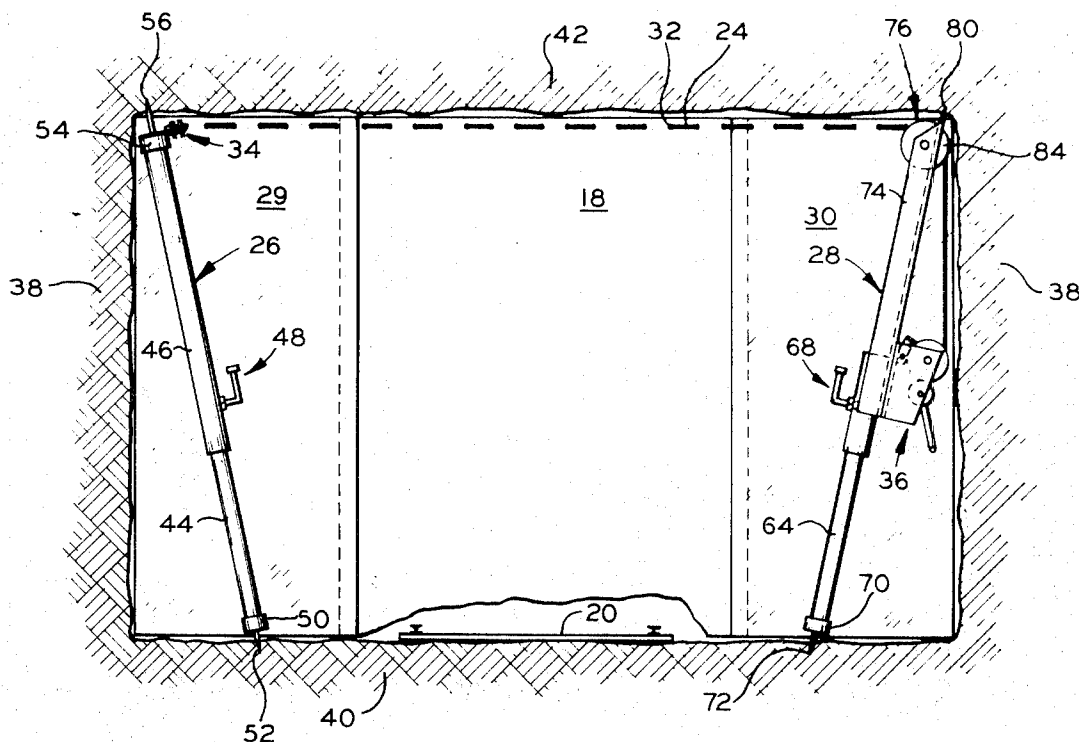
317,687	8/1929	Great Britain.....	273/29 BD
13,434	1913	Great Britain.....	98/50

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[57] ABSTRACT

A ventilation control system consisting of a gas impervious air directing curtain for directing the flow of air within a mine in combination with end supporting assemblies with the air directing curtain attached thereto to provide efficient ventilation within a mine.

8 Claims, 6 Drawing Figures



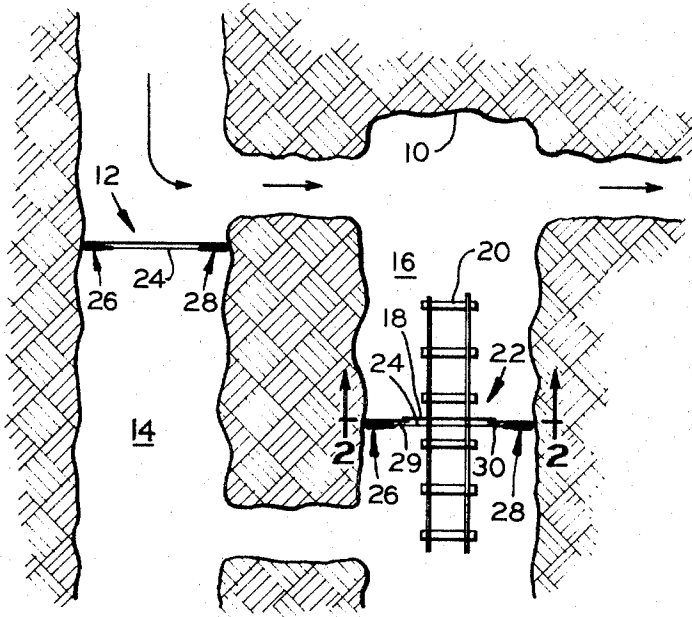


FIG. 1

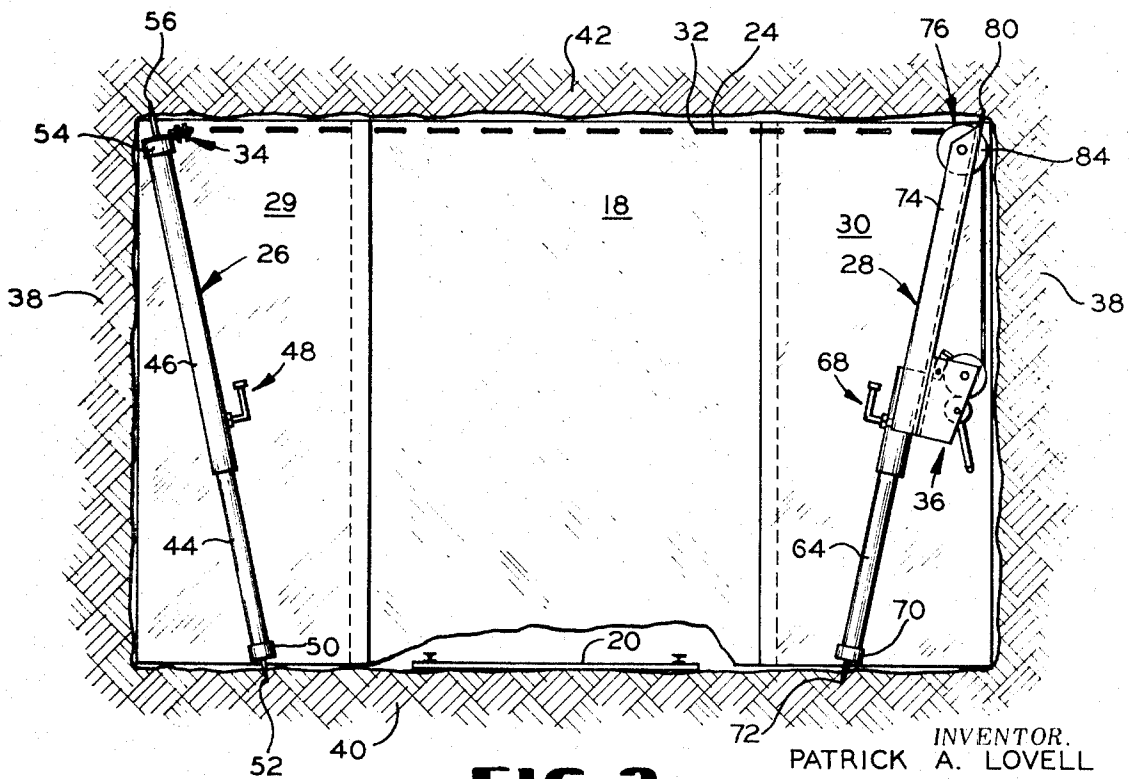


FIG. 2

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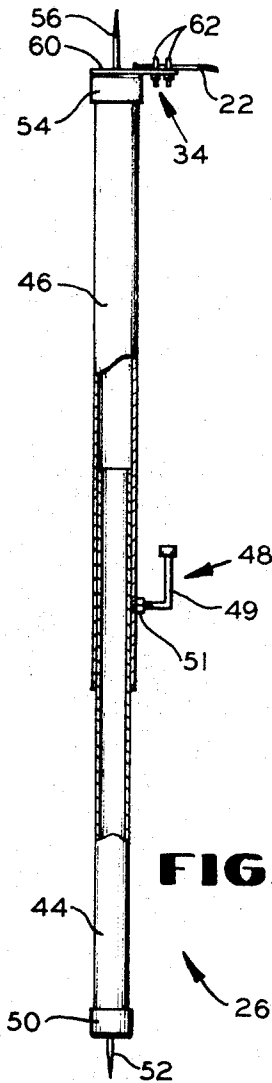


FIG. 3

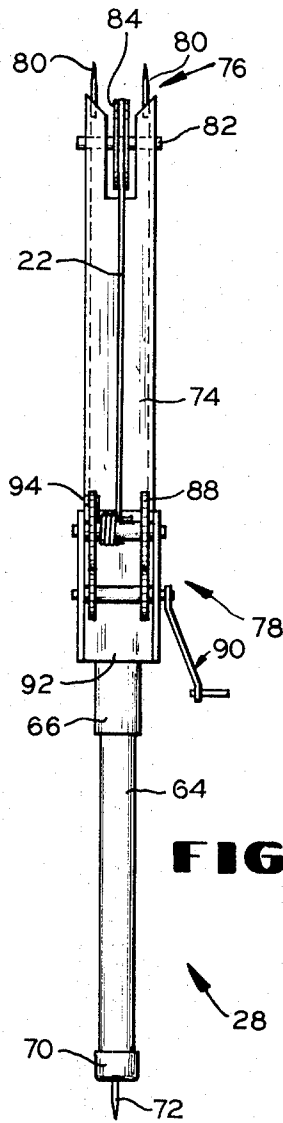


FIG. 5

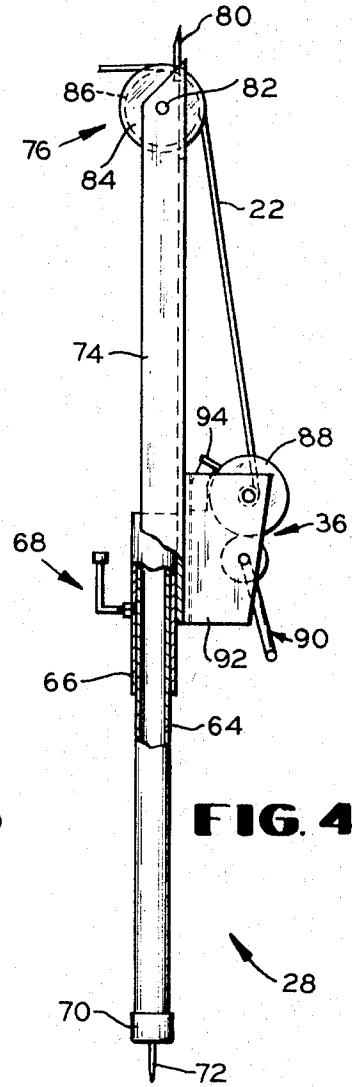


FIG. 4

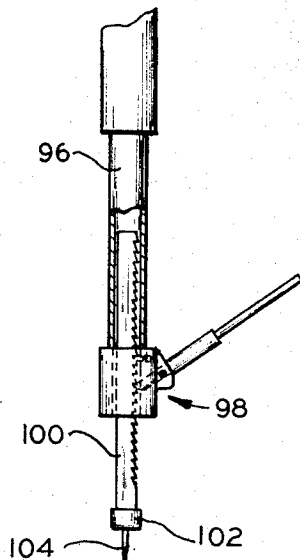


FIG. 6

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MINE VENTILATION CONTROL SYSTEM

BACKGROUND OF THE INVENTION

One of the problems of ventilating underground mines of dangerous gases and dust particles is properly directing the flow of clean air to those portions of the mines being worked and the efficient removal thereof.

Those knowledgeable in the art of mining are familiar with the use of line curtains or brattices to direct clean air to those areas being worked. In brattices such as line curtains, the curtains have been supported from beams and columns forming the roof and side walls of the particular area of the mines involved.

The present invention overcomes the requirement of installing beams and columns for a brattice with a brattice which is adjustable to fit a wide range of areas. Further, the brattice is also reuseable and can be removed from one location and adjusted to fit a new location.

SUMMARY

The present invention relates to mine ventilation control system and more particularly to a system having an extended sheet of flexible substantially gas impervious material supported by a cable extending between two spaced apart support assemblies. In the preferred embodiment, the sheet material is typically formed of a fire resistant poly vinyl chloride. The support assemblies are in the operable position posts which are inclined to have the bases spaced closer together than the upper portions of the posts across which the cable is strung. The sheet material is supported from the cable which is threaded through spaced apart grommets located in the upper portion of the sheet. With the sheet material so suspended and the posts engaged between the floor and roof of the mine, the cable across the top of the posts maintains the upper portion of the sheet material in sealing relation against the roof of the mine while the lower portion of the sheet material is disposed in sealing relation against the floor of the mine. Pointed terminal portions of the post are adapted to penetrate the mine roof and floor to secure the posts in place. The posts are adjustable in length to accommodate different mine dimensions. In one embodiment, an addition of a jack mechanism is employed to enhance the setting of the posts to aid in setting of the pointed terminal portions. Tensioning means may be employed to apply tension to the cable to maintain the same in taut condition.

The above apparatus provides an easily placed adjustable ventilating system for the underground mines which is reuseable for control of clean air supply to and away from the working areas of a mine. Other advantageous features of the invention reside in the simplicity of use, ruggedness and fire-resistant nature thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objectives and advantages of the invention will become readily apparent to one 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 plan view of a section of a mine showing various uses of the invention;

FIG. 2 is an elevational view of a fly sheet incorporating the invention shown in FIG. 1 with the sheet material partially cut away to reveal an associate track;

FIG. 3 is an elevational view of a supporting post as-

sembly with a portion cut away to reveal further detail;

FIG. 4 is an elevational view of a supporting post assembly used in association with the assembly illustrated in FIG. 3;

FIG. 5 is an end view of the apparatus illustrated in FIG. 4; and

FIG. 6 is a fragmentary view of a modified form of a supporting post assembly with a portion cut away to reveal further detail.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings, FIG. 1 illustrates a plan view of a section of a mine with arrows indicating clear air flow. The air is directed past the working face 10 of the mine by use of a stopping 12 which diverts the air from passing into shaft 14. Where a shuttle car, not illustrated, is used to remove mine material from the shaft 16, a fly sheet 18 is used over the shuttle car tracks 20 to effectively divert the flow of air from passing through the shaft 16. The fly sheet 18 is fixedly attached at the top to allow a car to pass thereunder by deflecting the bottom of the sheet 18 upwardly. Resealing of the opening by the fly sheet 18 is enhanced by the positive pressure of the air being supplied to the working face 10. Use of the stopping 12 and fly sheet 18 is an effective means of directing clean air to the working face 10 of a mine to thereby remove gas emissions and to sweep away dust that has become suspended by working of the mine.

The sheet material of the stopping 12 and fly sheet assembly 22 may be supported by assemblies made in accordance with the invention. FIG. 2 illustrates the fly sheet assembly 22 which consists of a cable 24 and a pair of supporting posts 26 and 28. Also included in the fly sheet assembly 22 are the fly sheet 18 and side sheets 29 and 30. The sheets 18, 29 and 30 have spaced apart grommets 32 in the upper portions thereof. The cable 24 may be threaded through the grommets 32 on sheets 18, 29 and 30 to attach the sheets 18, 29 and 30 to the cable 24. With one end of the cable 24 attached to support post 26 by cable attachment 34 and the other end of the cable wrapped around the upper portion of support post 28, the cable may be put in tension by cable tensioner 36 to which the other end of the cable is attached. With tension established on the cable 24 it is capable of supporting the fly sheet 18 and side sheets 29 and 30. Supporting the sheets 18, 29 and 30 as described above maintains the sheets in sealing relation to the floor of the mine to which they extend downwardly and the roof of the mine 42 where the sheets 18, 29 and 30 are maintained by the tension of cable 24 to completely close off the opening framed by the mine roof 42, floor 40 and side walls 38 when the sheets 29 and 30 are in close proximity to the side walls 38 to form a seal relative thereto. Applying tension to the cable 24 results in a force component being directed down the supporting posts 26 and 28 as the cable 24 in effect tends to bring the supporting posts 26 and 28 to an upright position. Thus, the supporting posts 26 and 28 having been installed in an inclined position having a greater distance between the cable 24 supporting ends than the opposite ends give firm support to the cable 24. Where the fly sheet 18 and side sheets 29 and 30 are replaced with a single continuous sheet as illustrated in the stopping 12 of FIG. 1, it can be seen that an effective stopping can be created in a

manner similar to the construction described above for the fly sheet assembly 22. Still another embodiment of the present invention would be a series of assemblies with overlapping sheet material to form a line brattice. In the above embodiment, the seal between the sheet material and the side walls 38 as well as the mine roof 42 can be enhanced by hemming, the margin of the sheet material adjacent the side walls 38 and the mine roof 42. Where the cable 24 is threaded through the grommets 32 and the sheet material the margin of material above the grommets 32 against the roof 42 can be sized slightly larger than the distance between the cable 24 and the roof 42 causing the cable 24 to have a tendency to deflect away from the roof 42 when the margin of the sheet material is placed between the cable 24 and the roof 42 resulting in the cable 24 holding the material against the roof 42.

Alternate means of attaching the sheet material to the cable are available. For example, spaced apart hooks could be placed on the cable to engage grommets on the sheet material, or hooks could be fastened to the sheet material to be attached to the cable in lieu of grommets. Also, the cable 24 may be attached to the sheet material without tension on the cable 24 and the cable 24 then used to lift the sheet material as tension is applied thereto.

The sheet material of the preferred embodiment is made of flexible substantially gas impervious plastic material such as polyvinyl chloride which is fire resistant and fire retardant. Other plastic sheet film materials may be used such as those made of polymerizates, condensation products or cellulosic derivatives as well as fiber glass. In many instances the sheet material will be reinforced with a scrim material.

FIG. 3 more fully illustrates the anchor post assembly 26 illustrated in FIGS. 1 and 2. An inner tubular member 44 is adjusted to slide within an outer tubular member 46 which results in a supporting structure which is adjustable lengthwise. Structural column rigidity is maintained between the members 44 and 46 by the use of a fastener 48 such as the threaded bolt and receiver 49 and 51. The fastener 48 also serves as a locking means to maintain the overall length of the anchor post 26 once it has been established. One skilled in the art would be aware of numerous alternatives for the fastener 48 such as spring loading member 44 with respect to member 46 and the use of a pin passing through coinciding holes in the members 44 and 46. Further, the member 44 could be solid as well as tubular and both members 44 and 46 could be shapes other than tubular, for example, square, and could be also inverted from the orientation illustrated. Covering the outer extremity of the member 44 is a cap 50 affixed thereto, with a pointed portion 52 for penetrating the floor 40 of a mine. Similarly, member 46 has a cap 54 and pointed portion 56 for penetrating the roof 42 of a mine. Permanently affixed to the cap 54 is a cable attachment 34 illustrated as a plate 60 having two "U" bolts 62 through which the end of the cable 24 can pass and the bolts 62 can subsequently be tightened down to retain the cable 24. Other cable attachments could be used, for example, a plate with a hole in it through which the cable 24 could be passed and a fastening loop formed of the end of the cable 24.

FIGS. 4 and 5 illustrate the tensioning post assembly 28 depicted in FIG. 2. Similarity in construction of the tensioning post 28 to the anchor post 26 is noted in

inner and outer tubular members 64 and 66, fastener 68 and cap 70 and pointed portion 72 which correspond to anchor post 26, elements 44 and 46, 48, 50 and 52 respectively. The above elements 64, 66, 68, 70 and 72 of the tensioning post 28, like the anchor post 26, also function to vary the length of the tensioning post 28, lock the post 28 at an established length and penetrate the mine floor 40. As described for the anchor post 26, the above elements of the tensioning post 28 have the same alternate embodiments. Fixedly attached to the outer tubular member 66 is a structure 74 in the form of a channel which supports both cable guide 76 and cable tensioner 36. Alternatives are available for structure 74, for example, a post or a pipe could be used. At the top of the structure is pointed portion 80 for penetrating the mine roof 42.

Attachment of the illustrated cable guide 76 to the structure 74 is accomplished by journaling a pin 82 thereto with a pulley 84 affixed to the pin 82 to provide a rotating guide for the cable 24 which lies in the peripheral groove 86 of the pulley 84. Examples of other cable guides 76 would be simply a pin or a notch in the top of structure 74 having a smooth base to receive the cable 24.

Tension is established and maintained on the cable 24 by the cable tensioner 36 which is illustrated as a winch consisting of a spool 88, onto which the cable is wrapped, a crank mechanism 90 for rotating the spool 88, a base 92 for pivotally supporting the spool 88 and crank mechanism 90, and ratchet 94 for locking the spool 88 in a particular position. Another example of a cable tensioner 36 would be a turnbuckle having one end fastened to the structure 74 and the other to the cable 22.

FIG. 6 illustrates a modification which can be applied to the inner tubular member 44 and 64 of the anchor post 26 and tensioning post 28 respectively to give still another embodiment of the invention.

Added to the bottom of the inner tubular member 96 is a jack mechanism 98 fitting within the inner tubular member 96. Actuation of the jack mechanism causes the rack 100 to either retract into the member 96 or advance outwardly. With the modification on either the anchor or tensioning posts 26 and 28 and the posts 26 and 28 in position as illustrated in FIG. 2 advancing the rack 100 outwardly will apply additional setting force to the cap 102 and pointed portion 104 for penetration of the point into the mine floor 40 as well as applying a like force to the upper portion of the posts 26 and 28, not illustrated in FIG. 6.

The invention described above is an adjustable brattice which is reuseable thereby making the apparatus very flexible in its use in various locations of a mine to control the flow of clean air to areas being worked. The simplicity of design makes the apparatus easy to use and rugged in character to thereby keep maintenance down. Also, the sheet material is fire resistant to retard mine fires.

In accordance with the provisions of the patent statutes, the principle and mode of operation of the apparatus have been explained and what is considered to represent its best embodiment has been illustrated and described. It should, however, be understood that the invention may be practiced otherwise than as specifically illustrated and described without departing from its spirit or scope.

I claim:

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1. In a ventilation control system for a mine having
a floor and roof comprising:
an extended sheet formed of flexible substantially gas
impervious material;
two spaced apart substantially upwardly extending
support posts wherein the upper terminal portions
of said posts are spaced a greater distance than the
lower terminal portions and extend between the
floor and the roof of the mine;
cable means extending between the upper terminal
portions of said posts adjacent the roof of the mine
for supporting said sheet in close proximity to the
roof of the mine and applying tension to the upper
terminal portions of said posts; and
grommets in said sheet located in spaced relation in
the upper portion thereof from which said sheet de-
pends upon engagement of said grommets with said
cable means to extend said sheet between the roof
and the floor of the mine whereby when tension is
applied to the upper terminal portions of said posts
by said cable means said posts are firmly engaged
between the floor and roof of a mine.

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2. The invention defined in claim 1 wherein said sup-
port posts include cooperating telescoping sections for
adjusting the length of said posts.

3. The invention defined in claim 2 including locking
means for preventing relative movement between the
cooperating telescoping sections.

4. The invention defined in claim 4 wherein said co-
lumnar members are provided with pointed terminal
ends for embedding in the floor and roof of a mine.

5. The invention defined in claim 2 including jacking
means affixed to said columnar members for effecting
selective relative axial movement between said sec-
tions.

6. The invention defined in claim 2 including tension-
ing means affixed to one of said columnar members and
said cable to apply tension to said cable.

7. The invention defined in claim 6 wherein said ten-
sioning means includes a winch.

8. The invention defined in claim 1 wherein said
sheet material is formed of polyvinyl chloride.

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