

June 17, 1930.

J. B. MILLER

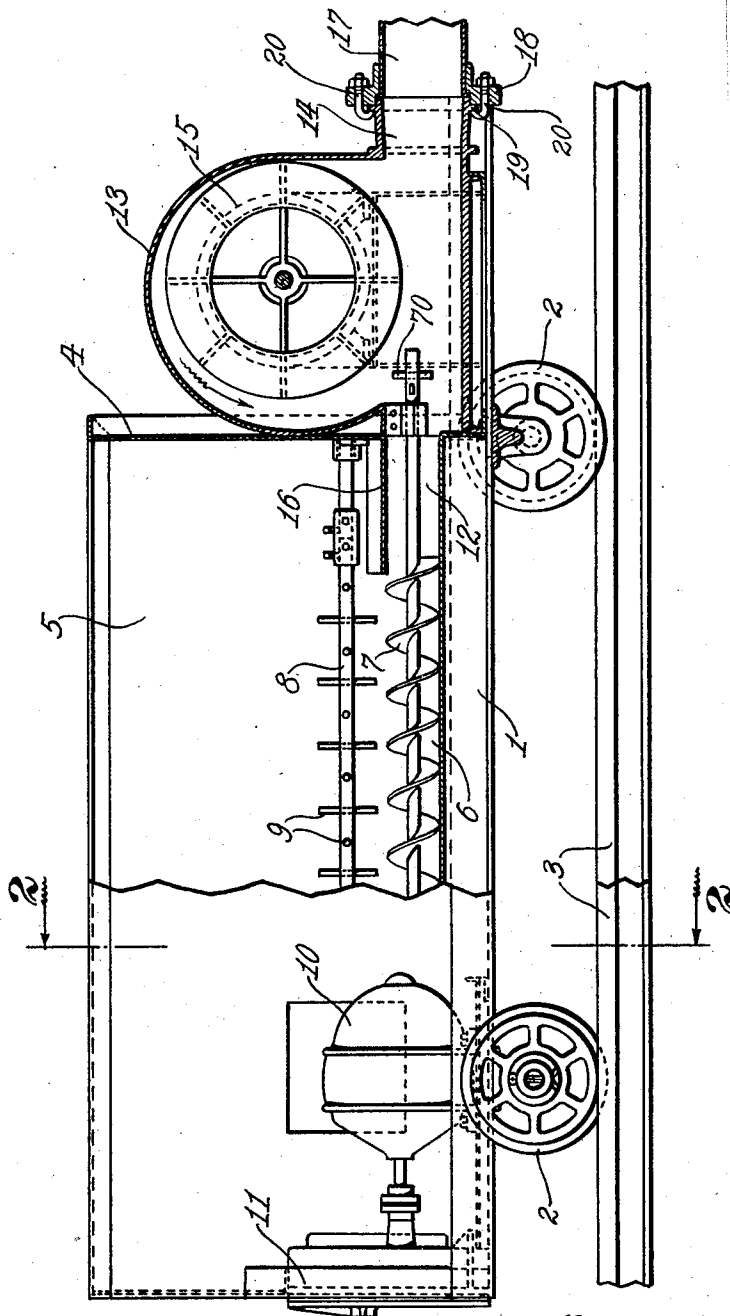
1,764,113

APPARATUS FOR ROCK DUSTING MINES

Filed Aug. 14, 1926

3 Sheets-Sheet 1

Fig. 1.



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Fig. 2.

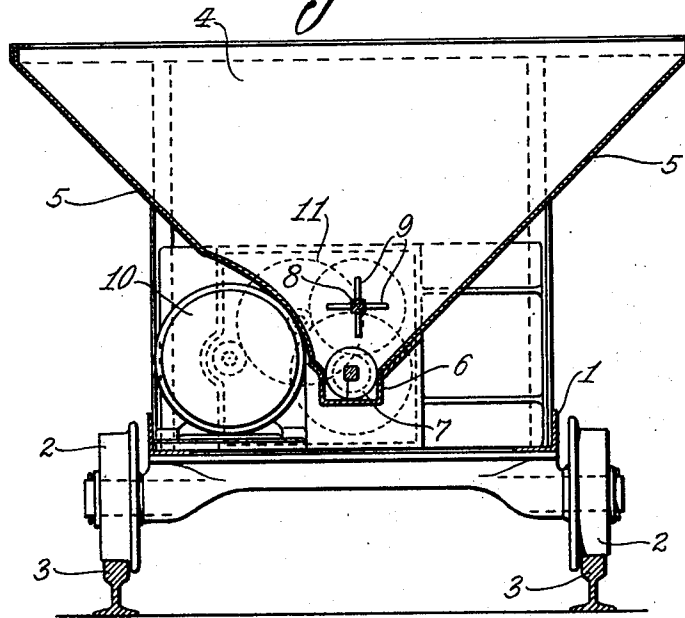
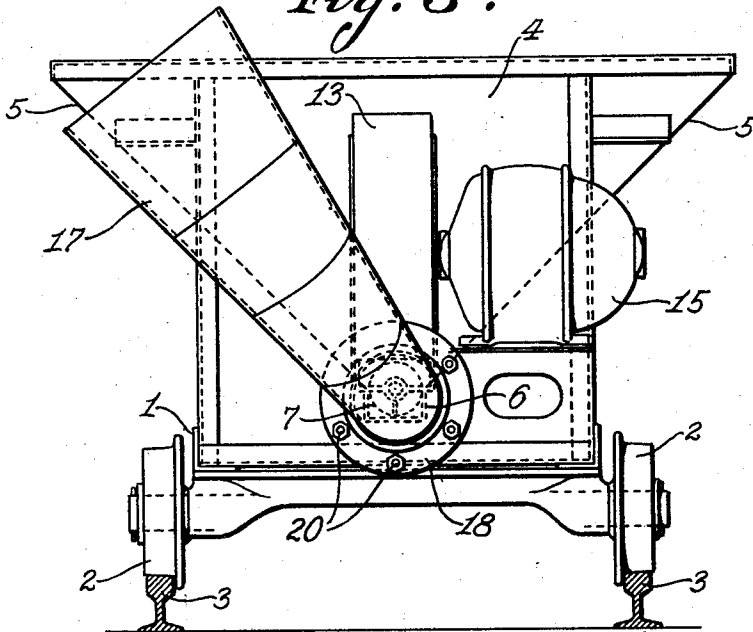


Fig. 3.



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Fig. 4.

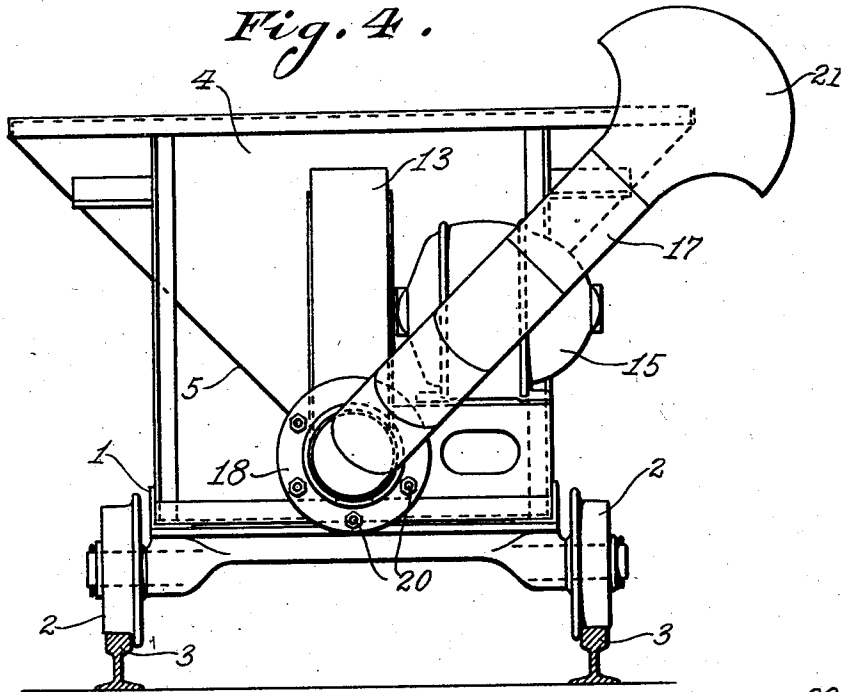
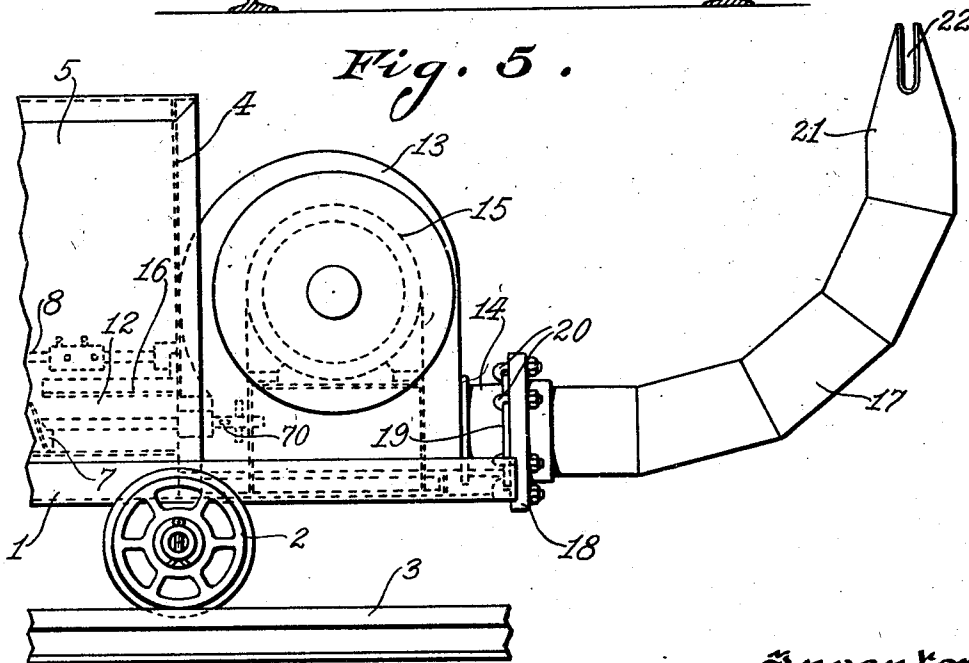


Fig. 5.



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UNITED STATES PATENT OFFICE

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APPARATUS FOR ROCK DUSTING MINES

Application filed August 14, 1926. Serial No. 129,171.

This invention pertains to apparatus for rock-dusting mines.

In many mines, particularly coal mines, the accumulation of coal-dust raised by the mining operations upon the various surfaces in the mine passage ways establishes a serious fire risk. There is nearly always more or less coal-dust suspended in the atmosphere of the mine, and as this fine dust is highly combustible, it is liable to be ignited. When such suspended dust becomes ignited, an explosion usually occurs as a result of the combustion of the mixture of air and coal-dust. When such an explosion occurs, the flame is liable to travel along the mine passage ways, increasing in violence as it goes. The blast of such a flame has a tendency to dislodge coal-dust which may have gathered on the walls and roof of the passage ways, and this dust is added to the combustible material, so that the flame gathers volume as it proceeds. Some very serious explosions have occurred, due to this cause. A method of preventing, or at least safe-guarding to a certain extent against, such explosions involves the coating of the surfaces of the roof and ribs of the passage ways with pulverized rock-dust. The rock-dust is incombustible and adheres to the surfaces so as to cover the deposit of coal-dust, thereby lessening the liability of ignition. At the same time, if an explosion should occur which dislodges the dust from the walls, the dislodged dust contains a large percentage of incombustible rock-dust, and the mixture so produced is not so rich in combustible material and, therefore, is more difficult to ignite. Experience has shown that mines systematically rock-dusted are much less liable to disastrous coal-dust explosions than those which are not so protected.

One of the objects of this invention, therefore, is to provide an apparatus by means of which the coating of rock-dust may be applied to the roof and ribs of the mine passage ways, as well as to the cracks and crevices in the same and behind timbers and the like wherever coal-dust may collect.

Another object of this invention is to provide such an apparatus which will be

reliable in service and economical to construct.

A further object is to provide means whereby the rock-dust coating may be applied to a large portion of the interior surface of the mine passage way at a single application.

Further objects will appear from the following description, taken in connection with the accompanying drawings, in which

Figure 1 is a side view partly in section illustrating a machine embodying this invention, a portion of the discharge conduit being broken away;

Figure 2 is a section on line 2—2 of Figure 1;

Figure 3 is a rear or right-hand end view of Figure 1;

Figure 4 is an end view, similar to Figure 3, showing another embodiment of this invention; and

Figure 5 is a side view of the rear end of the machine showing the mounting of the outlet conduit.

Referring to the accompanying drawings, 1 designates a chassis which may be constructed of channel or I-beams in any suitable manner and which is mounted on wheels 2 adapted to run on the rails 3 of the mine track on which the coal cars are hauled. The illustration shows a mounting for hauling the device along the track way. Any other suitable means of transportation may be used in such passage ways in which no tracks have been laid. Mounted on the chassis 1 is a hopper 4, which is preferably constructed with steeply sloping sides 5 so that the rock-dust will feed downward therein by gravity. The bottom of the hopper 4 is provided with a trough 6 in which is mounted a conveyor 7 which is shown as of the screw type. This conveyor has its shaft extending along the trough 6 so that rotation of the conveyor will feed the rock-dust along the trough. Mounted over the conveyor 7 and also along the bottom of the hopper is an agitator which may be constructed with a shaft 8 carrying a series of transversely extending pins 9 adapted to loosen the dust in the hopper and prevent

the same from bridging. Mounted on the chassis 1 and outside of the hopper 4 is a motor 10 connected by suitable gearing 11 to drive the shafts of the conveyor and the agitator. The gearing 11 is arranged so that the gears may be interchanged in order to provide any speed ratio between the motor and the conveyor or the agitator.

The hopper 4 communicates at its rear end through a passage 12 with the bottom part of the housing of a blower 13. The blower is mounted on the rear of the chassis 1 and with its outlet opening 14 directed to the rear. The blower is driven by a motor 15, also mounted on the chassis 1, and runs in such a direction that its draft is delivered rearwardly through the outlet 14.

It will be seen that the action of the conveyor 7 feeds the dust from the hopper 4 through the passage way 12 into the housing of the blower and in such a direction that the dust will be taken up by the draft produced by the blower and carried out through the outlet 14. The passage way 12, which may be formed by providing a housing 16 within the hopper 4 and which extends into the blower housing, receives the dust delivered by the conveyor and the dust accumulates in the passage so as to completely fill the same. The dust is then forced gradually through the passage by the action of the conveyor until it is delivered to the blower 13. The passage way 12 is thus always filled with dust so that the pressure established by the blower 13 will not blow backwardly into the hopper 4. The dust in this passage thus provides a seal to protect the hopper against back pressure from the blower. An agitator 70 within the blower at the exit of the passage 12 serves to loosen the dust as it is taken up by the draft.

Mounted in extension of the outlet 14 is an outlet conduit 17 which receives the dust from the blower and delivers it to the surfaces to be dusted. The conduit 17 is provided with an adjustable connection to the blower housing, which may comprise a collar 18 fixed to the conduit and adapted to fit a flange 19 on the outlet fitting 14. A series of hook bolts 20 may be provided to clamp the collar 18 against the flange 19. By means of such a connection the conduit 17 may be adjusted laterally to any desired position so that the dust stream issuing therefrom may be directed to any surface as desired.

The outlet conduit 17 may be flared so as to permit expansion of the dust stream as it issues therefrom. Such expansion will cause a wider distribution of the dust over the surface to be dusted. In Figure 3 the outlet conduit is shown as flaring gradually toward its upper end. In this embodiment

the conduit may retain its circular cross section from bottom to top, or the cross-section may change progressively to an oval or elongated shape at its upper end. In Figure 4 the outlet conduit is shown as provided with a flared head 21. This head is formed so as to flare laterally and at the same time to contract in a transverse direction so that a long, narrow slot 22 is provided at its end, through which the dust stream issues. This head may be mounted so that the slot 22 is directed transversely of the direction of movement of the machine. The dust stream issuing from such a slot will be spread out into a fan shape so as to project the dust in all directions toward the top and side of the mine passage.

In the operation of this device the machine is coupled so as to be drawn through the mine passages by a locomotive or other hauling means. One or more supply cars loaded with rock-dust may be coupled between the machine and the locomotive. The hopper 4 is loaded with rock-dust and the device hauled to the point at which the application of dust is to be made. The motors 10 and 15 are then started, and the machine is hauled slowly along the passage way. During the operation the conveyor 7 will feed the dust from the hopper to the blower 13. The agitator prevents bridging of the dust in the hopper and insures a continuous supply. The dust collecting in the passage 12 prevents any blowing of air back into the hopper 4. The dust delivered to the blower is taken by the draft of the latter and blown out through the outlet conduit 17. This conduit is set at such an angle as to direct the dust stream to those parts of the roof and ribs of the passage way which it is desired to coat. With the conduit set in one of the positions shown in Figures 3 or 4, the dust stream will be capable of coating one side and half of the roof of the passageway. The car is made to travel along the passage way so that the dust may be blown against the walls thereof. After traversing the required length of passage way under these conditions and coating one side and half of the roof thereof, a second trip through the same passage may be made with the conduit 17 adjusted to the other side so as to coat the other side and the other half of the roof. During each passage, the speed of the feed conveyor 7 and the speed of the blower 13, as well as the rate of travel of the car, may be so adjusted as to apply the desired amount of dust per linear foot of passage. After a little experience, the operator will readily learn to make these adjustments as desired.

It will be seen, therefore, that this invention provides a convenient and efficient apparatus for rock-dusting mines. The dust is fed continuously from the hopper to the blower, where it is taken up by the draft and

blown out in a predetermined direction so as to be deposited against the desired surfaces. The feed is continuous and the dust collecting in the passage 12 seals that passage against the back pressure. The dust is delivered to the bottom of the fan housing and in the direction in which the draft therein is moving. It is, therefore, fed in a direction to be immediately taken up by the draft and blown out positively through the outlet conduit. The conduit may be adjusted so as to deliver the dust stream in any desired direction so as to coat any desired surface. The flaring outlet of the conduit provides for spreading the dust stream so as to cover a maximum surface at a single application.

It is obvious that various changes may be made in the details of construction without departing from the spirit of this invention; it is to be understood, therefore, that this invention is not limited to the specific details shown and described.

Having thus described the invention, what is claimed is:

1. An apparatus for rock-dusting mines, comprising, a hopper, a blower having a casing communicating with said hopper by a passage, an outlet conduit from said blower adapted for direction toward the surface to be dusted, and a conveyor adapted to feed the dust through said passage from said hopper to said conduit so as to be taken up by the draft from said blower, and said passage being positioned and arranged to cause a collection of dust adapted to protect said hopper against back pressure from said blower.

2. An apparatus for rock-dusting mines, comprising, a hopper, a blower having a casing communicating with said hopper by means of a passage, an outlet conduit from said blower adapted for direction toward the surface to be dusted, a conveyor adapted to feed the dust through said passage from said hopper to said conduit so as to be taken up by the draft from said blower, said passage being constructed and arranged so as to cause a collection of dust to protect said hopper against back pressure from said blower.

3. An apparatus for rock-dusting mines, comprising, a hopper, a blower, means for feeding dust from said hopper to said blower, and means for agitating the dust within said blower in order to loosen the same to be taken up by the draft.

4. An apparatus for rock-dusting mines, comprising, a hopper, a blower, means for feeding dust from said hopper to said blower, constructed and arranged to cause accumulation of dust adapted to protect said hopper against back pressure from said blower, and means for agitating the dust

within said blower in order to loosen the same to be taken up by the draft.

5. An apparatus for rock-dusting mines, comprising, a hopper, a blower, means for feeding dust from said hopper to said blower including a passage adapted to accumulate dust between said hopper and said blower, and an agitator within said blower at the exit of said passage.

6. An apparatus for rock-dusting mines, comprising, a hopper, a blower, an outlet conduit from said blower mounted for direction toward the surface to be dusted, a movable member constructed to feed the dust from said hopper toward said conduit so as to be taken up by the draft from said blower, and an extended passage between said hopper and said outlet in which said member operates adapted to cause collection of dust to protect said hopper against back pressure from said blower, the action of said member terminating short of said passage.

7. An apparatus for rock-dusting mines, comprising, a mine car having a hopper thereon, a blower having a casing communicating with said hopper by a passage, an outlet conduit from said blower adapted for direction toward the surface to be dusted, and a conveyor adapted to feed the dust thru said passage from said hopper to said conduit so as to be taken up by the draft from said blower, constructed and arranged to cause a collection of dust in said passage adapted to protect said hopper against back pressure from said blower.

8. An apparatus for rock-dusting mines, comprising, a mine car having a hopper thereon, a blower mounted on said car in rear of said hopper and having a casing communicating with said hopper by a passage, an outlet conduit from said blower opposite said passage adapted for direction toward the surface to be dusted, and a conveyor adapted to feed the dust thru said passage from said hopper to said conduit so as to be taken up by the draft from said blower, constructed and arranged to cause a collection of dust in said passage adapted to protect said hopper against back pressure from said blower.

9. An apparatus for rock-dusting mines, comprising, a hopper, a blower having a casing communicating with said hopper by an extended passage, an outlet conduit from said blower adapted for direction toward the surface to be dusted, and means for feeding the dust through said passage into the bottom of said blower.

10. An apparatus for rock-dusting mines, comprising, a hopper, a blower, having a casing communicating with said hopper by an extended passage, an outlet conduit from said blower adapted for direction toward the surface to be dusted, and means for feeding

the dust from said hopper through said passage into said blower adjacent said outlet.

11. An apparatus for rock-dusting mines, comprising, a hopper, a blower having a casing communicating with said hopper by an extended passage, an outlet conduit from said blower adapted for direction toward the surface to be dusted, and means for feeding the dust from said hopper through said passage into said conduit in the direction of movement of the air from said blower.

In testimony whereof I affix my signature this 12th day of August, 1926.

JAMES B. MILLER.

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