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Oct. 13, 1925. 1,556,879

W. J. REID

METHOD FOR DUSTING COAL MINES

Filed July 3, 1924 4 Sheets-Sheet 1

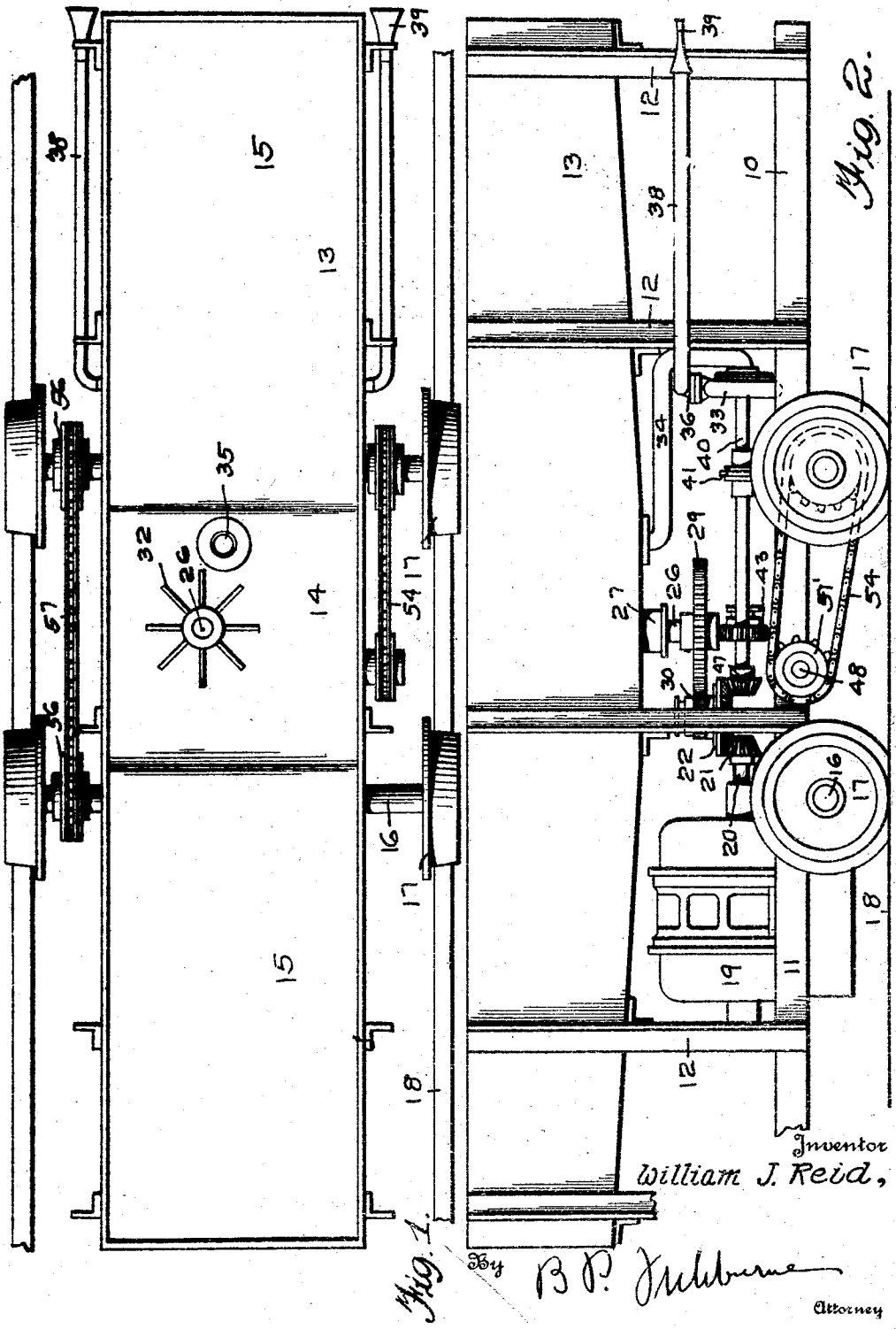


Fig. 1.

Fig. 2.

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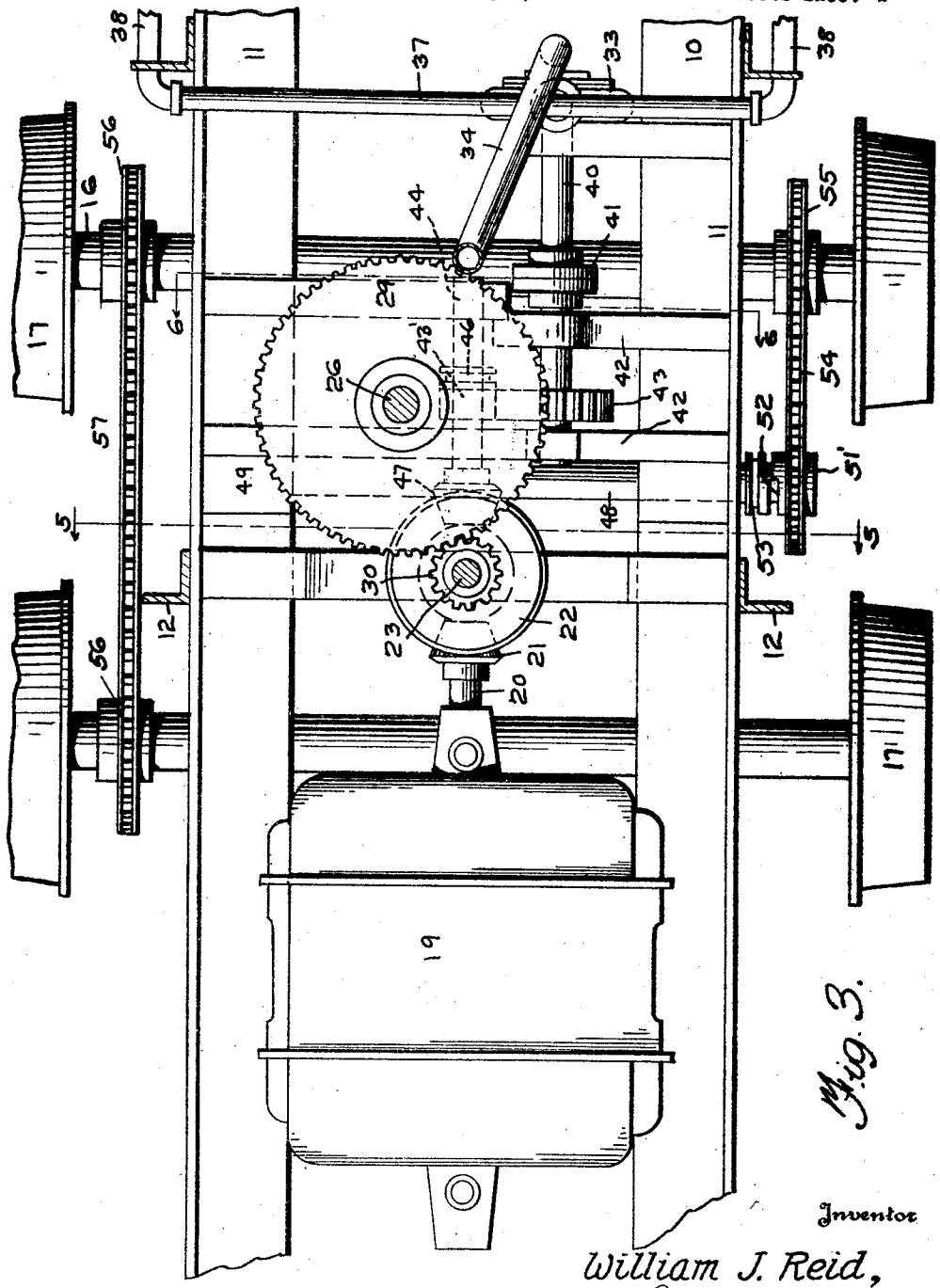


Fig. 3.

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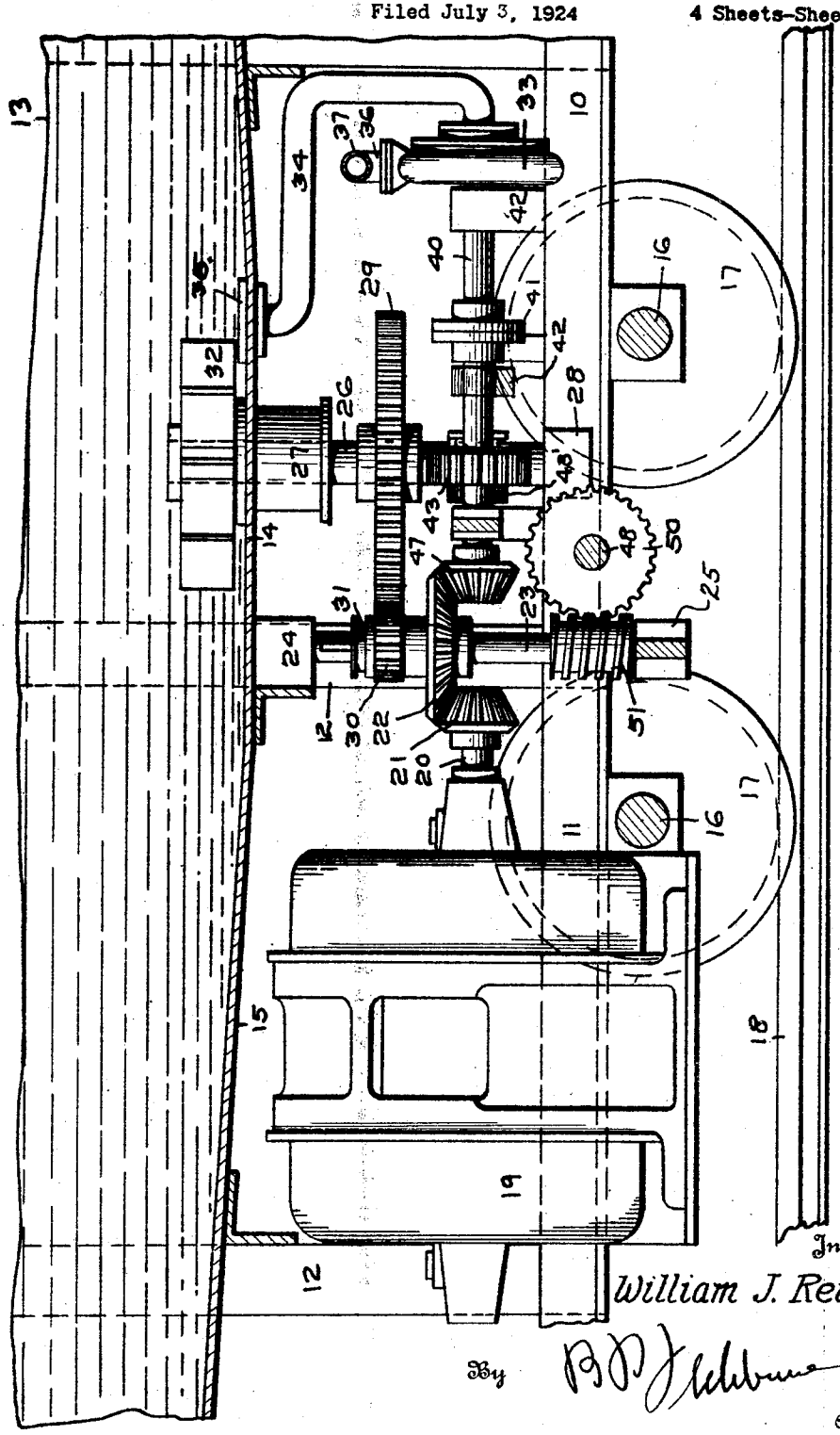


Fig. 4.

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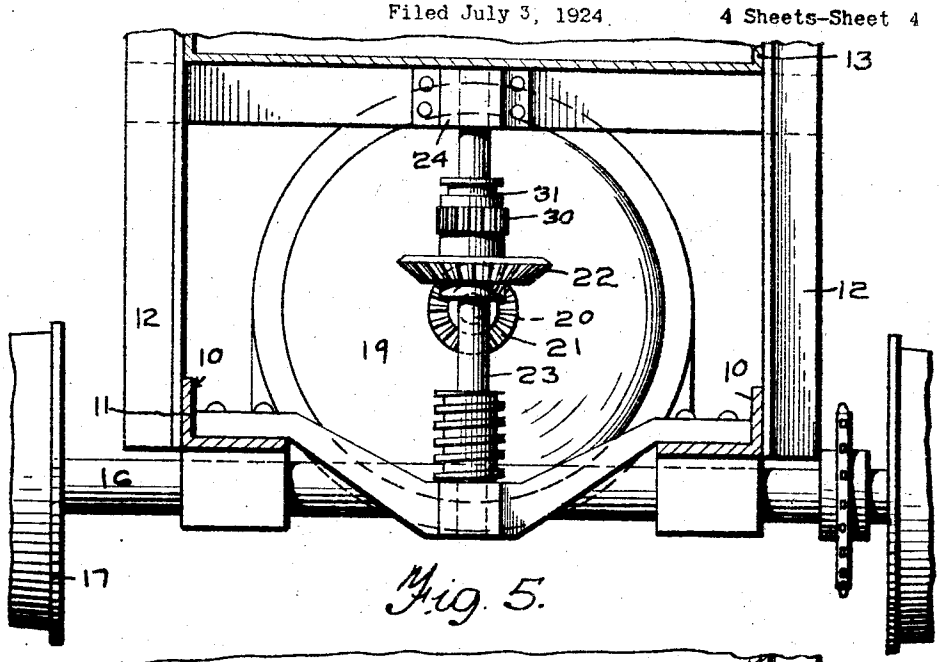


Fig. 5.

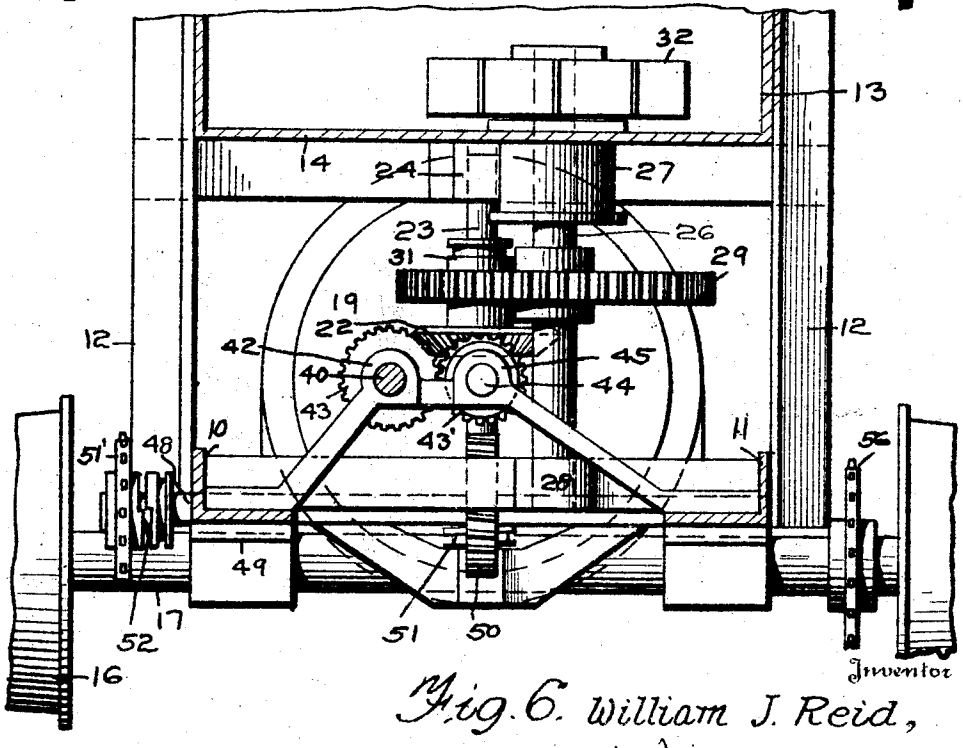


Fig. 6. William J. Reid,

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Patented Oct. 13, 1925. 1,556,879

UNITED STATES PATENT OFFICE.

WILLIAM J. REID, OF WATTIS, UTAH.

METHOD FOR DUSTING COAL MINES.

Application filed July 3, 1924. Serial No. 724,014.

To all whom it may concern:

Be it known that I, WILLIAM J. REID, a citizen of the United States, residing at Wattis, in the county of Carbon and State of Utah, have invented certain new and useful Improvements in Methods for Dusting Coal Mines, of which the following is a specification.

My invention relates to a method of applying a dusting material, in mines, for preventing explosions.

As is well known, explosions in coal mines or the like, are frequently occasioned by a combustible mixture of coal dust and air being present. The generally accepted method of preventing such explosions, is to dust the mines, by feeding into the same air laden with a non-combustible solid material or dust, whereby the coal dust accumulations are so diluted that combustion will not occur. The dusting material is ordinarily shale dust, adobe, clay, or the like.

This dusting of the mines, ordinarily termed "rock dusting" is prescribed by the laws of some States, and is unanimously conceded by all, to be the only effective and sure means of preventing explosions occurring in the mines. The ordinary way of applying this rock dust is very expensive and difficult, due to the present practice of its application. The present method, of rock dusting in coal mines, is to crush shale, rock or some other similar substance, to a fine condition, for producing the dust, and then employing powerful blowers, for forcing the same into the mine. This method leaves a great many places in the mine unprotected from coal dust explosions, and also involves a great expense, incidental to the purchase of heavy complicated machinery, and a number of men necessary to operate the same.

By my method, it is possible to apply the rock dust, such as shale, adobe or clay dust, or any other suitable non-combustible substance, in an efficient, economical and expeditious manner. When the term "powdered argillaceous rock" is employed in the claims, it is intended to cover powdered shale, clay, adobe, or the like. My method permits of the treatment of all roofs, floors, crevices, ledges, pocket and all other places that have heretofore been inaccessible to efficient rock dusting, by other means, as far as I am aware. By my method, the shale, clay, adobe, or other suitable substances, reduced to a dust or powder, is introduced into a large tank, in the presence of water, and the mass is worked into a thick fluid, or thin paste, which will flow readily through a centrifugal pump. The mixture is discharged by the pump through suitable holes or the like, in the liquid form, and is applied with sufficient force to adhere to all parts treated with the same. This mass will dry, and is then reduced to a dust form, by means of the usual mine ventilation, and the result is, that the coal dust accumulations are diluted to a non-combustible form.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings forming a part of this specification, and in which like numerals are employed to designate like parts throughout the same,

Figure 1 is a plan view of apparatus embodying my invention,

Figure 2 is a side elevation of the same,

Figure 3 is a horizontal section through the apparatus, parts broken away, taken directly beneath the tank and looking downwardly,

Figure 4 is an enlarged side elevation, parts broken away, and parts in longitudinal vertical section,

Figure 5 is a transverse section taken on line 5—5 of Figure 3, and,

Figure 6 is a similar view taken on line 6—6 of Figure 3.

In the accompanying drawings, wherein for the purpose of illustration is shown a preferred embodiment of apparatus embodying my invention, the numeral 10 designates a truck frame, as a whole, embodying longitudinal beams 11, having uprights 12 rigidly secured thereto, which support a longitudinally extending tank 13, arranged therebetween, as shown. This tank is preferably rectangular, and it is provided with a horizontal intermediate bottom portion 14, and side bottom portions 15, which are inclined and extend downwardly toward the horizontal bottom portion 14.

The frame 10 is supported by axles 16, mounted therebeneath, and suitably connected with the longitudinal beams 10, and these axles carry wheels 17, for traveling upon a track 18, as shown.

Arranged between and suitably rigidly mounted upon the longitudinal beams 11,

is an electric motor 19, having an armature shaft 20, provided with a beveled gear 21, rigidly secured thereto. This beveled gear engages a horizontal beveled gear 22, which is rigidly mounted upon a vertical shaft 23. This vertical shaft has its upper end journaled in a bearing 24, and its lower end in a bearing 25 which is also an end thrust bearing.

The numeral 26 designates a vertical agitator shaft, extending into the bottom of the tank 13, through the intermediate bottom portion 14, and passing through a gland 27. The lower end of this shaft is journaled in a bearing 28, which also constitutes an end thrust bearing. The shaft 26 receives its rotation from a large gear 29, rigidly secured thereto which in turn engages a smaller gear 30, which is splined upon the vertical shaft 23, so that it rotates therewith, but may be shifted longitudinally of the same, into and out of engagement with the gear 29. The gear 30 is equipped with the usual grooved collar 31, for the reception of the forked end of a shifting lever, not shown. The upper end of the agitator shaft 26, projects above the bottom portion 14, and has an agitator paddle wheel 32, rigidly secured thereto. This paddle wheel operates adjacent to the horizontal intermediate body portion 14, and is therefore arranged to act upon the solid portions of the mass which gravitate upon the horizontal body portion 14, from the inclined bottom portions 15.

Arranged beneath the tank 13, and near one end thereof, is a centrifugal pump 33, of any well known or preferred type, having an inlet pipe 34, which leads into the tank 13, at the horizontal intermediate bottom portion 14, in close relation to the agitator paddle 32, as clearly indicated at 35, in Figure 1. The inlet pipe 34 has its intake end arranged in close relation to the agitator paddle so that it will withdraw the material from the tank, at the point of maximum agitation. This centrifugal pump is provided in its top with an outlet coupling 36, and a transverse pipe 37 is connected therewith, having flexible hose 38 or the like, secured thereto, which hose may be of any suitable length, and lead to suitable nozzles 39.

The centrifugal pump 33 is driven by a longitudinal counter shaft 40, having a flexible coupling 41, connected therein. This shaft is journaled in bearings 42.

The counter shaft 40 is provided at its rear end with a gear 43, rigidly secured thereto, which gear is adapted to engage with a gear 43′, splined upon a longitudinal drive shaft 44. This longitudinal drive shaft is journaled in suitable bearings 45. The gear 43′ is equipped with the usual grooved roller 46, for receiving the forked end of a shifting lever, not shown, whereby the gear 43′ may be shifted into and out of engagement with the gear 43. The shaft 44 is provided at its rear end with a beveled gear 47, arranged to engage the beveled gear 22, as shown. It is thus seen that the pump is driven from the motor.

It is also desired that the motor may be employed to propel the truck, and for this purpose I provide a transverse counter shaft 48, journaled in suitable bearings 49, secured to the longitudinal beams 10. This counter shaft carries a worm wheel 50, near its center, which engages a worm 51, rigidly mounted upon the lower end of the vertical shaft 23. The transverse counter shaft 48 has a sprocket wheel 51′, rotatably mounted upon one end thereof, and provided with a clutch element 52, adapted to be engaged and disengaged by a coacting clutch element 53, splined upon the shaft 48, and adapted to be shifted into and out of engagement with the clutch element 15, by the usual shifting lever, not shown. The sprocket wheel 51′ is engaged by a sprocket chain 54, and this sprocket chain engages a sprocket wheel 55, which is rigidly mounted upon the axles 16 and 17. The axles 16, are provided at their opposite ends with sprocket wheels 56, engaged by a sprocket chain 57.

In operation, the apparatus is propelled along the track to the desired point. Of course the invention is not necessarily restricted to the idea of running the truck upon a track, as the truck may be employed without a track, by the substitution of suitable wheels. The machine is brought to rest upon the track, at the selected point, and the gearing is adjusted whereby the agitator paddle is set in motion, while the centrifugal pump may be at rest. The operator now introduces into the tank 13 a suitable amount of fine or powdered non-combustible material, such as powdered shale, adobe or clay, and also introduces into the tank a sufficient amount of water, whereby a heavy fluid or light paste is produced. Satisfactory results may also be obtained by introducing the shale, adobe or clay, into the tank, without pulverizing the same, as they will readily dissolve in the water, producing a mud, of a plastic consistency, which will flow. The mass is kept thoroughly agitated by the revolving agitator paddle, the heavier portion of the mass gravitating inwardly upon the inclined bottom portions 15, to the intermediate horizontal bottom portion 14. When the liquid or plastic mass is thoroughly mixed, the centrifugal pump is set in motion, while the agitator continues in motion, and the operator or operators spray the liquid or plastic mass upon the desired portions of the mine, by proper manipulation of the nozzles 39. This

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plastic mass may be thoroughly applied to all portions of the mine, and to many portions, such as crevices and pockets, which would be inaccessible in the ordinary method of dusting. The plastic mass is applied to the portions of the mine with sufficient force whereby it adheres to the same, and readily dries in such position. This plastic mass, upon drying, readily pulverizes, and is dusted throughout the mine, by the action of the usual air ventilating system. This method of dusting, is found by actual tests, to be highly effective. It will be seen that the application of this inert plastic mass, which adheres to the walls of the mine, forms a covering for the coal surfaces, thus preventing, to a considerable extent, the usual formation of coal dust from these coal surfaces. The plastic mass or covering is converted into dust, in sufficient quantities, to properly dilute the air which may become charged with the coal dust. If the plastic mass is applied to the walls of a damp mine, it acts just as effectively to prevent explosion. As it is well known, explosion occurs in a damp mine, which is believed to be caused first by an explosion of gas, producing intense heat in that portion of the mine in proximity to the gas, with the result that the coal surfaces become dried, and such surfaces then yield coal dust, which charge the atmosphere, and this charged atmosphere then explodes. In this manner explosions frequently continue in succession through a damp mine. Now when I spray the walls of a damp mine, upon the explosion of the gas, which usually occurs at the beginning of these disasters, the damp plastic mass of inert material, will be dried and pulverized, supplying to the atmosphere sufficient inert powder or dust, whereby it is diluted sufficiently, with respect to its coal dust, whereby the explosion which would otherwise result, is prevented.

It is to be understood that the form of my invention herewith shown and described is to be taken as a preferred example of the same, and that various changes may be resorted to in the steps of the method, and that changes may be made in the shape, size and arrangement of parts of the apparatus, without departing from the spirit of my invention, or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. The method of protecting coal mines against coal dust explosions, comprising mixing a powdered argillaceous rock and water to produce a mud, and applying said mud to the walls of the mine, said mud being adapted to be reduced to an anhydrous state by evaporation of the water, and to thereupon yield dust to the currents of air passing through said mine.

2. The method of protecting coal mines against coal dust explosions, comprising mixing a powdered argillaceous rock and water to produce a mud, and spraying said mud upon the walls of the mine, said mud being adapted to be reduced to an anhydrous state by evaporation of the water, and to thereupon yield dust to the currents of air passing through said mine.

In testimony whereof I affix my signature.

WILLIAM J. REID.