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POWDER LOADING MACHINE

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8 Claims. (Cl. 214—95)

The invention relates to the introduction of charges of explosive into bore holes such as used in mining operations, and more particularly to apparatus for lowering such charges into the holes.

The explosive charge employed in loading bore holes may be a gelatin powder or granular powder. The gelatin powder may come to the field in twelve and one-half pound cartridges wrapped in a waterproof container such as paraffin waxed paper. The present practice of loading such cartridges into the holes is to cut each twelve and one-half pound cartridge into four parts and drop the parts into the hole one by one. Assuming a 50 foot bench, the average depth of the holes will be about 60 feet. The step of cutting up the cartridge into small parts is resorted to in order to reduce the evident hazard which exists in dropping the powder for such a distance. The cutting up of the powder is a time-consuming operation, and has the further disadvantage of sacrificing the moisture-resistant protection afforded by the container, making it necessary to set off the powder sooner after loading than would be the case if the powder were still protected by the container.

Granular powder is generally packaged in twelve and one-half pound paper bags. It is less sensitive than gelatin powder and has no resistance to water. Its use is confined to dry holes, into which it is introduced by pouring from the bag. This method is dangerous because of the possibility that part of the charge will be lost in crevices or fissures beyond the reach of the detonating means employed. There is also the danger that rocks will be dislodged by the falling powder and drop into the main charge.

It will be seen that the loading of holes with either gelatin or granular powder is fraught with danger and that even with the use of picked crews of powdermen who are trained to give particular attention to details in their handling of powder, there is ever present the possibility of human failure or accident causing a major explosion. It is an object of my invention to provide means for minimizing the danger of explosion in powder loading operations.

More specifically, it is an object of my invention to provide apparatus which is capable of safely lowering a full sized uncut cartridge to the bottom of the hole. The apparatus which I have devised for this purpose can even be used for lowering much larger cartridges than the usual twelve and one-half pound cartridge, and in accordance with my invention, it has been found perfectly feasible to use, for example, a 50 pound cartridge. A cartridge of this size can be provided with an absolutely moisture-proof container, thereby preserving the full explosive qualities of the powder in wet holes. This will permit the use in wet holes of a less sensitive and cheaper grade of powder than could otherwise be employed. Moreover, the use of a large cartridge with its heavy concentrated charge requiring no tamping will eliminate the manual operations required to cut up a small cartridge into a number of pieces, drop them into the hole and tamp them. Accordingly, it has been an object of my invention to provide powder loading means which will eliminate these manual operations and which will greatly lessen the hazards incident thereto.

A further object of the invention is to provide powder loading apparatus which can be readily moved from one hole to another.

A more specific object of the invention is to provide apparatus of the class described which embodies numerous safety features which eliminate, or at least minimize, the hazards which might arise through improper manipulation of the controls—in other words, to eliminate the human equation in so far as possible.

A further object is to provide an improved lowering rig which enables the powder cartridge, when it reaches the bottom of the hole, to be loosed by fluid control means. Other objects and advantages will appear in the description which follows, taken in conjunction with the appended drawings in which:

Fig. 1 is a side elevational view of a preferred form of apparatus embodying my invention, showing a powder cartridge in the process of being lowered into a hole.

Figs. 2 and 3 are detail views of the fluid operated hook which forms a part of the apparatus shown in Fig. 1; Fig. 2 being a central cross-sectional view thereof, and Fig. 3 being a transverse sectional view taken on the line 3—3 of Fig. 2.

Fig. 4 is a rear elevational view of the apparatus shown in Fig. 1, but to a somewhat larger scale.

Figs. 5 and 6 are detail sectional views taken as indicated at 5—5 and 6—6 respectively in Fig. 4, Fig. 5 being taken at the center line of the hoisting drum and shaft, and Fig. 6 showing the braking mechanism.

Fig. 7 is a detail view of the upper end of the boom, showing the sheave and a device for catching the pneumatic hook in the event of its severance from the hoisting cable upon overwinding.