Jan. 24, 1967 J. H. PERKINS 3,299,567

METHOD OF SOIL EROSION CONTROL

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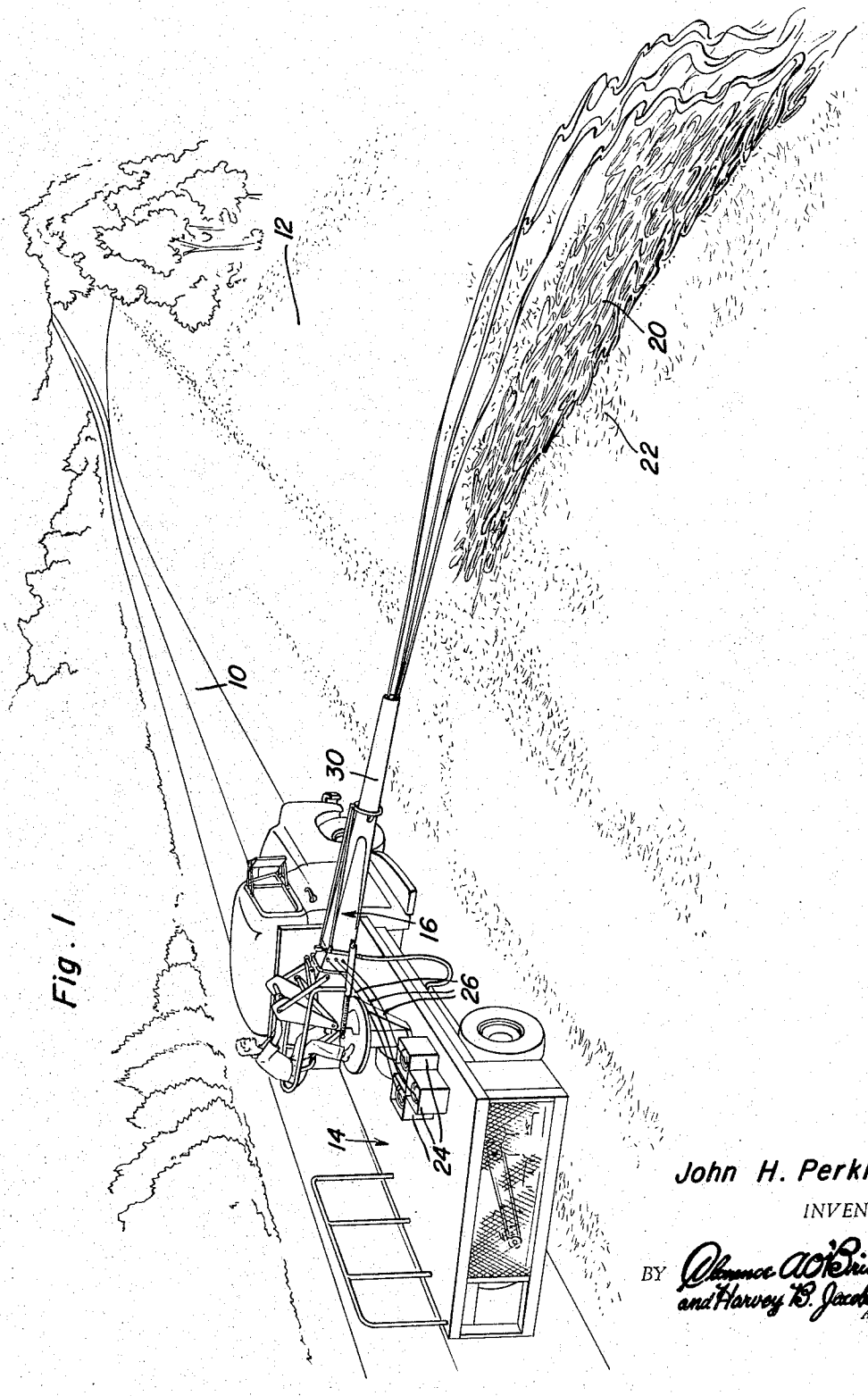


Fig. 1

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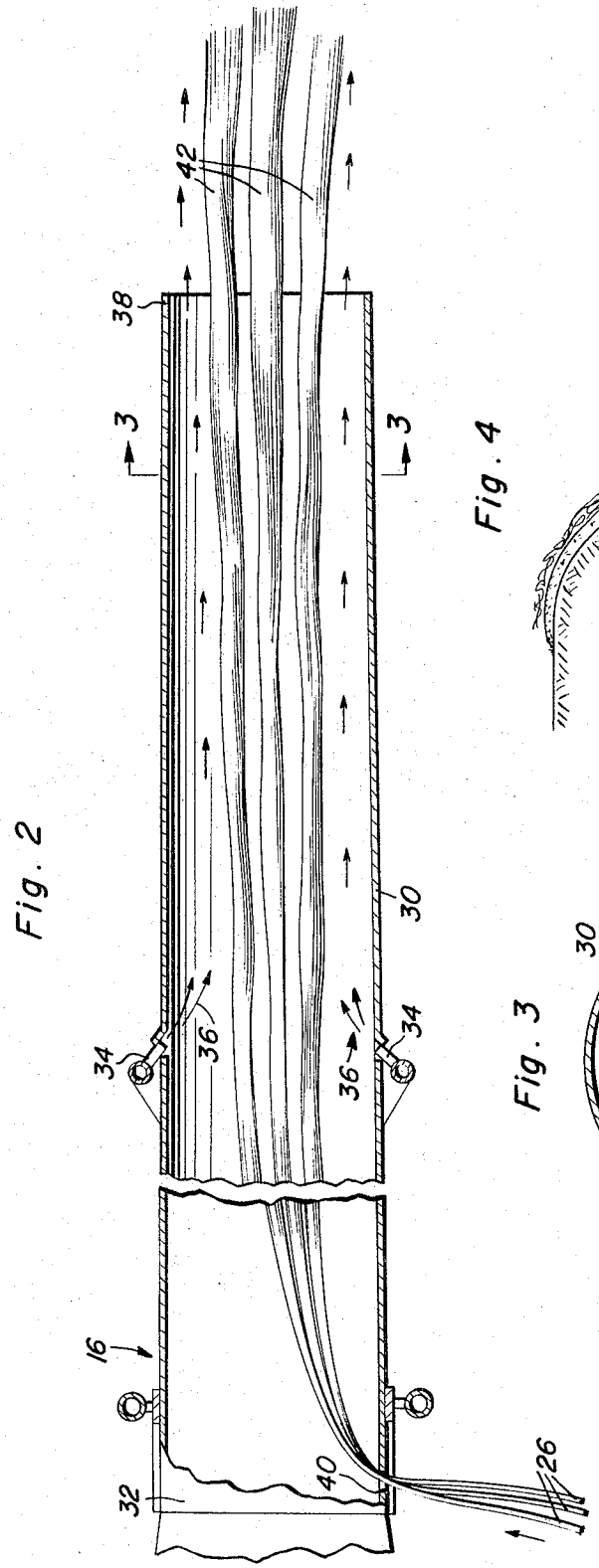


Fig. 2

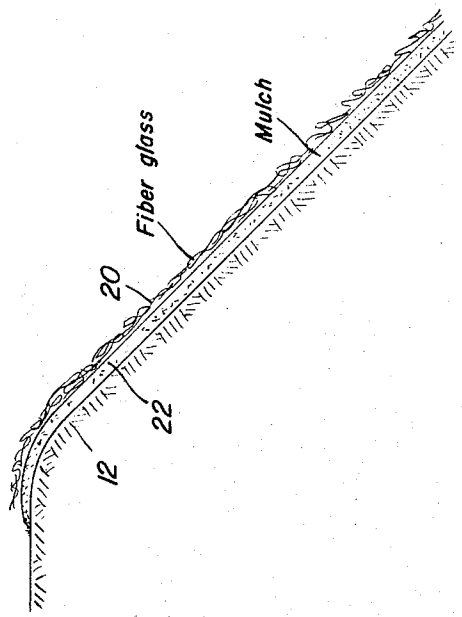


Fig. 4

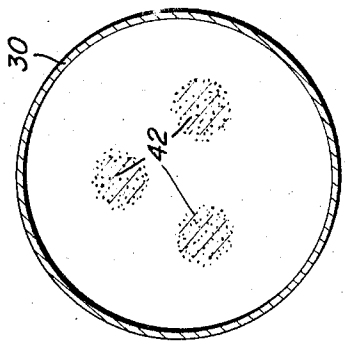


Fig. 3

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METHOD OF SOIL EROSION CONTROL

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4 Claims. (Cl. 47—9)

This invention comprises a novel and useful method for soil erosion control and more particularly pertains to a method and apparatus for effectively applying an erosion protective covering to the soil.

It has been known heretofore and is now common practice to provide a protective covering over those areas of soil which are particularly subject to erosion. By way of example, partially sloped or terraced areas such as adjacent to a new roadway or the like are particularly subject to erosion from the effects of precipitation or other water run-off particularly until such time as the area in question has been properly compacted and/or provided with a protective covering of erosion preventing vegetation. In order to combat such a condition at its inception, it has now become customary to apply a protective covering over the area subject to erosion. One such covering which has been heretofore employed with considerable success consists of strands of fibrous material such as fiber glass or the like. Heretofore such fiber glass material has been applied with a small hand operated air gun which blows the fibers therefrom in an accompanying air stream for a considerable distance out over the area to be protected. However, inasmuch as only a single strand is discharged by the air gun, it obviously requires a considerable length of time to apply a coating of a satisfactory density over a considerable area.

It is therefore the primary purpose of this invention to provide a method and a means for effectively applying a coating of a protective material of a fibrous nature over considerable areas which are subject to soil erosion.

A further object of the invention is to provide a method and a means whereby a plurality of strands of fiber glass or other fibrous material may be simultaneously applied by a single stream of air over an area to be protected, thereby greatly facilitating the covering of such area.

A still further object of the invention is to provide an apparatus and a method whereby a single air gun may be adapted to simultaneously discharge therefrom a plurality of continuous filaments or strands of a fibrous material such as fiber glass, and this from a plurality of individual containers for the fibers without danger of entangling the fibrous materials prior to discharge from the gun.

Yet another purpose of the invention is to provide an apparatus and a method which will effectively discharge a plurality of continuous strands of a fibrous material such as fiber glass or the like by means of a single spray of air from a single air gun and whereby, when once discharged, the materials will tend to intertwine and mingle with each other and thereby provide a cohesive mass of fibers well adapted to form a mat-like covering for the area.

Still another and more specific object of the invention is to employ a conventional type of mulch applying air gun, either with or without alterations, as an efficient means for producing and applying to selected soil areas an erosion protective covering of fibrous material such as glass fibers, and to considerably expand and fluff the fiber strands after they are fed into the barrel of the gun.

An additional subordinate object is to provide a means for increasing the turbulence in the barrel of a mulch applying air gun for expanding a plurality of fiber strands during their conveyance by the low velocity, high volume air blow of the gun.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is an elevational view showing one preferred manner in which the principles of the present invention are utilized to effect the applying of a protective erosion preventing covering of fibrous material to an area subject to soil erosion, and wherein the apparatus is rendered mobile by being applied to a truck or the like.

FIGURE 2 is a fragmentary detail view taken in vertical longitudinal sections upon an enlarged scale through the barrel portion of a conventional type of mulch applying air gun by which a plurality of individual fibrous strands are simultaneously discharged and applied to form the protective covering and to which barrel auxiliary turbulence producing high velocity air nozzles have been applied.

FIGURE 3 is a detailed view in vertical transverse section taken substantially upon the plane indicated by the section line 3—3 of FIGURE 2.

FIGURE 4 is a further detail view in vertical section of a portion of the sloping area of FIGURE 1 to which the soil erosion protective covering of fiber glass is to be applied.

Referring first primarily to FIGURE 1 there is represented a typical manner in which the principles of this invention may be effectively applied. Shown at **10** is a portion of a highway having at one side thereof a steeply inclined slope **12** which may be of newly filled material and which due to its inclination and the run-off of water from the highway is particularly vulnerable to the erosion effects of water run-off, particularly before the material has been properly settled and compacted by weathering and further protected by the development of a protective crop of erosion preventing vegetation.

Shown at **14** is any suitable type of mobile equipment such as a highway truck and preferably one which is conventionally employed for discharging a mulch by an air blast through a mulching gun indicated generally by the numeral **16** for applying a mulch covering to various areas for different purposes. The present invention beneficially and economically employs such conventional equipment, with slight alterations, to provide a protective soil erosion preventing covering as at **20** of a fibrous material such as fiber glass or the like directly over the mulch covering shown at **22** or if desired directly upon the bare soil itself.

By virtue of the use of the mulching gun **16**, a vastly greater output in the form of a conveying air stream and fibrous material carried by the air stream may be applied to provide the covering **20** than is possible with the previous equipment consisting of a single spray gun, such as that employed for applying fiber glass fibers to such purposes as coating boat hulls or the like, and which applies but a single strand of material.

Shown at **24** are a plurality of containers carried by the truck **14**, each container having a continuous filament of fibrous material such as fiber glass, The individual glass fibers or filaments from the containers are shown at **26**, three such filaments and containers being illustrated for simplicity of illustration only. It will be appreciated that any desired number of these containers may be provided as may be found convenient.

Any suitable source for producing a stream of air under pressure to be supplied to the breech of the gun barrel of the mulching gun **16** may be provided. The usual mulching gun has a power operated blower supplying a high volume but low velocity flow of air to the

breech of the gun barrel, but since this is conventional and well understood equipment and in itself forms no part of the present invention, an illustration and explanation of the same is deemed to be unnecessary.

In many instances, the conventional mulching gun and its high volume, low pressure air supply will be found satisfactory for conveying and applying a plurality of strands of fibrous material for producing an erosion preventing covering. However, for certain purposes it may be found desirable to obtain a more complete expansion and fluffing of the fibrous strands when they are introduced into the low velocity air stream and while they are within the gun barrel.

To obtain this last objective auxiliary air nozzles may be mounted upon and inserted into the gun barrel, adjacent the inlet openings for the fibrous strands. Such air nozzles will be connected to a suitable source for supplying air under a relative high pressure and velocity from any suitable source of compressed air, not shown.

In FIGURE 2, it will be noted that the mulching gun **16** includes a gun barrel **30** which adjacent its breech portion **32** is provided with a plurality of auxiliary air inlet nozzles as at **34** by means of which air is introduced into the gun as shown by the arrows **36** and is discharged from the open end **38** of the barrel. Adjacent the breech and rearwardly of the air inlet nozzle is the usual opening or openings **40** for the introduction of mulching material to be sprayed by the air blast from the gun barrel.

However, in accordance with this invention, in lieu of the mulching material, or in some instances if so desired, together with the mulching material there is supplied the individual continuous filaments of fibers **26** of the fibrous material such as fiber glass. As the material enters the gun, it is conveyed by the flow of the main air stream. In addition, it is engaged by the blast from the auxiliary air nozzles **34** and is rapidly propelled thereby along the gun barrel and discharged therefrom as shown in FIGURE 2.

During this operation, the fibers are fluffed, spread out or stretched to some extent by the conveying or main air stream, being continuously expanding from the relatively small dense fibers **26** that enter the gun into the relatively larger fibrous strands **42** when they emerge from the gun barrel. More important however, the angular impact of the high velocity streams from the auxiliary nozzles will produce a turbulence in the gun barrel which will considerably fluff and expand the strands of fibers. As the fibers emerge, they are intertwined, mixed or compacted with each other where they tend to adhere and thus as they are discharged from the gun barrel will fall together to form the coating **20**, see also FIGURE 4, which will directly overlie the mulch coating **22**, assuming that the mulch coating also has been or is being applied.

There is a cohesive action between the freshly discharged and expanded glass fibers **42** which tends to cause them to cohere together to form a blanket-like mass of varying density and thickness, depending upon the rate of propagation from the gun barrel as contrasted with the rate of forward travel of the vehicle. These fibers will overlie, cling to and hold down the layer of mulch **22** or when directly applied to the soil **12** will provide a protective covering for the latter which will prevent the rapid movement of water thereover and thus substantially retard or prevent erosion.

It will be appreciated that other fibrous materials than fiber glass may be utilized, the essential improvements of this invention residing in the handling of a plurality of continuous filaments of fibrous material by a single air blast producing means and further, the use of a conventional air blast mulching gun as a means for applying fibrous materials to form a protective covering or blanket.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. An improved method of applying a protective soil covering of fiber glass strands comprising producing a main conveying straight line flowing air stream towards the ground, protecting the produced flowing air stream from ambient atmospheric conditions, feeding a plurality of separate and individual strands of fiber glass from separate sources simultaneously and laterally into said air stream whereby each strand is converted from one of relatively dense fibrous condition into one of relatively large fibrous condition by the immediate subjection of each to the air stream and said fluffed out strands are deposited in an intermingled relation on the ground.

2. The method of claim **1** including the step of applying a coating of mulch to the ground prior to the depositing thereon of said strands.

3. The method of claim **1**, including the step of feeding a mulch substance into the main air stream whereby combined mulch and the strands are deposited by the main air stream upon the ground.

4. The method of claim **1**, including the step of producing additional turbulence in the main air stream and the conveyed strands by intersecting the main air stream prior to the depositing of the strands upon the ground by the main air stream with a plurality of auxiliary air streams at an angle to the straight line flow of the main air stream, such auxiliary air streams having a greater pressure and velocity of flow than the main air stream.

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