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TRAVELING-PLANT MIXER

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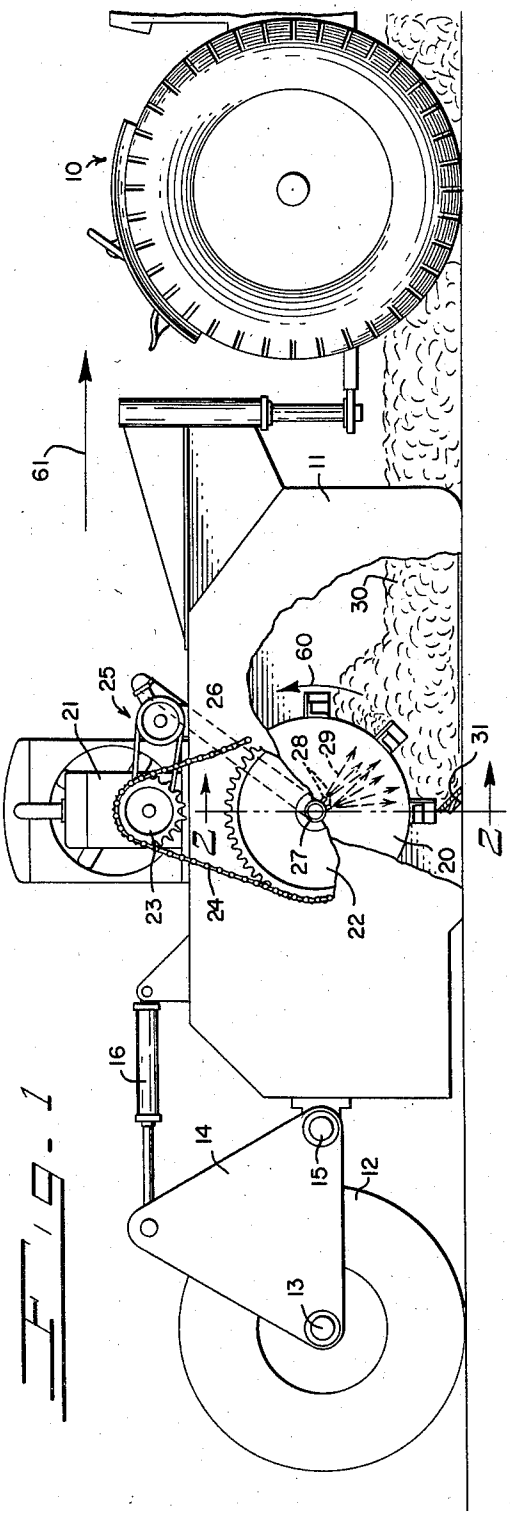

FIG. 1

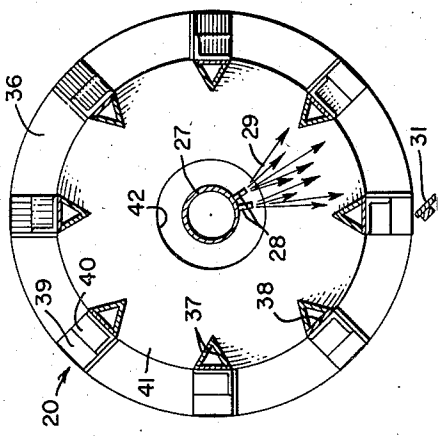

FIG. 3

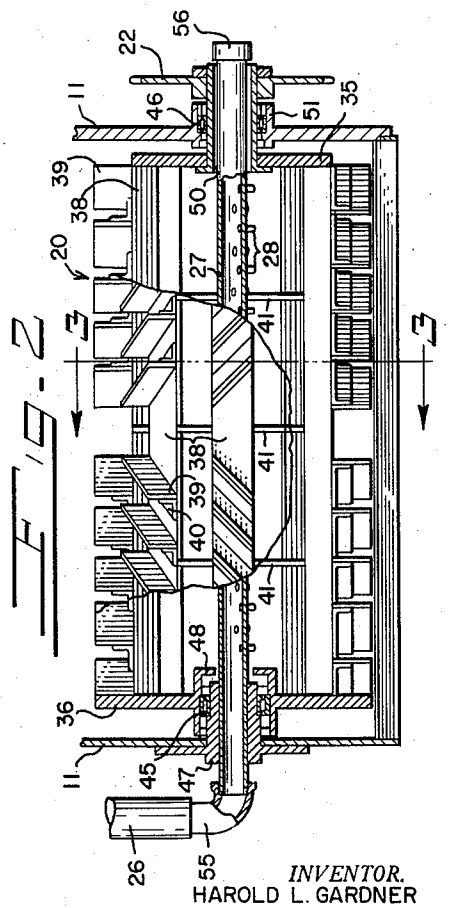

FIG. 2

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TRAVELING-PLANT MIXER

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13 Claims. (Cl. 94—40)

This invention relates to a machine for effecting in-place mixing of soils and aggregates with a suitable stabilizing agent and, more particularly, to a mixing machine embodying a new and improved device for completely dispersing the stabilizing material throughout the soil or aggregate being treated and for thoroughly mixing it therewith.

Modern construction specifications for roads, airfields, parking lots, etc. often call for the introduction of various types of stabilizing agents into the basic road materials by means of a mixing operation. To comply with this requirement, various types of machines have been developed for effecting the mixture of the different stabilizing materials with the soils and aggregates to be treated. The present invention deals with the in-place type of mixer in which the soils and aggregates are treated in situ as the mixer moves along. This type of machine incorporates means for agitating and blending the soils and aggregates, which means usually takes the form of a power driven rotor provided with protruding blades, fingers, or tines for pulverizing and mixing together the materials. The machine also contains a device for introducing bituminous or other liquid binders, including water where soil cement is employed, to the soils and aggregates. The latter device generally consists of a transverse pipe containing nozzles for producing a spray of the liquid against the outer periphery of the rotor, or on the material just ahead of the rotor.

In all presently known types of mixers employing the introduction of liquid stabilizers or binders, only a portion of the materials to be stabilized come into direct contact with the binder spray or with the liquid binder deposited thereon. Consequently, particles of the soils and aggregates not originally coated by the stabilizing agent or binder must be coated by being brought into contact with the coated particles in the mixing operation so as to permit the uncoated particles to pick up some of the stabilizing agent through contact with the already coated particles. This transfer must, of course, be effected before the stabilizing liquid sets up or congeals. In all of the known types of mixing machines, a number of mixing operations or passes are normally required in order to achieve a thorough dispersal of the stabilizing agent throughout the body of the material.

In order to provide a more efficient means for mixing the stabilizing agent with the soils and aggregates, and in order to reduce the need for repeated passes over the material being processed, I have devised a new type of mixer in which the liquid stabilizing agent or binder is sprayed outwardly from the center of the rotor against the material to be stabilized. As the machine travels along, and as the rotor slices and pulverizes the material over which it travels, the spray contacts all of the material as it is churned about by the rotor. In this manner, all of the particles receive a uniform coating of the stabilizing or binding material thereby reducing the necessity of repeated passes and producing a resultant mixture of the soils and aggregates with the stabilizing agent which is far superior to that achieved

by previous methods. Another advantage of my type of apparatus is that it places the spray nozzles in a location where they are not apt to be damaged or clogged by the aggregate being hurled thereagainst.

Accordingly, it is an object of the present invention to provide an improved type of traveling mixer for introducing a stabilizing agent with the soils and aggregates to be treated.

Another object of the invention is to provide an apparatus for introducing a stabilizing agent, whether in the form of a liquid such as water or bituminous material, or in the form of a solid granular material such as calcium or sodium chloride, or Portland cement, from the center of the rotor outwardly against the material as it is pulverized by the rotor.

Another object of the invention is to provide a mixing machine employing a new type of rotor construction for accommodating my coaxially mounted spray bar.

With these and other objects in view, which will become apparent from the following description, the invention includes certain novel features of construction and combinations of parts, the essential elements of which are set forth in the appended claims, and a preferred form or embodiment of which will hereinafter be described with reference to the drawings which accompany and form a part of this specification.

In the drawings:

Fig. 1 is a side elevation of a traveling mixer incorporating my invention with parts broken away to show the internal construction thereof.

Fig. 2 is a cross-sectional view taken along the line 2—2 of Fig. 1.

Fig. 3 is a cross-sectional view taken along the line 3—3 in Fig. 2.

Similar reference characters designate similar or identical elements and portions throughout the specification and throughout the different views of the drawings.

In the embodiment of the invention shown in the accompanying drawings, the traveling mixer takes the form of a two-wheeled buggy which, as shown in Fig. 1, is adapted to be drawn by a tractor **10** of conventional design. The mixer is provided with a frame which includes side frames or plates **11** which are held in spaced relation by means of suitable cross-bracing provided therefor. At the rear end of the frame are two pneumatic-tired wheels **12** which are journaled on an axle **13** supported between a pair of triangular plates **14** journaled on the rear end of the mixer frame by means of stub shafts **15**. A fluid pressure cylinder **16** is provided for rocking the plates **14** about their pivots **15** so as to raise or lower the wheels **12** with respect to the mixer frame and thereby raise or lower the latter with respect to the ground over which the mixer travels.

Situated between the side frames **11** and rotatably journaled therein is a rotor **20** which is adapted to be driven by a motor **21** mounted on top of the mixer frame. For this purpose, the rotor is provided with a sprocket **22** which is driven from a sprocket **23** on the motor shaft by means of a chain **24**. As shown in Fig. 1, the motor **21** also drives a pump **25** which withdraws the stabilizing agent from a suitable tank (not shown) and delivers it through a pipe **26** into one end of a spray pipe **27** passing through the center of the rotor. The stabilizing or binder material is emitted from the spray pipe **27** through nozzles **28** in a forward and downward direction as indicated by the arrows **29** so as to impinge against the soils and aggregates contained in a windrow **30** as they are being pulverized by the rotor.

To elevate the material in the windrow **30** against the rotor and prevent it from passing therebeneath, the mixer is provided with a blade **31** extending transversely between the frame plates **11** and supported thereby.

The construction and mounting of the rotor **20** is best understood by a reference to Figs. 2 and 3 of the drawings. As therein shown, the rotor comprises a pair of circular end plates **35** and **36** between which extend a plurality of circumferentially spaced V-plates **37** and support bars **38** which are secured at their ends to the plates **35** and **36**. The V-plates **37** and support bars **38** thereby provide a plurality of triangular members extending at intervals across the rotor so as to furnish supports for the blades **39** which are held in place thereon by means of angles **40** secured to the bars **38**. The V-plates **37** and bars **38** are further supported at intervals along the length of the rotor by means of circular disks **41** which are notched to receive the V-plates **37** and apertured, as indicated at **42** (Fig. 3), to receive the spray pipe **27**.

The rotor is journaled between the side frames **11**, as shown in Fig. 2, by means of roller bearings **45** and **46** so as to permit rotation of the rotor by means of drive sprocket **22**. The bearing **45** is supported on a hollow trunnion **47** secured to the frame plate **11**, the outer race of the bearing being held within a bearing sleeve **48** mounted in the end plate **36** of the rotor. The other end of the rotor is provided with a complementary construction which includes a hollow trunnion **50** mounted in the end plate **35** of the rotor and serving as a support for the inner race of the bearing **46**. The outer race of the bearing is supported in a bearing sleeve **51** formed on the frame plate **11**.

The spray pipe **27** passes through the hollow trunnions **47** and **50** and is held fast within the trunnion **47** so as to be maintained stationary with respect to the mixer frame. The opposite end of the spray pipe is journaled within the hollow trunnion **50** so as to permit the rotor to turn with respect to the pipe.

The spray pipe **27** is connected at one end to the delivery pipe **26** by means of an elbow **55** and is closed at the other end by a cap **56**. Hence, as the stabilizing agent is delivered through the pipe **26** into the spray pipe **27**, it will be emitted through the nozzles **28** in a downwardly and forwardly direction and will be permitted to spray between the blades **39** of the rotor and thereby come into intimate contact with the pulverized soils and aggregates being mixed about by the rotor. The V-plates **37** tend to deflect the spray and direct it between the rows of blades so that it has free access to the material being processed.

Referring to Fig. 1 suitable hoods may be provided above and behind the rotor **20** to prevent the material agitated by the blades from being thrown about. The rotor **20** is driven by the motor **21** in the direction of the arrow **60** so as to cause the bottom of the rotor to move into the windrow **30** in a direction corresponding to the direction of travel of the mixer which is indicated in Fig. 1 by the arrow **61**.

While I have described my invention in connection with one possible form or embodiment thereof and have used, therefore, certain specific terms and language herein, it is to be understood that the present disclosure is illustrative rather than restrictive, and that changes and modifications may be resorted to without departing from the spirit of the invention or the scope of the claims which follow.

I claim:

1. A vehicular apparatus for effecting in-place mixing of soils and aggregates with a suitable stabilizing agent comprising a movable frame, a cylindrical rotor mounted on said frame for rotation about a transverse horizontal axis, said rotor having circumferentially disposed wall sections at spaced intervals to provide openings alternating with said wall sections, a transverse spray pipe disposed on the said frame in coaxial relation with respect to said rotor and provided with spray orifices along its length for uniformly distributing the stabilizing agent to the soils and aggregates lengthwise of the rotor through

the openings between the wall sections of said rotor, driving means for said rotor, and a plurality of circumferentially spaced elements projecting outwardly from said rotor and extending substantially the width of the frame for pulverizing the soils and aggregates and mixing them with the stabilizing agent delivered from the spray pipe.

2. The apparatus of claim 1 wherein said spray pipe is stationary and said spray orifices are disposed downwardly and forwardly for spraying the stabilizing agent onto the soils and aggregates below and ahead of the rotor.

3. The apparatus of claim 1 wherein the direction of drive of said rotor by said driving means is such that the bottom of the rotor moves in the direction of travel of the apparatus.

4. The apparatus of claim 3 including a transverse blade supported on said frame and lying immediately beneath said rotor for directing the soils and aggregates upwardly against the bottom of the rotor.

5. The apparatus of claim 1 wherein said rotor includes a series of axially extending bars circumferentially spaced about the periphery of said rotor for supporting said spaced elements.

6. The apparatus of claim 5 wherein said bars are triangular in shape and are disposed with the base of the triangle facing outward.

7. A vehicular apparatus for effecting in-place mixing of soil and aggregates with a suitable stabilizing agent comprising a movable frame, a cylindrical rotor disposed transversely of said frame, said rotor having circumferentially disposed wall sections at spaced intervals to provide openings alternating with said wall sections, means supporting said rotor on said frame for rotation about its longitudinal axis, said means comprising a bearing sleeve on one end of said rotor and a hollow trunnion on the other end thereof, a hollow trunnion on one side of said frame cooperating with said bearing sleeve, and a bearing sleeve on the other side of said frame cooperating with the hollow trunnion on said rotor, and a spray pipe extending through said hollow trunnions, provided with spray orifices along its length, for delivering a stabilizing agent outward from the axis of said rotor to the circumferentially disposed openings, for admixture with the soils and aggregates to be stabilized.

8. The apparatus of claim 7 including a plurality of spaced elements projecting outwardly from the periphery of said rotor for pulverizing the soils and aggregates and mixing them with the stabilizing agent delivered from the spray pipe.

9. The apparatus of claim 7 wherein said spray pipe is non-rotatably mounted in the hollow trunnion on said frame and journaled in the hollow trunnion on said rotor.

10. The apparatus of claim 7 including means for driving said rotor in a direction such that the bottom of the rotor moves in the direction of travel of the apparatus.

11. The apparatus of claim 7 including a transverse blade supported on said frame and lying immediately beneath said rotor for directing the soils and aggregates upwardly against the bottom of the rotor.

12. The apparatus of claim 8 wherein said rotor includes a series of axially extending bars circumferentially spaced about the periphery of said rotor for supporting said spaced elements.

13. The apparatus of claim 12 wherein said bars are triangular in shape and are disposed with the base of the triangle facing outward.

References Cited in the file of this patent

UNITED STATES PATENTS

528,289 Cross ..... Oct. 30, 1894

(Other references on following page)

5

UNITED STATES PATENTS

1,408,512	Jack	Mar. 7, 1922
1,964,523	McConnaughy	June 26, 1934
2,083,767	Yett	June 15, 1937
2,090,290	Gardner	Aug. 17, 1937
2,192,027	Crowder	Feb. 27, 1940
2,314,934	Guernsey	Mar. 30, 1943

6

2,397,782	Flynn	Apr. 2, 1946
2,590,701	Hoffman	Mar. 24, 1952
2,602,388	Elliott et al	July 8, 1952
2,718,830	Green	Sept. 27, 1955

FOREIGN PATENTS

761,715	France	Jan. 13, 1934