United States Patent

Kharitonov et al.

[15] **3,704,865**

[45] **Dec. 5, 1972**

[54] PLANT FOR APPLYING SOLIDIFYING PLASTIC MASSES

[72] Inventors: **Gennady Grigorievich Kharitonov, Anatoly Mitrofanvoich Nebytov; Sergei Mikhailovich Doroshin; Mariana Sergeevna Alimova,** all of Moscow, U.S.S.R.

[73] Assignee: **Usesojuzny Nauchno-Issledovatelsky Institut Po Stroitelstvu Magistralnykh Truboprovodov Okruzhnoi proezd,** Moscow, U.S.S.R.

[22] Filed: **Jan. 5, 1970**

[21] Appl. No.: **729**

[52] **U.S. Cl.** .....**259/178 A,** 259/95

[51] **Int. Cl.** **B28c 5/10**

[58] **Field of Search** .....239/585; 259/4, 5, 95, 102, 259/145, 146, 147, 148, 149, 151, 153, 178, 178 A

[56] **References Cited**

UNITED STATES PATENTS

1,559,666	11/1925	Bernier	259/151
1,680,678	8/1928	Halliburton	259/147
3,173,663	3/1965	Schoonover	259/5
3,224,677	12/1965	Schmidt et al.	239/585 X

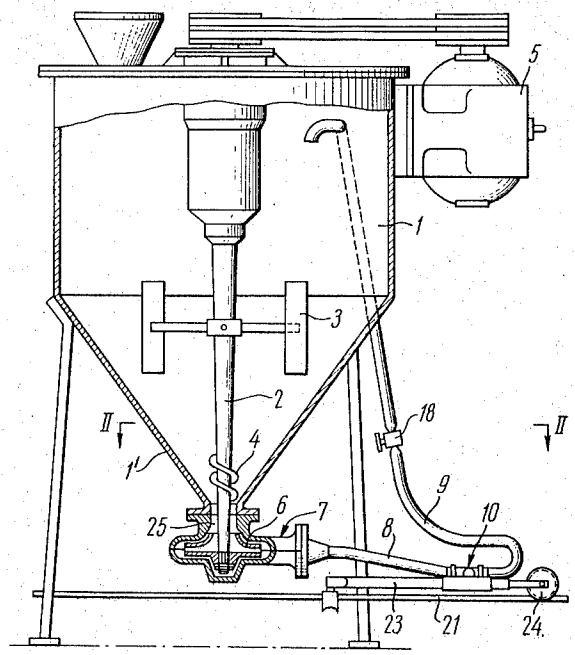
Primary Examiner—Robert W. Jenkins

Attorney—Waters, Roditi, Schwartz & Nissen

[57] **ABSTRACT**

A plant for applying solidifying plastic masses, which is essentially a tank having a pipeline to connect the upper and lower portions of the tank with a view to providing a continuous circulation of the mass inside the tank.

4 Claims, 3 Drawing Figures



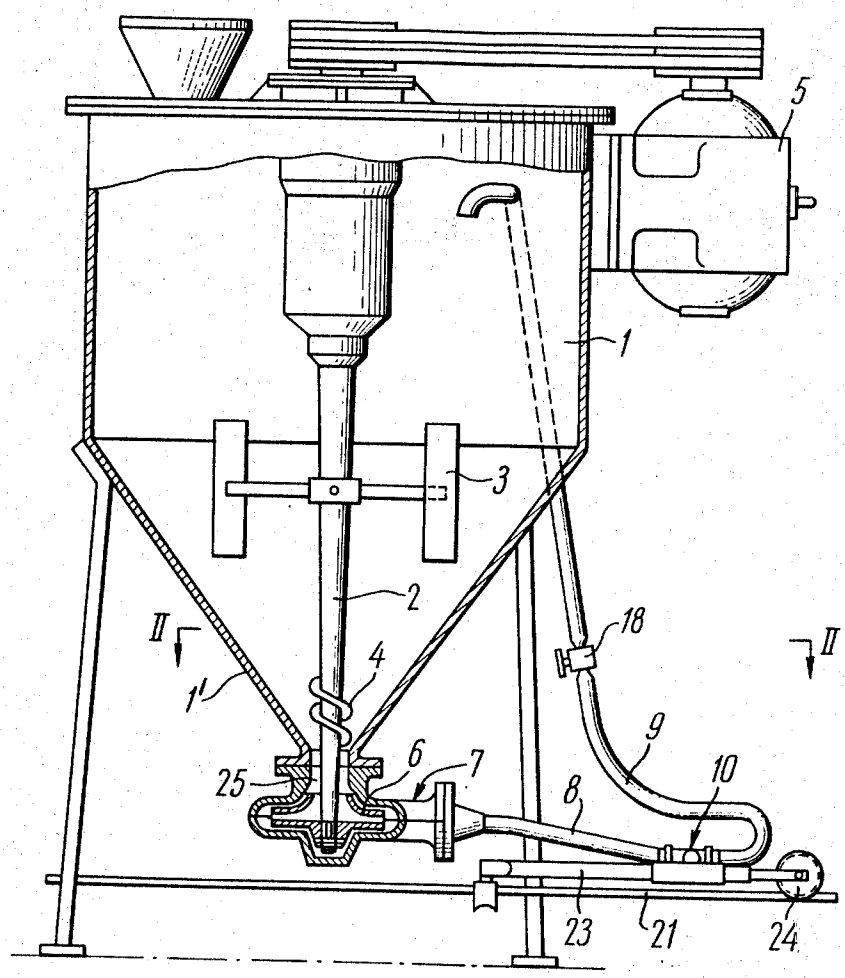


FIG. 1

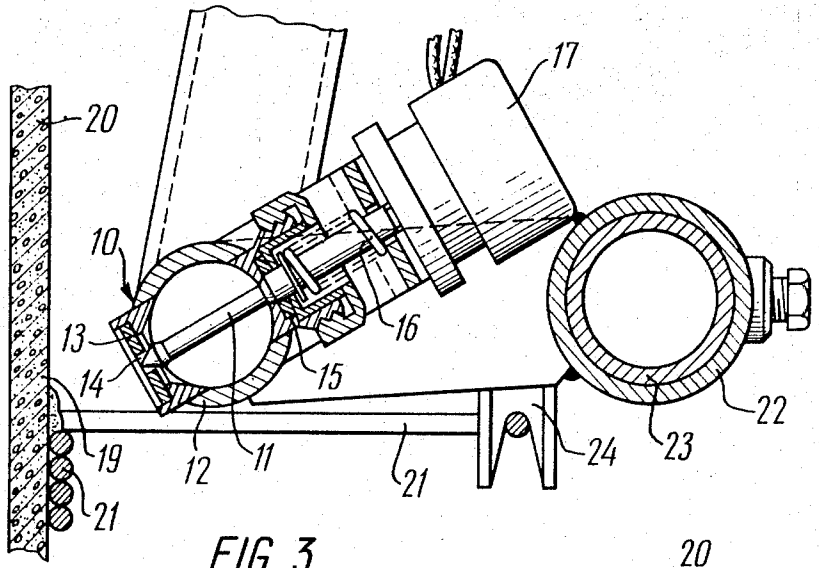

17
20
10
16
13
14
15
22
19
12
11
21
24
23
21

FIG. 3

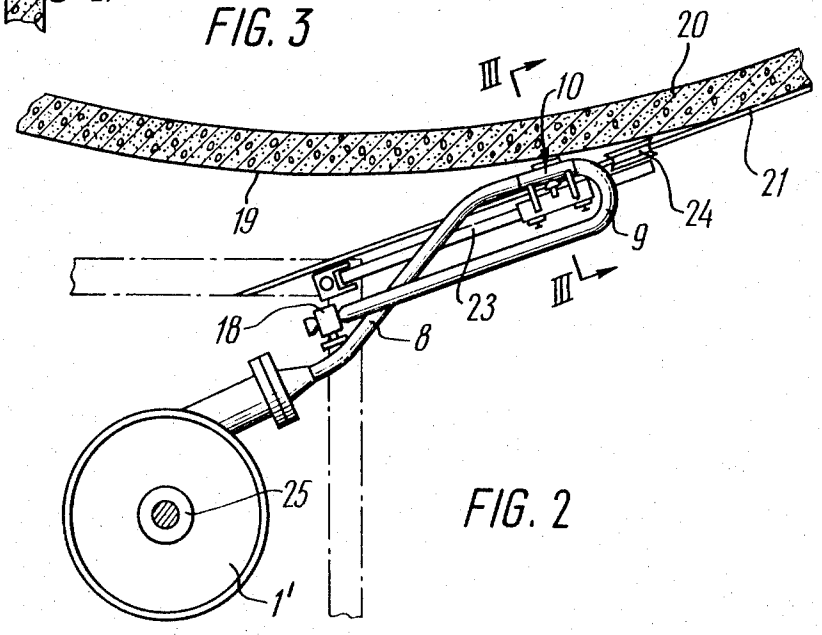

III
10
20
21
19
24
9
III
23
18
8
25
1'

FIG. 2

PLANT FOR APPLYING SOLIDIFYING PLASTIC MASSES

The present invention relates to construction equipment and, more particularly, to apparatus for applying solidifying plastic masses, mainly, cement mortars.

Known in the art are devices for applying protective substances, such as paints, essentially comprising a tank with a conical bottom having a pipeline built therein and ending with a working head used for applying a substance onto a surface.

Provided inside the tank is a vertical shaft with blades used for mixing a mass and pushing it into the pipeline the working head being a sprayer.

A disadvantage of the afore-said and similar apparatus is observed when they are used for applying cement mortar or other solidifying plastic masses in that the cement mortar solidifies in the pipelines in the course of its transition from the fluid state into the coagulative one even during short intervals in the work.

When using a viscous cement mortar having a low (0.32–0.35 water-cement ratio, the mortar may solidify and thus clog the pipelines (depending on the properties of the cement used and the temperature of the mortar) even while it is being applied. In such cases it is necessary to disassemble the plant, disconnect the pipelines (hoses), knock out the solidified cement, and wash the whole system with water.

Additionally, there are other known devices for applying cement mortar, for instance, cement guns, in which a dry cement-sand mixture supplied with the aid of compressed air along one of the pipelines and pressurized water supplied along the other pipeline are mixed in the working head (sprayer). Due to an uneven supply of the dry cement-sand mixture to the nozzle and a varying amount of the sand rebounded by the surface being coated, the amount of water supplied to the sprayer has to be continuously varied (manually with the aid of a valve) in order to make the mixture being applied not too dry and not too fluid. For the afore-said reasons the cement guns do not provide for a uniform and even coating.

Plunger pumps used for applying cement mortar do not provide for a uniform coating of the protective mixture either and, moreover, are not reliable and convenient in operation since the pipelines become clogged due to solidification of viscous cement mortars having a water-cement ratio equal to 0.32–0.35 during even short intervals in operation (for example; when the sprayers are clogged).

It is an object of the present invention to provide a device which eliminates the afore-mentioned disadvantages of the known devices.

In the accomplishment of said object, in apparatus for applying solidifying plastic masses, which essentially comprises a tank with a conical bottom communicating with a pipeline provided with a working head for applying the plastic mass and means for moving the mass along the pipeline, according to the invention, the pipeline branch is provided at the point of mounting the working head and is connected with the tank upper portion.

To provide for free movement of the plastic mass into the pipeline portion disposed after the working head, it is expedient to make this pipeline portion (branch) a direct continuation of the pipeline up to the point of mounting the working head. In this case, it is

preferred to make the working head in such a manner that a portion of the pipeline is used as its housing, said portion having an aperture made in the wall thereof for letting in the mass and being overlapped by a locking needle built in the aperture.

The following detailed description of an exemplary embodiment of the present invention is given with reference to the accompanying drawings, in which:

FIG. 1 is a vertical sectional view of apparatus for applying solidifying plastic masses, according to the invention, used for placing cement mortar to protect pre-stressed reinforcement members of reinforced concrete constructions;

FIG. 2 is a section taken along line II—II of FIG. 1 and

FIG. 3 is a section of the working head mounted in an aperture provided in the pipeline wall.

The apparatus comprises a tank **1** (FIG. 1) with a conical bottom **7'**. Mounted inside the tank **1** is a vertical shaft **2** having blades **3**, used for mixing the mass loaded into the tank **1**, and a screw conveyor **4**. The shaft **2** is rotated by an electric motor **5**. Secured at the lower end portion of the shaft **2** is a rotor **6** of a centrifugal pump **7** for pushing the mass along a flexible pipeline **8** and a branch **9** thereof connected to the upper portion of the tank **1**. The main element of a working head **10** is a locking needle **11** (FIG. 3) mounted inside a housing **12** which is essentially a portion of the walls of the pipeline **8** and branch **9**. The housing **12** has an aperture for receiving therein a detachable washer **13** with a hole **14**. The needle **11** has a packing **15** and passes transversely relative to the longitudinal axis of the housing and overlaps from the inside the hole **14** made in the washer **13**.

The locking needle **11** is provided with a spring **16** which urges the needle into closing position in the hole **14**. To open the hole **14**, the working head is provided with an electric magnet **17** overcoming the resistance of the spring **16**. The washer **13** is made replaceable and thus it is possible vary the size of the hole **14** and thus to control the supply of the mortar. The supply of the mortar may be also controlled by reducing with the aid of a screw clamp **18** (FIGS. 1 and 2) the cross section of the branch **9**.

The apparatus is adapted for placing cement mortar onto the reinforcement of pre-stressed reinforced concrete constructions, such as tanks, gasholders, powerful hydraulic presses, atomic reactors, high-thrust pipelines, etc.

Cement mortar is placed onto a surface **19** of a structure **20** in the course of winding reinforcement **21**. To effect this, and in order to supply the cement mortar directly under the reinforcement **21** being wound, the housing **12** is secured by means of straps **22** to a follower device which essentially comprises a rod **23** one end portion of which is pivotally connected with a device for winding the reinforcement and the other end rests through a roller **24** upon the reinforcement **21** being wound. From the tank **1** the cement mortar is pushed by the screw conveyor **4** through an annular slot **25** into the rotor **6** of the centrifugal pump **7**, and is supplied under pressure into the pipeline **8**. A portion of the cement mortar is discharged through the hole **14** in a compact stream onto the surface **19** of the structure **20** directly under the reinforcement **21** being

wound. The rest of the cement mortar is delivered along the branch 9 back into the tank 8. During intervals in operation, the needle 11 is made to close the hole 14 and all the cement mortar delivered by the pump 7 into the pipe-line 8 is continuously supplied through the intermediary of the housing 12 and branch 9 into the tank 1.

Thus, during the operation of the apparatus and during intervals in the operation the cement mortar is continuously circulated along a closed circuit (the tank 1—the pump 7—the pipeline 8—the housing 12—the branch 9—the tank 1). This precludes, during a long period of time (up to 4 hours since it was prepared), solidification of the cement mortar, preserves its high uniformity and necessary mobility, and prevents the pipeline and the working head from clogging. This circulation, as well as the construction of the working head, makes it possible to use cement mortar of having various degrees of viscosity, including portland cement paste in which the water-cement ratio is equal to 0.32–0.35.

The apparatus can be used for continuous placing of protective compositions directly under the reinforcement member being wound, such that there is complete filling of the space under the coils and between the latter, including the case when the reinforcement is wound without any clearance, i.e. when one coil is laid close to another, and in many rows.

The employment of the apparatus makes it possible to increase the durability of the construction and to decrease the time and cost of their erection. The apparatus is simple in construction, reliable in operation and does not require any auxiliary equipment, such as compressors, for its operation.

The apparatus can be successfully used for operation with any solidifying plastic masses, both mineral and organic.

In both cases, the applied covering is uniform and even.

What we claim is:

1. Apparatus for applying solidifying plastic material comprising a tank having a top and a conical bottom, a pipeline communicating with said conical bottom, means for moving said material through said pipeline, said pipeline comprising a linear length of pipe including head means incorporated therewithin for applying said plastic material, and a feedback portion connected between said head means and said top of said tank for returning a portion of said solidifying plastic material to said tank and forming a continuous circulation system for said solidifying plastic material, said head means being constituted by an aperture in said pipe through which said plastic material can be discharged and a locking needle extending transversely in said pipe for adjustably closing said aperture for controlling the amount of said plastic material which is discharged.

2. Apparatus as claimed in claim 1, wherein said head means further comprises a washer means having a central opening, said locking needle being movable within said central opening to selectively close the same, and means for replacing said washer means to provide a different sized central opening to control the amount of plastic material applied.

3. Apparatus as claimed in claim 2, comprising a spring wound around said locking needle and urging the same into said central opening to close said opening.

4. Apparatus as claimed in claim 3, comprising a screw clamp located in the feedback portion between said head means and said top of said tank, said screw clamp being adjustable to control the amount of plastic material recirculated and the amount of plastic material applied.

* * * * *

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,704,865 Dated December 5, 1972

Inventor(s) Gennady Grigorievich Kharitonov, et. al.

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

On the cover sheet [73] "Usesojuzny" should read -- Vsesojuzny -- .

Signed and sealed this 1st day of May 1973.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents

FORM PO-1050 (10-69)

USCOMM-DC 60376-P69
☆ U.S. GOVERNMENT PRINTING OFFICE : 1969 O—366-334.