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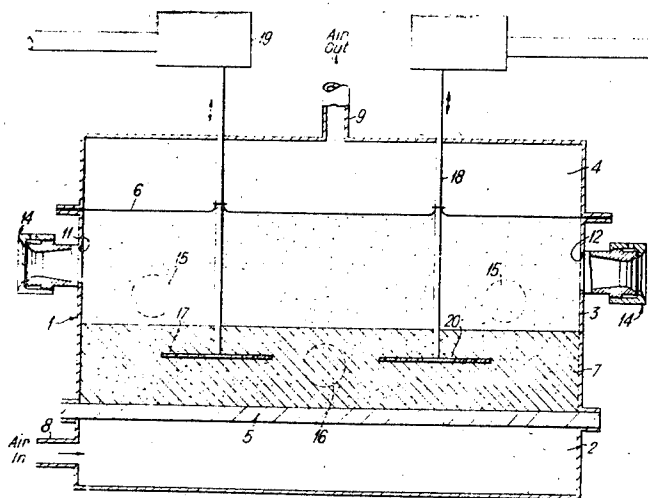
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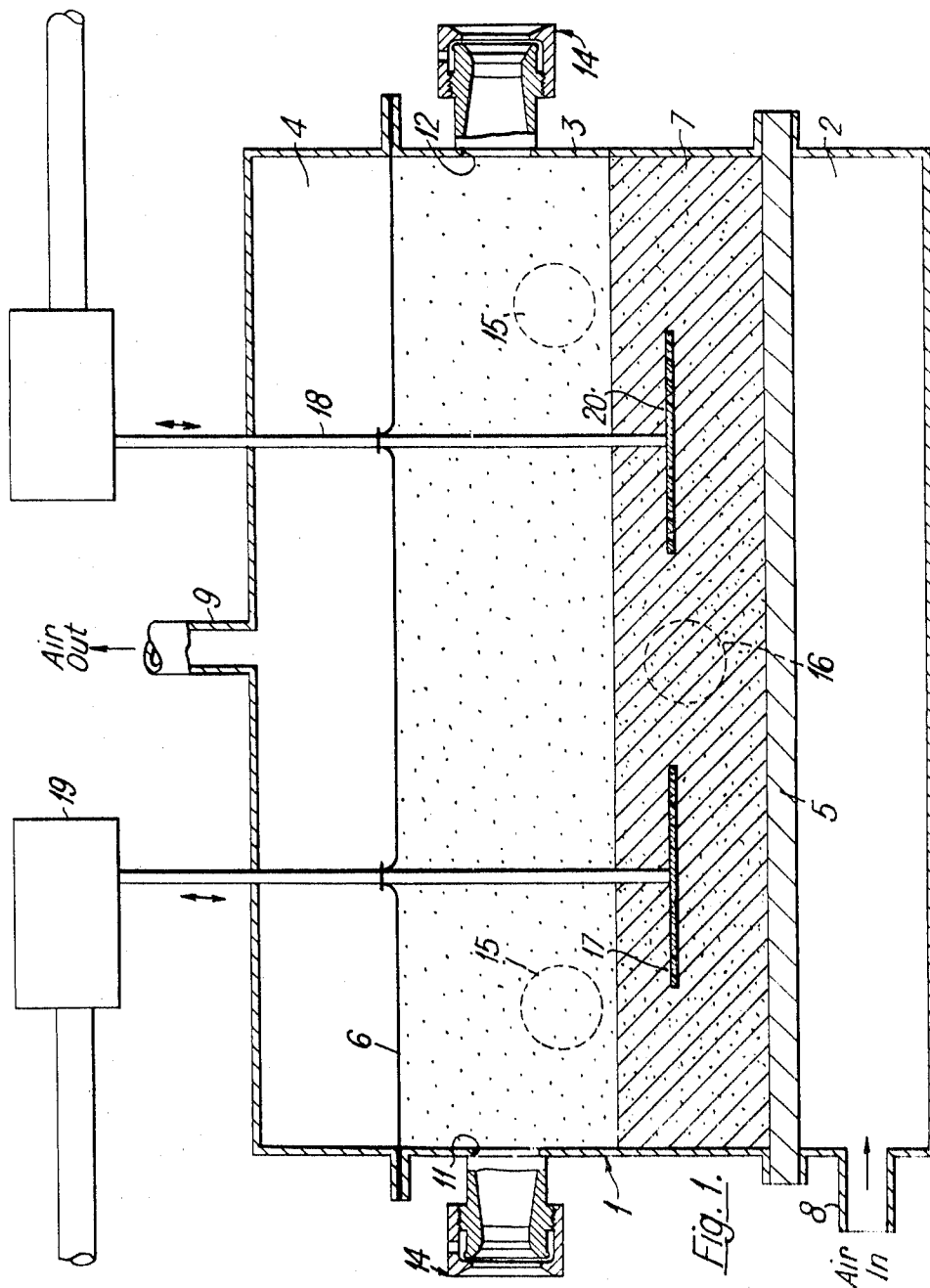
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[54] **APPARATUS FOR APPLYING POWDER TO**
ELONGATED ARTICLE
11 Claims, 3 Drawing Figs.

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118/DIG. 5
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[50] Field of Search **118/404,**
405, DIG. 5; 117/DIG. 6; 33/87

ABSTRACT: A fluidized bed-coating chamber, having entry and exit ports for passing an elongated object through the fluidized bed, is divided into a vertical arrangement of a lowermost gas feed chamber for fluidizing particulate coating stuff, a central chamber containing the fluidized bed and a top chamber providing for egress of the carrier gas. A porous membrane divides the upper chambers whereby to retain the particulate material in the central chamber and the latter chamber having vibrating means disposed therein.





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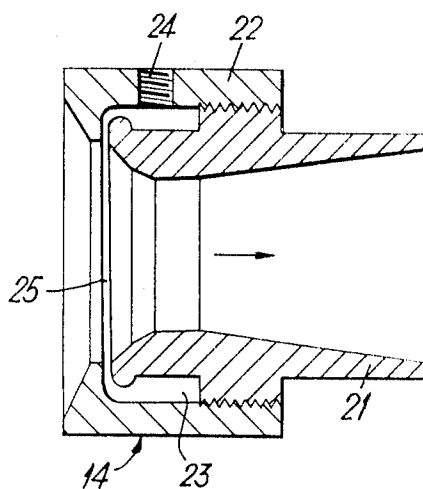


Fig. 2.

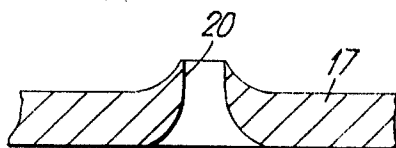


Fig. 3.

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APPARATUS FOR APPLYING POWDER TO ELONGATED ARTICLE

This invention relates to apparatus for applying powder to an elongated article as it is advanced longitudinally through the apparatus, and more especially for applying a dusting of powdered chalk or other powder to an insulated electric conductor or cable, which apparatus is hereinafter referred to as a chalking machine.

In accordance with our invention we provide an improved chalking machine which comprises a housing divided into three superposed chambers by upper and lower partitions which are pervious to gas but substantially impervious to the chalk or other dusting powder to be used. The lowermost of these three chambers is adapted to serve as an air chest for containing air under superatmospheric pressure, the lower partition is structurally capable of supporting a substantial layer of the powder within a lower part of the middle chamber and the upper partition serves as a filter to inhibit powder from passing into the upper chamber. The middle chamber has inlet and outlet ports for the passage of an insulated electric wire or cable or other elongated member through the middle chamber. Means are provided for imparting a vibrating movement to dusting powder contained in the lower part of the middle chamber to reduce under operating conditions the tendency for gas tunnels to form in the powder layer and to assist in the formation of a cloud of the powder in the upper part of the middle chamber.

Preferably means is also provided for extracting air from the upper chamber at a rate greater than the rate of flow of air into the lower chamber to the extent that the middle chamber can be maintained at a pressure below atmospheric. This ensures that air flows into the inlet and outlet ports to inhibit the escape of dusting powder through these ports.

We have found it difficult to maintain in the upper part of the middle chamber a sufficiently dense cloud of powdered chalk, powdered french chalk or other commonly used dusting powder unless the mass of powder in the lower part of the chamber is continuously vibrated. For imparting such vibration to the dusting powder, we prefer to use one or more vibrators comprising a foraminous disc mounted within the powder in the lower part of the middle chamber on a vertical or substantially vertical rod longitudinally vibrated by a vibrator motor. Preferably the apertures in the vibrator disc are asymmetrical in that the lower side of each of most or all of the apertures is flared. Where the vibrator disc is of sheet metal the apertures may be punched out in such a way that the metal around the opening is displaced towards the upper face of the disc. The vibrator rod or rods preferably pass downwards through the upper partition and the partition is preferably attached to the rod or rods in such a way that it will be vibrated, thus dislodging accumulated dusting powder and preventing clogging of the filter.

Preferably, means are provided at the ports in the wall of the middle chamber for the passage of the cable or other elongated member to be dusted to prevent escape of dusting powder into the ambient atmosphere.

An example of a chalking machine in accordance with the invention will now be described with reference to the accompanying drawings, in which:

FIG. 1 is a diagrammatic side elevation of the machine,

FIG. 2 is a sectional side view of an air mover of the kind located at the inlet and outlet ports of the middle chamber of the machine, and

FIG. 3 is a fragmental sectional side view of one of the vibrator discs of the machine,

Referring to the drawings, the chalking machine comprises a housing 1 divided into three superposed chambers 2, 3 and 4 by partitions 5 and 6. The lower partition 5, which is built-up of tiles that are pervious to air but substantially impervious to chalk, is structurally capable of supporting a substantial layer of chalk 7 within a lower part of the middle chamber 3. The upper partition 6 comprises a filter serving to inhibit chalk 7

from passing into the upper chamber 4 but permitting the passage of air.

The lowermost chamber 2 serves as an air chest for containing air under superatmospheric pressure which is introduced into the chamber through the air inlet 8. An air-heating device (not shown) is preferably provided for heating the air being introduced into the lowermost chamber 2 to ensure that the chalk 7 is kept dry. Such a heating device may comprise, for example, a "Vortex tube" (as supplied by Vortair Ltd.) which can be inserted in the air supply line to the air inlet 8. This tube heats the air to 60° C. by the "Rangne-Hilsh" effect.

The middle chamber 3 has an inlet port 11 and an outlet port 12 for the passage of an insulated wire or cable through the chamber and two fixed outer pulleys 15, over which the insulated wire or cable can pass, and a vertically adjustable middle pulley 16, under which it can pass, may be located in the middle chamber 3 to deflect the insulated wire or cable downwards to cause it to be submerged in the chalk 7 lying on the lower partition 5. At each of the ports 11 and 12 there is provided a device 14 known as an "Annular Airmover" which is marketed by Vac Klean Sales Ltd. of Glasgow and which serves to prevent escape of chalk into the ambient atmosphere. As will be seen on referring to FIG. 2, each air mover 14 comprises a coaxial pair of bushes 21 and 22 which are in screw-threaded engagement and which bound an annular gap 23 into which compressed air is introduced through a port 24. The compressed air is forced through a narrow gap 25 formed between an end wall of the inner bush 21 and an inwardly directed flange on the outer bush 22 and, owing to the profiles of the bushes, follows the contour of the inner bush and accelerates toward the interior of the middle chamber 3. Thus a partial vacuum is created over the entire port 11 or 12 and a flow of ambient air is induced into the middle chamber 3 through the clearance between the bore of the inner bush 21 and the insulated wire or cable passing into or out of the chamber. The air movers 14 need not necessarily be supplied with compressed air throughout the dusting operation. They may be used at intervals for removing excess chalk from the insulated wire or cable, especially at the outlet port 12.

For imparting a vibrating movement to the chalk 7 contained in the lower part of the middle chamber 3 there is provided a pair of vibrators each comprising a perforated sheet metal disc 17 mounted within the chalk on a substantially vertical rod 18 longitudinally vibrated by a vibrator motor 19. Each rod 18 passes downwards through and is secured to the filter 6 in such a way that the filter will be vibrated with the rod, thus dislodging accumulated chalk and preventing clogging of the filter. As will be seen on referring to FIG. 3 the apertures 20 in the disc 17 are punched out in such a way that the metal around the opening is displaced towards the upper face of the disc.

A suitable means for imparting vibration to the rods is that sold under the name VIBRO-MIXER E.I. by Chemap AG. of Hoboken, J., U.S.A. and Marnedorf, Switzerland.

The uppermost chamber 4 has an air outlet 9 which may be connected to a vacuum pump (not shown) for extracting air from the chamber at a rate greater than the rate of flow of air through the air inlet 8 into the lowermost chamber 2 to the extent that the air in the middle chamber 3 can be maintained at a pressure below atmospheric, thereby ensuring that air flows into the inlet and outlet ports 11 and 12 to inhibit the escape of chalk 7 through these ports.

If desired a valve (not shown) may be provided in the uppermost chamber 4 which is operable to the atmosphere and by means of which the rate of expulsion of air from the chamber to the atmosphere can be varied.

The apparatus of the present invention is especially suitable for chalking cable cores made by laying up two or more individual cores, since good penetration into the interstices between the individual cores is obtained.

What we claim as our invention is:

1. A chalking machine comprising:
 - a. a housing;

- b. upper and lower partitions in the housing which are pervious to gas but substantially impervious to the dusting powder to be used and which divide the housing into three superposed chamber, the lowermost of which three chambers is adapted to serve as an air chest for containing air under superatmospheric pressure, the lower partition being structurally capable of supporting a substantial layer of the powder within a lower part of the middle chamber and the upper partition serving as a filter to inhibit powder from passing into the upper chamber;
- c. inlet and outlet ports in the middle chamber for the passage of an elongated member through the middle chamber; and
- d. means disposed within the middle chamber for imparting a vibrating movement to dusting powder contained in the lower part of the middle chamber to reduce under operating conditions the tendency for gas tunnels to form in the powder layer and to assist in the formation of a cloud of the powder in the upper part of the middle chamber.
2. A chalking machine as claimed in claim 1, wherein means is provided for extracting air from the upper chamber at a rate greater than the rate of flow of air into the lower chamber to the extent that the middle chamber can be maintained at a pressure below atmospheric.
3. A chalking machine as claimed in claim 1, wherein the upper chamber is provided with a valve which is openable to the atmosphere and by means of which the rate of expulsion of air to the atmosphere can be varied.
4. A chalking machine as claimed in claim 1, wherein the means for imparting a vibrating movement to dusting powder comprises at least one vibrator comprising a foraminous disc mounted within the powder in the lower part of the middle chamber on a substantially vertical rod longitudinally vibrated by a vibrator motor.
5. A chalking machine as claimed in claim 4, wherein the vibrator rod passes downwards through the upper partition and the partition is attached to the rod in such a way that it will be vibrated, thus dislodging accumulated dusting powder and preventing clogging of the filter.
6. A chalking machine as claimed in claim 4, wherein the apertures in the foraminous vibrator disc are asymmetrical in that the lower side of each of at least most of the apertures is flared.
7. A chalking machine as claimed in claim 6, wherein the vibrator disc is of sheet metal and the apertures are each

punched out in such a way that the metal around the opening is displaced towards the upper face of the disc.

8. A chalking machine as claimed in claim 1, wherein means is provided for heating the air to be contained in the lowermost of the three chambers.

9. A chalking machine as claimed in claim 1, wherein means is provided in the middle chamber for deflecting the elongated member downwards and for causing it to be submerged in the powder lying on the lower partition.

10. A chalking machine comprising:

- a. a housing;
- b. upper and lower partitions in the housing which are pervious to gas but substantially impervious to dusting powder to AG., of used N.J., which divide the housing into three superposed chambers, the lowermost of which three chambers is adapted to serve as an air chest for containing air under superatmospheric pressure, the lower partition being structurally capable of supporting a substantial layer of the powder within a lower part of the middle chamber and the upper partition serving as a filter to inhibit powder from passing into the upper chamber;
- c. inlet and outlet ports in the middle chamber for the passage of an elongated member through the middle chamber;
- d. means disposed within the middle chamber for imparting a vibrating movement to dusting powder contained in the lower part of the middle chamber to reduce under operating conditions the tendency for gas tunnels to form in the powder layer and to assist in the formation of a cloud of the powder in the upper part of the middle chamber; and
- e. means at the inlet and outlet ports in the wall of the middle chamber to prevent escape of dusting powder into the ambient atmosphere.

11. A chalking machine as claimed in claim 10, wherein the means at the inlet and outlet ports in the wall of the middle chamber to prevent escape of dusting powder into the ambient atmosphere each comprises a coaxial pair of bushes shaped in such a way that air supplied under pressure to and through an annular gap between the bushes follows the contour of the inner bush and accelerates toward the interior of the middle chamber, thus creating a partial vacuum over the entire port and inducing a flow of ambient air into the chamber through the clearance between the bore of the inner bush and the elongated member passing into or out of the middle chamber.

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