June 2, 1964 J. L. KEMPTHORNE 3,135,561

APPARATUS FOR BLOWING AND SPRAYING LIGHT WEIGHT FIBERS AND GRANULATED MATERIALS

Filed Jan. 19, 1961 3 Sheets-Sheet 1

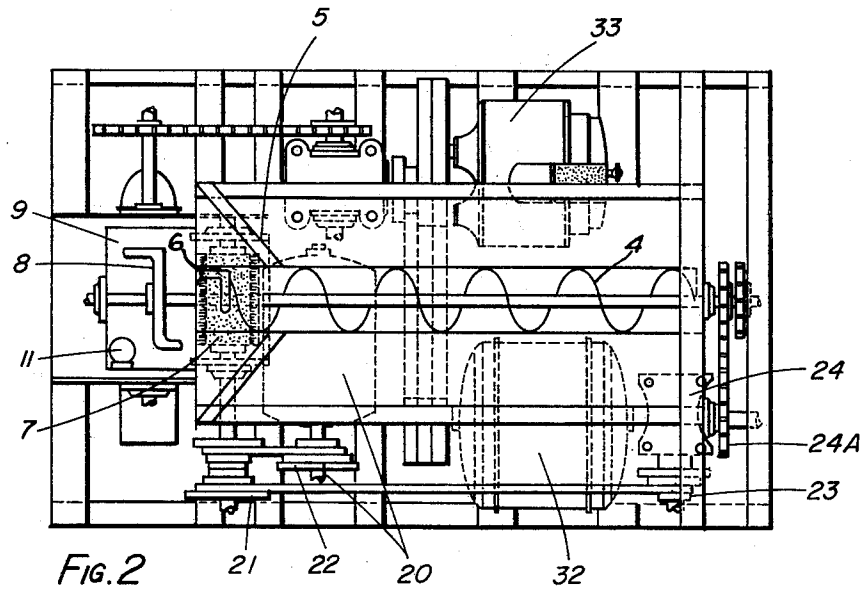


FIG. 2

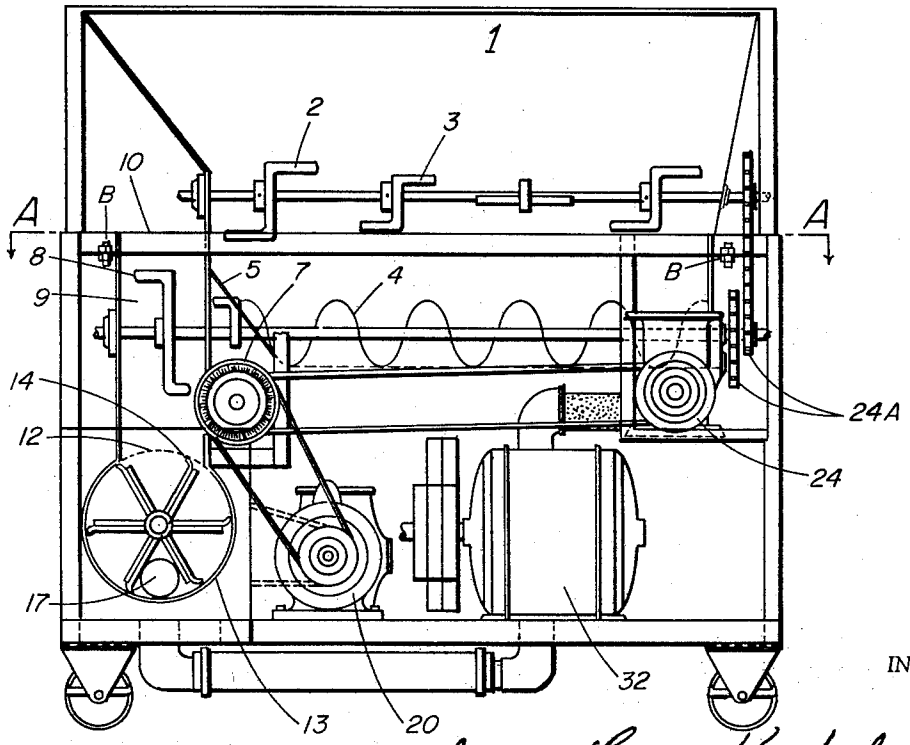


FIG. 1

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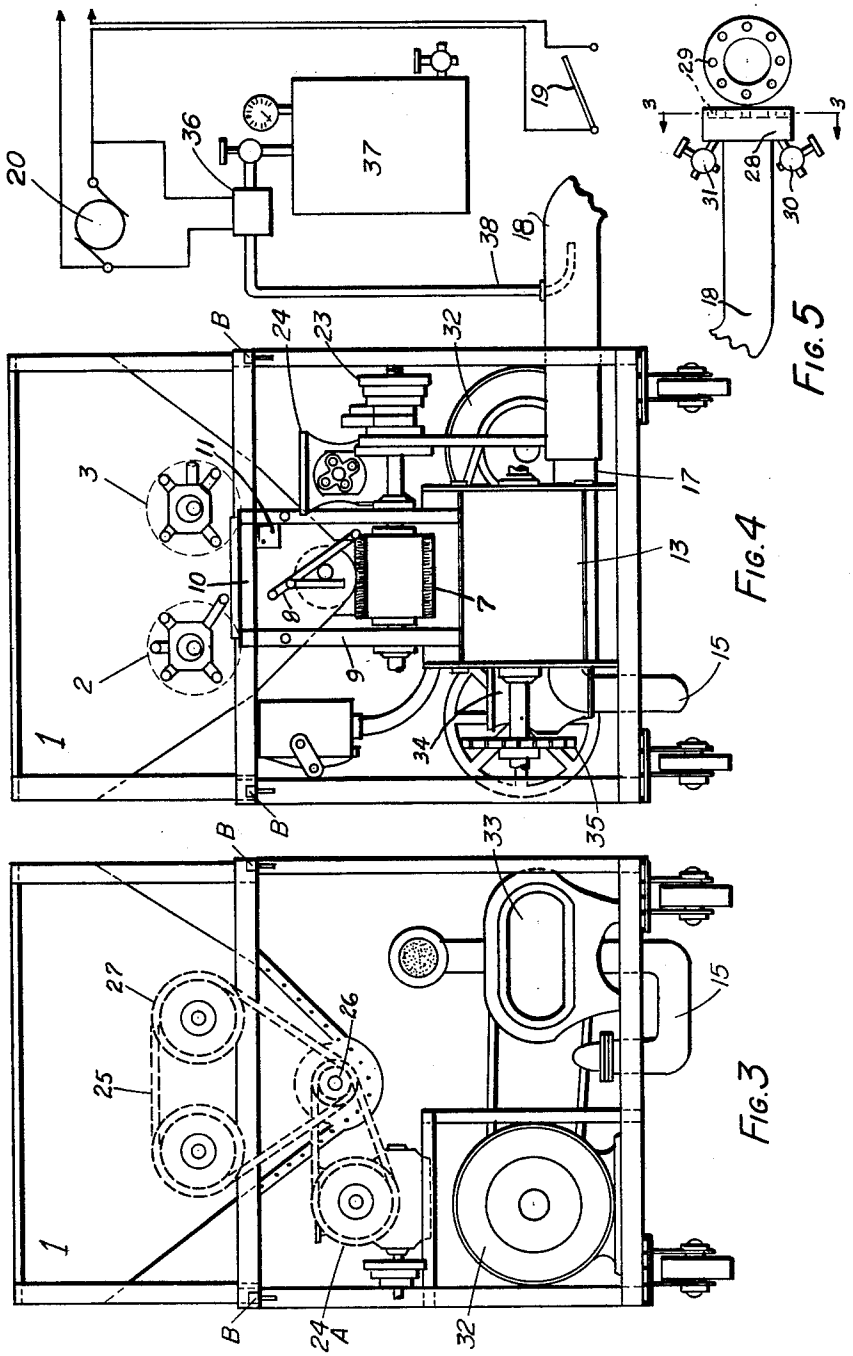


FIG. 5

FIG. 4

FIG. 3

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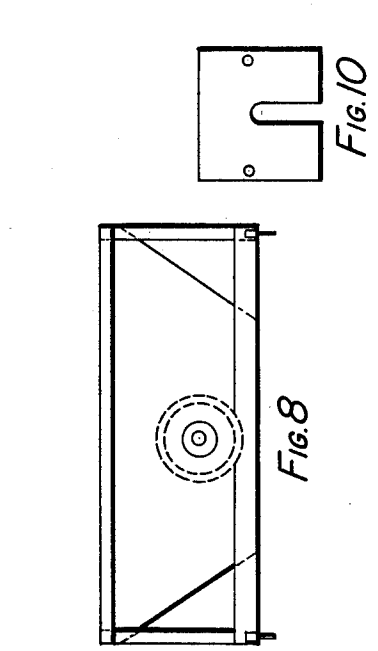


FIG. 10

FIG. 8

FIG. 9

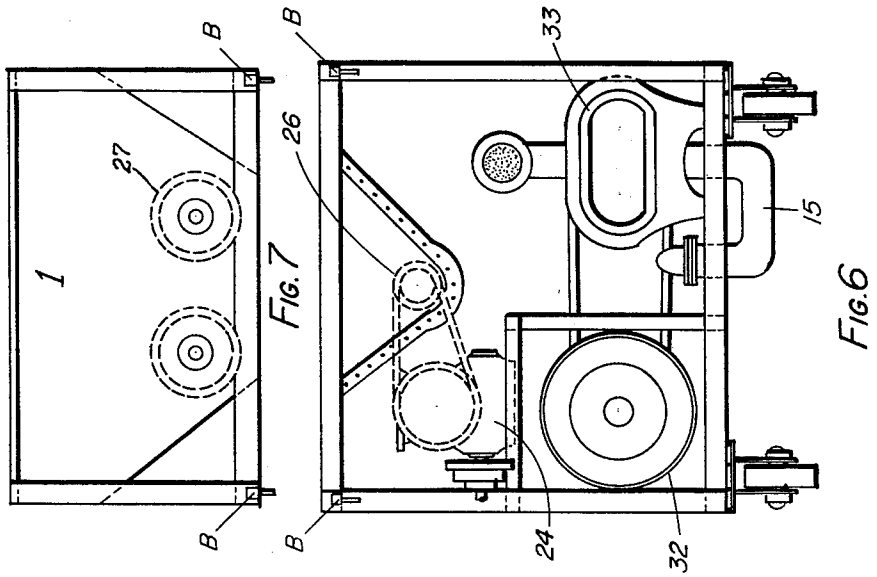


FIG. 7

FIG. 6

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APPARATUS FOR BLOWING AND SPRAYING LIGHT WEIGHT FIBERS AND GRANULATED MATERIALS

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2 Claims. (Cl. 302—49)

This invention involves an apparatus for blowing and spraying light weight fibers and granulated materials such as rock wool, glass wool, mineral wool, asbestos, perlite, and vermiculite and other materials mixed with binders and other agents. The process is adapted for acoustical treatment, sound deadening, thermal insulation, condensation control and fireproofing.

The equipment in this invention combines a number of essential units which, working together, produce results entirely new in the art. In the past there have been generally two types of equipment used, one designed for maximum application and applying a considerable tonnage of fiber per day where a rough industrial finish is all that is required, and a second type which embodies a machine having a carding brush action which gives a more acceptable finish but is much slower in the rate of application. It is now common practice to have a larger machine combined with a positive displacement type of blower applying the fiber in large volume, and then using a smaller type of hopper having a more even feed and over-spraying the initial application with a second and even a third coat in order to obtain a more acceptable finish.

When there is a "fallout" or failure of the material in application, due to improper procedure, a machine that is designed only for large production can only produce an unsightly patch, spoiling the appearance of the whole job. In small areas, sometimes, with poor light and ventilation, the operator cannot handle the material coming from the gun in the same manner of production as compared to large open areas.

Many times, larger production machines should be used but due to narrow halls and stairways where there is no elevator service, the size and weight necessitates the use of a smaller machine with slower application, and at a higher labor cost. Hoppers in the past, in many cases, had to be hand fed. They were difficult to repair and adjust, the essential parts were concealed and hard to reach.

The invention of this apparatus combines for the first time, all in one machine, the refinement of design better adapted for the blowing of materials described because of a variable and adjustable speed of application. The even flow of materials as discharged from the machine and the admission of steam into the flexible hose, causes the minute dust particles to adhere to one another more closely, resulting in less "fall out" of the light weight particles as they are propelled into the atmosphere and on to a surface. Dry layers are eliminated because of the even flow which is the greatest cause of failure in the past.

The purpose of the hopper is two-fold, first to meter the material evenly into the blower and, secondly, to give it a "carding action" which is a fluffing up of the material to increase the coverage and to produce a more acceptable finish.

One of the most important features is the easy accessible "feed box" having a transparent top through which the fiber flow is observed and adjusted. The feed box is lighted by an electric bulb.

This hopper has two or more types of bodies, one larger, one smaller, which are easily removed or changed by loosening four bolts. The machine is more easily handled because of lighter weight and less space required.

Using only the chassis, a still smaller hopper, light and compact, is then available. All parts of the equipment are accessible simplifying repairs.

The machine has a carding brush revolving at a high speed, partially carding the fiber and expelling it freely into the "star gate." This is the arrangement used when maximum production is essential. For a slower application with a better carding action and a better finish, the lower speed adjustments are made and a carding blade is then adjusted into place. This carding brush action is new in connection with the manner of feed. It is not to be confused with machines having a "beater" designed to eliminate "bridging" which is always present when using fibers of the kind described. Mechanical means are used to dislodge or break up the bridging action.

This equipment is different because the screw feed having a variable speed adjustment truly meters the flow of fiber. As the fiber is fed towards the carding brush, it passes under a control bridge. At this point it is no longer subject to the weight of fiber from above in the hopper and being at that point gently agitated by the mechanical finger, flows freely over the carding brush then into the feed box and "star gate." There is no jamming action because of the uninterrupted flow of fiber. This is most important inasmuch as "blow back" of the fiber is eliminated and the machine as a result does not throw out any dust.

The essential point of difference is as described and is not found in any other equipment. The "star gate" or air valve consisting of a series of vanes, have flexible ceiling strips to each vane which pneumatically seal each pocket from the next as it revolves.

In the drawings:

FIGURE 1 is an elevation.

FIGURE 2 is a plain drawing through the line A—A of FIGURE 1.

FIGURE 3 is an elevational end view.

FIGURE 4 is an elevational end view.

FIGURE 5 is a schematic drawing showing the addition of the flexible hose.

FIGURE 6 shows the chassis alone. The 4 bolts designated as B in FIGURES 1, 2, 3 and 4 have been removed, allowing the upper section or hopper designated as **1** to be removed.

FIGURE 7 shows the hopper the same type as in FIGURE 1, 2, 3 and 4 removed from the chassis.

FIGURE 8 shows a smaller type of hopper body used on smaller jobs.

FIGURE 9 shows a larger type of hopper body used on jobs requiring maximum production. The larger type body is needed so that one man is not required continuously to feed the machine. A body having the production required could not be gotten through the average doorway. It must be removable so as to go through sideways.

FIGURE 10 shows a removable carding blade, which is installed by two bolts in the feed box designated as B—B in FIGURE 4, also as B—B in FIGURE 1.

The machine operates as follows:

The dry fiber is placed in the hopper **1**. To prevent the bridging of the fiber which obstructs the even flow, the material is gently agitated by the members **2** and **3**. The screw feed **4** forces the fiber under the control bridge **5** and the fiber is gently agitated by the revolving finger **6**. The fiber is propelled over the rapidly spinning carding brush **7** and any bridging action is eliminated by the breaker **8** as the fiber falls freely into the feed box **9**. The fiber flow is observed through the transparent panel of the feed box **10** by means of the light **11** located in the feed box. From the feed box the fiber drops into the aperture **12** of the star gate or air valve **13**. The revolving vanes, having flexible air tight seals **14**, bring the fiber

into the air stream **15** through the opening **16** to the point of exit **17** and out through the flexible hose **18**. The operator, by means of the remote control switch **19**, located at the discharge end of the hose controls the starting and stopping of the motor **20** which, in turn, revolves the carding brush **7** by means of belts, the speed being varied by multi-step pulleys **21** and **22**. Adjusting the belt of the two multi-step pulleys **23** and **23A**, varies the driving speed to a gear reducer **24**, which in turn by means of chains and sprockets **24A** cause the screw feed **4** to revolve. The sprocket and chains **25**, **26** and **27**, turn the breakers **2** and **3**. At the discharge end of the flexible hose, a gun head **28** is located having multiple nozzles **29**. An air valve **30** and water valve **31** control the flow and atomization of the liquid.

The air and water valves **30** and **31** are used only when the fiber is wet in mid-air for the purpose of causing the material to adhere to a surface. But when the material is applied to ceilings from above being supported by the building construction, or when blown into wall pockets, the water and air valves **30** and **31** are not turned on. There is only then a slight moistening effect by the admission of steam to settle the dust for the protection of the workmen. By not using either the steam or the atomized water at the gun head does not affect the value of this invention.

The second motor **32** drives the positive pressure blower **33** and at the same time drives the gear reducer **34** through the chain and sprockets **35** which in turn causes the vanes **14** of the air valve **13** to revolve.

The workman in closing the switch, starts the motor **20** and causes the screw feed **4** to turn. As the motor **20** starts, the solenoid **36** is energized which permits dry steam to flow from the steam generator **37** in the tube and through the nozzle **38**, slightly moistening the fiber as it flows through the conduit **18** to the point of discharge.

What I claim is:

1. In a machine of the character described, the combination of a hopper, a feed screw for conveying material from the hopper, a rotatable carding brush adjacent and below the discharge end of the feed screw and having radial bristles extending above the lower level of the feed screw and adapted to receive the material moved by the feed screw, a transparent feed box below said carding brush to receive material thrown down by the brush, a rotatable star gate below the feed box and offset therefrom and comprising radial blades dividing it into compartments adapted to receive material from the feed box, a pneumatic conveying line adapted to receive material from said star gate, and a blower connected to said conveying line.

2. In a machine of the character described, the combination of a hopper, a feed screw for conveying material from the hopper, a rotatable carding brush adjacent and below the discharge end of the feed screw and having radial bristles extending above the lower level of the feed screw and adapted to receive the material moved by the feed screw, a feed box below said carding brush to receive material from the latter, a rotatable star gate comprising radial blades dividing it into compartments adapted to receive material from the feed box, a pneumatic conveying line adapted to receive material from said star gate, a blower connected to said conveying line, an electric motor for operating the blower and star gate and another electric motor for driving the carding brush and feed screw.

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