No. 684,261. Patented Oct. 8, 1901.

G. C. & C. E. JOHNSON.

DUST SPRAYING MACHINE.

(Application filed Feb. 28, 1901.)

(No Model.) 2 Sheets—Sheet 1.

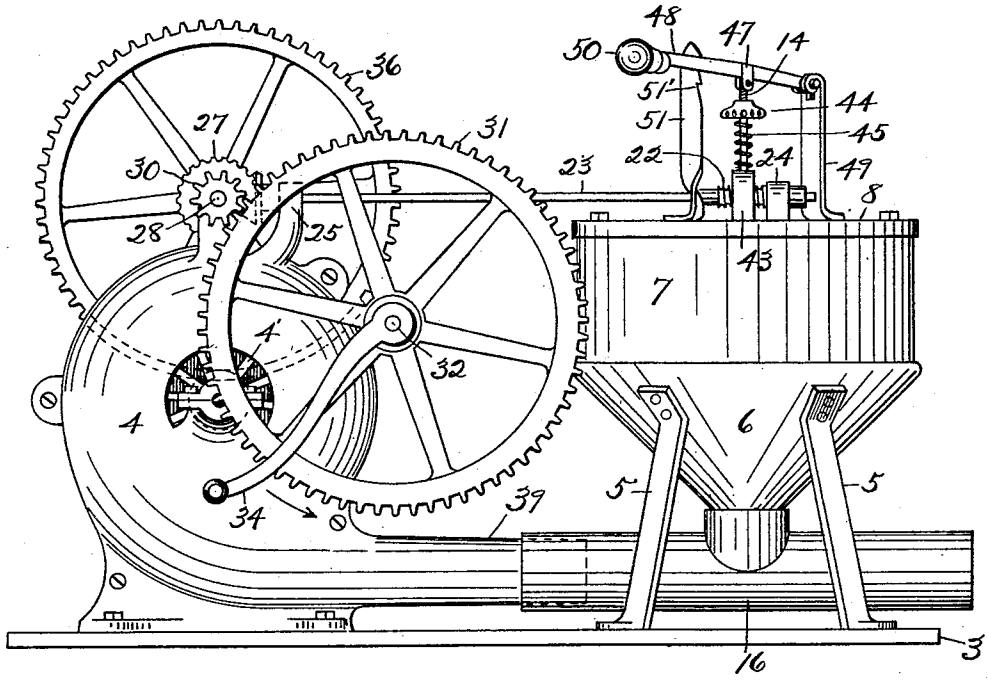


Fig. 1.

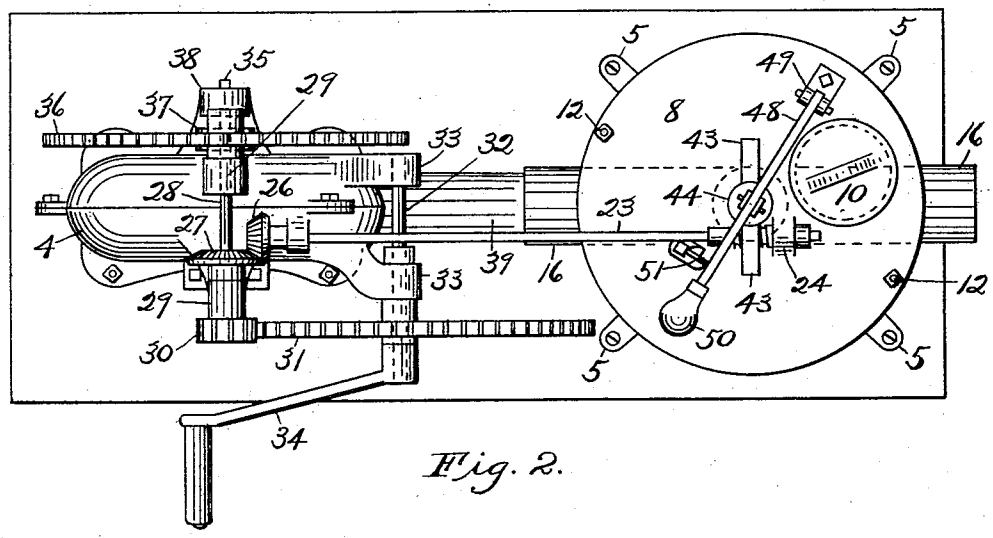


Fig. 2.

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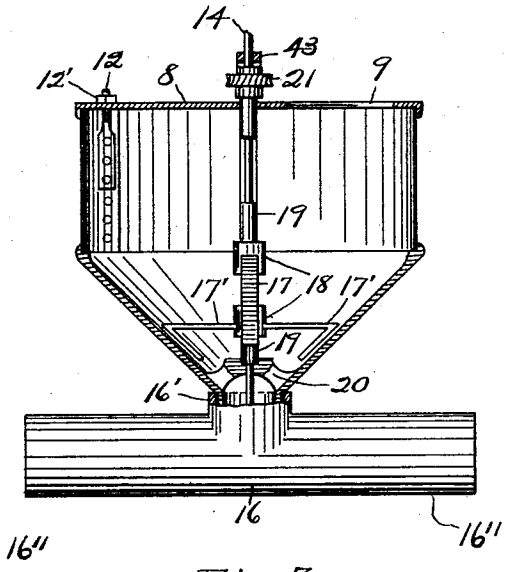


Fig. 3.

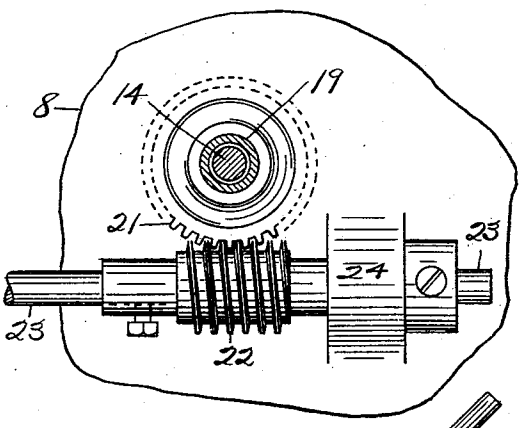


Fig. 7.

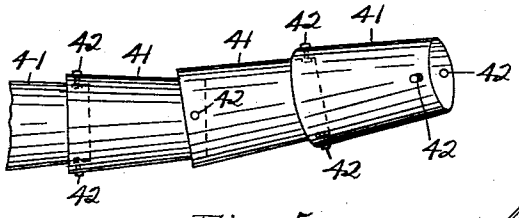


Fig. 5.

Fig. 4.

Fig. 6.

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UNITED STATES PATENT OFFICE.

GEORGE C. JOHNSON, OF ARGENTINE, KANSAS, AND CHARLES E. JOHNSON, OF KANSAS CITY, MISSOURI.

DUST-SPRAYING MACHINE.

SPECIFICATION forming part of Letters Patent No. 684,261, dated October 8, 1901.

Application filed February 28, 1901. Serial No. 49,258. (No model.)

To all whom it may concern:

Be it known that we, GEORGE C. JOHNSON, a resident of Argentine, in the county of Wyandotte and State of Kansas, and CHARLES E. JOHNSON, a resident of Kansas City, in the county of Jackson and State of Missouri, citizens of the United States, joint inventors, have invented new and useful Improvements in Dust-Spraying Machines, of which the following is a specification.

Our invention relates to a machine for projecting a spray of insecticide or fungicide powder or dust on trees, vineyards, tobacco, hop, and cotton fields, &c.

The principal object of the present invention is to provide a strong reliable gearing between the hand-wheel and the shaft of the agitator-blades.

A further object is to provide means for holding the valve-rod depressed. In said original machine the valve-rod must be held down by the hand when a flow of dust is required through the discharge-tube.

A still further object of the present invention is to produce a suitable flexible tubular connection between the discharge-tube, which is guided by the hand of the operator, and the tube leading from the dust-receptacle. We have found by exhaustive experiments that rubber tubing is not suitable for this connection either when reinforced by coiled springs or without them; but the connection described hereinafter obviates all the faults of rubber tubing or other flexible tubes and is simple and inexpensive of manufacture.

We will now proceed to describe our invention with reference to the accompanying drawings, in which—

Figure 1 is a side elevation of a machine constructed in accordance with our invention. Fig. 2 is a plan view of the same. Fig. 3 is an interior view of the dust-hopper, the hopper being in central vertical section, the valve-rod broken off above the hopper, the tubular shaft partly broken away to expose a part of said rod, and the T-union partly in section. Fig. 4 is a view on a small scale, showing the dust-hopper detached from other parts, the discharge-tube, and our improved flexible connection between said tube and the dust-hopper. Fig. 5 is an enlarged detail view of several of the members of the flexible tubular connection. Fig. 6 is an enlarged sectional view showing the valve and its seat, the T-union and lower end of the hopper being broken away. Fig. 7 is an enlarged detail view showing the worm-gear, the tubular shaft and the valve-rod being in transverse section and the lid of the hopper and the worm-shaft broken away.

Referring to Figs. 1 and 2, 3 designates a base-board to which are secured the shell 4 of a rotary blower and four hopper-supporting legs 5. The hopper comprises a conical bottom 6, to which said legs are secured, a drum or cylinder 7 above said bottom, and a lid 8, having a depending annular flange embracing the upper edge of drum 7. (See Fig. 3.) Said drum is seated in an annular shoulder formed in the upper edge of the conical bottom 6. This hopper is a receptacle for the dust or powder, which is placed therein through an opening 9 in the lid 8, said opening being provided with a cap 10. (Shown in Fig. 2.) Two stud-bolts 12 have their shanks secured to the inner side of the drum 7 and extend up through holes in the lid, which is thus secured to said drum by taps 12′ on said bolts.

The flow of dust from the hopper 6 is regulated by a puppet-valve 13, (see Fig. 6,) secured on the lower end of the valve-rod 14, which will be described presently. The seat of the valve 13 is formed by the lower edge of a depending tubular integral extension 15 of the hopper-bottom 6, said extension being externally threaded to receive an internally-threaded branch 16′ of a T-union 16. The purpose of this T-union or three-way tube is to conduct a blast of air across the point where the dust falls from the valve-opening.

To prevent the dust from packing or clogging in the hopper-bottom 6, we employ two pairs or sets of agitator-arms 17 and 17′, (see Fig. 3,) having hubs 18, secured adjustably (by set-screws) on a vertical tubular shaft 19, the lower end of which is supported and guided by a step formed in the top of a diametrical bridge-piece 20, cast integral with the hopper-bottom 6. Said shaft is made tubular in order to form a channel for the valve-rod 14, which cannot be placed outside of

said tubular shaft on account of the revolving arms 17 17'. Said arms are shaped substantially as shown, extending horizontally, then inwardly, and downwardly. The upper arms 17 are set at right angles across the lower arms 17' and the lower ends of arms 17 hang nearly as low as the ends of the lower arms, Fig. 3. The tubular shaft 19, on which said arms are mounted, extends up through a circular opening in the lid 8, said opening being large enough to permit free rotation of the shaft, but snug enough to prevent its rattling or wabbling. Said opening forms a journal-bearing for shaft 19, on which shaft above said opening is secured a worm gear-wheel 21, the teeth of which are preferably inclined and curved, as shown, to fit the worm 22, by which they are engaged. The worm is mounted on a horizontal shaft 23, the end of which adjacent to said worm is journaled in a perforated lug 24, integral with the hopper-lid 8. Shaft 23 extends across from the hopper to the blower-shell 4 and is journaled in a bracket-bearing 25, cast integral with one of the halves of said shell. Secured on the end of shaft 23, adjacent to bearing 25, is a bevel-pinion 26, meshing with a bevel gear-wheel 27 of about twice its diameter, secured on a transverse shaft 28, journaled in bearings 29 29, cast on the respective halves of the blower-shell 4. A gear-pinion 30 is secured on the end of shaft 28, adjacent to bearing 29, and said pinion is engaged by a large gear-wheel 31, mounted on a shaft 32, journaled in bearings 33 33, cast on the respective halves of the blower-shell 4. The hub of a hand-crank 34 is secured on the outer end of shaft 32, preferably by means of left-hand screw-threads on the shaft and in the hub, respectively, the crank being turned in the direction of the arrow to drive the blower in the proper direction. Rotation is communicated from shaft 28 of pinion 30 to the blower-shaft 35 through a gear 36 and a pinion 37, said gear being secured on the opposite end of shaft 28 from pinion 30 and pinion 37 (shown in dotted line in Fig. 1) being secured on the blower-shaft 35.

38 designates an extension-bearing cast on the blower-shell 4 for the blower-shaft 35. Said bearing is extended in order to permit pinion 37 and its gear 36 to be set close to the shell 4, reducing the strain on the bearing 29 adjacent to said gear. Thus when the crank 34 is turned gear 31 drives pinion 30, which rotates shaft 28 and gears 27 and 36. Gear 36 drives pinion 37, which rotates the blower-shaft 35 and the blower-wings 4'. Bevel-gear 27 at the same time drives bevel-pinion 26, which rotates shaft 23 and worm 22. The worm rotates wheel 21, tubular shaft 19, and the agitator-arms 17 17'. The nozzle 39 of the blower is considerably elongated and is tapered, as shown, and its terminal portion fits within one of the branches 16'' of the T-union 16. The opposite branch 16'' of said union is connected to the discharge-tube 40 by a flexible connection, to be described. The discharge-tube 40 is held in the right hand of the operator and directed up, down, or laterally when in use. A flexible connection between this tube and the branch 16'' is necessary, and we illustrate the preferred structure of said connection in Figs. 4 and 5. As shown most clearly in Fig. 5, this connection consists of several short tubular members 41 and two terminal members 41' and 41'', each member 41 being larger at one end than at the other, the members being secured in telescopic relation to one another by pivot-studs 42. Two of these pivot-studs are secured to the smaller end of each member 41, said studs being arranged oppositely, projecting outwardly, and preferably riveted through holes in the said members. The larger end of each member 41 is provided with two perforations for the outer ends of the pivot-studs 42, said perforations being so located that the pivotal axis connecting them is perpendicular to the pivotal axis connecting the pivots 42 at the opposite end of the member. The studs are swaged or headed at their outer ends to retain the larger ends of the members 41 thereon.

It will be apparent that the above-described construction provides a simple, cheap, and strong flexible tubing which cannot become flattened and cut off the flow of air from the discharge-tube 40. The two terminal members 41' and 41'' are cylindrical in form, as shown, and are pivotally connected to the short tapering members 41 by pivot-studs, as described. The terminal member 41' is slipped over the T branch 16'' when in use, and the other terminal member 41'' is slipped over or inside of one end of the discharge-tube 40. (See Fig. 4.)

Our improved device for manipulating the valve 13 will now be described. As previously stated, the valve-rod 14 extends up through the tubular shaft 19. Above the worm-wheel 21 on said shaft extends a bridge-piece 43, cast on the hopper-lid 8. The valve-rod 14 passes loosely through a central opening in said bridge-piece and extends upwardly several inches above it. The upper portion of the valve-rod is screw-threaded to hold a rotatable knob or hand-nut 44, which is supported by an expansion-spring 45, coiled around the valve-rod and resting on the bridge-piece 43. The knob 44 being supported by the spring 45 supports the valve-rod 14 and valve 13, and owing to the upward pressure of said spring the valve is normally closed—that is, in contact with the valve-seat 15. (See Fig. 6.) By adjusting the internally-threaded knob 44 on the valve-rod 14 the tension of spring 45 may be adjusted to provide for weakening of the spring or for different quantities of dust contained in the hopper. A pivot-pin is secured transversely in the upper end of the valve-rod 14, and its ends are engaged by two depending ears 47, secured to or integral with a depression-lever 48, one end of which is pivotally connected to a stand-

ard 49, secured to the hopper-lid 8. The opposite end of the lever 48 is provided with a handle 50 for raising or depressing the lever. A little underneath and at one side of lever 48, adjacent to the handle 50, is a vertical standard 51, provided with several notches 51′ for engaging the upper edge of said lever and holding it down when it is placed therein. The standard 51 is made of flat bar-iron, preferably twisted, as shown, and its foot is rigidly secured to the hopper-lid 8. The standard 49 is made of springy or easily-bent metal in order to accommodate or yield to the different movements and positions of lever 48 when said lever is placed in one of the notches 51′, the middle part of the lever 48 being virtually prevented from lateral motion by the valve-rod 14, connected thereto, as already described. When the lever 48 is free from the standard 51, the spring 45 holds the valve 13 closed. When the lever is placed in the upper notch 51′, said valve is held open a short distance, about as shown in Fig. 6. When the lever 48 is placed in the next lower notch, the valve is held lower and creates a larger opening, through which the dust may enter the T-union 16. The notches 51′ may be made smaller and closer together than shown to provide for closer adjustment of the valve 13, if desired. The depression-lever 48 may be arranged directly above and parallel to the bridge-piece 43, if preferred so, without altering the construction or operation of any part of the machine.

In using this machine the operator directs the discharge-tube 40 with his right hand and turns the crank 34 with his left. When said tube and coupling 41 are not in use, they may easily and quickly be detached from the T-union and laid in the bottom of the wagon on which the machine is preferably mounted.

Having now fully described our invention, what we claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a dust-spraying machine, the combination of a dust-receptacle, a vertical rotatable shaft therein, agitators mounted on said shaft, a worm-wheel secured on said shaft above the receptacle, a worm-shaft supported at an angle to said vertical shaft, a worm secured on said worm-shaft, engaging said worm-wheel, and gearing for imparting rotation to said worm-shaft, substantially as described.

2. In a dust-spraying machine, the combination of a dust-receptacle, a valve-seat in the bottom thereof, a puppet-valve arranged beneath said valve-seat and having a vertical valve-rod extending upwardly through said receptacle, a vertically-movable hand-lever mounted on the top of said receptacle a pivotal connection between said lever and the top of said valve-rod, a notched or toothed standard secured to the top of said receptacle, adjacent to said lever, for holding said lever depressed, a nut mounted on said valve-rod near the upper end thereof, a coiled spring around said rod below said nut, for yieldingly supporting said valve-rod, and a support for said spring, said support having a perforation through which said valve-rod extends, substantially as described.

3. In a dust-spraying machine, the combination of an air-blower, a shaft 32 mounted thereon, a hand-crank and a gear-wheel on said shaft, a shaft 28 mounted on the top of said blower, a pinion 30 on said shaft 28, engaged by said gear, a bevel gear-wheel 27 on said shaft 28, a dust-receptacle adjacent to said blower, a worm-shaft having one end thereof supported by said blower and its opposite end supported by said receptacle, a bevel-pinion on said worm-shaft, engaged by said bevel-gear, a worm on the opposite end of said worm-shaft, a vertical shaft located centrally in said receptacle, and a worm-wheel on said shaft, engaged by said worm; substantially as described.

4. In a dust-spraying machine, the combination with a dust-receptacle and a discharge-tube 40, of a lateral tube 16 connected to the bottom of said receptacle, and a flexible tubular connection between said lateral tube and said discharge-tube; said flexible connection comprising a plurality of short tapering tubular members, the smaller end of each member being pivotally secured within the larger end of an adjacent member by a pair of trunnion-pivots, the pivotal axes of alternate pairs of pivots being perpendicular to the axes of the other alternate pivots; a cylindrical terminal member 41′ connected to said lateral tube, and a cylindrical terminal member 41″ connected to said discharge-tube; substantially as described.

In testimony whereof we affix our signatures in the presence of two witnesses.

GEORGE C. JOHNSON.
CHARLES E. JOHNSON.

Witnesses:
M. L. LANGE,
K. M. IMBODEN.