Sept. 17, 1968 K. G. DOWNING 3,401,847

PNEUMATICALLY POWERED APPLICATOR

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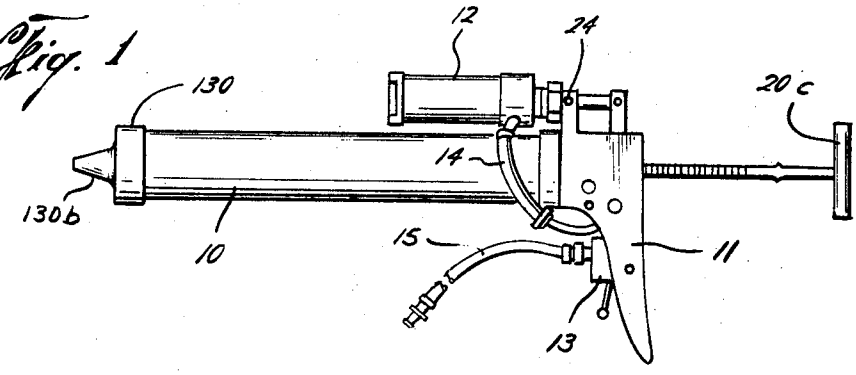
Fig. 1



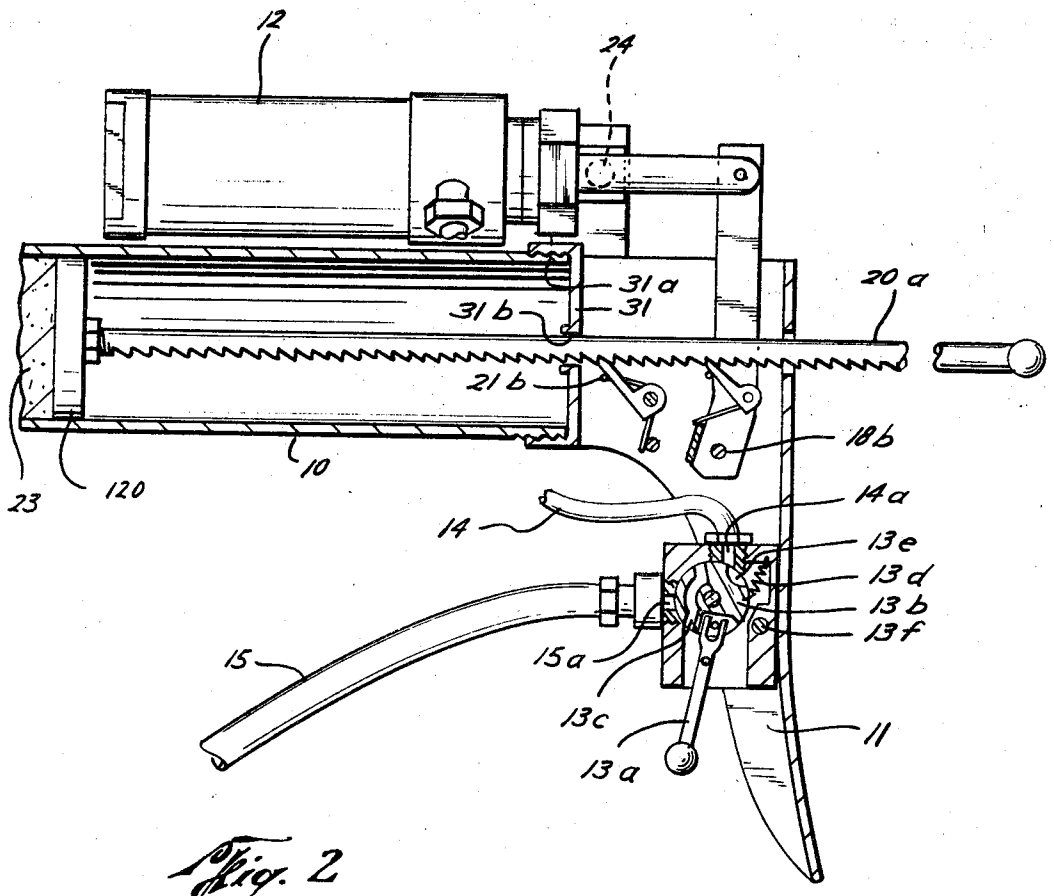


Fig. 2

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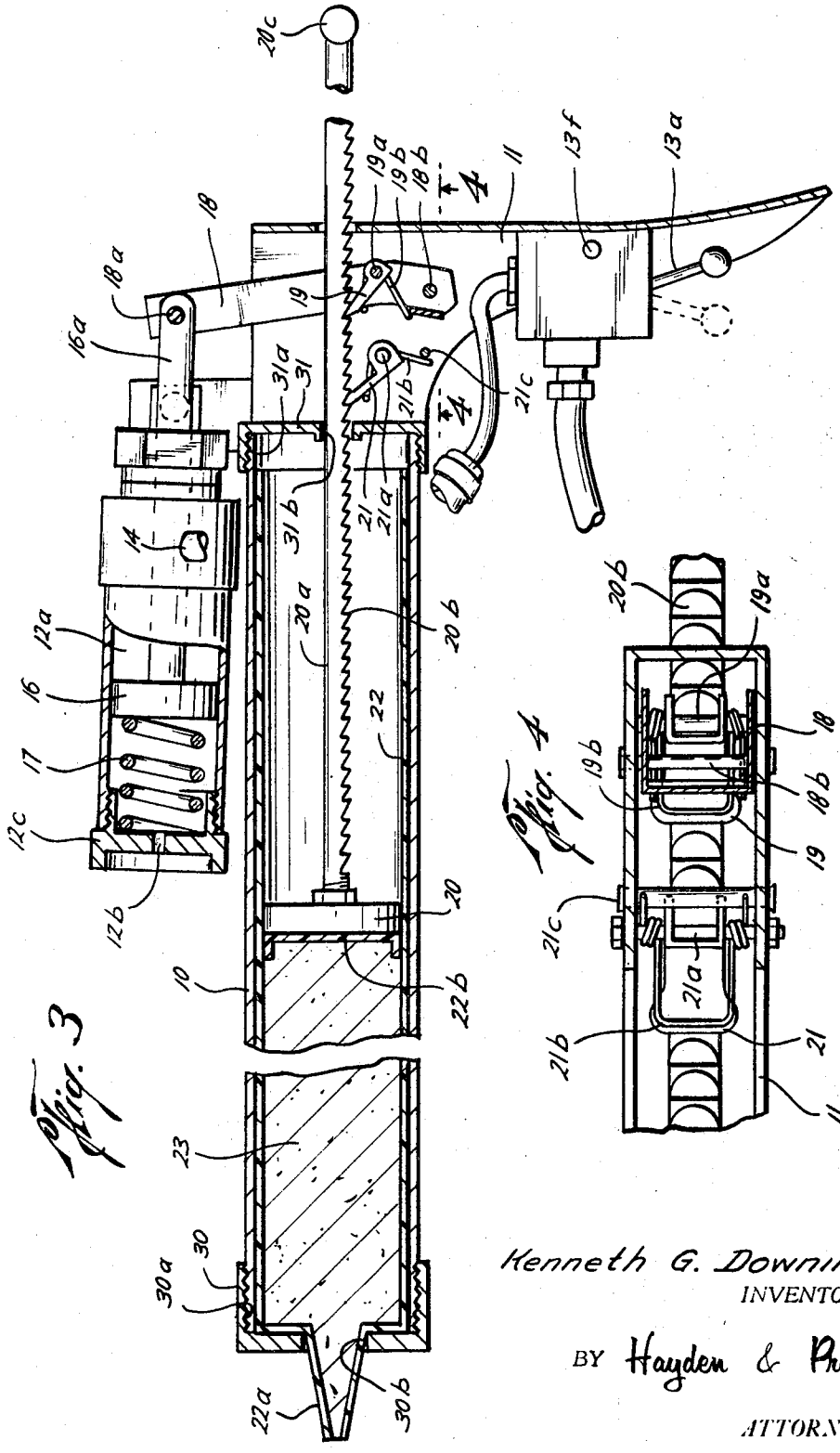

Fig. 3

Fig. 4

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PNEUMATICALLY POWERED APPLICATOR

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6 Claims. (Cl. 222—327)

ABSTRACT OF THE DISCLOSURE

A pneumatically powered applicator having a manually activated valve to utilize compressed air to successfully move an applicator plunger or piston to extrude the contents of the cylinder through an output nozzle.

BACKGROUND OF THE INVENTION

(1) *Field of the invention.*—The invention pertains in general to the controlled application of a composition to a given environment and in particular to the application, in discrete amounts, of a heat transfer material to a steam tracer line or other heating element generally used in maintaining a material transfer conduit at a given temperature. As is well known, such heat transfer material is used in certain industries where materials are conveyed from one processing point to another through pipelines or the like. The pneumatic applicator of the present invention is particularly suitable for applying heat conductive material. As will be appreciated from the following description, the applicator of the present invention is also suitable for use in the controlled application of calking compositions, lubricants, or any other semifluid substance.

(2) *Description of the prior art.*—Heretofore, mechanically actuated calking guns have been used for applying heat transfer material and the like. Although hand powered mechanical guns are satisfactory for use for short periods of time, they are too tiring for continuous use over prolonged periods of time.

SUMMARY OF THE INVENTION

The construction of the present applicator utilizes operator control but with a minimum of manual effort so that it may be used without causing the operator to become excessively fatigued. Further, it is economical in that it is fabricated using many of the structural components of a standard, manually operated calking gun. The working components of the applicator of the present invention are commercially accessible and may be repaired or replaced with relative ease. In contrast to many prior art devices, the entire applicator unit is self-contained and portable, requiring only a source of compressed air for power.

The pneumatic power supplied to the applicator is converted into a reciprocating mechanical movement by introducing the compressed air into a cylindrical chamber which drives a spring-loaded power piston. A rod attached to the power piston drives a double pawl and ratchet mechanism which in turn drives a second piston or plunger through the applicator cylinder containing heat transfer material or other semifluid composition for extruding the composition from a nozzle at the end of the applicator cylinder.

It is thus an object of the present invention to provide a new and improved pneumatically powered applicator for heat transfer materials and similar materials.

Additional objects will become evident from the drawings and the following description.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an elevation of a first form of the pneumatic applicator of the present invention;

FIG. 2 is a partial vertical section illustrating several operating details of the applicator of FIG. 1;

FIG. 3 is a vertical section illustrating several additional operating details of a slightly modified embodiment of the pneumatic applicator of the present invention; and

FIG. 4 is a horizontal section taken along the line 4—4 of FIG. 3.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The applicator of this invention includes a loading or applicator cylinder **10** connected to a handle **11**. A power cylinder **12** is mounted above the loading cylinder **10**. The handle **11** carries an air valve **13** which may be opened or closed by actuation of a valve trigger **13***a*. One side of the valve **13** is connected by an air line **14** to the power cylinder **12**. The other side of the valve **13** is connected to a supply line **15** which in turn is connected to a source (not illustrated) of compressed air.

As best illustrated in FIGS. 2 and 3 of the drawingss, the compressed air from the supply line **15** enters the air line **14** through the air valve **13** where it is then introduced into a chamber **12***a* in the power cylinder **12**. The pressure of the air in the chamber **12***a* displaces a power piston **16** aganst the force of a spring **17**. When the chamber **12***a* is depressurized, the spring **17** restores the piston **16** to its rest position (to the right in FIG. 3). An opening **12***b* is provided in a removable cap **12***c* at the end of the power cylinder **12** to vent the air contained within the cylinder **12** between the piston **16** and the cap **12***a*. A piston rod **16***a* transmits the movement of the piston **16** to a drive arm **18** through a pin **18***a*. In the preferred embodiment, the power cylinder **12** is adapted to pivot slightly about a pivot pin **24** to accommodate the arcuate movement of the pin **18***a* relative to the drive arm **18**. The drive arm **18** is pivotally secured at its lower end to the handle **11** by a pivot pin **18***b*.

As illustrated in FIGS. 3 and 4, a spring loaded pawl **19** is pivoted about a pivot pin **19***a* secured to the drive arm **18**. A spring **19***b* is mounted on the outer ends of the pivot pin **19***a* (FIGS. 3 and 4) and is confined under compression between the lower surface of the pawl **19** and the forward surface of the arm **18** so as to exert a constant resilient force tending to pivot the pawl **19** clockwise (FIG. 3) to hold it in contact with the ratchet teeth **20***b* while allowing the pawl **19** to pivot counterclockwise enough for the pawl **19** to move rearwardly (to the right in FIG. 3) relative to the teeth **20***b* when the arm **18** is retracted to the right (FIG. 2). A second spring-loaded backup pawl **21** is pivoted about a pin **21***a* and also engages the teeth **20***b*. The pawl **21** is urged resiliently into constant contact with the rachet teeth **20***b* by a compressed spring **21***b* which has its intermediate portion coiled about the ends of the pivot pin **21***a* and has its ends in engagement with the lower surface of the pawl **21** and a stop **21***c* secured to the handle **11**. Thus, the pawl **21** is urged in a clockwise direction about its pivot pin **21***a*, but it may pivot slightly in a counterclockwise direction (FIG. 3) to allow the teeth **20***b* to move forwardly or to the left relative to the pawl **21**. The rod **20***a* is removably secured at one end to a plunger **20** carried within the applicator cylinder **10**. The other end of the rod **20***a* has a handle **21***c* so as to facilitate retraction of the plunger **20** (to the right in FIG. 3) after the rod **20***a* has been partially rotated to disengage the ratchet teeth **20***b* from the pawls **19** and **21**, as will be more fully explained.

As viewed in FIG. 3 of the drawings, movement of the drive arm **18** to the left is transmitted to the rod **20***a* through the pawl **19**. When the rod **20***a* moves to the left, the backup pawl **21** merely slips over the ratchet teeth **20***b*. Movement of the arm **18** to the right draws the pawl **19** to the right in a slipping movement over the

teeth **20***b*. The rod **20***a* is prevented from moving to the right as the pawl **19** moves to the right because the engagement of the backup pawl **21** in a notch of the teeth **20***b* locks the rod **20***a* against such movement.

The pawls **19** and **21** may be disengaged from the teeth **20***b* by partially rotating the rod **20**, generally about 90° from the engaged position illustrated in FIG. 3 of the drawings to the released position illustrated in FIG. 1. When the teeth **20***b* have been thus disengaged, the rod **20** may be moved by hand in either direction in the cylinder **10**.

The form of the applicator illustrated in FIG. 3 of the drawings is adapted to be employed with a disposable cylindrical cartridge **22** which is prefilled with a heat transfer cement or other material **23**. Preferably, the cylinder **10** has a forward removable cap **30** which is threaded at **30***a* to the cylinder **10** or is otherwise removably secured thereto. The cap **30** has an aperture **30***b* therethrough. At the other end of the cylinder **10**, a removable cap **31** is preferably threaded thereto at **31***a*, and it has an opening **31***b* through which the rod **20***a* extends.

The cartridge **22** is of conventional construction and is usually provided at one end with a nozzle **22***a* and at its other end with a movable disk **22***b* or similar element. As the plunger **20** advances to the left in FIG. 3, the element **22***b* is forced along the inside of the cartridge **22** by the plunger **20**, causing the material **23** to be extruded through the nozzle **22***a* which projects outwardly through the opening **30***b*. The cap **30** may be disengaged from the applicator cylinder **10** and the cartridge **22** may be replaced after the contents **23** have been dispensed therefrom. When a new cartridge **22** is being inserted into the loading cylinder **10**, the piston **20** is restored to its starting position by turning the handle **20***c* to disengage the teeth **20***b* from the pawls **21** and **19** so that a smooth portion of the rod **20***a* may slide over the pawls **19** and **21**.

The embodiment illustrated in FIG. 2 of the drawings is the same as that of FIG. 3 except that the material **23** is placed directly in the bore of the cylinder **10** rather than in the separate cartridge **22**. In the modification of FIG. 2, the piston **120** has an outside diameter corresponding to the inside diameter of the cylinder **10**. The cylinder cap **130** has an attached or integrally formed nozzle **130***b*. Thus, the applicator of this invention may be readily adapted for either cartridge type loading or cylinder loading of the material to be dispensed.

FIG. 2 includes a schematic illustration of the air valve **13** which is secured to the handle **11** by bolt or rivet **13***f*. It should be understood that the illustrated form of the valve **13** is exemplary and any valve capable of providing the desired function may be employed. The valve **13** is spring loaded so that is closed in its "off" or rest position (FIG. 2 and dotted line position of FIG. 3). When a trigger **13***a* is squeezed or actuated to its "on" position (solid line position of FIG. 3), it rotates a cylindrical valve gate **13***b* to cause a central passage **13***c* to register with the opening **15***a* in the supply line **15** and an opening **14***a* in the air line **14**. With the form of the valve **13** illustrated in FIG. 2 of the drawings, the chamber **12***a* in the power cylinder **12** remains pressurized until the trigger **13***a* is released. The release of the trigger **13***a* allows a spring **13***d* to restore the valve gate **13***b* to the "off" or rest position where the chamber **12***a* may be vented through a channel **13***e* in the valve gate **13***b*. Each opening and closing of the valve **13** produces only one cycle or stroke of movement of the piston **16**. If desired, the valve **13** may be replaced by a valve mechanism which will continuously open and close to produce repetitive strokes of the piston **16** automatically so long as the trigger **13***a* remains depressed. In such a modification, the piston **20** would continue to advance through the applicator cylinder **10** until the valve trigger **13***a* is released.

In operating the embodiment illustrated in FIGS. 1 and 2 of the drawings, the handle **20***c* is first rotated to disengage the pawls **19** and **21** from the teeth **20***b*. The handle **20***c* is drawn to the right to position the piston **120** at the extreme right-hand end of the cylinder **10**. The end cap **130** is then removed and the cylinder **10** is filled with material **23**. The end cap **130** is replaced and the handle **20***c* is rotated to re-engage the pawls **19** and **21** with the teeth **20***b*. The nozzle **130***b* is then positioned in the desired area and the trigger **13***a* is pulled into the handle **11**. The plunger **120** advances a distance determined by the stroke of the piston **16** and thus for each stroke of the piston **16**, a quantity of the material **23** is extruded through the nozzle **130***b*.

In the embodiment illustrated in FIG. 3 of the drawings, the smaller piston **20** is positioned at the extreme right of the cylinder **10** by disengaging the teeth **20***b* and the pawls **19** and **21** and pulling the rod **20***a* to the right. The end cap **30** is removed, a full cartridge **22** is positioned in the cylinder **10**, and the cap **30** is replaced. The operator places the nozzle **22***a* in the desired position and squeezes the trigger **13***a*. Such squeezing takes only a minimum of effort and may be accomplished with one finger if desired. The piston **20** moves a predetermined amount to advance the movable disk **22***b* through cartridge **22**, causing a quantity of the material **23** to extrude through the nozzle **22***a* for each stroke of the piston **16**.

The foregoing disclosure and description of the invention are illustrative and explanatory thereof, and various changes in the size, shape, and materials as well as in the details of the illustrated construction may be made within the scope of the appended claims without departing from the spirit of the invention.

I claim:

1. An applicator for applying putty-like material to a desired work area comprising:

(a) an applicator cylinder for containing a putty-like material;

(b) a plunger disposed in said applicator cylinder for longitudinal movement relative thereto for dispensing the semifluid material from the cylinder;

(c) pneumatic power means for longitudinally moving said plunger within said applicator cylinder;

(d) movement transmission means operably connecting said pneumatic power means to said plunger for imparting only forward movements to the plunger from the pneumatic power means for effecting the dispensing of the material in said applicator cylinder; and

(e) said pneumatic power means including:

(1) a piston movable for a forward stroke by fluid pressure supplied thereto;

(2) resilient means to return said piston after its forward stroke;

(3) a drive arm pivotally connected to said piston; and

(4) a power pawl mounted on said drive arm for movement with said drive arm.

2. The applicator of claim **1** including:

(a) a handle on said applicator cylinder so that the entire applicator may be manually held by a user;

(b) valve means for said pneumatic power means including trigger means for opening and closing said valve means; and

(c) means mounting said valve means with said handle.

3. The applicator of claim **1** wherein:

(a) said applicator cylinder is adapted to receive a cartridge containing said putty-like material and having a nozzle therewith;

(b) said plunger being slidably received in the rearward end of said cartridge for forcing the material therein from the nozzle as said plunger moves longitudinally relative to said cylinder; and

(c) said cylinder having a centrally apertured remov-

able end cap through which said cartridge nozzle extends.

4. The applicator of claim 1 including:

(a) an end cap removably disposed at the forward end of said applicator cylinder; and

(b) an integrally formed nozzle with said end cap through which said material in said cylinder is dispensed.

5. The structure set forth in claim 1 wherein said movement transmission means includes:

(a) ratchet teeth on said rod engageable by said power pawl for moving said rod forwardly while slipping relative thereto as said power pawl is moved rearwardly upon the return of said piston by said resilient means; and

(b) a backup pawl also engageable with said ratchet teeth for preventing said rod from being moved rearwardly as said power pawl moves rearwardly.

6. The structure set forth in claim 1, including:

(a) a power cylinder for said piston mounted with said applicator cylinder; and

(b) means pivotally mounting said power cylinder on said applicator cylinder for relative pivotal movement thereof as said drive arm reciprocates.

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