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Loethen et al.

[11] **3,799,407**

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[54] **SEMI-SOLID MATERIAL DISPENSING INCLUDING A POWER OPERATED SCOOP**

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[52] **U.S. Cl.** **222/333,** 222/386

[51] **Int. Cl.** **G01f 11/00**

[58] **Field of Search** 222/334, 386, 385, 470, 222/367, 504, 344

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Assistant Examiner—James M. Slattery

[57] **ABSTRACT**

A movable, power-driven semi-solid material dispensing device that includes a prime mover for rotating a cylindrical scoop to fill the latter with the semi-solid material when the scoop is brought into rotatable pressure contact therewith. The scoop has a longitudinally movable ejector plate therein, that occupies a position adjacent the rear of the scoop when the latter is being rotated and filled with the semi-solid material.

The device includes control means to permit a prime mover forming a part thereof to rotate the scoop for filling purposes, and after the filling operation is completed the prime mover serves to provide the power to actuate the ejector plate to discharge semi-solid material from the scoop. The control means is of such structure and so operates that the scoop remains stationary during the time the semi-solid material is being discharged therefrom.

5 Claims, 9 Drawing Figures

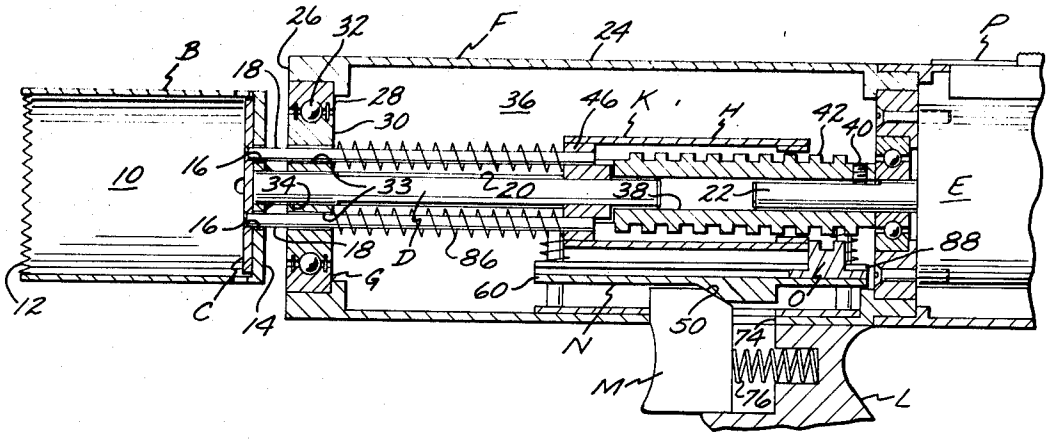


FIG. 1

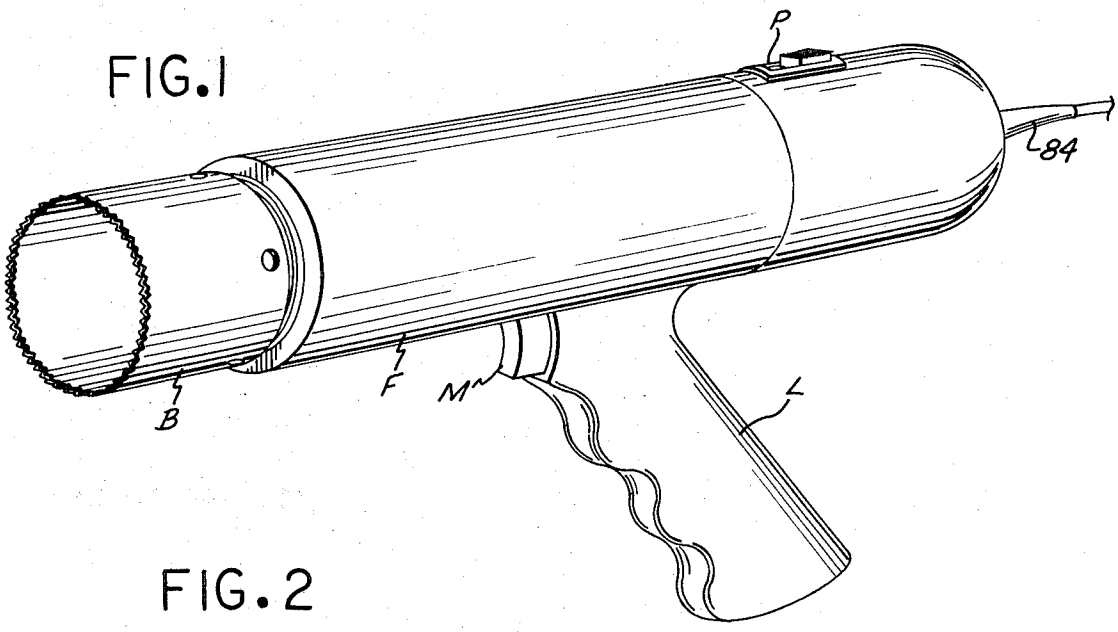
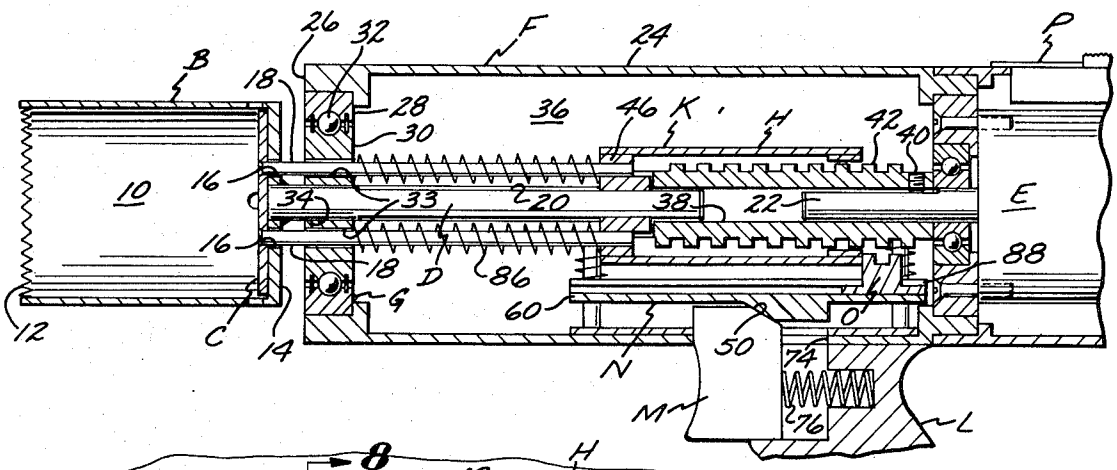


FIG. 2



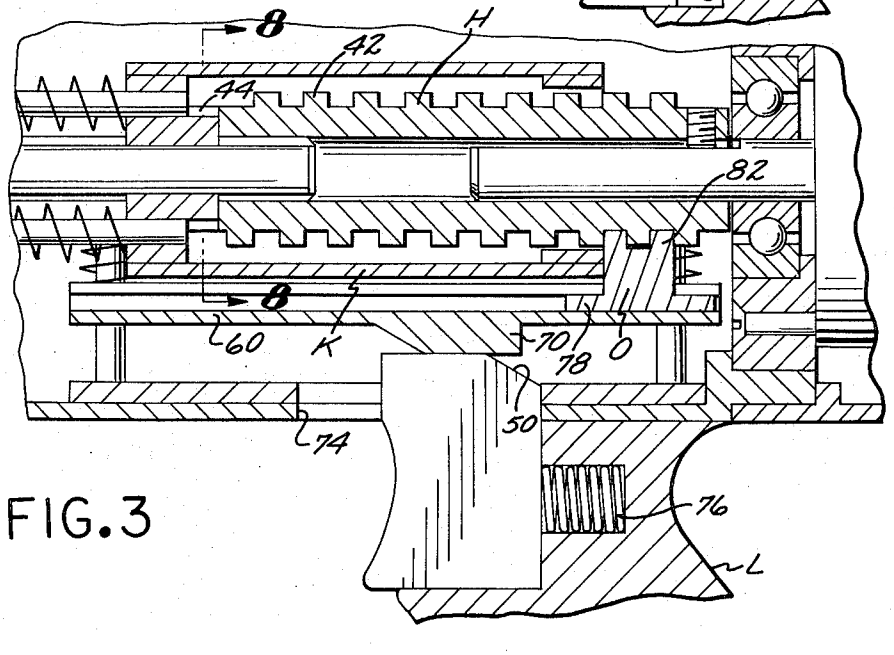


FIG. 3

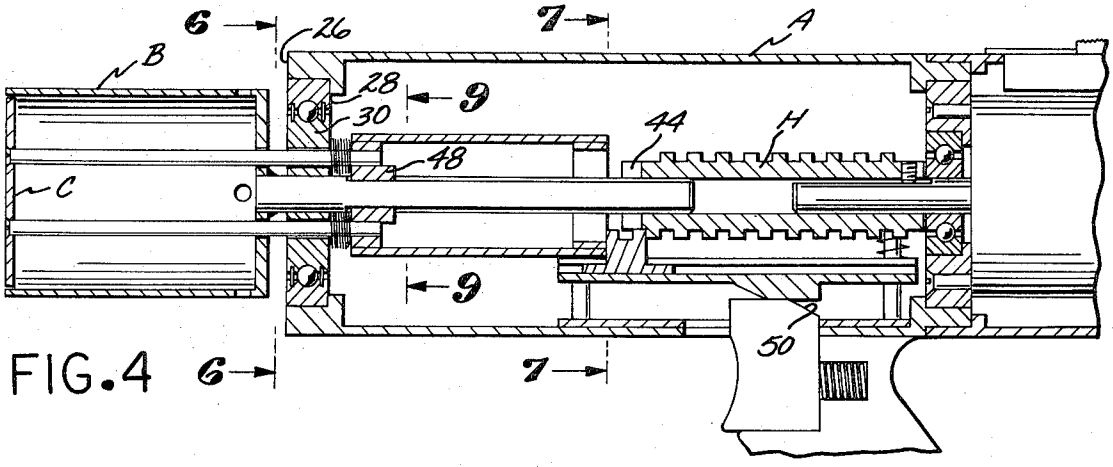


FIG. 4

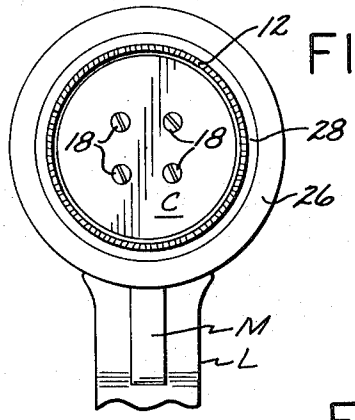


FIG. 5

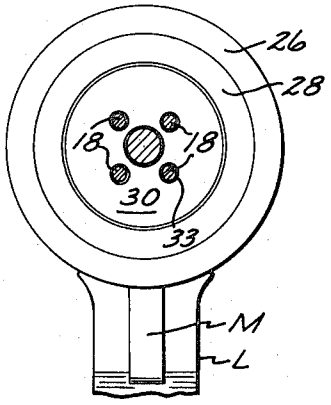
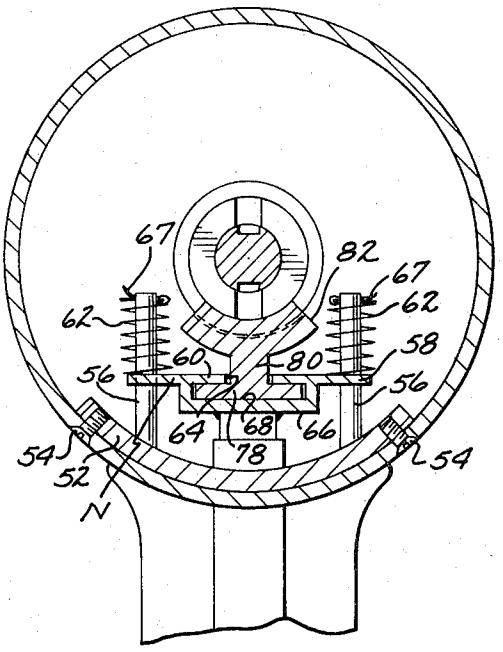


FIG. 6

FIG. 7



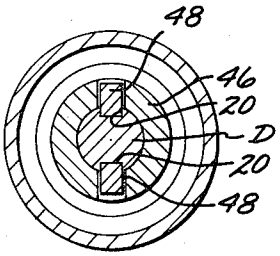


FIG. 8

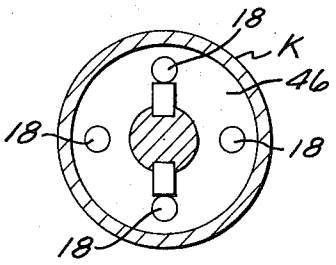


FIG. 9

SEMI-SOLID MATERIAL DISPENSING INCLUDING A POWER OPERATED SCOOP

BACKGROUND OF THE INVENTION

1. Field of the Invention

Semi-solid material dispensing device.

2. Description of the Prior Art

In the past, it has been common practice to use a scoop or spatula to manually remove semi-solid materials such as ice cream, lard, or the like, from a container. When the material is ice cream maintained at a substantially low temperature, the ice cream is hard, and dispensing it in the above described manner not only requires substantial physical exertion, but is inconvenient and time-consuming.

The primary purpose in devising the present invention is to supply a power-operated scoop that permits semisolid materials such as hard frozen ice-cream, lard, or the like to be easily dispensed from one container to another, and with this operation being carried out with a minimum of physical exertion on the part of the user of the invention, and with a substantial saving in time over the prior art methods used in such transfer.

SUMMARY OF THE INVENTION

The semi-solid material dispensing device includes a cup-shaped scoop that has a cylindrical side wall and a flat end wall, with the end wall having a number of circumferentially spaced bores therein. An ejector plate is slidably movable in the scoop. A number of rigid, parallel rods extend rearwardly from the ejector plate through the bores in the end piece, with the rods on the forward ends being secured to the plate. A driven shaft is secured to the center of the end wall and extends rearwardly therefrom.

A prime mover is provided that is preferably an electric motor, although an air-operated motor may be utilized if desired, with the prime mover having a driving shaft that is in coaxial alignment with the driven shaft. A housing assembly is also provided that extends forwardly from the prime mover and includes an end piece that has a rotatable center portion in which the rods are slidably mounted.

An elongate worm gear is situated within the housing assembly and is rigidly secured to the driving shaft, with the worm gear having a forward portion that preferably rotatably engages the driven shaft to maintain the two shafts in co-axial alignment. The forward portion of the worm gear has at least one longitudinal slot formed therein. A rigid drive tube is disposed within the confines of the housing, and when in a first position extends longitudinally about the worm gear. An end member is secured to the forward end of the drive tube and this end member is secured to the rear ends of the previously mentioned rods. The end member has a bore formed therein that slidably engages the driven shaft.

A first means is provided on the end member that at all times engage a longitudinally extending groove formed on the driven shaft, and the slot in the worm gear when the drive tube is in a first position. An elongate rail assembly is situated in the housing assembly adjacent the worm gear, and this assembly includes a stop on the rear end thereof. A grooved actuator is slidably mounted on the rail assembly. Compressed helical springs extend around the rods, and at all times tend to maintain the drive tube and the end member in a first position. A number of second springs are provided that at all times tend to support the rail assembly and actuator in a first position in which the drive tube is forced rearwardly against the actuator and the actuator as a result is moved rearwardly against the stop.

A normally open electric switch is provided for actuating the prime mover to rotate the driving shaft, and with the scoop accordingly being rotated and being filled with the semi-solid material when the scoop is brought into pressure contact therewith. A trigger or other control means is supplied for moving the rail assembly and actuator from a first to a second position, whereupon said actuator is in engagement with the worm gear and is moved forwardly on the rail assembly to concurrently move the drive tube, end member, rods and ejector plate forwardly until the semi-solid material in said scoop is discharged therefrom. During this discharge operation the scoop is stationary due to the first means being disengaged from the slots as said end member moves from said first position. The rail assembly and actuator at the conclusion of the semi-solid material being discharged from the scoop are allowed to move to the first position, whereupon the first spring means moves the guide tube and actuator rearwardly until the actuator contacts the stop, and the above described dispensing operation may be repeated. For convenience in handling the device, handle means are provided thereon, or in lieu of handle means, a suitable support for the device may be used that extends downwardly from an overhead position.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view of the semi-solid material dispensing device;

FIG. 2 is a longitudinal cross-sectional view of the device;

FIG. 3 is a fragmentary, enlarged longitudinal, cross-sectional view of a portion of the device;

FIG. 4 is a longitudinal, cross-sectional view of the device, after the ejector plate has moved longitudinally in the scoop to dispense semi-solid material formerly therein;

FIG. 5 is an end elevational view of the device;

FIG. 6 is a combined transverse cross-sectional and end elevational view of the device, taken on the line 6—6 of FIG. 4;

FIG. 7 is a transverse cross-sectional view of the device, taken on the line 7—7 of FIG. 4;

FIG. 8 is a transverse cross-sectional view of the device, taken on the line 8—8 of FIG. 3; and

FIG. 9 is a transverse cross-sectional view of the device, taken on the line 9—9 of FIG. 4.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The semi-solid dispensing device A, as may best be seen in FIG. 1, includes a cup-shaped scoop B that has a cylindrical side wall 10 on which a serrated forward cutting edge 12 is defined. The rear end of the side wall 10 has an end wall 14 secured thereto, which end wall has a number of circumferentially spaced bores 16 therein. A transverse ejector plate C is situated within the confines of the cylindrical side wall 10 and slidably engages the interior surface thereof. A number of rigid parallel rods 18 are slidably mounted in the bores 16,

with the forward ends of the rods being secured to the rear face of the ejector plate C.

A driven shaft D is provided that is secured to the center of the end wall **14** and extends rearwardly therefrom as best seen in FIG. **2.** As may be seen in FIGS. **1** and **4,** a prime mover E is provided that may be either an electric motor, air-operated motor, or the like. The prime mover E includes a driving shaft **22** that is in coaxial alignment with the driven shaft D as shown in FIG. **2.** A housing assembly F is provided that includes a shell **24** that terminates on the forward end in an end piece **26** that has a bearing G forming a part thereof. The bearing G includes a fixed outer race **28** and a rotatable inner race **30** that have ball or roller bearings **32** situated therebetween. The inner race is circular and provides a rotatable central portion of the housing that has a number of circumferentially spaced first bores **33** and a centered bore **34** formed therein. The bores **33** are slidably engaged by the rods **18.** The housing assembly F has a confined space **36** defined therein as shown in FIGS. **2** and **4,** in which an elongate worm gear H is situated. The worm gear H preferably has a longitudinal bore **38** formed therein. A rear portion of the worm gear H is in engagement with the driving shaft **22,** and is secured thereto by a set screw **40,** or other conventional means. Threads **42** are defined on the exterior surface of the worm gear H. The worm gear H has at least one longitudinal slot **44** formed in the forward portion thereof as best seen in FIG. **4.** A bearing assembly J is preferably located within the confines of the forward end of the worm gear H and rotatably engages the rear end of the driven shaft D.

A rigid drive tube K is situated within the confined space **36,** and when the drive tube is in a first position as shown in FIG. **2** it extends around the worm gear H. The drive tube K includes a forwardly disposed end member **46** that has the rear ends of the rods **18** secured thereto, as may be seen in both FIGS. **2** and **4.** The end member **46** includes at least one key **48** that is at all times in slidable engagement with one of the grooves **20,** and with the key extending rearwardly to engage the slot **44** in the worm gear H, when the drive tube K is disposed in the first position shown in FIG. **2.**

In the form of the device A illustrated in FIG. **1** it will be seen that a piston type grip L extends downwardly from the housing assembly F to serve as a handle. The piston grip L has a spring-loaded trigger M slidably mounted thereon, and the trigger includes a first inclined cam face **50.** A rail assembly N, best seen in FIGS. **2** and **7,** is situated within the confined space **36,** with the rail assembly including an arcuate plate that is secured by screws **54,** or other conventional fastening means, to the lower interior portion of the shell **24.** The plate **52** has four rigid legs **56** extending upwardly therefrom that slidably engage bores **58** formed in an elongate rigid plate **60** as best seen in FIG. **7.** A number of compressed helical springs **62** are in abutting contact with the upper surface of the plate **60,** with the springs **62** encircling the legs **56,** and the upper ends of the springs being in abutting contact with pins or cotter keys **67** that extend through bores (not shown) formed in the upper portion of the legs **56.** The plate **60** has a centrally disposed, longitudinal slot **64** therein, and the plate has the sides thereof joined by a channel-shaped member **66** located below the slot **64.** The slot **64** and channel-shaped member **66** cooperatively define a longitudinally extending space **68** of T-shaped transverse cross section.

The plate **60,** as may best be seen in FIG. **2** has a body **70** extending downwardly therebelow that defines a second cam face **72.** The trigger M extends upwardly through a slot **74** formed in the shell **24** and plate **60,** and is at all times urged forwardly to a position where it is in contact with the forward end of this slot by a compressed helical spring **76** shown in FIG. **2.**

An actuator O is provided that includes a base **78** and an upwardly extending arm **80** that slidably engage the space **68,** and are longitudinally movable on the plate **60.** The actuator O inclides an arcuate transversely grooved body **82** which, when the rail assembly moves from the first position shown in FIG. **2** to an upwardly disposed second position as shown in FIG. **7** is forced into engagement with the threads **42** on worm gear H. The body **82** is moved into contact with the threads **42** by manually moving the trigger M rearwardly, with the trigger as it so moves moving the first cam face **50** relative to the second cam face **72,** with the plate **60** and body **82** being moved upwardly as a result thereof to further compress the springs **62.** When a normally open electric switch P is closed, the prime mover E is electrically energized through current delivered thereto through a conductor **84.** Compressed helical springs **86** that encircle the rods **18,** and abut against the rear portion of the inner race **30** and the forward surface of the end member **46** at all times tend to maintain the drive tube K in the first position shown in FIG. **2,** where the rear end of the drive tube is in abutting contact with the grooved body **82.**

When it is desired to use the device, the electric switch P is placed in the closed position, to actuate the prime mover E. The driving shaft **22** then starts to rotate, and rotates the drive tube K due to the key **48** of member **46** being in engagement with the slot **44.** As the end member rotates the rods **18** are likewise rotated, as is the scoop B, and when the scoop is forced into pressure contact with a semi-solid material (not shown) the scoop is filled with semi-solid material (not shown).

When it is desired to discharge the semi-solid material from the scoop B, the trigger M is moved rearwardly to permit the cam face **72** to slide relative to the cam face **50,** and in so doing moving the rail assembly N upwardly to bring the grooved body **82** into engagement with the threads **42** on the worm gear H. As the worm gear H rotates, the body **82** moves forwardly, and in so doing moves the drive tube K and end member **46** forwardly. The rods **18** and ejector plate C are likewise moved forwardly, and as the ejector plate so moves, semi-solid material in the scoop B is discharged therefrom. As the drive tube K starts to move forwardly, the key **48** separates from the slot **44** in worm gear H, and rotation of the driven shaft D accordingly is terminated.

During this forward movement of the drive tube K, the springs **86** are compressed from the position shown in FIG. **2** to that illustrated in FIG. **4.** After the semi-solid material is discharged from the scoop B, pressure on the trigger M is released, and the trigger returns to the position shown in FIG. **2.** The grooved body **82** then moves out of engagement with the threads **42** on the worm gear H, and the compressed springs **86** move the drive tube K from the position shown in FIG. **4** to

that illustrated in FIG. 2, with the drive tube K concurrently moving the grooved body **82** rearwardly.

Rearward movement of the grooved body **82** on the rail assembly N is limited by a stop **88** as shown in FIG. 2. As such rearward movement of the drive tube K takes place, concurrent rearward movement of the ejector plate C likewise takes place, for the ejector plate and the drive tube are connected by the rods **18.** As the drive tube K moves rearwardly to assume the position shown in FIG. 2, the scoop B again starts to automatically rotate, due to the key **48** again engaging the slot **44** in the forward end of the worm gear H. The device A is then in a condition to have the scoop B again brought into pressure contact with the semi-solid material to be dispensed, and as the rotating cutting edge **12** moves through the semi-solid material the latter moves into the scoop B to fill the same. The operation previously described to discharge the semi-solid material from the scoop B is then repeated.

The use and operation of the device A has been described previously in detail, and need not be repeated.

We claim:

1. A semi-solid material dispensing device that includes:

a. a cup-shaped scoop, which when forced into pressure contact with said semi-solid material, is filled with the same, which scoop includes an end wall, and a cylindrical side wall that extends forwardly therefrom, with said end wall having a plurality of first circumferentially spaced bores therein;

b. an injector plate longitudinally movable in said scoop;

c. a plurality of rigid, parallel rods slidably mounted in said bores in said end wall and secured to said ejector plate;

d. a driven shaft secured to the center of said end wall and extending rearwardly therefrom, which shaft has at least one longitudinal groove therein;

e. a prime mover that includes a driving shaft which is in coaxially alignment with said driven shaft;

f. a housing assembly that extends forwardly from said prime mover and includes an end piece that has a rotatable central portion in which a plurality of second bores are formed which slidably engage said rods, and said center portion also having a third bore that is slidably and rotatably engaged by said driven shaft;

g. an elongate worm gear positioned inside said housing assembly and rigidly secured said driving shaft, and worm gear having a forward portion that rotatably engages said driven shaft, and in which forward portion at least one longitudinal slot is formed;

h. a rigid drive tube that has forward and rear ends and is disposed inside said housing assembly, which drive tube when in a first position, extends longitudinally about said worm gear;

i. an end member secured to the forward end of said drive tube, which end member is secured to the rear ends of said rods, with said end member having a bore formed therein that slidably engages said driven shaft;

j. first means on said end member that at all times engages said groove on said driven shaft, and said slot in said worm gear when said drive tube is in said first position;

k. an elongate rail assembly disposed inside said housing adjacent said worm gear, which rail assembly includes a stop on a rear end thereof;

l. a grooved actuator slidably mounted on said rail assembly;

m. first spring means that at all times tend to move said drive tube and end member to said first position;

n. second spring means that at all times tend to support said rail assembly and actuator in a first position in which said drive tube is forced rearwardly against said actuator and said actuator against said stop by said first spring means;

o. second means for actuating said prime mover to drive said driving shaft to rotate said scoop in pressure contact with said semi-solid material to fill said scoop with the latter when said actuator is in said first position;

p. third means for moving said rail assembly and actuator from said first to a second position when said third means is moved from a first to a second position, whereupon said actuator is in engagement with said worm gear and moved forwardly on said rail assembly to concurrently move said drive tube, and member, rods and ejector plate forwardly until said semi-solid material in said scoop is discharged therefrom, with said scoop being stationary during the discharge of said semi-solid material therefrom due to disengagement of said first means from said slot as said end member moves from said first position, and said rail assembly and actuator at the conclusion of discharge of said semi-solid material from said scoop being allowed to move to dispose said rail assembly in said first position by returning said third means to said first position, and said first spring means then moving said guide tube and actuator rearwardly until said actuator contacts said stop and said actuator is also in said first position; and

q. handle means on said device for moving the latter to dispense said semi-solid material from said scoop and to move said device to permit said scoop to be placed into rotatable pressure contact with said semi-solid material.

2. A device as defined in claim **1** in which said housing includes:

r. a shell that occupies a fixed position relative to said prime mover and that extends forwardly therefrom; and

s. an end piece that includes a bearing that has a fixed outer race and a rotatable inner race portion, with rearward portions of said rods rigidly secured to said inner race portion.

3. A device as defined in claim **1** in which said prime mover is an electric motor, and said second means is:

t. electric conductors for supplying electric power to said motor; and

u. a switch for controlling the flow of electric power through said conductors to said motor.

4. A device as defined in claim **1** in which said first means is a rectangular key on said end member that is at all times in slidable engagement with said groove and that can removably engage said slot.

5. A device as defined in claim **2** in which said first spring means are a plurality of compressed helical springs that encircle said rods, with forward ends of said springs abutting against said rotatable inner race portion and rearward ends of said springs against said end member.

* * * * *