United States Patent

DeHart

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[54] APPLICATING DEVICES

[72] Inventor: **Damon DeHart**, 6 Veterans Ln., Stoneham, Mass. 02180

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[21] Appl. No.: **879,333**

[52] **U.S. Cl.**.....**222/333**, 222/326

[51] **Int. Cl.**.....**F16n 3/12**

[58] **Field of Search**.....222/251, 309, 324, 325, 326, 222/327, 333, 386, 390

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Primary Examiner—Robert B. Reeves
Assistant Examiner—Thomas E. Kocovsky

[57] **ABSTRACT**

A device including an encasement, a dividing plate inside the encasement, a securing bar mounted on the encasement, a drive source secured by the securing bar to the encasement, a gear train supported inside the encasement, a modified rack gear driven linearly through the encasement by the gear train, a storage chamber mounted on the encasement through which the modified rack gear also travels linearly, a disk mounted on the end of the modified rack gear which forces the contents of the storage chamber to expel as the modified rack gear advances through the storage chamber, an automatic stop on the modified rack gear which prevents its advancement after a predetermined distance of travel, a keeper to cause the modified rack gear to resist disengaging from the gear train, but still allow the disengagement and withdrawal of the modified rack gear from any point of its advancement.

12 Claims, 14 Drawing Figures

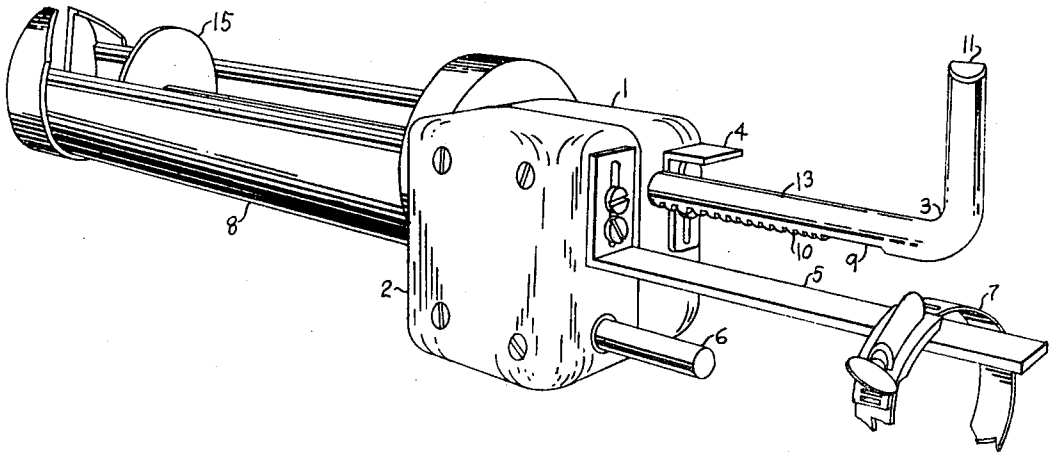


FIG. 1.

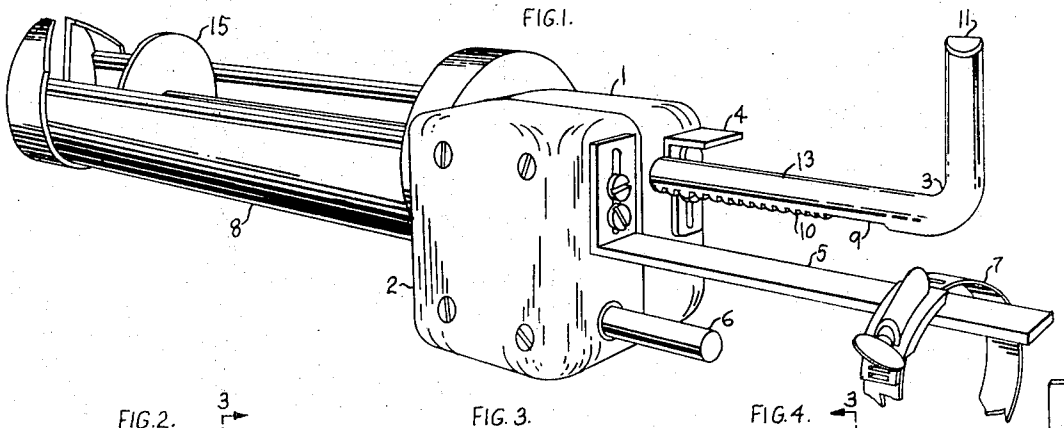
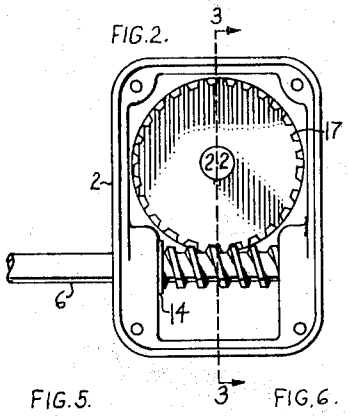


FIG. 2.



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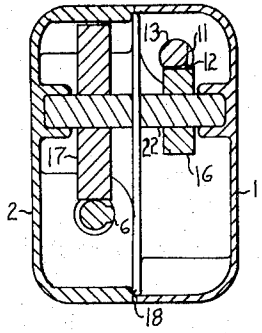

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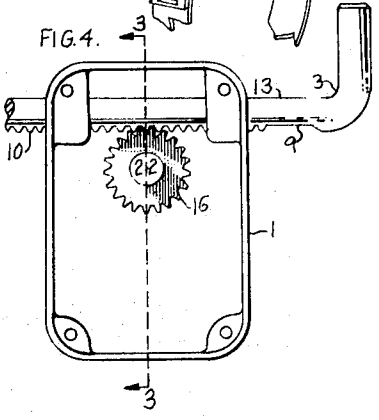

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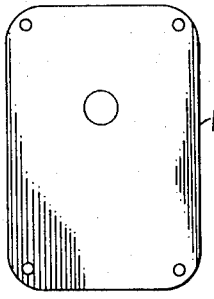

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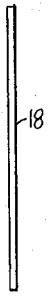

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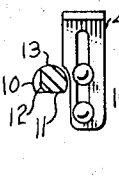

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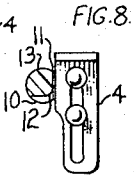

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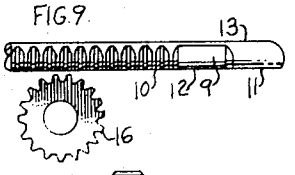

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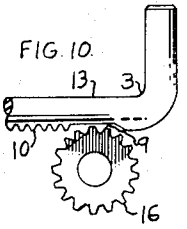

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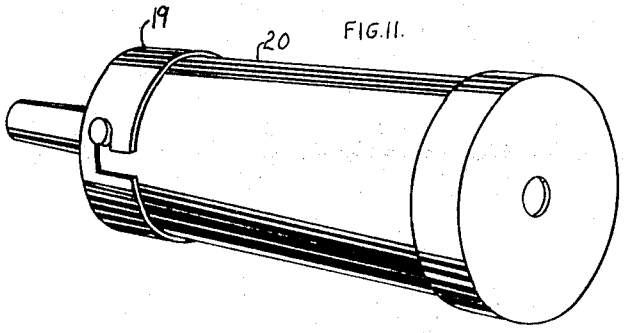

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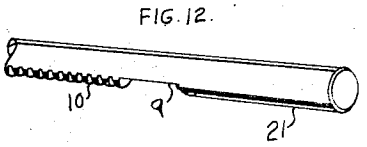

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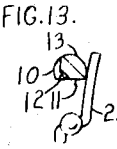

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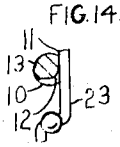

INVENTOR. Damon DeHart

APPLICATING DEVICES

This invention relates to the improvement in applicating devices, and more particularly to applicating devices for use with cartridge loading chambers and, also, refillable chambers which use detachable portable electric drills or other such small power drive sources which may be detachable. Permanently installed power drive sources could also be adapted to the applicating device. Most applicating devices, such as caulking guns, grease gums etc., are manually operated and tend to fatigue the operator. The application of substances in slow, and the appearance of the resulting bead of the substance, which the applicating device produces, is often unattractive because of the irregularities produced by the hand operated applicating device.

The object of this invention is to provide an applicating device which uses a disposable cartridge or a refillable chamber as a means of storing the substance to be applied.

Another object is to use a removable power source such as a portable electric drill or other such removable power supply; with slight modifications, a permanent source could be used with the applicating device.

The third object is to improve the speed at which a substance can be applied.

A fourth object is to improve the physical comfort for the operator of this device.

Still another object is to improve the appearance of the resultant bead in cases such as caulking, where appearance is important.

The embodiment of this invention, together with the modifications, are illustrated in the accompanying drawings.

FIG. 1 is a perspective view of one form of the invention, showing a chamber for use with cartridges.

FIG. 2 is a plane view of one half of the encasement, showing the inside structural supports of the gears, and also showing a worm gear with retainer ring, wheel gear and axle.

FIG. 3 is a sectional view of both halves of the encasement, showing the structural supports of the gears, the relationship of the gears to each other and to the encasement, and the dividing plate and its position in the encasement.

FIG. 4 is a plane view of the other half of the encasement, showing the structural supports, axle, and the spur gear engaged in the modified rack gear.

FIG. 5 is a front view of the dividing plate.

FIG. 6 is a side view of the dividing plate.

FIG. 7 is a sectional view of the modified rack gear in the engaged position, and a front view of the locking bar, which is in the "up" position; this allows the rack gear to be pulled out.

FIG. 8 is a sectional view of the modified rack gear in the engaged position, and a front view of the locking bar, which is in the "down" position; this prevents the rack gear and the spur gear from disengaging.

FIG. 9 is a front view showing the modified rack gear disengaged from the spur gear.

FIG. 10 is a front view showing the modified rack gear and the spur gear at the "automatic stop" position.

FIG. 11 is a perspective view of a refillable chamber, and chamber cap and spout assembly.

FIG. 12 is a perspective view of a rod rack gear.

FIG. 13 is a sectional view of the modified rack gear in the disengaged position, and a front view of the spring lock, which is in the disengaged position; this allows the rack gear to be pulled out.

FIG. 14 is a sectional view of the modified rack gear in the engaged position, and a front view of the spring lock, which is in the engaged position; this prevents the rack gear and the spur gear from disengaging.

With more detailed reference to the drawing, wherein like reference characters denote corresponding parts, the numerals 1 and 2 designate the encasement which can be produced by die casting or other such process from a strong material such as zinc or aluminum alloy. The modified rack gear 13, and the rod rack gear 21, the worm gear 6, the axle 22, the wheel gear 17, and the spur gear 16 are made from a strong material such as steel, and may be produced by machining or other process. The locking bar 4, securing bar 5, and rack disk 15 may be made out of a material such as steel, and may be produced by a process such as stamping. The cartridge chamber 8, the chamber 20, and the chamber cap and spout assembly 19 may also be made from a material such as steel and may also be produced by a process such as stamping, and a fastening process such as spot welding. The dividing plate 18 may be produced by a process such as stamping or die casting, and may be made from a material such as steel, zinc, or aluminum alloy. The retainer ring 14 may be made from a material such as steel, and be produced by a process such as stamping. The hose clamp 7 may be made out of a material such as steel, and may be produced by a process such as machining and stamping. The spring lock 23 may be made out of such a material as spring steel.

In order to ready the applicating device such as in FIG. 1, loosen screws on securing bar 5, and loosen hose clamp 7. Place worm gear 6 in chuck of a portable electric drill and tighten chuck. Place securing bar 5 down on top of the drill body. Place the hose clamp 7 around both the body of the drill and securing bar 5. Tighten the hose clamp 7 and then tighten the screws on securing bar 5. Lift up the locking bar 4; this is not necessary if spring lock 23 is used, because it is self adjusting; turn handle 3 of rack gear 13 clockwise until it stops, then pull out rack gear 13 until it stops. Place a new cartridge of substance into cartridge chamber 8; turn handle 3 counterclockwise until it stops. Locking bar 4 will automatically fall in the down position thus securing the modified rack gear 13 in the engaged position; if spring lock 23 is used instead of locking bar 4, it will also automatically secure the modified rack gear 13 in the engaged position. Press the trigger of the drill, which will activate rack gear 13, thus causing the substance in the cartridge to flow. Release the trigger of the drill and the flow of the substance from the cartridge will stop. When rack disk 15 reaches the bottom of the cartridge, the automatic stop 9 prevents the rack gear 13 from traveling further and doing damage to the device. When the cartridge is empty, locking bar 4 is lifted to the "up" position; if spring lock 23 is used, this is not necessary because it is self adjusting. Turn handle 3 clockwise until it stops; the rack gear 13 is pulled out until it stops. The empty cartridge is lifted out of the chamber 8, and a new cartridge is inserted ready for use.

When the refillable chamber 20, and chamber cap and spout assembly 19 is used, a cartridge is not necessary. This method of operation is similar to the method previously explained except that in order to fill chamber 20, chamber cap and spout assembly 19 is removed and the open end of the chamber 20 is inserted into a container of substance. When rack gear 13 is pulled out, it causes the substance to flow into the chamber 20, thus filling it. When the chamber cap and spout assembly 19 is attached to chamber 20, the device is ready for operation.

When a drill with a forward and reverse direction is used with this device, the rod rack gear 21 can be used. Rod rack gear 21 has no handle 3, annular teeth 12, locking bar 4, or flat 11. It does not have to be circular in shape, but can be square or any other shape, so long as the rest of the device is adapted to it. It does not need to turn during any part of the operation; it only goes in and out of the chamber. It does require an additional automatic stop 9 near the rack plate 15 to prevent the plate 15 from causing damage when the drill is in the reverse position. The operation of the device is similar to the two previous operations except that the manual pulling out of the rack 13 is eliminated.

When the locking spring 23 is used instead of the locking bar 4, the necessity of lifting the locking bar 4 is eliminated due to the locking bar's automatically adjusting to the position of the rod rack 21.

While the invention has been described and illustrated in some detail on the forms shown, it is to be understood that changes may be made in minor details of the construction, without departing from the spirit of the appended claims.

What is claimed and desired to be secured by Letters Patent is:

1. An applicating device comprising an encasement; a drive source mounted to said encasement; a storage chamber, secured to said encasement, enclosing a disposable cylindrical cartridge, containing a high viscosity fluid for application, having a dispensing opening at one end and a removable cap at the other end; a means of changing angular motion to linear motion consisting of a modified rack gear which travels linearly through said encasement and said storage chamber forcing said high viscosity fluid out said dispensing opening; a spur gear which drives said modified rack gear; a gear train structurally supported in said encasement with gear means to perpendicularly couple and reduce the angular motion of said drive source to the angular motion of said spur gear; and a dividing plate in said encasement for isolating lubricated high speed gears in said gear train from nonlubricated low speed gears in said gear train.

2. An applicating device as set forth in claim 1, wherein said gear means consists of a worm gear coupled to said drive source and axially fixed in said encasement; a wheel gear driven by said worm gear, secured to an axle which is axially supported in said encasement, facilitating a perpendicular coupling and reduction of angular motion of said drive source to the angular motion of said spur gear which is mounted on said axle.

3. An applicating device as set forth in claim 1, in which said modified rack gear is comprised of a round bodied rod having a set of mating teeth corresponding to the teeth of said spur gear; a flat which is the full length of said modified rack gear perpendicular to and at the same depth as the roots of said set of mating in said modified rack gear; a set of annular teeth whose roots are tangent to said roots of said set of mating teeth and tangent to said flat and whose faces are contiguous to the faces of said set of mating teeth and whose crests are contiguous to the crests of said set of mating teeth; a handle at the end of said modified rack gear which is a short end piece of said modified rack gear bent at an angle to facilitate angular turning of said modified rack gear and subsequent disengagement of said modified rack gear from said spur gear; a disk fixed to said modified rack gear at the end opposite of said handle adapted to force said high viscosity fluid out said dispensing opening of said storage chamber upon actuation of said modified rack gear by said drive source through said gear train; an automatic stop on said modified rack gear, at the opposite end of said disk, which is a number of said set of mating and said set of annular teeth that have been removed to the depth of said roots of said set of mating teeth and said roots of said set of annular teeth and would engage the teeth of said modified rack gear; and a keeper mounted to said encasement for biasing said modified rack gear to engage with said spur gear.

4. An applicating device as set forth in claim 1 wherein said modified rack gear is comprised of a rod, having a set of mating teeth corresponding to the teeth of said spur gear; an automatic stop at both ends of said modified rack gear which is a number of said set of mating teeth that have been removed to the depth of the roots of said set of mating teeth and would engage the teeth of said spur gear at that section of said modified rack gear; and a disk fixed to the end of said modified rack gear adapted to force said high viscosity fluid out said dispensing opening of said storage chamber upon actuation of said modified rack gear by said drive source through said gear train.

5. An applicating device as set forth in claim 1, wherein said drive source is detachably mounted to said encasement.

6. An applicating device as set forth in claim 5, wherein said drive source is detachably mounted to said encasement with a securing bar bent at a 90° angle with a slot in which it is adjusted and fixed to said encasement; and a securing clamp with which said bar is secured to said drive source.

7. An applicating device comprising an encasement; a drive source mounted to said encasement; a cylindrical storage chamber, containing a high viscosity fluid for application, secured at one end to said encasement, and having a removable cap with dispensing opening at the other end; a means of changing angular motion to linear motion consisting of a modified rack gear which travels linearly through said encasement and said storage chamber forcing said high viscosity fluid out said dispensing opening; a spur gear which drives said modified rack gear; a gear train structurally supported in said encasement with gear means to perpendicularly couple and reduce the angular motion of said drive source to the angular motion of said spur gear; and a dividing plate in said encasement for isolating lubricated high speed gears in said gear train from nonlubricated low speed gears in said gear train.

8. An applicating device as set forth in claim 7 wherein said gear means consists of a worm gear coupled to said drive source and axially fixed in said encasement; a wheel gear driven by said worm gear, secured to an axle which is axially supported in said encasement, facilitating a perpendicular coupling and reduction of angular motion of said drive source to the angular motion of said spur gear which is mounted on said axle.

9. An applicating device as set forth in claim 7 in which said modified rack gear is comprised of a round bodied rod having a set of mating teeth corresponding to the teeth of said spur gear; a flat which is the full length of said modified rack gear perpendicular to and at the same depth as the roots of said set of mating teeth in said modified rack gear; a set of annular teeth whose roots are tangent to said roots of said set of mating teeth and tangent to said flat and whose faces are contiguous to the faces of said set of mating teeth and whose crests are contiguous to the crests of said set of mating teeth; a handle at the end of said modified rack gear which is a short end piece of said modified rack gear bent at an angle to facilitate angular turning of said modified rack gear and subsequent disengagement of said modified rack gear from said spur gear; a disk fixed to said modified rack gear at the end opposite said handle adapted to force said high viscosity fluid out said dispensing opening of said storage chamber upon actuation of said modified rack gear by said drive source through said gear train; an automatic stop on said modified rack gear, at the opposite end of said disk, which is a number of said set of mating teeth and said set of annular teeth that have been removed to the depth of said roots of said set of mating teeth and said roots of said set of annular teeth and would engage the teeth of said spur gear at that section of said modified rack gear; and a keeper mounted to said encasement for biasing said modified rack gear to engage with said spur gear.

10. An applicating device as set forth in claim 7 wherein said modified rack gear is comprised of a rod, having a set of mating teeth corresponding to the teeth of said spur gear; an automatic stop at both ends of said modified rack gear which is a number of said set of mating teeth that have been removed to the depth of the roots of said set of mating teeth and would engage the teeth of said spur gear at that section of said modified rack gear; and a disk fixed to the end of said modified rack gear adapted to force said high viscosity fluid out said dispensing opening of said storage chamber upon actuation of said modified rack gear by said drive source through said gear train.

11. An applicating device as set forth in claim 7, wherein said drive source is detachably mounted to said encasement.

12. An applicating device as set forth in claim 9, wherein said drive source is detachably mounted to said encasement with a securing bar bent at a 90° angle with a slot in which it is adjusted and fixed to said encasement; and a securing clamp with which said bar is secured to said drive source.

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