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(54) **ROW UNIT FOR A SEEDING MACHINE WITH DUAL SEED METERS**

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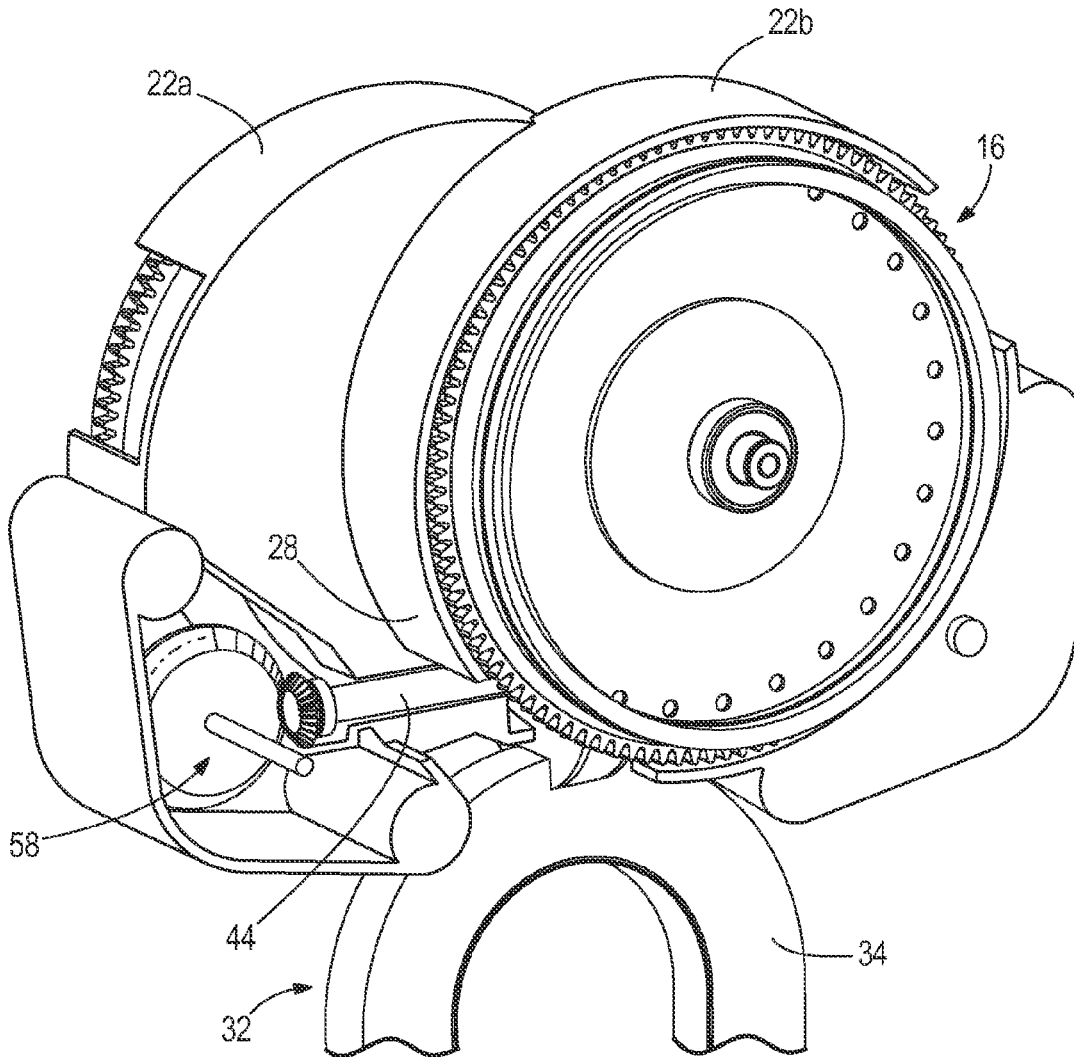
(57) **ABSTRACT**

(22) Filed: **Sep. 29, 2015**

A row unit for a seeding machine has a seed meter assembly having first and second reservoirs for holding a first pool of seeds and a second pool of seeds, respectively. The seed meter assembly is operable to selectively transport seeds from the first pool and seeds from the second pool. The row unit also has a conveyor with a conduit for receiving seeds and configured to discharge the seeds from the seeding machine, and a seed loader disposed between the seed meter assembly and the conveyor for directing the seeds from the seed meter assembly to the conveyor.

**Related U.S. Application Data**

(60) Provisional application No. 62/077,030, filed on Nov. 7, 2014.



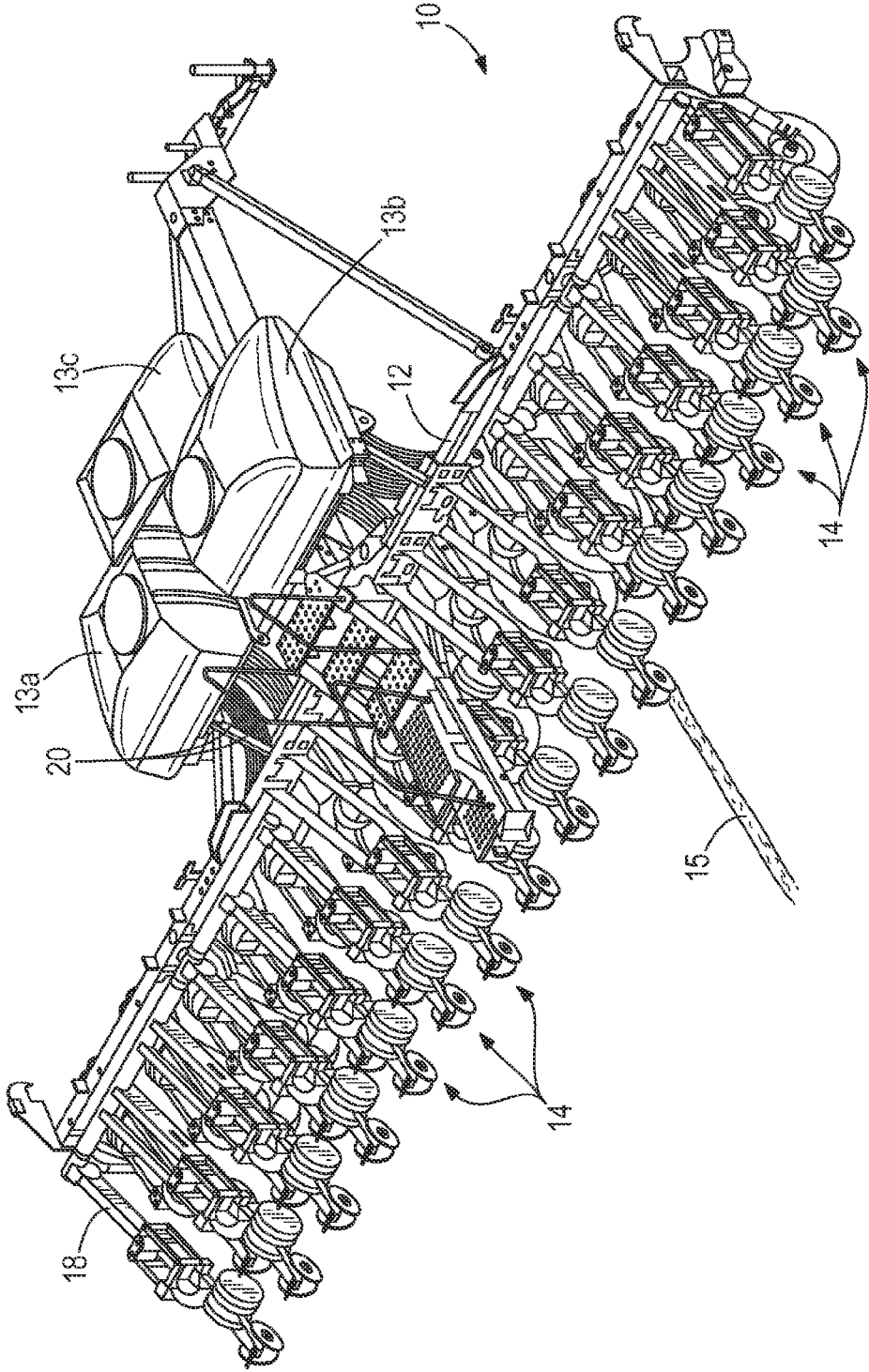


FIG. 1

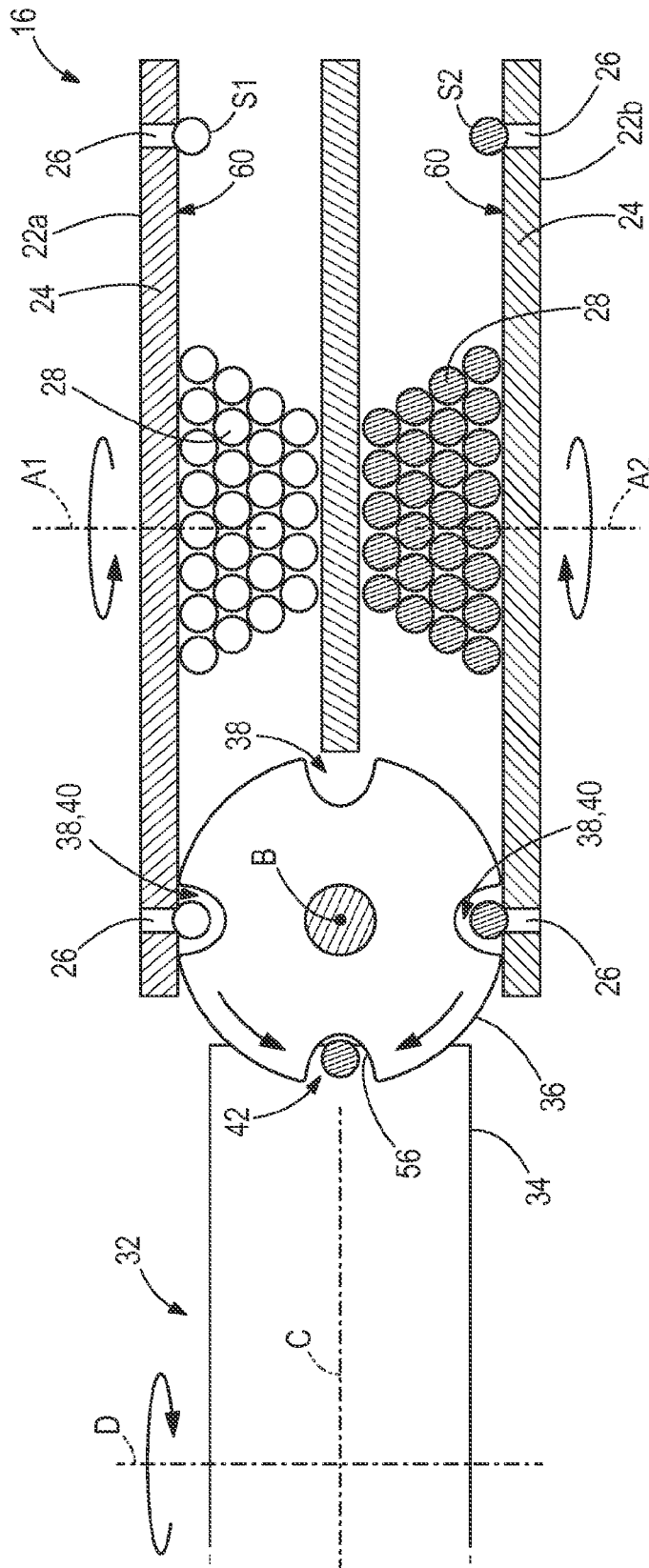


FIG. 2

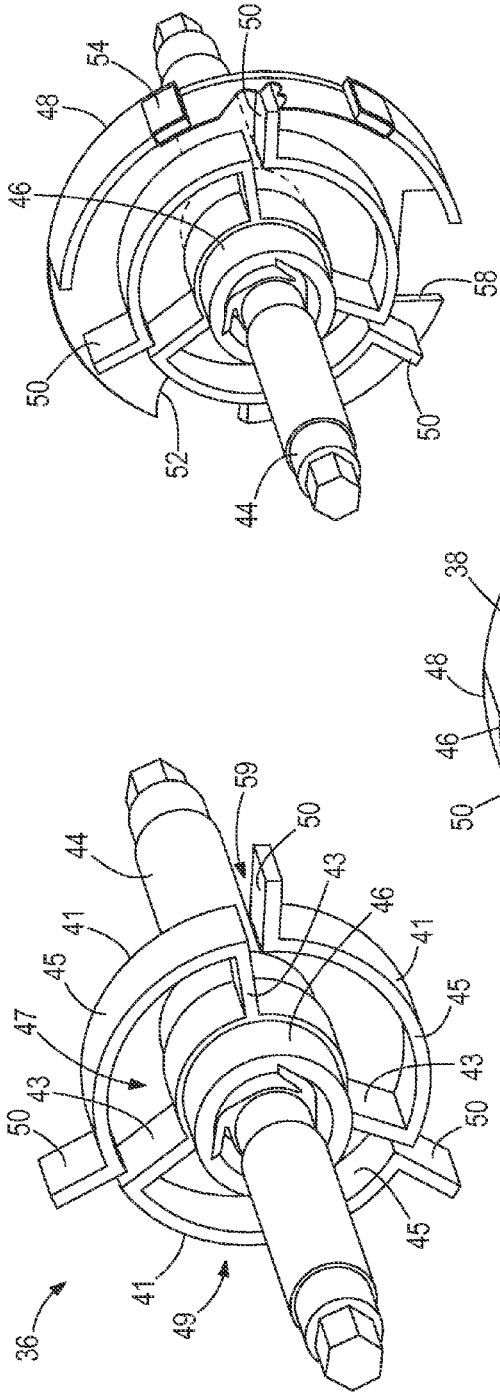


FIG. 4

FIG. 3

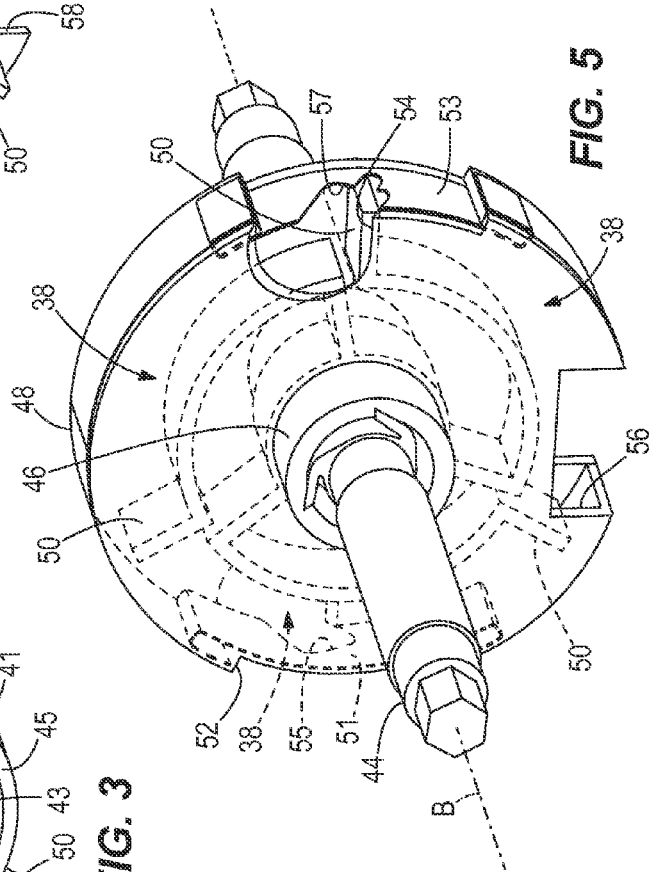


FIG. 5

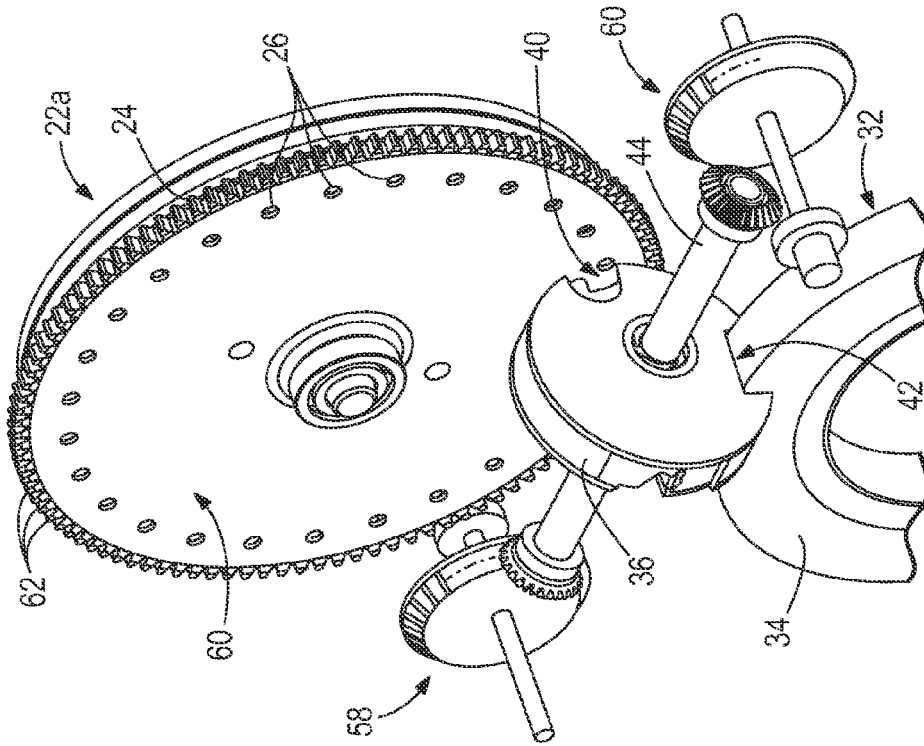


FIG. 7

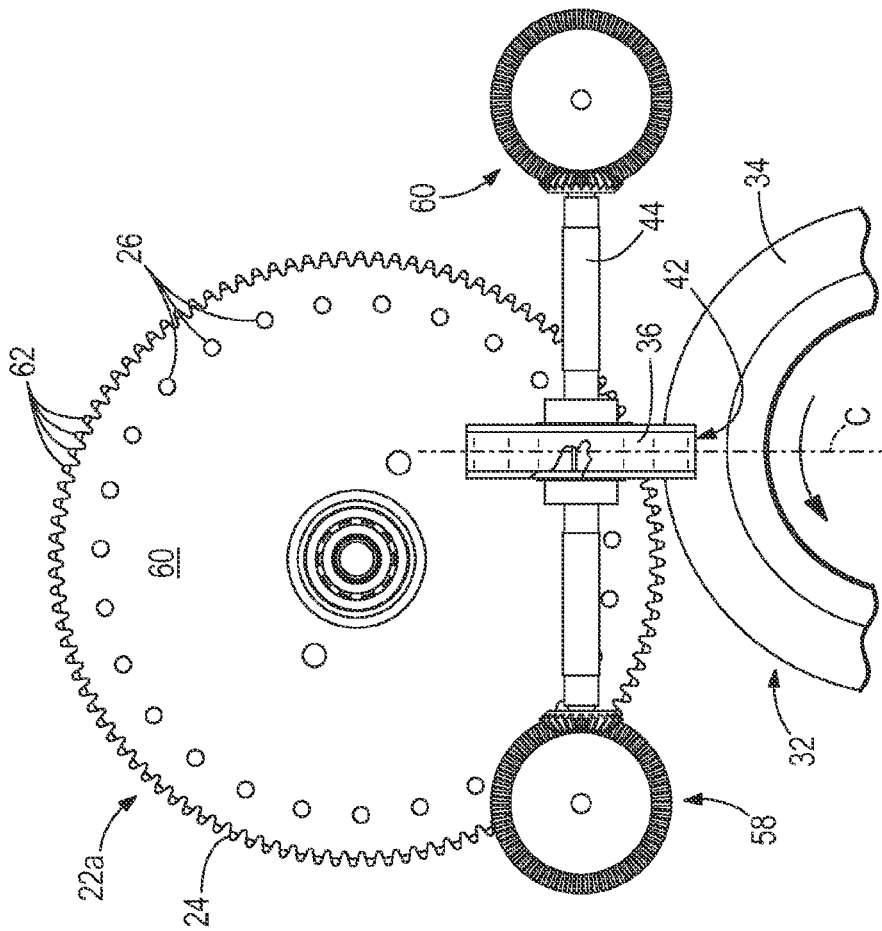


FIG. 6

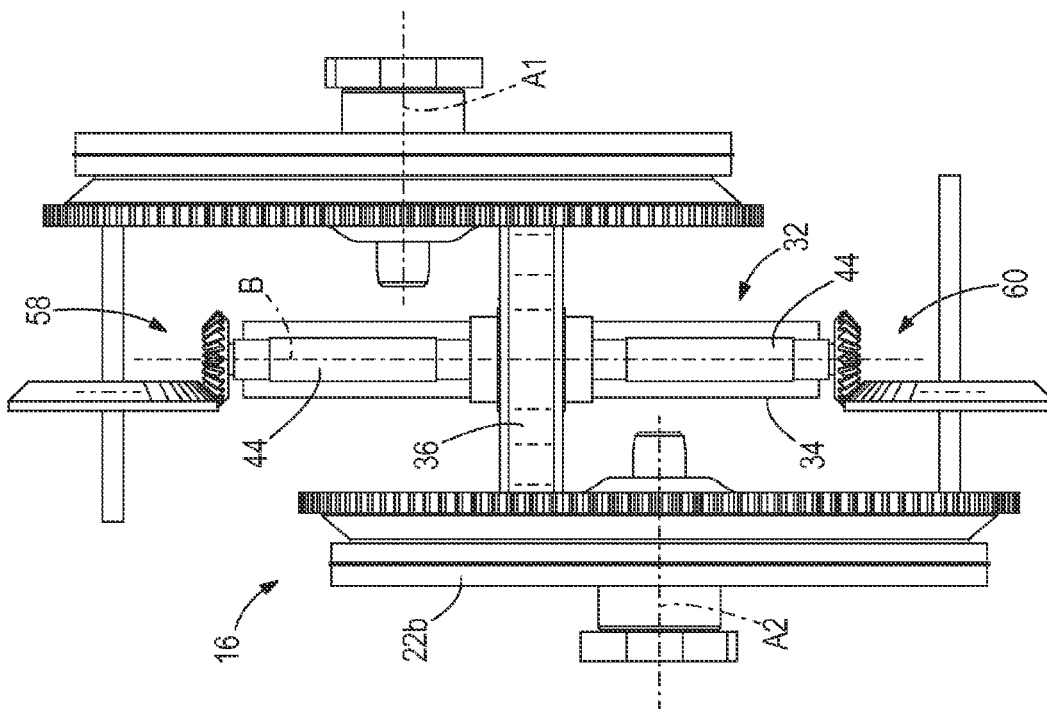


FIG. 9

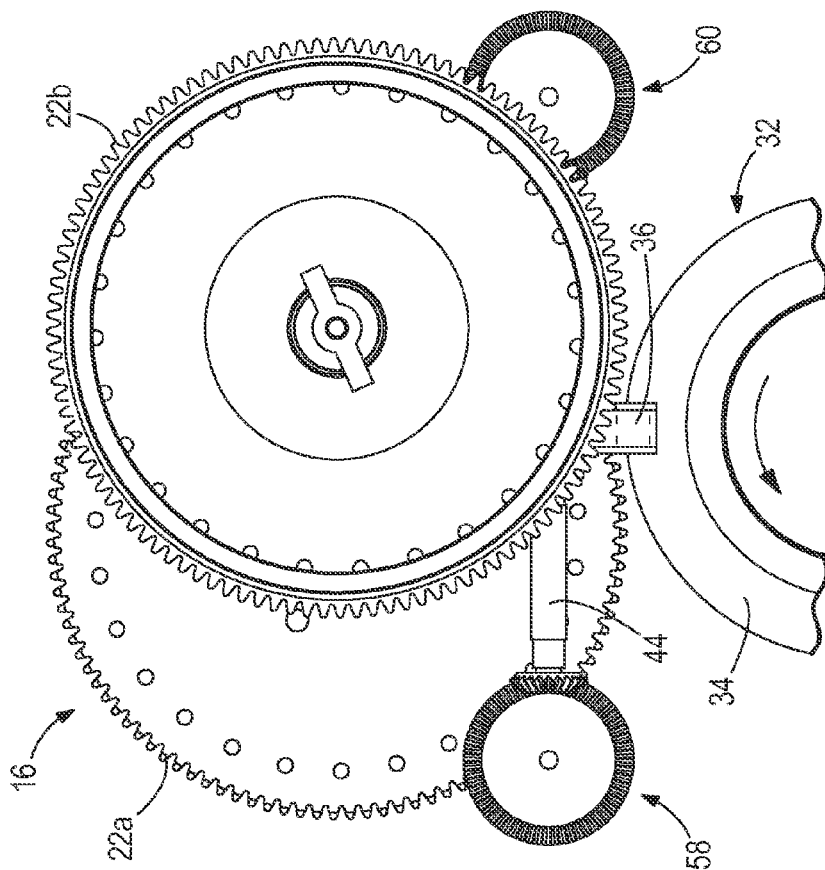
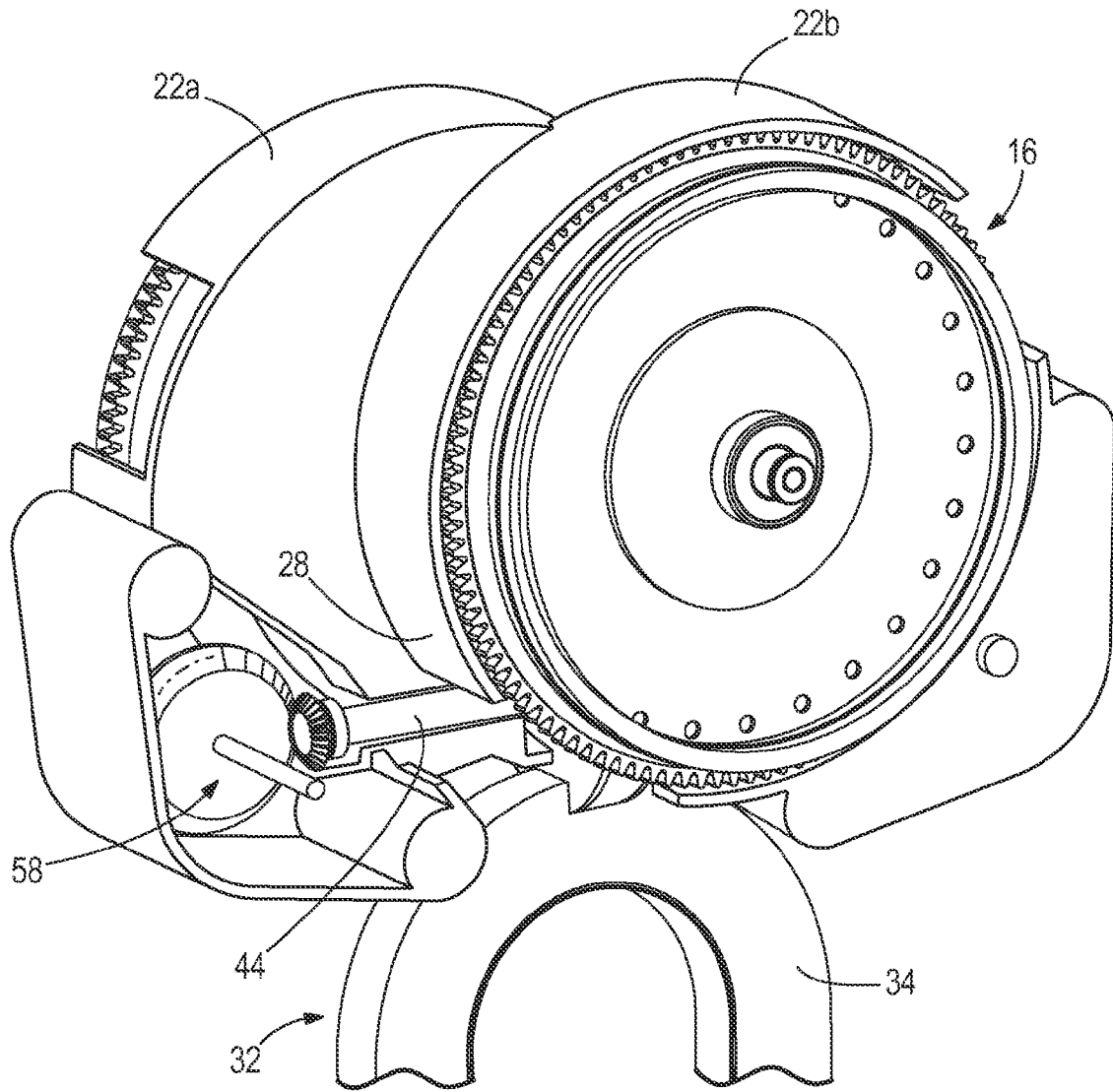
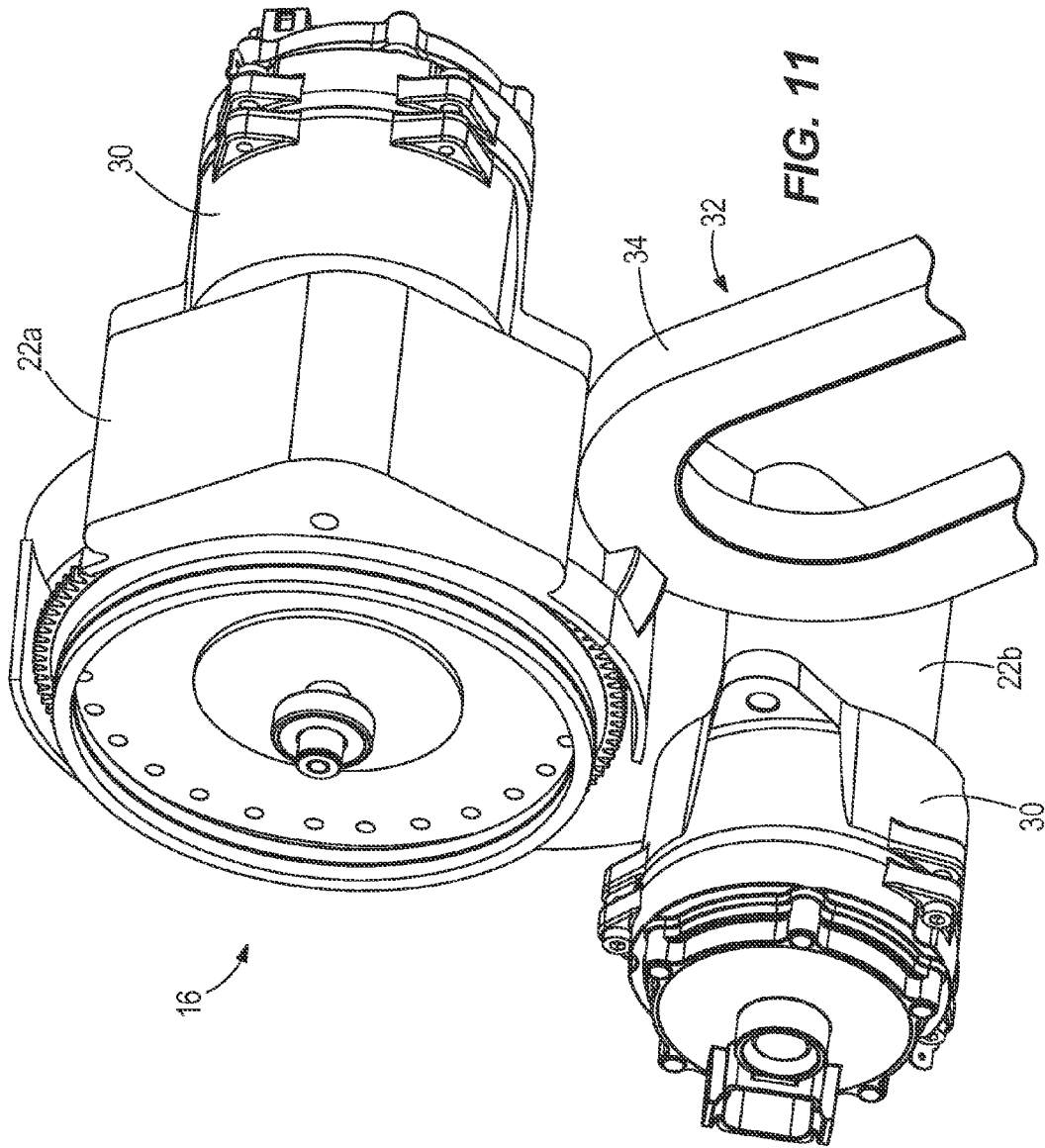


FIG. 8



**FIG. 10**





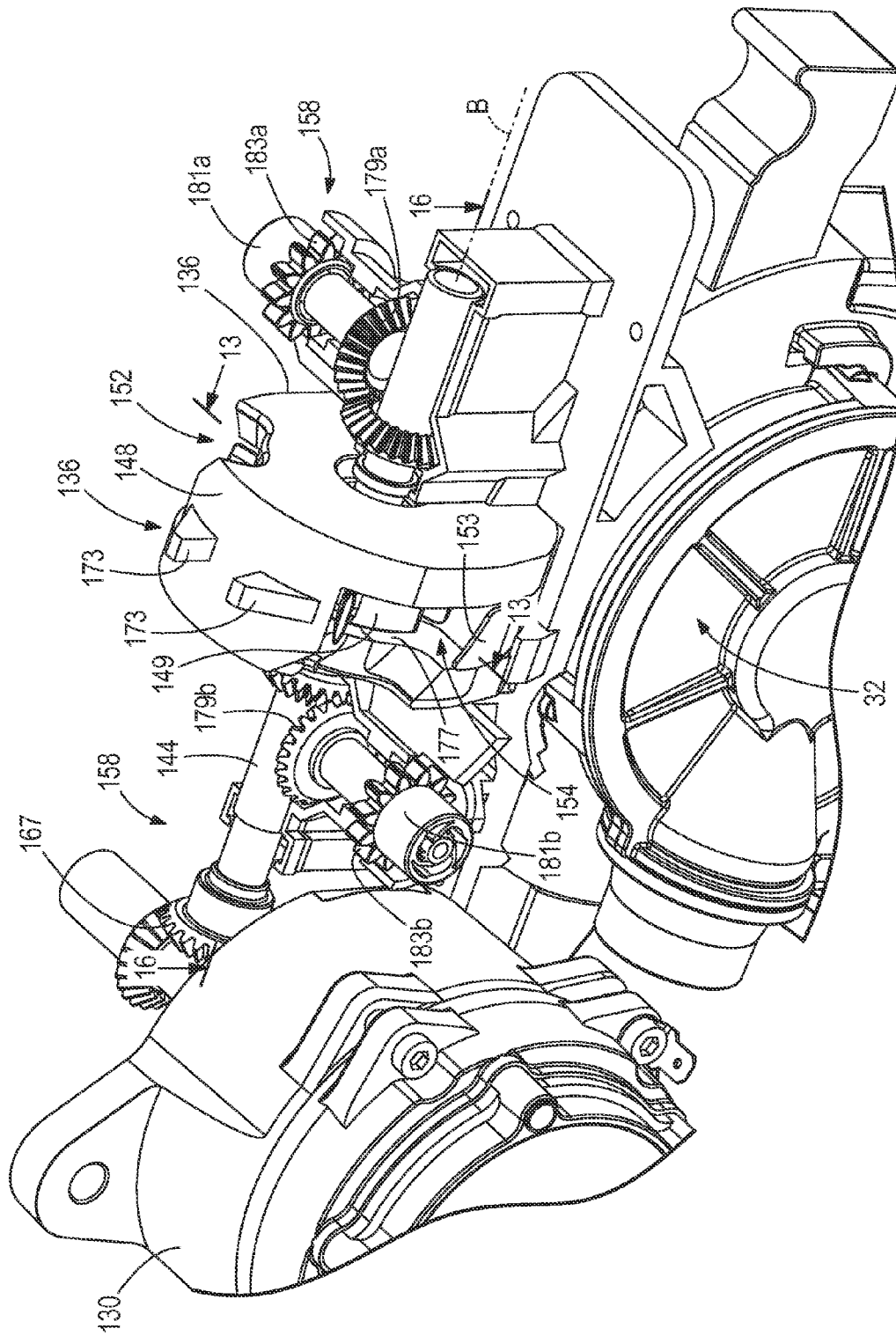
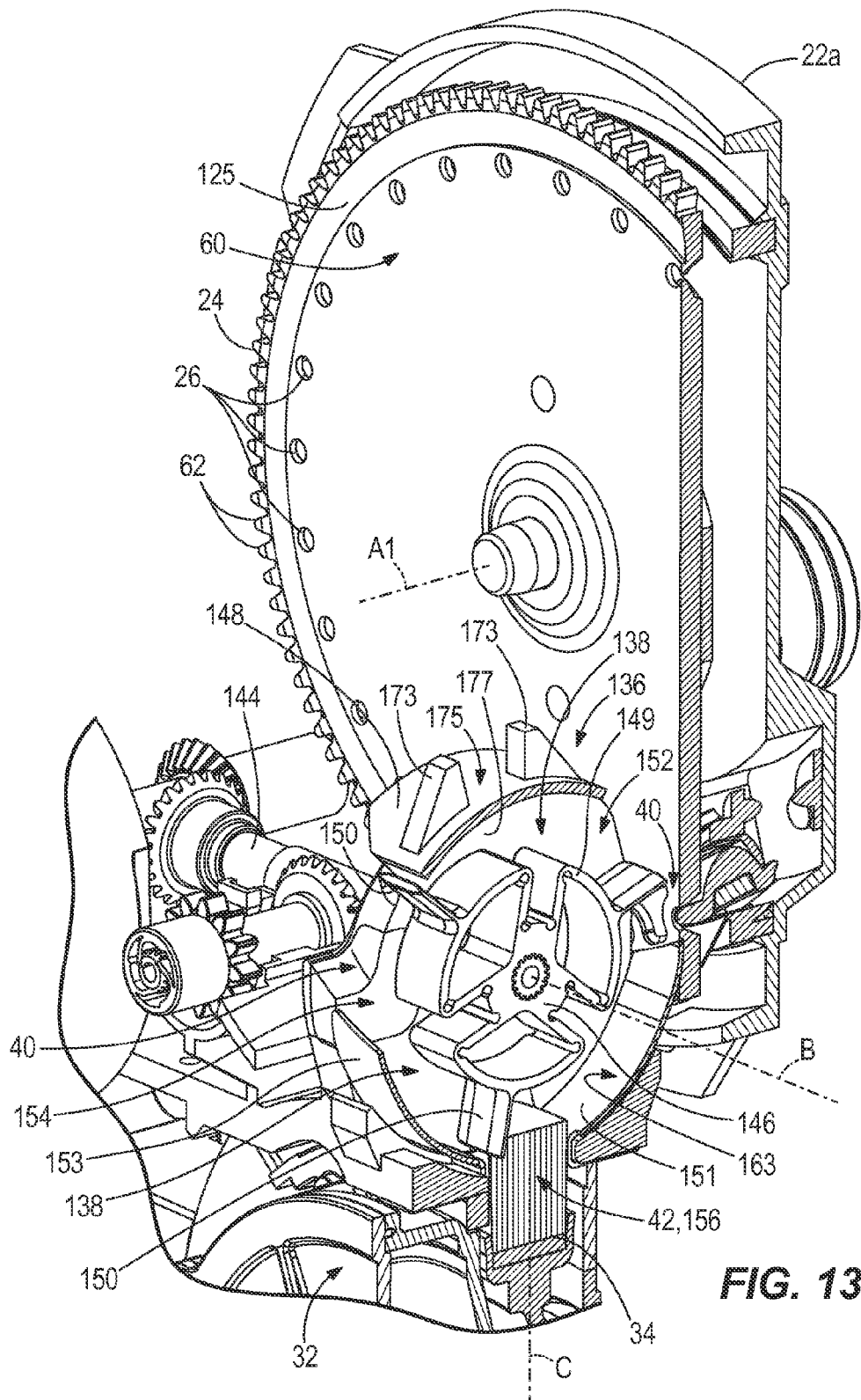


FIG. 12



**FIG. 13**





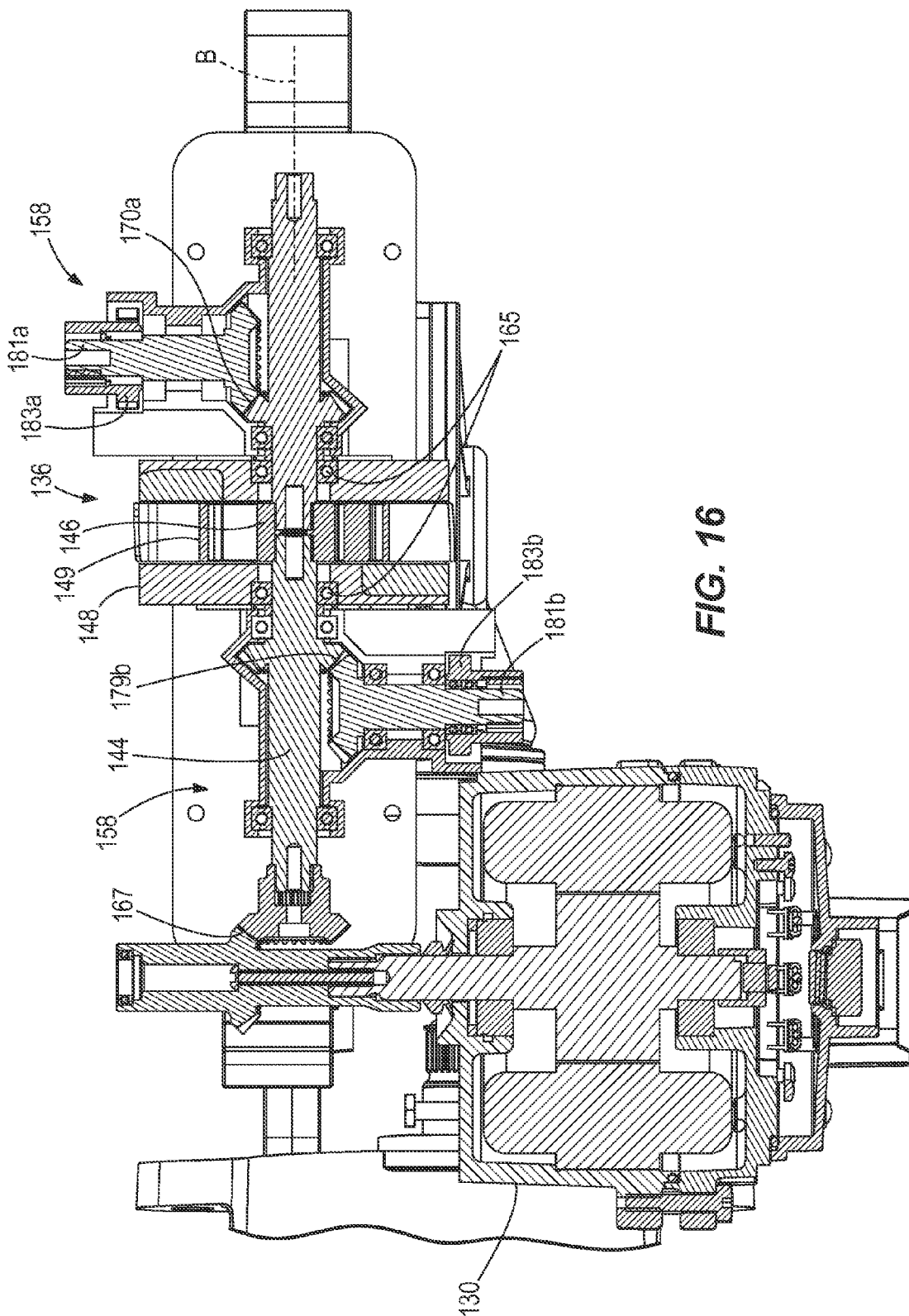
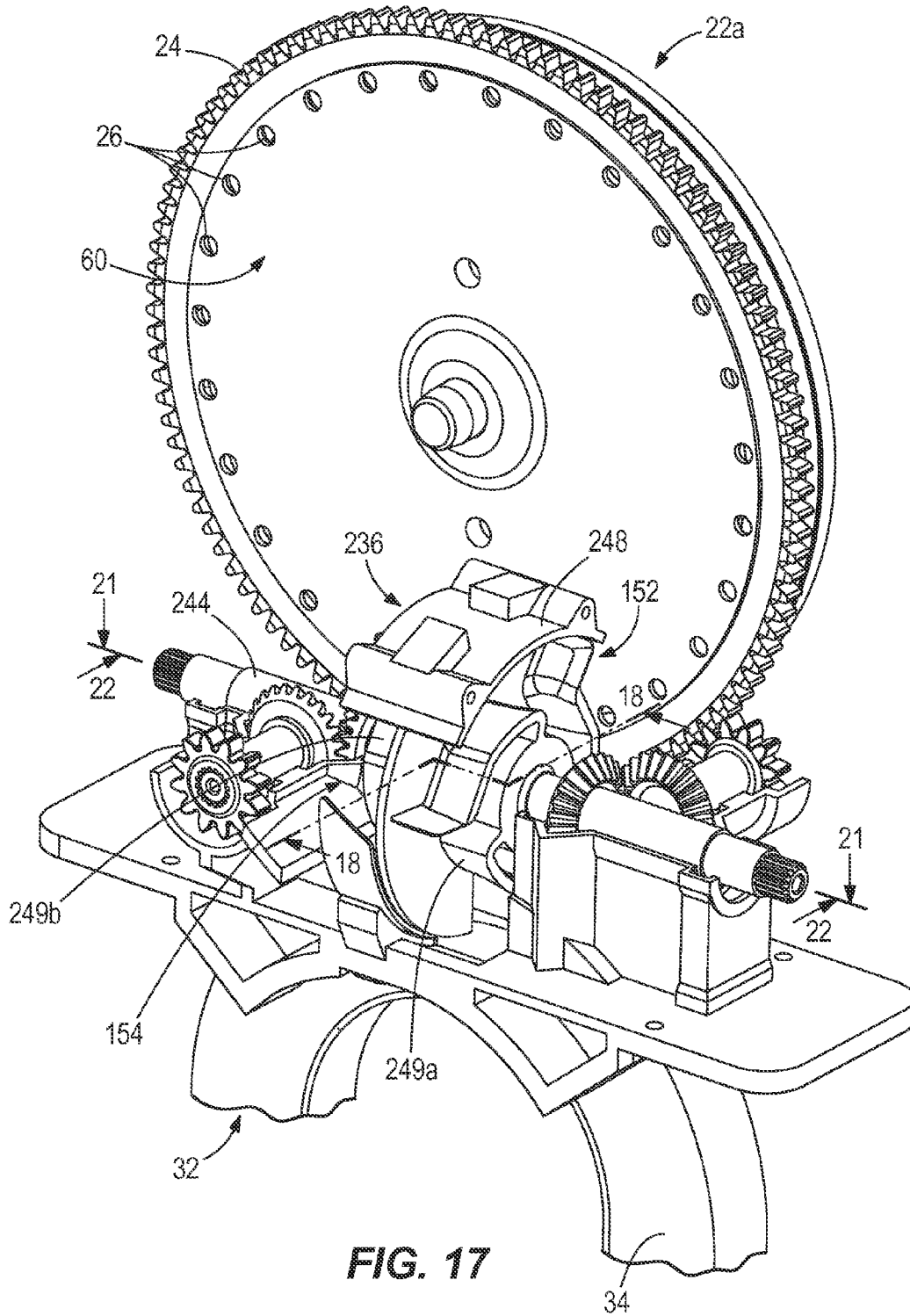
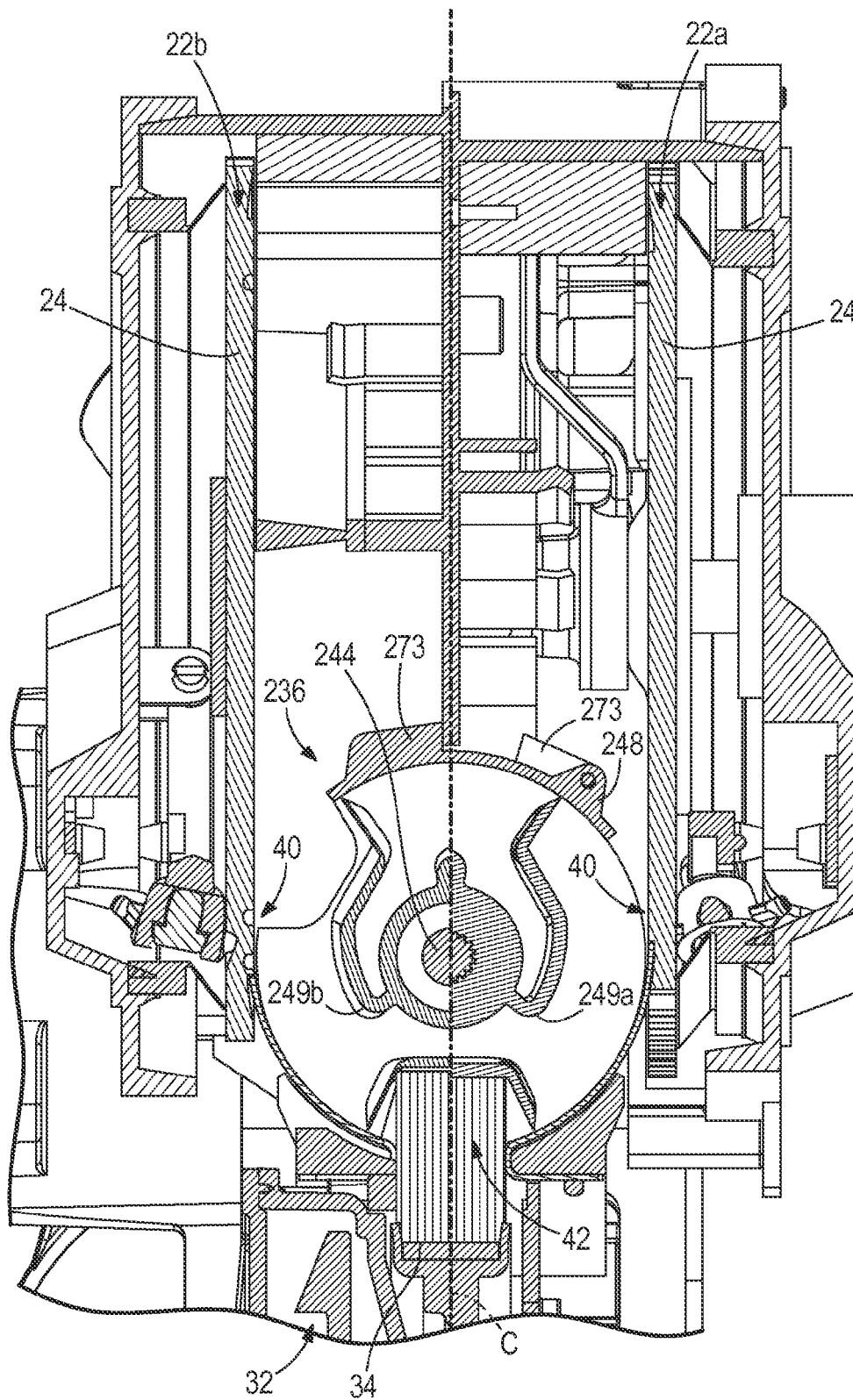


FIG. 16





**FIG. 18**

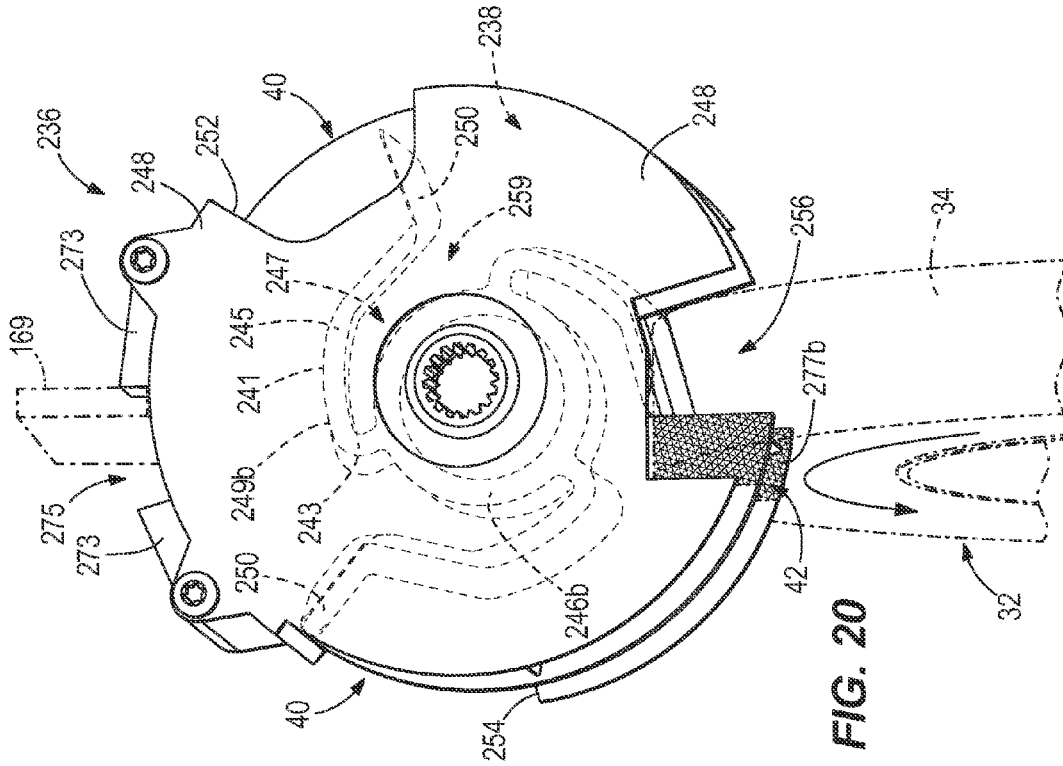


FIG. 20

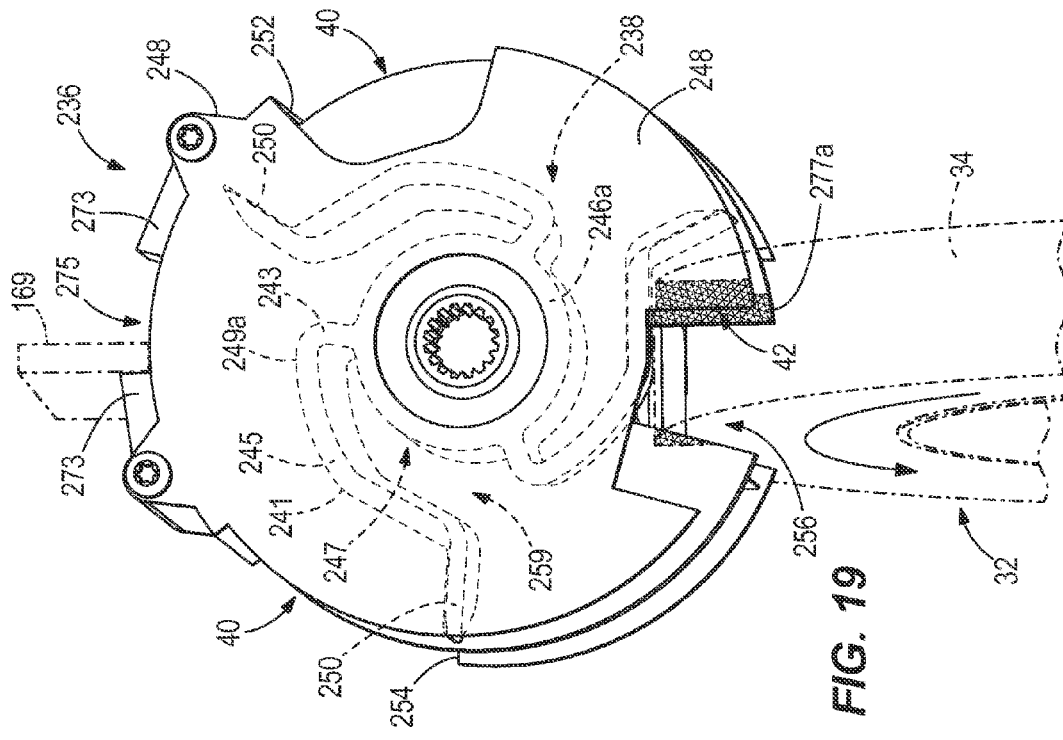
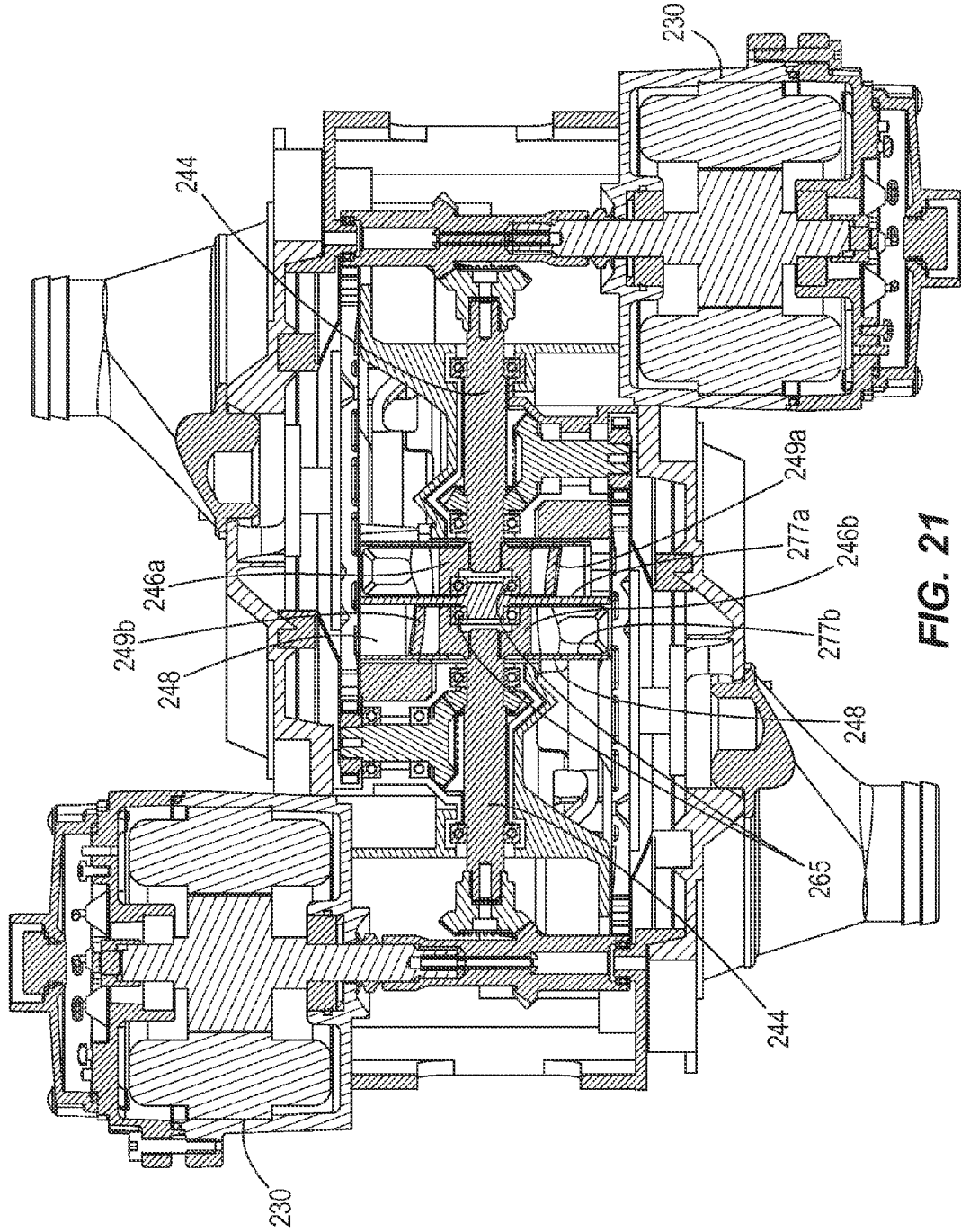


FIG. 19





**FIG. 21**

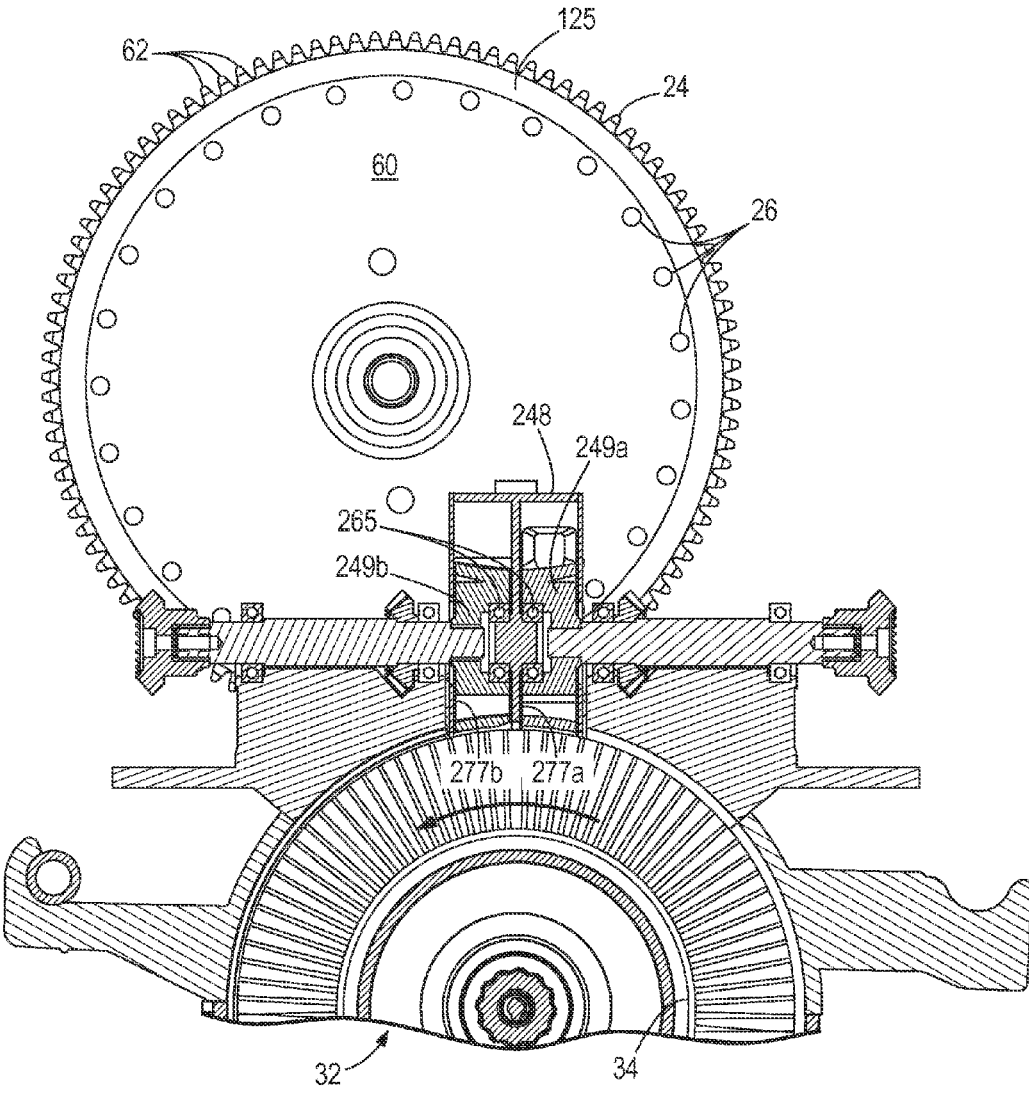
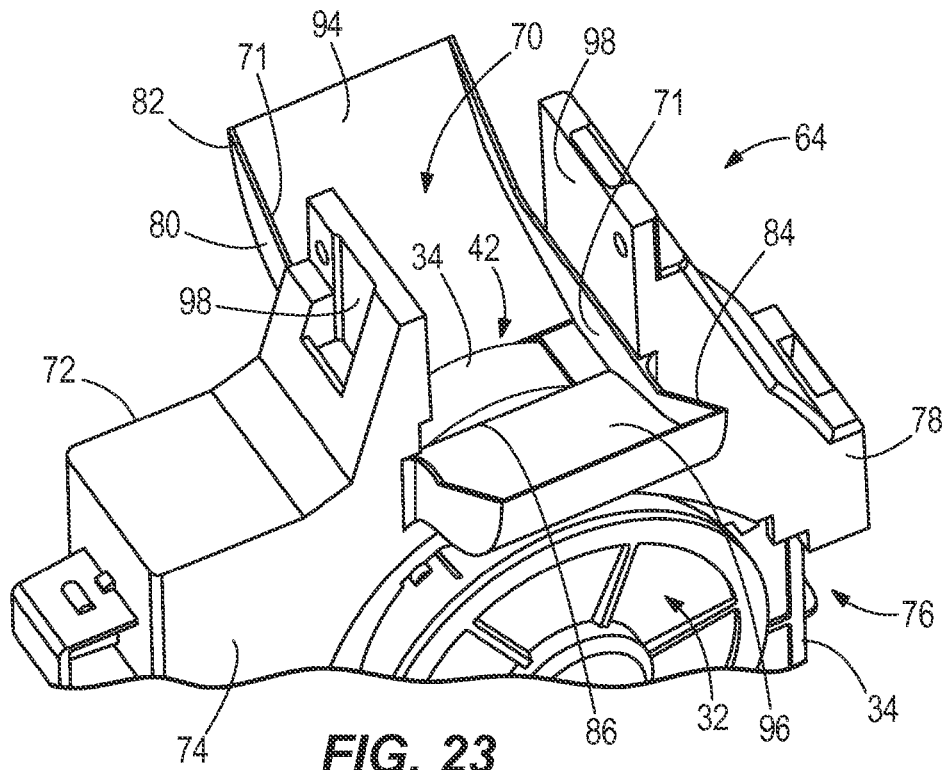
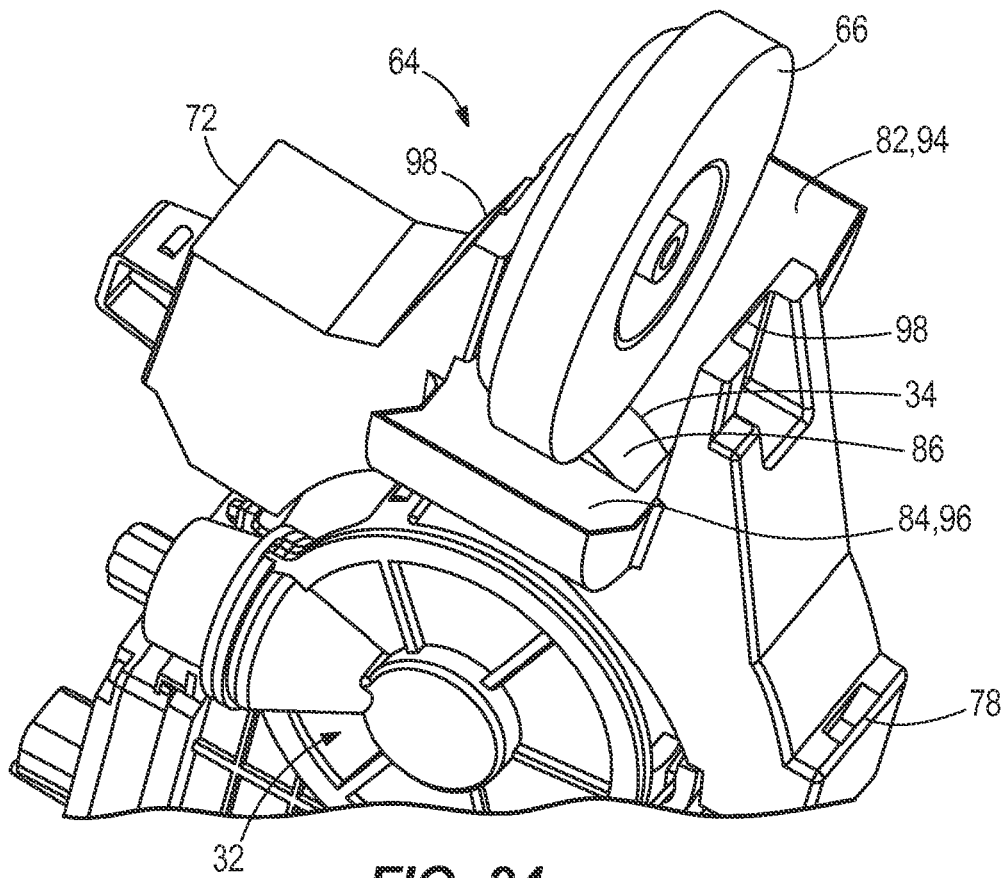


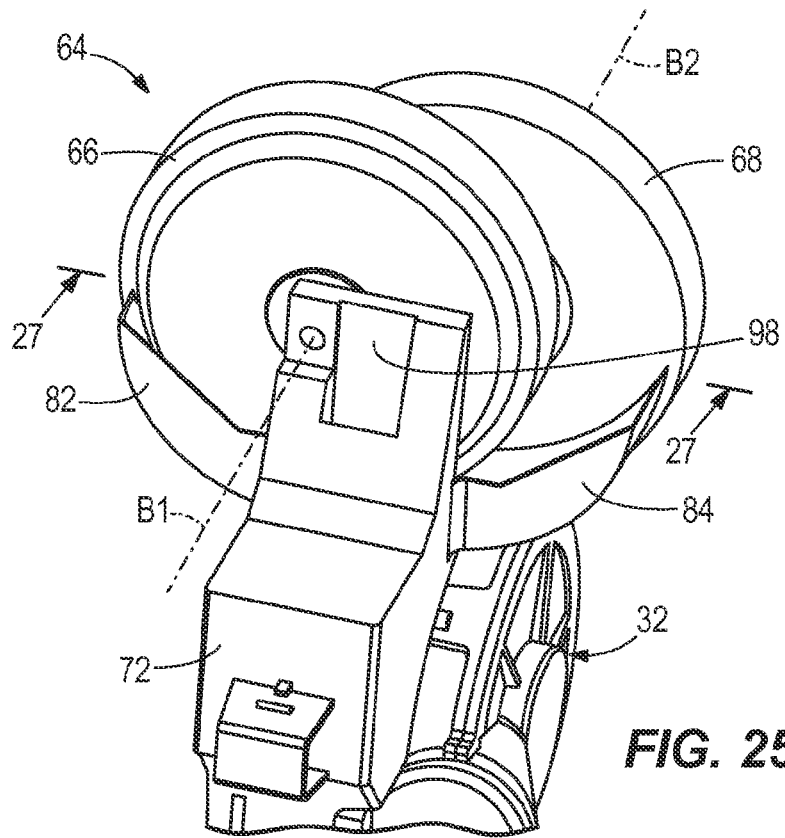
FIG. 22



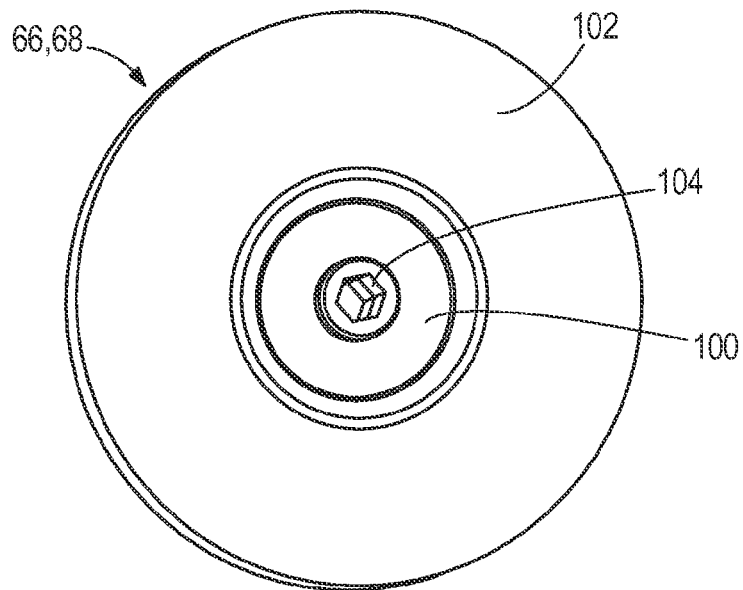
**FIG. 23**



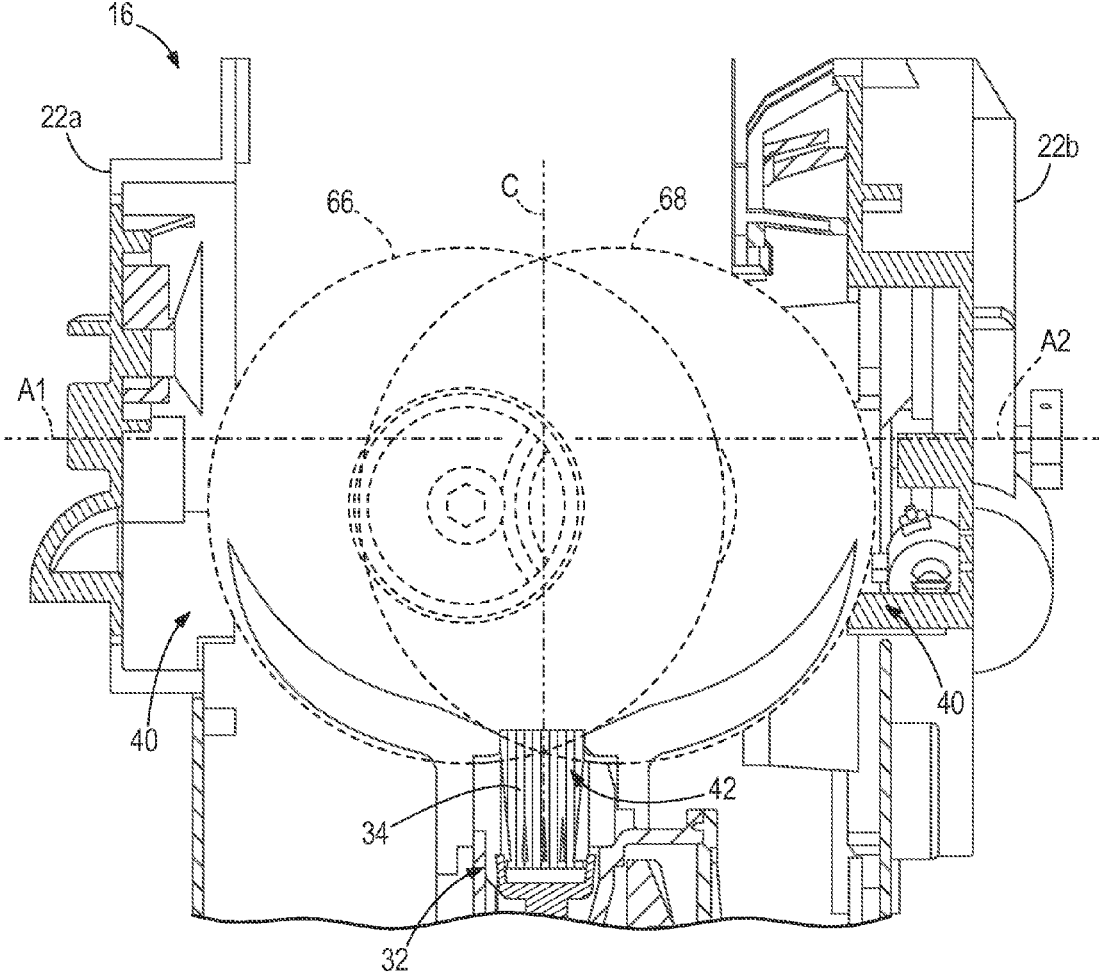
**FIG. 24**



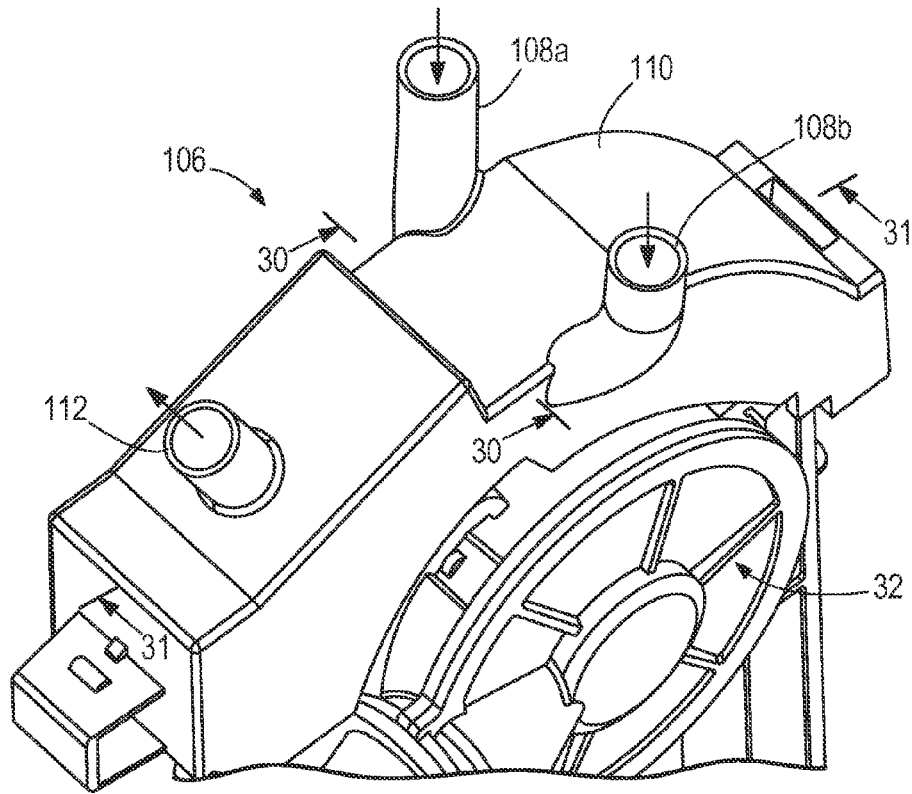
**FIG. 25**



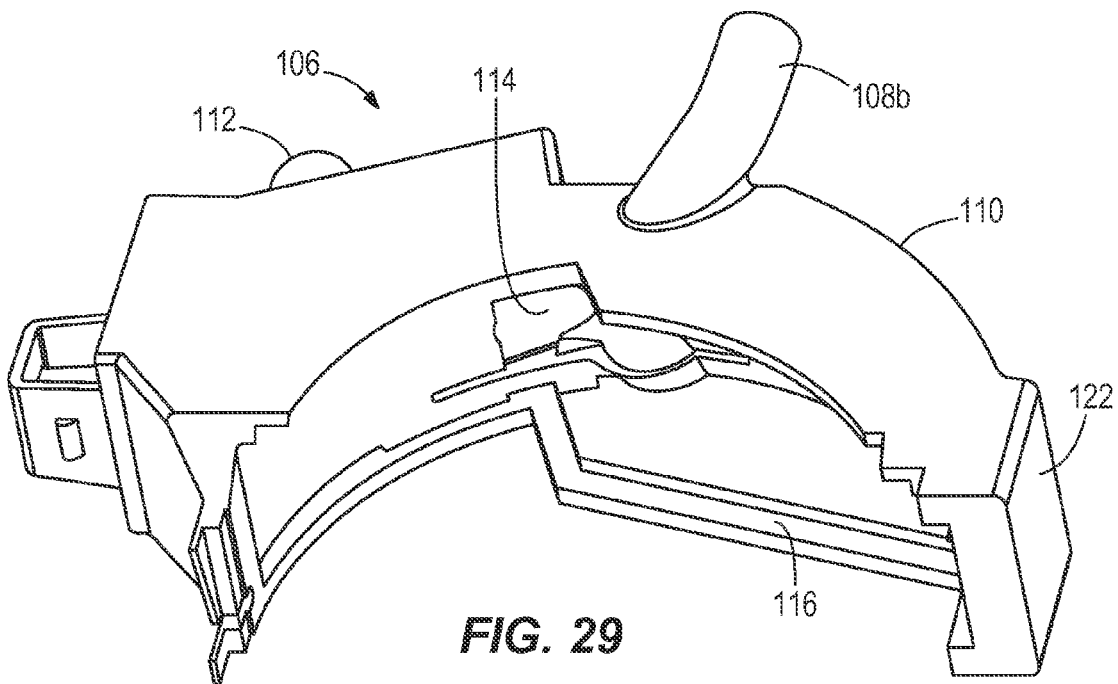
**FIG. 26**



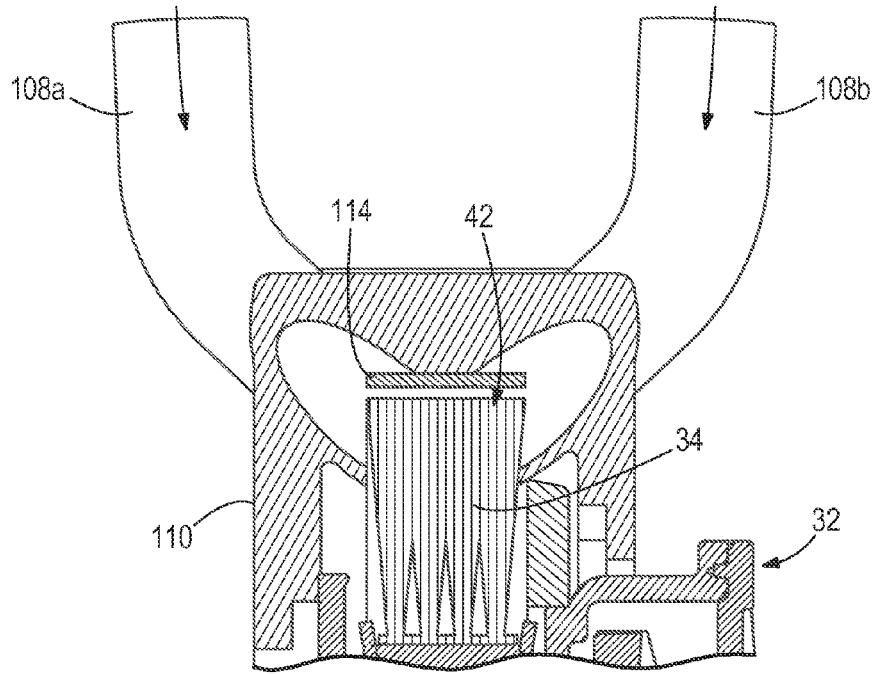
**FIG. 27**



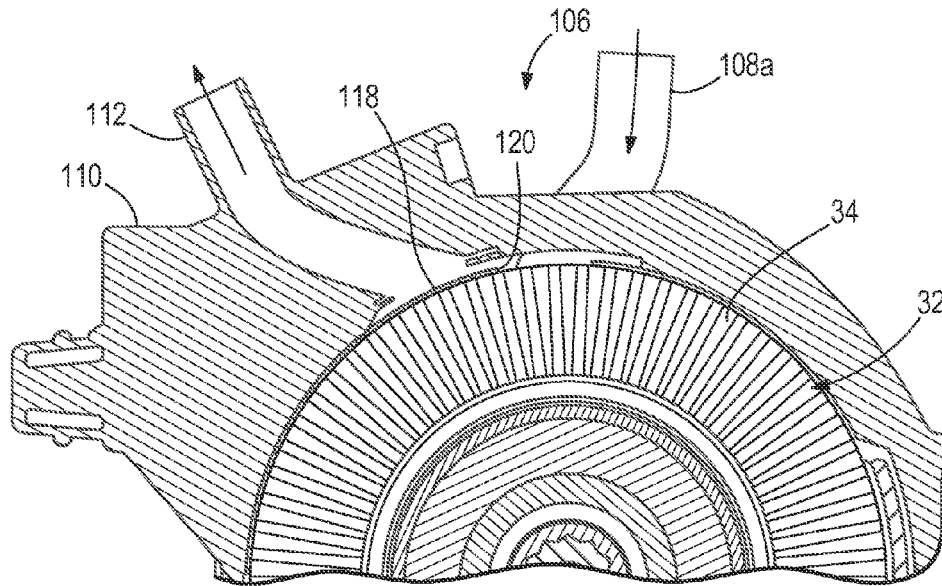
**FIG. 28**



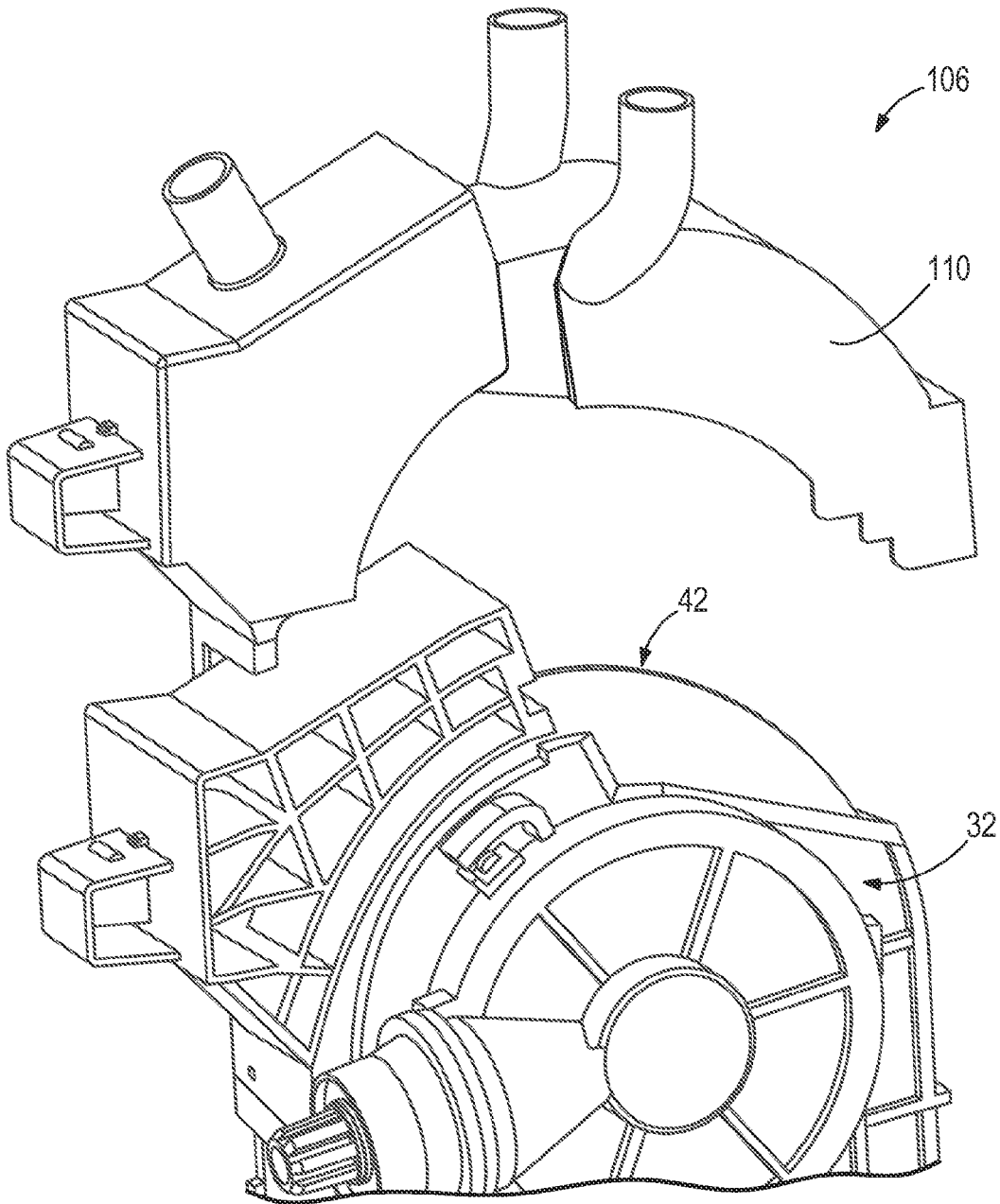
**FIG. 29**



**FIG. 30**



**FIG. 31**



**FIG. 32**



## ROW UNIT FOR A SEEDING MACHINE WITH DUAL SEED METERS

### CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority to co-pending U.S. Provisional Patent Application No. 62/077,030 filed on Nov. 7, 2014, the contents of which are incorporated by reference herein.

### BACKGROUND

[0002] The present disclosure relates to a row unit for a seeding machine, such as a row crop planter for agricultural applications. More specifically, the present disclosure relates to a row unit having a seed meter and a seed delivery mechanism.

### SUMMARY

[0003] In one aspect, the disclosure provides a row unit for a seeding machine. The row unit includes a seed meter for selectively moving individual seeds from two different seed pools, such as of a first variety of seeds and a second variety of seeds, a seed delivery mechanism for discharging the individual seeds from the seeding machine, and a seed loader disposed between the seed meter and the seed delivery mechanism for directing the individual seeds from the seed meter to the seed delivery mechanism. In some aspects, the seed loader is configured to rotate about an axis of rotation. In other aspects, the seed loader includes a shroud and a pneumatic pressure source coupled to the shroud. The seed meter may include a first seed meter and a second seed meter, the first seed meter moving the first variety of seeds and the second seed meter moving the second variety of seeds. The seed meter, the seed delivery mechanism, and the seed loader may be mounted to a row unit frame.

[0004] In another aspect, the disclosure provides a row unit for a seeding machine. The row unit includes a seed meter assembly having first and second reservoirs for holding a first pool of seeds and a second pool of seeds, respectively. The seed meter assembly is operable to selectively transport seeds from the first pool and seeds from the second pool. The row unit also has a conveyor with a conduit for receiving seeds and configured to discharge the seeds from the seeding machine, and a seed loader disposed between the seed meter assembly and the conveyor for directing the seeds from the seed meter assembly to the conveyor.

[0005] In yet another aspect, the disclosure provides a row unit for a seeding machine. The row unit includes a first seed meter having a first metering member for moving seeds sequentially from a first seed pool, and a second seed meter having a second metering member for moving seeds sequentially from a second seed pool. The row unit also includes a seed loader in communication with the first and second seed meters, the seed loader configured to selectively receive seeds from one or both of the first and second seed meters.

[0006] In another aspect, the disclosure provides a seed loader for transferring a seed in a seeding machine. The seed loader includes a housing having a first meter opening, a second meter opening, and a delivery opening spaced about an axis. The seed loader also includes a hub portion configured to rotate within the housing about the axis, and a sweeper extending from the hub portion. The sweeper includes a paddle extending generally away from the hub portion and

configured to move from at least one of the first or second meter opening toward the delivery opening.

[0007] Other aspects of the disclosure will become apparent by consideration of the detailed description and accompanying drawings.

### BRIEF DESCRIPTION OF THE DRAWINGS

[0008] FIG. 1 is a perspective view of a seeding machine.

[0009] FIG. 2 is a schematic diagram of a seed loader for the seeding machine of FIG. 1.

[0010] FIGS. 3-5 are perspective views of one construction of the seed loader of FIG. 2.

[0011] FIGS. 6-11 are various views of the seed loader of FIGS. 3-5 disposed in the seeding machine.

[0012] FIGS. 12-16 are various views of another construction of the seed loader of FIG. 2 disposed in the seeding machine.

[0013] FIGS. 17-22 are various views of yet another construction of the seed loader of FIG. 2 disposed in the seeding machine.

[0014] FIGS. 23-27 are various views of a pneumatic seed loader disposed in the seeding machine.

[0015] FIGS. 28-32 are various views of another pneumatic seed loader disposed in the seeding machine.

### DETAILED DESCRIPTION

[0016] Before any embodiments of the disclosure are explained in detail, it is to be understood that the disclosure is not limited in its application to the details of construction and the arrangement of components set forth in the following description or illustrated in the accompanying drawings. The disclosure is capable of other embodiments and of being practiced or of being carried out in various ways.

[0017] FIG. 1 illustrates a seeding machine 10, such as a row crop planter. The seeding machine 10 has a frame 12 on which are mounted a plurality of individual row units 14. Seed sources, such as storage tanks 13a-13c, hold seed that is delivered, e.g., pneumatically, to a mini-hopper (not shown) on each row unit 14. The storage tanks 13a-13c may be coupled to the mini-hoppers by way of conduits 20, such as hoses, and a pressurized delivery apparatus (not shown). Each storage tank 13a-13c can be used to contain the same variety of seeds, or a different variety of seeds. For example, a first storage tank 13a may contain a first variety of seeds, a second storage tank 13b may contain a second variety of seeds, and a third storage tank 13c may contain a third variety of seeds. The varieties are typically within the same crop (such as corn, soy, etc.), with each variety having different traits which allows a more optimal variety to be planted at a given location in a field. The traits may include tolerances of seed to disease, draught, moisture, pests, and other seed characteristics, etc. It may also be possible for the different varieties to include plant type, such as corn, soy, etc. For example, the first storage tank 13a may contain corn, the second storage tank 13b may contain soy, and the third storage tank 13c may contain a more moisture tolerant variety of corn or soy. Thus, each row unit 14 can be coupled to several conduits 20 such that each row unit 14 is coupled to each storage tank 13a-13c to receive the first, second, and third varieties of seed. In other constructions, the storage tanks 13a-13c may contain the same variety of seed.

[0018] Each row unit 14 has a frame 18 to which the components of the row unit 14 are mounted. For example, the

frame 18 may carry furrow opening disks for forming an open furrow 15 in the soil beneath the seeding machine 10 into which seed is deposited, and closing and packing wheels to close the furrow 15 over the deposited seed and to firm the soil in the closed furrow 15.

[0019] In general, and with reference also to FIG. 2 for context, a seed meter assembly 16 having two seed meters 22a, 22b is coupled to each row unit frame 18. The seed meter assembly 16 may have one, two, three or more seed meters coupled to each row unit frame 18. The illustrated seed meters 22a, 22b are substantially the same, with like parts labeled with the same or similar reference numerals herein. In other constructions, the seed meters 22a, 22b may be different (for example, two different types of seed meters may be used). Each seed meter 22a, 22b takes seeds from a seed pool and sequentially discharges single seeds for delivery one at a time (e.g., meters, or singulates, the seeds). As one example, each seed meter 22a, 22b may use an air pressure differential, (i.e., vacuum and/or positive pressure), to adhere seeds to a metering member 24, which can be in the form of a disk, a bowl, or more generally a plate, having apertures 26 that extend therethrough. The apertures 26 are generally arranged circumferentially about a meter axis A1, A2 (respectively), substantially in a circle, proximate an outer edge of the metering member 24. The metering member 24 may be driven by a motor 30, such as an electric motor (see FIG. 11, for example). In other constructions, other types of motors, such as hydraulic, pneumatic, etc. may be used as well as various types of mechanical drives.

[0020] A seed reservoir 28 containing a seed pool is positioned on one side of each metering member 24 at a lower portion thereof, and is connected to one or more of the storage tanks 13a-13c to receive seeds therefrom by way of the conduits 20. A pressure differential is applied across the metering member 24, which rotates about the meter axis A1 or A2 through the seed pool such that individual seeds S1, S2 (FIG. 2) from the respective seed pool are adhered or attracted by virtue of the pressure differential to the passing apertures 26. In order to release a seed, one seed at a time (e.g., to meter, or singulate, the seeds), the pressure differential is terminated at a desired release position, though in other embodiments the differential is maintained and mechanical assistance is utilized to knock, pull, or push the seed off the metering member 24, interfere with the aperture to disrupt the pressure differential, or otherwise release the seed. In yet other constructions, other types of metering members for metering/singulating the seeds may be employed.

[0021] A seed delivery mechanism 32 is also coupled to each row unit frame 18. The seed delivery mechanism 32 receives metered seeds from each seed meter 22a, 22b and delivers the seeds to the furrow 15 in the soil. The seed delivery mechanism 32, or conveyor, may include a conduit such as a belt 34, which receives the metered seeds from each seed meter 22a, 22b, conveys the metered seeds toward the ground, and expels the metered seeds in the furrow 15. The belt 34 is driven through one or more pulleys (not shown) rotating about an axis D (FIG. 2) by a motor, such as an electric motor, or by any hydraulic or pneumatic drive as well as various types of mechanical drives. The belt 34 can be in the form of a brush belt 34 with bristles for trapping, holding, and releasing the metered seeds whereby the seed movement between the seed meter and the furrow is controlled. In other constructions, the seed delivery mechanism 32 may include other types of belts, such as a foam belt, a conveyor belt, a

flighted belt, a pocketed belt, a belt with resilient fingers, etc. In yet other constructions, the seed delivery mechanism 32 can include other types of mechanisms suitable for receiving seeds from each seed meter 22a, 22b and conveying the seeds to the furrow 15. For example, the seed delivery mechanism 32 may include other conduits such as one or more tubes to direct seeds from each seed meter 22a, 22b to the furrow 15.

[0022] Two or more seed meters 22a, 22b are coupled to each row unit frame 18. The first seed meter 22a is in communication with one seed source (e.g., one of the storage tanks 13a-13c), and the second seed meter 22b is in communication with another seed source (e.g., another one of the storage tanks 13a-13c), and so on. As illustrated in FIG. 2, the first and second seed meters 22a, 22b may be arranged generally in parallel such that the respective meter axes A1, A2 are substantially coaxial. In other constructions, such as illustrated in the constructions of FIGS. 8-11, 12-15 and 16-21, the first and second meters 22a, 22b may be arranged such that the respective meter axes A1, A2 are generally parallel but offset by a certain distance. In other similar constructions, the first and second meters 22a, 22b may be tilted with respect to each other such that the meter axes A1, A2 intersect with a small included angle. In yet other constructions, the seed meter assembly 16 may include a single seed meter configured to selectively meter seeds from two or more different seed sources, or alternatively, three or more seed meters may be coupled to each row unit frame 18 and in communication with one or more of the storage tanks 13a-13c.

[0023] A seed loader 36 is disposed between the first and second seed meters 22a, 22b. FIGS. 3-11 illustrate a first construction of the seed loader 36 as a single-wheel loader, FIGS. 12-16 illustrate a second construction of the seed loader 136 also as a single-wheel loader, and FIGS. 17-22 illustrate a third construction of the seed loader 236 as a dual-wheel loader. Generally, the seed loader 36, 136, 236 is positioned for selectively receiving metered seeds from one (or both) of the first and second seed meters 22a, 22b and transferring metered seeds to the seed delivery mechanism 32. In other constructions, the seed loader 36, 136, 236 may be disposed adjacent a single seed meter and used to transfer metered seeds from the single seed meter (22a or 22b) to the seed delivery mechanism 32.

[0024] The seed loader 36, 136, 236 is a rotating seed loader mounted for rotation about a loader axis B disposed generally perpendicular to at least one or both of the meter axes A1, A2. In some constructions, e.g., the first and second seed meters 22a, 22b are tilted with respect to one another, the loader axis B may be disposed transverse to the meter axes A1, A2 but not necessarily perpendicular.

[0025] As illustrated schematically in FIG. 2, the seed loader 36, 136, 236 includes receptacles 38 for receiving a seed from the seed meters 22a, 22b at a pickup location 40. The receptacles 38 are configured to rotate about the loader axis B to transfer the seed in a circumferential path from the pickup location 40 to a drop off location 42 at the seed delivery mechanism 32.

[0026] It should be understood that FIG. 2 is merely schematic, and that the number, spacing, and structure of the receptacles 38 and the loader 36, 136, 236 may vary between constructions. In one construction, four receptacles 38 are employed, and the receptacles 38 are spaced about 90 degrees apart about the loader axis B. However, the receptacles 38 may be spaced unevenly about the loader axis B in other constructions. Furthermore, one, two, three, five, or more

receptacles **38** may be employed in other constructions and may be spaced evenly or unevenly about the loader axis B. The constructions of the seed loader **36**, **136**, **236** illustrated herein have three receptacles **38**.

[0027] FIGS. 3-11 and FIGS. 12-16 illustrate two constructions of a single-wheel seed loader **36**, **136**. The seed loader **36**, **136** includes a shaft **44**, **144**, a hub portion **46**, **146**, a housing **48**, **148**, and a sweeper **49**, **149**. Like features of the seed loader **36** and the seed loader **136** need not be described separately herein and are labeled with the same or similar reference numerals plus 100. The hub portion **46**, **146** is coupled to the shaft **44**, **144** for rotation therewith about the loader axis B and includes a sweeper **49**, **149** extending therefrom for sweeping a seed from the seed meters **22a**, **22b**. The shaft **44**, **144** hub portion **46**, **146** and sweeper **49**, **149** rotate with respect to the frame **18**. In the illustrated construction, the sweeper **49**, **149** comprises paddles **50**, **150** extending radially from the hub portion **46**, **146** for sweeping a seed from the respective seed meter **22a**, **22b**. Three paddles **50**, **150** define three receptacles **38**, **138** (FIG. 5, FIG. 14) for receiving seeds, each receptacle **38**, **138** being defined as the space or compartment within the housing **48**, **148** between successive paddles **50**, **150** and the hub portion **46**, **146** in which the seed is received and moved from the pickup location **40** to the drop off location **42**. The paddles **50**, **150** are spaced approximately evenly about the loader axis B by angular distances of about 120 degrees, but it is to be understood that fewer or more paddles **50**, **150** may be employed to define fewer or more receptacles **38**, **138**, and that the paddles may be spaced evenly or unevenly.

[0028] Each paddle **50**, **150** is coupled to the hub portion **46**, **146** in a cantilevered fashion by way of an arm **41**, **141**, which allows radial and/or circumferential flexion capability. Each paddle **50**, **150** extends from the arm **41**, **141** and may be radial or oblique with respect to the axis B. In the illustrated constructions, each arm **41**, **141** includes a first portion **43**, **143** extending generally radially from the hub and a second portion **45**, **145** extending generally circumferentially from the first portion **43**, **143** leaving a first gap **47**, **147** between the hub portion **46**, **146** and the second portion **45**, **145** in a radial direction and a second gap **59**, **159** between the paddle **50**, **150** and the adjacent arm **41**, **141** in a circumferential direction. The paddle **50**, **150** extends generally radially from the second portion **45**, **145**. As such, the provision of the first and second gaps **47**, **147**, **59**, **159** allows room for flexion of each arm **41**, **141** and of each paddle **50**, **150** in radial and circumferential directions, for example in response to engagement of the paddles **50**, **150** with the belt **34** of the seed delivery mechanism **32** (which will be described in greater detail below) or in response to engagement of the paddles **50**, **150** with other components, such as the seed meters **22a**, **22b** and with the seeds themselves. The first gap **47**, **147** may be filled with an elastic material, such as foam or resin, to inhibit seeds from being trapped in the seed loader **36**, **136**.

[0029] With reference to the construction of FIGS. 12-15, the first portion **143** is forked including two extensions each connecting to the second portion **145** at opposite ends such that each sweeper **149** is substantially symmetrical about a radial axis E (FIG. 15). The symmetrical construction of each sweeper **149** allows each paddle **150** to flex and react to forces the same way when the seed loader **136** is rotating counter-clockwise and clockwise.

[0030] Rather than paddles **50**, **150**, the sweeper **49**, **149** may also include other mechanisms for sweeping the seed,

such as brushes, bristles, foam, resilient fingers, etc. Some sweeper mechanisms, such as a brush wheel and a foam wheel, may be continuous about the loader axis B, and may effectively define as many receptacles **38**, **138** as locations at which a seed may be received.

[0031] The housing **48**, **148** includes a first meter opening **52**, **152** disposed adjacent the first seed meter **22a**, a second meter opening **54**, **154** disposed adjacent the second seed meter **22b**, and a delivery opening **56**, **156**, or outlet, disposed adjacent and in communication with the seed delivery mechanism **32**. The first meter opening **52**, **152** and the second meter opening **54**, **154** correspond with the pickup locations **40**. Inserts **51**, **53** (FIG. 5) and **151**, **153** (FIGS. 13-14) made from spring steel or other low-wearing material are disposed proximate each meter opening **52**, **54**, respectively. The inserts **51**, **53**, **151**, **153** may also be referred to herein as ramps.

[0032] With reference to the construction of FIGS. 3-11, and as shown specifically in FIGS. 3-5, each insert **51**, **53** can be retained in place over/across/at/proximate each opening **52**, **54** in any manner desired (e.g., bent-over ends that mate with features of the housing **48**, snap-fit, fastened, etc.), and can have an aperture **55**, **57** (respectively) shaped and sized to permit seed to pass. The inserts **51**, **53** inhibit wear on the seed loader **36** and may be replaceable as needed. In some constructions, the openings **52**, **54** may be sized and shaped to permit certain varieties of seed (e.g., significantly different sizes of seed) to pass and may be interchanged depending on the variety of seed being used.

[0033] With reference to the construction of FIGS. 12-15, and with particular reference to FIGS. 13-14, each insert **151**, **153** is received in a recessed groove **125** in the respective metering member **24**. The recessed groove **125** is recessed from a surface of the metering member **24**, such as a seed surface **60** in communication with the seed pool and to which metered seeds are attracted. The recessed groove **125** is substantially arcuate with respect to the respective metering axis A1, A2 and, more specifically, may be substantially circular. As the seed meters **22a**, **22b** rotate in frictional engagement with the inserts **151**, **153**, the inserts **151**, **153** are recessed in the circular recessed groove **125** and remain stationary with respect to the frame **18**. When other types of metering members are employed, it should be understood that the groove **125** may have other corresponding shapes and configurations. The inserts **151**, **153** each have a respective ramp surface **161**, **163** inclined from the first meter opening **152** and the second meter opening **154**, respectively, to the delivery opening **156**, that guide the seed through the seed loader **136** from the first and second seed meters **22a**, **22b** to the seed delivery mechanism **32**. Specifically, the ramp surfaces **161**, **163** may be arcuate with respect to the loader axis B for cooperating with the sweeper **149** to guide seeds. The ramp surfaces **161**, **163** are flush with or recessed from the respective surface of the metering member **24** so as to facilitate a smooth, uninhibited path for each seed to travel from the first and second meter openings **152**, **154** to the delivery opening **156**. The inserts **151**, **153** may engage the seed delivery mechanism **32**, e.g., the conduit **34**, to reduce gaps that could trap seeds unintentionally.

[0034] Returning to the seed loaders **36**, **136**, the sweeper **49**, **149** may or may not contact the metering member(s) **24** and may engage the seed while the seed is still adhered to the metering member(s) **24** by vacuum, after the vacuum is released, broken, disrupted, etc., or after the seed is otherwise released from the metering member(s) **24**. Any one or more of

the housing **48**, **148** the paddles **50**, **150** the inserts **51**, **53** and **151**, **153**, etc. may contact the metering member(s) **24** while sweeping a seed from the metering member(s) **24**, or may receive the seed without contacting the metering member(s) **24**, or may engage the metering member **24** of one of the seed meters **22a**, **22b** and not the other of the seed meters **22a**, **22b**. For example, the paddles **50**, **150** may engage the metering member(s) **24** to sweep a seed that is adhered to the metering member(s) **24** by pressure differential. As such, the paddles **50**, **150** may break the seed away from adherence with the metering member(s) **24** by contact with the seed and metering member(s) **24**. In other constructions, the paddles **50**, **150** may break the seed away from adherence with the metering member(s) **24** by contact with the seed without contacting the metering member(s) **24**. In yet other constructions, a gap may be disposed between the sweeper **49**, **149** and the metering member(s) **24** such that the sweeper **49**, **149** receives a seed after the seed is released from the metering member(s) **24** without engaging the metering member(s) **24**.

[0035] With reference to the construction of FIGS. 3-11, the housing **48** is fixed against rotation with respect to the loader axis B, i.e., does not rotate with respect to the frame **18**. The housing **48** may be disposed to overlap with the belt **34** of the seed delivery mechanism **32** such that the housing **48** enters into the bristles of the belt **34** (see FIGS. 6 and 7). The delivery opening **56**, which corresponds with the drop off location **42**, thus opens into the belt **34** and specifically into the bristles of the belt **34** for depositing seeds therein. The seed loader **36** may be substantially centered about a centerline C of the belt **34** of the seed delivery mechanism **32** (see the side view of FIG. 6 and the top view of FIG. 9), or may be slightly offset in other constructions.

[0036] With reference to the construction of FIGS. 12-16, the housing **148** is journaled for rotation about the loader axis B by way of a bearing **165** disposed between the housing **148** and the shaft **144**. This configuration may be applied to any construction in this disclosure. When the shaft **144** rotates, friction in the bearing **165** acts to couple the housing **148** for rotation in the direction of the shaft **144**. Thus, the housing **148** is driven to rotate with the shaft **144**. However, a stop **169** limits the range of motion of the housing **148** to a few degrees, e.g., about 5 to about 10 degrees, about 1 to about 30 degrees, about 1 to about 20 degrees, or about 1 to about 15 degrees, or about 1 to about 10 degrees, etc. When the stop **169** is reached, the shaft **144** rotates freely in the bearing **165** and the housing **148** remains against the stop **169**. Projections **173** extending generally radially from the housing **148** and spaced apart by a radial gap **175** engage the stop **169** to inhibit rotating, or rocking, motion of the housing **148** in either direction, the stop **169** being disposed in the gap **175** radially between the projections **173**. FIGS. 14-15 illustrate the housing **148** moving between a first position (FIG. 14) and a second position (FIG. 15) against the stop **169**.

[0037] The housing **148** has a wall **177** disposed generally normal to the axis B and disposed just downstream of the sweeper **149** with respect to the direction of the seed delivery mechanism **32**. In other words, the seed delivery mechanism **32** (e.g., the belt **34**) moves past the sweeper **149** first and then the wall **177**. The wall **177** includes a first wall **177a** and a second wall **177b**, which may be formed separately or as one piece, that rock into and out of overlapment with the seed delivery mechanism **32**, e.g., the belt **34**, such that the first wall **177a** enters into the bristles of the belt **34** adjacent to and downstream from the sweeper **149** (with respect to the direc-

tion of seed delivery of the conduit **34**, which is moving into the page in FIGS. 14 and 15) when the housing **148** rotates in one direction as shown with phantom lines in FIG. 15, and the second wall **177b** enters into the bristles of the belt **34** adjacent to and downstream from the sweeper **149** when the housing **148** rotates in the other direction as shown in phantom lines in FIG. 14. Thus, the first and second walls **177a**, **177b** guide seeds from the first and second seed meters **22a**, **22b**, respectively, into an inner region of the seed delivery mechanism **32** proximate the centerline C rather than just to the edge of the seed delivery mechanism **32**. The first and second walls **177a**, **177b** provide a backstop to inhibit the seed from being swept away into the seed delivery mechanism **32** until the seed reaches an inner region, such as near the center, of the seed delivery mechanism **32**. In other words, the delivery opening **156**, which corresponds with the drop off location **42**, thus opens into an inner region of the belt **34**, rather than the edge, and specifically into the inner region of the bristles of the belt **34** for depositing seeds therein. When the first wall **177a** (FIG. 15) is overlapping the seed delivery mechanism **32**, the second wall **177b** is not, and vice versa. Thus, the first and second walls **177a**, **177b** alternate engagement into the seed delivery mechanism **32** in conjunction with a direction of rotation of the seed loader **136**. As such, the housing **148** acts as a rocking segue to form a blocking wall (**177a** or **177b**, alternately) so that the seed is deposited into the inner region of the brush belt **34**. The housing **148** rocks from one side to the other to present the wall **177a**, **177b** extending into the brush belt **34** from one side or the other depending on the seed meter **22a**, **22b** that is operating. The walls **177a**, **177b** inhibit the seed from being swept away by the seed delivery mechanism **32** before the seed reaches a secure position in the inner region of the seed delivery mechanism **32**.

[0038] Returning to the seed loaders **36**, **136** the sweeper **49**, **149** travels in a direction generally transverse to the direction of travel of the belt **34** where the sweeper **49**, **149** and belt **34** meet (i.e., proximate the drop off location **42**). Thus, the paddles **50**, **150** sweep across the belt **34** and into the belt bristles laterally, i.e., transverse to the direction of movement of the belt **34**, e.g., generally perpendicular to movement of the belt **34** or, in other constructions, transverse at any other angle with respect to movement of the belt **34**. In other constructions, the sweeper **49**, **149** may travel generally parallel with the direction of travel of the belt **34** proximate the drop off location **42**, e.g., counter to the direction of travel of the belt **34** or concurrent with the direction of travel of the belt **34**.

[0039] The seed loader **36**, **136** is selectively driven to rotate in clockwise and counterclockwise directions by at least one motor, which may include the respective motor **30** driving the respective seed meters **22a**, **22b** (as shown in FIGS. 6-11), two motors independent from the seed meter motors **30** (not shown), a single independent motor (not shown), or a single seed meter motor **130** (FIG. 12). In any case, a mechanical drive **58**, **158** (described below) coupled to the motor(s) includes gears and/or clutches to drive the seed meters **22a**, **22b** and the seed loader **36**, **136** in a choreographed fashion. That is, based on the number of receptacles **38**, **138** or paddles **50**, **150** the shaft **44** may be controlled (e.g., mechanically by way of gears and clutches in the mechanical drive or electronically via a controller in other constructions) to operate at a speed that corresponds with the number, spacing, and speed of seeds being picked up by the seed meters **22a**, **22b** such that the paddle **50**, **150** sweeps

each metered seed sequentially. In yet other constructions, other types of motors, such as hydraulic or pneumatic motors, may be used as well as other types of mechanical drives. The motor(s) or other device may be controlled to operate in a specified direction depending on which seed meter **22a**, **22b** is active, or the seed meter motor(s) **30**, **130** may be geared and clutched to drive the seed loader **36**, **136** in the corresponding direction.

[0040] As illustrated in FIGS. **6-11**, a mechanical drive **58** may be coupled to each side of the shaft **44** between the shaft **44** and the respective seed meter motor **30** for transferring driving force to drive the shaft **44** about the loader axis B. Thus, the seed loader **36** may be driven in one direction when the first seed meter **22a** is operating and in an opposite direction when the second seed meter **22b** is operating by the respective seed meter motor **30**.

[0041] As illustrated in FIGS. **12-16**, with particular reference to FIGS. **12** and **16**, a motor **130**, which may be a single reversible motor, and a mechanical drive **158** are configured to selectively drive one of the seed meters **22a**, **22b** and the seed loader **136** together such that the sweeper **149** is driven in a direction that corresponds with the seed meter **22a**, **22b** being driven to move seeds from the seed meter **22a**, **22b** being driven such that the paddles **150** are timed to meet with a seed from each passing aperture **26** in sequence. As illustrated, the mechanical drive **158** includes a shaft **144** coupled to the motor **130** by way of gears **167**, such as bevel gears or another suitable type of coupling. The shaft **144** is driven in a first direction when the motor **130** is operated in a first direction and is driven in a second opposite direction when the motor **130** is driven in a second opposite direction. The mechanical drive **158** also includes meter gears **179a**, **179b**, such as bevel gears or another suitable type of coupling, coupled between the shaft **144** and the metering member **24** of the respective seed meter **22a**, **22b**. Specifically, the meter gears **179a**, **179b** are each coupled to a respective one-way clutch **181a**, **181b** disposed between the shaft **144** and the respective metering member **24** for driving the respective metering member **24** when motor **130** is operating in the respective direction. The one-way clutch **181a**, **181b** may include teeth **183a**, **183b**, or other suitable structure, for meshing with teeth **62**, or other suitable structure, of the corresponding metering member **24**. For example, when the motor **130** is driven in the first direction, the first seed meter **22a** is driven through the first one-way clutch **181a** and the second one-way clutch **181b** freewheels such that the second seed meter **22b** is not driven, and vice versa. Thus, an output of the motor is reversible. Alternatively, the motor **130** may be a single direction motor and the mechanical drive **158** may include a reverser (not shown) for reversing the direction of the output of the motor. In other constructions, the output of the motor may be reversible in other ways. As such, a single motor selectively drives one of the seed meters **22a**, **22b** and correspondingly drives the seed loader **136**.

[0042] In operation, as the hub portion **46**, **146** rotates within the housing **48**, **148**, the paddles **50**, **150** sweep a seed from the first seed meter **22a** or the second seed meter **22b** as the paddles **50**, **150** pass by the first meter opening **52**, **152** and the second meter opening **54**, **154**, respectively. The paddles **50**, **150** may sweep the seed up or down, depending on which way the sweeper **49**, **149** rotates (as described in greater detail below). The first and second seed meters **22a**, **22b** may be selectively operated such that only one seed meter is metering seeds at a time. In this way, the first and second

seed meters **22a**, **22b** may be controlled to provide a selected variety of seed to the seed delivery mechanism **32** for delivery to the furrow **15**. In other constructions, both seed meters **22a**, **22b** may be operable to provide seeds at the same time.

[0043] In another construction, the seed loader **36** may rotate in a direction dependent on which of the first or second seed meters **22a**, **22b** is running. For example, the seed loader **36** may run counterclockwise when the first seed meter **22a** is running and clockwise when the second seed meter **22b** is running, such that the seeds need only be transferred in a circumferential path about the loader axis B of less than 180 degrees to the drop off location **42**. The reverse may also be used such that the seeds are always transferred in an angular path about the loader axis B of greater than 180 degrees. It is to be understood that other angular distances may be used depending on the spacing of the first meter opening **52**, the second meter opening **54**, and the delivery opening **56**. In other constructions, the seed loader **36**, **136** may rotate about the loader axis B in a single direction (e.g., clockwise or counterclockwise). With reference to the schematic of FIG. **2**, if the seed loader **36**, **136** operates clockwise, a first seed is picked up at the pickup location **40** of the first seed meter **22a** (if the first seed meter **22a** is operating) and moved in a circumferential path about the loader axis B for greater than 180 degrees (e.g., about 270 degrees) to the drop off location **42**, or a second seed is picked up at the pickup location **40** of the second seed meter **22b** (if the second seed meter **22b** is operating) and moved in a circumferential path about the loader axis B for less than 180 degrees (e.g., about 90 degrees) to the drop off location **42**. The reverse of this operation may also be employed.

[0044] In other constructions, the seed loader **36**, **136** may be oscillating, reciprocating, translating, or moving in other manners to pick up seeds at one or more meter openings **52**, **54** and to discharge the seeds at the drop off location **42**.

[0045] In yet other constructions, two or more seed loaders **36**, **136** may be employed, e.g., one seed loader **36**, **136** for every individual seed meter. Or, equivalently, the seed loader **36**, **136** may include dual sweepers as described in greater detail below. As such, two seed loaders **36** (or sweepers **49**, **149**) may be used such that one seed loader always rotates in one direction for transferring seeds from the first seed meter **22a** to the seed delivery mechanism **32**, and the other seed loader always rotates in the same or an opposite direction for transferring seeds from the second seed meter **22b** to the seed delivery mechanism **32**.

[0046] One example of such dual seed loaders is illustrated in FIGS. **17-22**. A seed loader **236** includes two hub portions **246a**, **246b** and two sweepers **249a**, **249b**. The sweepers **249a**, **249b** include the same features as the sweeper **49** but are each driven in opposite directions. Like features are labeled in FIGS. **19-20** using the same reference numerals shown in FIGS. **3-5** plus 200 and need not be described again. Reference for the common features is made to the description above. The sweepers **249a**, **249b** are each dedicated to one seed meter **22a**, **22b** and configured to rotate when the corresponding seed meter **22a**, **22b** is in use. It is apparent from the disclosure above that many constructions exist for driving the sweepers **249a**, **249b** accordingly. For example, the hub portions **246a**, **246b** may be coupled to the same shaft **244** (e.g., like the shaft **144**) driven by a single motor **130** and geared such that one of the sweepers **249a**, **249b** is driven when the shaft **144** rotates in one direction and the other of the sweepers **249a**, **249b** is driven when the shaft **144** rotates in the other

direction. Alternatively, two separate shafts **244** may be employed, one for each hub portion **246a**, **246b**. In some constructions, one of the sweepers **249a**, **249b** is driven by a first motor (not shown) and the other of the sweepers **249a**, **249b** is driven by a second motor (not shown). The seed loader **236** may be driven by any of the motor and mechanical drive arrangements described above. In FIG. **21**, the seed loader **236** is illustrated as being driven individually by separate seed meter motors **230**.

**[0047]** The sweepers **249a**, **249b** are driven to rotate in opposite directions such that each paddle **250** sweeps a seed in a downward direction from top to bottom with respect to gravity. Thus, the seed loader **236** is a dual seed loader.

**[0048]** The seed loader **236** includes a single housing **248** mounted rotatably by bearings **265** and movable between a first position (FIG. **19**) and a second position (FIG. **20**), as described above with respect to the housing **148**. Like features are given the same reference numeral as the corresponding features in the construction of FIGS. **12-16** plus **100**. The wall differs from the wall **177** in that one wall **277a** is disposed between the sweepers **249a**, **249b** and another wall **277b** is disposed parallel to the one wall **277a**. FIGS. **19-20** illustrate in greater detail the walls **277a**, **277b** in action. The wall **277a** overlaps into the seed delivery mechanism **32** when one of the sweepers **249a** is working (as shown by hatching in FIG. **19**) and the other wall **277b** overlaps into the seed delivery mechanism **32** when the other of the sweepers **249** is working (as shown by hatching in FIG. **20**). As described above, the walls **277a**, **277b** are disposed generally normal to the loader axis **B** and disposed adjacent their respective sweepers **249** in a direction downstream as defined by the direction of motion of the seed delivery mechanism **32**, which is shown by arrows in FIGS. **19-20**. As such, the housing **248** acts as a rocking segue to form a blocking wall (**277a** or **277b**) so that the seed is deposited into the center of the brush belt **34** as described above. The housing **248** rocks from one side to the other to present a wall **277a**, **277b** extending into the brush belt **34** from one side or the other depending on the seed meter **22a**, **22b** that is working.

**[0049]** In the construction of FIGS. **23-27**, two seed meters **22a**, **22b** are coupled to each row unit frame **18** (see FIG. **27**) in a similar manner as described above with respect to FIGS. **2-22**. As illustrated in FIG. **27**, the first and second seed meters **22a**, **22b** are arranged generally in parallel such that the respective meter axes **A1**, **A2** are generally parallel. In other constructions, the first and second meters **22a**, **22b** may be arranged such that the respective meter axes **A1**, **A2** are generally coaxial or translationally offset, or the first and second meters **22a**, **22b** may be tilted with respect to each other such that the meter axes **A1**, **A2** are offset by an included angle. In yet other constructions, a single seed meter (**22a** or **22b**) can be configured to selectively meter seeds from two or more different seed sources (e.g., from the tanks **13a-13c**). In still other constructions, three or more seed meters may be coupled to each row unit frame **18**.

**[0050]** A seed loader **64** is coupled to the frame **18** of each row unit **14**. The seed loader **64** includes a first wheel **66** disposed between the first seed meter **22a** and the seed delivery mechanism **32**, and a second wheel **68** disposed between the second seed meter **22b** and the seed delivery mechanism **32** and offset from the first wheel **66**. The first and second seed meters **22a**, **22b** of the illustrated embodiment are arranged generally in parallel with each other by way of example only, and the seed loader **64** is positioned for selectively receiving

metered seeds from the first and second seed meters **22a**, **22b** and transferring seeds to the seed delivery mechanism **32**.

**[0051]** The seed loader **64** cooperates with a loader baffle **80** disposed on or integrally formed with a seed delivery shroud **72** to transfer the metered seeds toward the drop off location **42**. The seed delivery shroud **72** includes a mounting portion **74** coupled to a receiving portion **76** of the seed delivery mechanism **32** proximate the drop off location **42** where seed is received on the seed delivery mechanism **32**. The seed delivery shroud **72** may be coupled to the seed delivery mechanism **32** by way of a clamp **78**. In other constructions, the seed delivery shroud **72** may be coupled to the seed delivery mechanism **32** by way of a snap-fit, a fastener, or in any other suitable manner. In yet other constructions, the seed delivery shroud **72** may be formed with a housing of the seed delivery mechanism **32**.

**[0052]** The loader baffle **80** includes a first arm **82** disposed adjacent the first wheel **66**, a second arm **84** disposed adjacent the second wheel **68**, and a delivery opening **86** therebetween to facilitate the passing of seed to the seed delivery mechanism **32**. In other constructions, the seed delivery shroud **72** may include a single arm **82**, **84** (e.g., in embodiments in which both wheels **66**, **68** rotate in the same direction), and/or two or more delivery openings, one for each of the first and second wheels **66**, **68**, respectively. In the illustrated embodiment, the arms **82**, **84** define a trough **70** with opposite sides **71** between and within which a periphery of each wheel **66**, **68** is received and along which seeds are moved by the wheels **66**, **68** to the delivery opening **86**. The trough **70** can have various lengths depending at least in part upon the circumferential distance between the pickup locations **40** and the delivery opening **86**, and can have various widths depending at least in part upon the widths of the wheels **66**, **68**. Also, in some embodiments, the trough **70** has generally rotund shape that is elongated proximate the delivery opening **86** in order to receive seeds from wheels **66**, **68** that are offset (such as the wheels shown in the illustrated embodiment of FIGS. **23-27**), whereas in other embodiments the trough is round in order to receive seeds from the wheels **66**, **68** that are co-axial.

**[0053]** Returning to FIGS. **23-27**, the first arm **82** includes a curved or arcuate surface **94** that generally corresponds with the contour of the first wheel **66**, and the second arm **84** includes a curved or arcuate surface **96** that generally corresponds with the contour of the second wheel **68**. The first and second arms **82**, **84** extend from proximate the pickup locations **40** adjacent the first and second seed meters **22a**, **22b**, respectively, to the delivery opening **86**. In other constructions, a single arm may be employed, and a single wheel may be disposed adjacent a single seed meter and used to transfer metered seeds from the single seed meter (**22a** or **22b**) to the seed delivery mechanism **32**.

**[0054]** In the illustrated construction, the first and second wheels **66**, **68** are mounted for rotation about respective loader axes **B1**, **B2** disposed generally perpendicular to at least one or both of the meter axes **A1**, **A2**. In some constructions, e.g., when one or both of the first and second seed meters **22a**, **22b** are slightly tilted, the loader axes **B1**, **B2** may be disposed transverse but not necessarily perpendicular to the meter axes **A1**, **A2**. With reference to FIGS. **24** and **25**, the first and second wheels **66**, **68** are rotatably mounted to the seed delivery shroud **72** at respective bracket portions **98** extending from the seed delivery shroud **72**. As illustrated in FIGS. **25** and **27**, the first and second wheels **66**, **68** are slightly offset from the centerline **C** of the seed delivery

mechanism 32 defined by the centerline of the belt 34 such that seeds may be dropped substantially on the centerline C of the belt 34 when the first and second wheels 66, 68 lose tangency with the belt 34. In other constructions, the first and second wheels 66, 68 may be coaxial and/or may be offset from the centerline C of the belt 34.

[0055] As illustrated in greater detail in FIG. 26, each of the first and second wheels 66, 68 includes a hub portion 100 and a sweeper 102 extending from the hub portion 100. The hub portion 100 is coupled to a shaft (not shown) for rotation therewith about respective the loader axis B1, B2, and may be driven in a similar manner to the seed loader 36 described above. For example, the hub portion 100 may include a hex opening 104 for engaging a hex shaft (not shown).

[0056] The illustrated sweeper 102 includes a brush having bristles extending radially from the hub portion 100 for sweeping a seed from a seed meter 22a, 22b. The bristles of the first and second wheels 66, 68 may slightly overlap the bristles of the belt 34 (FIG. 27) for opening the bristles of the sweeper 102 and/or belt 34 to assist transfer of the seeds. Rather than bristles, the sweeper 102 may also include other mechanisms for sweeping the seed, such as paddles, foam, resilient fingers, other brushes, etc.

[0057] In operation, the first and second wheels 66, 68 sweep a seed from the first or second seed meters 22a, 22b, respectively. The first and second wheels 66, 68 may sweep the seed up or down, depending on which way the sweeper 102 rotates (as described in greater detail below). The first and second seed meters 22a, 22b may be selectively operated such that only one seed meter 22a, 22b meters seeds at a time. In this way, the first and second seed meters 22a, 22b may be controlled to provide a selected variety of seed to the seed delivery mechanism 32 for delivery to the furrow 15. In other constructions, both seed meters 22a, 22b may be operable to meter seeds at the same time.

[0058] More specifically, as illustrated in FIGS. 24-27, the first and second wheels 66, 68 are configured for receiving or sweeping a seed from the respective seed meters 22a, 22b at the pickup location 40. Each wheel 66, 68 rotates about the loader axis B1, B2 to move the seed in a circumferential path about the loader axis B1, B2 to transfer the seed to the seed delivery mechanism 32 at the drop off location 42. The loader baffle 80 (specifically, the respective surface 94, 96) cooperates with the first and second wheels 66, 68 to guide the seed along the circumferential path to the delivery opening 86.

[0059] In one construction, the first and second wheels 66, 68 each rotate about the loader axis B1, B2 in a single direction (e.g., clockwise or counterclockwise). For example, the first wheel 66 rotates clockwise and the second wheel 68 rotates counterclockwise, or vice versa, or both first and second wheels 66, 68 rotate in the same direction. By way of example, and with reference to FIG. 26, if the first wheel 66 operates counterclockwise, a seed is picked up at the pickup location 40 of the first seed meter 22a and moved about the loader axis B1 for about 90 degrees to the drop off location 42. If the second wheel 68 operates clockwise, a seed is picked up at the pickup location 40 of the second seed meter 22b and moved about the loader axis B2 for about 90 degrees to the drop off location 42. The reverse or any combination of directions and configurations (e.g., different angular distances) may also be employed, in which case the seed loader 64 can include walls proximate and circumferentially extending about upper portions of either or both wheels 66, 68 in a manner similar to the arms 82, 84 described above. In other

constructions, the seed loader 64 may be oscillating, reciprocating, translating, etc. In yet other constructions, one, three, or more wheels may be employed for feeding seeds to one or more pickup locations 40 of the same seed loader. In such cases, the width of the seed loader (e.g., the width of arm 82 and/or arm 84) can be increased or decreased as necessary to receive the periphery of the wheels.

[0060] In the construction of FIGS. 28-32, one, two, or more seed meters 22a, 22b may be employed as described above with respect to FIGS. 2-27. In the illustrated construction, first and second seed meters 22a, 22b (not shown) are each configured to drop a metered seed from the pickup location 40 into or near a respective pressure conduit 108a, 108b of a seed loader 106. One pressure conduit 108a, 108b may be disposed adjacent each seed meter 22a, 22b or, alternatively, the seed loader 106 only includes one pressure conduit in communication with a seed meter (22a or 22b) in those applications utilizing only a single seed meter. The seed loader 106 includes a seed delivery shroud 110 positioned between the first and second seed meters 22a, 22b and the seed delivery mechanism 32 proximate the drop off location 42 (as described above with respect to FIGS. 22-26). The seed delivery shroud 110 is integrated with or integrally formed as one piece with at least a portion of the first pressure conduit 108a and the second pressure conduit 108b, although in other embodiments these elements can be separate pieces connected together in any suitable manner. The illustrated seed delivery shroud 110 is coupled to the seed delivery mechanism 32 by way of a clamp 122. However, in other constructions, the seed delivery shroud 110 may be coupled to the seed delivery mechanism 32 by way of a snap-fit, a fastener, or in any other suitable manner. The seed delivery shroud 110 is further configured to be coupled to a pressure differential device (not shown), such as an air pump or a vacuum pump. Either positive pressure or negative pressure may be employed.

[0061] As indicated by the arrows in FIGS. 30 and 31, the seed delivery shroud 110 can be coupled to a vacuum source by way of a suction tube 112. Thus, the first and second pressure conduits 108a, 108b, which extend to and end proximate the drop off location 42 (see FIG. 32), are subjected to a vacuum for drawing the metered seeds from the first or second seed meter 22a, 22b. As illustrated in FIG. 29, a screen 114 is disposed near the end of the suction tube 112 to inhibit seeds from entering the suction tube 112. Also, a seal ledge 116 is provided for sealing the seed delivery shroud 110 to a housing of the seed delivery mechanism. It will be appreciated that the shape and configuration of the seed delivery shroud 110 can be changed in number of different manners to define a sealed interface between the seed delivery shroud 110 and the housing of the seed delivery mechanism. A liner 118 may be provided, as illustrated in FIG. 30, having an opening 120 positioned proximate the drop off location 42 for encouraging seeds to enter into the seed delivery mechanism 32 at the drop off location 42. The liner 118 may be made of a metal or other suitable low-wearing material for inhibiting wear on the seed delivery shroud 110 as the belt 34 and the seeds pass therealong. The liner 118 may also act as a primary screen or guard against seeds entering the suction tube 112.

[0062] In other constructions, a positive pressure may be used in place of or in addition to the above-described vacuum pressure to urge metered seeds to pass along the pressure conduits 108a, 108b into the seed delivery mechanism 32. In those constructions in which no vacuum pressure is utilized,

the suction tube **112** is not necessary, and positive pressure is delivered to the seed delivery mechanism **32** (e.g., into the seed delivery shroud **110**) by way of an air pump or other device positioned and operable to produce a source of positive pressure down the pressure conduits **108a**, **108b**. The positive pressure may be exhausted naturally through cracks in the seed delivery mechanism **32**, or an exhaust vent (not shown) may be provided in the seed delivery mechanism **32** or in the seed delivery shroud **110**. As noted above, in yet other embodiments, both a source of positive pressure and a source of negative pressure (vacuum) can be used concurrently with the seed loader **106**.

**[0063]** Although two pressure conduits **108a**, **108b** are utilized in the illustrated embodiment of FIGS. **28-32** each of which extends to a respective seed meter feeding the pressure conduits **108a**, **108b** with metered seed, it should be noted that any number of pressure conduits **108a**, **108b** can be provided on the seed delivery shroud **110** for supplying metered seed to the seed delivery mechanism **32**. For example, the seed loader **106** can have a single pressure conduit **108a** feeding seed to the seed delivery mechanism **32**. In other embodiments, three or more pressure conduits **108a**, **108b** can feed seed to the seed delivery mechanism **32**. Pressure conduits **108a**, **108b** (in any number) can each terminate at or proximate the drop-off location **42** in the illustrated embodiment for delivering seed to the drop-off location **42**, or can terminate in one or more other drop-off locations **42** located proximate the periphery of the seed delivery mechanism **32**. In this regard, any number of drop-off locations are possible for any number of pressure conduits **108a**, **108b** of the seed delivery shroud **110**. Also, one or more of the pressure conduits **108a**, **108b** can be fed by two or more upstream seed meters, such as in cases where two or more seed meters deliver to a common seed input leading to the same pressure conduit **108a** or **108b**.

**[0064]** Thus, the disclosure provides, among other things, a seed loader for selectively transferring seeds from one, two or more seed meters to a seed delivery mechanism such that a single seed delivery mechanism (i.e., for a single row unit on the seeding machine) is configured to selectively deposit one, two, or more seed varieties.

What is claimed is:

1. A row unit for a seeding machine comprising:
  - a seed meter assembly having first and second reservoirs for holding a first pool of seeds and a second pool of seeds, respectively, the seed meter assembly operable to selectively transport seeds from the first pool and seeds from the second pool;
  - a conveyor having a conduit for receiving seeds and configured to discharge the seeds from the seeding machine; and
  - a seed loader disposed between the seed meter assembly and the conveyor for directing the seeds from the seed meter assembly to the conveyor.
2. The row unit of claim **1**, wherein the seed loader is configured to rotate about an axis of rotation.
3. The row unit of claim **1**, wherein the seed loader is a pneumatic seed loader including a shroud and an air pressure source coupled to the shroud.
4. The row unit of claim **1**, further comprising a row unit frame, wherein the seed meter assembly, the conveyor, and the seed loader are mounted to the row unit frame.
5. The row unit of claim **1**, wherein the seed meter assembly includes a first seed meter and a second seed meter,

wherein the first seed meter is configured to transport seeds from the first pool of seeds and the second seed meter is configured to transport seeds from the second pool of seeds.

6. The row unit of claim **1**, wherein the seed loader includes a rotatable hub and a sweeper extending generally radially from the hub, the sweeper including a paddle for directing the seeds to the conveyor.

7. The row unit of claim **6**, wherein the sweeper is cantilevered from the hub for flexion.

8. The row unit of claim **6**, wherein the sweeper includes a forked arm disposed radially between the hub and the paddle.

9. A row unit for a seeding machine comprising:
 

- a first seed meter having a first metering member for moving seeds sequentially from a first seed pool;
- a second seed meter having a second metering member for moving seeds sequentially from a second seed pool; and
- a seed loader in communication with the first and second seed meters, the seed loader configured to selectively receive seeds from one or both of the first and second seed meters.

10. The row unit of claim **9**, further comprising a conveyor having a conduit for discharging the seeds from the seeding machine, wherein the seed loader is in communication with the conveyor for transferring the seeds to the conveyor.

11. The row unit of claim **10**, wherein the seed loader has a first opening disposed proximate the first seed meter for receiving a first seed therefrom, a second opening disposed proximate the second seed meter for receiving a second seed therefrom, and a third opening proximate the seed delivery mechanism for delivering at least one of the first or second seeds thereto.

12. The row unit of claim **10**, wherein the seed loader includes a reversible rotating sweeper.

13. The row unit of claim **9**, wherein the seed loader engages one or both of the first and second seed meters for selectively receiving seeds therefrom.

14. The row unit of claim **9**, wherein the seed loader selectively receives the seeds from one or both of the first and second seed meters without engaging the one or both of the first and second seed meters.

15. A seed loader for transferring a seed in a seeding machine, the seed loader comprising:

- a housing having a first meter opening, a second meter opening, and a delivery opening spaced about an axis;
- a hub portion configured to rotate within the housing about the axis; and
- a sweeper extending from the hub portion, the sweeper including a paddle extending generally away from the hub portion and configured to move from at least one of the first or second meter opening toward the delivery opening.

16. The seed loader of claim **15**, wherein the paddle is a first paddle and the sweeper further includes second and third paddles extending generally radially from the hub portion.

17. The seed loader of claim **15**, wherein the sweeper includes a flexible arm extending from the hub portion, wherein the paddle extends from the flexible arm.

18. The seed loader of claim **17**, wherein the flexible arm has radial and/or circumferential flexion capability with respect to the axis.

19. The seed loader of claim **17**, wherein the flexible arm is substantially symmetrical about a radial axis.

20. The seed loader of claim **15**, wherein the hub portion is a first hub portion and the sweeper is a first sweeper, further



comprising a second hub portion configured to rotate within the housing about the axis and disposed axially adjacent the first hub portion, and a second sweeper extending from the second hub portion, wherein the first sweeper is disposed in communication with the first meter opening and the second sweeper is disposed in communication with the second sweeper opening.

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