US 20250256936A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2025/0256936 A1**

Goecke et al. (43) **Pub. Date: Aug. 14, 2025**

(54) **AUTOMATED MACHINES AND METHODS TO APPLY TAPE TO A SURFACE**

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(21) Appl. No.: **19/049,994**

(22) Filed: **Feb. 10, 2025**

Related U.S. Application Data

(60) Provisional application No. 63/551,626, filed on Feb. 9, 2024.

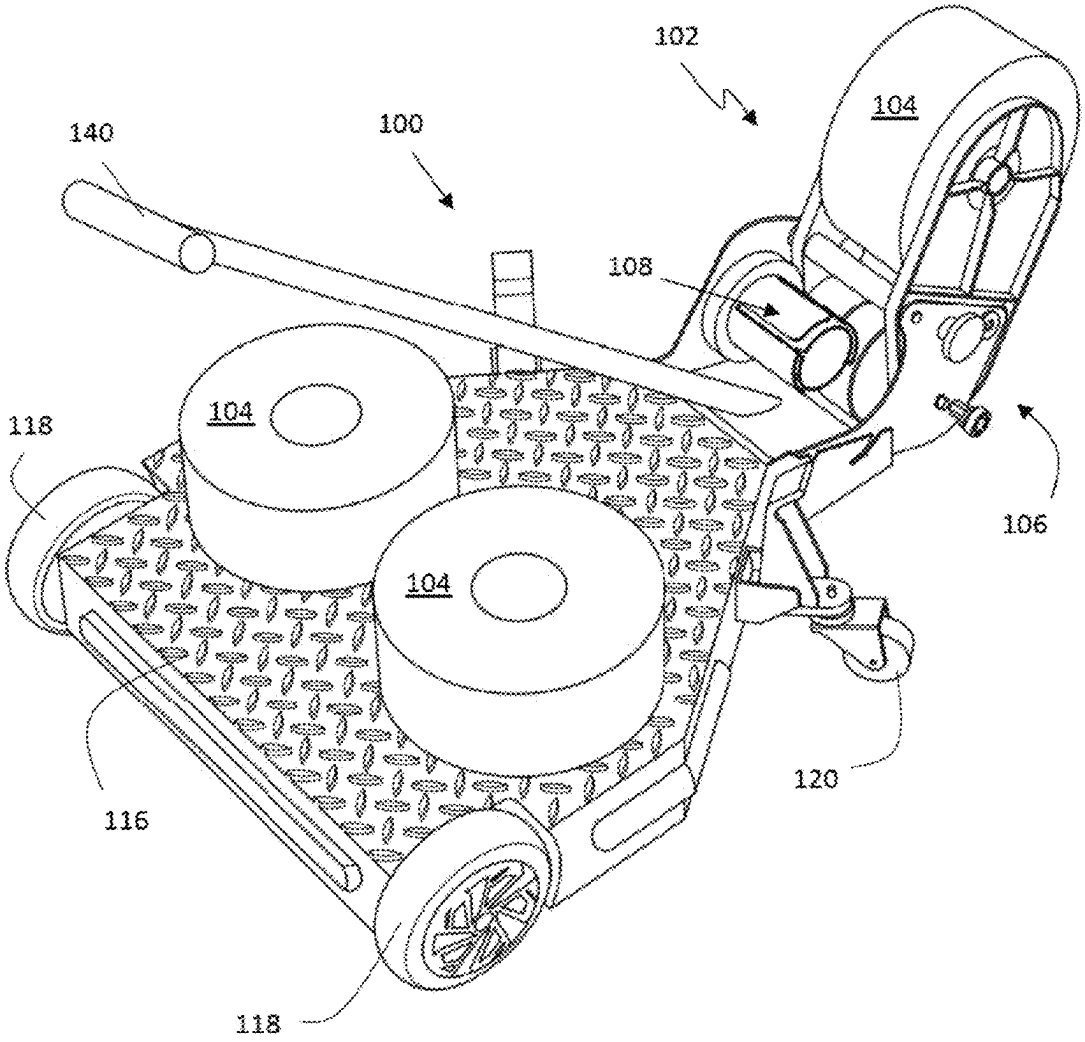
Publication Classification

(51) **Int. Cl.**
B65H 35/00 (2006.01)

(52) **U.S. Cl.**
CPC ***B65H 35/0013*** (2013.01); ***B65H 35/0073*** (2013.01); *B65H 2701/377* (2013.01)

(57) **ABSTRACT**

A machine to apply tape to a surface includes a handle for manipulation by a user connected to a wheeled applicator allowing the tape to be dispensed from the applicator and rolled onto a surface. The applicator includes two sidewalls adjustable relative to each other on guide bars to define space therebetween where rolls of tape having different widths can be accommodated. The sidewalls further include bottom portions shaped complimentarily with the wheel to define a path sized for a width of the tape around the wheel, and where the sidewalls further define a path sized for the width of the tape over at least one guide bar. The applicator also may include a clutched take-up reel operatively connected to the wheel, where rotation of the wheel causes the take-up reel to rotate and collect a liner.



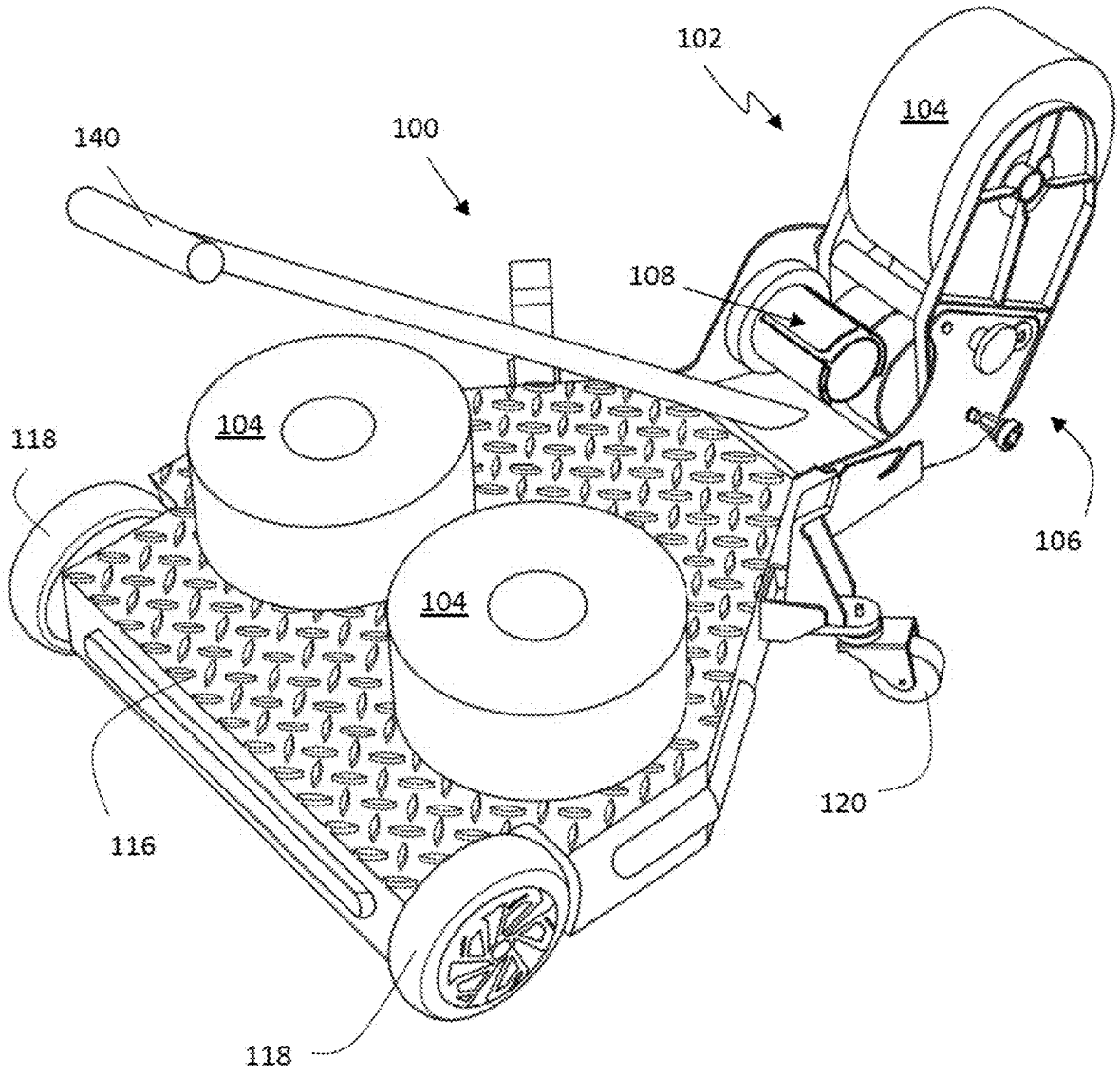


Fig. 1A

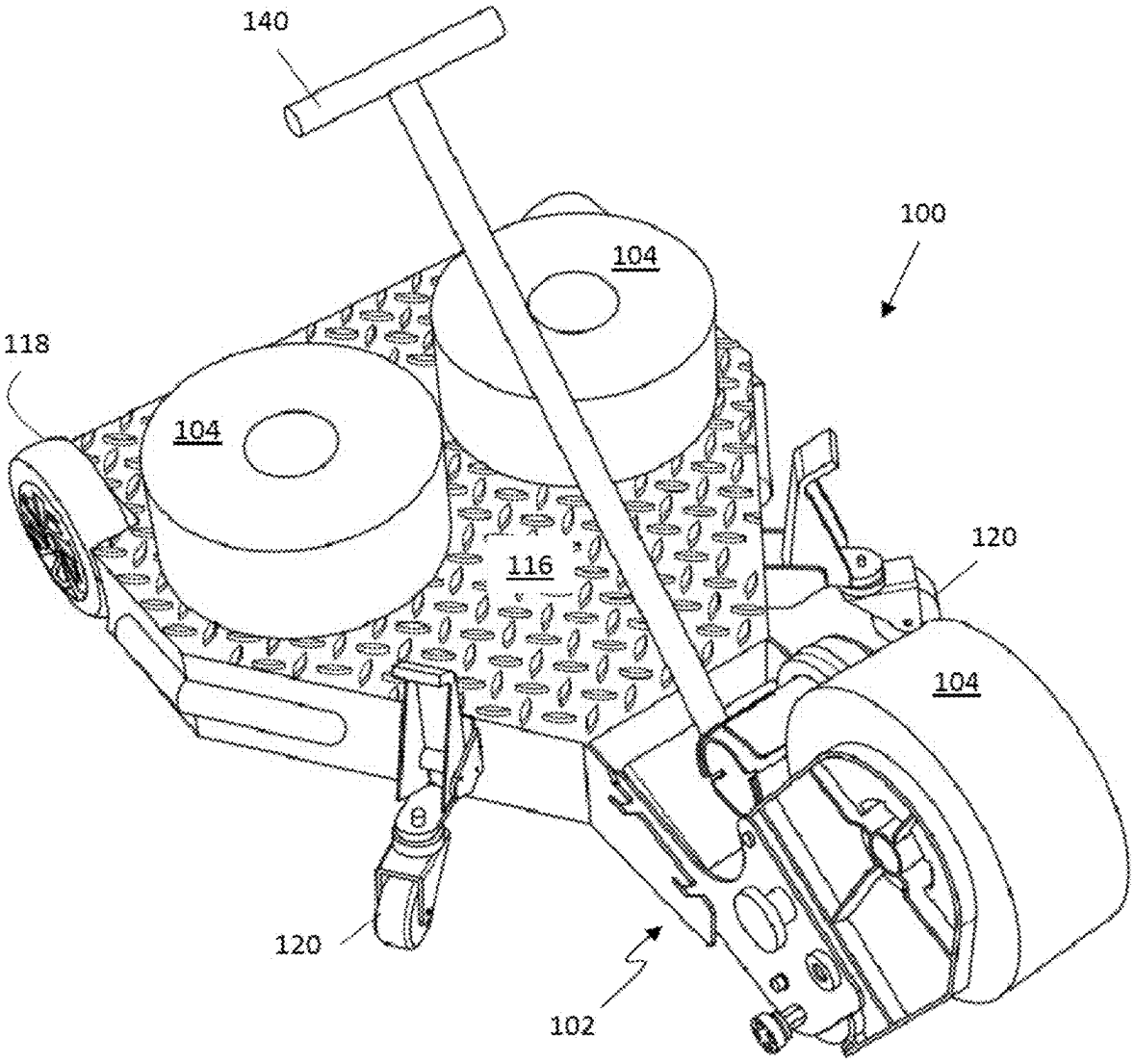


Fig. 1B

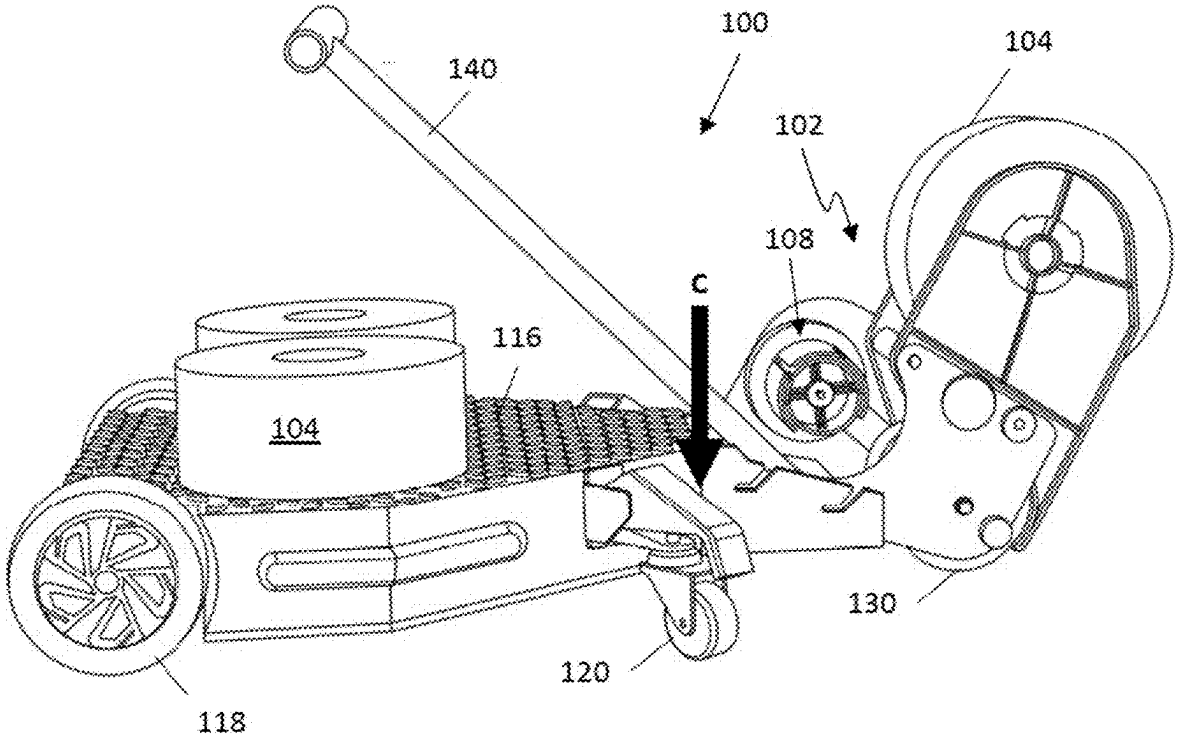


Fig. 1C

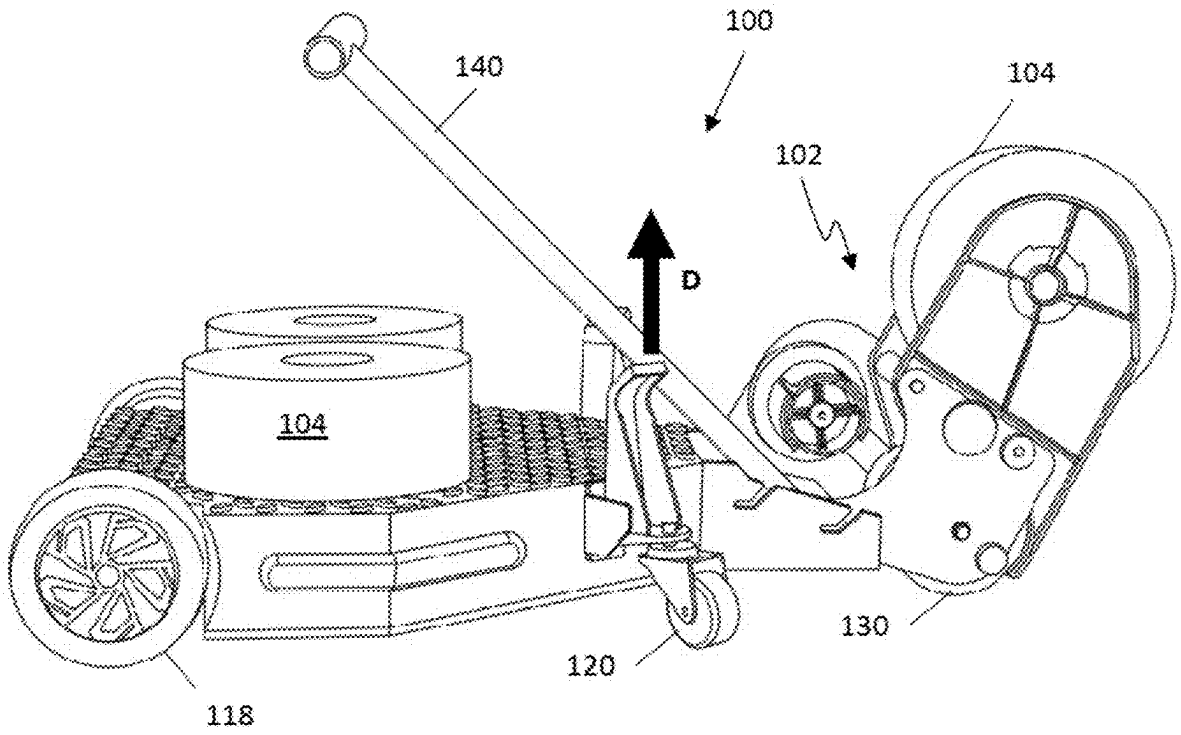


Fig. 1D

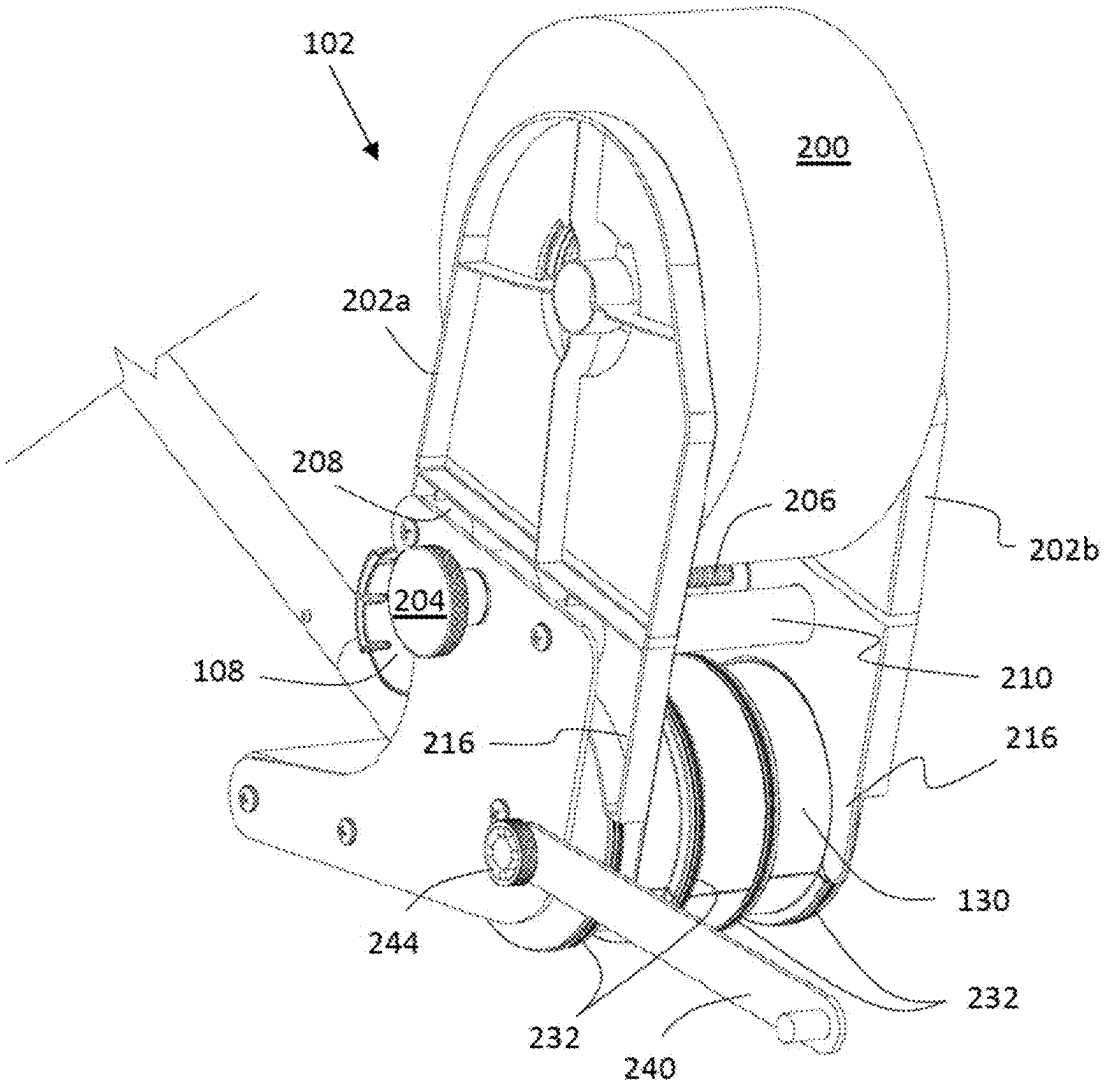

102
200
202a
208
206
202b
204
210
108
216
216
130
244
232
232
240

Fig. 2

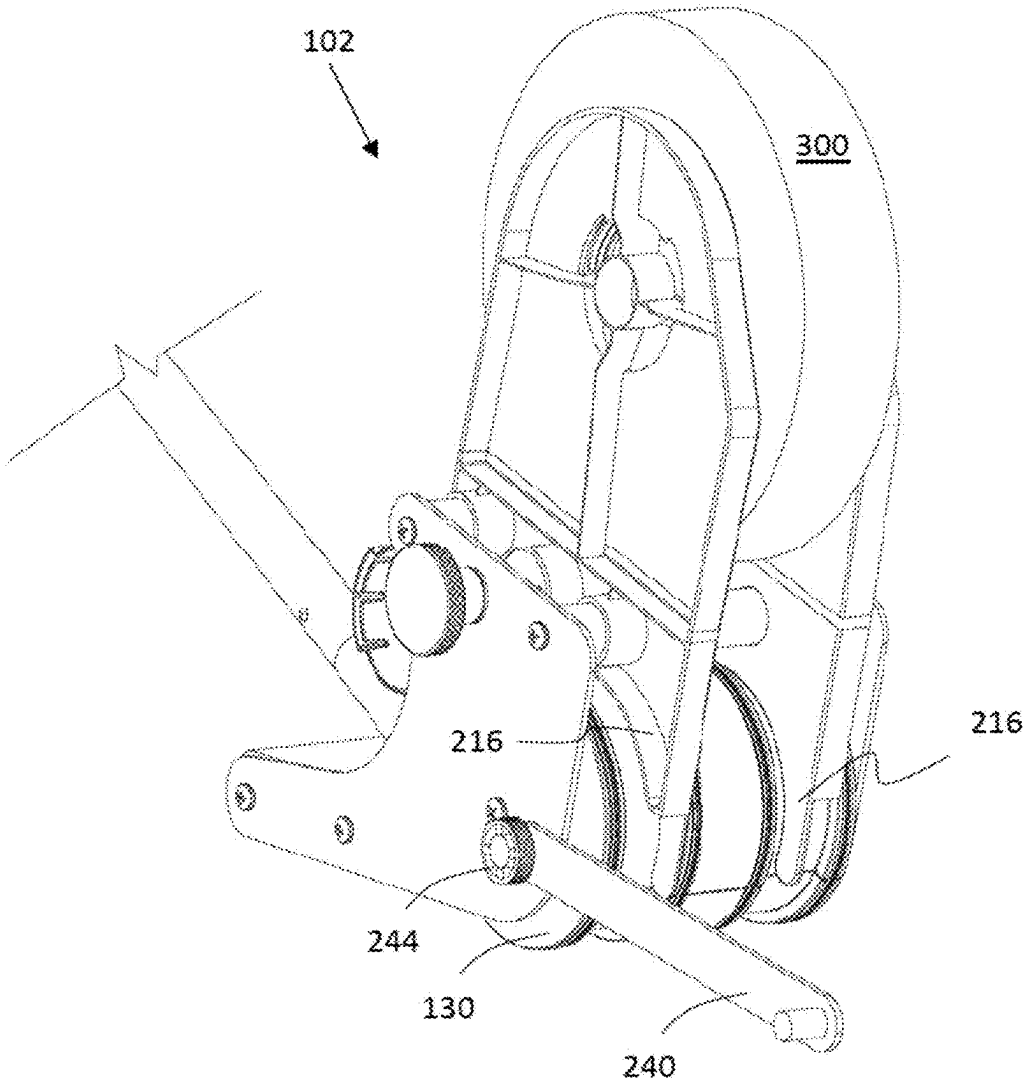


Fig. 3

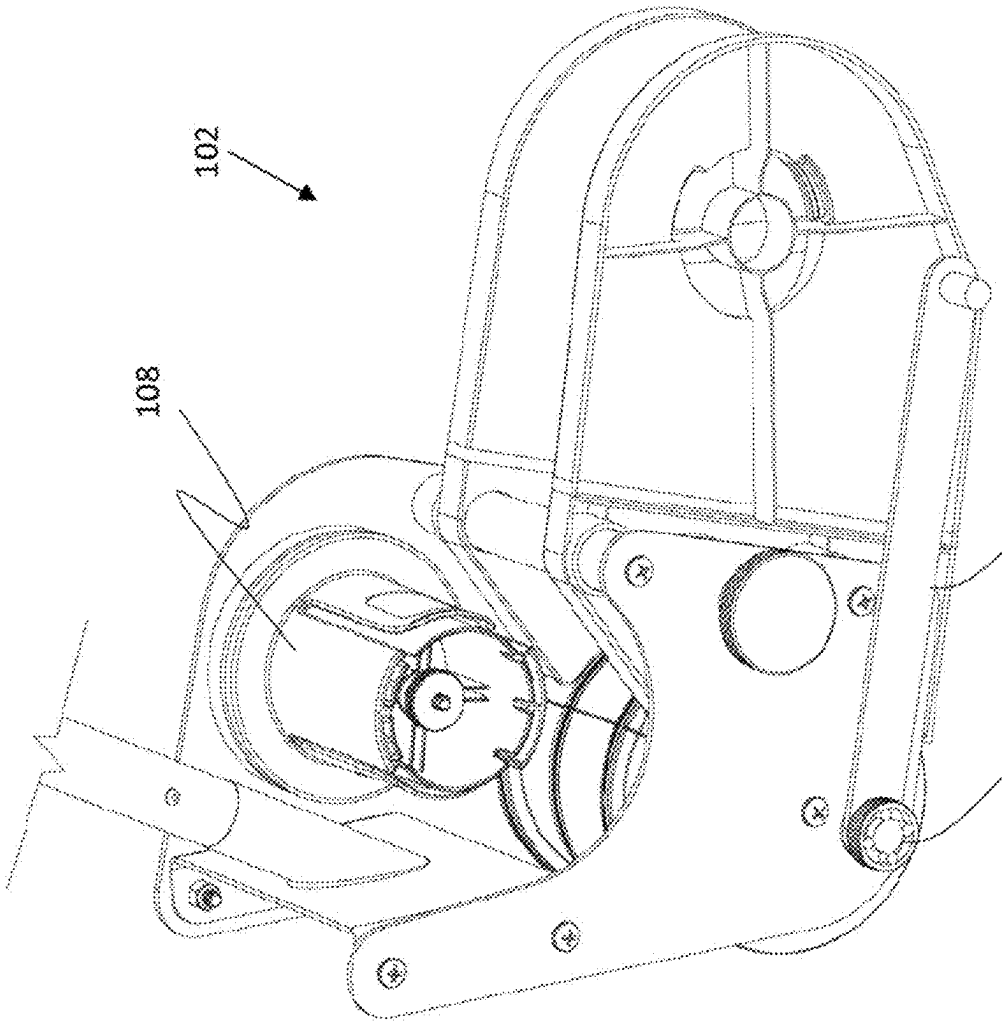


Fig. 4

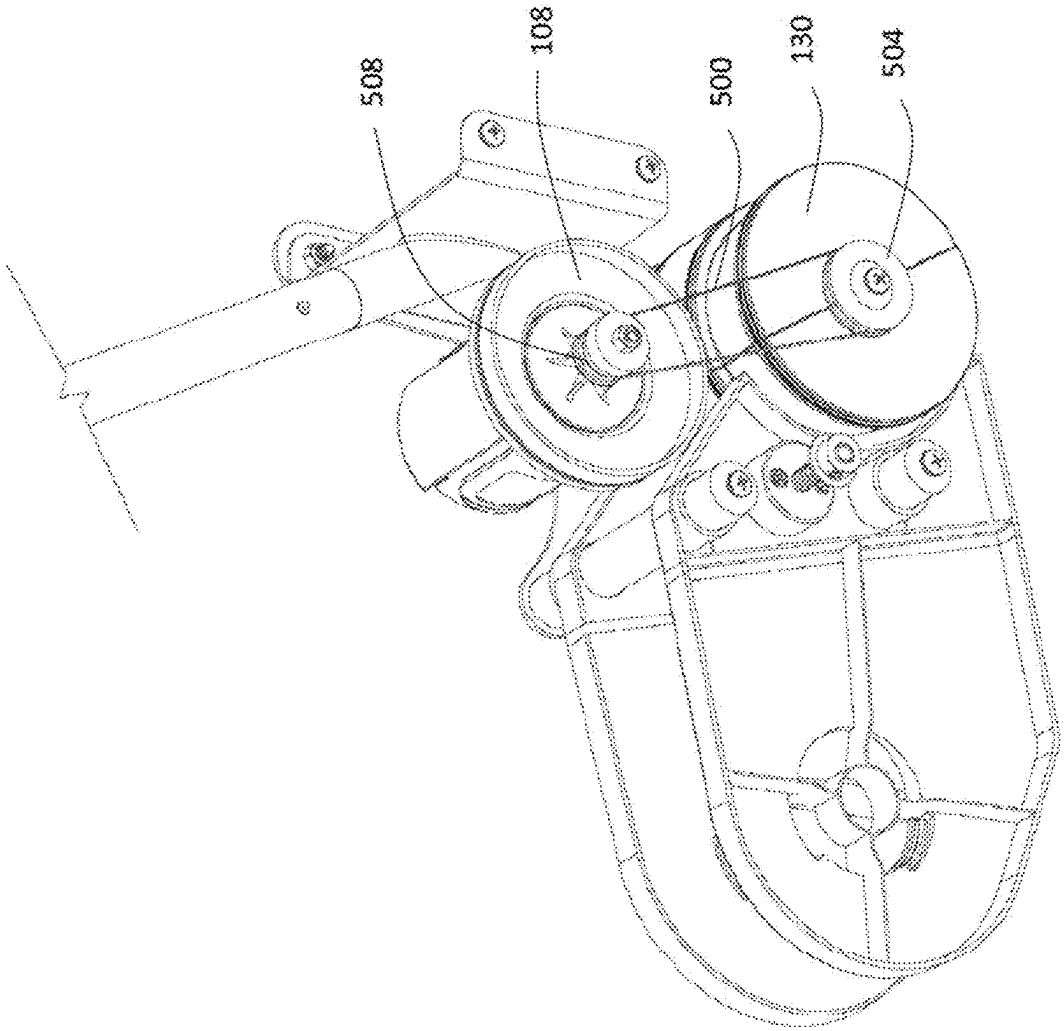


Fig. 5

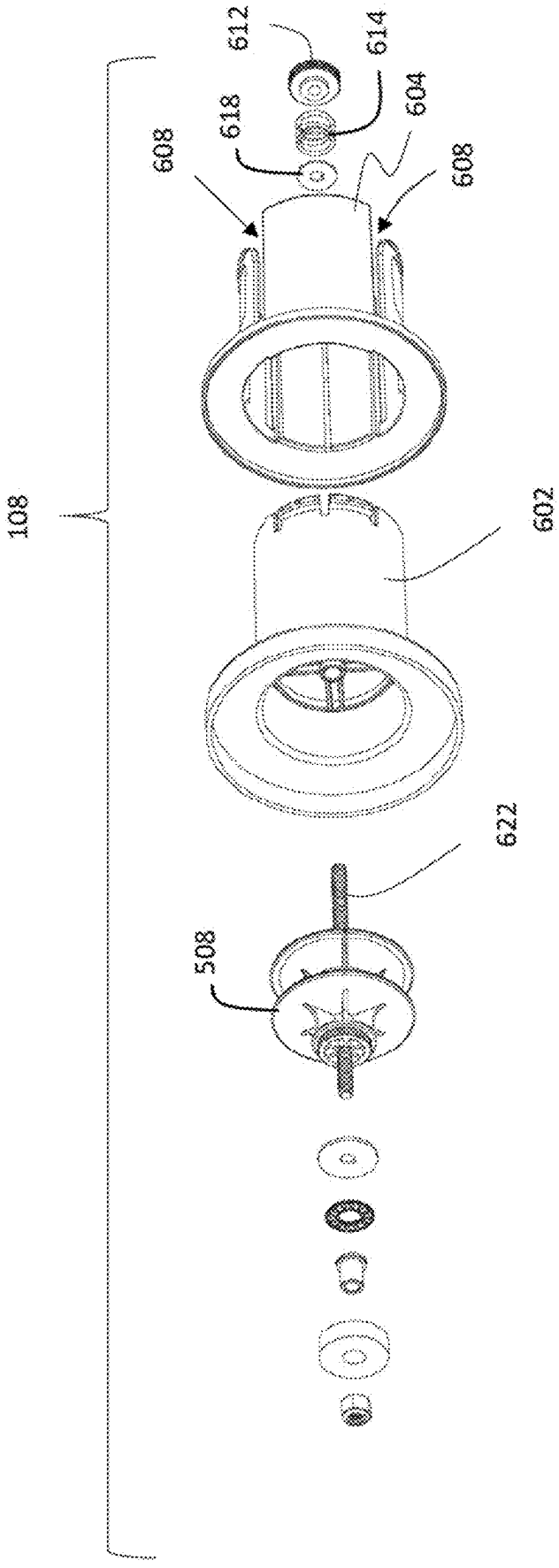


Fig. 6

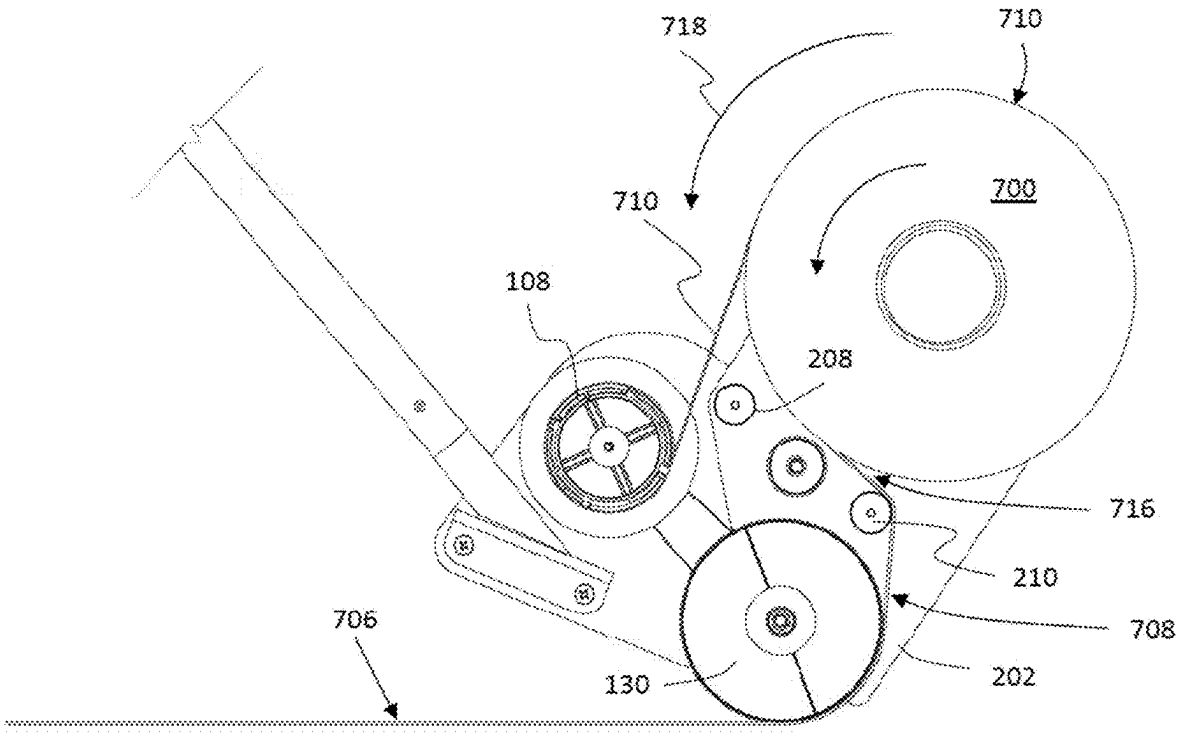


Fig. 7

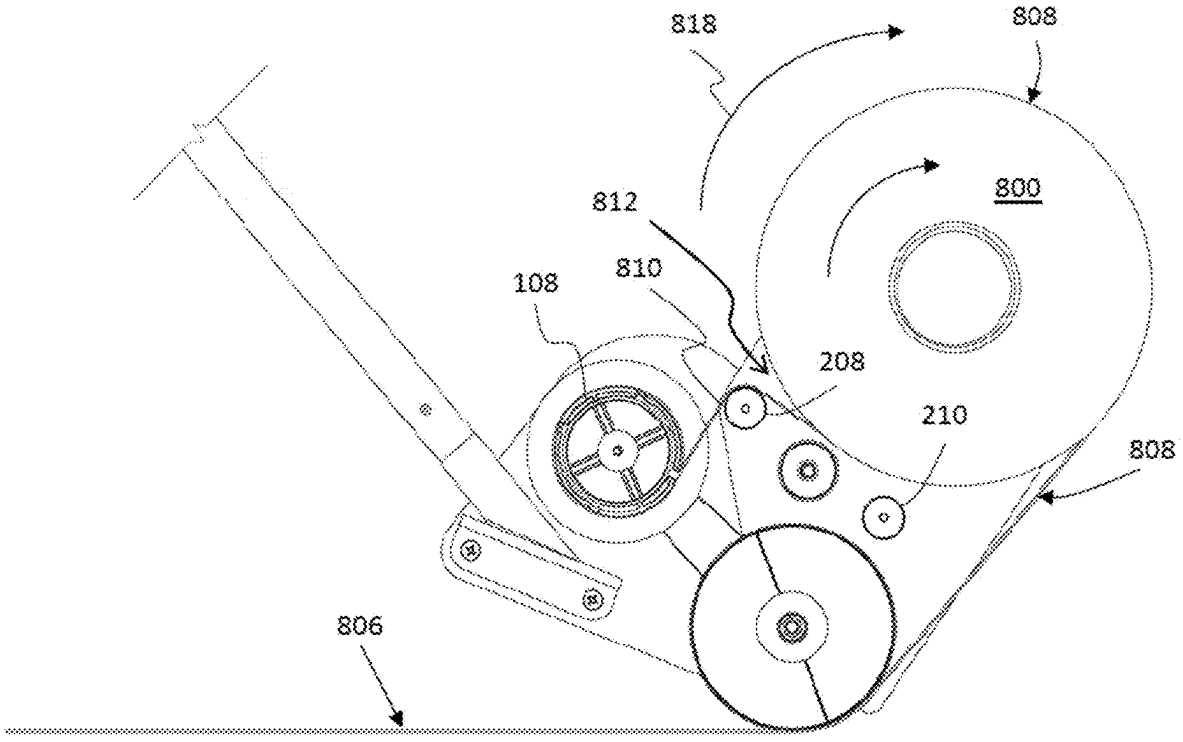


Fig. 8

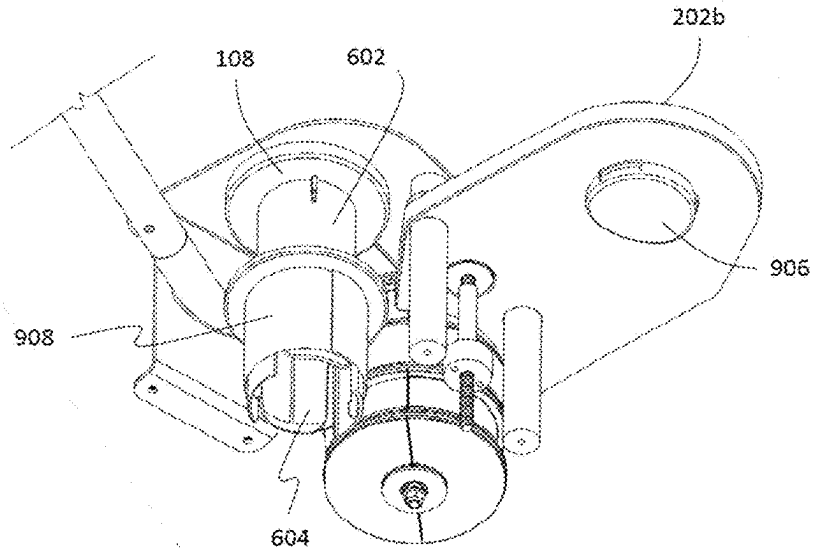


Fig. 9

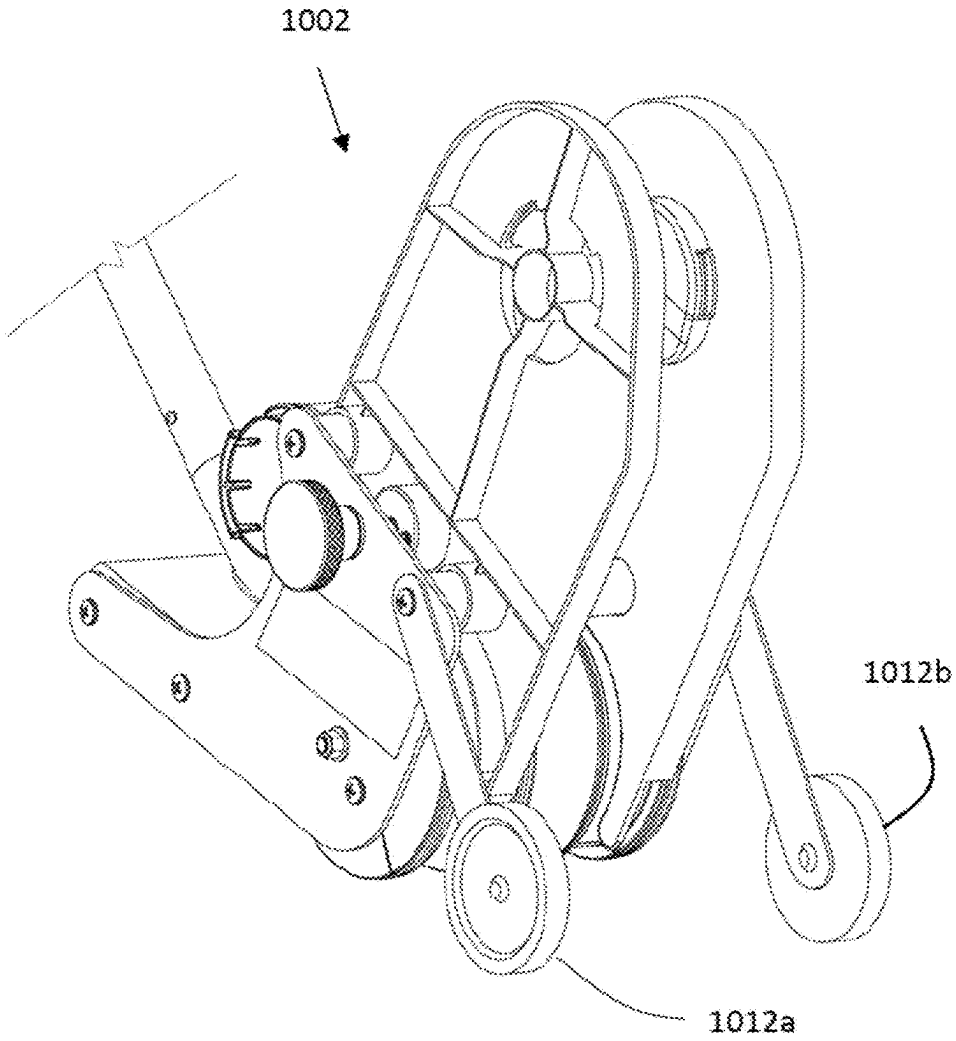


Fig. 10

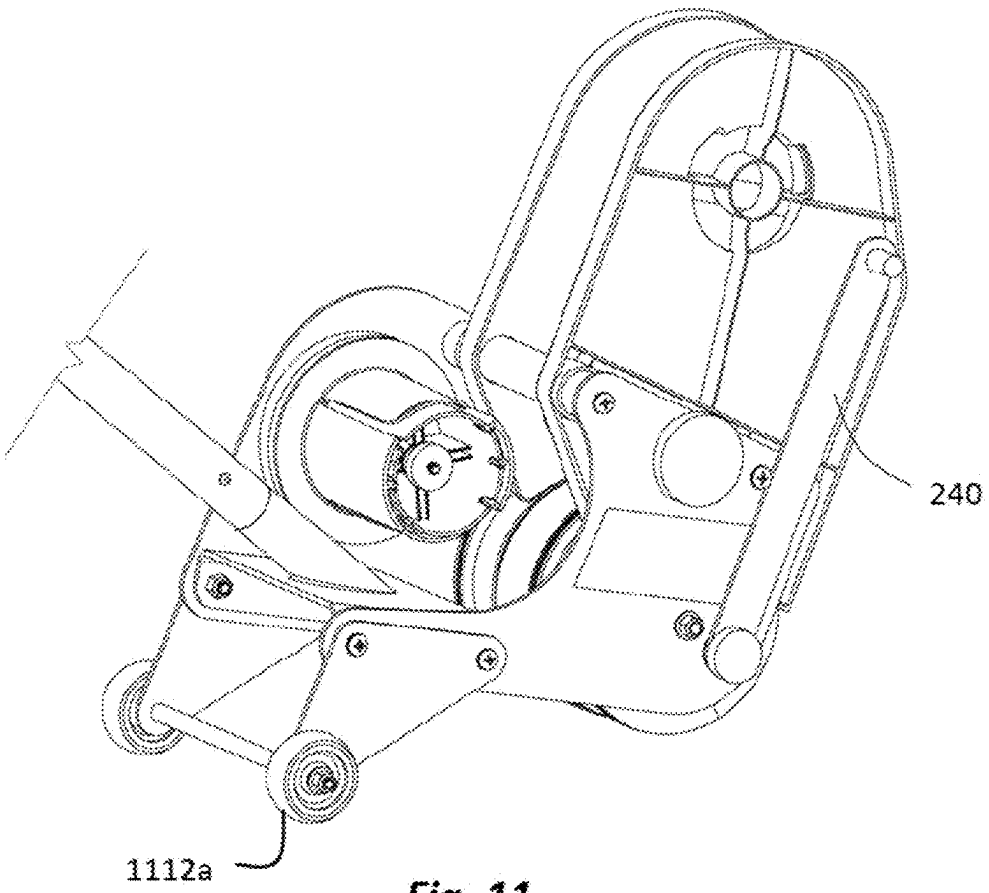


Fig. 11

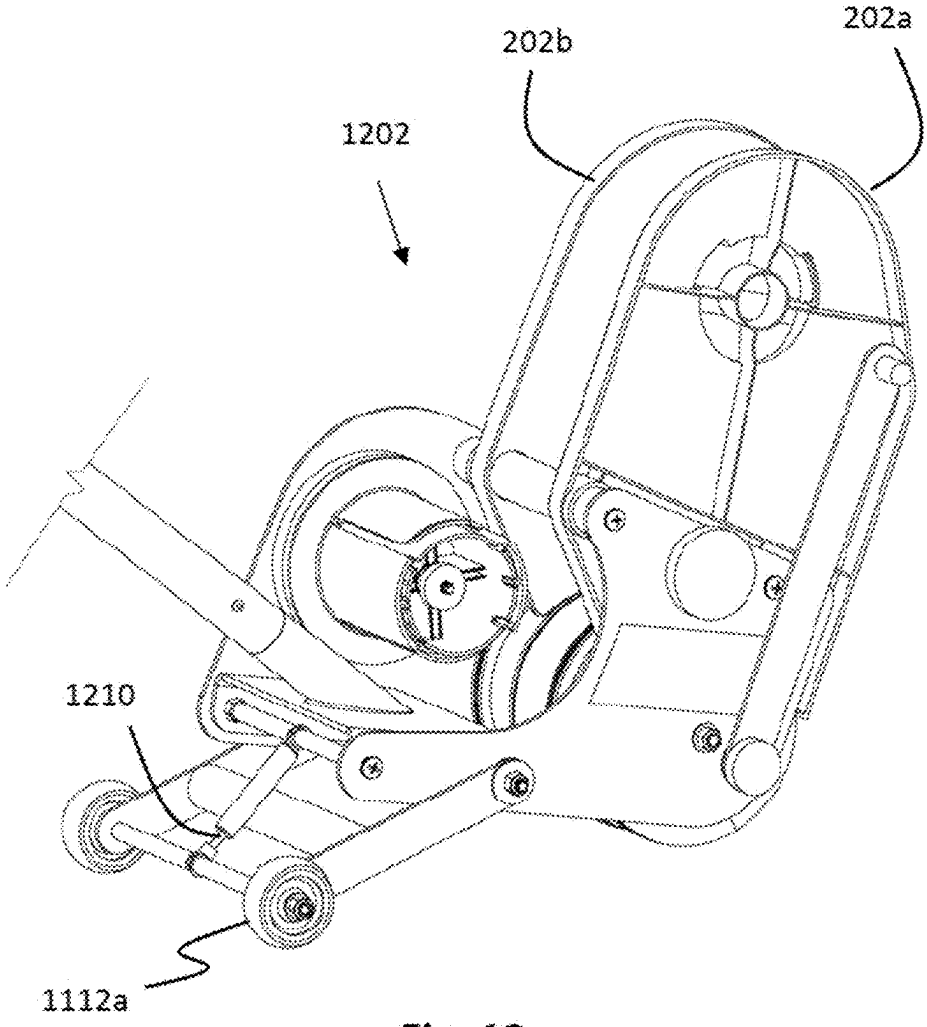


Fig. 12

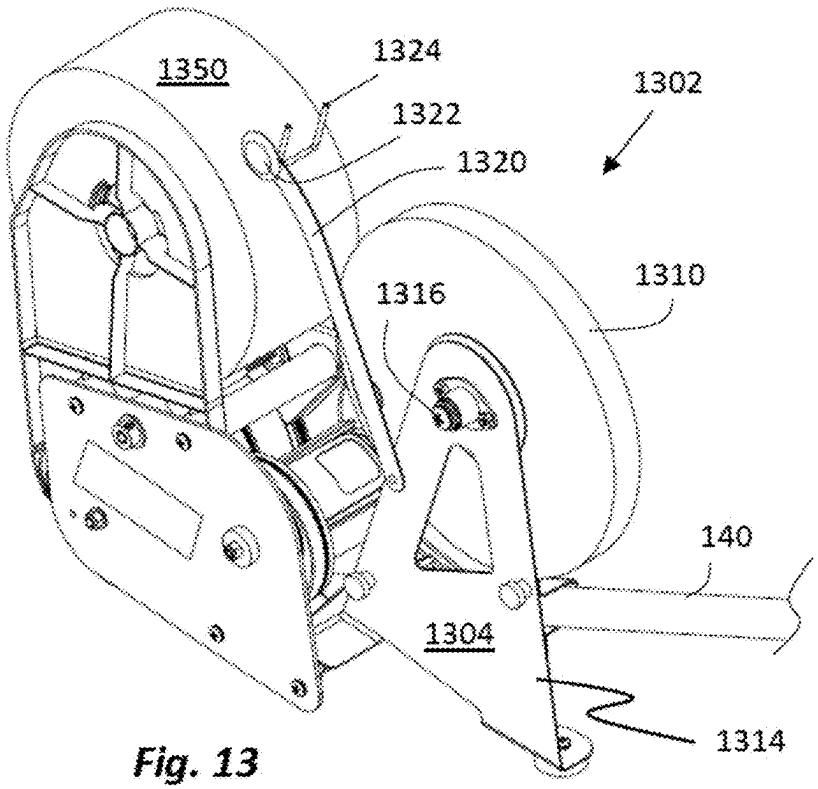

1350
1324
1322
1320
1302
1316
1310
140
1304
1314

Fig. 13

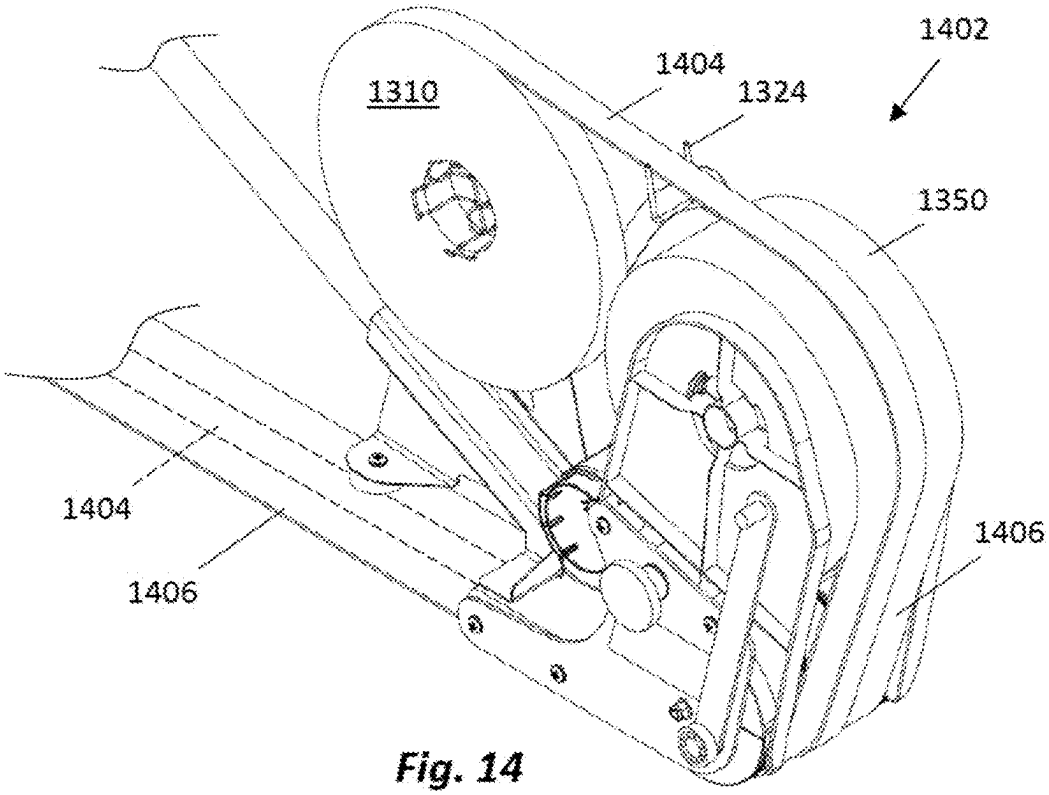

1402
1404
1310
1324
1350
1404
1406
1406

Fig. 14

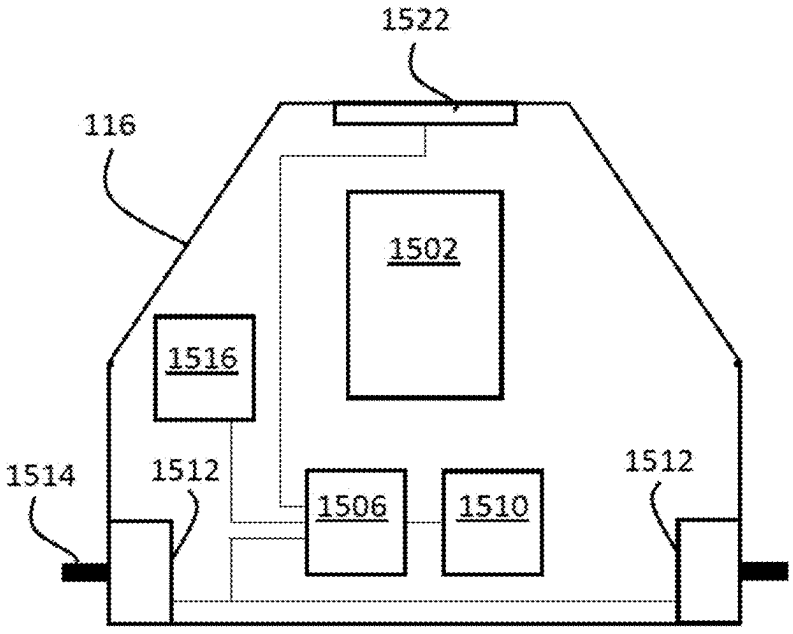


Fig. 15

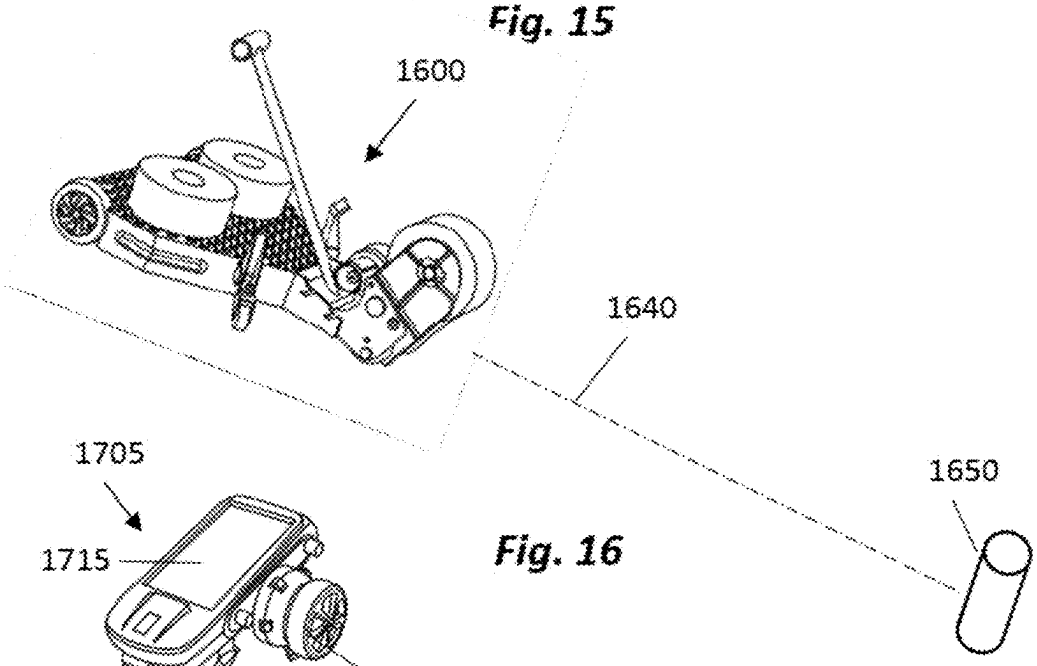


Fig. 16

Fig. 17

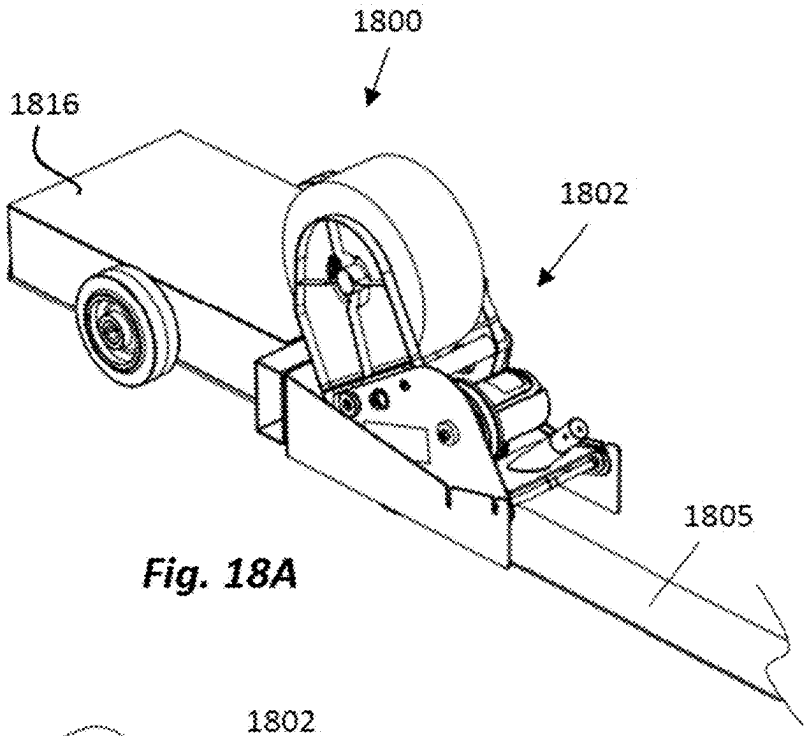


Fig. 18A

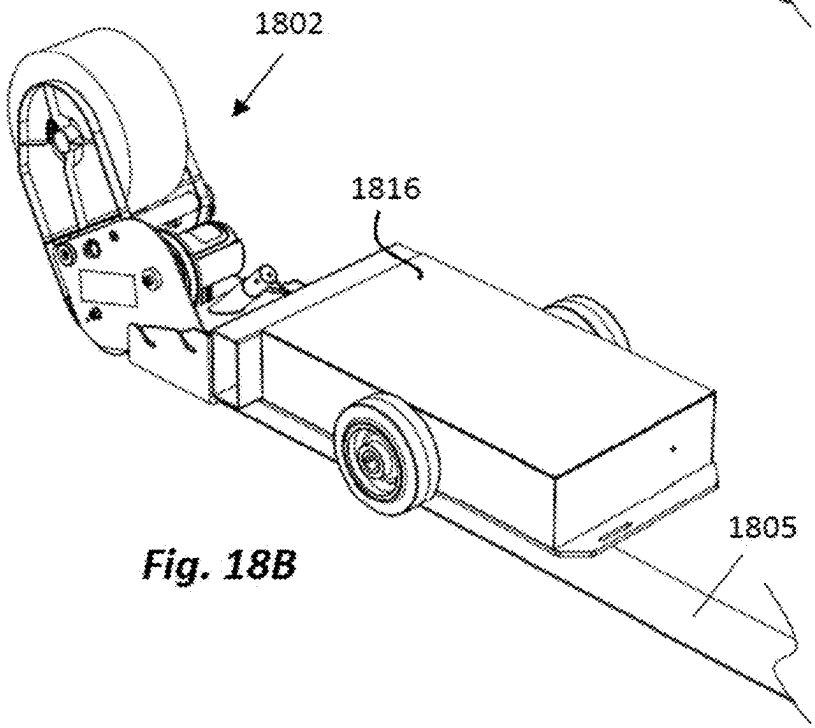


Fig. 18B

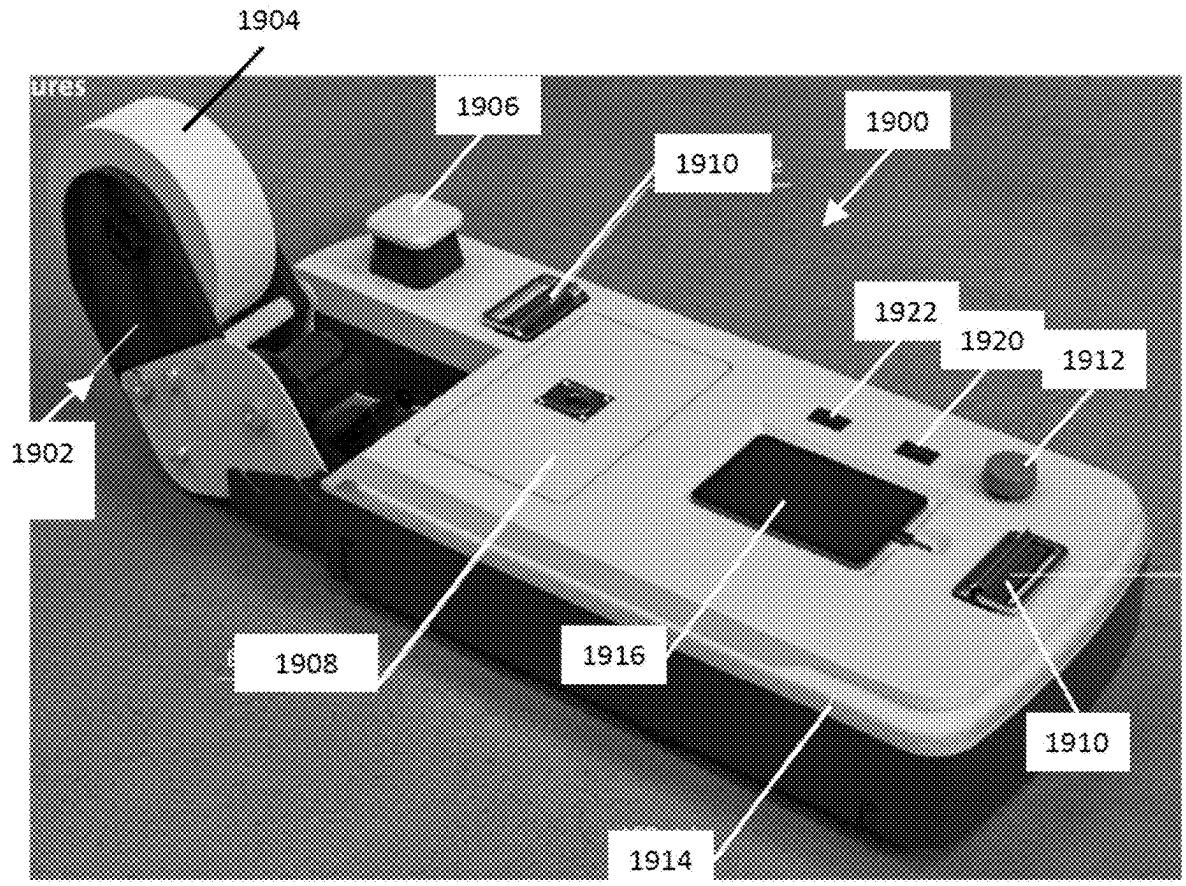


Fig. 19

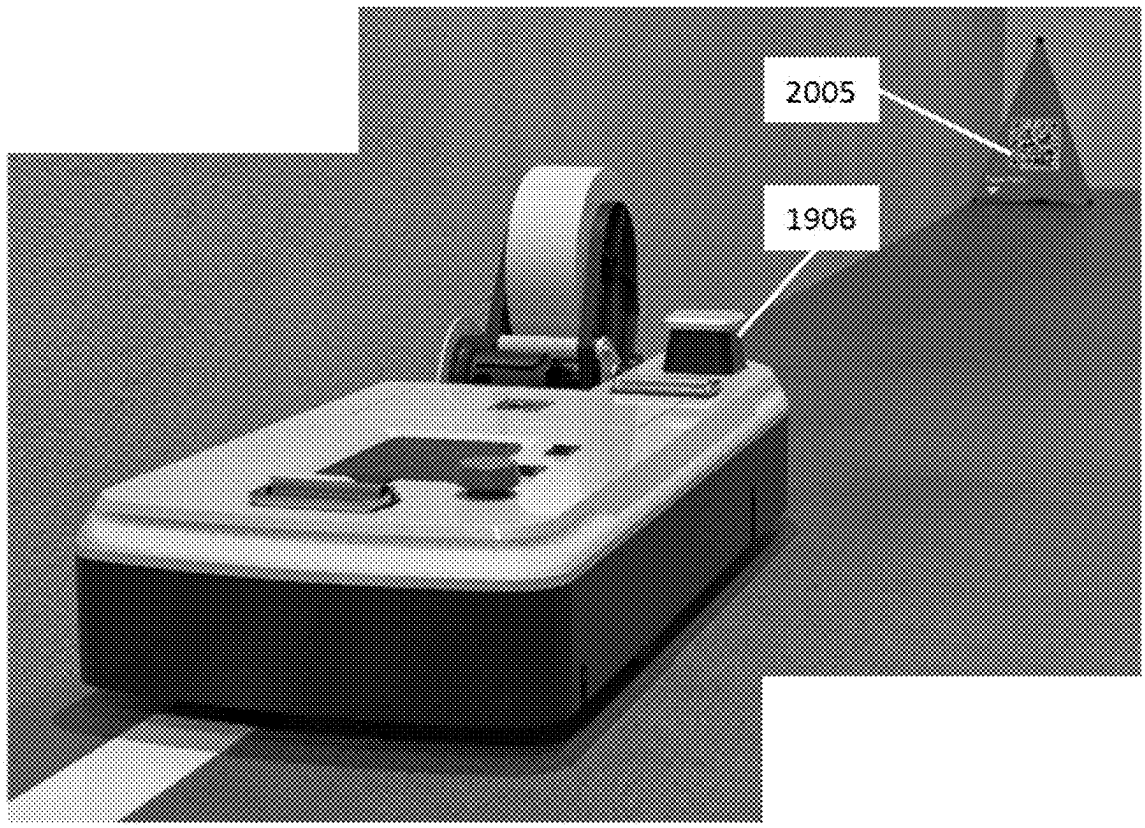


Fig. 20

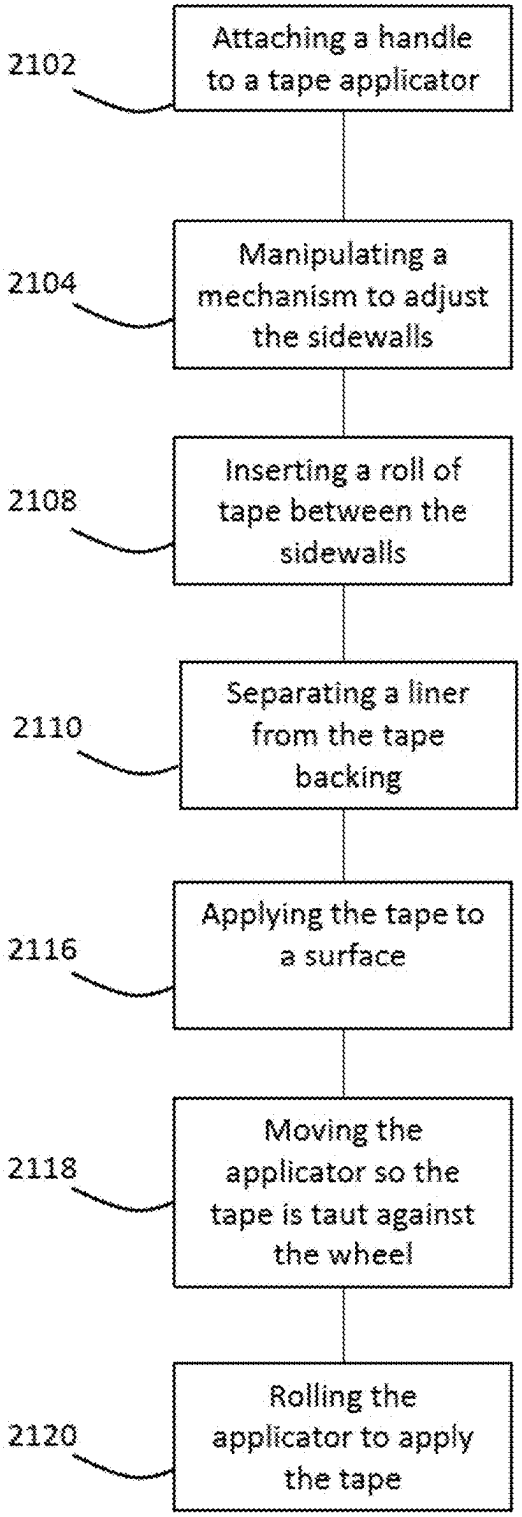

2102
Attaching a handle to a tape applicator
2104
Manipulating a mechanism to adjust the sidewalls
2108
Inserting a roll of tape between the sidewalls
2110
Separating a liner from the tape backing
2116
Applying the tape to a surface
2118
Moving the applicator so the tape is taut against the wheel
2120
Rolling the applicator to apply the tape

Fig. 21

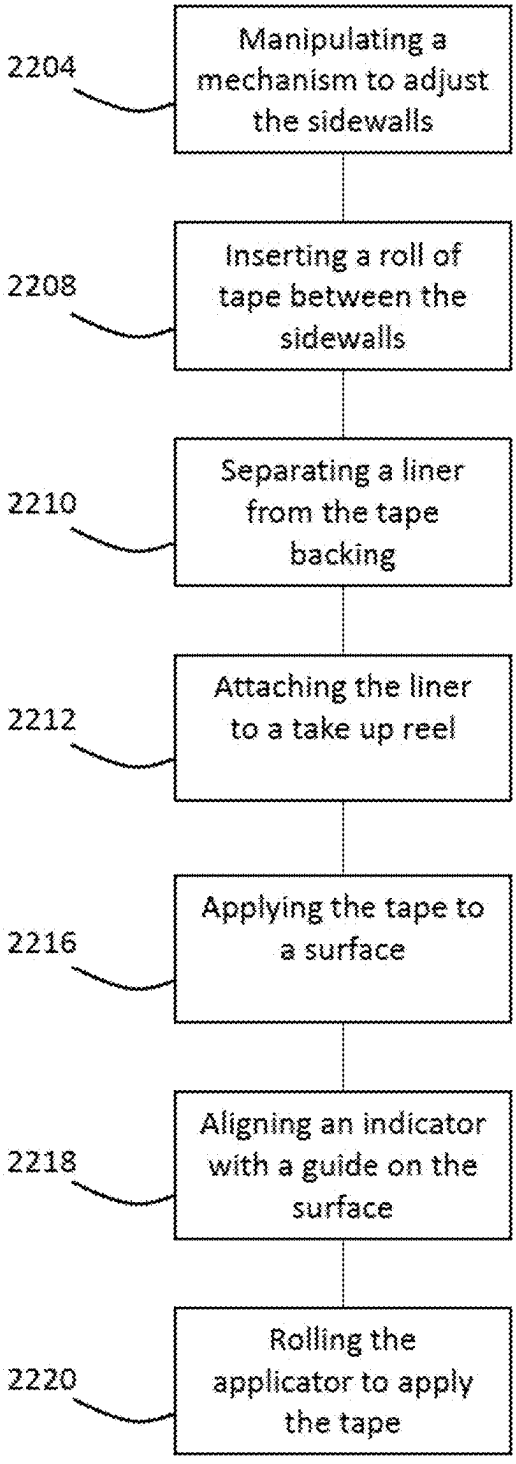

2204
Manipulating a mechanism to adjust the sidewalls
2208
Inserting a roll of tape between the sidewalls
2210
Separating a liner from the tape backing
2212
Attaching the liner to a take up reel
2216
Applying the tape to a surface
2218
Aligning an indicator with a guide on the surface
2220
Rolling the applicator to apply the tape

Fig. 22

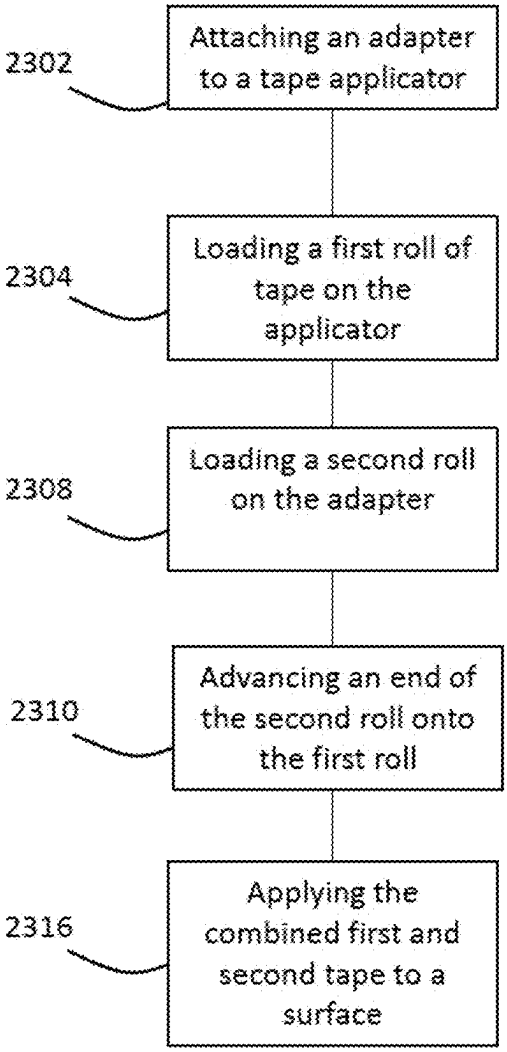

2302
Attaching an adapter to a tape applicator
2304
Loading a first roll of tape on the applicator
2308
Loading a second roll on the adapter
2310
Advancing an end of the second roll onto the first roll
2316
Applying the combined first and second tape to a surface

Fig. 23

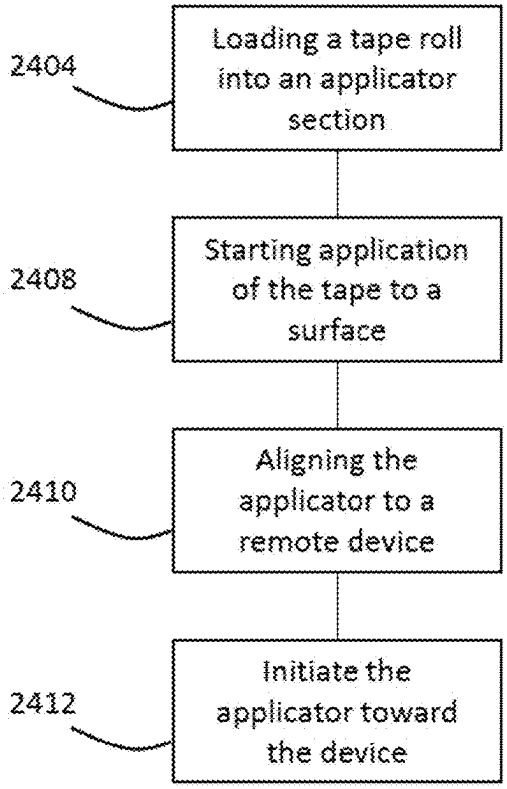

2404
Loading a tape roll into an applicator section
2408
Starting application of the tape to a surface
2410
Aligning the applicator to a remote device
2412
Initiate the applicator toward the device

Fig. 24

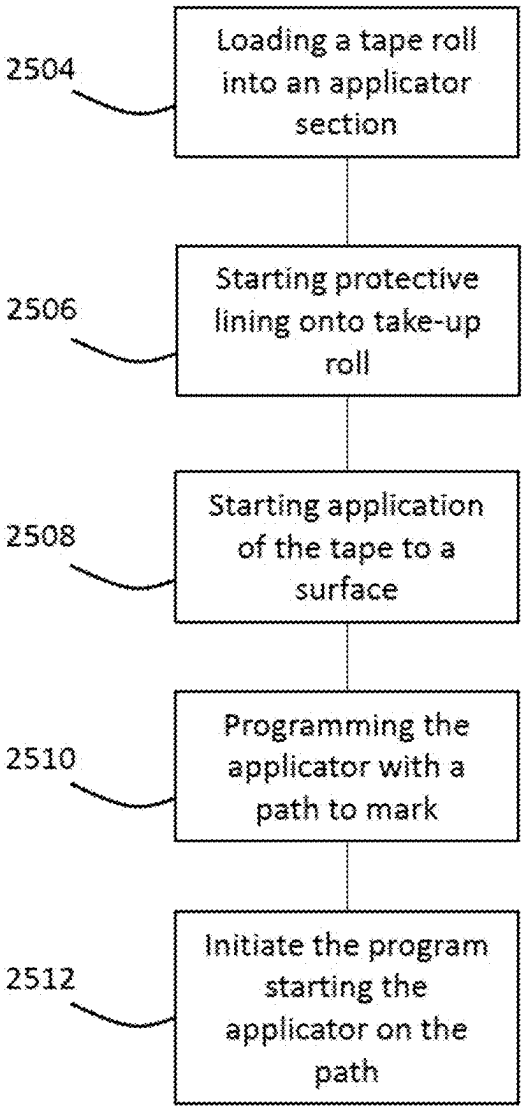

2504
Loading a tape roll into an applicator section
2506
Starting protective lining onto take-up roll
2508
Starting application of the tape to a surface
2510
Programming the applicator with a path to mark
2512
Initiate the program starting the applicator on the path

Fig. 25

AUTOMATED MACHINES AND METHODS TO APPLY TAPE TO A SURFACE

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] The present application is related to and claims the benefit of priority to U.S. Provisional Application No. 63/551,626, filed Feb. 9, 2024, the disclosure of which is incorporated by reference in its entirety.

FIELD OF THE INVENTION

[0002] This disclosure is directed to the field of tape or pressure sensitive adhesive material placement on a surface. It finds application, among others, in the placement of floor marking tapes of varying dimensions in roll form onto a surface. Aspects include an applicator section connected to a wheeled housing, where the applicator section includes a roll dispenser directing tape to the flooring surface and a take-up roll for collection of a protective lining substrate often used to protect the adhesive in those instances where such liners are used. Other aspects include a power source and motorized propulsion to enable the machine to be controlled remotely. Yet other aspects include a remote device such as a beacon to which the machine can navigate to. Other aspects will be discussed below.

SUMMARY

[0003] Systems and methods are disclosed herein for economically applying floor tape, and indeed, most types of tapes, for example, masking tapes, painter's tapes, duct tape, packing tape-all of varying widths-to a surface, such as a floor. Desirably, the systems and methods permit remote control of the machine or internal navigation to permit automated, "hands-off" application of tapes.

[0004] These illustrative features are mentioned not to limit or define the disclosure, but to provide examples to aid understanding thereof. Additional embodiments are discussed in the Detailed Description, and further description is provided there.

DESCRIPTION OF THE FIGURES

[0005] These and other features, embodiments, and advantages of the present disclosure are better understood when the following Detailed Description is read with reference to the accompanying drawings.

[0006] FIGS. **1**A-**1**D are views of an automated machine to apply tape to a surface.

[0007] FIG. **2** is an enlarged view of an applicator section of a machine to apply tape to a surface with a roll of tape installed.

[0008] FIG. **3** is an enlarged view of an applicator section to apply tape to a surface with a roll of tape installed.

[0009] FIG. **4** is an enlarged top, right side elevational view of an applicator section to apply tape to a surface.

[0010] FIG. **5** is an enlarged top, left-side elevational view of an applicator section to apply tape to a surface with the left side panel removed.

[0011] FIG. **6** is an exploded view of an embodiment of a take-up reel and clutch assembly.

[0012] FIG. **7** is a side view of an applicator section with side cover and arm removed showing the take-up reel and a typical roll of tape (tape face on top, removable liner on bottom).

[0013] FIG. **8** is a side view of an applicator section with side cover and arm removed showing the take-up reel and an alternate roll of tape (removable liner on top, tape on bottom).

[0014] FIG. **9** is a side elevated perspective view of an applicator section with side cover and arm removed showing take-up reel in an extended position.

[0015] FIG. **10** is a forward perspective view of a different embodiment of a tracking indicator.

[0016] FIG. **11** is a right rear perspective view of a different embodiment of a rear wheel support.

[0017] FIG. **12** is a right rear perspective view of an alternate embodiment of a rear wheel support.

[0018] FIG. **13** is a rear perspective view of an adapter to hold a second roll.

[0019] FIG. **14** is a forward, right perspective view of an adapter applying a combination tape to a surface.

[0020] FIG. **15** is a schematic diagram of exemplary internal components of the wheeled housing.

[0021] FIG. **16** is a schematic of an exemplary automated tape applicator and a remote device.

[0022] FIG. **17** is an exemplary controller.

[0023] FIGS. **18**A and **18**B show an options for placement of a wheeled housing.

[0024] FIGS. **19** and **20** show options for another variation of an automated tape applicator.

[0025] FIG. **21** shows a method of applying a tape.

[0026] FIG. **22** shows a method of applying a tape.

[0027] FIG. **23** shows a method of applying a tape.

[0028] FIG. **24** shows a method of applying a tape.

[0029] FIG. **25** shows a method of applying a tape.

DETAILED DESCRIPTION

[0030] This disclosure describes techniques and methods that enable factory owners, for example, to maintain operations within the facility or an area of the facility during re-striping or reconfiguring where floor markings designating aisleways, hazardous areas, loading/storage areas and the like are located. Previously, such areas required facility shut down or severely impaired production while old painted lines were removed and new lines were painted. Additionally, marking tapes can be heavy and cumbersome to apply alone necessitating a simple applicator that is both sturdy enough to support a marking tape. Desirably the applicator may be self powered and controlled by a user interacting with a remote control. Optionally, the applicator may be guided by a beacon disposed in a spaced relationship with the applicator so that when the applicator is initiated, it begins applying tape as it self-propels toward the beacon. Other uses include the ability to program paths into the applicator.

[0031] In one example, rolls of durable tape may be economically applied to designate pedestrian walkways, fork-lift or other trafficways, and outline hazardous areas where equipment may be operating or materials may be stored. These durable tape markings may be applied quickly and while full factory operations are underway.

[0032] In another example, rolls of tape may be applied as borders for areas where painting is desired. For example, boundary lines may be quickly and economically laid in straight, curved, or lines of any contour to define lateral edges of a floor space where painted is to be applied in between.

[0033] In another example, rolls of tape may be applied in parking lots, vehicle traffic areas, sidewalks and the like to define parking spaces, drive lanes, walkways, etc.

[0034] Referring now to FIGS. **1**A-**1**D, a tape applicator **100** includes an applicator section **102** capable of rotatably holding a rolls of adhesive tape **104**, such as MightyLine® brand tapes commercially available at https://mightylinetape.com/, and other tapes with or without liners such as other polymeric tapes, masking tapes, painting tapes, duct tapes and the like. The applicator section **102** includes a roll dispenser assembly **106** directing tape **104** to the flooring surface and a take-up roll **108** for collection of a protective lining substrate (not shown) often used to protect the adhesive in those instances where such liners are used. The applicator section **102** is mounted onto or integrally formed into a wheeled housing **116**.

[0035] With particular reference to FIGS. **1**C and **1**D, in one embodiment, the wheeled housing **116** includes two fixed rear wheels **118** and two front wheels **120** movable between an extended position when actuator moves in direction indicated by arrow C which holds the applicator section **102** off the flooring surface and a retracted position when actuator moves in direction indicated by arrow D where the applicator is supported on the rear wheels **118** and a dispensing wheel **130** at the bottom of the applicator section **102** for application of the tape to the floor. In embodiments, the tape applicator **100** includes a handle **140** to allow a user to manually control the applicator **100**, in addition to the applicator being remotely controlled as further discussed below.

[0036] With reference now to FIG. **2**, a detail of an exemplary applicator section **102** supports a roll of tape **200** between two sidewalls **202***a*, **202***b*. In one embodiment, the sidewalls are adjusted by a turning knob **204** which actuates a screw drive **206** that connects to both sidewalls **202** and moves them apart or toward each other depending on rotation direction along guide bars **208**, **210**. Other mechanisms to position the sidewalls are envisioned including moving only one side wall and mechanisms to fix the sidewall(s) in place with pins, detents, clips, electromechanical actuators and the like. As will be further discussed below, in certain arrangements, guide bar **210** may also act as part of a path travelled by a tape as it comes off a roll **200**. In cases where the tape includes a protective liner (not shown), the tape backing and protective liner can be separated as the tape passes over guide bar **210** for protective liner take up on a take-up reel **108** while the tape backing is applied to a surface.

[0037] Applicator section **102** also includes at least one dispensing wheel **130** having elastomeric or other suitable bands **232** around a circumference of the wheel **230** at select locations. The bands **232** facilitate tracking of the applicator on the surface as well as providing friction to feed the tape off the roll **200** and onto the floor or other surface. While FIG. **2** includes four bands **232**, other embodiments can include differing numbers of bands including a continuous sleeve covering or partially covering the surface of the wheel **130**. In other embodiments, the two, opposite, outermost bands contact the flooring surface allowing tapes to pass therebetween which improves straight line tape installations while thinner inner bands contact the tape passing around the wheel.

[0038] Comparing FIGS. **2** and **3** best illustrates a guiding feature of the adjustable sidewalls **202** depending on the width of the roll of tape. As an example, assuming roll **200** has a width of four inches, bottom portions **216** of the sidewalls **202** are complimentarily shaped to, and partially encircle the wheel **130** defining a path for the tape over the wheel of four inches. FIG. **3**, in contrast, shows as an example roll **300** with a width of two inches and the bottom portions **216** of the sidewalls **202** defining a path for the tape over the wheel of two inches.

[0039] FIGS. **2**, **3** and **4** also show an indicator **240** movably connected to the applicator **102**. While the indicator is shown on the right side of the applicator **102**, it can be alternately mounted on the left side if desirable for a guide on that side. Indicator **240** rotates around a connection point **244** between a stored position (FIG. **4**) and an extended position (FIGS. **2** and **3**) in front of the applicator to indicate an approximate location on the surface where the tape backing will be applied. In other uses a guide on the floor surface may be aligned with the indicator to assist in application of tape in a desired position on the surface. Examples of guides include, a user snapped chalk line; a laser path; an existing seam, painted or taped line on the floor; or other mechanisms to be referenced by the indicator **240** to ensure tape application along the desired path.

[0040] Referring now to FIG. **5**, a left side view of the applicator is shown with a side panel removed to show one embodiment of the rotational coupling of the wheel **130** and the take-up reel **108**. In the illustrated embodiment, a belt **500** engages a driving wheel **504** connected to the wheel **130** and turning as the wheel moves along the surface. The belt also engages a clutch drive **508** connected to and rotating the take-up reel **108**. In other embodiments, a chain drive can be substituted. In still other embodiments, electrical sensor and motors can be substituted, where a motor on the take-up reel turns as to take up the liner when the wheel is rotating in a forward direction and where the motor on the take-up reel stops when the wheel is stopped or rotating in a rearward direction.

[0041] FIG. **6** illustrates an exploded view of the take-up reel **108** assembly. The assembly includes an inner sleeve **602** coupled to an outer sleeve **604**, where the outer sleeve **604** includes lengthwise slits **608** to receive an end of the liner after separation from the tape backing. In one embodiment, the outer sleeve **604** may slide off of, or slide at least partially away from the inner sleeve **602** to facilitate removal of collected liner wrappings after application of floor tape to the floor surface. Additionally, the take-up reel **108** acts as an adjustable clutch that variably slips or allows differential rotational speed of the take-up reel **108** as compared with the rotation of the wheel **130** (FIG. **5**). In use, an operator adjusts the clutch thumb fastener **612** to adjust the take-up rate. In one example, tightening the fastener **612** decreases the slip and increases the take up rate by compressing spring **614** onto clutch washer **618** which compresses the mechanism along threaded shaft **622** extending from the clutch drive **508**. Adjustment of the clutch drive accommodates variations in take-up speed of the liner and the application of the floor marking tape.

[0042] FIG. **7** shows a right side view with the right side sidewall and right side frame of the applicator removed to permit view of one embodiment of a path for tape backing and liner. Roll **700** includes a polymer tape backing with the finish side **706** outward on the roll **700**. Adhesive side **708** is at least partially covered by a protective liner **710** until approximately location **716** where the liner is separated from

the tape and is wrapped in the direction of arrow **718** and onto take-up reel **108**. At about the same location **716**, the tape backing is contained within the sidewalls **202** preventing drift or other lateral variation and routed over guide bar **210**. From guide bar **210**, the tape with the liner removed continues to be contained by sidewalls **202** and passes along a path to wheel **130** for application onto the flooring surface.

[0043] FIG. **8** shows a right side view with the right side sidewall and right side frame of the applicator removed to permit view of another embodiment of a path for tape backing and liner. Roll **800** includes a polymer tape backing with the finish side **806** inward on the roll **800** and the adhesive side **808** outward facing on the roll **800** and protected by liner **810** prior to application to the floor. In this embodiment, the roll **800** also rotates in a clockwise fashion and the liner **810** is removed and started on take-up reel **108** from the lower side of the roll at about the position **812**. As depicted, liner **810** is routed over guide bar **208** onto the take-up reel **108**. The then linerless tape backing continues around in direction of arrows **818** and is contained by sidewalls **202** at least through the path to wheel **130** for application onto the flooring surface.

[0044] Referring now to FIG. **9**, a partial right side view with the right side cover and sidewall **202***a* removed. Sidewalls **202** include inwardly facing hubs or protrusions **906** shaped to support of a roll of adhesive tape (not shown) and permit rotation of the roll of adhesive tape to dispense tape along the sized path between the sidewalls and under the wheel to the surface. In embodiments, the roll of adhesive tape includes a cardboard core or cores made from other materials around which the tape is rolled. Protrusions **906** are sized and shaped to accommodate the core permitting rotation. FIG. **9** additionally illustrates liner take-up reel **108** in the extended position where the outer sleeve **604** extends beyond the right side cover (not shown) to facilitate removal of collected lining material **908** after tape application to a flooring surface.

[0045] With reference now to FIG. **10**, other embodiments of an indicator include at least one additional wheel **1012***a* connected to the applicator section **102** and extending ahead of the applicator section **1002**. The wheels **1012***a*, **1012***b* singularly or together provide additional stability and also provide function of the indicator for a user to align with a guide while applying floor tape along a desired path on the surface.

[0046] With reference now to FIG. **11**, another embodiment includes both indicator **240**, and rear mounted, at least one additional fixed wheel **1112***a*. The at least one additional wheel **1112***a* provides some added stability and improved tracking along the flooring surface as well as another reference to inform a user of fidelity of tape application with respect to the guide line. For example, a user desiring a straight line tape path may refer to the additional wheel **1112***a* and maintain a consistent spacing between the wheel **1112***a* and the applied tape and/or any guide line on the floor.

[0047] FIG. **12** illustrates an alternate arrangement for the at least one additional wheel **1112***a*, where an adjuster arm **1210** can set varying angles for the applicator **1202** relative to the flooring surface. In the retracted position shown, the sidewalls **202***a*, **202***b* form a nearly perpendicular angle relative to the flooring surface, while in an expended position (not shown) the arms would form a more acute, smaller, angle relative to the flooring surface.

[0048] With reference now to FIG. **13**, an adapter **1304** to support a second roll **1310** of tape, wire or other material is illustrated for connection to an applicator section **1302**. Preferably, the tape, wire or other material comprises a detectable property, such as optical, electromagnetic, ferrous or the like to be detectable when installed beneath the floor tape. The adapter **1304** includes a frame **1314** that connects to the handle **140**. A hub **1316** supporting the second roll **1310** of tape is positioned at a location sufficiently spaced from the handle to allow clearance and rotation of the second roll **1310**. A guide arm **1320** attaches to the frame **1314** on one side and includes a tracking element, **1322** for example, a wheel, on the opposite side. Additionally, a guide **1324** is disposed on the opposite side and aligned substantially in the middle of the roll **1350** held by the applicator section **102**.

[0049] As best appreciated by reference to FIG. **14**, in use, second tape, wire or other material **1404** is fed off roll **1310** and onto the middle of the adhesive side of roll **1350** on the applicator section **1402**. A combination of second tape, wire or other material **1404** and tape **1406** from the roll **1350** travels along the path through the applicator onto the surface. In embodiments, second roll **1310** includes magnetic, metallic, electrical, optical or other properties that allow it to be sensed by robotic or manual machinery operating in a factory, healthcare or other facility. Specifically, a sensor on the machinery detects the second tape, wire or other material **1404** underneath the tape **1406** on the surface allowing robotic machinery to track along the path or providing alerts or prompting for manual machinery when it deviates from the path.

[0050] Referring to FIGS. **15** and **16**, a diagrammatic depiction of exemplary components for powering and controlling the applicator **1600**. The housing contains a power source **1502** powering the components (electrical connections not shown for clarity). Preferably the power source **1502** includes a rechargeable internal battery and necessary charging port connections (wireless or wired) to an external power source to recharge. Processing logic **1506**, for example an application specific integrated circuit (ASIC) or a microprocessor, may be programmed to control the unit and dispense tape along a path. As a relatively simple example, in response to a user command (for example, voice, manipulation of a switch or control on the applicator, or interaction via remote control (wireless or wired)); a program stored in memory **1510**; or interactions with a guide marker, beacon or other remote marking apparatus **1650** (FIG. **16**) the processing logic **1506** may control motors **1512** connected to axles **1514** and cause wheels (not shown) to move the applicator **1600** along a desired path and apply tape or, alternatively, stop movement and tape application. For example, a user may interact with a remote control, phone or computer app, or other remote communication device to start or control movement of the applicator. As another example, processing logic **1506** may respond to a signal from an accelerometer **1516** to note movement and estimate distance travelled, and in embodiments, stop tape application after a set distance or at the end of a path. Additionally, processing logic **1506** may stop tape application when approaching an obstacle or when tape supply is low or exhausted. Moreover, processing logic can be programmed with the desired path to apply tape, or programmed with areas to avoid application as in a "keep out zone." As discussed above, the illustrated functional blocks may be combined or divided into further functional blocks,

as one example, memory **1510** may include a single computer-readable medium, one computer-readable media formatted into several logical different memory blocks, as well as several similar or different physical computer-readable media.

[0051] Processing logic **1506** may further interface with at least one transceiver **1522** for exchanging wireless signals **1640** with one or more remote devices **1650**. As further discussed below, transceiver **1522** may employ various signal transfer protocols, including but not limited to infra-red, Bluetooth, ZigBee, WiFi, AM, FM, as well as known and later developed radio-frequency, infra-red or other signaling protocols. In alternate embodiments, a camera (FIG. **19**, **20**) may be used additionally or alone. As a non-limiting specific example, a communication link **1640** is established between the applicator **1600** and the remote device **1650**, the processing logic **1506** can control the motors **1512** to navigate the applicator **1600** along a path where application of a tape line is desired.

[0052] With reference to FIG. **17**, an exemplary hand-held remote **1705** is depicted. In one example, an operator can initiate and control tape application remotely from the applicator **1600**. Exemplary controls can include start, stop, turn and the like, and accessed through a user interface **1715**, for example, a graphical user interface, or a manual controller **1720**. Also, the remote can be used to denote a path in the desired area and upload the path to the processor/memory for later application.

[0053] Alternate embodiments are shown in FIG. **18**. A tape applicator **1800** includes an applicator section **1802** connected variously to a wheeled housing **1816**. FIG. **18**A illustrates a "pull" version where the wheeled housing **1816** connects to and in use, pulls the applicator section **1802** dispensing tape **1805** from behind as the applicator **1800** moves along a path. FIG. **18**B illustrates a "push" version where the wheeled housing **1816** connects to (with an adapter or directly) the applicator section **1802**. In use, the wheeled housing **1816** pushes the applicator section **1802** dispensing tape **1805** under the wheeled housing **1816** and in embodiments, the wheeled housing **1816** can be aligned so one or more wheels or an included roller (not shown) further press the tape **1805** onto the floor surface.

[0054] With reference to FIGS. **19** and **20**, an alternate exemplary tape applicator **1900** is shown including an applicator section **1902** holding a roll of tape **1904**. As illustrated, the applicator section **1902** is offset to one side of the tape applicator **1900** to allow tape to be applied close to shelving units or walls. The applicator as illustrated is powered by a rechargeable battery (not shown) accessible through access panel **1908**. The tape applicator **1900** includes one or more handles **1910** to allow easy placement/retrieval by a user. The applicator **1900** includes a power button/kill switch **1912** to power up or stop the applicator **1900**. When power is applied, an indicator **1914** provides indication of the applicator status for example an LED strip around the body. For example, off may indicate power off; blue light may indicate powered on/active; yellow (or blinking) may indicate that attention is needed; red may indicate a critical warning, batter low, or internal problem. A user interface **1916** permits user control of the tape applicator **1900** and fine adjustment button **1920** allows a user to "nudge" the applicator **1900** forward or backward. A caster control **1922** controls raising and lowering of casters to properly adjust height of the applicator **1900** for the surface, thickness of tape and/or prepare for use.

[0055] In use, signals from camera **1906** can be used to control the path of the tape applicator **1900** along a path. The camera sights a beacon **2005**, illustrated as including a QR code, and the proceeds to apply tape to the floor along the path to the beacon.

[0056] With reference to FIG. **21**, a method of applying a tape to a floor surface includes an attaching step **2102** where a handle is assembled as needed and attached to a tape applicator. The method includes a manipulating step **2104** where a mechanism such as a screw drive controls positioning of the two sidewalls of a floor tape applicator section and adjusts the sidewalls to accommodate a width of a roll of floor tape which is to be applied to the flooring surface. For example, the sidewalls can be adjusted to accommodate various widths of floor marking tape, for example, one, two, three, four and six inch-wide rolls of tape with or without a liner, one inch rolls of painters tape, two and a half inch rolls of duct tape and others. The method includes a loading step **2108** where the roll of floor tape is loaded between the sidewalls. In an embodiment, the roll of floor tape is supported by inward facing protrusions or hubs in the sidewalls which engage a core upon which the tape is rolled. The sidewalls may flex outward slightly to permit insertion of some tape rolls. Where tapes with liners are used, the tape may be rolled onto the cores finish side inward, or finish side outward. Where finish side is inward, the rolls are inserted so that the tape is dispensed from the roll over the top (FIG. **8**). In finish side outward rolls, the rolls are inserted so that the tape is dispensed from the roll off the bottom (FIG. **7**).

[0057] Continued reference to FIG. **21** shows the method includes an optional separating step **2110** where several feet of tape are advanced from the roll and the liner (if used) is separated from the tape backing to expose the adhesive. The liner is wrapped over the roll (in the case of a liner side down roll) and onto a take-up reel. In the case of a liner side up roll, the separated liner is guided directly onto the take-up reel. In one embodiment, the liner is fed through a tab or slit in an outer sleeve and the reel is manually advanced in the direction of rotation during forward motion of the applicator.

[0058] The method includes an applying step **2116** where the end of the tape is applied to the flooring surface in front of the floor tape applicator adhesive side down. The method includes a moving step **2118** where the floor tape applicator is moved atop the tape to a position where the tape is resting taut against the wheel. Preferably the applicator is lifted over the tape and placed atop as opposed to being rolled into position. The method includes a rolling step **2120** where a user manually or automatically initiates the applicator forward to apply a tape path on the flooring surface.

[0059] With reference now to FIG. **22**, alternate or additional method steps include manipulating a mechanism to adjust sidewalls of an applicator, **2204**. A roll of tape may then be loaded between the sidewalls, **2208**. If used, the protective liner is separated from the tape backing, **2210**. The liner may then be attached to a take-up reel, **2212**. An end of the tape is applied to the surface where marking is desired, **2216**. Optionally, an indicator is aligned with a guide on the surface, **2218**. The guide provides the user with a desired path for applying the tape. In one embodiment, the indicator includes an indicator arm movable between a stored position and an extended position in front of the floor tape applicator. In another embodiment, the indicator

includes a guide wheel or wheels positioned in front of or behind the floor tape applicator. Suitable guides on the flooring surface include a chalk line, a laser path, an existing seam or feature of the flooring surface, a painted or taped line, or other mechanisms to be referenced by the indicator to assist in applying the tape to a desired location. The user may then initiate manually or automatically the applicator movement along a path applying the tape to the flooring surface, **2220**.

[0060] With reference now to FIG. **23**, one embodiment of a method includes attaching an adapter to a floor tape applicator or applicator section **2302**. For example, the adapter can attach to a handle on the floor tape applicator and include a hub to support a roll of tape, for example, having detectable properties. The method includes loading a first roll of tape on the applicator **2304** and loading a second roll of tape, wire or other material on the adapter **2308**. In an embodiment, the first roll of tape has a width of 4-6 inches and the second roll has a width of an inch or less. The method includes advancing an end of the second roll of tape, wire or other material onto an adhesive side of the first roll, **2310**, and subsequently applying the combined first tape and second tape, wire or other material to a surface, **2316**. For example, the surface can be locations where machinery can operate autonomously or where machinery includes sensors to provide path following feedback to an operator.

[0061] With reference now to FIG. **24**, aspects of a method include loading a roll of tape into an applicator section **2404** and optionally starting the liner onto the take-up reel. The method includes starting application of the tape onto the surface to be marked, **2408**, which can further include adjusting front wheels of a wheeled housing into an upward, retracted position and/or urging the handle to begin application of the along the desired path. The method includes aligning the applicator to a remote device and desirably initiating a communication path **2410**. The applicator can then be started along the path to the remote device **2412** by a user remotely initiating movement or a user interacting with a controller, switch or other control on the applicator.

[0062] With reference now to FIG. **25**, aspects of a method include loading a roll of tape into an applicator section **2504**, and starting the liner onto the take-up reel **2506**. The method includes starting application of the tape onto the surface to be marked **2508**, which can further include adjusting front wheels of a wheeled housing into an upward, retracted position and/or urging the handle to begin application of the along the desired path. The method includes programming the applicator to a remote device with a desired path for the machine to apply tape **2510**. The applicator can then be started along the path by a user remotely initiating movement or a user interacting with a controller, switch or other control on the applicator **2512**.

[0063] In other embodiments, a kit is provided including a handle, remote device, a floor applicator section, and wheeled housing and optionally an adapter as described above and instructions describing any or all of assembly, preparation, use and storage. The instructions can include some or all of the methods described here and may be provided on printed materials, on-line videos, apps, and the like. The kit may also include one or more rolls of tape suitable for application to a floor surface, a chalk line, laser or other guide for application to the floor and one or more rolls of second tape, wire or other material.

[0064] Those skilled in the relevant art will recognize that many changes can be made to the several aspects described, while still obtaining the beneficial results shown and described. It will also be apparent that some of the desired benefits can be obtained by selecting some of the features without utilizing other features. Accordingly, those who work in the art will recognize that many modifications and adaptations are possible and can even be desirable in certain circumstances and are a part of the present disclosure. Thus, the description is provided as illustrative of certain principles and not in limitation thereof.

[0065] As used herein, the singular forms "a," "an" and "the" include plural referents unless the context clearly dictates otherwise. Thus, for example, reference to a "wheel" includes aspects having two or more wheels unless the context clearly indicates otherwise.

[0066] Ranges can be expressed herein as from "about" one particular value, and/or to "about" another particular value. When such a range is expressed, another aspect includes from the one particular value and/or to the other particular value. Similarly, when values are expressed as approximations, by use of the antecedent "about," it will be understood that the particular value forms another aspect. It will be further understood that the endpoints of each of the ranges are significant both in relation to the other endpoint, and independently of the other endpoint.

[0067] As used herein, the terms "optional" or "optionally" mean that the subsequently described event or circumstance may or may not occur, and that the description includes instances where said event or circumstance occurs and instances where it does not.

[0068] Terms used herein, such as "exemplary" or "exemplified," are not meant to show preference, but rather to explain that the aspect discussed thereafter is merely one example of the aspect presented.

[0069] Additionally, as used herein, relative terms, such as "substantially", "generally", "approximately", and the like, are utilized herein to represent an inherent degree of uncertainty that may be attributed to any quantitative comparison, value, measurement, or other representation. These terms are also utilized herein to represent the degree by which a quantitative representation may vary from a stated reference without resulting in a change in the basic function of the subject matter at issue.

[0070] The hardware and data processing components used to implement the various processes, operations, illustrative logics, logical blocks, modules and circuits described in connection with the embodiments disclosed herein may be implemented or performed with a general purpose single- or multi-chip processor, a digital signal processor (DSP), an application specific integrated circuit (ASIC), a field programmable gate array (FPGA), or other programmable logic device, discrete gate or transistor logic, discrete hardware components, or any combination thereof designed to perform the functions described herein. A general purpose processor may be a microprocessor, or, any conventional processor, controller, microcontroller, or state machine. A processor also may be implemented as a combination of computing devices, such as a combination of a DSP and a microprocessor, a plurality of microprocessors, one or more microprocessors in conjunction with a DSP core, or any other such configuration. In some embodiments, particular processes and methods may be performed by circuitry that is specific to a given function. The memory (e.g., memory,

memory unit, storage device) may include one or more devices (e.g., RAM, ROM, Flash memory, hard disk storage) for storing data and/or computer code for completing or facilitating the various processes, layers and modules described in the present disclosure. The memory may be or include volatile memory or non-volatile memory, and may include database components, object code components, script components, or any other type of information structure for supporting the various activities and information structures described in the present disclosure. According to an exemplary embodiment, the memory is communicably connected to the processor via a processing circuit and includes computer code for executing (e.g., by the processing circuit or the processor) the one or more processes described herein.

[0071] The present disclosure contemplates methods, systems and program products on any machine-readable media for accomplishing various operations. The embodiments of the present disclosure may be implemented using existing computer processors, or by a special purpose computer processor for an appropriate system, incorporated for this or another purpose, or by a hardwired system. Embodiments within the scope of the present disclosure include program products comprising machine-readable media for carrying or having machine-executable instructions or data structures stored thereon. Such machine-readable media can be any available media that can be accessed by a general purpose or special purpose computer or other machine with a processor. By way of example, such machine-readable media can comprise RAM, ROM, EPROM, EEPROM, or other optical disk storage, magnetic disk storage or other magnetic storage devices, or any other medium which can be used to carry or store desired program code in the form of machine-executable instructions or data structures and which can be accessed by a general purpose or special purpose computer or other machine with a processor. Combinations of the above are also included within the scope of machine-readable media. Machine-executable instructions include, for example, instructions and data which cause a general purpose computer, special purpose computer, or special purpose processing machines to perform a certain function or group of functions.

[0072] Although the figures and description may illustrate a specific order of method steps, the order of such steps may differ from what is depicted and described, unless specified differently above. Also, two or more steps may be performed concurrently or with partial concurrence, unless specified differently above.

[0073] It is important to note that any element disclosed in one embodiment may be incorporated or utilized with any other embodiment disclosed herein. Although only one example of an element from one embodiment that can be incorporated or utilized in another embodiment has been described above, it should be appreciated that other elements of the various embodiments may be incorporated or utilized with any of the other embodiments disclosed herein.

[0074] As used herein, "connection" or "connected" means both directly, that is, without other intervening elements or components, and indirectly, that is, with another component or components arranged between the items identified or described as being connected. To the extent that the term "includes" or "including" is employed in the detailed description or the claims, it is intended to be inclusive in a manner similar to the term "comprising" as that term is interpreted when employed as a transitional word in a claim. Furthermore, to the extent that the term "or" is employed in the claims (e.g., A or B) it is intended to mean "A or B or both." When the applicants intend to indicate "only A or B but not both" then the term "only A or B but not both" will be employed. Similarly, when the applicants intend to indicate "one and only one" of A, B or C, the applicants will employ the phrase "one and only one." Thus, use of the term "or" herein is the inclusive, and not the exclusive use. See, Bryan A. Garner, A Dictionary of Modern Legal Usage 624 (2d. Ed. 1995). To the extent that the phrase "one or more of A, B and C" is employed herein, (e.g., storage for one or more of A, B and C) it is intended to convey the set of possibilities A, B, C, AB, AC, BC, and/or ABC (e.g., the storage may store only A, only B, only C, A&B, A&C, B&C, and/or A&B&C). It is not intended to require one of A, one of B, and one of C. When the applicants intend to indicate "at least one of A, at least one of B, and at least one of C," then the phrasing "at least one of A, at least one of B, and at least one of C" will be employed.

What is claimed is:

1. An automated machine to apply tape to a surface, the machine comprising:

A housing supporting a tape dispenser including two sidewalls each having an inwardly facing protrusion, the sidewalls adjustable relative to each other on at least one guide bar to define a space of varying width, where a roll of floor tape can be accommodated in the space of varying width and where the roll of floor tape can rotate on the inwardly facing protrusions to dispense the floor tape around a wheel onto the surface;

a take-up reel operatively connected to the wheel, where rotation of the wheel on the surface causes the take-up reel to rotate and collect a liner from the floor tape as it is dispensed; and

a processor programmed to control movement of the housing to dispense the floor tape along a path.

2. A method as described herein.

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