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CA 2677766 C 2016/05/24

(11)(21) 2 677 766

(12) BREVET CANADIEN
CANADIAN PATENT

(13) C

(86) Date de dépôt PCT/PCT Filing Date: 2008/02/19
(87) Date publication PCT/PCT Publication Date: 2008/08/28
(45) Date de délivrance/Issue Date: 2016/05/24
(85) Entrée phase nationale/National Entry: 2009/08/10
(86) N° demande PCT/PCT Application No.: US 2008/054269
(87) N° publication PCT/PCT Publication No.: 2008/103651
(30) Priorité/Priority: 2007/02/19 (US60/890,612)

(51) Cl.Int./Int.Cl. *F16F 15/32* (2006.01),
G01M 1/32 (2006.01)

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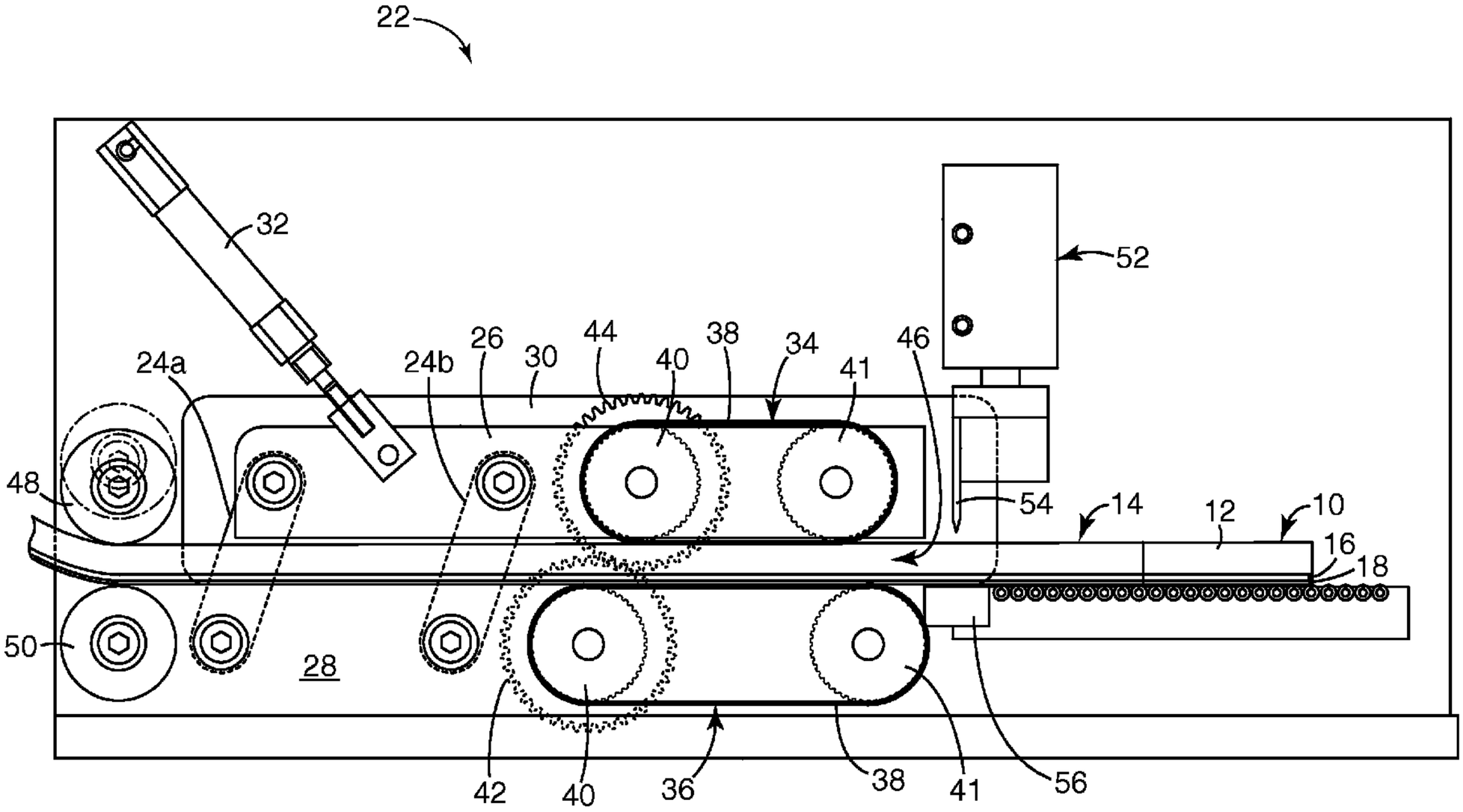
(54) Titre : APPAREIL ET PROCEDE DE REPARTITION DE POIDS DE LESTAGE POUR VEHICULE
(54) Title: APPARATUS AND METHOD FOR DISPENSING VEHICLE BALLASTING WEIGHTS



(57) Abrégé/Abstract:
An apparatus for and a method of dispensing a vehicle ballasting weight for balancing a portion of a vehicle. The method comprises dispensing a vehicle ballasting weight material comprising a flexible polymeric matrix material filled with a high density particulate material, and severing an incremental length of the vehicle ballasting weight material from an initial length of the weight material, where the incremental length can correspond exactly to a desired mass for the vehicle ballasting weight.

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
28 August 2008 (28.08.2008)

PCT

(10) International Publication Number
WO 2008/103651 A1

(51) International Patent Classification:
F16F 15/32 (2006.01) *G01M 1/32* (2006.01)

(21) International Application Number:
PCT/US2008/054269

(22) International Filing Date:
19 February 2008 (19.02.2008)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/890,612 19 February 2007 (19.02.2007) US

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(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:
— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*
— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

Published:
— *with international search report*
— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

(54) Title: APPARATUS AND METHOD FOR DISPENSING VEHICLE BALLASTING WEIGHTS

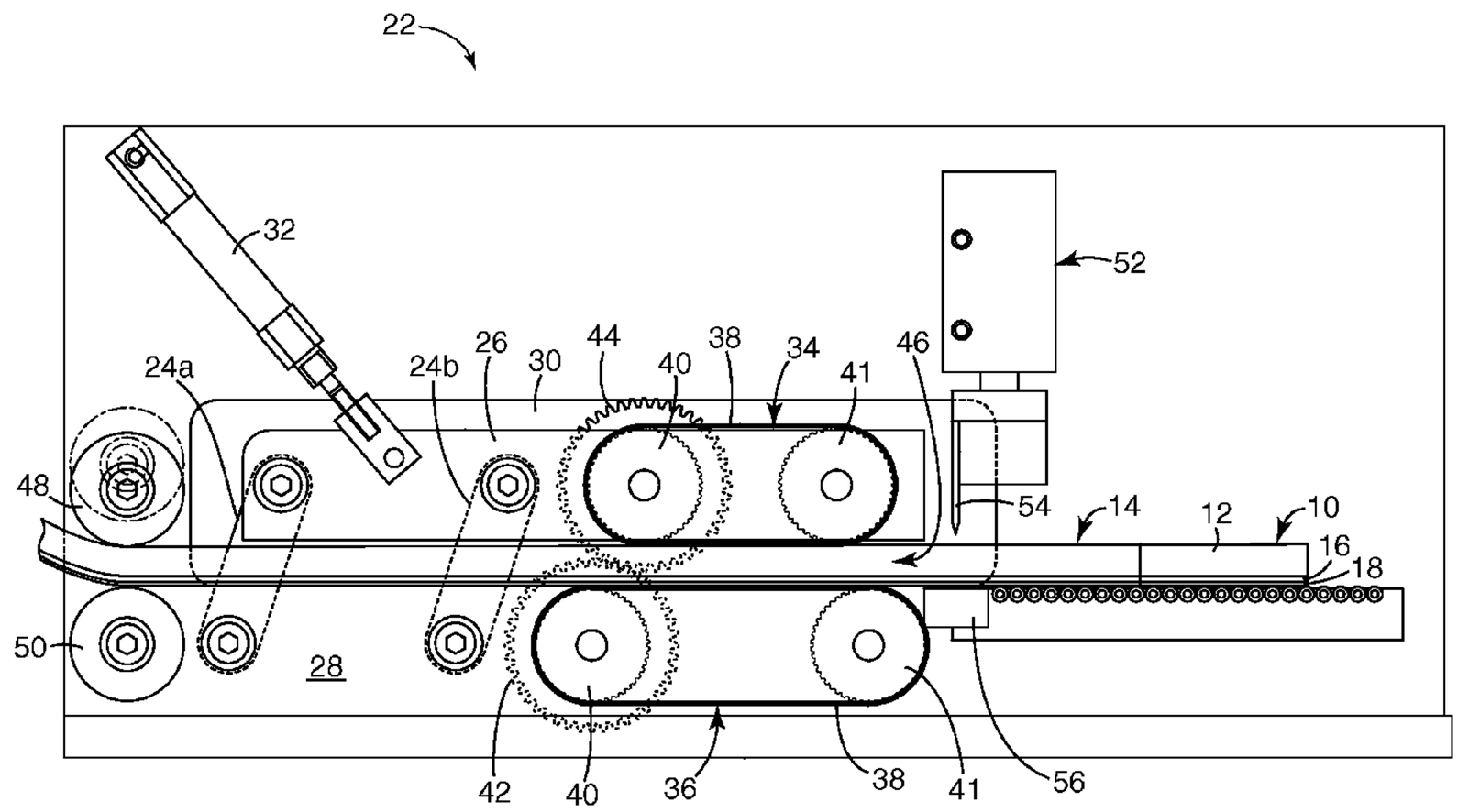

Fig. 3

(57) Abstract: An apparatus for and a method of dispensing a vehicle ballasting weight for balancing a portion of a vehicle. The method comprises dispensing a vehicle ballasting weight material comprising a flexible polymeric matrix material filled with a high density particulate material, and severing an incremental length of the vehicle ballasting weight material from an initial length of the weight material, where the incremental length can correspond exactly to a desired mass for the vehicle ballasting weight.

APPARATUS AND METHOD FOR DISPENSING VEHICLE BALLASTING WEIGHTS

Field of the Invention

The present invention relates to methods and devices for dispensing weights used in vehicle ballasting applications, in particular, for dispensing weights used in balancing rotating portions of a vehicle and, more particularly, for dispensing weights used in balancing automobile or other vehicle wheels.

Background

Automotive wheel balancing devices or balancers currently use individual wheel balancing weights of varying sizes (i.e., weight), typically in increments of 5 grams or 1/4 ounces, and made of lead or other metals. In addition to being stored and applied separately, such individual conventional wheel weights require a different part number for each weight increment, and wheel diameter.

In an effort to avoid such problems with individual conventional weights, weights of the same size have been attached together along a length of adhesive tape. One or more of such taped wheel weights are removed from the tape and adhered to the desired location on the wheel, in accordance with the particular balancing requirements. One example of such a conventional tape of individual wheel balancing weights can be found in U.S. Patent No. 6,364,421. A problem with such taped individual wheel weights is that the balancing process can only round up or down one of the individual weights on the tape, when dispensing the number of individual weights to be used on a wheel. This lack of precision adds error to the wheel balancing results.

The present invention provides one or more improvements in the art of vehicle wheel balancing, as well as in other ballasting applications.

Invention Summary

The present invention has one or more advantages which can include, for example, allowing for a reduction in part numbers, or only one part number, to be used regardless of the variety of weight sizes needed, which reduces inventory. The present invention is not bound by having to dispense a ballasting weight in increments of a particular unit weight.

Therefore, the present invention can also have the advantage of allowing for the application of the exact weight required for the particular ballasting application (e.g., to balance a wheel), which results in improved tire performance and vehicle ride. Further, the present invention can be used to automatically dispense such weights.

In accordance with a first aspect of the present invention, a method is provided for dispensing or otherwise providing a vehicle ballasting weight for balancing a portion of (e.g., a wheel or other rotating portion) of an automobile, other wheeled motor vehicle or other vehicle (e.g., a car, van, truck, bus, motorcycle, bicycle, airplane, trailer, etc.). The method comprises:

sandwiching a length of a vehicle ballasting weight material, which is longer than it is either wide or thick, between opposing movable surfaces that are movable in the same direction such that each movable surface makes contact with an opposite surface of the weight material;

moving a leading end of the length of vehicle ballasting weight material an incremental distance past a severing position by moving the opposing movable surfaces in a direction toward the severing position while the weight material is sandwiched therebetween; and

severing the vehicle ballasting weight material at the severing position, after said moving, to form an incremental length of the weight material,

wherein the vehicle ballasting weight material comprises a flexible polymeric matrix material filled with a high density particulate material, and the incremental length corresponds, within a high degree of accuracy, to an exact mass for the vehicle ballasting weight.

The vehicle ballasting weight material can be dimensioned or otherwise operatively adapted so as to be suitable (e.g., by being sufficiently loaded with the particulate material to provide a sufficient density) for use in balancing a wheel of an automobile (e.g, a car, van, truck, bus, etc.). The vehicle ballasting (e.g., wheel balancing) weight material can be substantially longer (e.g., 10, 20, 30, 40, 50, 60, 70, 80, 90, 100 or more times longer) than it is wide and substantially wider (e.g., 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 or more times wider) than it is thick.

The vehicle ballasting weight material can have a density approximately equal to, somewhat less than, somewhat greater than or comparable to elemental lead, depending at

least in part on size constraints for applying the weight material. The vehicle ballasting weight material can be provided in a rolled, spooled or otherwise wound form. The vehicle ballasting weight material can be provided in a container having an opening through which an end of the vehicle ballasting weight material can be dispensed or otherwise removed out of the container, and the method can further comprise removing at least the incremental length of the vehicle ballasting weight material from the container, before said severing.

The vehicle ballasting weight material can be backed with an adhesive suitable for permanently adhering or at least substantially adhering (i.e., the vehicle ballasting weight is bonded well enough to a desired portion of the vehicle to meet any applicable customer specifications and/or governmental regulations/requirements) the incremental length of the vehicle ballasting weight material to the vehicle. The vehicle ballasting weight material can be backed with an adhesive. The adhesive can be a pressure sensitive adhesive (e.g., a psa foam tape), which is desirably protected using a conventional release liner.

In accordance with a another aspect of the present invention, a method is provided for balancing a wheel of an automobile or other wheeled motor vehicle or other vehicle (e.g., a car, van, truck, bus, motorcycle, bicycle, airplane, trailer, etc.). The method comprises dispensing or otherwise providing a wheel weight as described above; and securing the wheel weight onto the wheel so as to balance the wheel. The securing step can comprise adhering the wheel weight to the wheel. The method can further comprise using a wheel balancing device to determine the exact mass of the vehicle ballasting weight needed to balance the wheel. The wheel balancing device can also determine the exact location to place the weight to balance the wheel.

The severing step can comprise forming an incremental length of vehicle ballasting weight material that corresponds to the exact mass determined by the wheel balancing device. The incremental length of vehicle ballasting weight material can correspond to within 0.1 grams of the exact mass determined by the wheel balancing device.

In an additional aspect of the present invention, an apparatus is provided for performing the above method of dispensing a vehicle ballasting weight. The apparatus comprises a movable belt mounting element, a stationary belt mounting element, at least two parallel links, a belt pressure actuating assembly, a first and second drive belt assembly and a severing device. The movable element is disposed within an opening in

the stationary element. Each of the parallel links has one end pivotally mounted to the movable belt mounting element and another end pivotally mounted to the stationary belt mounting element. The opening is dimensioned to allow pivotal movement of the movable element within the opening and about the links. The belt pressure actuating assembly has one end mounted to the stationary belt mounting element, and another end mounted to the movable belt mounting element and between the links, such that the belt pressure actuating assembly has a longitudinal axis positioned at an obtuse or acute angle to a longitudinal axis of the movable element. The first drive belt assembly is mounted to the stationary belt mounting element and, spaced therefrom, the opposing second drive belt assembly is mounted to the movable belt mounting element.

The first drive belt assembly comprises a first drive belt defining one opposing movable surface, and the second drive belt assembly comprises a second drive belt defining another opposing movable surface. The second drive belt is spaced from the first drive belt so as to form a gap therebetween through which a length of vehicle ballasting weight is moved. Each drive belt is disposed over a plurality of pulleys so as to rotate as the pulleys rotate. The first drive belt assembly further comprises a drive gear, and the second drive belt assembly further comprises a driven gear. At least one pulley from the corresponding plurality of pulleys is mounted so as to rotate with the drive gear, and at least one pulley from the other plurality of pulleys is mounted so as to rotate with the driven gear. The drive gear and the driven gear are mounted such that the rotation of the drive gear drives the rotation of the driven gear, the first drive belt and the second drive belt. The severing device is mounted downstream from the drive belts. It is used for severing an incremental length of vehicle ballasting weight material from a length of vehicle ballasting weight material that is moved downstream through the gap.

The parallel links can enable the drive gear and the driven gear to remain meshed when the vehicle ballasting weight material being dispensed changes thickness. The the gap can automatically adjust to the thickness of the vehicle ballasting weight being dispensed, without having to make adjustments to how the first and second belt assemblies are mounted. The drive gear can drive the rotation of the belts simultaneous. The gap is open along at least one side of the first and second belt assemblies such that the gap can accommodate vehicle ballasting weight materials having a variety of widths. The present apparatus can be used in combination with a length of vehicle ballasting weight material in

a rolled-up condition. It can be preferable for the rolled-up weight material to be wound on a level wound spool. The present apparatus can also be used in concert with (e.g., in a continuous or semi-continuous production line with) a wheel balancing device.

According to one aspect of the present invention, there is provided a method of dispensing a vehicle ballasting weight having a mass suitable for balancing a portion of a vehicle, said method comprising: sandwiching a length of a vehicle ballasting weight material, which is longer than it is either wide or thick, between opposing movable surfaces that are movable in the same direction such that each movable surface makes contact with an opposite surface of the weight material; moving a leading end of the length of vehicle ballasting weight material an incremental distance past a severing position by moving the opposing movable surfaces in a direction toward the severing position while the weight material is sandwiched therebetween; and severing the vehicle ballasting weight material at the severing position, during or after said moving, to form an incremental length of the weight material, wherein the vehicle ballasting weight material comprises a flexible polymeric matrix material filled with a particulate material, the incremental length corresponds, within a degree of accuracy, to an exact mass of the vehicle ballasting weight that is suitable for balancing a portion of a vehicle, and at least one of (a) the vehicle ballasting weight material is provided in a level wound form, (b) the vehicle ballasting weight material is provided in a container having an opening through which a leading end of the vehicle ballasting weight material can be dispensed or otherwise removed out of the container, and said method further comprises removing at least the incremental length of the vehicle ballasting weight material from the container, before said severing, and (c) the opposing movable surfaces are spaced apart a distance that is automatically adjustable to accommodate the thickness of the vehicle ballasting weight material.

According to another aspect of the present invention, there is provided a method of balancing a wheel of a wheeled vehicle, said method comprising: dispensing an incremental length of vehicle ballasting weight material according to the method as described herein; and securing the incremental length of vehicle ballasting weight material onto the wheel so as to balance the wheel.

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According to still another aspect of the present invention, there is provided an apparatus for performing the method as described herein, said apparatus comprising: a movable belt mounting element and a stationary belt mounting element, said movable element being disposed within an opening in said stationary element; at least two parallel links, each of said links having one end pivotally mounted to said movable belt mounting element and another end pivotally mounted to said stationary belt mounting element, with said opening being dimensioned to allow pivotal movement of said movable element within said opening and about said links; a belt pressure actuating assembly having one end mounted to said stationary belt mounting element, and another end mounted to said movable belt mounting element and between said links, such that said belt pressure actuating assembly has a longitudinal axis positioned at an obtuse or acute angle to a longitudinal axis of said movable element; a first drive belt assembly mounted to said stationary belt mounting element and, spaced therefrom, an opposing second drive belt assembly mounted to said movable belt mounting element, with said first drive belt assembly comprising a first drive belt defining one opposing movable surface, said second drive belt assembly comprising a second drive belt defining another opposing movable surface, said second drive belt being spaced from said first drive belt so as to form a gap therebetween through which a length of vehicle ballasting weight is moved, each said drive belt being disposed over a plurality of pulleys so as to rotate as said pulleys rotate, said first drive belt assembly further comprising a drive gear, said second drive belt assembly further comprising a driven gear, at least one pulley from the corresponding plurality of pulleys being mounted so as to rotate with said drive gear, at least one pulley from the other plurality of pulleys being mounted so as to rotate with said driven gear, and said drive gear and said driven gear being mounted such that the rotation of said drive gear drives the rotation of said driven gear, said first drive belt and said second drive belt; a severing device mounted downstream from said drive belts for severing an incremental length of vehicle ballasting weight material from a length of vehicle ballasting weight material being moved downstream through said gap.

Brief Description of Drawings

Fig. 1 is a perspective view of a length of adhesive-backed wheel weight material wound into a planetary roll in accordance with the present invention;

Fig. 2 is a perspective view of a length of adhesive-backed wheel weight material wound into a level-wound spool in accordance with the present invention;

Fig. 3 is a front plan view of a device for dispensing a wheel weight assembly in incremental lengths in accordance with one embodiment of the present invention; and

Fig. 4 is a partial front plan view of alternative wheel weight material feeder rollers for the device of Fig. 3.

Exemplary Modes for Carrying Out the Invention

The present invention is directed to the dispensing of individual vehicle ballasting weight increments 10 that are cut or otherwise separated from a finite or continuous length of vehicle ballasting weight material 12. Such weight increments 10 are useful in vehicle ballasting applications such as, for example, balancing the wheels of an automobile or other vehicle. The weight material 12 is a high density polymer composite material comprising a flexible polymeric matrix material loaded or filled with a high density particulate material. The matrix material can comprise, for example, an elastomeric polymer material, and the high density particulate material can comprise, for example, stainless steel, tungsten and/or other metal particles. Examples of such a metal polymer composite material can be found in International Publication Nos. WO 2005/049714, and WO 2007/092018. It
has been found that various of the metal polymer composite materials described in this publication can be particularly useful in making the weight material 12 used in accordance with the present invention. Such metal polymer composite materials are particularly useful in providing individual vehicle ballasting weight increments 10, because such composite materials can exhibit one or more, and preferably all, of following properties, even when loaded with a level of high density particles that results in the composite

having a density approaching, equaling or exceeding the density of the metal lead: (a) their ability to be readily extrudable with a desired crossectional profile, (b) their flexibility, and (c) the ease in which such materials can be cut.

Referring to Figs. 1 and 2, it can be desirable for the length of weight material 12 to be in the form of an adhesive-backed vehicle ballasting weight assembly 14 that is wound into, for example, a planetary roll (Fig. 1) or a level-wound spool (Fig. 2). Level-wound spools are preferred over planetary rolls, because more of the assembly 14, or material 12, can be supplied for a given diameter with a level-wound spool than with a planetary roll. The weight assembly 14 includes an adhesive backing 16 protected by a release liner 18. The adhesive backing 16 can be, for example, a layer of pressure sensitive adhesive or other desired conventional adhesive (e.g., in the form of a coating or double-sided tape) that is compatible with the weight material 12 and the substrate (e.g., the rim of an automobile tire) on which the material 12 is be bonded (i.e., the adhesive is able to adequately bond to both the weight material 12 and the substrate). The liner 18 can be, for example, a silicon coated paper liner or other conventional release liner that is compatible with the adhesive 16 (i.e., the liner 18 will remain bonded so as to protect the adhesive 16 but is also readily removable when it is desirable to expose the adhesive 16). For wheel balancing applications, and other applications where the substrate to be bonded to is curved (i.e., has a simple or compound curvature), it is preferred that the adhesive 16 be in the form of a double-sided adhesive foam tape. In addition, for most if not all applications, the release liner 18 is preferably oversized, with a width that is wider than that of the weight material 12. In this way, the portion 20 of the liner 18 that extends beyond the longitudinal edge of the weight material 12 can be gripped when removing a length of the liner 18 from the adhesive 16. The present weight assembly 14 readily enables the use of the exact weight increment 10 required for the particular balancing application by simply cutting or otherwise separating the desired weight increment 10 from the length of weight assembly 14.

Referring to Fig. 3, a device 22 is shown that can be used to automatically cut an exact weight increment 10, from the length of an assembly 14. The device 22 includes a pair of parallelogram or parallel links 24a and 24b that connect a movable belt mounting plate 26 or other such movable mounting element to a stationary belt mounting or main plate 28 or other such stationary mounting element. The movable plate 26 is disposed

within an opening 30 in the stationary plate 28 that is dimensioned to allow pivotal movement of the plate 26 within the opening 30 about the links 24a and 24b. A belt pressure actuating cylinder assembly 32 has its cylinder end mounted to the stationary plate 28, above plate 26, and its actuating piston end mounted to the movable plate 26, between the links 24a and 24b. The cylinder 32 is mounted with its longitudinal axis being at an obtuse or acute angle to the plate 26. An upper drive belt assembly 34 is mounted to the movable plate 26 and an opposing lower drive belt assembly 36 is mounted to the stationary plate 28 and below the upper belt 34.

Each of the drive belt assemblies 34 and 36 includes a drive belt 38 stretched over a rear pulley 40 and a forward pulley 41. Each pair of pulleys 40 and 41 are horizontally spaced apart. The lower drive belt assembly 36 includes a fixed-location drive gear 42, and the upper drive belt assembly 34 includes a movable driven gear 44. Gear 42 is mounted on a shaft that is driven, so as to rotate gear 42, using a conventionally drive mechanism such as, for example, a conventional electric servo motor. The gears 42 and 44 are mounted so that their teeth are meshed, with gear 44 being driven by the rotation of gear 42. The use of the parallel links 24a and 24b enable these two gears 42 and 44 to remain meshed regardless of the thickness of the weight material 12 being dispensed. The rear pulley 40 and the gear 42 of the assembly 36 are mounted on the same shaft so as to rotate together as the gear 42 is driven. The rear pulley 40 and the gear 44 of the assembly 34 are mounted on the same shaft so as to rotate together as the gear 44 is rotated. The gears 42 and 44 are disposed behind the plates 28 and 26, respectively. Each set of pulleys 40 and 41, with its belt 38, is disposed in front of its corresponding plate 28 or 26.

The drive belts 38 of assemblies 34 and 36 are mounted opposite to each other (e.g., one above and one below each other) so as to define an automatically adjustable gap 46 therebetween through which a weight assembly 14, or a weight material 12 alone, can be dispensed. The parallel links 24a and 24b allow the gap 46 between the opposing belt surfaces (i.e., the opposing movable surfaces of the belts 38) to automatically adjust to the thickness of the vehicle ballasting weight assembly 14 being used, without having to make adjustments to how the belt assemblies 34 and 36 are mounted. The gears 42 and 44 allow for simultaneous driving of the upper and lower belts 38, while still allowing the parallel links 24a and 24b to automatically adjust the gap 46. The links 24a and 24b are positioned behind the plates 26 and 28.

It can be desirable for the gap 46 to open along at least one side of the belt assemblies 34 and 36 (e.g., the side extending out of the figure). With such an open side, this exemplary device 22 is able to accommodate vehicle ballasting weight assemblies 14 having a wide variety of widths, without having to make any adjustments or other changes in the device 22. In addition, the use of such a driven belt system eliminates, or at least is less likely to cause, dents or other deformations in the weight assembly 14 (e.g., in the material 12, adhesive 16 and/or liner 18) that would be expected from using a pair of opposing pinch rollers to advance the leading end of the length of weight assembly 14 forward.

A length of the weight assembly 14 is preferably provided in a rolled-up condition such as, for example, wound on a spool (e.g., a level wound spool) or roll (e.g., a planetary roll). One end of the length of weight assembly 14 is pulled off of the roll (see Fig. 1) or spool (see Fig. 2), threaded between a set of opposing guide rollers 48 and 50, and into the gap 46. These rollers 48 and 50 are used to guide the weight assembly 14 into the gap 46. The rollers 48 and 50 are spring biased toward each other so as to pinch the weight assembly 14 therebetween. For example, guide roller 48 is vertically movable within a slot formed in plate 28, spring biased downward and disposed above roller 50. Alternatively, two lower guide rollers 50a and 50b can be used, instead of the single lower guide roller 50 (see Fig. 4).

In the operation of the device 22, a length of weight assembly 14, or weight material 12, is pulled off of the roll or spool and moved forward through the gap 46 and toward a severing position where a severing device 52 is located. The device 52 can have, for example, an axially movable arm or piston that includes a cutting blade 54 on its leading end and that can be actuated to move the blade 54 in cutting contact with a receiving anvil (e.g., a urethane or other plastic anvil) or other suitable blade stop 56. The assembly 14, or material 12, is moved forward by driving the driving gear 42 in a clockwise rotation, which directly rotates the belt 38 of assembly 36 clockwise and directly drives the movable driven gear 44 in a counterclockwise rotation. The counterclockwise rotation of the gear 44 drives the belt 38 of assembly 34 counterclockwise, as well. If desired, the length of weight assembly 14, or weight material 12, can also be moved rearward by driving the gear 42 counterclockwise. The belt pressure cylinder 32 is actuated to apply a normal force between the movable surfaces

of the opposing belts 38 that is sufficient to produce the frictional forces required to grip and move the vehicle ballasting weight assembly 14, or weight material 12, forward past the cutting blade 54 a length that is precisely equal to, or is within an acceptable tolerance of (e.g., within 0.1 gram of the exact ballasting weight), the amount of weight material 12 needed to perform the particular ballasting operation or purpose. The severing device 52 is then actuated to force the blade 54 to move through at least the weight material 12 and the adhesive layer 16, leaving the release liner 18 intact. Alternatively, if desired, the blade 54 can be moved completely through the assembly 14 until it contacts the anvil 56 and severs-off the desired incremental piece 10 from the remainder of the assembly 14.

The belts 38 can be actuated for the period of time needed to move the leading end of the assembly 14 enough past the blade 54 to produce the desired incremental length 10 of weight assembly 14, the belts are then stopped and the blade 54 actuated to cut the assembly 14. Alternatively, the movement of the assembly 14 through the gap 46 and the actuation of the cutting blade 54 can be synchronized so that the blade 54 is actuated to cut the assembly 14 while the belts 38 continue to move the assembly 14 forward. It is desirable for the motors (e.g., servo-motors) used to drive the belts 38 to be sensitive enough to precisely cut the assembly 14 within length segments that have corresponding weight increments of at least about 5 grams (1/4 ounce) and preferably within length segments that have corresponding weight increments of less than 5 grams (e.g., 2.5 grams or less). In this way, the assembly 14 can be cut to a desired length that corresponds exactly to the ballasting weight identified, for example, by the applicable wheel balancing equipment, or at least within a tolerance (e.g., within 0.1 gram of the exact ballasting weight) that was otherwise not practical until the present invention.

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CLAIMS:

1. A method of dispensing a vehicle ballasting weight having a mass suitable for balancing a portion of a vehicle, said method comprising:

sandwiching a length of a vehicle ballasting weight material, which is longer than it is either wide or thick, between opposing movable surfaces that are movable in the same direction such that each movable surface makes contact with an opposite surface of the weight material;

moving a leading end of the length of vehicle ballasting weight material an incremental distance past a severing position by moving the opposing movable surfaces in a direction toward the severing position while the weight material is sandwiched therebetween; and

severing the vehicle ballasting weight material at the severing position, during or after said moving, to form an incremental length of the weight material,

wherein the vehicle ballasting weight material comprises a flexible polymeric matrix material filled with a particulate material, the incremental length corresponds, within a degree of accuracy, to an exact mass of the vehicle ballasting weight that is suitable for balancing a portion of a vehicle, and at least one of (a) the vehicle ballasting weight material is provided in a level wound form, (b) the vehicle ballasting weight material is provided in a container having an opening through which a leading end of the vehicle ballasting weight material can be dispensed or otherwise removed out of the container, and said method further comprises removing at least the incremental length of the vehicle ballasting weight material from the container, before said severing, and (c) the opposing movable surfaces are spaced apart a distance that is automatically adjustable to accommodate the thickness of the vehicle ballasting weight material.

2. The method according to claim 1, wherein the vehicle ballasting weight material is operatively adapted so as to be suitable for being used in balancing a rotating portion of a vehicle.

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3. The method according to claim 1, wherein the vehicle ballasting weight material is operatively adapted so as to be suitable for being used in balancing a wheel of a wheeled vehicle.

4. The method according to any one of claims 1 to 3, wherein the vehicle ballasting weight material is substantially longer than it is wide and substantially wider than it is thick.

5. The method according to any one of claims 1 to 4, wherein the vehicle ballasting weight material has a density approximately equal to elemental lead.

6. The method according to any one of claims 1 to 5, wherein the vehicle ballasting weight material is backed with an adhesive.

7. The method according to claim 6, wherein the adhesive of the vehicle ballasting weight material is protected by a release liner that has a width that is greater than the width of the vehicle ballasting weight material.

8. The method according to claim 6 or 7, wherein the adhesive is a pressure sensitive adhesive.

9. The method according to any one of claims 1 to 8, wherein the flexible polymeric matrix material comprises an elastomeric polymeric material and the particulate material comprises metal particles.

10. The method according to claim 9, wherein the metal particles comprise tungsten particles, stainless steel particles or combination of both.

11. The method according to any one of claims 1 to 10, wherein during said moving, the opposing movable surfaces are simultaneously movable in the same direction.

12. A method of balancing a wheel of a wheeled vehicle, said method comprising:

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dispensing an incremental length of vehicle ballasting weight material according to the method of any one of claims 1 to 11; and

securing the incremental length of vehicle ballasting weight material onto the wheel so as to balance the wheel.

13. The method according to claim 12, wherein only one incremental length of vehicle ballasting weight material is required to balance the wheel.

14. The method according to claim 12 or 13, wherein said securing comprises adhering the incremental length of vehicle ballasting weight material to the wheel.

15. The method according to any one of claims 12 to 14, further comprising:

using a wheel balancing device to determine the exact mass needed to balance the wheel, and

said severing comprises forming an incremental length of vehicle ballasting weight material that corresponds to the exact mass determined by the wheel balancing device.

16. The method according to claim 15, wherein the incremental length of vehicle ballasting weight material corresponds to within 0.1 grams of the exact mass determined by the wheel balancing device.

17. An apparatus for performing the method according to any one of claims 1 to 11, said apparatus comprising:

a movable belt mounting element and a stationary belt mounting element, said movable element being disposed within an opening in said stationary element;

at least two parallel links, each of said links having one end pivotally mounted to said movable belt mounting element and another end pivotally mounted to said stationary belt mounting element, with said opening being dimensioned to allow pivotal movement of said movable element within said opening and about said links;

a belt pressure actuating assembly having one end mounted to said stationary belt mounting element, and another end mounted to said movable belt mounting element and between said links, such that said belt pressure actuating assembly has a longitudinal axis positioned at an obtuse or acute angle to a longitudinal axis of said movable element;

a first drive belt assembly mounted to said stationary belt mounting element and, spaced therefrom, an opposing second drive belt assembly mounted to said movable belt mounting element, with said first drive belt assembly comprising a first drive belt defining one opposing movable surface, said second drive belt assembly comprising a second drive belt defining another opposing movable surface, said second drive belt being spaced from said first drive belt so as to form a gap therebetween through which a length of vehicle ballasting weight is moved, each said drive belt being disposed over a plurality of pulleys so as to rotate as said pulleys rotate, said first drive belt assembly further comprising a drive gear, said second drive belt assembly further comprising a driven gear, at least one pulley from the corresponding plurality of pulleys being mounted so as to rotate with said drive gear, at least one pulley from the other plurality of pulleys being mounted so as to rotate with said driven gear, and said drive gear and said driven gear being mounted such that the rotation of said drive gear drives the rotation of said driven gear, said first drive belt and said second drive belt;

a severing device mounted downstream from said drive belts for severing an incremental length of vehicle ballasting weight material from a length of vehicle ballasting weight material being moved downstream through said gap.

18. The apparatus according to claim 17, wherein said parallel links enable said drive gear and said driven gear to remain meshed when the vehicle ballasting weight material being dispensed changes thickness.

19. The apparatus according to claim 17 or 18, wherein said gap automatically adjusts to the thickness of the vehicle ballasting weight being dispensed, without having to make adjustments to how said first and second belt assemblies are mounted.

20. The apparatus according to any one of claims 17 to 19, wherein said drive gear drives the rotation of said belts simultaneous.

21. The apparatus according to any one of claims 17 to 20, wherein said gap is open along at least one side of said first and second belt assemblies such that said gap can accommodate vehicle ballasting weight materials having a variety of widths.

22. The apparatus according to any one of claims 17 to 21, in combination with a length of vehicle ballasting weight material in a rolled-up condition.

23. The apparatus according to any one of claims 17 to 21, in combination with a length of vehicle ballasting weight material wound on a level wound spool.

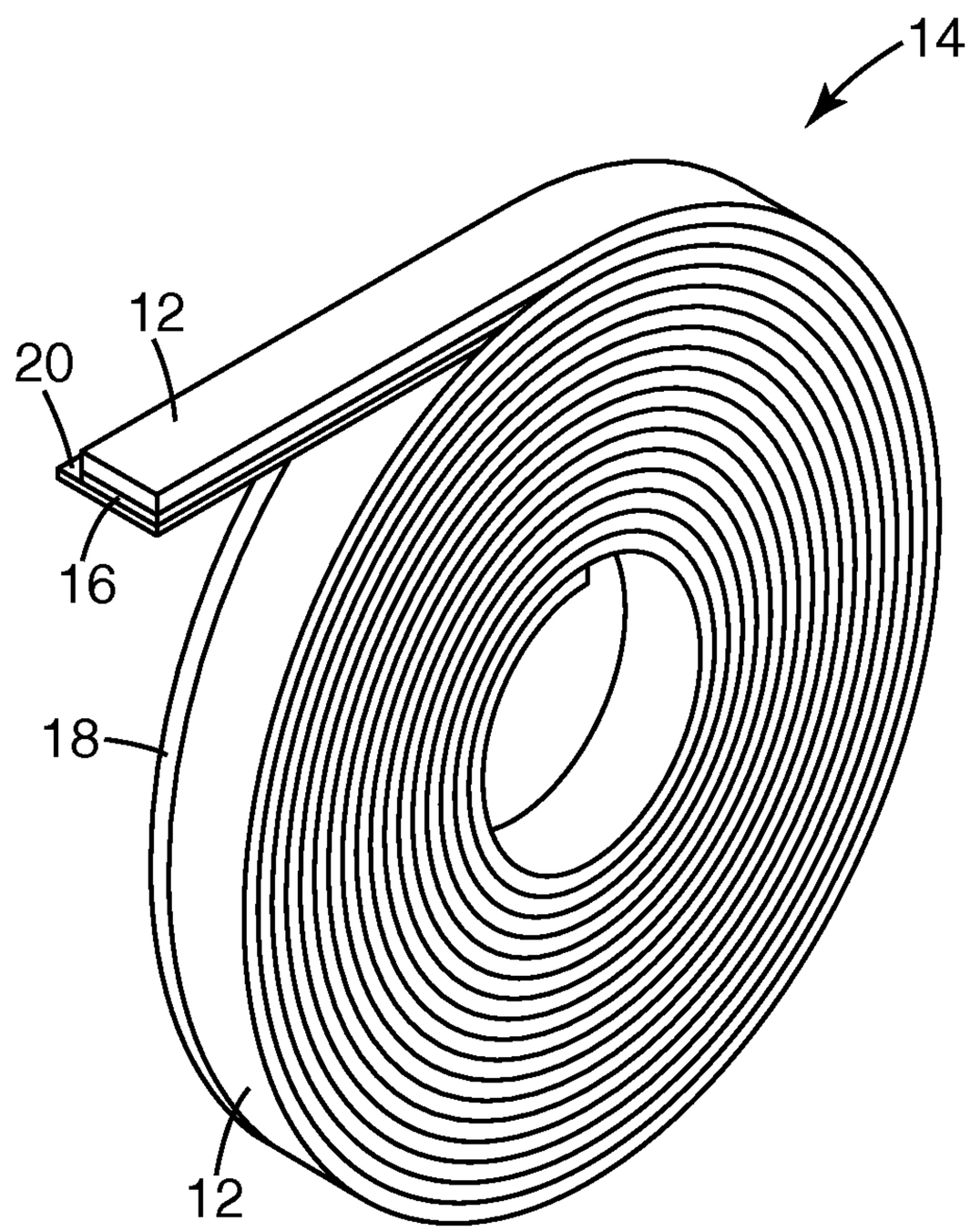

Fig. 1

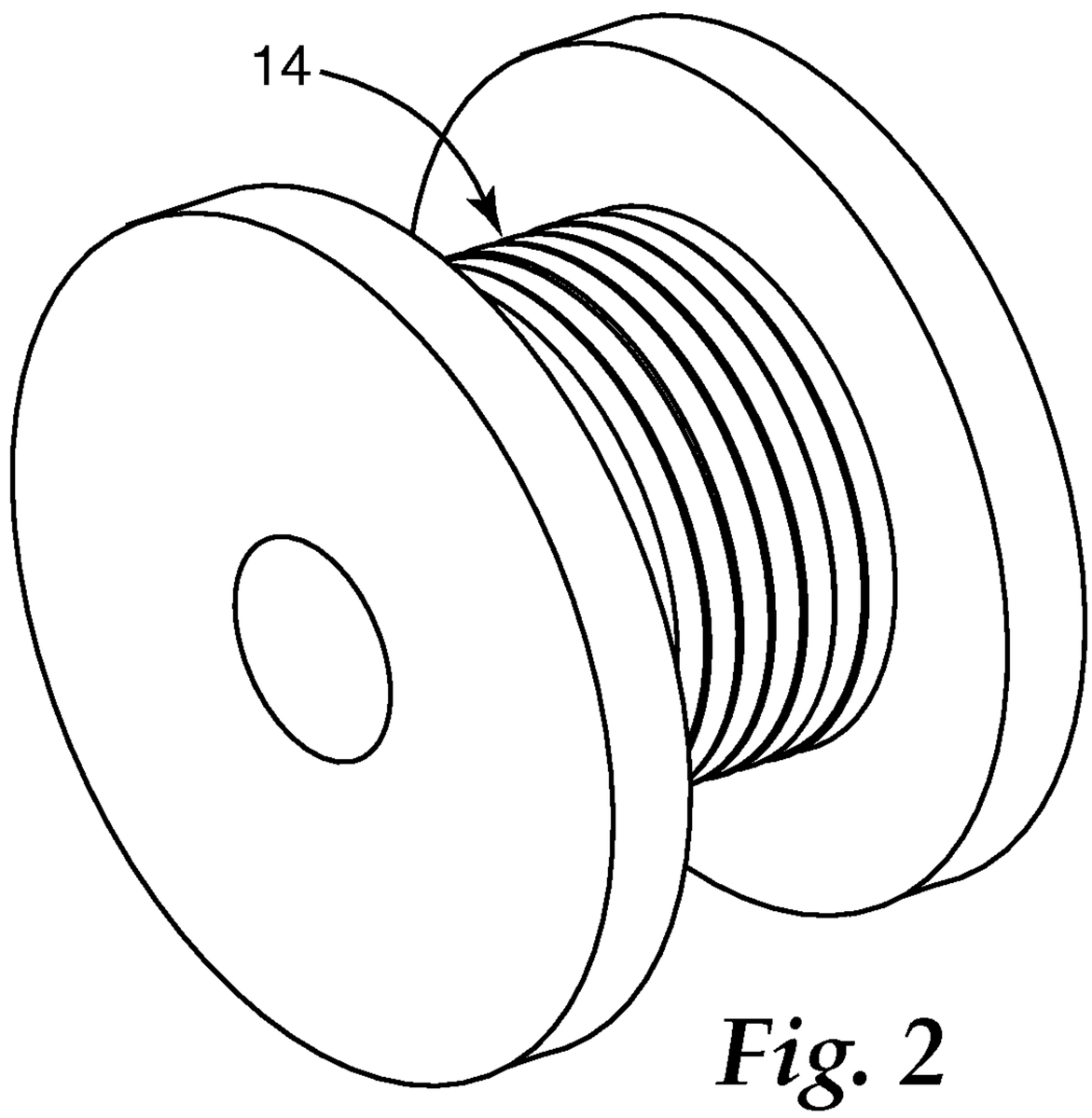

Fig. 2

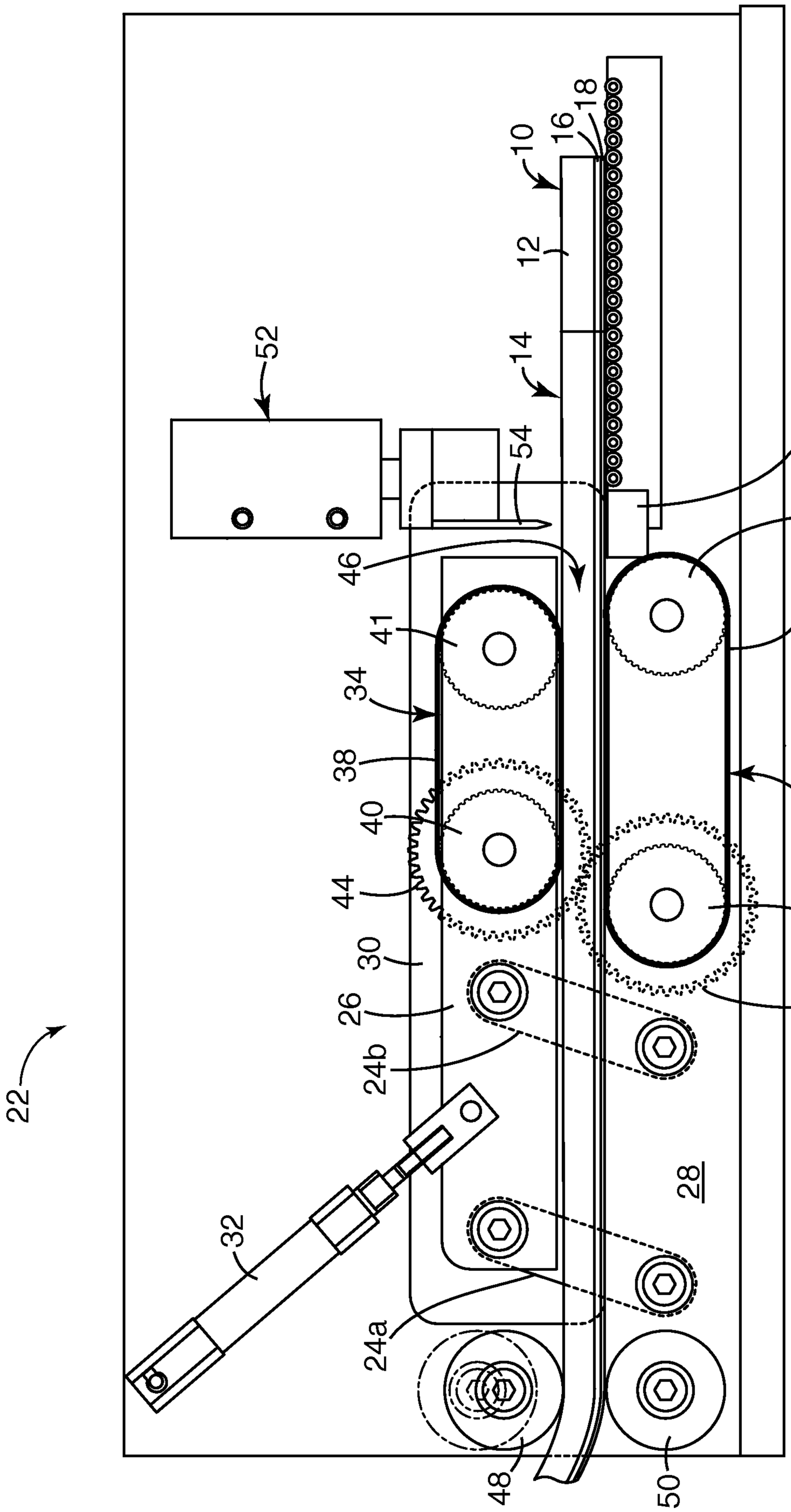
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Fig. 3

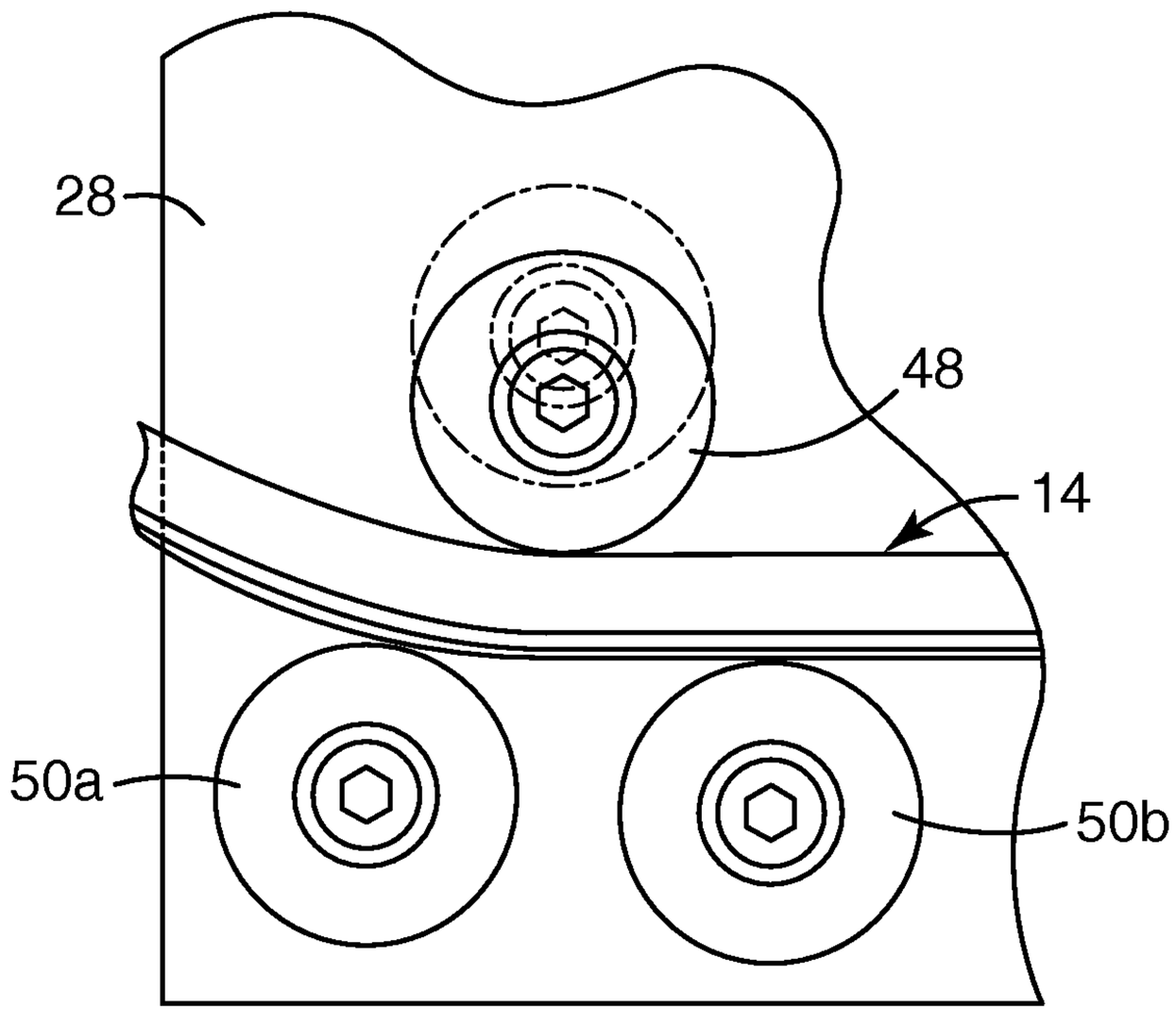
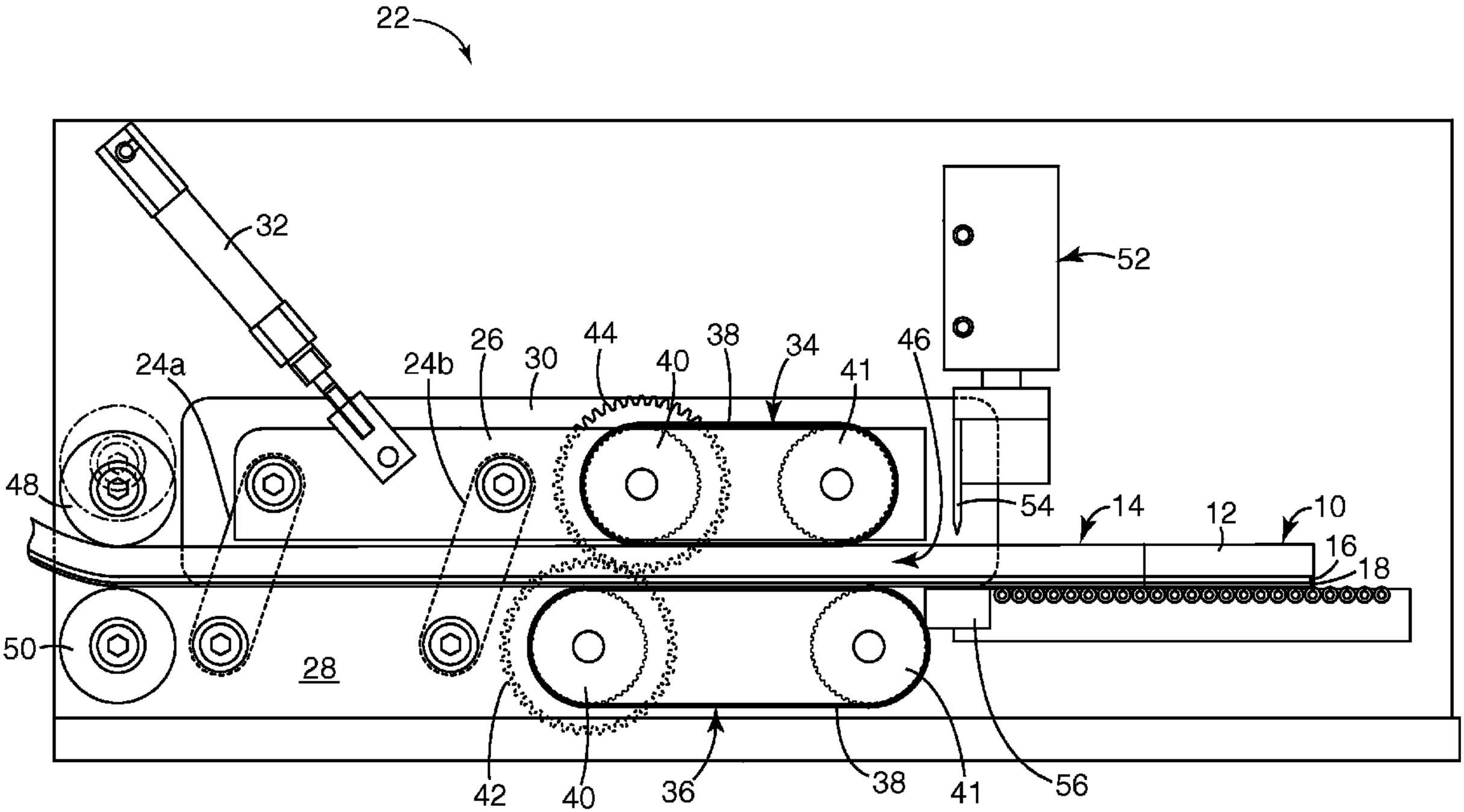


Fig. 4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