



(51) International Patent Classification:

G01B 3/1041 (2020.01) G01B 3/1061 (2020.01)

(21) International Application Number:

PCT/GB2021/000086

(22) International Filing Date:

28 July 2021 (28.07.2021)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

2013029.0 20 August 2020 (20.08.2020) GB
2014040.6 07 September 2020 (07.09.2020) GB

(71) Applicant: **GATOR PRODUCTS LIMITED** [GB/GB];
24 Warminster Road, Westbury, Wiltshire BA13 3PE (GB).

(72) Inventors: **HOGAN, Phillip**; GATOR PRODUCTS
LIMITED, 24 Warminster Road, Westbury, Wiltshire

BA13 3PE (GB). **JOHNSON, David**; GATOR PRODUC-
TS LIMITED, 24 Warminster Road, Westbury, Wiltshire
BA13 3PE (GB).

(74) Agent: **FERRAR, Nicholas** et al.; Adamson Jones, BioC-
ity Nottingham, Pennyfoot Street, Nottingham Notting-
hamshire NG1 1GF (GB).

(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, BN, BR, BW, BY, BZ,
CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO,
DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN,
HR, HU, ID, IL, IN, IR, IS, IT, JO, JP, KE, KG, KH, KN,
KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD,
ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO,
NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW,
SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN,
TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

(54) Title: TAPE MEASURING DEVICE COMPRISING A WINDOW AND ONE OR MORE GUIDES

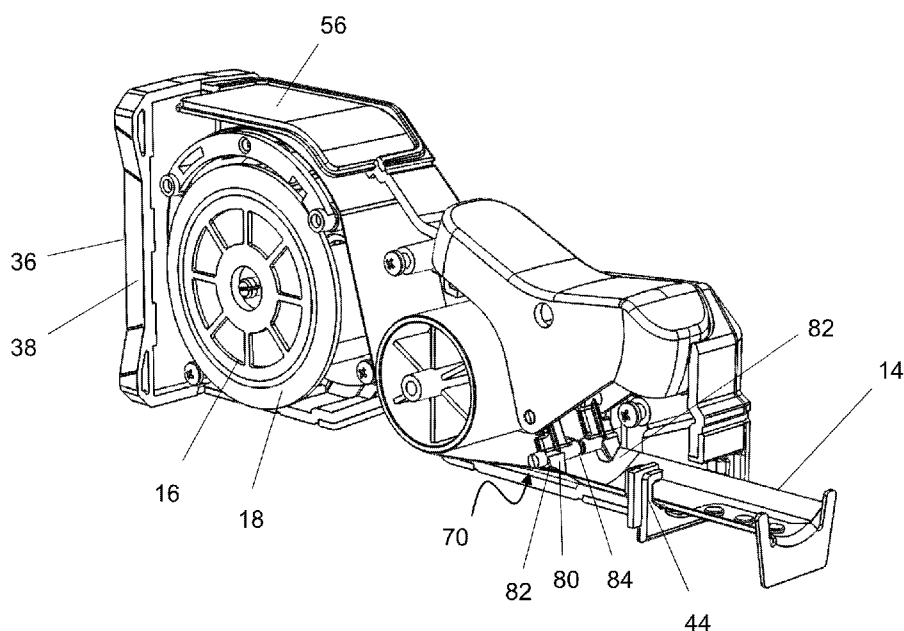


Figure 3

(57) Abstract: There is disclosed a tape measuring device with a housing and a spool mounted within the housing. A flexible measuring tape is mounted to the spool such that tape winds onto the spool during retraction thereof in a first direction and is extensible from the housing by winding of the spool in an opposing direction. The tape has measurement indicia thereon and a window in the housing permits the measurement indicia to be viewed externally to the housing through the window. The window provided on a first side of the housing and a guide provided within the housing to deflect the tape extending from the spool in a direction away from the first side of the housing and toward a second, opposing side of the housing. The tape measuring device can be used to take a length measurement both from the opening and also from an end wall of the housing.



(84) **Designated States** (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, 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))*
- *of inventorship (Rule 4.17(iv))*

Published:

- *with international search report (Art. 21(3))*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

TAPE MEASURING DEVICE COMPRISING A WINDOW AND ONE OR MORE GUIDES

The present invention relates to a measuring device, particularly to tape measure device.

5

Introduction

A schematic prior art tape measure is shown in figure 1. The tape measure comprises a semi-flexible tape 2 mounted onto a spool 4 provided inside a casing 6. The tape 2 is retractable in and out of the casing 6 to allow measurement of the distance. The tape 2 comprises a flange 8 which may be hooked onto a distal edge to hold the tape 2 in place without user intervention. In order to measure the distance the tape 2 extends, the user reads the indicia located at arrow 10.

15 The inventor has found numerous problems with prior art devices. When using the device adjacent a corner (for example, when measuring the height of a wall), to measure the true height of the wall, the tape must extend into the apex of the corner. However, the casing 6 prevents this, so the user must extend out more tape 2, such that tapes extends across the corner and casing 6 is sufficiently removed from the corner to allow the user to read the indicia on the tape 2. This may be awkward for the user and requires the use of two hands, which may be difficult, for example, when using a ladder or holding other equipment. Also, bending the tape into an internal corner to take a reading can cause inaccuracy as the tape curves around the internal corner, rather than extending perfectly into the corner.

25 Furthermore, the type of tape measure shown in Figure 1 is awkward to use when measuring the height of curtain poles, hand rails and other elevated fixtures and fittings that are not flush with a wall. This is because the user will typically want to take an accurate reading at or below eye level. The user will thus locate the free/distal end of the tape 2 at the elevated fixture/fitting and then look at the lower portion of the tape adjacent the casing 6 to take the reading. However the user must also concurrently make sure the flange 8 at the distal end of the tape 2 has

30

not slipped or moved at the time the reading is taken. The flange 8 is typically outside the user's line of sight when taking a reading. It is often the case that the flange 8 is moved accidentally whilst the user is taking the reading, resulting in an inaccurate reading or else requiring a further reading to be taken.

5

An example of a tape measure offering a viewing window by which a user can take a measurement through the viewing window is described in US Patent 4,574,486. However this type of tape measure conforms to a conventional form factor of the housing and does not offer an optimal user experience. For example, a dual-sided
10 tape is used that would give different readings on each side if used incorrectly. Furthermore, when using wider tapes of concave constructions, e.g. to permit longer lengths of tape to be dispensed, the arrangement of US 4,574,486 can lead to inaccuracy when viewing through the window. In short, the accuracy may be generally acceptable for narrower, or shorter-length, tapes but inaccuracy of
15 readings can be a problem for wider/longer tapes.

It is an aim of the present invention to overcome or ameliorate one or more of the above problems.

20 Statements of Invention

According to a first aspect of the invention, there is provided a tape measure device comprising: a housing having an end wall and an opening spaced from the end wall; a spool mounted within the housing; a flexible measuring tape mounted
25 to the spool such that tape winds onto the spool during retraction thereof in a first direction and is extensible from the opening in the housing by winding of the spool in an opposing direction, the tape comprising measurement indicia thereon; a window in the housing such that the measurement indicia may be viewed externally to the housing through the window; and, a guide member within the
30 housing arranged to deflect a path of the tape between the spool and the opening such that the length of the tape from a location behind the window to the opening is equal to the length of the housing from the opening to the end wall.

The end wall may comprise a flat/planar end wall. The end wall may comprise an end plate member.

5 The measurement indicia may be provided on the outside surface of the tape when wound on the spool. When viewed in a longitudinal section taken through the centerline of the tape with the housing opening and/or distal end of the tape extending to the right hand side, the tape may wind onto the spool in an anticlockwise direction.

10 The guide may have one or more guide element. The guide (e.g. the guide element thereof) may comprise one or more roller for passage of the tape there-over. The guide may comprise a plurality of guide elements/rollers, e.g. with the guide taking the form of a carriage. The guide/carriage may comprise an arched shape, and/or may follow a profile of a portion of the spool. The guide
15 elements/rollers may be mounted in an arched array.

The guide may be mounted between the spool and the window. The tape may pass from the spool over the guide in-between the guide and the window. The guide may present the tape immediately beneath the window, e.g. for viewing by a
20 user.

The housing may comprise a further guide. The further guide may orient/redirect the tape for passage through the opening and/or for passage beneath a locking mechanism. The further guide may comprise a wheel/roller.
25

According to a second aspect of the invention, there is provided a tape measure device comprising: a housing; a spool mounted within the housing; a flexible measuring tape mounted to the spool such that tape winds onto the spool during retraction thereof in a first direction and is extensible from the opening in the
30 housing by winding of the spool in an opposing direction, the tape comprising measurement indicia thereon; and, a releasable locking mechanism having an engagement portion configured to selectively engage and hold the tape to prevent extension and/or retraction thereof in a first condition, the locking mechanism

comprising a pivoting mounting for the engagement portion, wherein the engagement portion rotates on the pivoting mounting between the first condition and a second condition in which the tape is released.

- 5 The engagement portion may extend toward the extension direction of the tape from the pivoting mounting in the first condition, such that when tape is extended from the housing, the engagement portion rotates away from the tape and at least partially disengages therefrom.
- 10 When the tape is retracted, the engagement portion may rotate into engagement with the tape.

- The engagement portion may be mounted to a manual actuator. The manual actuator may comprise a pivoting/rocking actuator. The manual actuator may be
- 15 pivotably mounted to the housing. The manual actuator may comprise a rocker switch.

- A proximal end of the engagement portion (i.e. the pivoting mounting) may move in unison with the manual actuator. A distal end of the engagement portion may
- 20 pivot relative to the manual actuator. The engagement portion, e.g. the distal end thereof, may undergo compound movement comprising a component due to the movement of the manual actuator and a further component due to pivoting relative to the manual actuator.

- 25 The engagement portion may pivot forward in the direction of extension/payout of the tape from the spool to permit extension of the tape, e.g. when the manual actuator is at-rest. The engagement portion may pivot rearward in the direction of retraction of the tape onto the spool to permit retraction of the tape, e.g. when the manual actuator is moved/rocked to an actuated condition.

30

The manual actuator may be biased to an at-rest condition.

The engagement portion may pivot through a perpendicular orientation to the tape when engaging/disengaging the tape. The pivoting mounting of the engagement member may pass directly between the pivoting mounting of the manual actuator and the tape when engaging/disengaging the tape. Either or both of the
5 engaged/disengaged conditions of the locking mechanism may be angularly offset from said orientation of the engagement portion and/or pivoting mountings.

The pivoting mounting of the engagement portion may be beneath the pivoting mounting of the manual actuator.
10

The window may be provided on a first side of the housing. The guide or further guide may be configured to direct the tape extending from the spool in a direction away from the first side of the housing and toward a direction toward a second, opposing side of the housing.
15

According to a third aspect of the invention, there is provided a tape measure comprising a housing having an opening for extension and retraction of a length of tape from a spool within the housing, the housing having a flat rear wall and being elongate in form in a direction from the flat rear wall to the opening, wherein the
20 housing comprises first and second portions, the first portion being proximal the rear wall and having a greater height dimension than the second portion, wherein the second portion depends from the first portion towards the opening, the first portion comprising the spool and the second portion comprising a manual actuator of a locking mechanism for selectively locking the tape to prevent extension and/or
25 retraction thereof.

According to a fourth aspect of the invention, there is provided a measuring device comprising: a housing having an opening; a spool mounted within the housing; a flexible measuring tape mounted to the spool such that tape winds onto the spool
30 during retraction thereof in a first direction and is extensible from the housing by winding of the spool in an opposing direction, the tape passing from the spool through the opening and comprising measurement indicia thereon; a window in the housing such that the measurement indicia may be viewed externally to the

housing through the window, the window provided on a first side of the housing; and a guide provided within the housing, the guide configured to direct the tape extending from the spool in a direction away from the first side of the housing.

- 5 The measuring tape may have a width of greater than 19mm or 20 mm. The blade may have a width of greater than or equal to 22mm, 23mm, 24mm or 25mm.

The tape may be concave/curved in form when viewed in cross section.

- 10 According to a further aspect of the invention, there is provided a measuring tape comprising a length of flexible tape having measurement indicia along its longitudinal axis and flange formation at an end thereof said flange formation comprising a hook formation having an intermediate portion extending from the end of the tape in a perpendicular direction and a distal portion that is angularly
15 oriented relative to the intermediate portion, wherein the hook formation has a lateral dimension relative to the longitudinal axis that is greater than a width dimension of the tape.

- The hook formation may comprise a plurality of hooks spaced in the lateral
20 direction. The hooks may be oriented in parallel.

The intermediate portion may extend linearly.

- The distal portion may turn back towards the tape. The distal portion may be
25 substantially parallel with the longitudinal axis of the tape.

- The flange formation may releasably attachable to the tape, e.g. to flange of the tape. The tape flange may be conventional, such that the flange formation may comprise an optional additional flange attachment. The tape may be supplied with
30 or without the flange formation.

The tape measure may provide improved ease of use and/or improved accuracy of measurement for the user. The invention is particularly well-suited to the

measurement of internal dimensions where abutment with one or more surface is required to take a length measurement. The invention may be beneficial for measuring internal dimensions of doorways, windows and other recesses in buildings but the invention is not limited thereto and could be used for any tape measuring scenario. The tape measure may also be used in a conventional manner, whereby a reading is taken at the housing opening or else at a location along the tape spaced from the housing opening. The flange formation may be used with the tape measure of any other aspect of the invention, or else in conjunction with a conventional tape measure.

10

The tape measuring device can be used to take a length measurement both from the opening and also from the rear/end wall of the housing. This can be achieved using length scale along the tape starting from the tape end for either measurement, e.g. using a single length scale along the tape length or a pair of length scales (i.e. metric and imperial) that both terminate at the tape end.

15

Any of the optional features described above in relation to any one aspect may be applied to any further aspect, wherever practicable.

20 Detailed description

Practicable embodiments of the invention are described by way of example only with reference to the accompanying drawings, of which:

25

Figure 1 shows a prior art tape measure

Figure 2 shows a first perspective view of a measuring device;

Figure 3 shows a first perspective, partially cut-away view of the measuring device;

Figure 4 shows a second perspective view of a measuring device;

30

Figure 5 shows a second perspective, partially cut-away view of the measuring device;

Figure 6 shows a first side-on, partially cut-away view of the measuring device;

Figure 7 shows a second side-on, partially cut-away view of the measuring device.

- 5 Figures 2-7 show a measuring device 12 for measuring the length of objects. The device 12 comprises a flexible or semi-flexible tape 14 configured to extend away from the device 12 to allow variable distance measurement of the object. Such devices are commonly referred to as “tape measures”.
- 10 The tape 14 is fixed to a spool 16 (i.e. via an end thereof). The spool 16 comprises a rotatable wheel/drum, thereby allowing winding/unwinding of the tape 14. The spool 16 is rotationally biased (e.g. via torsion spring or the like) to bias the tape 14 into a wound state. The tape 14 is thus biased into a retracted state. The spool 16 comprises a side walls 18 (best seen in figure 3) to retain the tape 14 thereon,
- 15 I.e. to laterally constrain the tape.

The spool 16 is mounted within a housing 20. The housing 20 allows the user to hold/grip the device 12. The housing 20 comprises a moulded polymer, for example, a moulded thermoplastic. The housing comprises a first recess 22 on a

20 first side 24 thereof. The first recess 22 provides a recess for the user's thumb in use. The housing comprises a second recess 26 on a second side 28 thereof. The second recess 26 provides a recess for the user's index finger in use. The housing 20 is thus ergonomic.

- 25 The housing 20 comprises a first half 30 and a second half 32. The halves 30,32 are joined together via fasteners or the like to form a shell-like arrangement. The halves 30, 32 may each be shell-like and may meet at the midplane of the device 12.
- 30 The housing 20 comprises a first end 34. The spool 16 is provided proximal the first end 34. The first end 34 comprises a plate 36. The plate 36 may be a unitary construction (i.e. a single moulded piece). The plate 36 seals the housing 20 at the first end. The plate 36 may be substantially flat (e.g. the outer surface thereof). The plate 36 comprises a flange 38 configured to overlies the edges of the halves

30,32 to retain the flange onto the housing 20 and/or provide rigidity to the halves 30,32. The plate 36 may be a different material and/or piece from the remainder of the housing. In other examples, the housing could have a simple flat first end 34.

- 5 The housing 20 comprises a second end 40 provided at an opposing end of the housing 20 to the first end 34. The second end 40 comprises an opening 42 therein in which the tape 14 extends through. The opening comprises an elongate slot. The opening 42 is provided proximal/adjacent the second side 28 of the housing 20 (though not on the side 28 itself). Thus, when the second side 28 is
10 placed against a wall (and therefore parallel thereto), the tape 14 extends parallel to the wall. The tape 14 therefore extends parallel the axial length of housing 20.

- A mandrel 44 is provided adjacent or within the opening 42. The mandrel 44 is configured to bend the tape 14 into a curved (e.g. U-shaped profile). The mandrel
15 44 comprises a curved opening smaller in width than the flat width of the tape 14. The mandrel 44 thus induces a curved profile into the tape 14. This maintains the flexible tape 14 into a substantially rigid configuration.

- The free end of the tape 14 comprises a flange 46 to allow hooking of the free end
20 onto an edge or lip etc. The flange 46 is curved to maintain the curved profile of the tape 14.

- The tape 14 is configured to pass over a first guide 48 (see figure 6). The first guide 48 is provided adjacent the spool 16. The first guide 48 is arcuate/curved.
25 The first guide 48 at least partially surrounds the spool 16 (i.e. the circumference thereof). The first guide 48 is provided proximal/adjacent the first side 24 of the housing 20. The first guide is thus interposed the spool 16 and the first side 24 of the housing 20.

- 30 The tape 14 is configured to pass over an outer surface 50 of the guide 48 (i.e. interposed the guide 48 and the first side 24). The first guide 48 may comprise one or more static and/or rotatable pins 52 to help guide the tape 14 thereover.

A window 54 is provided adjacent the guide 48, such that the tape 14 is visible therein. The tape 14 is thus visible from outside the housing 20. The window 54 may comprise a transparent wall member 56 (e.g. transparent glass or polymer). Alternatively, the window 54 may be open (i.e. the window 54 merely comprises an aperture). The window may have a marker, e.g. an arrow, line or other indicia, for lining up with length markings/indicia on the tape 14.

The tape 14 is configured to pass over a second guide 58. The second guide 58 comprises a rotatable wheel/drum/roller 60. The second guide 58 is displaced away from the first side 24 of the housing 20. The second guide 58 thus directs the tape 14 away from the first side 24 and toward the second side 28 of the housing 20.

An edge 62 of the second guide 58 is located proximal the second side 28 of the housing 20. Thus, the tape 14 is directed to a position adjacent/proximal the second side 28. The tape 14 is therefore directed to a position aligned with the opening 42. The tape 14 extends between the second guide 58 and the opening 42 substantially parallel to the second side 28. The tape 14 thus follows a crook or sickle shaped path from the spool 16 to the opening 42 (e.g. provides a tortuous path). During extension/retraction of the tape 14, the spool 14 and the second guide 58 are configured to rotate in opposing directions.

In some embodiments, the second guide 58 may comprise a static pin/drum. However, it can be appreciated that a rotatable drum reduces the friction during payout of the tape 14, so is preferable.

The device 12 comprises a locking mechanism 64 to hold the tape 14 at a fixed extension. The locking mechanism comprises a manual actuator 66 (i.e. switch) to allow the user to release or engage the tape 14. The switch 66 is provided on the first side 24 of the housing 20. The switch is provided in the first recess 22. The switch 66 is provided proximal/adjacent the second end 40 of the housing 20. The switch 66 is mounted via a pivot 68 on the housing 20, thus providing a "rocker" switch.

The locking mechanism 64 comprises an engagement portion 70 configured to selectively engage the tape 14 to hold the tape 14 in position. The engagement portion 70 is mounted to the switch 66 via a pivot 72. The engagement portion 70 is therefore rotatable relative to the switch 66. The engagement portion 70 is mounted to a fulcrum 76 on the switch 66. When the switch 66 is moved to a locked position, as shown in figure 7, the fulcrum 76 extends toward the second guide 58. This causes a foot portion 78 of the engagement portion 70 to engage the tape 14 (best seen in figure 3). The fulcrum thus provides lateral movement of the pivot 72 (i.e. along the axial length of the tape 14/housing 20).

The foot portion 78 comprises a grip member 80 configured to engage the tape 14. The grip member 80 holds (i.e. by friction) or clamps the tape 14 in place. A foot portion 78 is provided on each side of the switch 66. Thus, the grip members 80 are configured to engage side portions 82 of the tape 14. The grip members 80 are curved to conform with the shape of the tape 14.

In some embodiments, the grip members 80 may comprise a high-friction surface (e.g. rubber etc.). Alternatively, the holding force may be provided by the intrinsic friction/clamping force of the grip members 80.

A cross-member 84 extends from the respective foot portions 78 across the width of the tape 14. The cross-member 84 ensures the correct spacing of the foot portions 78.

25

In some embodiments, a single foot portion 78/grip member 80 may be provided. The grip member 80 may extend across the entire width or a substantial portion of the tape 14.

30 In the locked position, the foot portion 78 of the engagement portion 70 extends toward the extended direction of the tape 14 (i.e. toward the opening 42). The engagement 70 portion is therefore angled with respect to the tape 14. Therefore, when the tape 14 retracts onto the spool 14, the grip members 80 engage the tape

14 and prevent retraction thereof. The angled arrangement ensures that the retraction of the tape 14 encourages the engagement portion 70 to rotate therewith (i.e. away from the opening 42). The engagement portion 70/grip member 80 rotate thus toward/into the tape 14. This increases the frictional force between the grip members 80 and the tape 14, preventing further retraction. The angled arrangement thus provides a positive feedback loop.

Conversely, when in the locked position, extension of the tape 14 causes rotation of the engagement portion 70/grip member 80 away from the tape 14. The grip members 80 therefore partially or fully disengage from the tape 14 allowing extension thereof. The locking mechanism 64 thus prevents retraction of the tape 14 but allows extension thereof when in the locked position.

In locked position, the engagement portion 70 (i.e. the axial length thereof) is angled at greater than 45 degrees relative to the tape 14. This ensures the engagement portion rotates with the tape 14 during retraction thereof (i.e. the grip members 80 do not lose traction). Preferably, the engagement portion 70 is angled at greater than 55 degrees, preferably, greater than 65 degrees.

In alternative embodiments, the friction/clamping force of the engagement portion 70 may be sufficient to preventing movement in both directions.

The locking mechanism 64 is shown in an unlocked position in figure 7. The fulcrum 76 is rotated toward the opening 42 by the rotation of the switch 66. The engagement portion 70 (i.e. the grip members 80) is rotated away from the tape 14 and out of engagement therewith. The engagement portion 70 may be rotated to a position where the tape 14 is flatter and thus does not engage the side portions 82 of the tape 14. The tape 14 is thus freely movable in the retracted direction. The tape 14 may therefore be freely movable in the retracted and extended direction.

30

In some embodiments, in the unlocked position, the engagement portion 70 is angled in an opposing direction to the locked position. The locking mechanism 64 thus acts in the same fashion as in the locked position. The tape 14 therefore may

be moveable in the retracted direction, but prevented from moving in the extended direction. This may prevent accidentally or undesired payout of the tape 14.

- 5 The tape 14 comprises indicia (not shown) thereon to indicate the degree of the extension of the tape 14. The indicia may comprise measurement gradations and numerals etc. The indicia are visible on the tape 14 through the window 54. Indicia may be provided on/adjacent the window 54 to allow the user to accurately interpret the indicia on the tape (i.e. to provide a datum point).
- 10 The indicia are configured such that they display (e.g. at the datum point) the distance 86 between the base plate 36 and the end of the tape 14/the flange 46. The indicia thus indicate the length 88 of the housing 20 of the device 12 in addition to the length of the extension 90 of the tape 14. For example, when the tape 14 is fully retracted, the indicia at the window 54/datum will read the length 88
- 15 of the housing 20. When the tape 14 is extended, the indicia at the window 54/datum will read length $88+90$ (86).

Such an arrangement allows the user to use the device as part of the measurement, whilst still achieving accuracy. For example, when measuring the

20 height of the wall, the user can place the base 36 on the floor adjacent the corner between the floor and the wall. The tape 14 can then be extended as required and a measurement can be taken. This does not require awkward bending of the tape 14 or re-positioning of the housing 20. The positioning of the window 54 means the user can read the indicia, whilst the tape 14 extends substantially parallel to the

25 wall (i.e. due to the second guide 58 directing the tape from the first side 24 to the second side 28 of the device). The first guide 48 and second guide 58 thus ensure that the user can easily read measurement whilst ensuring accurate measurement due to parallel alignment with the wall.

- 30 In some embodiments, the first guide 48 may be absent the indicia on the tape 14 can read by whilst the tape 14 resides on the spool 14. However, it can be appreciated this arrangement is suboptimal, as during unwinding of the tape 14, the distance between the tape 14 on the spool and the window 54 will increase,

thus making the indicia inaccurate and potentially more difficult to read. The first guide 48 thus ensures the tape 14 is provide at a fixed position relative to the window 54 and/or that there is a fixed tape length extending from a point on the guide beneath the window to the opening 42.

5

The tape may be concave/curved/arched in cross-sectional profile. In any examples of the invention, the guide (e.g. roller 58 and/or guide 48) may be arranged to flatten the tape profile as it passes there-over. This can help improve the accuracy of a reading taken through the window since the flattened tape is presented beneath the window. This may additionally/alternatively reduce the resistance of the blade caused by its curved profile.

10

The tape may have opposing concave/convex sides, e.g. defined by the profile of the tape as it leaves the housing. The tape may be wound onto the spool in a direction in which the concave side of the tape faces outwardly of the spool. When viewed from the side with the tape leaving from the right had side of the housing, the tape may wind onto the spool in a anticlockwise/counterclockwise direction.

15

Claims:

1. A measuring device comprising:
 - a housing having an end wall and an opening spaced from the end wall;
 - 5 a spool mounted within the housing;
 - a flexible measuring tape mounted to the spool such that tape winds onto the spool during retraction thereof in a first direction and is extensible from the housing by winding of the spool in an opposing direction, the tape passing from the spool through the opening and comprising measurement indicia thereon;
 - 10 a window in the housing such that the measurement indicia may be viewed externally to the housing through the window; and
 - a guide provided within the housing and arranged to deflect a path of the tape between the spool and the opening such that the length of the tape from a location behind the window to the opening is equal to the length of the housing
 - 15 from the opening to the end wall.
2. A measuring device according to claim 1, where the housing comprises a first side and a second side, the window being provided on the first side of the housing and the guide directing the tape towards the second side and/or the
- 20 opening being provided proximal the second side of the housing.
3. A measuring device according to claim 2, where the guide, or an outer edge thereof, is provided proximal the second side of the housing.
- 25 4. A measuring device according to claim 3, where the outer edge of the guide is aligned with the opening, such that the tape extends substantially parallel to the second side of the housing between the guide and the opening.
5. A measuring device according to any preceding claim, where the tape
- 30 passes from the opening beneath the guide and passes from the guide over the spool; and/or where the tape passes around the guide in a first angular direction and passes around the spool in an opposing angular direction.

6. A measuring device according to any preceding claim, comprising a second guide configured to direct the tape extending from the spool in a direction toward the first side of the housing and/or the window.

5 7. A measuring device according to claim 6, where the second guide is provided adjacent the window, the tape extending between the second guide and window such that measurement indicia can be read therefrom.

8. A measuring device according to claim 6 or 7, where the second guide is
10 arcuate in form and/or at least partially surrounds the spool.

9. A measuring device according to any one of claims 6-8, where the second guide circumferentially extends around the spool in close conformity thereto.

15 10. A measuring device according to any one of claims 6-9, where the second guide comprises a static guide surface over which the tape slides in use.

11. A measuring device according to any preceding claim, where the guide or second guide comprises one or more wheel or static/rotatable pin thereon.

20 12. A measuring device according to any preceding claim, comprising a releasable locking mechanism having an engagement portion configured to engage and hold the tape in a first configuration to prevent extension and/or retraction thereof.

25 13. A measuring device according to claim 12, where the spool is biased towards a retraction direction for the tape and/or the locking mechanism is configured to permit extension of the tape but prevent retraction of tape in the first configuration.

30 14. A measuring device according to claim 12 or 13, where the locking mechanism comprises a pivoting mounting for the engagement portion, wherein the engagement portion extends toward the extension direction of the tape from the pivoting mounting in the first condition, such that when tape is extended from
35 the housing, the engagement portion rotates away from the tape and at least

partially disengages therefrom, and/or that when the tape is retracted, the engagement portion rotates into engagement with the tape.

15. A measuring device according to claim 12, 13 or 14, where the angle
5 formed between a longitudinal axis of the tape and an axis of the engagement portion extending from the pivoting mounting is greater than or equal to 45 degrees when in the first condition.

16. A measuring device according to any one of claims 12 to 15, where the
10 engagement portion comprises a grip/friction portion configured to engage the tape, the grip portion comprising for example a curved/angled engagement surface.

17. A measuring device according to claim 16, where a plurality of engagement
15 portions are provided, each comprising a respective grip portion, the grip portions engaging respective sides of the tape.

18. A measuring device according to any one of claims 12 to 17, where the
locking mechanism comprises a manual actuator, the manual actuator comprising
20 a fulcrum and being configured to rock between a first position and a second position, the engagement portion being mounted to the manual actuator.

19. A measuring device according to claim 18, where the engagement portion
is mounted to the manual actuator at a pivoting mounting, the pivoting mounting
25 being spaced from the fulcrum, e.g. spaced in a direction towards the tape.

20. A measuring device according to claim 18 or 19, where rocking of the
manual actuator to the second position raises the pivoting mounting away from the
tape by at least a height dimension of the engagement member.

30

21. A measuring device according to claim 18, 19 or 20, where rocking of the
manual actuator between the first and second position permits rotation of the
engagement member through a perpendicular orientation relative to the
longitudinal axis of the tape.

22. A measuring device according to any one of claims 12 to 21, where the tape comprises a curved profile as it passes through the locking mechanism.

5 23. A measuring device according to claim 22, where the device comprises one or more guide for maintaining the curved profile of the tape as it passes through the locking mechanism.

24. A measuring device according to any one of claims 12 to 23, where the
10 locking mechanism is configured to disengage from the tape in second configuration to permit movement thereof.

25. A measuring device according to any one of claims 12 to 24, where the
15 locking mechanism is configured to permit retraction of the tape but prevent extension of tape in the second configuration.

26. A measuring device according to any preceding claim, where the housing
comprises first and second portions, the first portion being proximal the end wall
and having a greater height dimension than the second portion, wherein the
20 second portion depends from the first portion towards the opening, the first portion
comprising the spool therein and the second portion comprising a manual actuator
of a locking mechanism for selectively locking the tape to prevent extension and/or
retraction thereof.

25 27. A measuring device according to any preceding claim, where the measuring tape has a width of greater than or equal to 20 mm.

28. A measuring device according to any preceding claim, where the measuring
tape has a hook formation at its end, the hook formation having a lateral
30 dimension relative to the longitudinal axis of the measuring tape that is greater
than a width dimension of the tape.

29. A measuring device according to claim 28, where the hook formation comprises a pair of hooks spaced apart in the lateral dimension.

1/5

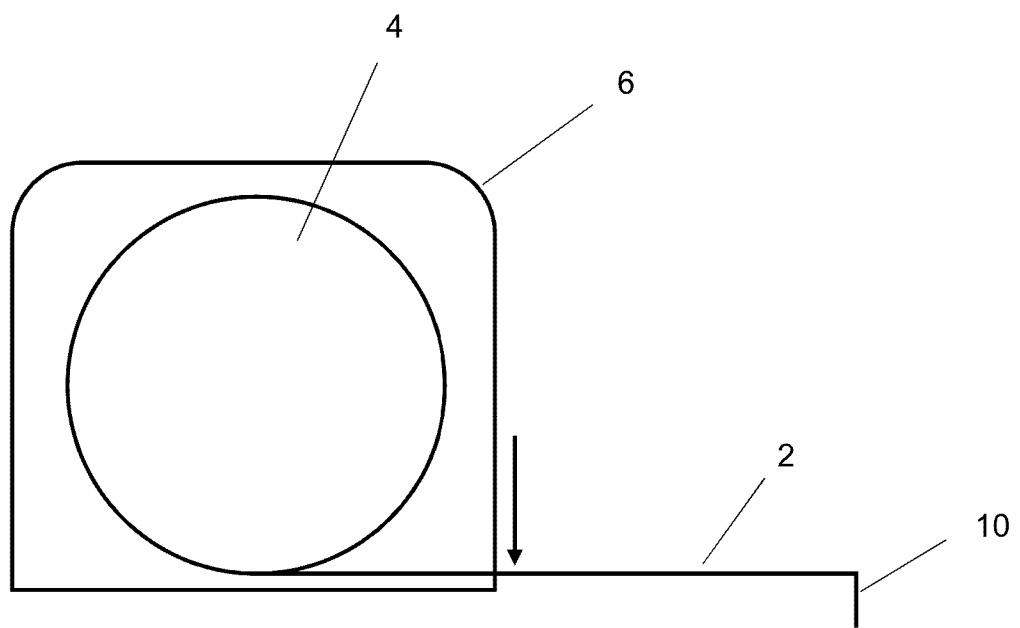


Figure 1

2/5

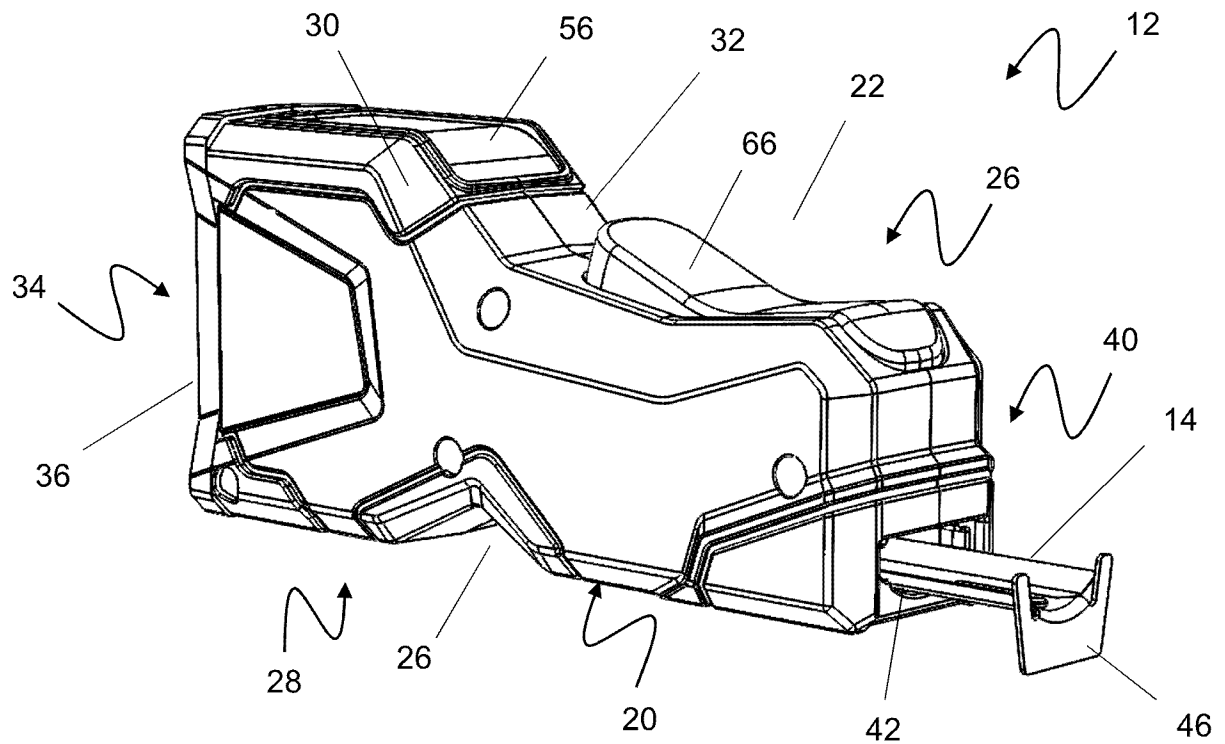


Figure 2

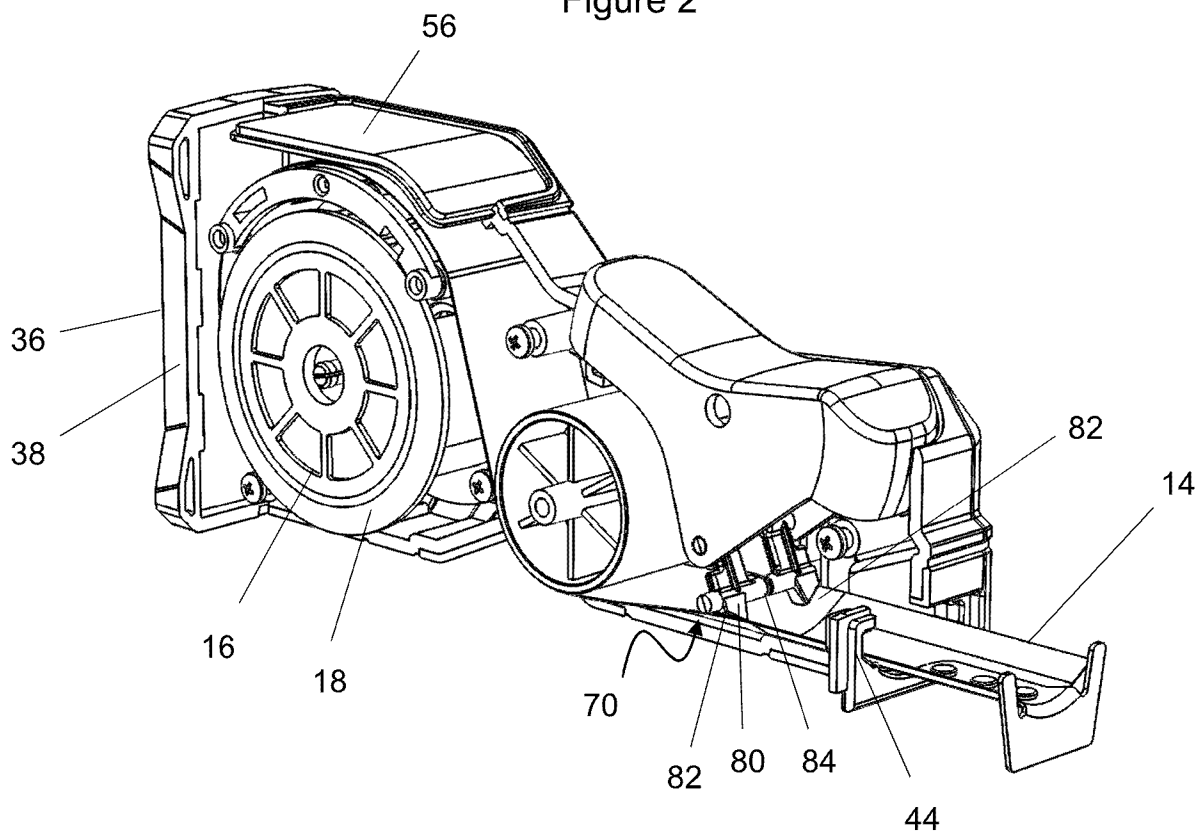


Figure 3

3/5

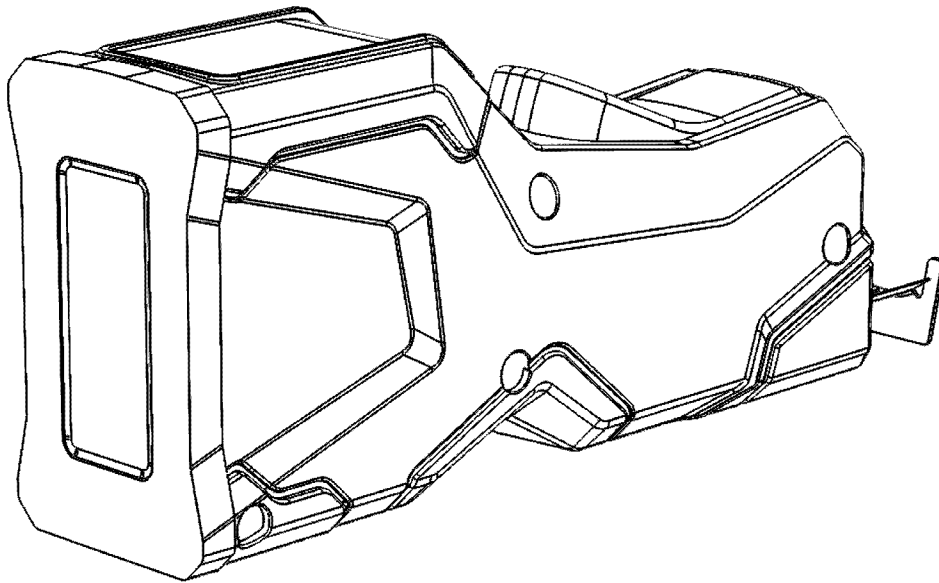


Figure 4

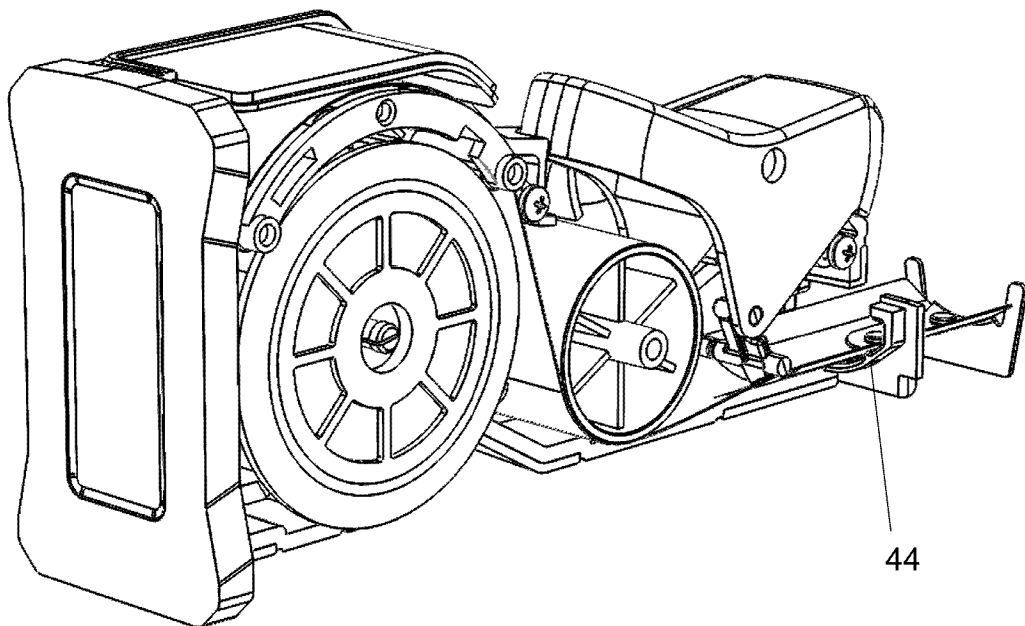


Figure 5

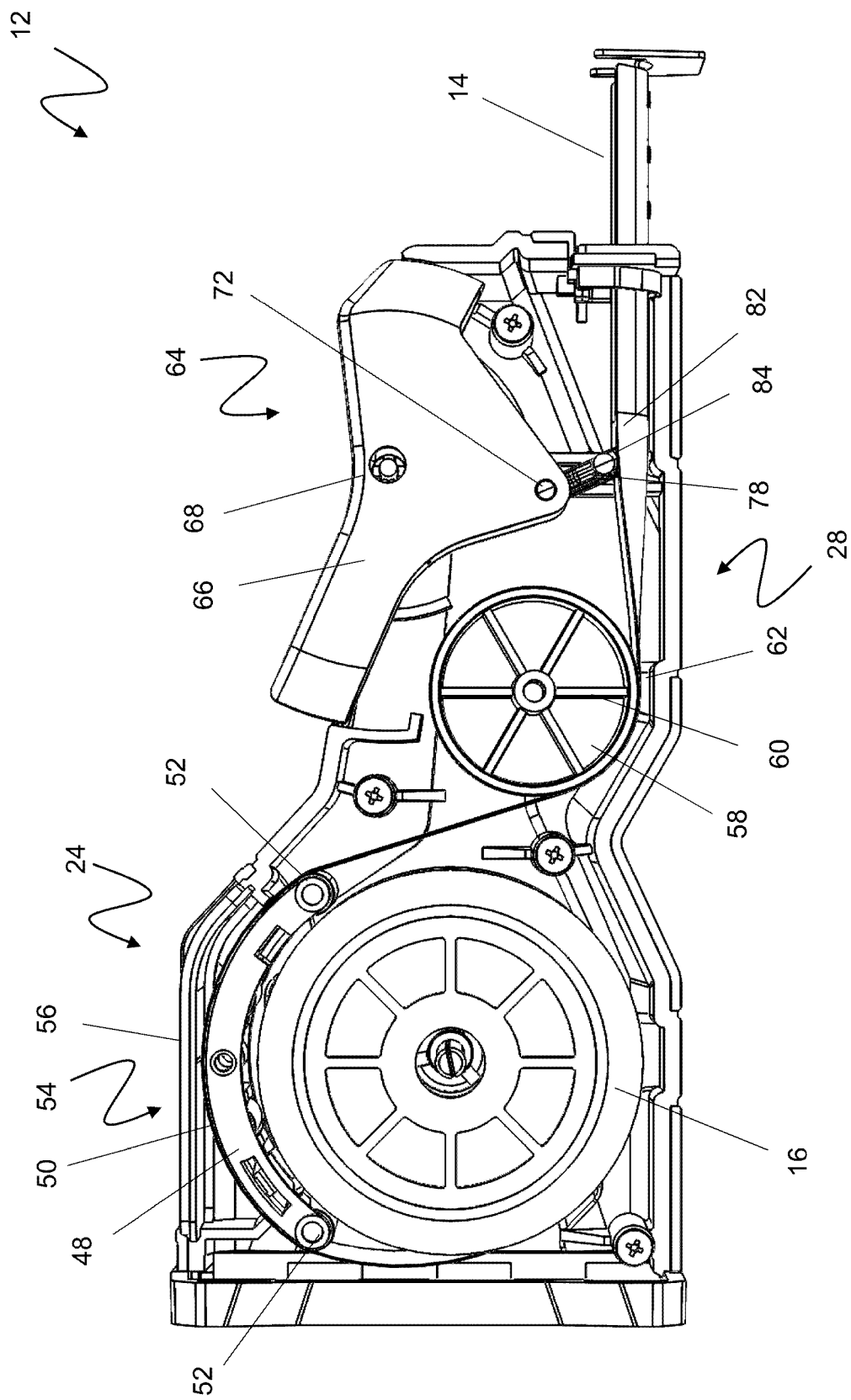


Figure 6

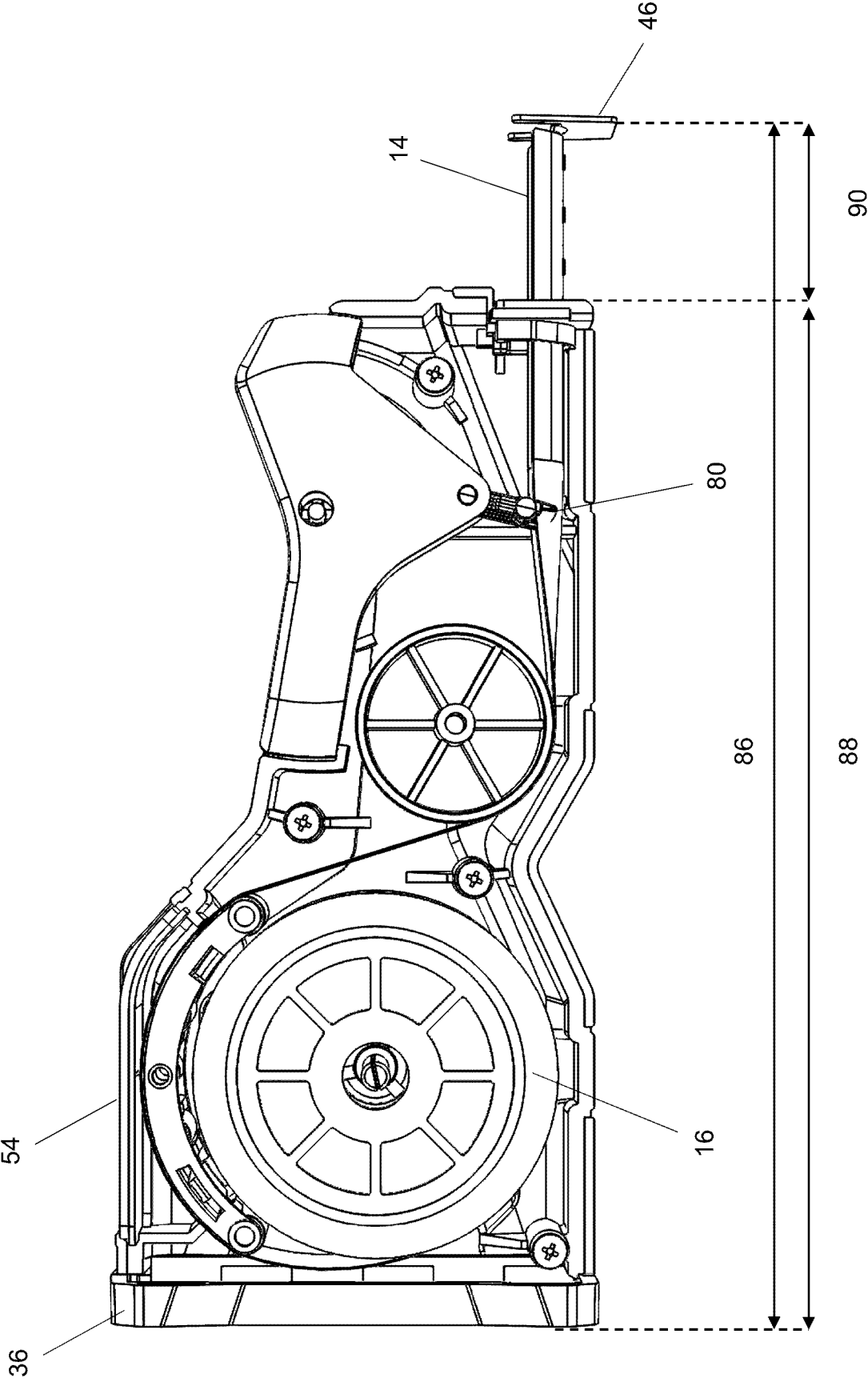


Figure 7

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2021/000086

A. CLASSIFICATION OF SUBJECT MATTER

INV. G01B3/1041

ADD. G01B3/1061

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

G01B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2010/224046 A1 (OSBOURNE HOWARD GEORGE [GB]) 9 September 2010 (2010-09-09)	1-26
Y	abstract figures 7, 8, 13, 14 paragraphs [0001] - [0067], [0084] - [0107] -----	27-29
X	US 8 898 921 B1 (ADORNO DAVID [US]) 2 December 2014 (2014-12-02) abstract figures 1, 7, 9, 10 column 4, line 38 - column 10, line 30 -----	1-5, 11-20
Y	WO 2019/040752 A1 (MILWAUKEE ELECTRIC TOOL CORP) 28 February 2019 (2019-02-28) abstract figures 1,2 paragraphs [0034] - [0038], [0045], [0049], [0052], [0064] -----	27-29



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance;; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance;; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

6 December 2021

Date of mailing of the international search report

14/12/2021

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2

NL - 2280 HV Rijswijk

Tel. (+31-70) 340-2040,

Fax: (+31-70) 340-3016

Authorized officer

Poizat, Christophe

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/GB2021/000086

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2010224046 A1	09-09-2010	CN 101715377 A	26-05-2010
		EP 2144725 A1	20-01-2010
		GB 2448760 A	29-10-2008
		US 2010224046 A1	09-09-2010
		WO 2008132515 A1	06-11-2008

US 8898921 B1	02-12-2014	NONE	

WO 2019040752 A1	28-02-2019	CN 111033167 A	17-04-2020
		TW 201917346 A	01-05-2019
		US 10422617 B1	24-09-2019
		US 10697747 B1	30-06-2020
		US 2019063893 A1	28-02-2019
		US 2020340792 A1	29-10-2020
		US 2021278188 A1	09-09-2021
		WO 2019040752 A1	28-02-2019
