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CA 2840631 C 2019/01/15

(11)(21) 2 840 631

(12) BREVET CANADIEN
CANADIAN PATENT

(13) C

(86) Date de dépôt PCT/PCT Filing Date: 2012/06/28
(87) Date publication PCT/PCT Publication Date: 2013/01/03
(45) Date de délivrance/Issue Date: 2019/01/15
(85) Entrée phase nationale/National Entry: 2013/12/27
(86) N° demande PCT/PCT Application No.: US 2012/044639
(87) N° publication PCT/PCT Publication No.: 2013/003587
(30) Priorités/Priorities: 2011/06/29 (US61/502,421); 2012/06/28 (US13/536,140); 2012/06/28 (US13/536,083)

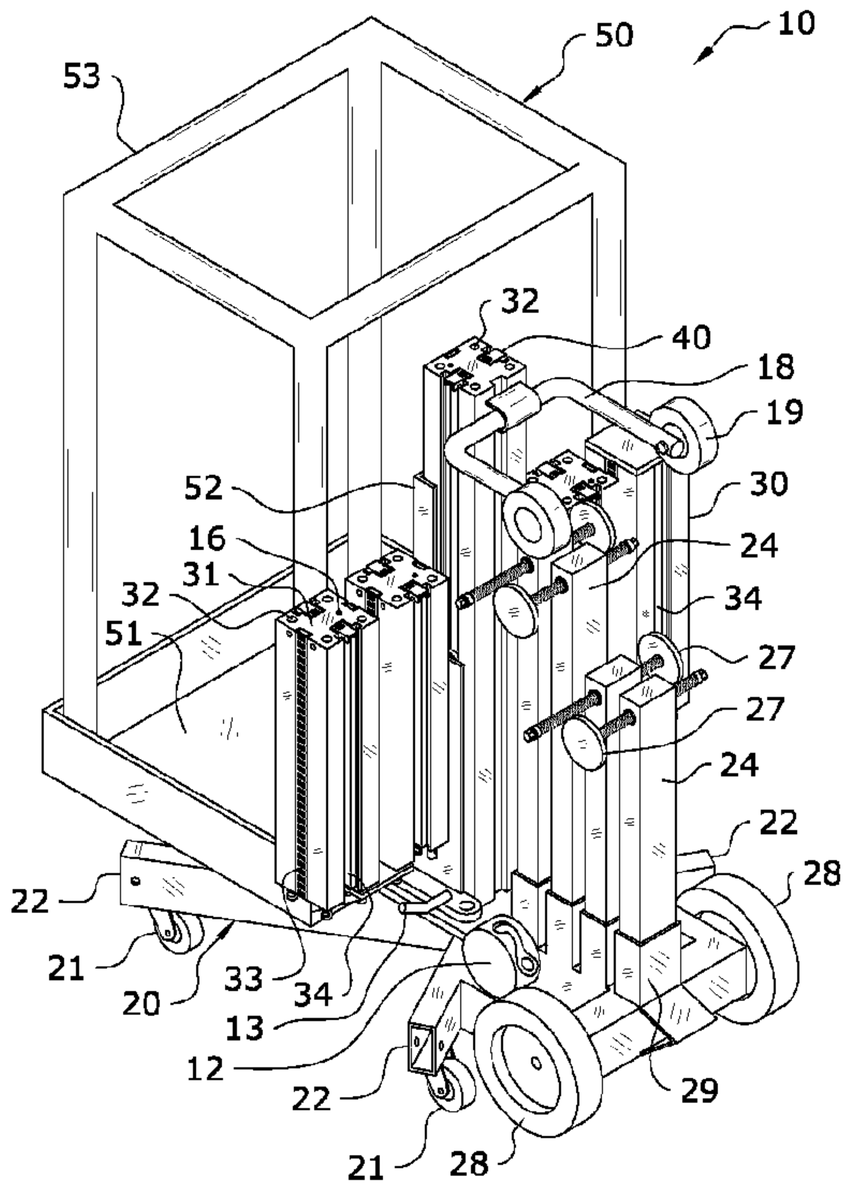
(51) Cl.Int./Int.Cl. *B66F 9/06* (2006.01), *B66C 23/78* (2006.01), *B66F 11/04* (2006.01)

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(54) Titre : SYSTEME DE LEVAGE MODULAIRE PORTATIF
(54) Title: PORTABLE MODULAR LIFT SYSTEM




(57) Abrégé/Abstract:
A portable modular lift system that may be easily transported to a lifting location and compactly stored when not in use. The portable modular lift system generally includes a support base having a plurality of base wheels, a plurality of mast sections connectable to one another to form a vertical mast, a support platform movably positioned upon the vertical mast, and a drive unit connected to the support platform to elevate and lower the support platform upon the mast sections. The mast sections include a plurality of receiver apertures within a first end and a plurality of locking pins extending from a second end that are catchably received within the corresponding receiver apertures.

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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
3 January 2013 (03.01.2013)

WIPO | PCT

(10) International Publication Number
WO 2013/003587 A3

(51) **International Patent Classification**:
***B66F 9/06*** (2006.01) ***B66C 23/78*** (2006.01)
***B66F 11/04*** (2006.01)

(21) **International Application Number**:
PCT/US2012/044639

(22) **International Filing Date**:
28 June 2012 (28.06.2012)

(25) **Filing Language**: English

(26) **Publication Language**: English

(30) **Priority Data**:

| | | |
|---|---|---|
| 61/502,421 | 29 June 2011 (29.06.2011) | US |
| 13/536,083 | 28 June 2012 (28.06.2012) | US |
| 13/536,140 | 28 June 2012 (28.06.2012) | 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, CL, 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, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, 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, LR, LS, MW, MZ, NA, RW, SD, SL, 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, ML, MR, NE, SN, TD, TG).

*[Continued on next page]*

(54) **Title**: PORTABLE MODULAR LIFT SYSTEM

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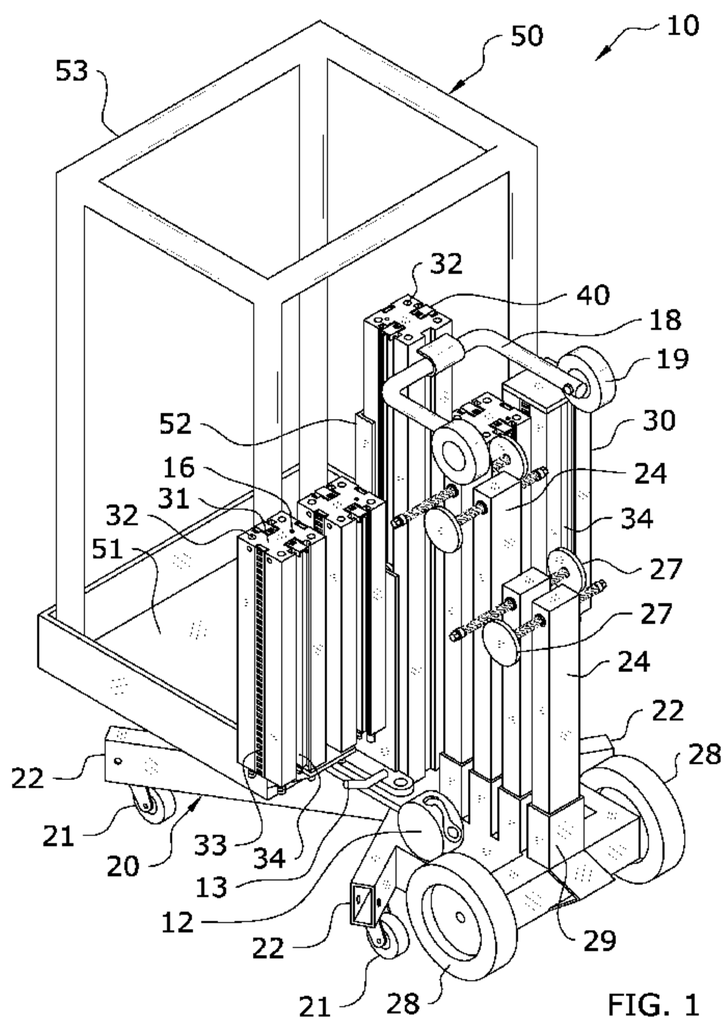



FIG. 1

WO 2013/003587 A3

WO 2013/003587 A3

**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))*

**(88) Date of publication of the international search report**:
7 March 2013

# Portable Modular Lift System

## BACKGROUND OF THE INVENTION

### Field of the Invention

The present invention relates generally to a portable lift and more specifically it relates to a portable modular lift system that may be easily transported to a lifting location and compactly stored when not in use.

### Description of the Related Art

Any discussion of the related art throughout the specification should in no way be considered as an admission that such related art is widely known or forms part of common general knowledge in the field.

Conventional lift systems have been in use for years for elevating workers, materials and the like to elevated locations. Lift systems are utilized by maintenance workers, sound and light professionals, home owners, warehouse owners and the like to reach elevated locations. Conventional lift systems utilize one or more vertically orientated masts. The masts are typically attached to the side or wall of the structure to be worked upon with bracing. The masts may be comprised of a unitary structure or a modular structure. The modular masts are comprised of mast sections that are secured together in a vertical manner with conventional fasteners to form an elongated mast structure. A support platform is movably positioned upon the masts and may be elevated/lowered utilizing an electric motor or other power source. An example of a

unitary mast configuration utilized for elevating workers and materials is U.S. Patent No. 6,981,573 to Nickel and owned by Reechcraft, Inc. The Reechcraft patent discloses a pair of vertical posts that support a movable platform between thereof and that utilizes braces attached between the posts and the wall structure.

One problem with conventional lift systems is that they are relatively heavy making them difficult to transport to a work area. Another problem with conventional lift systems is that they are time consuming to assemble because they require tools and manual assembly with fasteners to attach the modular masts together.

A further problem with conventional lift systems is that they are difficult to transport and are not designed to be easily utilized in smaller sized locations like the interiors of buildings. Another problem with conventional lift systems is that they typically require more than one worker to assemble, utilize and disassemble. A further problem with conventional lift systems is that they require attachment of the masts to the side of a building structure being worked upon. Another problem with conventional lift systems is that they are expensive and complex making them difficult to utilize on smaller projects.

Because of the inherent problems with the related art, there is a need for a new and improved portable modular lift system that may be easily transported to a lifting location and compactly stored when not in use.

## BRIEF SUMMARY OF THE INVENTION

The invention generally relates to a portable lift which includes a support base having a plurality of base wheels, a plurality of mast sections connectable to one another to form a vertical mast, a support platform movably positioned upon the vertical mast, and a drive unit connected to the support platform to elevate and lower the support platform upon the mast sections. The mast sections include a plurality of receiver apertures within a first end and a plurality of locking pins extending from a second end that are catchably received within the corresponding receiver apertures.

There has thus been outlined, rather broadly, some of the features of the invention in order that the detailed description thereof may be better understood, and in order that the present contribution to the art may be better appreciated. There are additional features of the invention that will be described hereinafter and that will form the subject matter of the claims appended hereto. In this respect, before explaining at least one embodiment of the invention in detail, it is to be understood that the invention is not limited in its application to the details of construction or to the arrangements of the components set forth in the following description or illustrated in the drawings. The invention is capable of other embodiments and of being practiced and carried out in various ways. Also, it is to be understood that the phraseology and terminology employed herein are for the purpose of the description and should not be regarded as limiting.

## BRIEF DESCRIPTION OF THE DRAWINGS

Various other objects, features and attendant advantages of the present invention will become fully appreciated as the same becomes better understood when considered in conjunction with the accompanying drawings, in which like reference characters designate the same or similar parts throughout the several views, and wherein:

FIG. 1 is an upper perspective view of the present invention in a compact storage position.

FIG. 2 is an upper perspective view of the present invention being assembled.

FIG. 3 is an upper perspective view of the present invention fully assembled.

FIG. 4a is a magnified upper perspective view illustrating two mast sections being initially positioned together in an unlocked state with the securing lever in the released position and with the locking lever in the locked state to prevent movement of the securing levers.

FIG. 4b is a magnified upper perspective view illustrating the two mast sections with the locking lever moved to a release state to allow for movement of the securing levers.

FIG. 4c is a magnified upper perspective view illustrating the securing lever positioned in the locked position to lock the locking pins within the receiver apertures by the locking shaft.

FIG. 4d is a magnified upper perspective view illustrating the securing lever positioned in the locked position and the locking lever in the locked state to prevent movement of the securing levers.

FIG. 5a is a side cutaway view of a first mast section positioned above a second mast section prior to connection thereof.

FIG. 5b is a side cutaway view of the first mast section connected to the second mast section with the locking shaft rotated to lock the locking pins.

FIG. 6a is a bottom end view of a mast section showing the locking lever in the locked state to prevent movement of the securing levers.

FIG. 6b is a bottom end view of a mast section showing the locking lever in the release state to prevent movement of the securing levers.

FIG. 7a is a side cutaway view showing the securing levers in the released position extending outwardly thereby preventing passage of the guide wheels upwardly onto the next mast section.

FIG. 7b is a side cutaway view showing the securing levers in the released position extending outwardly with the guide wheels engaging the extended securing levers thereby preventing passage of the guide wheels upwardly onto the next mast section.

FIG. 7c is a side cutaway view showing the securing levers in the locked position thereby allowing passage of the guide wheels upwardly onto the next mast section.

FIG. 8a is a side view of an upper mast section positioned above a lower mast section with a sequencing pin extending from the lower end in a first position of the upper mast section and aligned with a sequencing aperture extending within the upper end of the lower mast section in a first position corresponding to the sequencing pin.

FIG. 8b is a side view of an upper mast section positioned above a lower mast section with a sequencing pin extending from the lower end in a second position of the upper mast section and aligned with a sequencing aperture extending within the upper end of the lower mast section in a second position corresponding to the sequencing pin.

FIG. 8c is a side view of an upper mast section positioned above a lower mast section with a sequencing pin extending from the lower end in a third position of the upper mast section and aligned with a sequencing aperture extending within the upper end of the lower mast section in a third position corresponding to the sequencing pin.

FIG. 8d is a side view of an upper mast section positioned above a lower mast section with a sequencing pin extending from the lower end in a fourth position of the upper mast section and aligned with a sequencing aperture extending within the upper end of the lower mast section in a fourth position corresponding to the sequencing pin.

FIG. 9a is a top end view of a mast section illustrating the sequencing aperture.

FIG. 9b is a bottom end view of the mast section illustrating the sequencing pin.

FIG. 10 is an upper perspective view of the outer leg removed from the inner leg.

FIG. 11 is an upper perspective view of the support platform elevated above the support base.

FIG. 12 is an upper perspective cutaway view of the inner leg and outer leg.

FIG. 13a is a side cutaway view of the outer leg with no weight supported by the corresponding adjustment member.

FIG. 13b is a side cutaway view of the outer leg with weight supported by the corresponding adjustment member thereby releasing the locking detent and the corresponding finger member.

FIG. 13c is a side cutaway view of the outer leg with weight supported by the corresponding adjustment member and with the corresponding finger member removed from the corresponding guide member.

## DETAILED DESCRIPTION OF THE INVENTION

### *A. Overview.*

Turning now descriptively to the drawings, in which similar reference characters denote similar elements throughout the several views, Figures 1 through 13c illustrate a portable modular lift system **10**, which comprises a support base **20** having a plurality of base wheels **28**, a plurality of mast sections **30** connectable to one another to form a vertical mast, a support platform **50** movably positioned upon the vertical mast, and a drive unit **60** connected to the support platform **50** to elevate and lower the support platform **50** upon the mast sections **30**. The mast sections **30** include a plurality of receiver apertures **32** within a first end **31** and a plurality of locking pins **38** extending from a second end **37** that are catchably received within the corresponding receiver apertures **32**.

### *B. Support Base.*

Figures 1 and 2 best illustrate the support base **20** which is utilize to provide support and stability to the present invention when in use. The support base **20** is comprised of a portable structure that is preferably lightweight which allows for easy transportation by a single individual. The support base **20** may be comprised of various types of materials such as but not limited to aluminum, steel and the like.

The support base **20** includes a plurality of legs that extend outwardly along a horizontal plane. The legs may extend outwardly in various patterns such as but not limited to an X-shaped pattern. There are preferably at least two front set of legs and two rear set of legs as illustrated in Figures 2 and 3 of the drawings. The legs may be comprised of a stationary leg structure, pivoting leg structure, telescoping leg structure or a removable leg structure. It is preferable that the legs have a compact state for storage and transportation as shown in Figure 1 of the drawings, and an extended state for providing stability during use of the present invention as shown in Figures 2 and 3 of the drawings.

Figures 1 through 3 illustrate a removable leg structure wherein the legs are comprised of a plurality of inner legs **22** and a plurality of corresponding outer legs **24** that

are received within the interior of the inner legs **22**. The outer legs **24** are removed when the present invention is in the compact state and stored within the storage receivers **29** attached to the support base **20** as illustrated in Figure 1 of the drawings. The storage receivers **29** are comprised of vertically orientated tubular receivers that receive an inner end of the outer legs **24** for storage as shown in Figure 1.

The support base **20** preferably has a width of 30 inches or less when the plurality of legs are in the compact state to allow for passage through doorways and other narrow areas. The support base **20** preferably has a width of 53 inches or more when the plurality of legs are in the extended state to provide stability to the present invention when in use.

The support base **20** preferably includes a plurality of wheels to assist in the transportation of the present invention from one location to another. As illustrated in Figures 1 and 2 of the drawings, the plurality of wheels preferably include of a pair of base wheels **28** attached to a rear portion of the support base **20** that provide for transportation between various locations and upon various types of terrain (e.g. stairs, grass). as illustrated in Figures 1 and 2 of the drawings. A handle **18** having a U-shaped structure with opposing upper wheels **19** is preferably attached to the base mast as shown in Figure 1 to provide additional support for the present invention when loading horizontally on to a flat surface such as a vehicle (e.g. pickup, truck).

The plurality of wheels further preferably includes a plurality of caster wheels **21** that allow for horizontal movement of the present invention upon a flat surface. The base wheels **28** are larger than the caster wheels **21** to provide for increased mobility over uneven terrain. The base wheels **28** may be constructed of a non-pneumatic tire structure (e.g. flat free tire) or a pneumatic tire structure. The base wheels **28** are preferably sufficient in size to allow for transport of the present invention up and down stairs. The bottom ends of the base wheels **28** are preferably higher than the lower end of the caster wheels **21** so that only the caster wheels **21** are supporting the present invention when in a substantially horizontal state and only the base wheels **28** support the present invention

when inclined rearwardly. The caster wheels **21** are connected to the distal portions of the inner legs **22** to provide for maximum stability during movement when in the compact storage position as illustrated in Figure 1 of the drawings.

The outer legs **24** each include an adjustment member **26** as illustrated in Figures 2, 3, 10 and 11 of the drawings. Each adjustment member **26** is preferably comprised of a threaded shaft that includes a coupler at the upper end thereof for allowing a wrench or drill to connect to for rotation thereof. Each adjustment member **26** includes a pad **27** at the lower end thereof that engages a ground surface supporting the present invention. The pad **27** is preferably comprised of a broad structure to prevent damage to the surface and to provide increased stability.

The outer legs **24** are secured within the inner legs **22** by a detent structure or fastener. Each of the inner legs **22** include a guide member **70** having an upper tapered opening that receives a corresponding finger member **55** extending downwardly from the support platform **50**. The finger members **55** are preferably attached to a pair of extended members **56** that extend from the support platform **50** as illustrated in Figure 11 of the drawings. The finger members **55** extend downwardly and are aligned with the openings within the guide members **70** so when the support platform **50** is fully lowered, the finger members **55** are positioned within the guide members **70** and when the support platform **50** is elevated slightly the finger members **55** are outside of the guide members **70**.

Each inner leg **22** includes a lower biased unit **72** that is positioned within a lower interior portion of the inner leg **22** below each of the guide members **70** to allow for selective engagement of the upper end of the lower biased unit **72** with the lower end of the finger members **55**. A flanged end member **74** extends horizontally from the lower biased unit **72** and extends through a slot **25** within a partition member **23** within the outer leg **24**.

Each outer leg **24** preferably includes an upper bushing **80** and a lower bushing **82** as illustrated in Figure 12 of the drawings. The upper bushing **80** and the lower bushing **82**

each preferably have an interior flange that is larger than the aperture within the outer leg **24** positioned within. A first engaging member **84** is threadably attached to each adjustment member **26** between the upper bushing **80** and the lower bushing **82**. The first engaging member **84** has a width that is slightly less than the interior width of the outer leg **24** thereby preventing rotation of the first engaging member **84** when the adjustment member **26** is rotated. The first engaging member **84** has a tapered end that selectively engages a corresponding tapered end of a second engaging member **86** as shown in Figure 12. The second engaging member **86** is positioned upon an alignment pin **87** and is biased towards the first engaging member **84** with a biasing device (e.g. spring). An elongated shaft **88** is attached to the second engaging member **86** and passes through an aperture within the partition member **23** and selectively engages a locking detent **57** within the corresponding finger member **55** as shown in Figures 12 through 13c of the drawings.

When the pad **27** is not bearing any weight, the first engaging member **86** is adjacent to and touching the lower bushing **82** as illustrated in Figure 13a. When the pad **27** engages the ground surface and is bearing weight, the first engaging member **84** is elevated within the outer leg **24** to engage the upper bushing **80** and also engaging the second engaging member **86** as illustrated in Figures 13b and 13c of the drawings.

***C. Vertical Mast.***

It is preferable to have a single vertical mast constructed from the plurality of interconnected mast sections **30** as illustrated in Figures 2 and 3 of the drawings. However, more than one vertical mast may be constructed utilizing the present invention in situations that require more than one vertical mast to increased strength and stability. The vertical mast includes a track **33** extending up the length of the vertical mast that the drive unit **60** engages (e.g. with a sprocket or gear) to elevate and lower the support platform **50** with respect to the vertical mast. The vertical mast further includes a pair of opposing side channels **34** that receive the guide wheels **54** of the support platform **50**.

The vertical mast extends upwardly from the support base **20** as illustrated in Figures 2 and 3 of the drawings. The vertical mast is comprised of a plurality of mast sections **30** removably connected to one another to form the vertical mast that extends upwardly from the support base **20**. The vertical mast may be constructed of various numbers of mast sections **30** (e.g. 2, 3, 4, 5, etc.) and each of the mast sections **30** may be comprised of the same or different lengths (e.g. 2 feet, 4 feet, 6 feet).

While not required, it is preferable to have a base mast that is permanently or semi-permanently attached to the support base **20** as illustrated in Figure 1 of the drawings. The permanent attachment of the base mast increases stability and provides a partial assembly of the present invention. The base mast may also have the same length or be longer than the other mast sections **30**. The upper end of the base mast includes a coupler that is capable of receiving the next mast section **30** similar to the ends of the mast sections **30** as discussed further herein. Alternatively, one of the plurality of mast sections **30** may be removably attached to the support base **20** instead of having a base mast.

The plurality of mast sections **30** each have a first end **31** and a second end **37**. The first end **31** may be comprised of the upper end or the lower end of the respective mast section **30**. The second end **37** of the respective mast section **30** is opposite of the first end **31** and may be comprised of the upper end or the lower end of the respective mast section **30**. The first end **31** and the second end **37** of the mast sections **30** are preferably parallel with respect to one another.

The first end **31** of each mast section **30** includes a first coupler and the second end **37** of each mast section **30** includes a second coupler. The first coupler is removably connectable to the second coupler to removably connect the plurality of mast sections **30** in a vertical and aligned manner. The first coupler and the second coupler allow for secure and relatively non-moving attachment of the mast sections **30** with respect to one another.

As shown in Figures 8a through 8d of the drawings, a sequencing aperture **16** is preferably positioned within the first end **31** of the mast section **30** that corresponds to a sequencing pin **14** extending from a second end **37** of a mast section **30** designed to be positioned above the initial mast section **30**. To ensure that the proper combination of mast sections **30** are assembled in the proper order, alignment and to limit the height of the assembled vertical mast (i.e. with the track **33** aligned for each of the mast sections **30** the sequencing aperture **16** could be positioned within the opposite side of the track **33**), the sequencing aperture **16** for each of the mast sections **30** is different and the sequencing pin **14** for each of the mast sections **30** is different. Figures 8a through 8d illustrate utilizing a steadily moving set of sequencing apertures **16** and sequencing pins **14**. The upper most mast section **30** would not have a sequencing pin **14** or sequencing aperture **16** at the upper end thereof. The upper most mast section **30** preferably does not have any sequencing aperture **16** or receiver apertures **32**.

Each of the plurality of mast sections **30** preferably has a rectangular cross section (e.g. square shaped) and are comprised of extruded aluminum to provide for a cost-effective, lightweight structure capable of supporting the support platform **50** along with cargo. It can be appreciated that the mast sections **30** may be comprised of various other cross sections (e.g. circular, hexagonal, triangular, etc.) The first end **31** and the second end **37** of each of the mast sections **30** is preferably flat and transverse with respect to the longitudinal axis of the respective mast sections **30** to maximize the physical contact between the first end **31** of a first mast section **30** and a second end **37** of an adjacent mast section **30**. Each of the mast sections **30** includes a track **33** on one side thereof that the drive unit **60** engages. The track **33** for each of the mast sections **30** is aligned when assembled into the vertical mast. Each of the mast sections **30** also includes the opposing pair of side channels **34**. The side channels **34** for each of the mast sections **30** are aligned when assembled into the vertical mast thereby creating a single elongated pair of side channels **34** within the vertical mast allowing free passage of the guide wheels **54**.

The first coupler and the second coupler are each preferably comprised of a plurality of receiver apertures **32** or a plurality of locking pins **38** that are received within the receiver apertures **32**. If the first coupler is comprised of the receiver apertures **32** then the second coupler is comprised of the locking pins **38** to allow for interconnection of two or more mast sections **30**. The first coupler is aligned with the second coupler for each of the mast sections **30** to allow for interconnection of each of the mast sections **30**.

Figures 8a through 8d illustrate the receiver apertures **32** within the first end **31** (the first end **31** is shown as the upper end in the figures whereas the first end **31** could be the lower end alternatively). The receiver apertures **32** are formed to have an upper tapered portion to help guide the locking pins **38** into the receiver apertures **32** with the middle to lower portions of the receiver apertures **32** formed to snugly receive the locking pins **38** with limited movement to ensure a stable vertical mast when constructed. The plurality of receiver apertures **32** are preferably comprised of four corner receiver apertures **32** positioned adjacent to each corner of the first end **31** of the mast section **30** as illustrated in Figure 9a of the drawings.

The plurality of receiver apertures **32** removably receive the plurality of locking pins **38** in a catchable manner. The locking pins **38** have a length sufficient to ensure secure reception within the receiver apertures **32** (e.g. at least one inch). The locking pins **38** are also preferably comprised of four corner locking pins **38** positioned adjacent to each corner of the second end **37** of the mast section **30** The plurality of locking pins **38** each include a locking channel **39** that extends through a side portion of the locking pins **38** transverse with respect to the longitudinal axis of the locking pins **38**. The locking channel **39** allows the locking shaft **44** to pass through and selectively prevent the locking pins **38** from exiting the receiver apertures **32**. The plurality of locking pins **38** extend parallel with respect to a longitudinal axis of the plurality of mast sections **30**.

One or more locking shafts **44** are rotatably positioned within each of the plurality of mast sections **30** and partially extend into at least two of the plurality of receiver

apertures **32** to selectively engage the locking pins **38**. As shown in Figures 5a and 5b of the drawings, two locking shafts **44** are preferably utilized to selectively secure opposing pairs of locking pins **38**. The locking shaft **44** is comprised of a cam shaped structure that allows for selective release and locking of the plurality of locking pins **38** with respect to the plurality of locking pins **38**. As illustrated in Figures 5a and 5b of the drawings, the cam shaped structure of the locking shaft **44** is preferably comprised of a generally circular cross sectional shape with a side portion cutaway forming a cutaway that allows the locking pins **38** to pass by as illustrated in Figure 5a of the drawings. When the locking shaft **44** is rotated the thicker body portion is rotated into the receiver openings and into the respective locking channel **39** of the locking pins **38** thereby preventing removal of the locking pins **38**. As illustrated in Figure 5a of the drawings, the locking channel **39** preferably has a curved configuration that corresponds to the diameter of the locking shaft **44** to ensure a snug fit when the locking shaft **44** is rotated into the lock position as shown in Figure 5b of the drawings.

A securing lever **40** is connected to the locking shaft **44** to allow for manual rotation of the locking shaft **44**. Each locking shaft **44** includes a securing lever **40**, so as illustrated in the Figures 7a through 7c of the drawings, it is preferably to have two opposing securing levers **40** attached near the first end **31** of each respective mast section **30**. The securing lever **40** has a locked position preventing release of the plurality of locking pins **38** from the receiver apertures **32** and a release position allowing release of the plurality of locking pins **38** from the receiver apertures **32**. Each of the securing levers **40** is preferably positioned within one of the side channels **34** within the vertical mast to allow for stoppage of the guide wheels **54** when the locking shaft **44** has not fully secure the locking pins **38** or passage of the guide wheels **54** when the locking shaft **44** has fully secured the locking pins **38**. Each of the securing levers **40** preferably includes a biase member **41** (e.g. spring) that forces the securing levers **40** outwardly into the release position as shown in Figure 7a of the drawings. When the securing lever **40** is positioned within the release position as shown in Figures 7a and 7b of the drawings, the support

platform **50** is prevented from being elevated to an upper mast section **30** above a lower mast section **30**.

A locking lever **46** is rotatably attached to the second end **37** of a mast section **30** above a lower mast section **30** as illustrated in Figure 9b of the drawings. The locking lever **46** is rotatably biased by a spring or other device to be positioned in a locked position and the locking lever **46** is positioned adjacent to the securing levers **40** to prevent movement of the securing levers **40** when in the locked state. The locking lever **46** preferably extends from both sides of the mast section **30** to allow for selective engagement with the securing levers **40** with a single movement. The securing levers **40** each include a centrally located notch **42** that when the locking lever **46** is aligned with (as shown in Figure 9b of the drawings) the locking lever **46** is allowed to be pivoted into the locked position thereby rotating the locking shaft **44** to the locked position to prevent the locking pins **38** from being released from the receiver apertures **32**.

***D. Support Platform.***

The support platform **50** is adapted to be movably connected to the vertical mast. Figures 1 through 3 illustrate an exemplary support platform **50** having a floor **51** and a cage **53**. It can be appreciated that various other configurations may be utilized for the support platform **50** that are capable of lifting and lowering workers and materials. The width of the support platform **50** is the same or less than the width of the support base **20** when in the compact state to allow for passage through narrow areas. It is preferable that the width of the support platform **50** be 30 inches or less. The support platform **50** is constructed of a lightweight material such as but not limited to aluminum.

The support platform **50** includes a sliding support **52** extending from the support platform **50** that has a U-shaped structure that is positioned about three sides of the vertical mast. The sliding support **52** includes a plurality of guide wheels **54** that are movably received within the side channels **34** of the vertical mast to allow for relatively free upward and downward movement of the support platform **50** upon the vertical mast. It is

preferable to have at least two guide wheels **54** for each of the side channels **34** within the vertical mast, with one of the guide wheels **54** positioned within an upper portion of the sliding support **52** and another of the guide wheels **54** positioned within a lower portion of the sliding support **52** to provide for increased stability and to prevent binding during operation. The diameter of the guide wheels **54** is slightly smaller than the width of the side channels **34** within the vertical mast to limit movement thereof.

A drive unit **60** is connected to the support platform **50** that is adapted to elevate and lower the support platform **50** upon the vertical mast. The drive unit **60** may include an actuator (e.g. electric motor, hydraulic motor) or a drive connector **62** to attach an outside actuator (e.g. a drill, hand crank). The drive unit **60** preferably includes an automatic braking system that prevents accidental lowering of the support platform **50** if the actuator should fail or is accidentally removed. The drive unit **60** mechanically engages the track **33** extending along a substantial portion of the length of the vertical mast utilizing a sprocket or other mechanical drive device. U.S. Patent No. 6,981,573 to Nickel illustrates an exemplary drive unit **60** and is hereby incorporated by reference herein.

An emergency winch **12** is attached to the support base **20** that has a tether connectable to an emergency connector **13** attached to the support platform **50** to allow for an individual at the base of the present invention to lower the support platform **50** where the operator of the present invention is unable to. The emergency winch **12** draws the support platform **50** downwardly overcoming the braking force applied by the automatic breaking system within the drive unit **60** thereby forcing the support platform **50** to lower.

At least one mast storage device **58** extends outwardly from the support platform **50** as illustrated in Figures 1 through 3 of the drawings. The plurality of mast sections **30** are removably connectable to the mast storage devices **58** for storage of the plurality of mast sections **30** during non-use of the present invention, during assembly of the vertical mast and during disassembly of the vertical mast. The mast storage devices **58** are comprised of an extended bracket structure with an upper plate that includes a plurality of

storage apertures **59** that receive the corresponding locking pins **38** from each mast section **30**. As illustrated in Figure 1 of the drawings, only two of the locking pins **38** from each mast section **30** are required to be inserted into the mast storage device **58** thereby allowing two or more mast sections **30** to be received and stored upon each of the mast storage devices **58**. The mast storage devices **58** are preferably attached to the lower portion of the support platform **50** and extend outwardly on opposing sides of the vertical mast as illustrated in Figures 1 through 3 of the drawings.

***E. Operation of Preferred Embodiment.***

In use, the user transports the present invention in the compact storage position (Figure 1) to a desired location where working at an elevated height is required (e.g. interior of a building). The user then removes the outer legs **24** and attaches them to the inner legs **22** of the support base **20**.

The respective adjustment members **26** for each of the outer legs **24** are lowered by rotating the adjustment members **26** until the caster wheels **21** are no longer supporting the present invention.

The support platform **50** will not be allowed to move upwardly unless all of the finger members **55** are allowed to freely pass through and out of the guide members **70**. Free movement of the finger members **55** within the guide members **70** requires an upward pressure to be applied to each of the adjustment members **26** causing the first engaging member **84** to inwardly push the second engaging member **86** thereby causing the elongated shaft **88** to depress the corresponding locking detent **57** sufficiently so that the locking detent **57** does not catch upon the lower end of the corresponding guide member **70** as illustrated in Figures 13b and 13c of the drawings. If any of the legs are not supporting weight, the support platform **50** will not be allowed to be released since at least one of the finger members **55** will be captured within the corresponding guide member **70** by the corresponding locking detent **57**. The user will have to adjust the adjustment member **26** until each of the adjustment members **26** has sufficient and substantially equal

weight supported by the same thereby causing the corresponding elongated shaft **88** to depress the corresponding locking detent **57**. The user may test whether all of the finger members **55** are released by attempting to lift the support platform **50** upwardly a small distance.

After the user has tested the stability of the support base **20**, the user may then enter the support platform **50** and begin assembly of the vertical mast with the mast sections **30** as shown in Figure 2 of the drawings. To assemble the vertical mast, the user removes the proper mast section **30** from the mast storage device **58** while they are positioned within the support platform **50** and positions the second end **37** of the mast storage device **58** upon the first end **31** of the base mast section **30**. The locking pins **38** extend into the receiver apertures **32** and the user then rotates the locking lever **46** thereby allowing rotating of the securing levers **40**. With the locking lever **46** centrally located and aligned with the notch **42** within the corresponding securing levers **40**, the user then rotates the securing levers **40** to rotate the locking shaft **44** to lock the locking pins **38** within the receiver apertures **32**. The locking lever **46** is rotated back to the locked position to prevent movement of the securing levers **40** thereby ensuring the corresponding mast sections **30** will remain securely connected. The user is able to operate the drive unit **60** to elevate the support platform **50** onto the last assembled mast section **30** to allow for attachment of another mast section **30** above thereof. The process is continued for each of the remaining mast sections **30** until the vertical mast is completed as illustrated in Figure 3 of the drawings. The user may then travel along the vertical mast with the support platform **50** as desired to perform their work. When the work is completed, the user then reverses the process by releasing the locking lever **46**, releasing the securing levers **40** and removing each of the mast sections **30** (the sliding support **52** must be positioned beneath the connection point to be released before releasing the same). This process continues until the support platform **50** is fully lowered and all of the mast sections **30** have been removed and positioned within the mast storage device **58** as shown in Figure 10 of the drawings. Once the finger members **55** are all fully extended into the guide members **70**, the corresponding lower biased units **72** are corresponding forced downwardly by the same

thereby lowering the flanged end member **74** to the lower broader portion of the slot **25** within the partition member **23** thereby allowing removal of the corresponding outer leg **24** (if the lower biased unit **72** is not fully lowered, then the corresponding outer leg **24** cannot be removed). Once the outer legs **24** are positioned in the storage position, the user may then transport the present invention to storage or another work location.

Unless otherwise defined, all technical and scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this invention belongs. Although methods and materials similar to or equivalent to those described herein can be used in the practice or testing of the present invention, suitable methods and materials are described above. All publications, patent applications, patents, and other references mentioned herein are incorporated by reference in their entirety to the extent allowed by applicable law and regulations. In case of conflict, the present specification, including definitions, will control. The present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof, and it is therefore desired that the present embodiment be considered in all respects as illustrative and not restrictive. Any headings utilized within the description are for convenience only and have no legal or limiting effect.

CLAIMS:

1. A portable modular lift, comprising:

a support base, wherein said support base is comprised of a portable structure;

a plurality of mast sections, wherein said plurality of mast sections are removably connectable to one another to form a vertical mast that extends upwardly from said support base;

a support platform adapted to be movably connected to said vertical mast; and

a drive unit connected to said support platform, wherein said drive unit is adapted to elevate and lower said support platform upon said vertical mast;

at least one mast storage device directly connected to and extending outwardly from said support platform, wherein said plurality of mast sections are removably connectable to said at least one mast storage device for storage of said plurality of mast sections.

2. The portable modular lift of claim 1, wherein said support base includes a plurality of wheels.

3. The portable modular lift of claim 2, wherein said plurality of wheels is comprised of a pair of base wheels attached to a rear portion of said support base.

4. The portable modular lift of claim 3, wherein said plurality of wheels is comprised of a plurality of caster wheels.

5. The portable modular lift of any one of claims 1 to 3, wherein said support base includes a plurality of legs.

6. The portable modular lift of claim 5, wherein said plurality of legs have a compact state and an extended state.

7. The portable modular lift of claim 6, wherein said support base has a width of 30 inches or less when said plurality of legs are in said compact state.

8. The portable modular lift of claim 7, wherein said support base has a width of 53 inches or more when said plurality of legs are in said extended state.

9. The portable modular lift of any one of claims 1 to 7, wherein said plurality of mast sections are each comprised of an extruded aluminum structure.

10. A portable modular lift, comprising:

a support base;

a vertical mast extending upwardly from said support base, wherein said vertical mast is comprised of a plurality of mast sections removably connected to one another;

wherein said plurality of mast sections each have a first end and a second end, wherein said first end includes a first coupler and wherein said second end includes a second coupler, wherein said first coupler is removably connectable to said second coupler to removably connect said plurality of mast sections;

wherein said first coupler is comprised of a plurality of receiver apertures and wherein said second coupler is comprised of a plurality of locking pins, wherein said plurality of receiver apertures removably receive said plurality of locking pins in a catchable manner;

a first locking shaft rotatably positioned within each of said plurality of mast sections, wherein said first locking shaft partially extends into at least two of said plurality of receiver apertures to selectively engage said locking pins; and

a support platform adapted to be movably connected to said vertical mast to move up and down said vertical mast.

11. The portable modular lift of claim 10, wherein said plurality of locking pins extend parallel with respect to a longitudinal axis of said plurality of mast sections.

12. The portable modular lift of claim 10 or 11, wherein each of said plurality of mast sections has a rectangular cross section and wherein said plurality of receiver apertures are comprised of four corner receiver apertures positioned adjacent to each corner of said first end.

13. The portable modular lift of any one of claims 10 to 12, wherein said plurality of locking pins each include a locking channel that allows said first locking shaft to pass through.

14. The portable modular lift of claim 13, wherein said first locking shaft is comprised of a cam shaped structure that allows for selective release and locking of said plurality of locking pins with respect to said plurality of locking pins.

15. The portable modular lift of any one of claims 10 to 14, including a first securing lever connected to said first locking shaft, wherein said first securing lever has a locked position preventing release of said plurality of locking pins from said receiver apertures and a release position allowing release of said plurality of locking pins from said receiver apertures.

16. The portable modular lift of claim 15, wherein when said first securing lever is positioned within said release position, said support platform is prevented from being elevated to an upper mast section above a lower mast section.

17. A portable modular lift, comprising:

a support base;

a vertical mast extending upwardly from said support base, wherein said vertical mast is comprised of a plurality of mast sections removably connected to one another;

wherein said plurality of mast sections each have a first end and a second end, wherein said first end includes a first coupler and wherein said second end includes a second coupler, wherein said first coupler is removably connectable to said second coupler to removably connect said plurality of mast sections;

a support platform adapted to be movably connected to said vertical mast to move up and down said vertical mast;

wherein said first coupler is comprised of a plurality of receiver apertures and wherein said second coupler is comprised of a plurality of locking

pins, wherein said plurality of receiver apertures removably receive said plurality of locking pins in a catchable manner;

a first locking shaft rotatably positioned within each of said plurality of mast sections, wherein said first locking shaft partially extends into at least two of said plurality of receiver apertures to selectively engage said locking pins and wherein said first locking shaft is comprised of a cam shaped structure that allows for selective release and locking of said plurality of locking pins with respect to said plurality of locking pins;

wherein said plurality of locking pins each include a locking channel that allows said first locking shaft to pass through; and

a first securing lever connected to said first locking shaft, wherein said first securing lever has a locked position preventing release of said plurality of locking pins from said receiver apertures and a release position allowing release of said plurality of locking pins from said receiver apertures, wherein when said first securing lever is positioned within said release position, said support platform is prevented from being elevated to an upper mast section above a lower mast section.

18. A portable lift comprising:

a support base having a plurality of legs, wherein each of said plurality of legs respectively includes a distal portion and an inner portion;

a plurality of adjustment members respectively extending downwardly from said distal portion of said plurality of legs and configured to move vertically

between a first position which is disengaged from a support surface and a second position which engages the support surface;

a plurality of first lock members respectively attached to said inner portion of said plurality of legs;

a vertical mast extending upwardly from said support base;

a support platform movably connected to said vertical mast, wherein said support platform is configured to move upwardly and downwardly along said vertical mast; and

a plurality of second lock members attached to said support platform and configured to mechanically connect to said plurality of first lock members attached to said plurality of legs;

wherein a respective one of said plurality of first lock members in combination with a respective one of said plurality of second lock members form at least one pair of locking members which are configured to move between a locked state and an unlocked state,

wherein the locked state locks the at least one pair of locking members together which locks the support platform to the support base and prevents the support platform from moving along the mast,

wherein the unlocked state has the at least one pair of locking members unlocked from one another to allow movement of the support platform vertically along the mast, wherein the at least one pair of locking members is configured to switch from the locked state to the unlocked state as a direct result of a

corresponding one of the plurality of adjustment members moving from the first position to the second position which moves a corresponding engaging member along a major length of a corresponding one of the plurality of legs to unlock the at least one pair of locking members from one another.

19. The portable lift of claim 18, wherein said support base includes a plurality of wheels.

20. The portable lift of claim 19, wherein said portable lift is configured to be in the unlocked state when all of said plurality of wheels are elevated above said support surface.

21. The portable lift of any one of claims 18 to 20, wherein said plurality of adjustment members are capable of minimizing horizontal movement of said support base when all of said plurality of adjustment members are respectively supporting weight from the portable lift in the unlocked state.

22. The portable lift of any one of claims 18 to 21, wherein said plurality of first lock members are each respectively comprised of a guide member having an inner passage capable of receiving a corresponding second lock member of said plurality of second lock members.

23. The portable lift of claim 22, wherein said second lock members are each respectively comprised of a finger member that is formed to slidably fit within a corresponding guide member of said guide members.

24. The portable lift of claim 23, wherein each of said finger members respectively includes a locking detent that catchably engages the

corresponding guide member of said guide members when in the locked state and each of said finger members is respectively configured to pass through the corresponding guide member of said guide members when in the unlocked state.

25. The portable lift of claim 24, wherein each of said plurality of adjustment members is respectively configured to cause a mechanical engagement and release of a corresponding locking detent of said locking detents.

26. The portable lift of claim 25, wherein each of said plurality of legs is tubular and wherein each of said plurality of adjustment members is slidably positioned within said plurality of legs.

27. The portable lift of claim 26, wherein each of said plurality of adjustment members respectively includes a first engaging member that is respectively capable of mechanically engaging a second engaging member.

28. The portable lift of claim 27, wherein each of the second engaging members is respectively adapted to mechanically engage said corresponding locking detent of said locking detents.

29. The portable lift of claim 28, wherein each of said second engaging members respectively includes an elongated shaft that is adapted to mechanically engage said corresponding locking detent of said locking detents.

30. The portable lift of any one of claims 18 to 29, wherein each of said plurality of adjustment members includes a pad attached to a lower end.

31. A portable lift, comprising:

a support base having a plurality of legs, wherein each of said plurality of legs respectively includes a distal portion and an inner portion;

a plurality of adjustment members, each of said plurality of adjustment members extending downwardly from each of said distal portions of said plurality of legs respectively and configured to move vertically between a first position which is disengaged from a support surface and a second position which engages the support surface;

a first lock member attached to said support base;

a vertical mast extending upwardly from said support base;

a support platform movably connected to said vertical mast, wherein said support platform is adapted to move upwardly and downwardly upon said vertical mast; and

a second lock member attached to said support platform and adapted to mechanically connect to said first lock member;

wherein said first lock member in combination with said second lock member form a pair of locking members which are configured to move between a locked state and an unlocked state,

wherein said locked state locks said pair of locking members together which locks said support platform to said base and prevents said support platform from moving along said mast, wherein said unlocked state has said pair of locking members unlocked from one another to allow movement of said support platform vertically along said mast,

wherein said pair of locking members is configured to switch from said locked state to said unlocked state as a direct result of at least one of said plurality of adjustment members moving from said first position to said second position which moves an engaging member along a major length of a corresponding one of said plurality of legs to unlock said pair of locking members from one another.

32. The portable lift of claim 31, wherein said support base includes a plurality of wheels.

33. The portable lift of claim 32, wherein said portable lift is configured to be in the unlocked state when at least one of said plurality of wheels is elevated above said support surface.

34. The portable lift of claim 32 or 33, wherein said portable lift is configured to be in the unlocked state when all of said plurality of wheels are elevated above said support surface.

35. The portable lift of any one of claims 31 to 34, wherein said plurality of adjustment members are capable of minimizing horizontal movement of said support base when at least one of said plurality of adjustment members is supporting weight from the portable lift in the unlocked state.

36. The portable lift of any one of claims 31 to 35, wherein said plurality of adjustment members are capable of minimizing horizontal movement of said support base when all of said plurality of adjustment members are respectively supporting weight from the portable lift in the unlocked state.

37. The portable lift of any one of claims 31 to 36, wherein said first lock member is comprised of a guide member having an inner passage capable of receiving the second lock member.

38. The portable lift of claim 37, wherein said second lock member is comprised of a finger member that is formed to slidably fit within said guide member.

39. The portable lift of claim 38, wherein said finger member includes a locking detent that catchably engages said guide member when in the locked state and said finger member is configured to pass through said guide member when in the unlocked state.

40. The portable lift of claim 39, wherein at least one of said plurality of adjustment members is configured to cause a mechanical engagement and release of said locking detent.

41. The portable lift of claim 40, wherein each of said plurality of legs is tubular and wherein said each of said plurality of adjustment members is slidably positioned within said plurality of legs.

42. The portable lift of claim 41, wherein each of said plurality of adjustment members respectively includes a first engaging member that is respectively capable of mechanically engaging a second engaging member.

43. The portable lift of claim 42, wherein at least one of said second engaging members is respectively adapted to mechanically engage said locking detent.

44. The portable lift of any one of claims 31 to 43, wherein each of said plurality of adjustment members includes a pad attached to a lower end.

45. A portable lift, comprising:

a support base having a plurality of legs, wherein each of said plurality of legs respectively includes a distal portion and an inner portion;

a plurality of adjustment members, each of said plurality of adjustment members extending downwardly from each of said distal portions of said plurality of legs respectively and configured to move vertically between a first position which is disengaged from a support surface and a second position which engages the support surface;

a first lock member attached to said support base;

a vertical mast extending upwardly from said support base;

a support platform movably connected to said vertical mast, wherein said support platform is adapted to move upwardly and downwardly upon said vertical mast; and

a second lock member attached to said support platform and adapted to mechanically connect to said first lock member;

wherein said first lock member in combination with said second lock member form a pair of locking members which are configured to move between a locked state and an unlocked state,

wherein said locked state locks said pair of locking members together which locks said support platform to said base and prevents said support platform from moving along said mast,

wherein said unlocked state has said pair of locking members unlocked from one another to allow movement of said support platform vertically along said mast,

wherein said pair of locking members is configured to switch from said locked state to said unlocked state as a direct result of at least one of said plurality of adjustment members moving from said first position to said second position which moves an engaging member with respect to said support base to unlock said pair of locking members from one another.

46. A portable lift, comprising:

a support base having

distal portion and inner portions; a plurality of adjustment members extending downwardly from said distal portions of said support base and configured to move vertically between a first position which is disengaged from a support surface and a second position which engages the support surface;

a first lock member attached to said support base;

a vertical mast extending upwardly from said support base;

a support platform movably connected to said vertical mast, wherein said support platform is adapted to move upwardly and downwardly upon said vertical mast; and

a second lock member attached to said support platform and adapted to mechanically connect to said first lock member;

wherein said first lock member in combination with said second lock member form a pair of locking members which are configured to move between a locked state and an unlocked state,

wherein said locked state locks said pair of locking members together which locks said support platform to said base and prevents said support platform from moving along said mast,

wherein said unlocked state has said pair of locking members unlocked from one another to allow movement of said support platform vertically along said mast, wherein said pair of locking members is configured to switch from said locked state to said unlocked state as a direct result of at least one of said plurality of adjustment members moving from said first position to said second position which moves an engaging member along a major length of said support base to unlock said pair of locking members from one another.

47. The portable lift of claim 46, wherein said support base is comprised of a plurality of legs extending outwardly from a central location.

48. The portable lift of claim 46 or 47, wherein said support base includes a plurality of wheels.

49. The portable lift of claim 48, wherein said portable lift is configured to be in the unlocked state when at least one of said plurality of wheels is elevated above said support surface.

50. The portable lift of claim 48 or 49, wherein said portable lift is configured to be in the unlocked state when all of said plurality of wheels are elevated above said support surface.

51. A portable modular lift, comprising:

a support base;

a vertical mast extending upwardly from said support base, wherein said vertical mast is comprised of a plurality of mast sections removably connected to one another;

wherein at least two of said plurality of mast sections each have a first end and a second end, wherein said first end includes a first coupler and wherein said second end includes a second coupler, wherein said first coupler is removably connectable to said second coupler to removably connect said plurality of mast sections;

wherein said first coupler and said second coupler have a locked state and a released state, wherein when said couplers are in said locked state said plurality of mast sections are in non-movable attachment with respect to one another, wherein when said couplers are in said released state said plurality of mast sections are movable with respect to one another, and wherein said first coupler is comprised of a plurality of receiver apertures and wherein said second coupler is comprised of a plurality of locking pins;

a support platform adapted to be movably connected to said vertical mast to move up and down said vertical mast; and

a locking shaft positioned within each of said plurality of mast sections, wherein said locking shaft partially extends into at least two of said plurality of receiver apertures to selectively engage said locking pins.

52. The portable modular lift of claim 51, wherein said plurality of locking pins extend parallel with respect to a longitudinal axis of said plurality of mast sections.

53. The portable modular lift of claim 51 or 52, wherein said plurality of locking pins each include a locking channel.

54. The portable modular lift of claim 53, including a locking shaft positioned within at least one of said plurality of mast sections, wherein said locking shaft is extendable within at least one of said plurality of receiver apertures to catchably engage a respective locking pin.

55. The portable modular lift of claim 54, wherein said locking shaft is rotatable within said at least one of said plurality of mast sections.

56. The portable modular lift of claim 55, wherein said locking shaft is comprised of a cam shaped structure that allows for selective release and locking of said respective locking pin.

57. The portable modular lift of any one of claims 51 to 56, wherein said plurality of locking pins each include a locking channel that allows said locking shaft to pass through.

58. The portable modular lift of claim 57, wherein said locking shaft is comprised of a cam shaped structure that allows for selective release and locking of said plurality of locking pins with respect to said plurality of receiver apertures.

59. The portable modular lift of any one of claims 51 to 58, including a securing lever connected to said locking shaft, wherein said securing lever has a locked position preventing release of said plurality of locking pins from said receiver apertures and a release position allowing release of said plurality of locking pins from said receiver apertures.

60. The portable modular lift of claim 59, wherein when said securing lever is positioned within said release position, said support platform is prevented from being elevated to an upper mast section above a lower mast section.

61. The portable modular lift of any one of claims 51 to 60, wherein said plurality of receiver apertures have a tapered portion to guide said plurality of locking pins into said plurality of receiver apertures.

62. The portable modular lift of any one of claims 51 to 61, wherein said plurality of locking pins have a tapered distal end.

63. The portable modular lift of any one of claims 51 to 62, wherein said plurality of locking pins are locked within said plurality of receiver apertures when in said locked state.

64. The portable modular lift of any one of claims 51 to 63, wherein each of said plurality of mast sections has a rectangular cross section, wherein said

first end and said second end of said plurality of mast sections have a rectangular cross section.

65. The portable modular lift of any one of claims 51 to 364, wherein said first coupler is comprised of at least four corner receiver apertures positioned adjacent to each corner of said first end and wherein said second coupler is comprised of at least four locking pins aligned with said at least four corner receiver apertures.

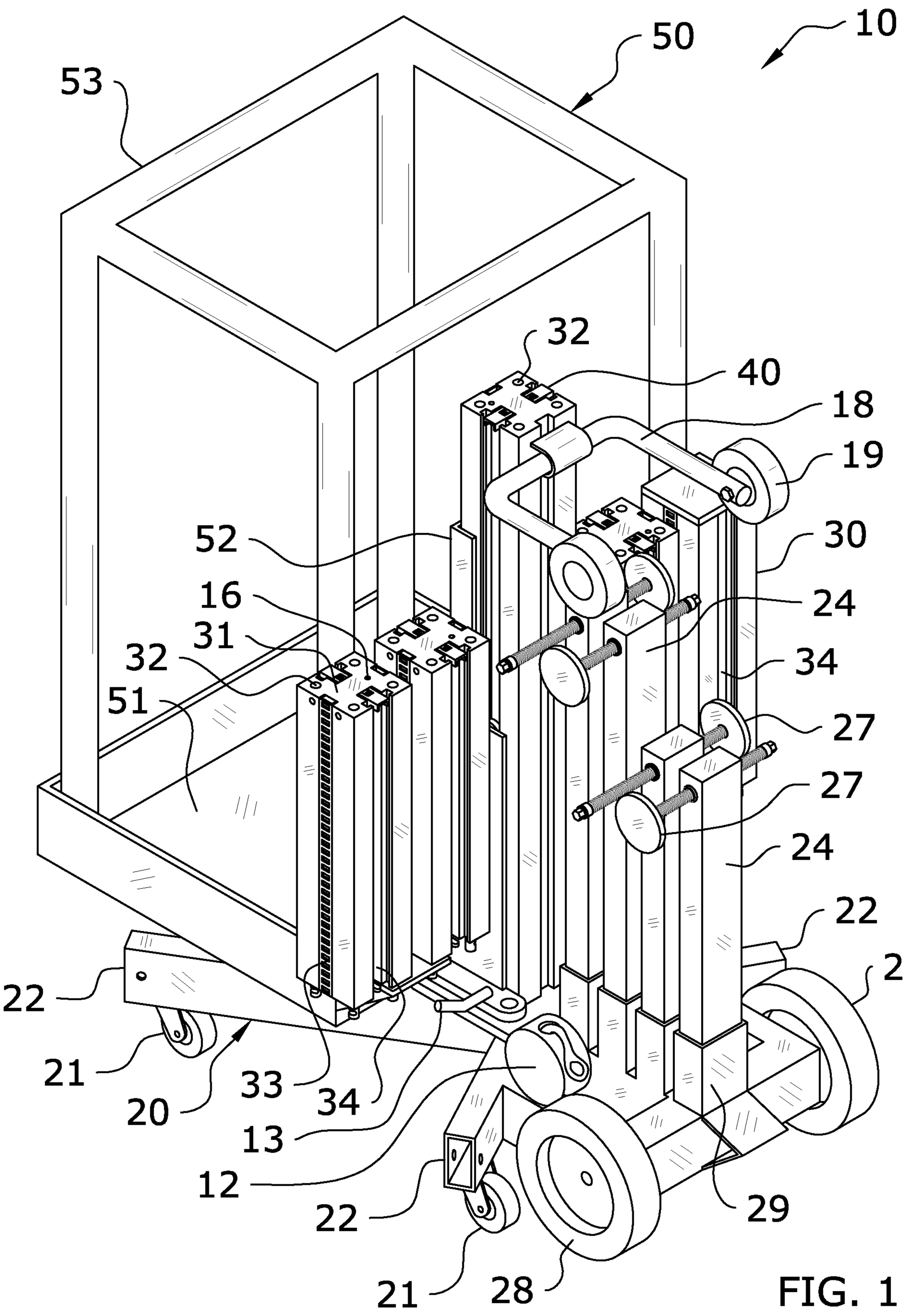

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FIG. 1

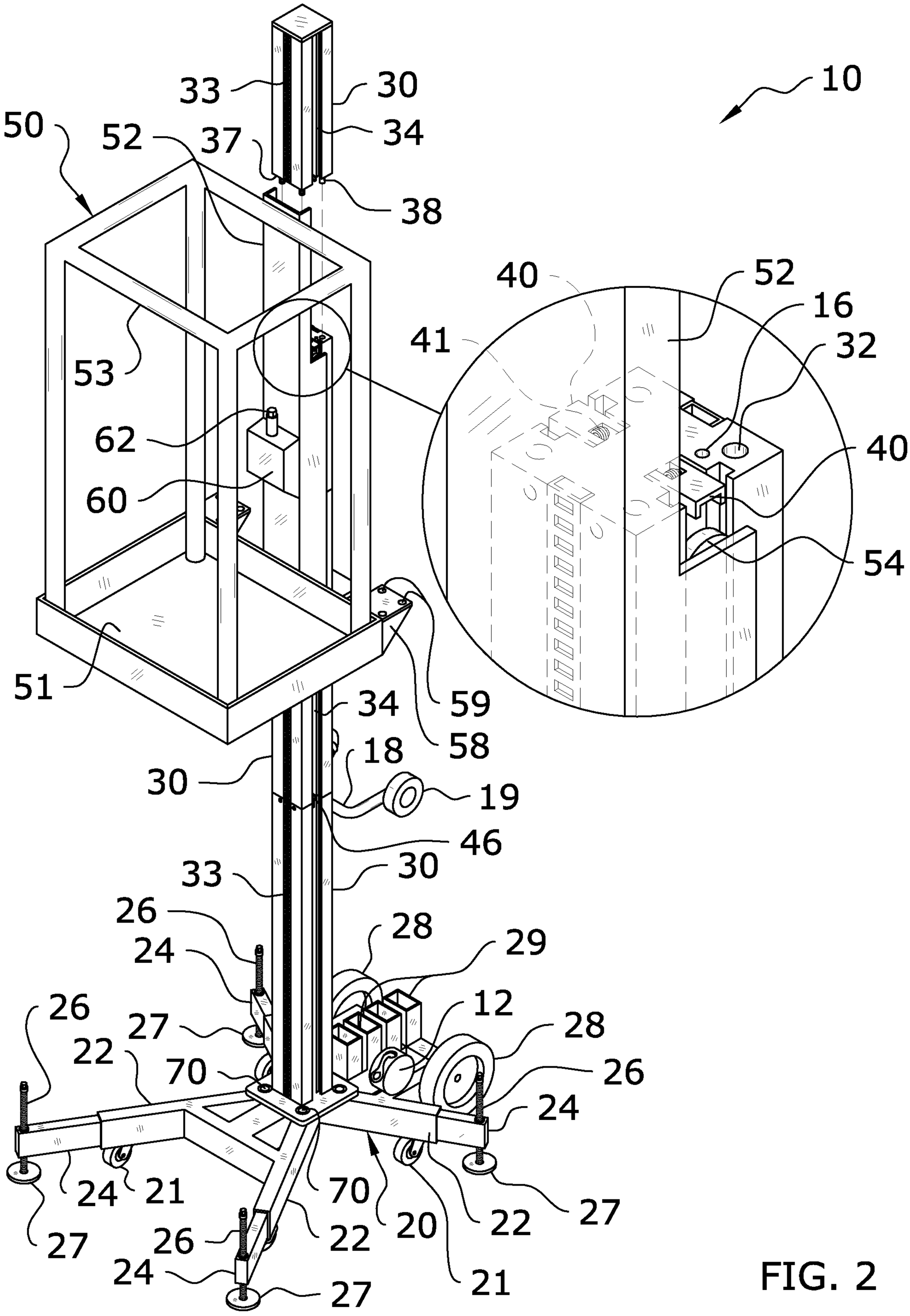

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FIG. 2

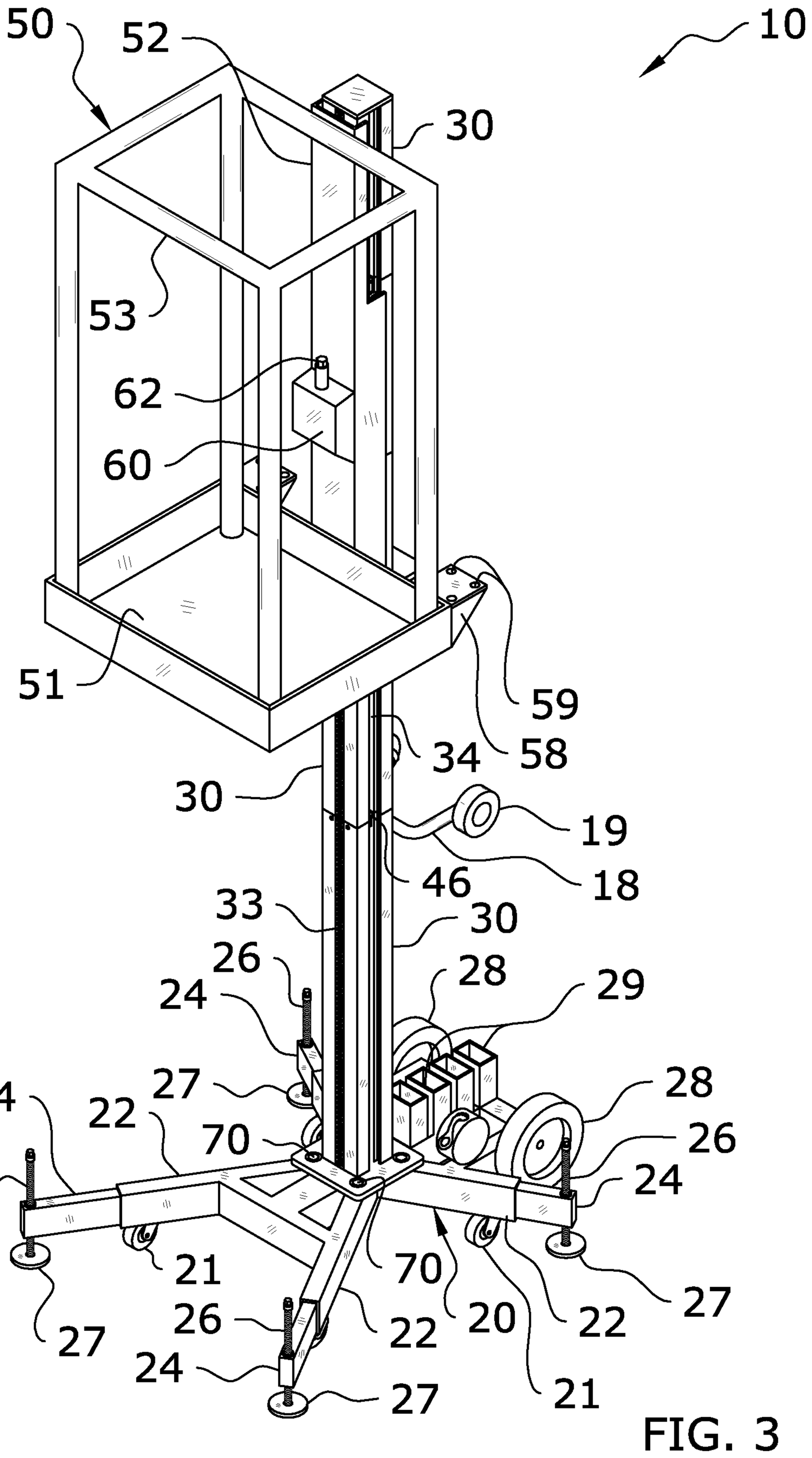

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FIG. 3

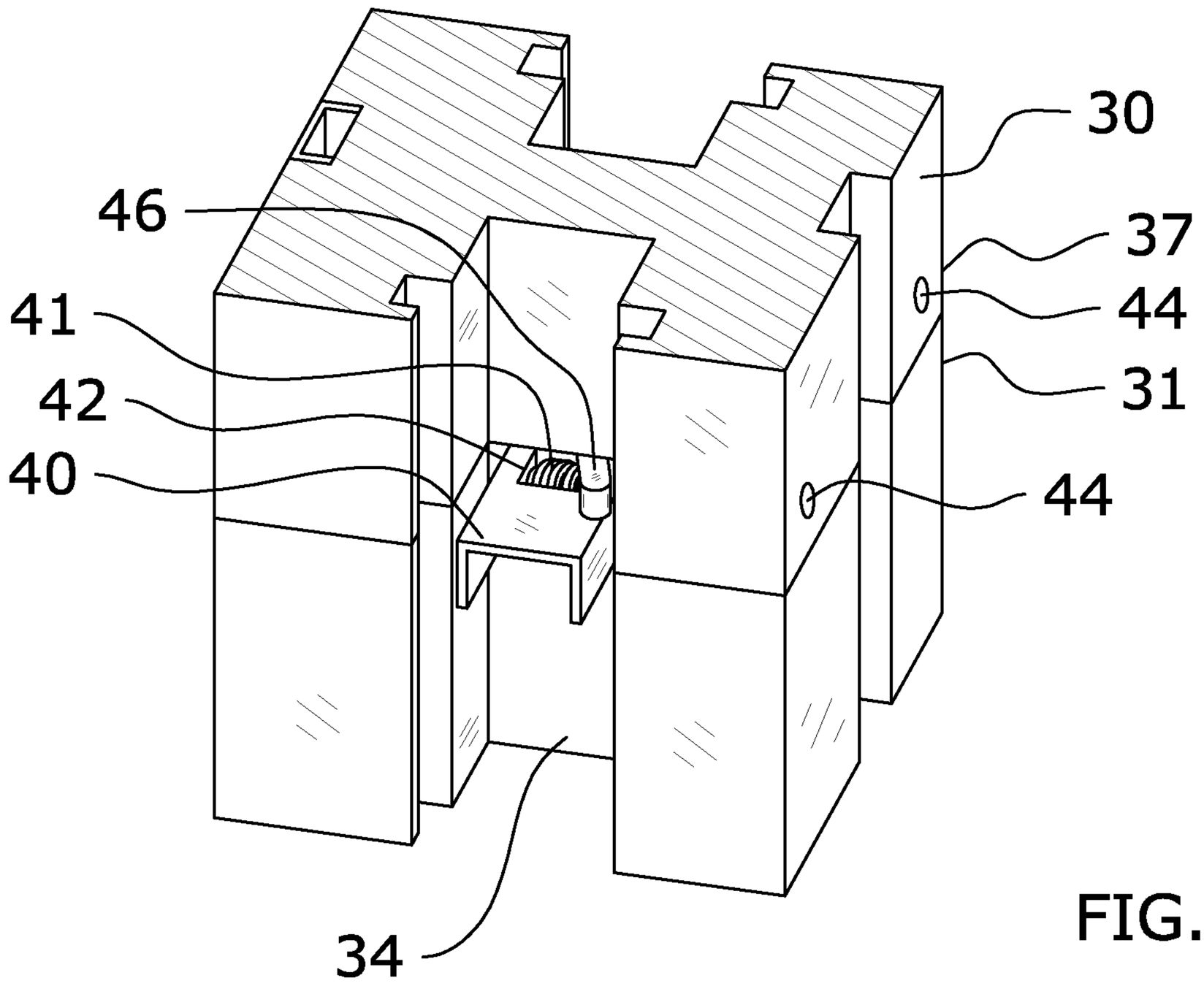



FIG. 4a

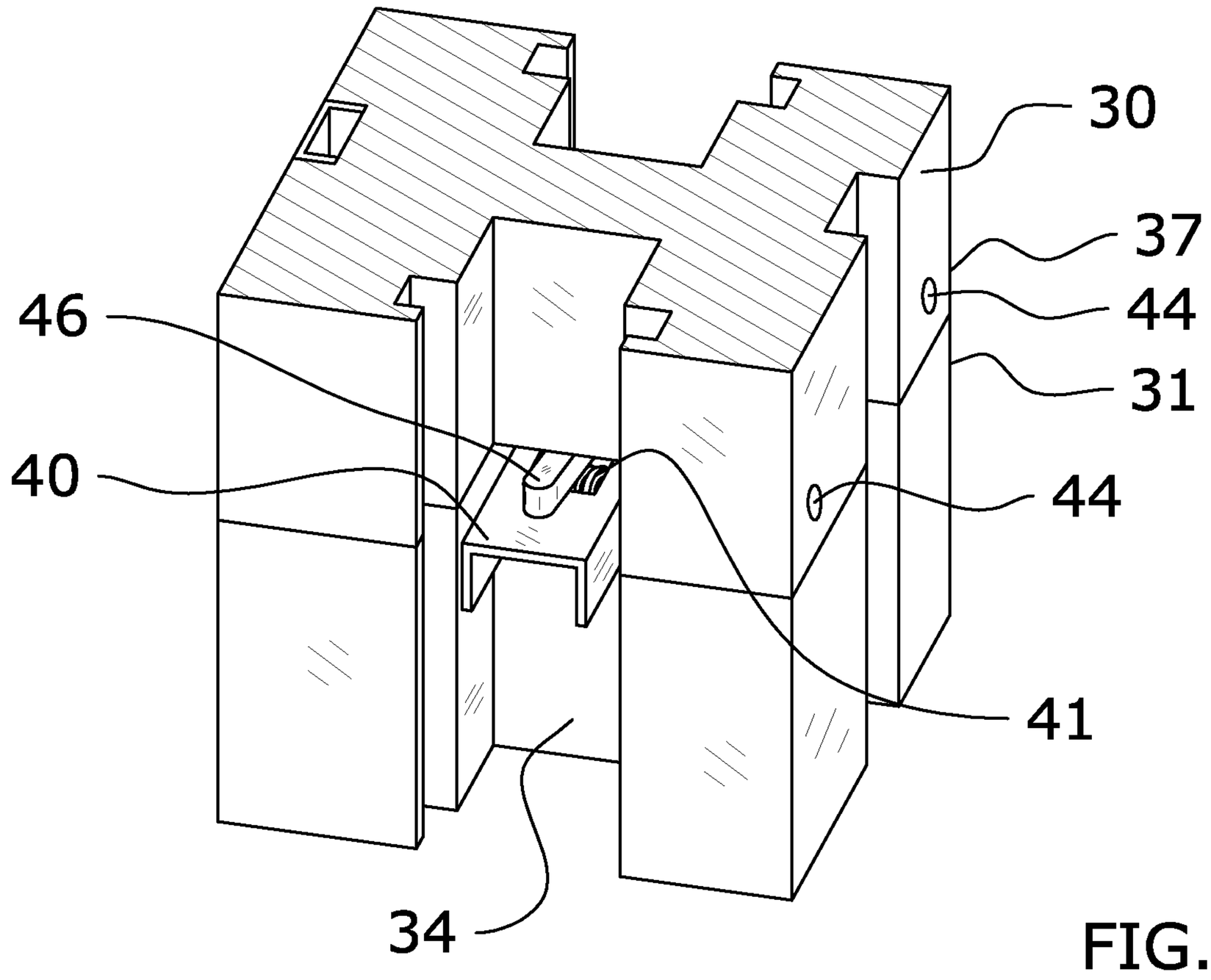



FIG. 4b

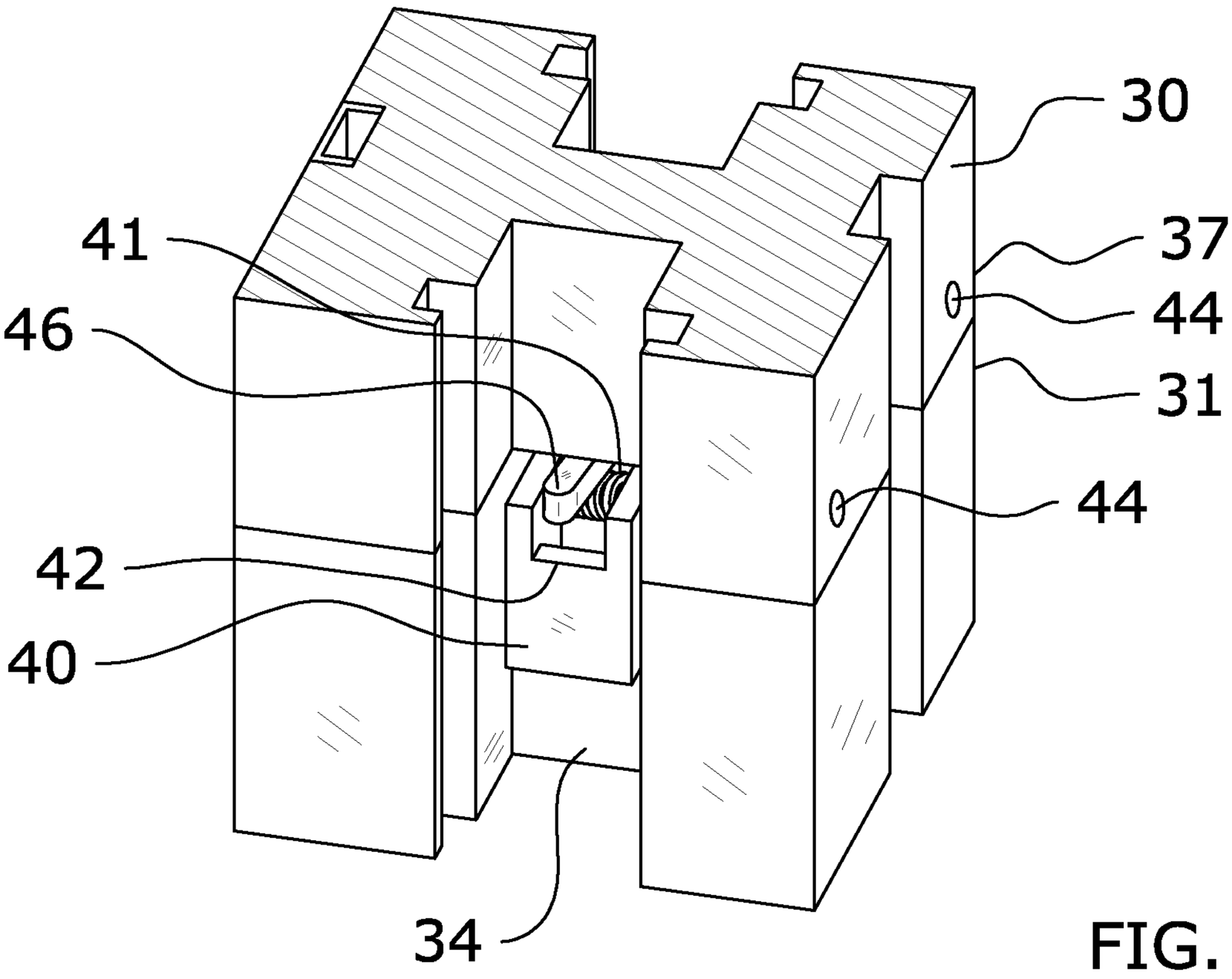



FIG. 4c




FIG. 4d

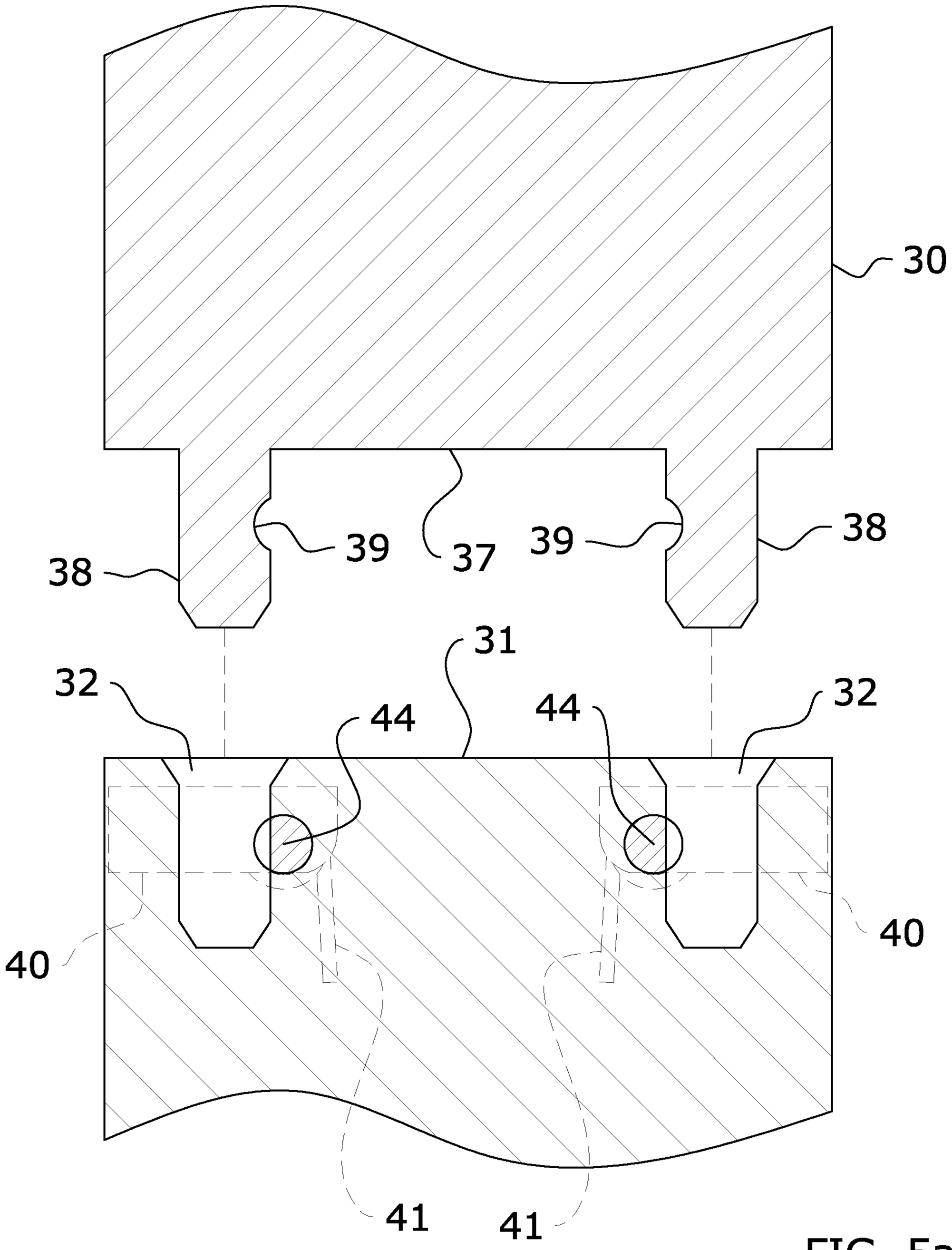



FIG. 5a

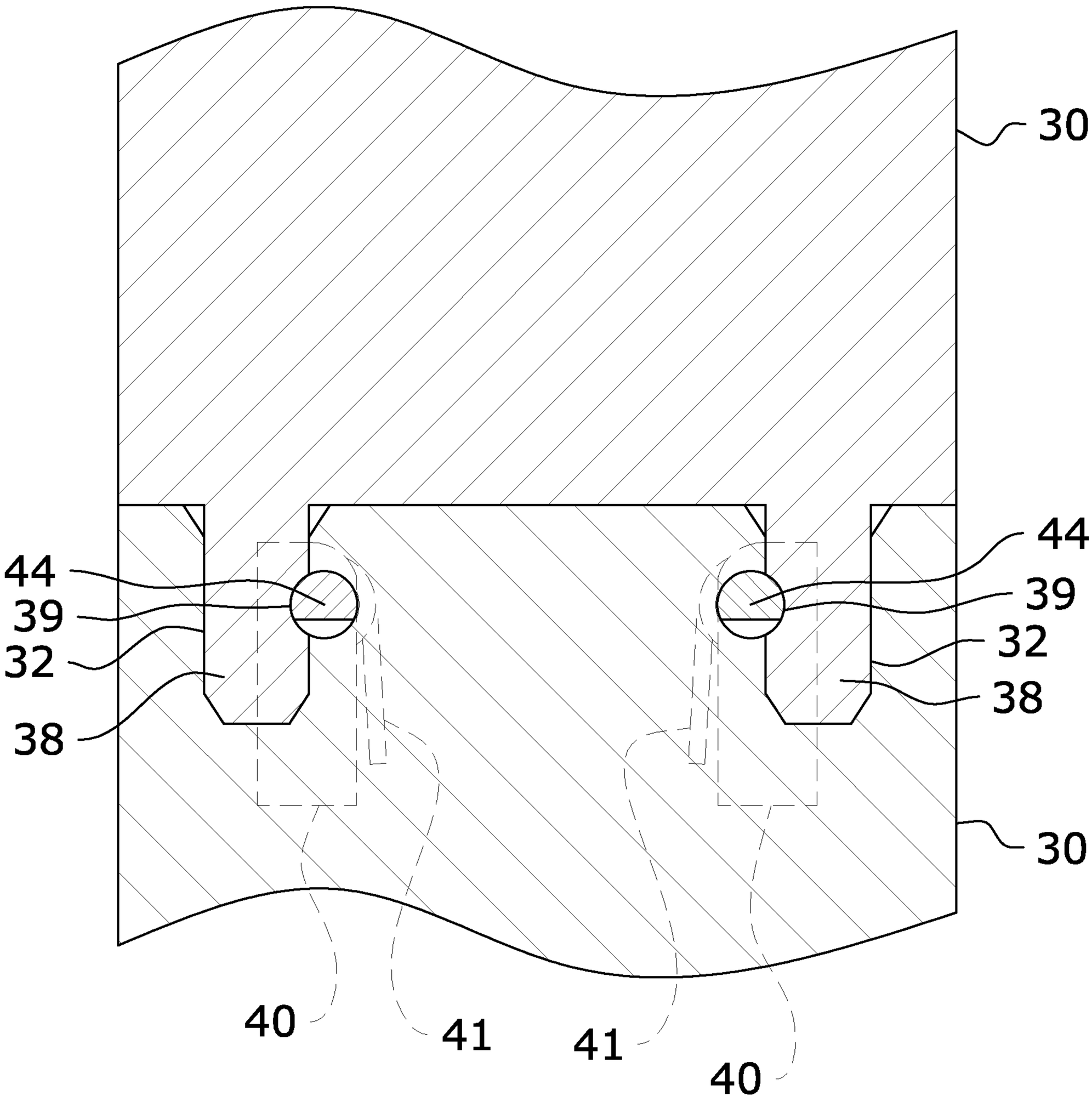



FIG. 5b

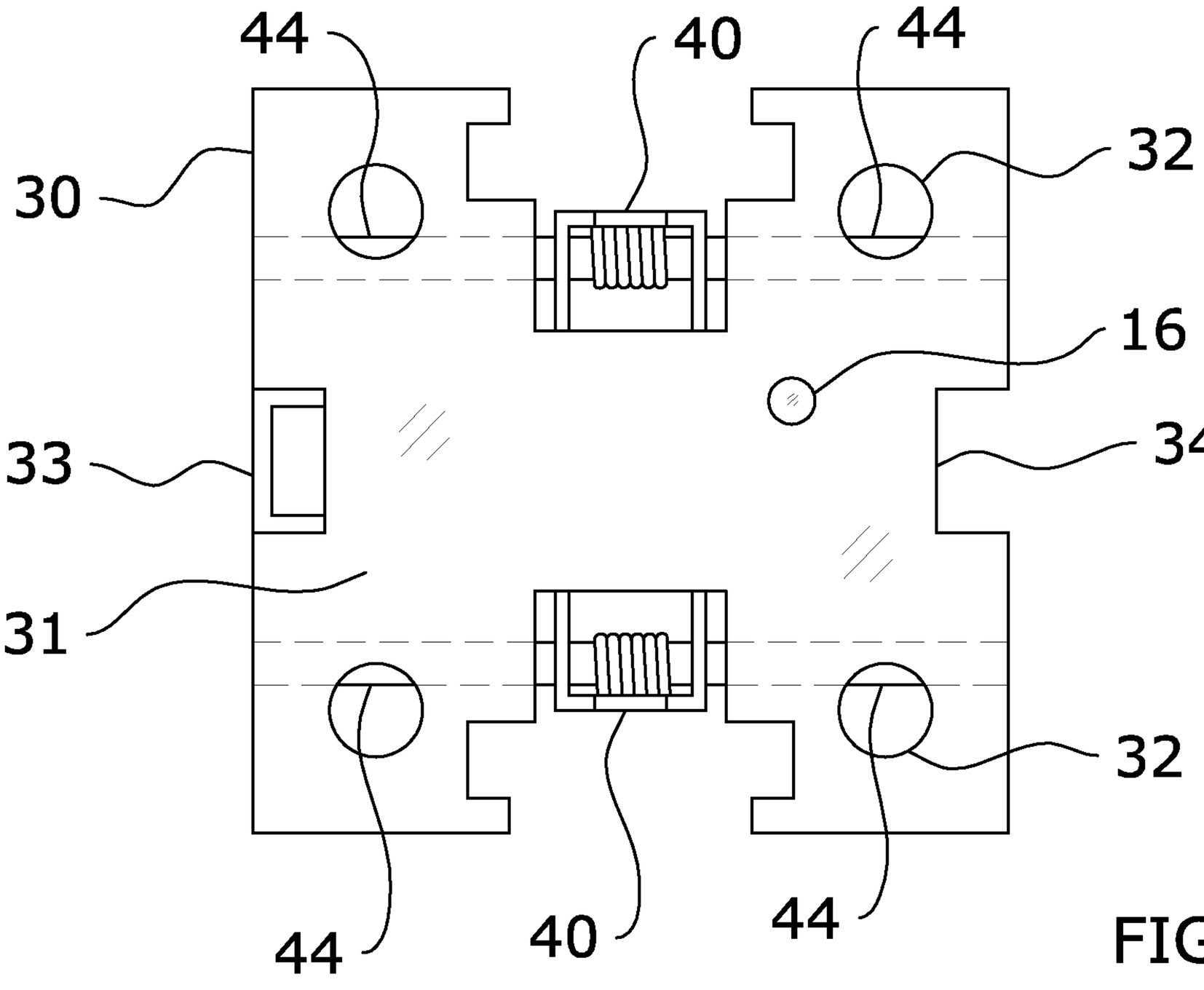



FIG. 6a

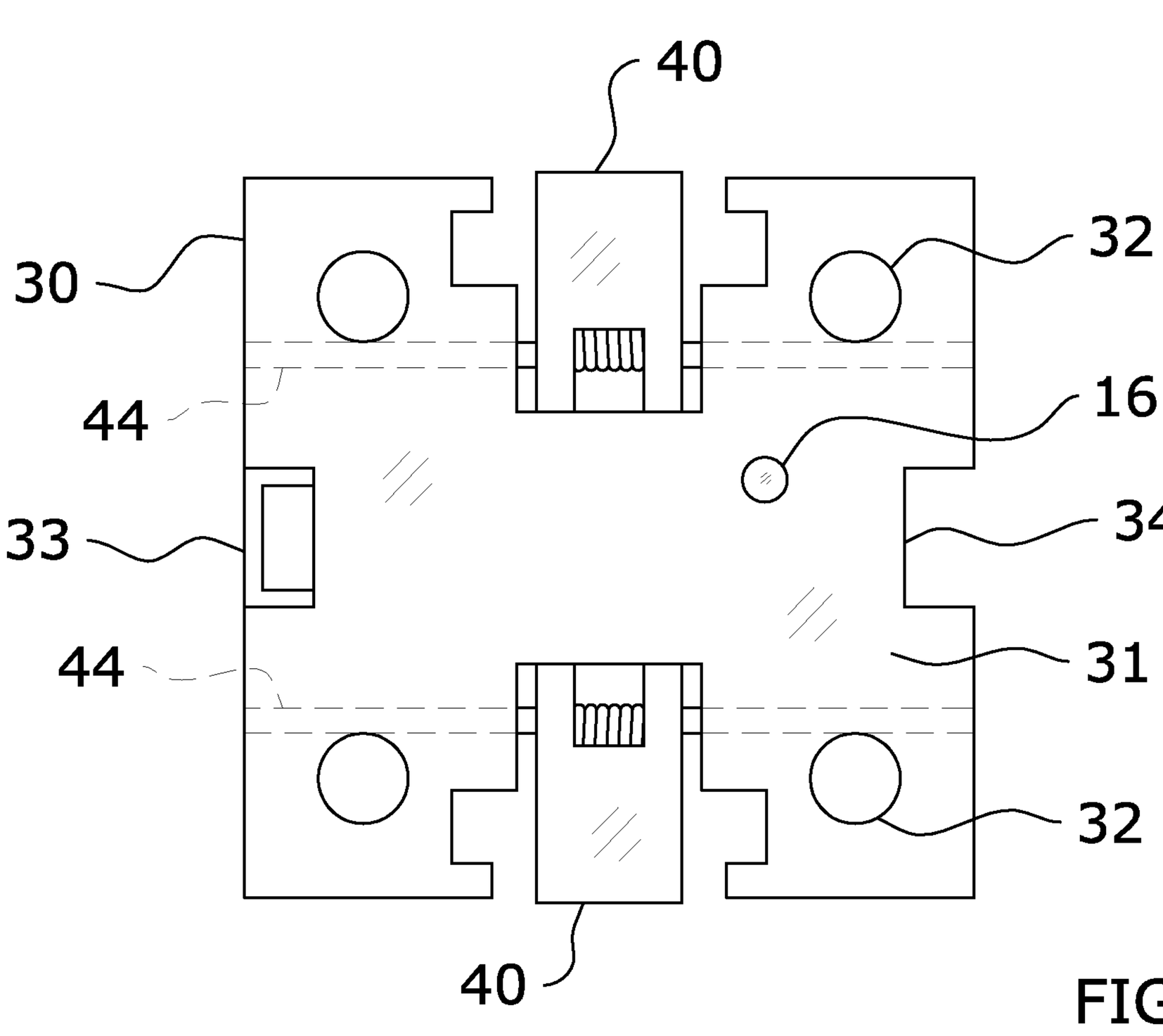



FIG. 6b

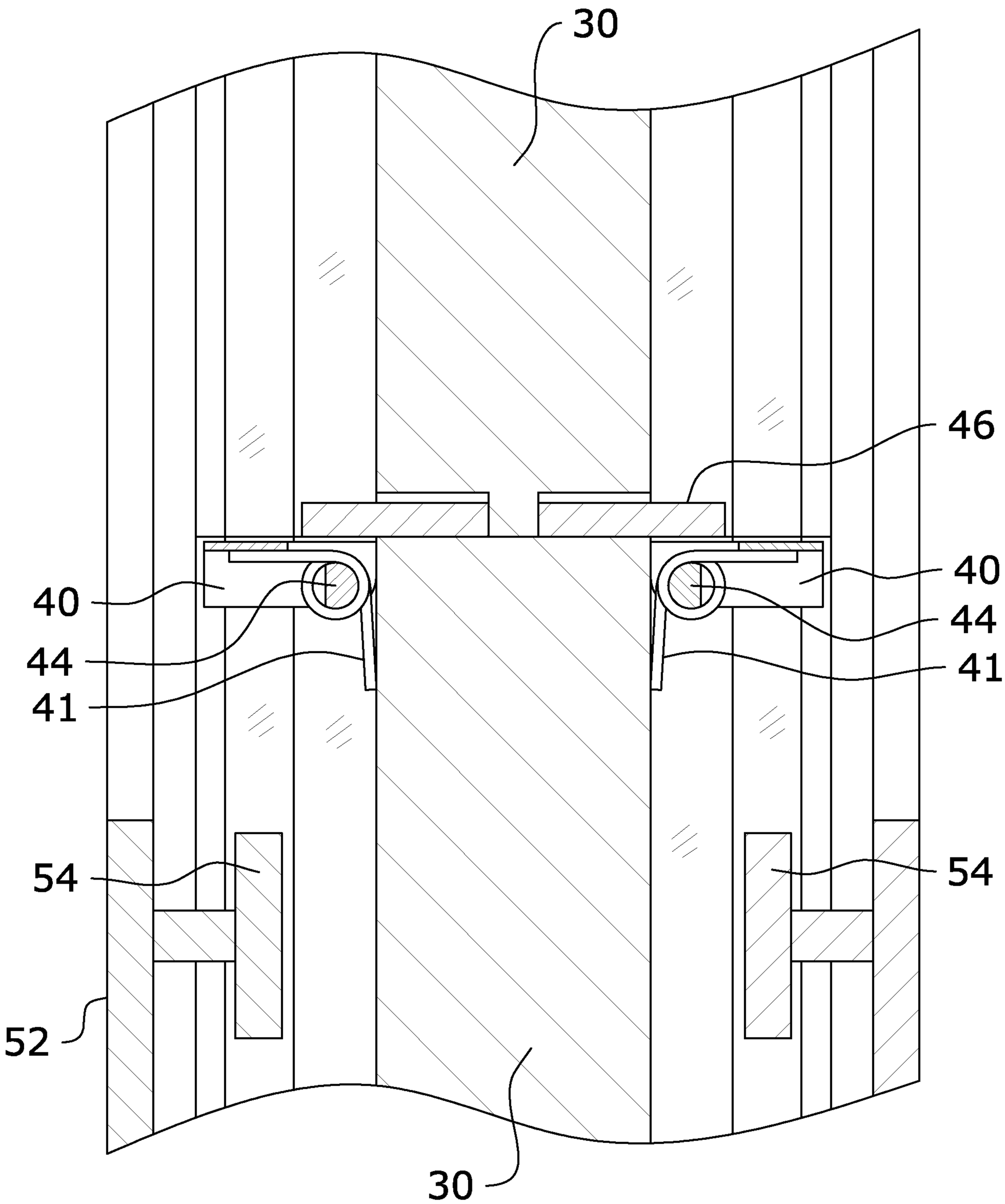



FIG. 7a

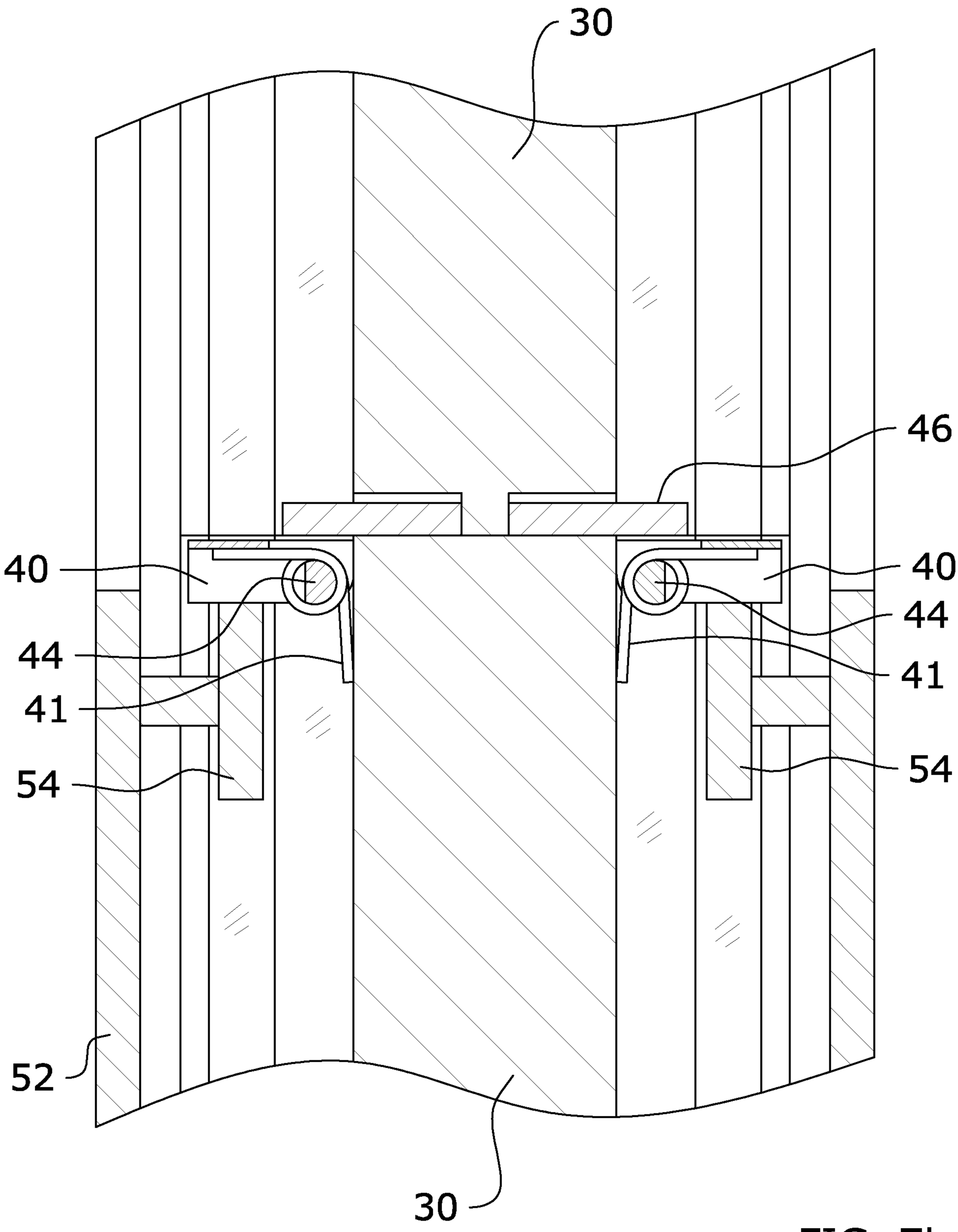



FIG. 7b

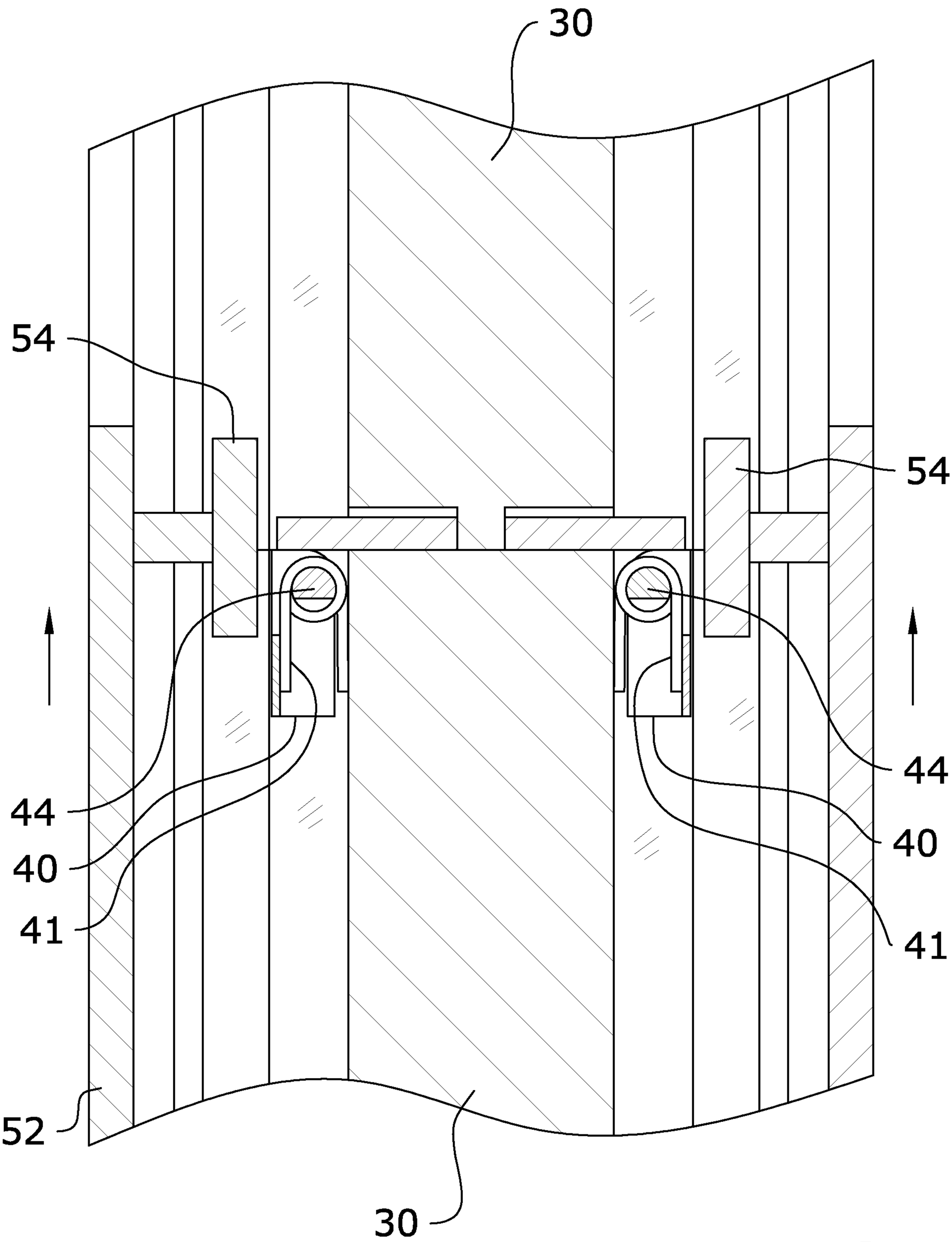



FIG. 7c

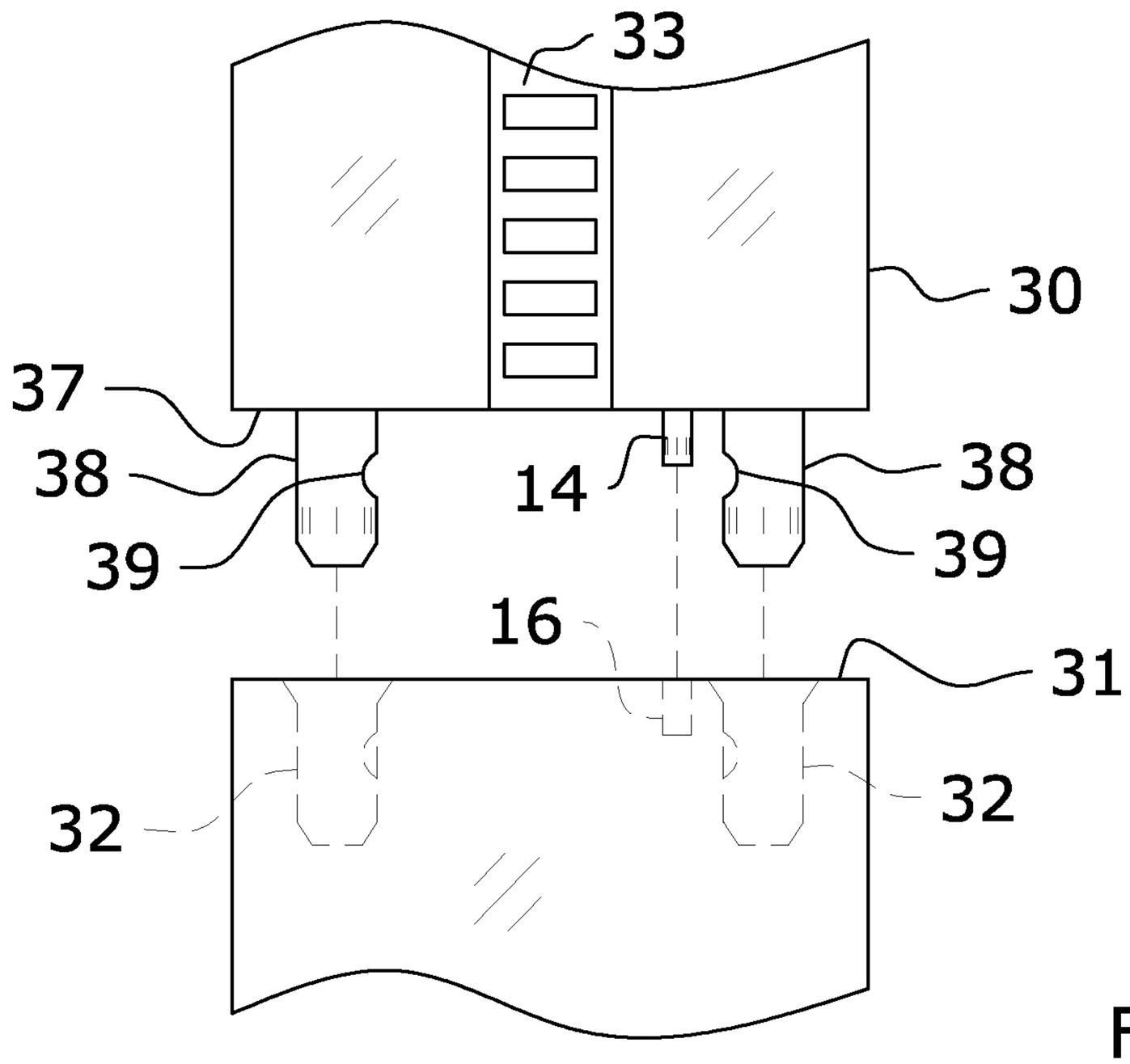



FIG. 8a

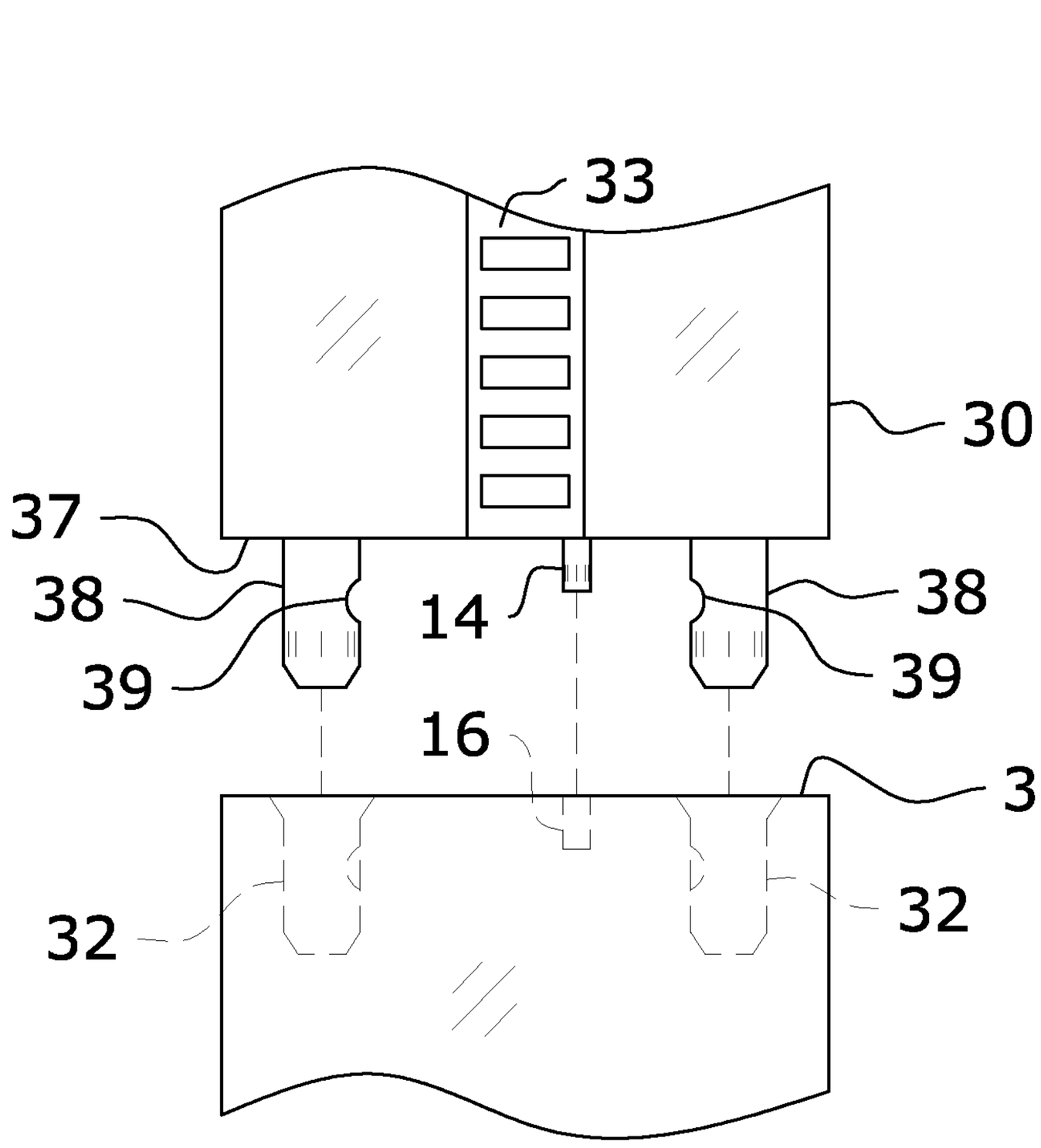



FIG. 8b

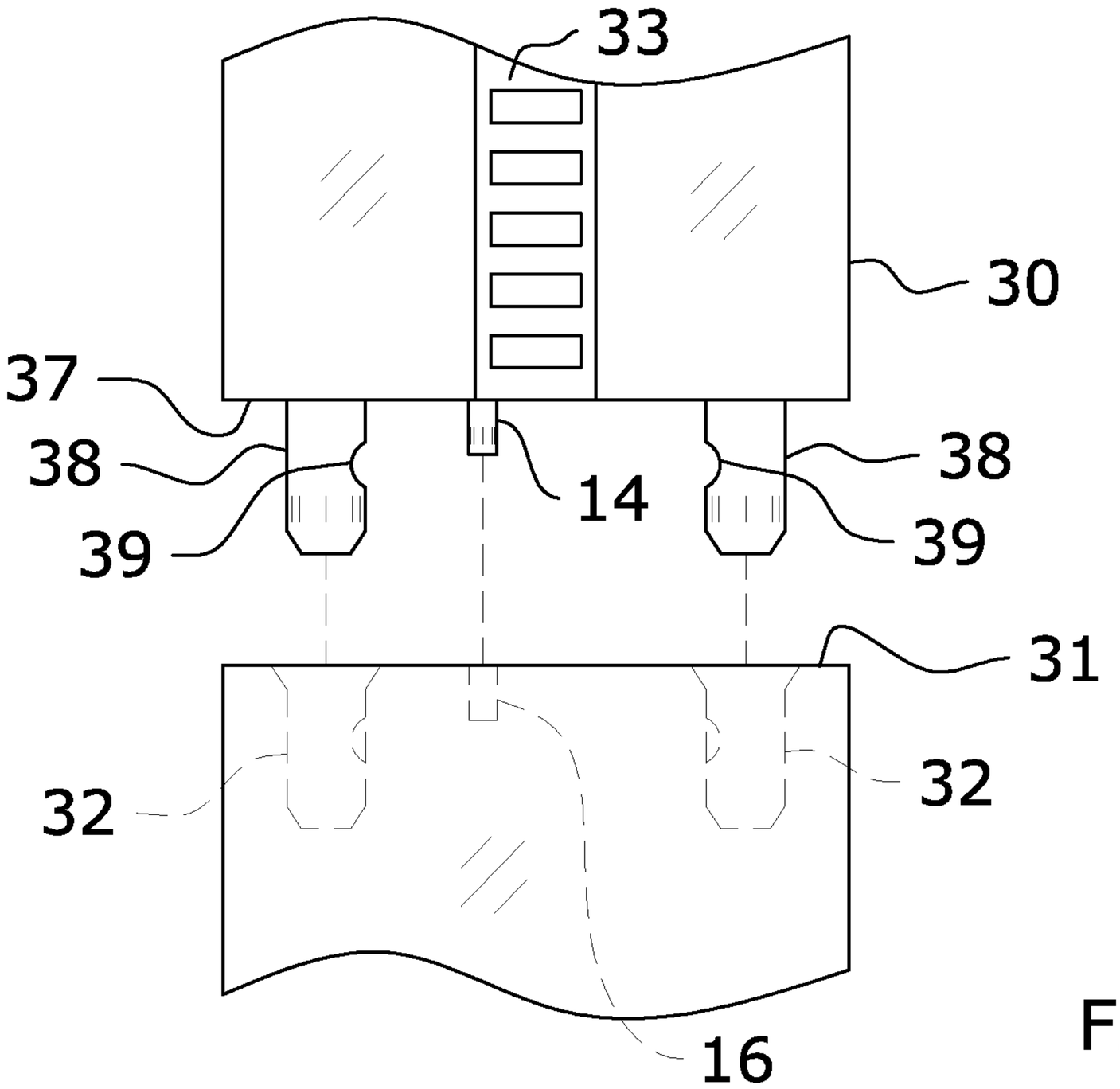



FIG. 8c

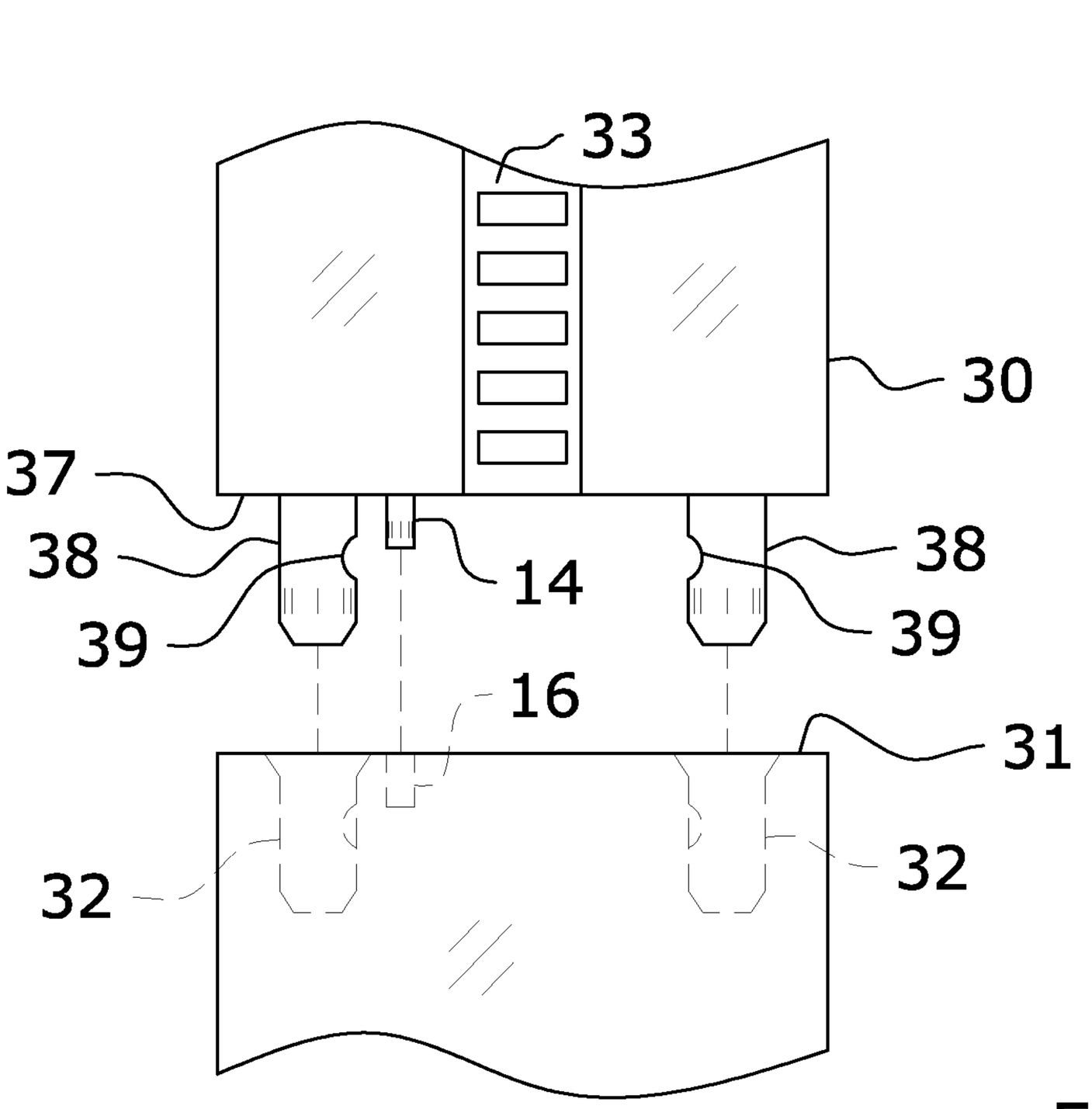



FIG. 8d

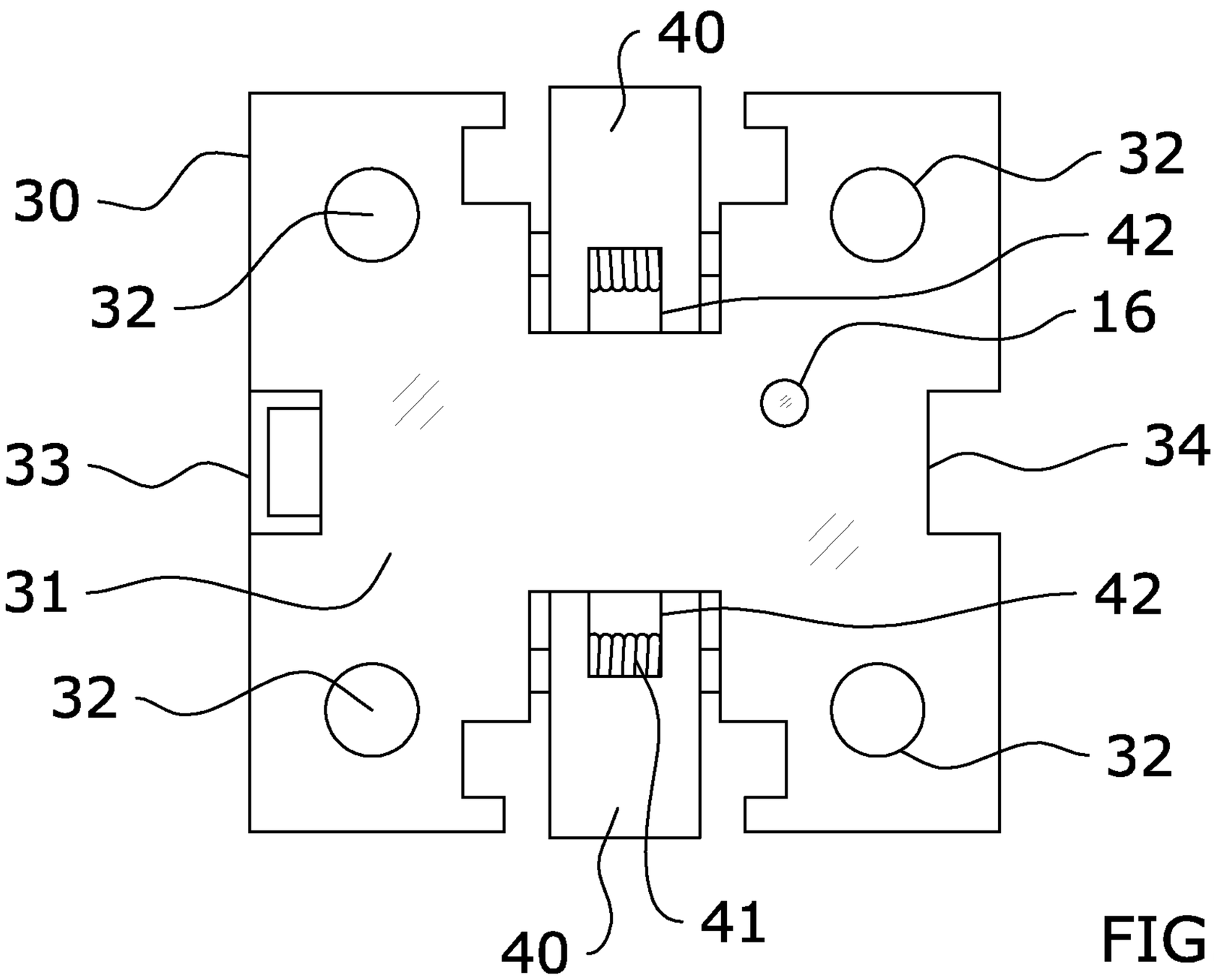

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FIG. 9a

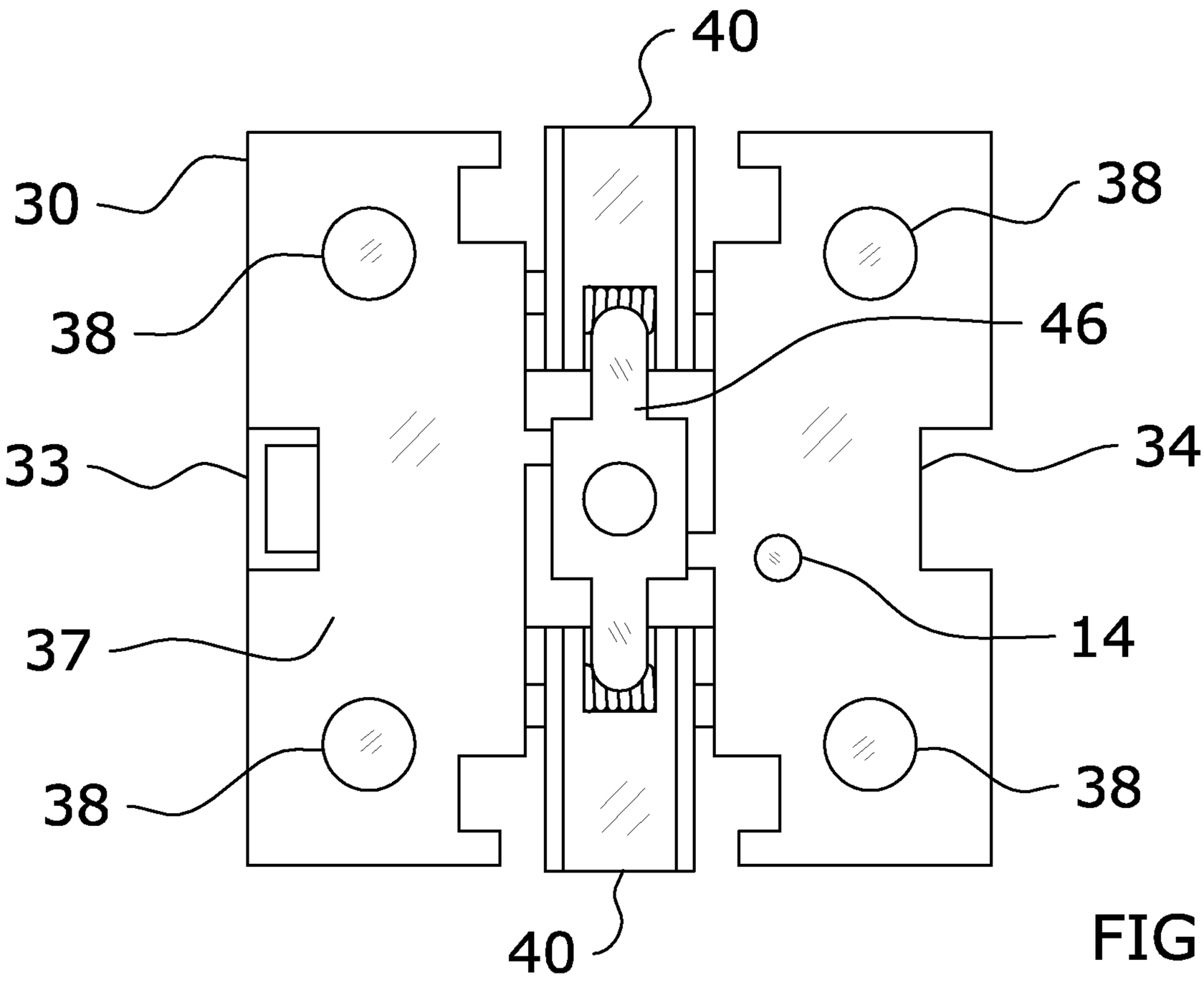

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FIG. 9b

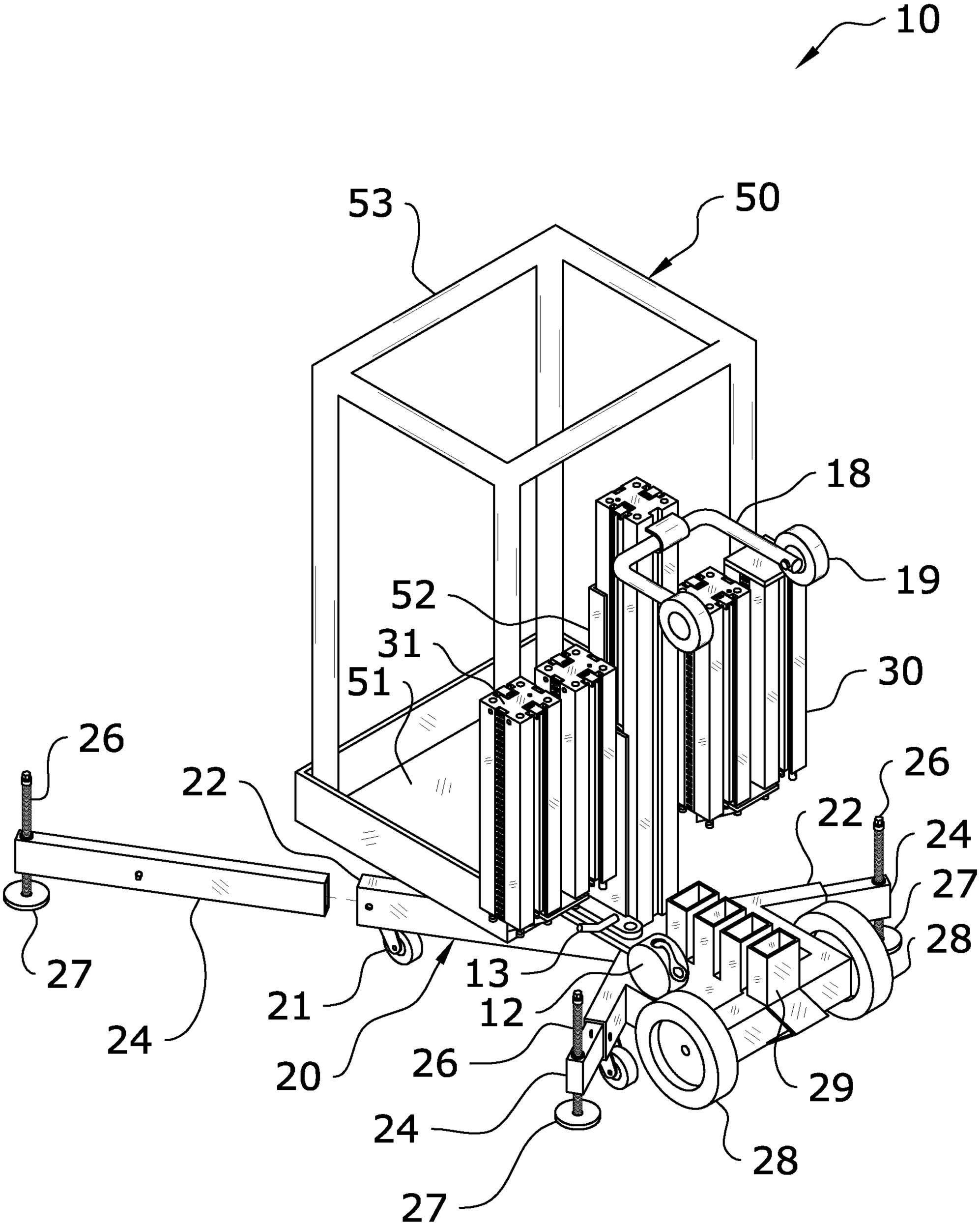

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FIG. 10

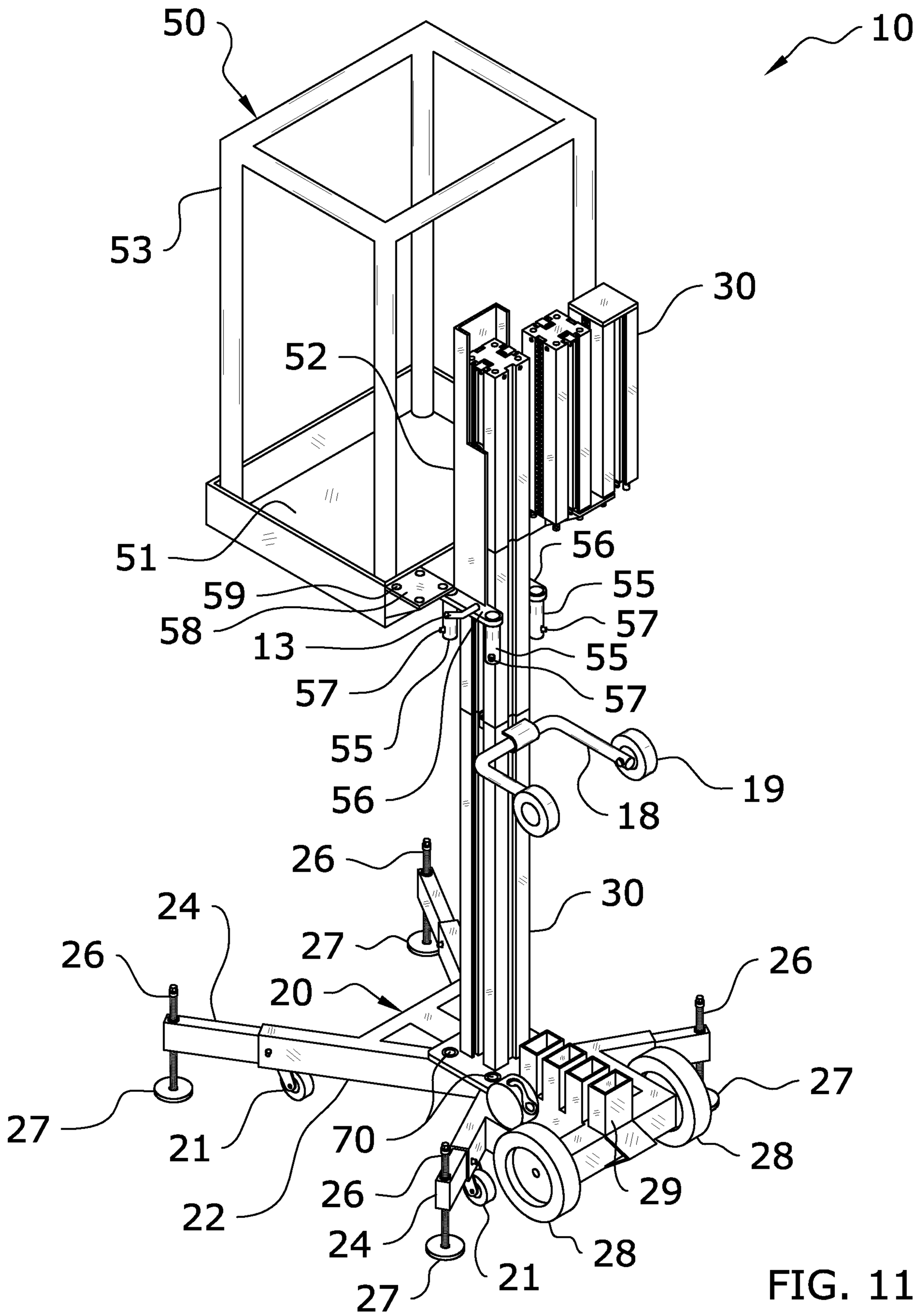

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FIG. 11

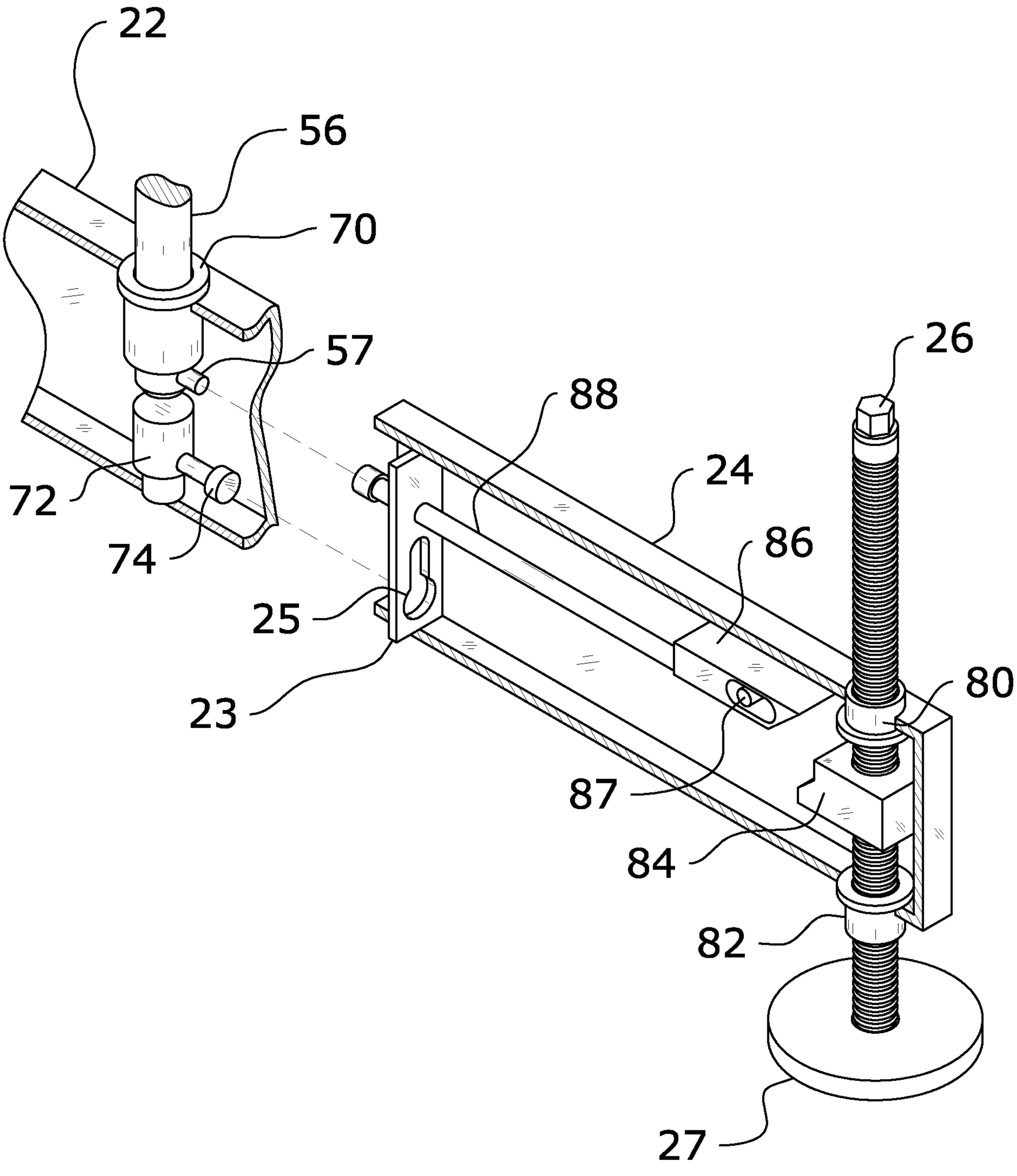



FIG. 12

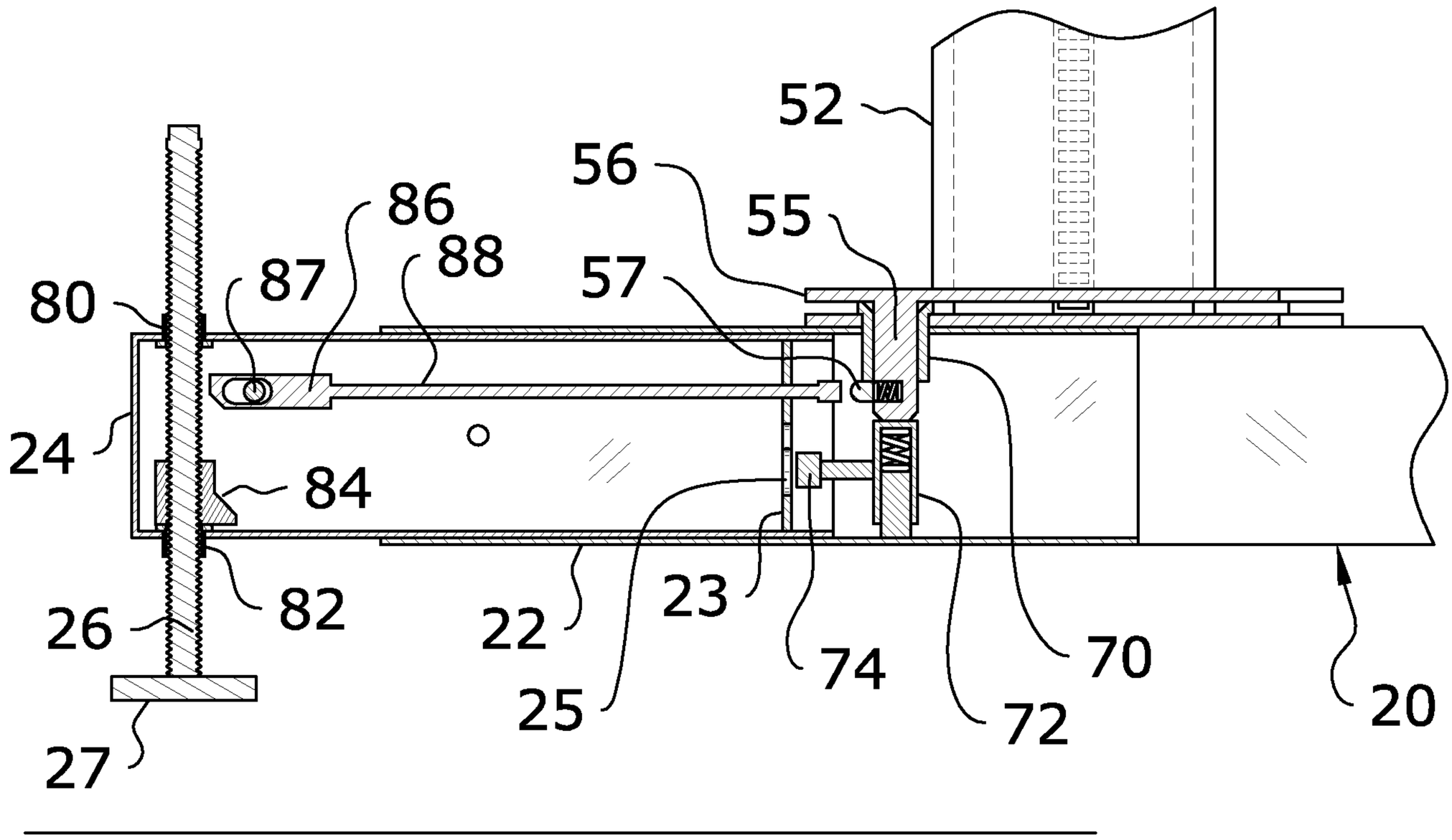



FIG. 13a

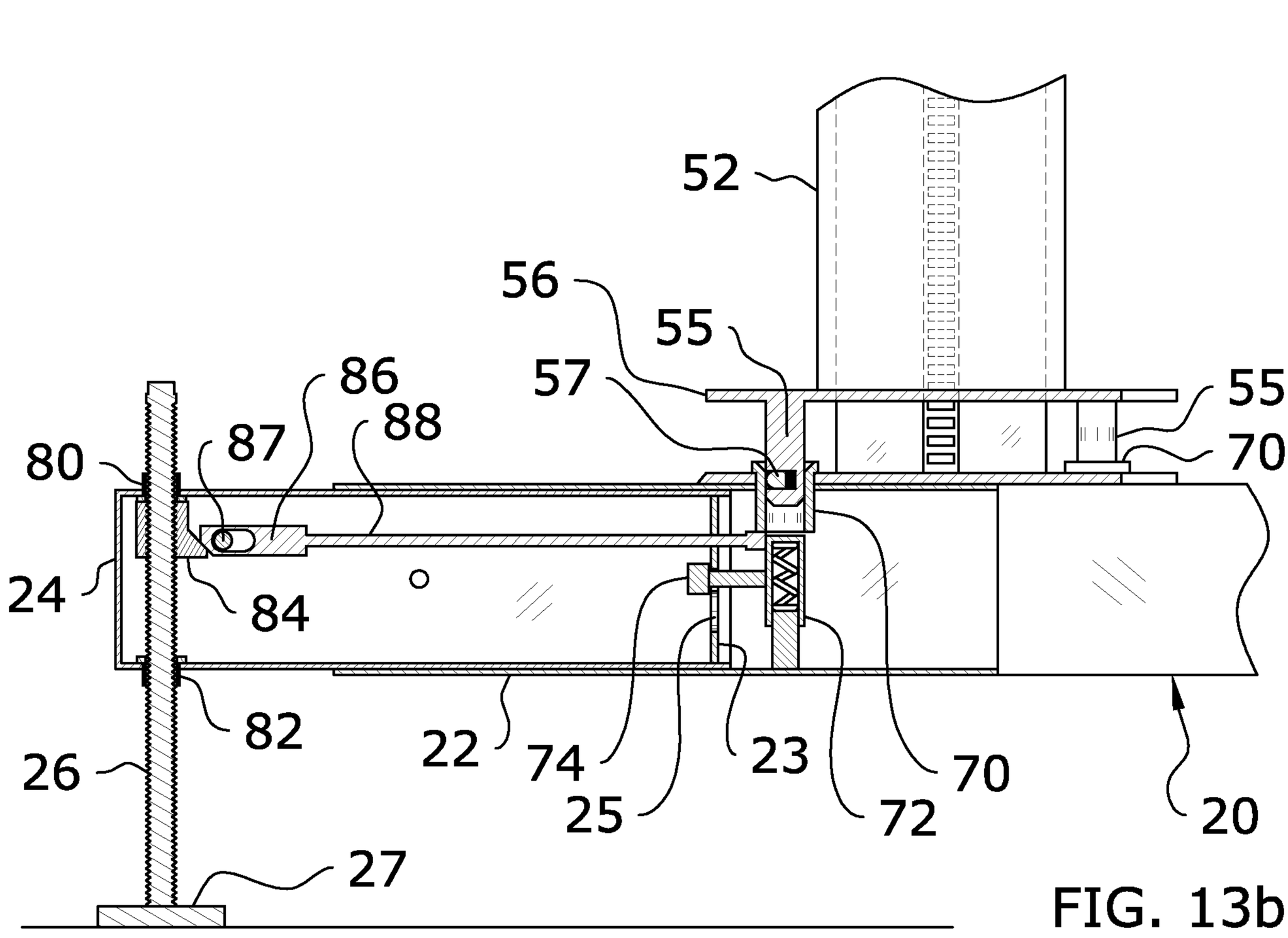



FIG. 13b

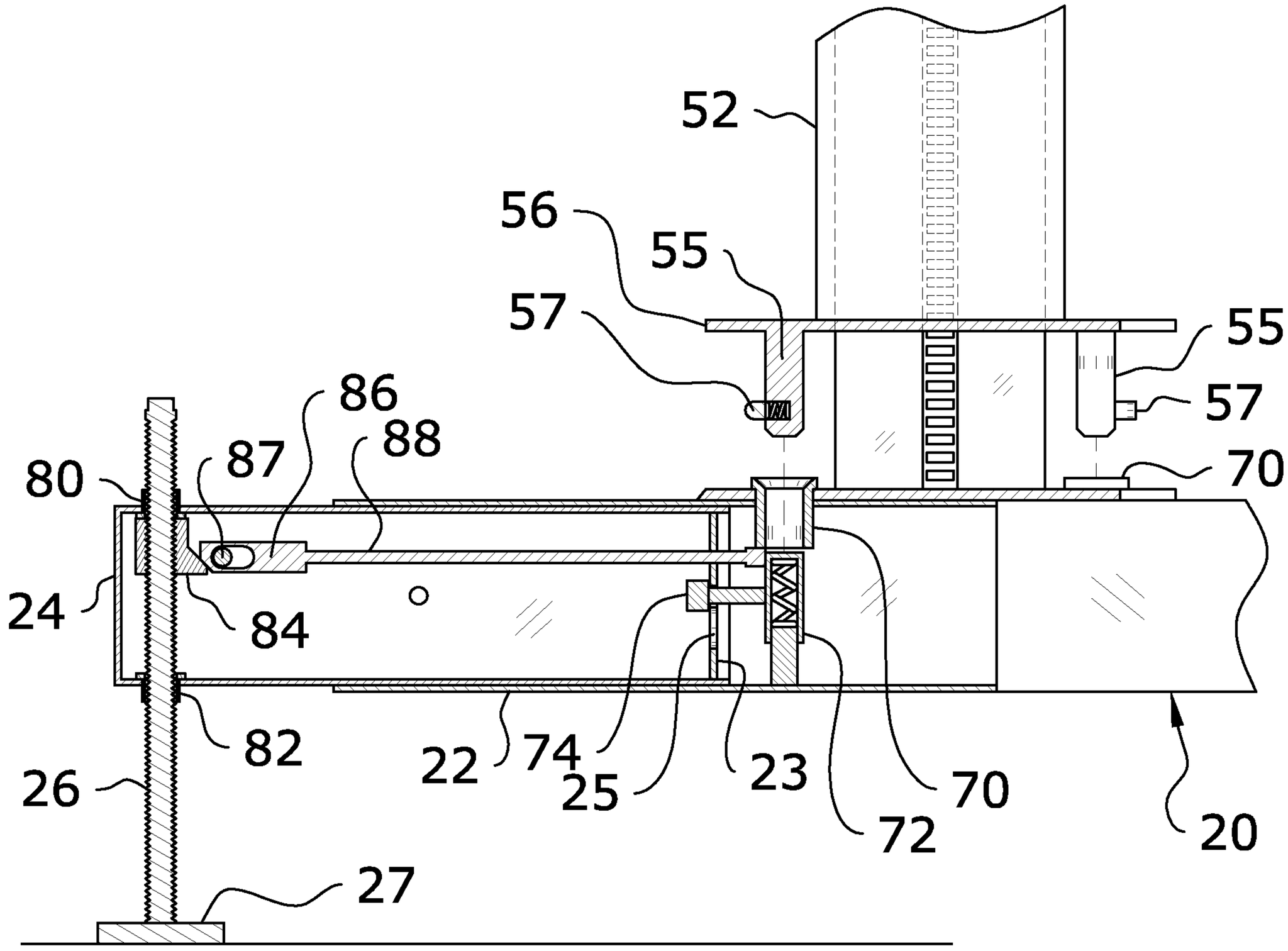
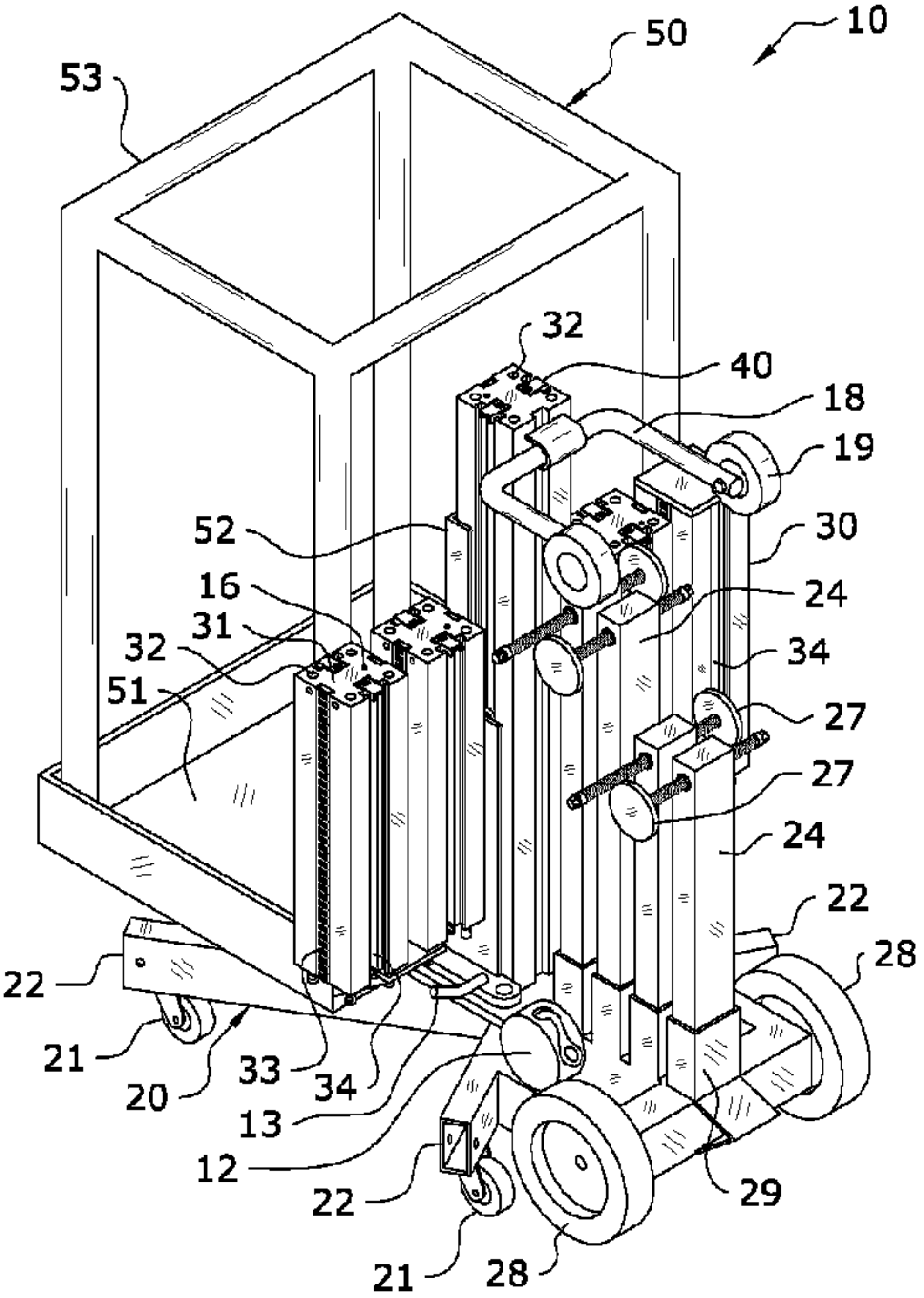



FIG. 13C


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