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An agency of Industry Canada

CA 2282036 C 2007/11/27

(11)(21) **2 282 036**

(12) **BREVET CANADIEN**
CANADIAN PATENT

(13) **C**

(22) **Date de dépôt/Filing Date**: 1999/09/10

(41) **Mise à la disp. pub./Open to Public Insp.**: 2000/09/26

(45) **Date de délivrance/Issue Date**: 2007/11/27

(30) **Priorité/Priority**: 1999/03/26 (CA2,267,394)

(51) **Cl.Int./Int.Cl.** *E06B 11/00* (2006.01),
E06B 11/08 (2006.01)

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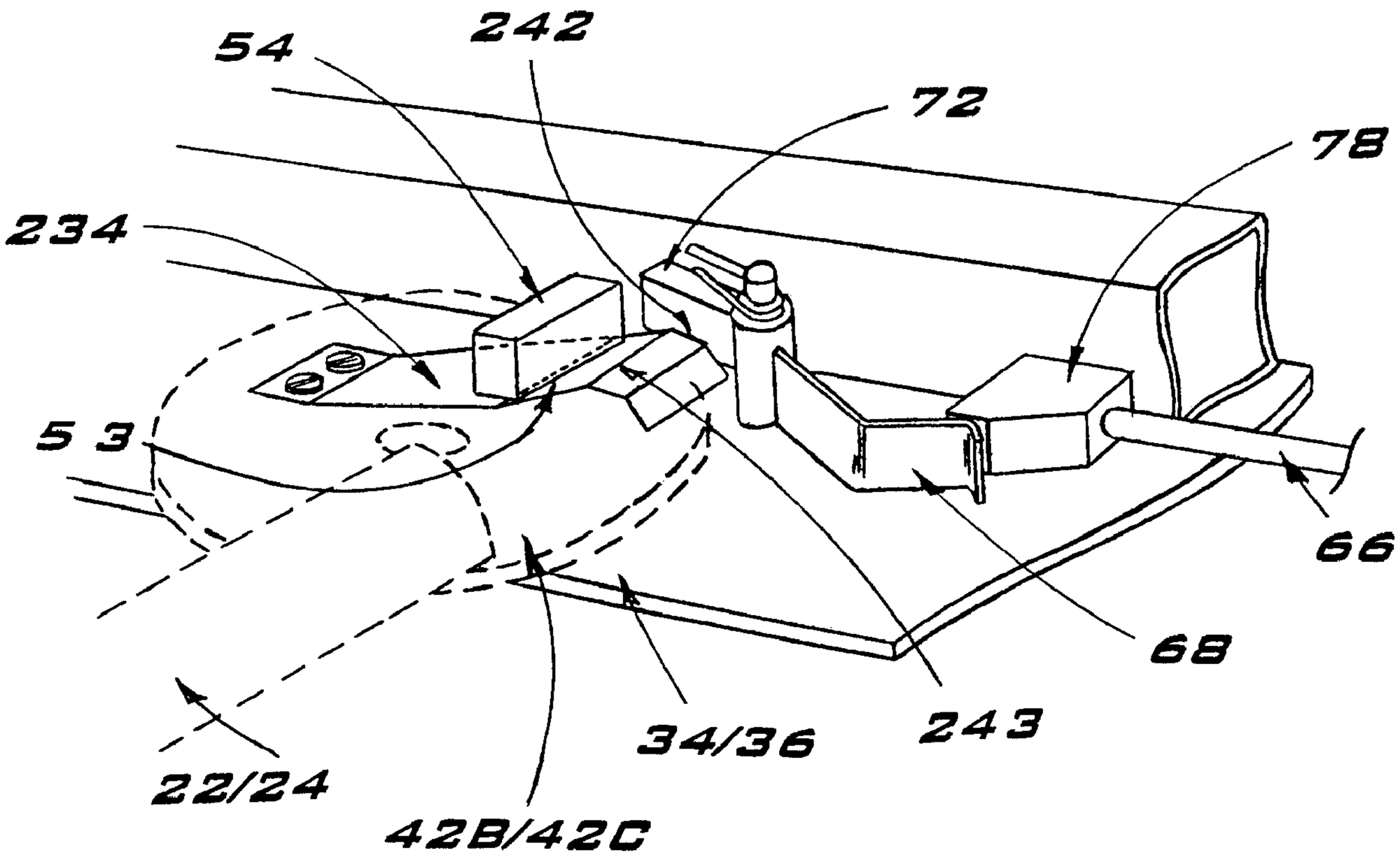
(54) **Titre : DISPOSITIF D'ENTREE MUNI DE BRAS D'OUVERTURE DES BARRIERES**
(54) **Title: ENTRANCE DEVICE HAVING BARRIER ARM UNLOCKING MEANS**



(57) **Abrégé/Abstract**:
An entrance device having at least two barrier means to permit entrance in one direction comprising a first barrier manually displaceable from a closed position to an open position and a second barrier manually displaceable from a closed position to an open position when said first barrier is being engaged to achieve said second open position wherein said first and second barriers are presented by said entrance device in sequence, and includes barrier arm unlocking means.

Entrance Device Having Barrier Arm Unlocking Means

Abstract of the Disclosure

An entrance device having at least two barrier means to permit entrance in one direction comprising a first barrier manually displaceable from a closed position to an open position and a second barrier manually displaceable from a closed position to an open position when said first barrier is being engaged to achieve said second open position wherein said first and second barriers are presented by said entrance device in sequence, and includes barrier arm unlocking means.

Description

Entrance Device Having Barrier Arm Unlocking Means

Field of Invention

This invention relates generally to an improved gated entrance device permitting passage in one direction and specifically relates to an entrance device having barrier arm unlocking means. This invention further relates to a gated entrance device having a gate collapsing means for allowing unobstructed traversal of said gated entrance device in either direction in case of an emergency. This invention further relates to a method of traversing a gated entrance device.

Background of Invention

This invention relates to the art of self-closing gates or barriers that permit passage in one direction, but not in the other direction.

For example U.S. Patent No. 5,615,520 granted to John D. McGuire provides for a one-way gate for allowing passage in one direction whose internal mechanical works are concealed within an enclosure, those mechanical works including independent means to perform three function of, first, biasing the gate to return to a closed position; second, limiting the range of motion of the gate between a closed position and a fully open stop; and third, providing a damper to retard the motion of the gate.

Some prior art self-closing gates or barriers permit a person to gain passage through said one-way gate in a direction opposite to said one direction by displacing said gate or barrier said one direction and passing through the resulting unobstructed passageway. There is a need therefore for entrance devices which prevent the one-way gate or barrier from being "tampered" in this way. For example, WO 93/23799 provides for at least one entrance gate, and a system for controlling entrance through said entrance gates comprising, first, entrance passageway defined by posts on which gates are

pivotally mounted; second, a sonar sensor means which functions to detect the presence of people and objects in the vicinity of the passageway and to deliver signals to a control means for controlling opening and closing of the gate; wherein said sonar sensor means includes at least one sonar which is mounted in or in the vicinity of the passageway.

The prior art entrance device utilizing sonar is complicated in that said entrance device requires, first, a sonar emitting device; second, an electronic unit for amplifying sonar pulses; third, a microprocessor for sampling said sonar signals; fourth, a microprogram operably associated with said microprocessor for processing said sonar signals to a further microprocessor which controls opening and closing of the gates. Operation of said prior art entrance device utilizing sonar also requires configuration of said microprocessors to store input related to a defined external measuring area within which objects are detected by said sonar sensing means.

There is a need therefore for an entrance device of simple construction that is easy and inexpensive to produce, that can be installed without difficulty, and which is easy to operate.

Summary of the Invention

In accordance with a first aspect of the invention, an entrance device is provided having at least two barrier means to permit entrance in one direction comprising, a first barrier means manually displaceable from a closed position to an open position; and second barrier means manually displaceable from a closed position to an open position when said first barrier means is being engaged to achieve said second open position; wherein said first and second barrier means are presented by said entrance device in sequence.

In another aspect of this invention, an entrance device to permit entrance in one direction is provided, said entrance device comprising: (a) at least one partition member defining a passageway; (b) first barrier arm assembly mounted on said partition member, said first barrier arm assembly comprising, (i) a first barrier arm, and (ii) first barrier arm rotor means connected to said first barrier arm and rotatably mounted on said

partition member and adapted for manual rotation of said first barrier arm between a first closed position and second open position; and (c) second barrier arm assembly mounted on said partition member and spaced apart from said first barrier arm assembly, said second barrier assembly comprising, (i) a second barrier arm; (ii) second barrier arm rotor means connected to said second barrier arm and rotatably mounted on said partition member and adapted for manual rotation of said second barrier arm between a first closed position and second open position; and (iii) sequential barrier arm rotor releasing means comprising, (A) a stopping means comprising, a stopping member presented by said partition member adjacent to said second barrier arm rotor means; and stopping arm presented by said second barrier arm rotor means and operably associated with said stopping member, wherein said stopping means prevents rotation of said second barrier arm rotor means from said closed position toward said open position; and (B) releasing means for displacing said stopping member, thereby releasing said stopping means when said first barrier arm rotor means is rotated from said closed position toward said open position, and thereby allowing rotation of said second barrier arm rotor means from said closed position toward said open position.

In a further aspect of the invention, one may additionally find a collapsing means for manually displacing said first and second barrier arms from said first closed position or second open position to achieve a third collapsed position wherein said first and second barrier arms permit unobstructed passage through said passageway.

In a still further aspect of the invention, a method of traversing an entrance device having at least a first and second manually operable barrier means mounted in sequence on at least one partition member comprising the steps of: (a) manually displacing said first barrier arm so as to allow passage past said first barrier arm; (b) said first barrier arm releasing a blocking means that prevents displacement of said second barrier arm, so as to allow passage past said second barrier arm by having displaced said first barrier arm; and (c) manually displacing said second barrier arm so as to exit said entrance device.

It is yet another aspect to provide an entrance device having at least two barrier means to permit entrance in one direction comprising: a first barrier means manually

displaceable from a closed position to an open position; and second barrier means manually displaceable from a closed position to an open position when said first barrier means is being engaged to achieve said second open position; sequential barrier releasing means for opening said first and second barrier means in sequence; and sequential barrier releasing means including releasing means for releasing at least one of said barrier arms for manual displacement from a closed position to an open position.

Brief Description of Drawings

A detailed description of the preferred embodiments are provided herein below, by way of example only, with reference to the following drawings, in which:

Figure **1** is a perspective view of a preferred embodiment of the access control device with the casing on.

Figure **2** is a top plan view of the access control device shown in Figure **1** with the casing removed.

Figure **3** is a perspective view of one side of Figure **1** with the casing off.

Figure **4** is a top plan view of the first barrier assembly.

Figure **5** is a top plan view of the first and second barrier assembly in a closed position.

Figure **6** is a top plan view of the first and second barrier assembly with the first barrier arm in an open position.

Figure **7** is a top plan view of the first, second and third barrier arm assemblies.

Figure **8** is a perspective view showing the use of the access control device.

Figures **9a**, **9b**, **9c** and **9d** are views showing different stages of the second and third barrier assemblies.

Figure **10** is a top plan view of another embodiment of the invention.

Figure **11** is a top plan view of yet another embodiment of the invention.

Figure **12** is a top plan view of a further embodiment of the invention.

Figure **13** is a perspective view showing the access control device in a collapsed position.

Figure **14** is a partial vertical cross-section of the access control device.

Figure **15** is a partial perspective view of the access control device illustrating structure for collapsing the access control device.

Figures **16a** and **16b** are partial top plan views illustrating roller frames.

Figure **17** is a partial cross-sectional view of the access control device illustrating collapsing of the device.

Figure **18** illustrates the access control device with a detecting means.

Figure **19** is a perspective view of another embodiment of the access control device.

Figure **20** is a perspective view of the access control device of Figure **19** in a collapsed position.

Figure **21** is a side elevational view through a support post of Figure **19**.

Figure **22** is a perspective view of a retaining spring.

Figure **23** is a partial perspective view of an arm assembly with retaining spring in a rest position.

Figure **24** is a partial perspective view of an arm assembly with the retaining edge of the retaining spring contacting the pivot stop bar.

Figure **25** is a partial perspective view of an arm assembly as shown in Figure **24** with the rotor release block in an at rest position.

Figure **26** is a partial perspective view of an arm assembly as shown in Figure **25** with the barrier arm displaced from its rest position.

Figure **27** is a perspective view of another embodiment of the invention.

Figure **28** is a perspective view of the access control device of Figure **27** in a collapsed position.

In the drawings, preferred embodiments of the invention are illustrated by way of example. It is expressly understood that the description and the drawings are only for the purpose of illustration and as an aid to understanding and are not intended as a definition of the limits of the invention.

Best Mode for Carrying Out The Invention

In the description which follows, like parts are marked through the specification and the drawings with the same respective reference numerals. The drawings are not necessarily to scale, and in some instances proportions may have been exaggerated in order to more clearly depict certain features of the invention.

Referring to Figure **1,** there is illustrated a first preferred embodiment of the entrance device **10** in which there are three pairs of barrier arms. In this first preferred embodiment of the invention, the entrance device comprises a first partition member **12** and second partition member **14**. Each of said first and second partition members **12**, **14** further comprises a top member **16** and pair of support posts **18** for supporting each of said top members **16**. Each of said first and second partition members **12**, **14** further comprise a first barrier arm **20**, second barrier arm **22** and third barrier arm **24** which are mounted on said top members **16**, in a manner made evident below.

Each of said top members **16** includes a casing **26** for enclosing the mechanism as shown in the drawings corresponding to each of said first, second and third barrier arms **20**, **22**, **24** and described in detail below.

Each of said supporting posts **18** further comprises a base **28** for fixing each of said partition members **12**, **14** to the floor or ground by means of an attachment means, for example, a flange **17** associated with said supporting posts **18**, which flange presents holes for receiving screws which are secured into the ground or floor. Partition members **12**, **14** are fixed to the floor or ground spaced apart from each other so as to delimit or define a passageway, as shown in Figure **1**.

It should be understood that while a pair of supporting posts **18** are illustrated herein as means for supporting top member **16**, this invention also contemplates alternate means for supporting top member **16**, such as one support post for supporting each of said top members **16**, attaching said top member **16** to a support wall extending all or substantially all the length of top member **16**, or attaching said top member **16** to an existing barrier such as a wall, using an attachment means such as screws or the like.

Each of said first and second partition members **12**, **14** present the same mechanical structure when casing **26** is removed, as best illustrated by Figure **2**, which presents a top view of top member **16** of each of said first and second partition members **12**, **14** with casing **26** removed.

Now referring to Figure **3**, the various structural elements of each of said first and second partition members **12**, **14** are illustrated. More specifically Figure **3** shows the complete third barrier arm assembly **36** including the rotor post reinforcing bracket **43**, while the second barrier arm assembly **34** has the rotor post reinforcing bracket **43** removed, and the first rotor arm assembly **32** drawn with phantom lines to better illustrate the first rotor post **37**. Top member **16** presents main base plate **30**, first barrier arm assembly **32**, second barrier assembly **34** and third barrier arm assembly **36**. Main base plate **30** presents first, second and third rotor posts **37**, **38** and **39**.

Now referring to Figure **4**, the structure of said first barrier arm assembly **32** is represented, which structure is also representative of said second and third barrier arm assemblies **34**, **36**, and also of the arm assemblies which are part of the various embodiments of the invention described below. Figs. **4** and **7** show rotor post reinforcing bracket **43** in partial cut away view.

Said first barrier arm assembly **32** comprises said first barrier arm **20** which is connected to a rotor bottom plate **42** (see Figure **9a**) spaced from a rotor top plate **48** (see Figure **7**). A rotor bearing tube **44** is disposed between the rotor bottom plate **42** and rotor top plate **48** and receives and rotationally engages rotor bearing **46**. Said rotor bottom plate **42** and rotor bearing **46** are received by said rotor post **37** thereby permitting manual rotation of barrier arm **20** about said rotor post **37**. The first, second and third barrier arm assemblies **32**, **34** and **36** also present side covers **31**, **33** and **35**.

As best shown in Figure **3**, each of said first, second and third barrier arm assemblies **32**, **34**, **36** further includes a rotor post reinforcing bracket **43** which is placed on top of barrier arm assemblies **32**, **34**, **36** so as to prevent them from being removed from said rotor posts **37, 38, 39** while permitting rotatable displacement of said rotor bottom plate **42** (as shown in Figure **3**). Said main base plate **30** further presents main support tube **49**. Main support tube **49** presents fastening holes **50a**, **50b** which communicate with corresponding holes presented by said rotor post reinforcing bracket **43**, whereby said rotor post reinforcing bracket **43** is secured to said main support tube **49** using fastening means such as nuts and bolts, or the like. The rotor post reinforcing bracket **43** reinforces the rotor post in that it restricts deflection of the barrier arm assemblies **32**, **34** and **36** when for example some one hangs from the barrier arms **20**, **22** and **24**.

In accordance with the above, said first barrier arm assembly **32** permits manual displacement of said first barrier arm **20** from a first closed position to a second open position. Referring to first barrier assembly **32**, as illustrated in Figure **5**, barrier arm **20** is shown in said first closed position. Now referring to first barrier arm assembly **32**, as illustrated in Figure **6**, barrier arm **20** is shown in said second open position.

Now referring to Figure **5**, one provides means for resisting or inhibiting movement of said barrier arm **20** in a direction other than said one direction (said one direction being direction "A") when said barrier arm **20** is in said closed position. In the embodiments of the present invention described herein, said means for inhibiting movement is presented by a base plate stop **52** which is presented by said main base plate **30**, and further by rotor stop block **54** which is presented by rotor bottom plate **42**. As best shown in Figure **5**, said base plate stop **52** comes into contact with rotor stop block **54** when an attempt is made to rotate said barrier arm **20** in a direction opposite to said direction A (direction B) when said barrier arm **20** is in said first closed position.

As illustrated in Figure **7**, the various embodiments of the invention described herein also provide for a biasing means **41** for said barrier arms **20**, **22**, **24** to be biased toward said first closed position. Said biasing means **41** prevents passage through said entrance device **10** in said direction B by ensuring that once a person has passed through said entrance device in direction A, said barrier arms **20**, **22**, **24** return to said closed position to obstruct passage through said entrance device **10**. In the embodiments of the invention described herein, said biasing means **41** is presented by a rotor return spring **56** which is preferably operably associated with each of said barrier arm assemblies **32**, **34**, **36**. Said rotor return spring **56** is mounted between a spring pin **58** presented by said rotor top plate **48**, and spring post **60** presented by said main support tube **49**.

In order to prevent said barrier arm assemblies **32**, **34**, **36** to return from said second open position to said first open position with great force in combination with said rotor return spring **56**, and thereby possibly causing injury to person traversing said entrance device **10** soon after another person, it is desirable to associate some form of dampening means with said barrier arm assemblies **32**, **34**, **36**. As best shown in Figure **7**, in the embodiments of the invention described herein, said dampening means is presented by a dampening cylinder **62** which is also operably associated preferably with each of said barrier arm assemblies **32**, **34**, **36**. Said dampening cylinder **62** is mounted to said main support tube **49** and operably connected with said rotor top plate **48**, again as illustrated in Figure **7**.

Figure **8** illustrates said entrance device **10** in operation by reference to the first embodiment of the invention disclosed herein, and shows the passage of a person between said first and second partition members **12**, **14**. The entrance device **10** described herein restricts passage therethrough into passage in said one direction only by means of a sequential releasing means. Said sequential releasing means presents means for permitting displacement of second barrier arm **22** only once said first barrier arm **20** has been previously displaced; and of the third barrier arm **24**, in turn, only once said second barrier arm **22** has been previously displaced.

As particularized below, said sequential releasing means can either be provided mechanically or electronically.

Again in reference to Figure **7**, said sequential releasing means is illustrated which more particularly operates as follows. When said first barrier arm **20** is displaced, said second barrier arm **22** is thereby mechanically released by way of said sequential releasing means, so long as said first barrier arm **20** has not yet returned to said first closed position. Similarly, manual displacement of said second barrier arm **22** in turn releases said third barrier arm **24** thereby permitting said third barrier arm **24** to be opened, but only so long as said second barrier arm **22** has not yet returned to said first closed position.

The biasing means **41** and dampening cylinder **62** may be adjusted in a manner well-known to those skilled in the art, in order to provide for return of said first and second barrier arms **20**, **22** to said first closed position more slowly than it would take such person to make its way from one barrier arm to the next barrier arm so as to minimize the chance of the first and second barrier arm **20**, **22** returning to the first closed position too quickly and before the next barrier arm can be manually displaced. Moreover, the length of the arms **20**, **22** and **24** tend to contact a user and then swing to the closed position once the user has passed through the appropriate position.

Now referring to Figure **9a**, a preferred embodiment of a first mechanical sequential releasing means **64** is illustrated, which in this figure is operably associated with said first and second barrier arm assemblies **32**, **34**. Said first sequential releasing

means **64** comprises a rotor release rod **66**, pivot cam arm **68**, pivot bushing **70**, and pivot stop bar **72**.

Said rotor release rod **66** is pivotally or rotatably connected to said first rotor bottom plate **42a** by means of rotor release stud **74** presented by the top of said first rotor bottom plate **42a** and rotor bushing **76**. Connected to said rotor release rod **66** at the end of said rotor release rod **66** opposite to said rotor release stud bushing **76** is a rotor release block **78**.

Said main base plate **30** further presents a pivot assembly post **80**. Said pivot cam arm **68** and pivot stop bar **72** are rotatably mounted on said pivot assembly post **80** by means of said pivot bushing **70**, whereby said pivot stop bar **72** can be rotated from a first blocking position in which said pivot stop bar **72** blocks said rotor stop block **54**, thereby preventing rotation of said second barrier arm **22** from said first closed position to said second open position; to a second releasing position wherein said rotor stop block **54** is released thereby permitting manual displacement of said second rotor bottom plate **42b**.

In operation, as best shown in Figure **9b**, when said first barrier arm **20** is manually displaced, said rotor bottom plate **42a** is rotated, and thereby said rotor release rod **66** is displaced atop said main base plate **30** toward said first barrier arm assembly **32**. Said displacement of said rotor release rod **66** causes said rotor release block **78** to displace said pivot cam arm **68** thereby causing pivot stop bar **72** to rotate away from said second rotor bottom plate **42b**. Rotor stop block **54** is consequently released, thereby permitting said second barrier arm **22** to be manually displaced from said first closed position to said second open position.

A pivot assembly return spring **71** biases said pivot stop bar **72** toward said first blocking position. Consequently, when said first rotor bottom plate **42a** returns to said first closed position by means of said rotor return spring **56** and dampening means **62**, said pivot stop bar **72** again blocks said rotor stop block **54**, thereby preventing rotation of said second rotor bottom plate **42b** from said first closed position to said second open position.

Said third barrier arm assembly presents a second releasing means **77** identical to said first sequential releasing means **64** for releasing said third barrier arm **24** when said second barrier arm **22** is manually displaced, as best shown in Figure **9c**, **9d**.

Also as best shown in Figure **9a**, said first barrier arm assembly **32** may also be provided with a first rotor blocking means **79** for preventing said first rotor bottom plate **42a** from being rotated from said first closed position to said first open position. Said first rotor blocking means **79** is presented by a first barrier stop bar **81** which is mounted on said main base plate **30** by means of a first barrier post **82**, along with first barrier bushing **84** to provide for rotatable displacement of said first barrier stop bar **81** from a first blocking position in which said first barrier stop bar **81** blocks said rotor stop block **54**, thereby preventing rotation of said first barrier arm **20** from said first closed position to said second open position; to a second releasing position wherein said rotor stop block **54** is released thereby permitting manual displacement of said first rotor bottom plate **42a**.

Further associated with said first barrier stop bar **81** is a rotating arm **85**. Said rotatable displacement of said first barrier stop bar **81** can be obtained by providing various means for engaging said rotating arm **85**, such as a turn-key release, or solenoid combined with an access card reader or remote activation, connection to fire alarm systems, proximity sensors or similar devices.

In a second preferred embodiment of the entrance device described herein, each of said first and second partition members comprises two barrier arm assemblies **32**, **34** comprising the constituent elements described above, as shown in Figure **10**.

In a third preferred embodiment of the entrance device described herein, said entrance device comprises only one partition member having two barrier arm assemblies **32**, **34** wherein a passageway is defined by said partition member, and an external barrier such as a wall or barrier, or handrail mounted on a wall, as shown in Figure **11**.

In a fourth preferred embodiment of the entrance device described herein, said entrance device also comprises only one partition member, but said partition member presents three barrier arm assemblies, as illustrated in Figure **12**.

In a fifth preferred embodiment of the entrance device described herein, said entrance device is provided with barrier arm configurations of either of said first, second, third or fourth embodiments of the invention described herein, and an electronic sequential releasing means rather than the mechanical sequential releasing means described above. Said electronic sequential releasing means consists of a solenoid operably associated with said second barrier stop bar **72**, and sensing means for sensing when said first barrier arm is displaced from said first closed position to achieve said second open position, wherein said sensor is activated when said first barrier arm **20** is displaced from said first closed position to achieve said second position so as to engage said pivot stop bar **72** thereby permitting manual displacement of said second rotor bottom plate **42b**, as described above. Said sensing means may be provided, for example, by a photo electric beam. Any subsequent barrier arm assemblies, if any, are similarly provided with a sensing means and solenoid.

In a modification to the fifth preferred embodiment sensing means such as a photo electric beam or the like could be placed in advance of any barrier arm **20, 22, 24** to indicate the presence of a person attempting to traverse the entrance device in the desired direction "A", whereupon the signal from the beam would activate the solenoid operably associated with the barrier arm to which the person is attempting to traverse.

In a sixth preferred embodiment of the invention described herein, said entrance device is further provided with a collapsing means for displacing said barrier arms **20**, **22**, **24** presented by either of said first, second, third or fourth preferred embodiments of the invention described above, from said first closed position or second open position to achieve a third collapsed position wherein said barrier arms permit unobstructed passage through said passageway. Figure **13** illustrates the collapsed position. The entrance device could be collapsed in the event of an emergency so as to prevent unobstructed passage through the device in both directions in the event of a fire or the like.

As best shown in Figure **14**, the preferred embodiment of said collapsing means is provided by a hinge means **86**, displaceable locking means **88**, wherein said hinge

means **86** is presented by a pivot shaft **87** around which said top member **16** may be pivoted.

In the preferred embodiment of said collapsing means described herein, said hinge means **86** is presented by each of said support posts **18**, however said hinge means **86** could be easily adapted to be presented by a single support post or alternate means for supporting top member **16** such as a support wall by fixing said hinge means **86** to the top of such a support wall using a flange and screws, for example.

As illustrated in Figure **15**, said top member **16** and support posts **18** present said displaceable locking means **88** by providing a collapsing ramp **92** secured to post **18**. The collapsing ramp **92** communicates with bottom opening **95** of said main base plate **30**. Said collapsing ramp **92** comprises a ramp edge **94** and locking notch **96**. Said top member **16** provides a break away roller **98** which is biased to engage said locking notch **96** and thereby hold said hinge means **86** in place.

Now referring to Figure **16a**, the structure providing said displaceable locking means **88** comprises a roller frame **97a** and **97b** corresponding to each of said collapsing ramps **92** presented by said entrance device **10**, depending on the means used to support said top member **16**, as provided above. As best shown in Figure **15**, said roller frame **97a** and **97b** each define an opening **99** for receiving a shaft about which break away roller **98** rotates within said roller frame **97a** and **97b**.

Again referring to Figure **16a**, each of said roller frames **97a** and **97b** are interconnected by means of a pair of rods **100**, **102**. Top member **16** is also provided with a collapsing means release handle **104** which is connected to the adjacent roller frame **97a** and **97b** for engaging said rods **100**, **102** to consequently displace said roller frames **97**, using for example a hinged handle in combination with a clevis **101** for displacing said rods **100**, **102**.

Top member **16** also provides two spring mechanisms **106** opposite to said collapsing means release handle **104** corresponding to each of said pair of rods **100**, **102**.

Said spring mechanisms **106** present means for biasing said roller frames **97**, and consequently said break away rollers **98**, toward said breakaway ramp **92**.

Referring to Figs. **15** and **14a**, said barrier arms obstruct traversal through said passageway as said break away roller **98** engage said locking notch **96**, thereby preventing said top member **16** from being pivoted to achieve said collapsed position.

As best shown in Figure **16b**, in operation, when said collapsing means release handle **104** is engaged, said rods **100**, **102** cause said roller frames **97a** and **97b** to be displaced, thereby removing said break away rollers **98** from said locking notches **96**, thereby permitting top member **16** from being pivoted about hinge means **86** to achieved said collapsed position. The roller frames **97a** and **97b** generally move in unison with one another to remove the break away rollers **98** from the locking notches **96**. However, the frames **97a** and **97b** can move independently of one another since rod **102** is welded to frame **97b** but traverses through frame **97a** (frame **97a** has two holes permitting rod **102** to move freely of frame **97a**). In other words, by pulling handle **104** then **97b** is moved by rod **100** while frame **97a** is moved by rod **100**; but a self adjustment means (i.e. locking nuts **103**) are provided to allow adjustment so that both frame **97a** and **97b** move appropriately in unison.

In order to return top member **16** to said first position wherein said barrier arms **20**, **22**, **24** obstruct traversal through said passageway, said top member **16** is pivoted in direction C, as shown in Figure **17**. As said break away rollers **98** are biased toward said collapsing ramp **92**, said break away rollers **98** travel up ramp edge **94** to locate said locking notches **96** when said top member **16** has been pivoted in direction C so as to permit communication between said locking notches **96** and break away rollers **98**, thereby locking said top member **16** in place, as described above.

Other means can be provided to permit the barrier arm to swing out of operable position in the event of an emergency. For example, the barrier arms **20**, **22** and **24** may be releasably secured to the upper and lower rotor plates **48** and **42** for rotation as described. In the event of an emergency the handle **104** could be pulled so as to release the arms **20**, **22** and **24** for free pivotal movement with respect to the plates **42** and **48**.

In other words, the arms **20**, **22** and **24** could freely horizontally swing in either direction A or B by manually pushing same. In this case, the handle **104** would release a pin so as to disengage the arms **20**, **22** and **24** from plates **42** and **48**.

An advantage of the present invention over turnstile-type entrance devices is that the entrance device disclosed herein can be negotiated by persons using a wheelchair, in which case said barrier arms are generally displaced by the shoulders of a person of average height, or by a person pushing a shopping cart or stroller. Separate entrances are required in these circumstances where an ordinary turnstile-type entrance is used. Furthermore, the device may also be used in airports where individuals usually hold luggage in their arms. By utilizing the device herein there would be no need to lift the luggage over the device but rather to just walk through with the luggage dangling from the arms.

While the preferred embodiments of the invention described herein refer to use of barrier arms as means of obstructing passage through said passageway, it should also be understood that alternate means for obstructing passage through said entrance devices could be used such as a series of U-shaped gate assemblies, paddles or the like.

Also, the preferred embodiments of the invention described herein, provide for each of said partition member to have two or three barrier arms. However, it is also possible to provide for four, five or more barrier arms if need be.

Also, in order to achieve the benefits of the invention, said barrier arms should be spaced apart along said partition members at a distance that is sufficient to make it difficult for a person seeking entrance through said entrance device in said direction B by displacing the first barrier arm, and then subsequent barrier arms sequentially to gain passage through said last pair of barrier arms.

Said top member can be further provided with a detecting means operably associated with at least one of said barrier arms for sensing when said barrier arms are displaced from said first closed position to said second open position, and providing signals to a microprocessor for generating data related to the traffic passing through said

entrance device, or to a security monitor or camera or other device which monitors traffic activity. As shown in Figure **18**, said detecting means may be provided, for example, by an ordinary solenoid switch **110**, having a solenoid connection arm **112**. Said solenoid switch **110** is operably associated with said rotor bottom plate **42**. Said solenoid switch comprises a spring means (not shown) which biases said solenoid connection arm toward said rotor bottom plate **42**. Said solenoid switch is easily adjusted to provide an electronic signal when said rotor bottom plate **42** is rotated, as described above, thereby engaging said solenoid connection arm **112**. A counting means can then be operably associated with said detecting means for tracking traffic flowing through said entrance device.

It will be understood from the above description, that if a person attempts to traverse the preferred embodiments of said entrance device presenting said mechanical sequential releasing means and it takes more time than was anticipated for such person to traverse said embodiment of the entrance device when adjusting said biasing means and dampening cylinder, then it is possible that such person may be trapped between two sets of barrier means, if the previous barrier means has returned to said first closed position before the next barrier means is manually displaced. While it would be relatively simple to displace the previous barrier means to release the next barrier means, some persons traversing said entrance device may not realize this fact, or perhaps may not be able to do so due to physical impediment, for example. To address this eventuality, said entrance device may be easily equipped with an alarm means comprising, for example, a timer in combination with a solenoid switch which provide an alarm signal if a person has traversed, for example, said first barrier means, and a certain period of time has elapsed and said second barrier means has not yet been manually displaced. Said alarm signal could result in a siren being sounded, for example, either in the immediate vicinity of said entrance device or at an administrative office, for example.

The working components of said entrance device are readily available and can be assembled in a manner well-known to those skilled in the art. Said main base plate **30**, support posts and casing **26** may be fashioned from sheet metal, but may also comprise some other rigid material such as a rigid plastic polymer or wood.

Further Alternate Embodiments

Further alternate embodiments of the invention are illustrated in Figures **19 - 28** inclusive.

Like parts are marked through the specification and the drawings with the same respective reference numerals. Accordingly, Figures **19** and **20** are similar to those shown in Figure **1** and **13** and illustrate an entrance device **10** having first partition member **12** and second partition member **14**, each of which comprises a top member **16**, a pair of support posts **18** for supporting each of the top member **16** and first barrier arm **20**, second barrier arm **22**, and third barrier arm **24**.

Figure **20** illustrates the entrance device **10** in a collapsed position and is different from that shown in Figure **13** in that the casing **26** is substantially located between the pair of support posts **18** in both of the positions shown in Figures **19** and **20** while Figure **13** shows that the casing **26** protrudes into the passageway in the collapsed position. In other words the clearance or distance between the partition members **12** and **14** in the collapsed position shown in Figure **20** is greater than that shown in Figure **13**. The entrance device **10** illustrated in Figures **19 - 28** inclusive operates in a fashion as described above except as described below.

More specifically, Figure **21** illustrates a cross-sectional view of one of the support posts **18** which has an outer post frame **219** and inner post frame **220** which are each comprised of stainless steel plate or the like. The top member **16** presents at each end thereof an end plate **214** fixedly secured to the top member **16** by means of welding or the like. At least one of the end plates **214** has secured thereto a top member pivot assembly **216** which permits rotation of the top member **16** relative the support post **18**. The top member pivot assembly **216** includes a threaded pin or shaft welded to the inner post frame **220** and a sleeve or bushing **221** welded to the end plate **214** as illustrated. A locking nut **223** secures the parts together for relative rotation. As shown in Figure **21** the thickness of inner post frame **220** is greater than outer post frame **219**, although this does not need to be the case provided that the frame **220** exhibits sufficient strength characteristics.

Figure **21** also illustrates the position of the top member **16** for normal operation in a non-collapsed mode or position through the use of a top member locking pin **212**. Locking pin **212** is displaceable within the locking pin bushing **213**. Locking pin bushing **213** is secured to the inner post frame **220** by means of welding or the like. The locking pin **212** securely fixes the post and top member **16** together when locking pin **212** is received by locking pin tapered hole **215**.

The top member **16** may be moved to the collapsed position shown in Figure **20** by placing one's hands or fingers into the release handle opening **202** and pulling up on the bottom of the release handle **200** so as to cause the release handle **200** to rotate about the release handle pin and bushing assembly **204**. Such action places pressure on the bottom of a release pivot arm **206** causing the arm **206** to rotate about release pivot arm shaft **208** in a counter-clockwise direction when viewed in Figure **21**. Such action generates retracting pressure on release pivot pin **210** so as to withdraw the top member locking pin **212** from the locking pin tapered hole **215** thereby allowing the top unit **16** to rotate about pin **217** and collapse to the position shown in Figure **20**.

The release pivot arm **206** is biased to automatically relock the entrance unit pin to the operating position shown in Figure **19**. This occurs when the collapsed arms are lifted up into the operating position, because of the tension from released pivot arm return spring **218** acting on release pivot arm **206** which causes the locking pin **212** to move back into tapered hole **215**.

The support posts **18** illustrated in Figure **21** may include an alarm activation switch **222**. The alarm activation switch **222** closes a low-voltage circuit when depressed by release pivot arm **206** so as to activate the alarm **224**. Once the alarm **224** is activated an audible noise is emitted to signal staff or management that the emergency feature of the unit has been engaged.

Alternatively, the emergency release mechanism described above can be made inoperable through the use of a release mechanism lock out **226**. The release mechanism lock out **226** shown in Figure **21** may consist of a cabinet style key activated lock which is adapted to be turned or rotated by a key to a locked position so as to move a locking

plate into the travel path of the top locking pin **212** as illustrated by the phantom lines so as to prevent the locking pin **212** from being removed from the locking pin tapered hole **215**.

Figures **22 - 26**, inclusive, illustrate means or structure to minimize the possibility that a person may be trapped between two sets of barrier means as referred to earlier. In other words, the device now has a mechanical means to allow a person to pass through a barrier arm provided that the preceding arm has been displaced.

A retaining spring **213** manufactured from spring steel can be utilized so as to set a barrier arm in a "released mode" as a result of movement or displacement of a preceding barrier arm. Such spring **230** would normally only appear on the second barrier arm assembly **34** and if installed, barrier arm assembly **36**, except where the first barrier arm assembly **32** has an installed solenoid used in conjunction with a remote release feature such as a card reader or the like, in which event the retaining spring **230** would also be applicable to the first barrier assembly **32**.

More specifically the retaining spring **230** has at one end thereof a flat securing face **232** which is adapted to be secured to main base plate **30** by means of securing screws **240**. The other end of the retaining spring **230** includes a suspended end **246** which is sprung to operate with upward pressure or biasing force as a result of forces provided by spring tension area **234**. Suspended end **246** includes an opening ramp face **236**, spring top surface **244** and closing ramp face **238** along with retaining edge **242**. The retaining spring **230** illustrates one type of spring that can be utilized but should not be limited thereto as counter balanced type of device or spring loaded form plate or various other configurations can be utilized within the scope of this invention.

Figure **23** illustrates a typical second or third barrier arm assembly **34** or **36** with the retaining spring **230**.

The second or third barrier arms **22** or **24** have been drawn with hidden or phantom lines to assist in establishing the spatial relationship between the rotor bottom plate **42b** or **42c** along with second and third barrier arms **22** or **24**. The rotor stop block

54 is secured by means of welding or other fastening means to the rotor bottom plate **42**. However, rotor stop block **54** is shown in solid lines to assist in the understanding to be described herein. Figure **23** shows a barrier arm assembly in the normal "at rest" position.

The retaining spring **230** is secured to the rotor bottom plate **42b** or **42c** by means of securing screws **240** as shown. For simplicity the base plate stop **52** has not been shown in the figures, although the base plate stop **52** is utilized as previously described.

The suspended end **246** of retaining spring **230** is applying upward pressure on pivot stop bar **72** as shown in Figure **23**. More specifically, Figure **23** shows that there is contact between the bottom of pivot stop bar **72** and the spring top surface **244** in the normal "at rest" position such as shown in Figures **19** and **23**.

Figure **24** illustrates a disengaged pivot stop bar **72** position where the rotor release rod **66** has been activated by movement of a previous barrier arm whereby rotor release rod **66** has drawn rotor release block **78** from its rest position as shown in Figure **23** and caused the pivot cam arm **68** to be displaced and thereby disengage the pivot stop bar **72**. The rotor bottom plate **42** has not yet moved from its initial position shown in Figure **23** since no contact has yet been made with barrier arm **22/24**.

The displacement of the pivot cam arm **68** causes the pivot stop bar **72** to rotate away from the rotor stop block **54** a sufficient distance to allow the spring top surface **244** to move upwards thereby permitting retaining edge **242** to move upwards and alongside or against the pivot stop bar **72**. This action assists in minimizing the possibility of an individual being accidentally trapped between two sets of barrier means.

Figure **25** illustrates the return of rotor release block **78** to its original "at rest" position when the previous barrier arm returns to a closed position. Figure **25** also illustrates that the second or third barrier arm **22**, **24** continues to be at rest since it has not yet been contacted by an individual. However, the pivot stop bar **72** is held in a displaced position by retaining edge **242**; accordingly pivot cam arm **68** does not return to its initial rest position against rotor release block **78**. This minimizes the possibility

of a person being trapped between two sets of barrier means. More specifically, the activation or displacement of the prior barrier arm has caused the pivot stop bar **72** to be positioned in an unlocking or open position and the retaining spring **230** is holding pivot stop bar **72** in such position by means of the retaining edge **242**.

It should also be noted that the barrier arm **22** or **24** in both Figure **24** and **25** has not yet been moved and accordingly the rotor stop block **54** has also not yet been moved. However, the spring top surface **244** has moved upwards in both Figures **24** and **25** and accordingly the distance between the edge **53** of rotor stop block **54** and edge **243** of spring top surface **244** appears to be and is different in Figures **23** than that shown in Figures **24** and **25**.

Figure **26** illustrates the access control device when a barrier arm such as barrier arm **22** or **24** is displaced from its rest position. As the user moves barrier arm **22** or **24**, rotor bottom plate **42** begins to rotate in a clockwise direction when viewed in Figure **26** so as to rotate and bring the rotor stop block **54** into contact with opening ramp face **236** of the retaining spring **230**. As the rotor stop block 54 continues to rotate, the suspended end **246** of the retaining spring is depressed to the extent that retaining edge **242** drops below the pivot stop bar **72** thereby allowing pivot stop bar **72** to come into contact with the end of rotor stop block **54** because of the biasing force generated by spring **73**. The bottom of rotor stop **54** is slightly lower than the bottom of the pivot stop bar **72** so that the rotor stop block **54** may push down on the spring top surface **244**.

As the barrier arm **24** or **24** continues to be displaced or rotated in a clockwise fashion, the rotor stop block **54** continues to rotate so as to travel across the spring top surface **244**, and then down the closing ramp face **238** of the retaining spring. As this occurs, pivot stop block **72** moves to its normal at rest position as shown in Figure **23**.

More specifically as barrier arm **22** or **24** returns back to its normal rest position, rotor stop block **54** travels across suspended end **246** of retaining spring **230** in a counter-clockwise direction. As the rotor stop block **54** travels across suspended end **246** of retaining spring **230**, it applies pressure on the various faces and the suspended end **246**

is displaced downward and allows the rotor stop block **54** to return to its original rest position as shown in Figure **23**.

As the barrier arm **22** or **24** moves to its closing position, rotor stop block **54** passes by and displaces pivot stop bar **72** when it is returning to its rest position. The displacement of pivot stop block **72** is not sufficient to allow the suspended end **246** to rise up and allow the retaining edge **242** to again hold pivot stop bar **72** in a preset condition. Spring **73** biases the pivot stop bar **72** towards rotor stop block **54**.

Figure **27** illustrates a further alternate embodiment of the access control device **10**. In the embodiment illustrated in Figure **27** a protruding rail **250** having a generally U-shaped configuration is used in place of the guide rail **19** shown in Figure **12**. The collapsible rail **250** is secured to the top member **252** such that when moving the access control device shown in Figure **27** to the collapsed position of Figure **28** the clearance between the partition members is sufficient to meet code requirements such as handicap code requirements or fire exits requirements. Under normal circumstances the three barrier arms on one partition shown in Figure **27** is sufficient to allow passage of pedestrians, wheelchairs, strollers and in some cases shopping carts, without the need to collapse rail **250**.

The collapsible rail partition **254** operates in the same manner as the standard barrier arm partitions with respect to the collapsing means shown in Figures **19**, **20** and **21**. Top member **252** is free to rotate in the manner similar to that shown Figure **21** by engaging collapsible rail handle **256** as previously described. However, the other methods of achieving the rotational displacement of the collapsible rail may be utilized by a multitude of means for releasing the top member **252** in a rotational fashion about pin **217**.

One advantage of utilizing a collapsible rail partition as shown in Figure **27** relates to its simplicity of manufacture thereby being less expensive to produce than any regular barrier arm configurations shown in the previous drawings. However, all of the features of the regular barrier arm system as described herein will accommodate the passage of most patrons.

Various embodiments of the invention have now been described in detail. Since changes in and/or additions to the above-described best mode may be made without departing from the nature, spirit or scope of the invention, the invention is not to be limited to said details. Specifically, suggested components assembled in suggested mechanical relationships have been described herein to obtain the benefits of the invention, however, it should be understood that various different components and alternate modes of assembly may be used to achieve the benefits of the same invention without diverging from the invention disclosed herein.

CLAIMS

I claim:

1. An entrance device having at least two barrier means to permit entrance in one direction comprising:

(a) a first barrier means manually displaceable from a closed position to an open position; and

(b) a second barrier means manually displaceable from a closed position to an open position when said first barrier means is being engaged to achieve said second open position;

(c) sequential barrier releasing means for opening said first and second barrier means in sequence; and

(d) sequential barrier releasing means including releasing means for releasing at least one of said barrier means for manual displacement from a closed position to an open position.

2. An entrance device as claimed in claim 1, wherein said releasing means comprises a retaining spring.

3. An entrance device as claimed in claim 2 wherein said releasing means is associated with said second barrier means.

4. An entrance device as claimed in claim 3 wherein said sequential barrier releasing means comprises:

(a) a barrier stopping means for preventing said second barrier means from being manually displaced from said closed position to achieve said open position; and

(b) a barrier arm releasing means operably associated with said first barrier means and second barrier means for releasing said second barrier stopping means upon said first barrier means being engaged to achieve said second open position.

5. An entrance device as claimed in claim 4 wherein said releasing means comprises spring means having[:

(a) opening ramp face;

(b) a spring top surface;

(c) closing ramp face; and

(d)retaining edge]

a spring top surface disposed between an open ramp face and a closed ramp face so as to present a retaining edge.

6. An entrance device as claimed in claim 3 wherein said entrance device includes a partition member and wherein said sequential barrier releasing means comprising:

(a) a pivot stop bar presented by said partition member adjacent a barrier arm rotor means;

(b) rotor stop bar presented by said barrier arm rotor means and operably associated with said pivot stop bar;

(c) wherein said pivot stop bar prevents rotation of said barrier arm rotor means from said closed position towards said open position;

(d) releasing means for displacing said pivot stop bar, thereby releasing said pivot stop bar where said [second] barrier arm rotor means is rotated from said closed position towards said open position and thereby allowing rotation of said [second] barrier arm rotor means from said closed position toward open portion.

7. An entrance device as claimed in claim 6 wherein said sequential barrier releasing means further include releasing means associated with barrier arm rotor means.

8. An entrance device as claimed in claim 7 wherein said releasing means comprises a releasing leaf spring.

9. An entrance device as claimed in claim 8 wherein said releasing leaf spring is disposed below said rotor stop block and adapted to engage and disengage said pivot stop bar.

10. An entrance device as claimed in claim 9 wherein said releasing leaf spring includes and edge for retaining said pivot stop bar in a retaining position.

11. An entrance device as claimed in claim 10 further including support posts for supporting said partition member.

12. An entrance device as claimed in claim 11 wherein said partition member presents said barrier means in an operable position.

13. An entrance device as claimed in claim 12 wherein said partition member and said barrier means rotate to a collapsed portion by activating a pin.

14. A method of traversing an entrance device having at least a first and second manually operable barrier arm mounted in sequence on at least one of a pair of partition members comprising the steps of:

(a) manually displacing said first barrier arm so as to permit passage past said first barrier arm;

(b) releasing a blocking means that prevents displacement of said second barrier arm so as to allow passage past said barrier arm by having displaced said first barrier arm; and

(c) manually displacing said second barrier arm so as to exit said entrance device.

15. A method as claimed in claim 14 wherein said first and second barrier arms are displaced in a horizontal position.

16. A method as claimed in claim 15 wherein said first and second barrier arms are collapsed to a vertical position.

17. A method as claimed in claim 16 wherein said barrier arms are collapsed to a vertical position by removing a pin from a retaining hole.

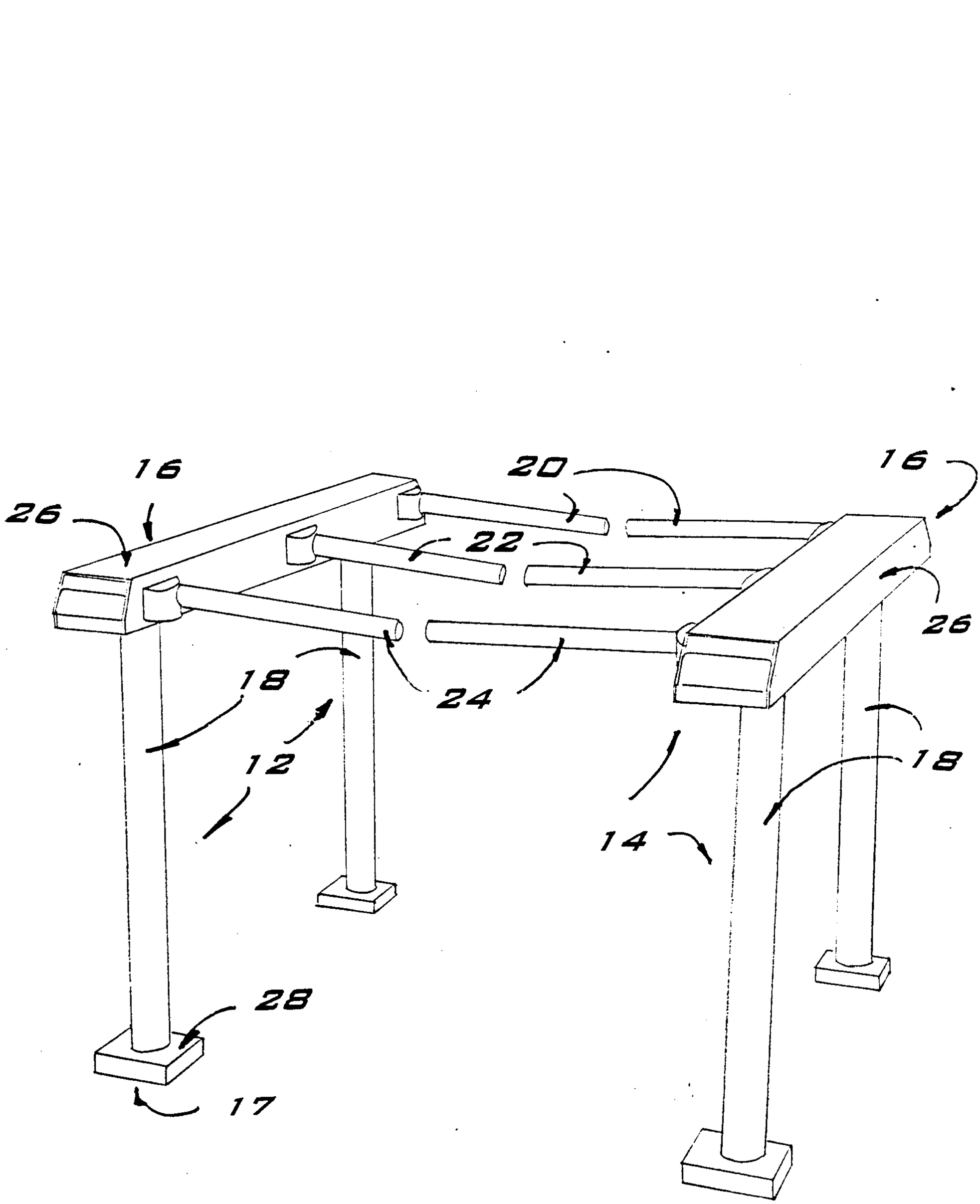


FIG. 1

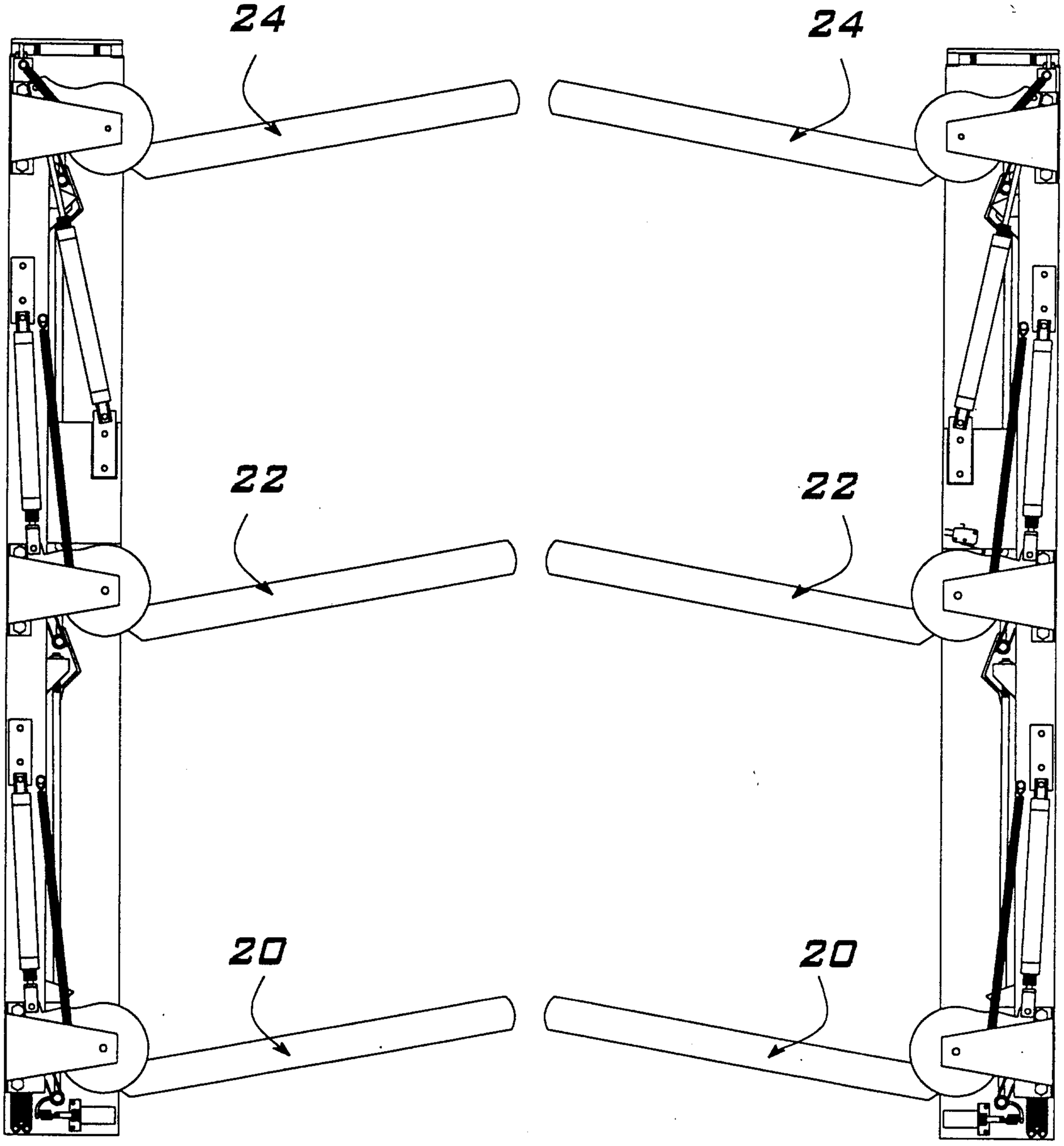


FIG. 2

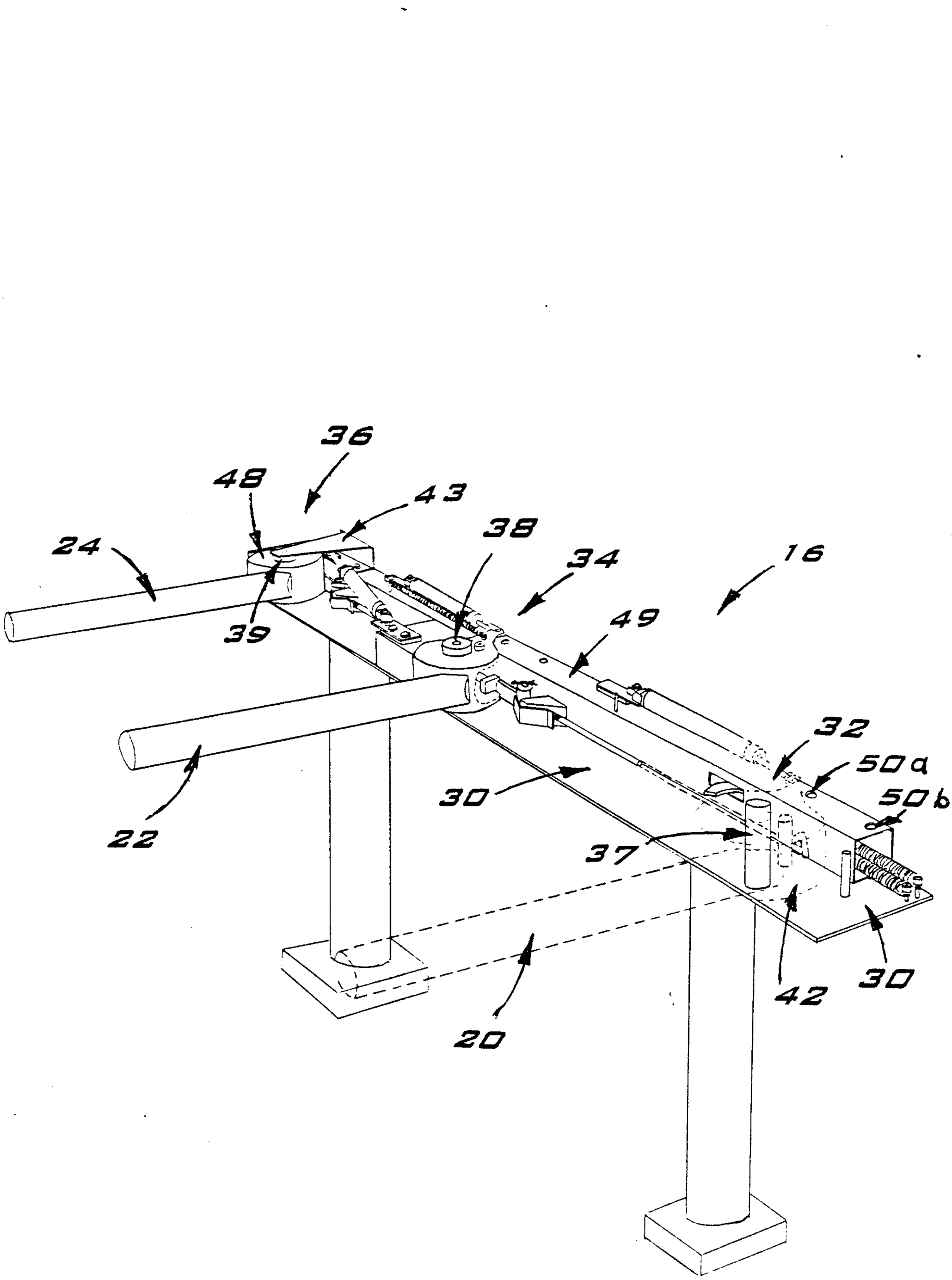


FIG. 3

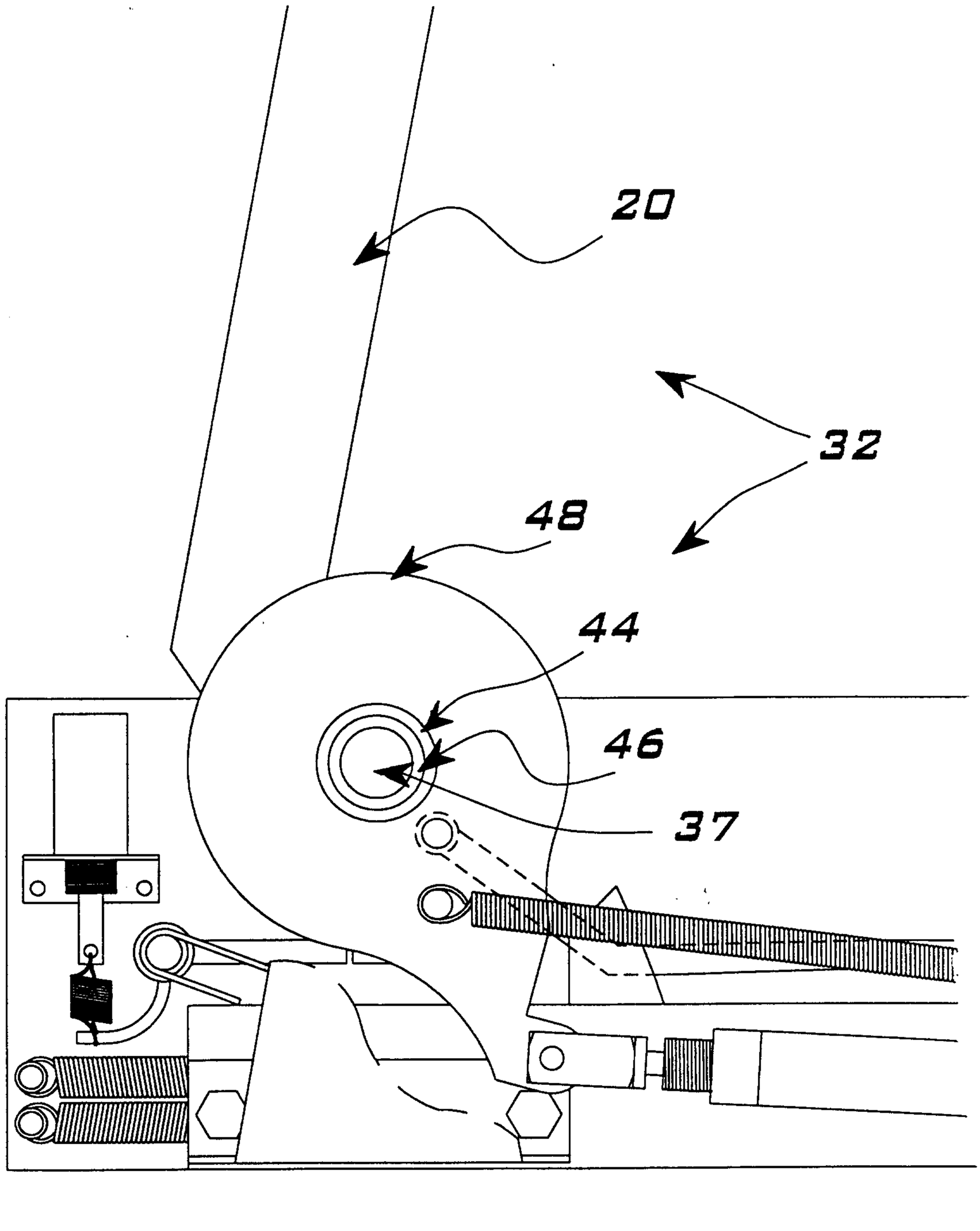


FIG. 4

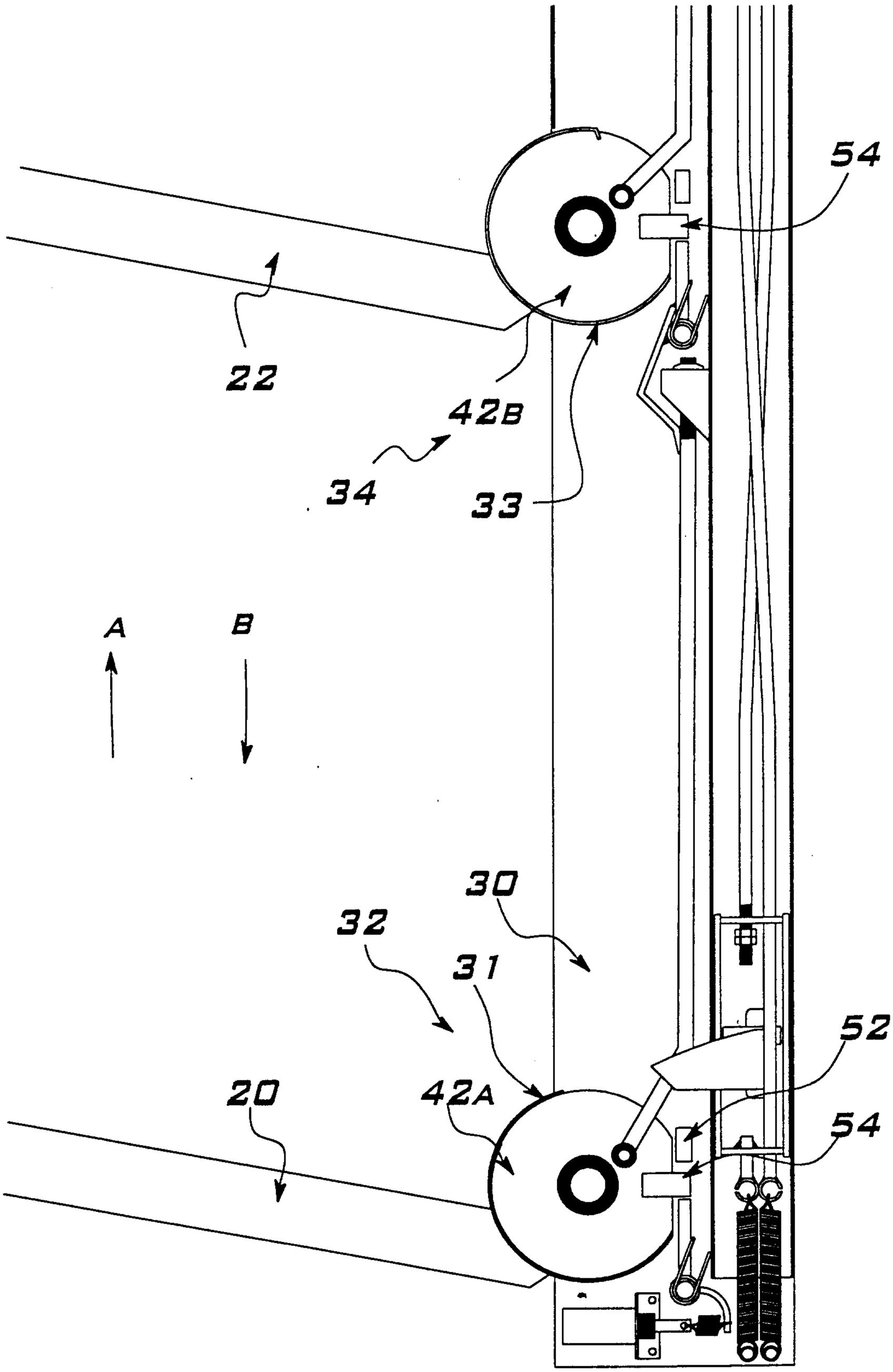


FIG. 5

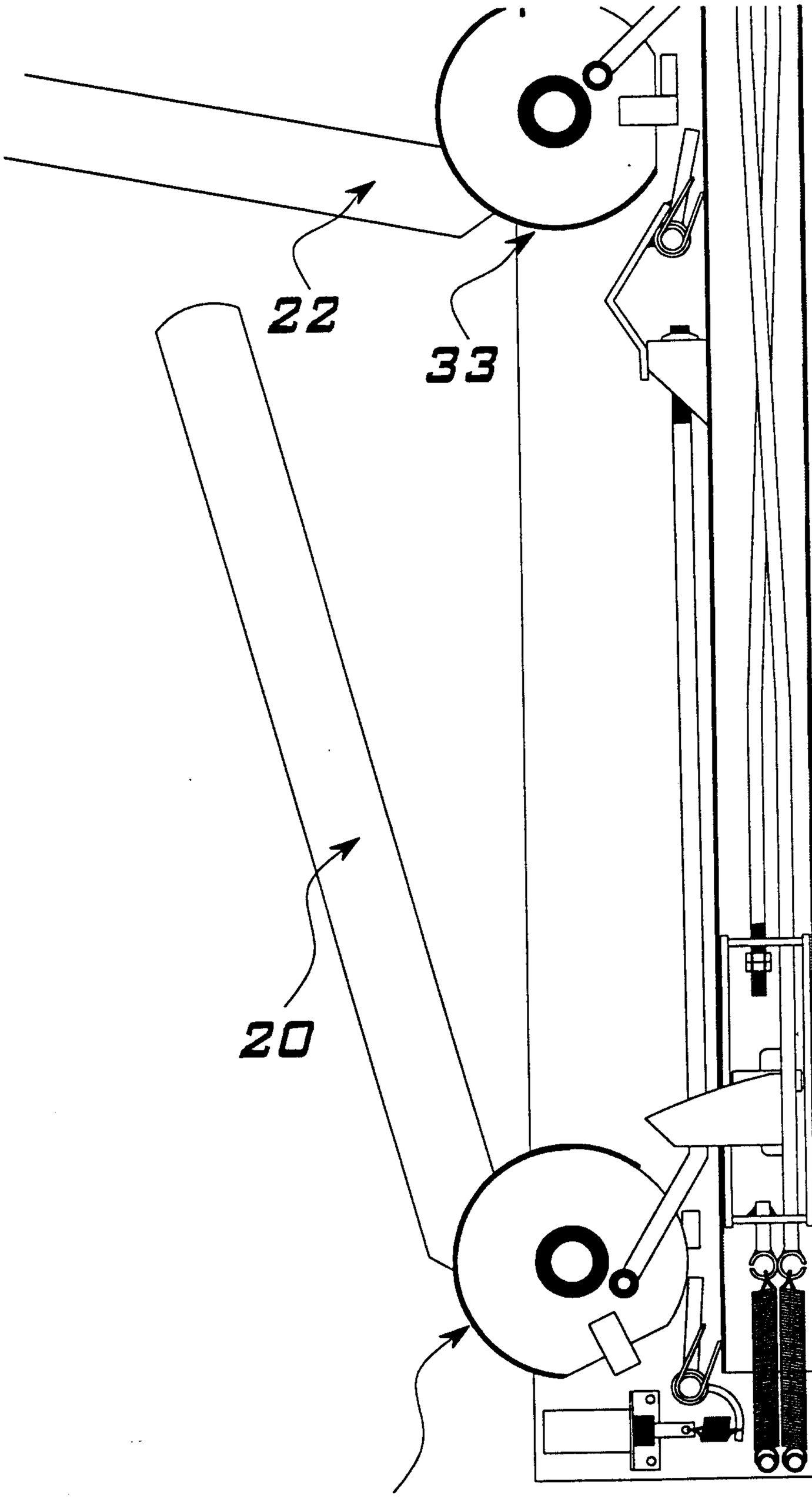


FIG. 6

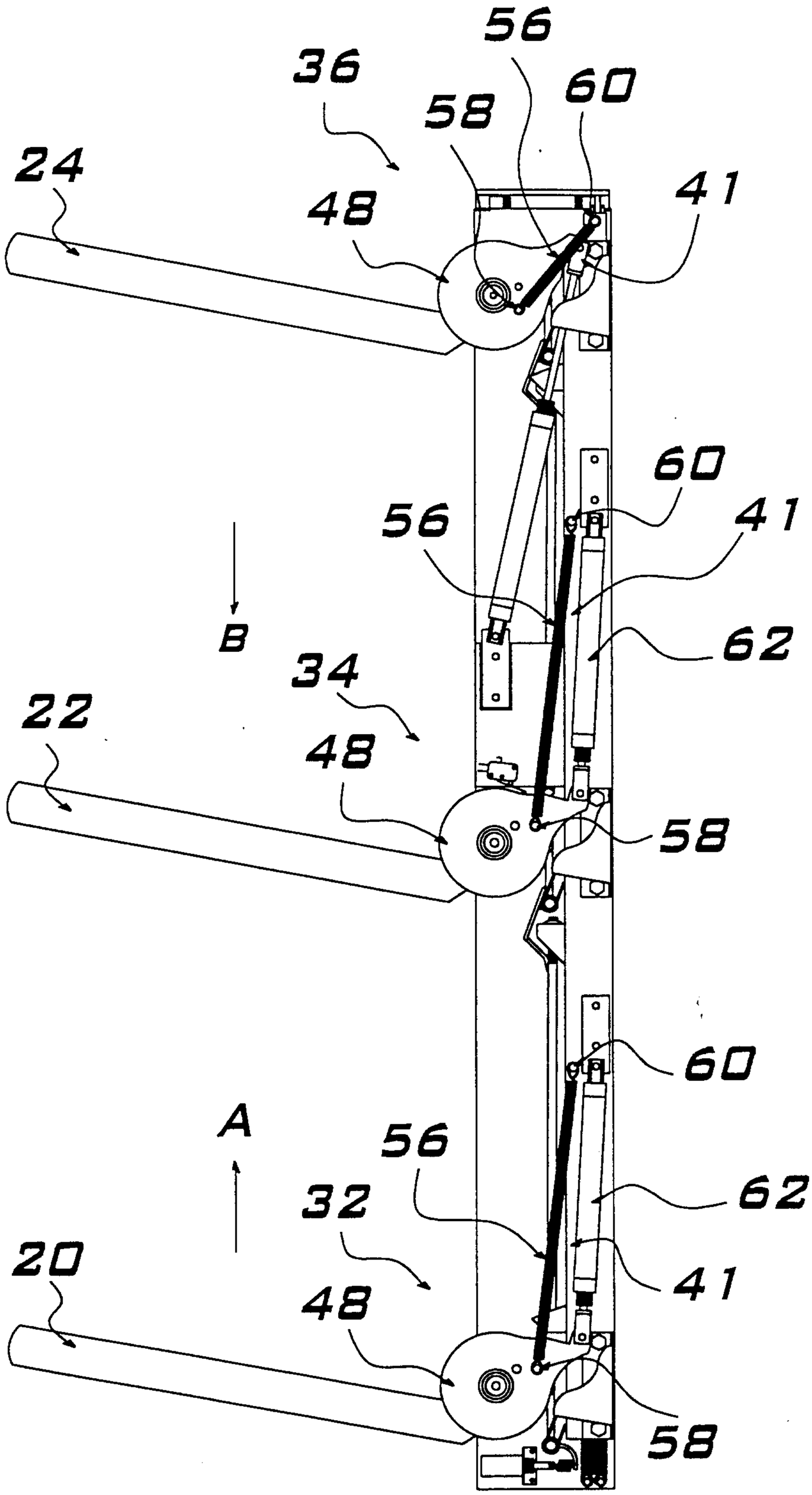


FIG. 7

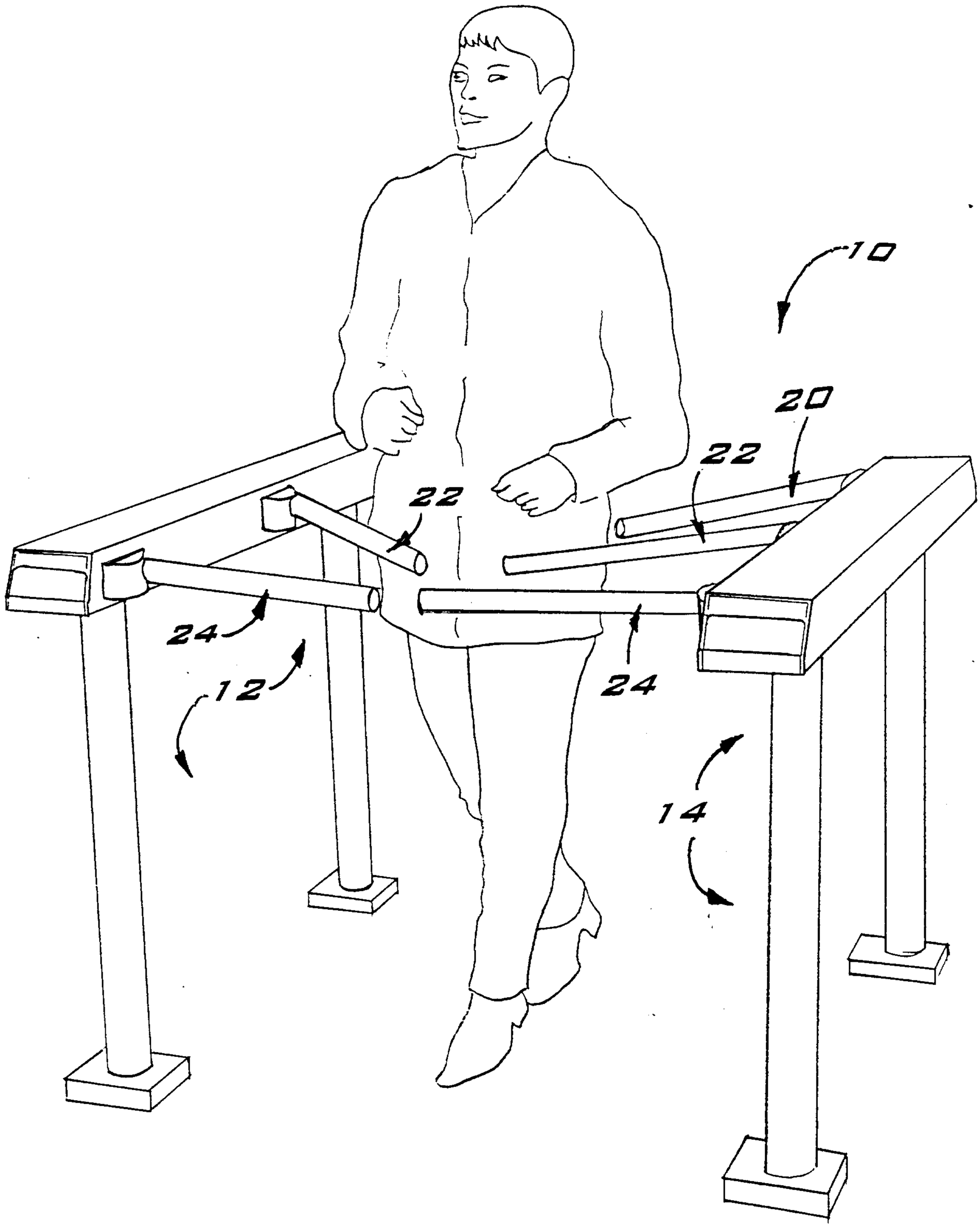
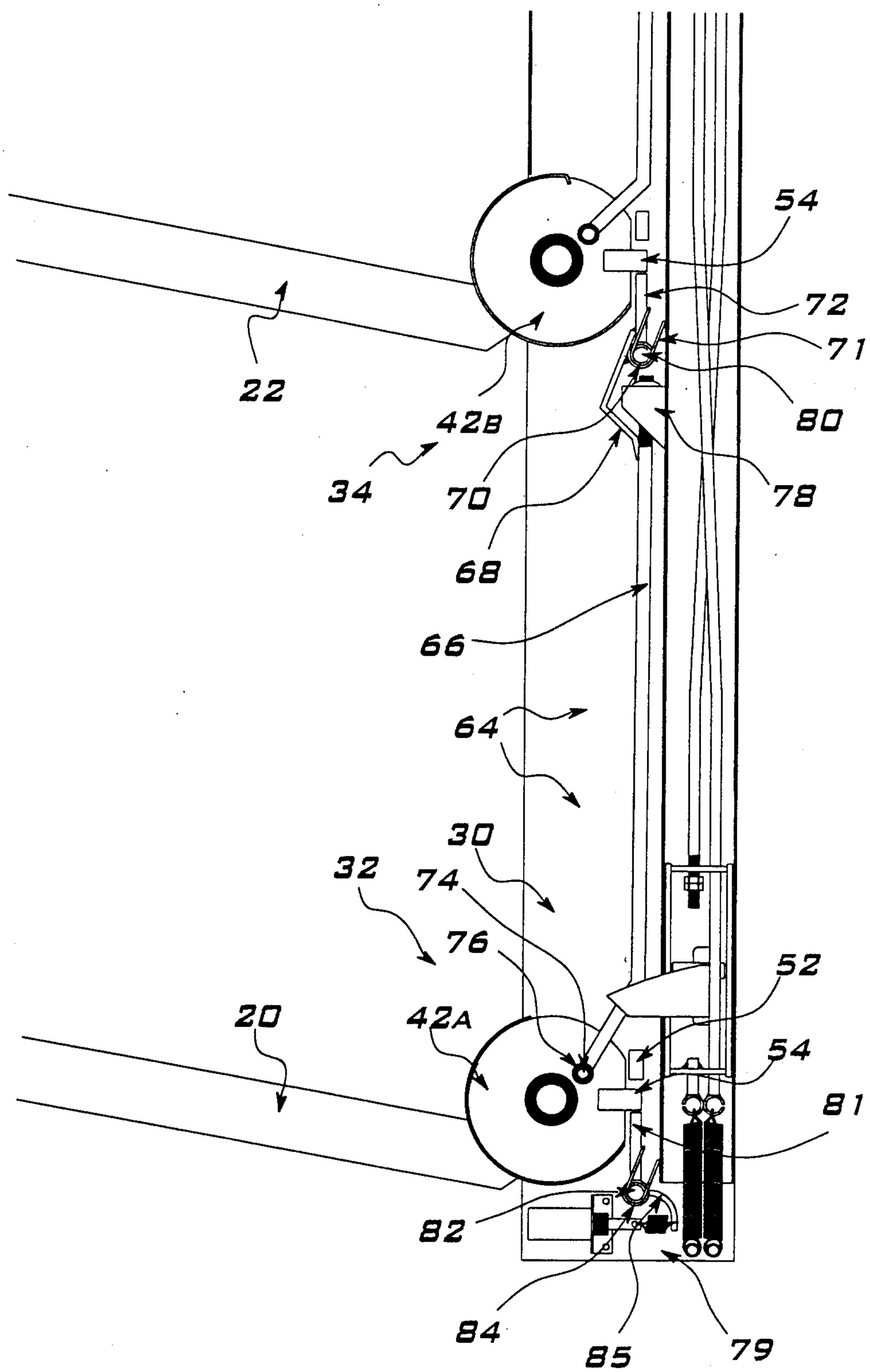


FIG. 8


54
72
71
80
78
22
42B
34
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42A
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FIG. 9A

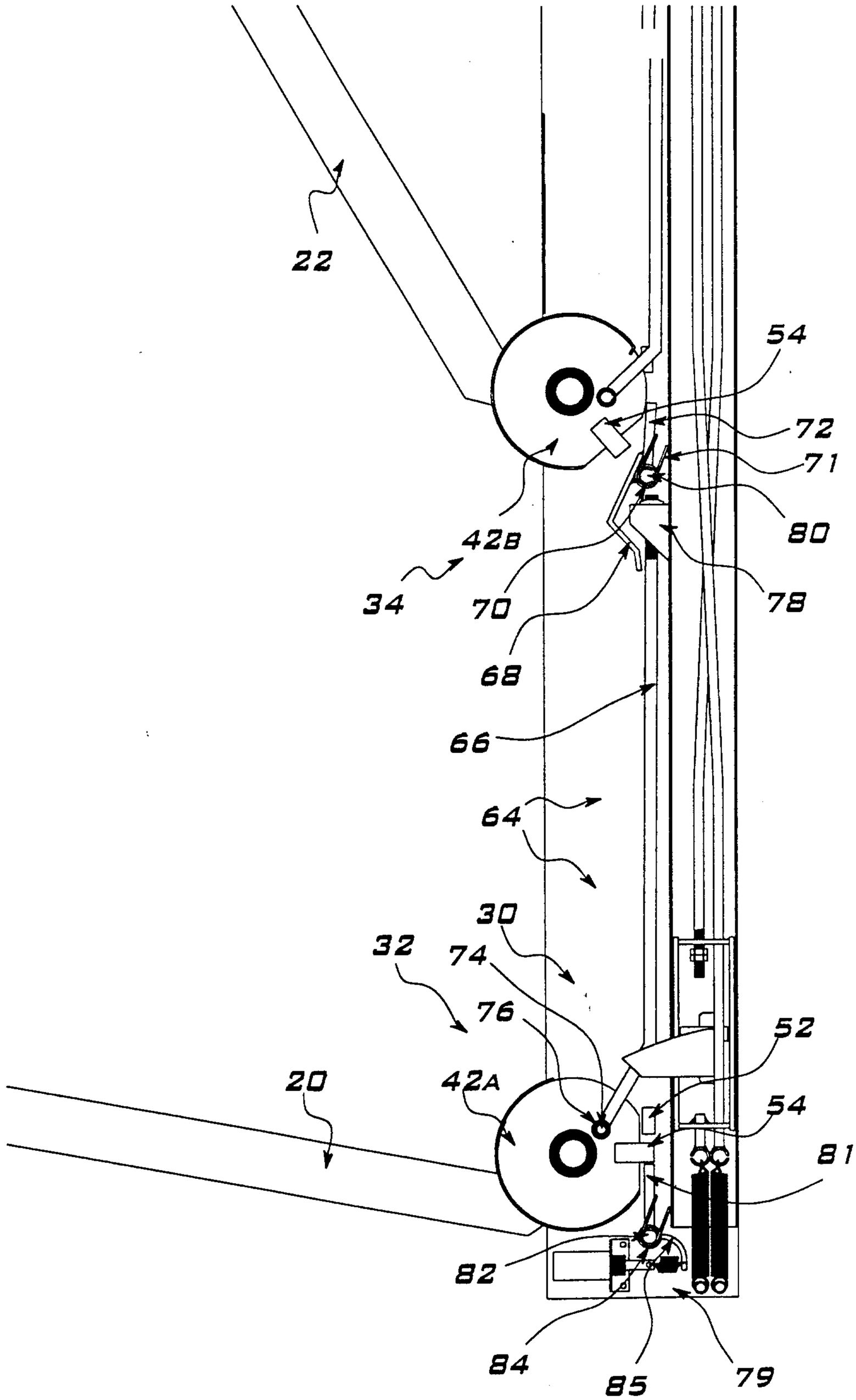
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FIG. 9B

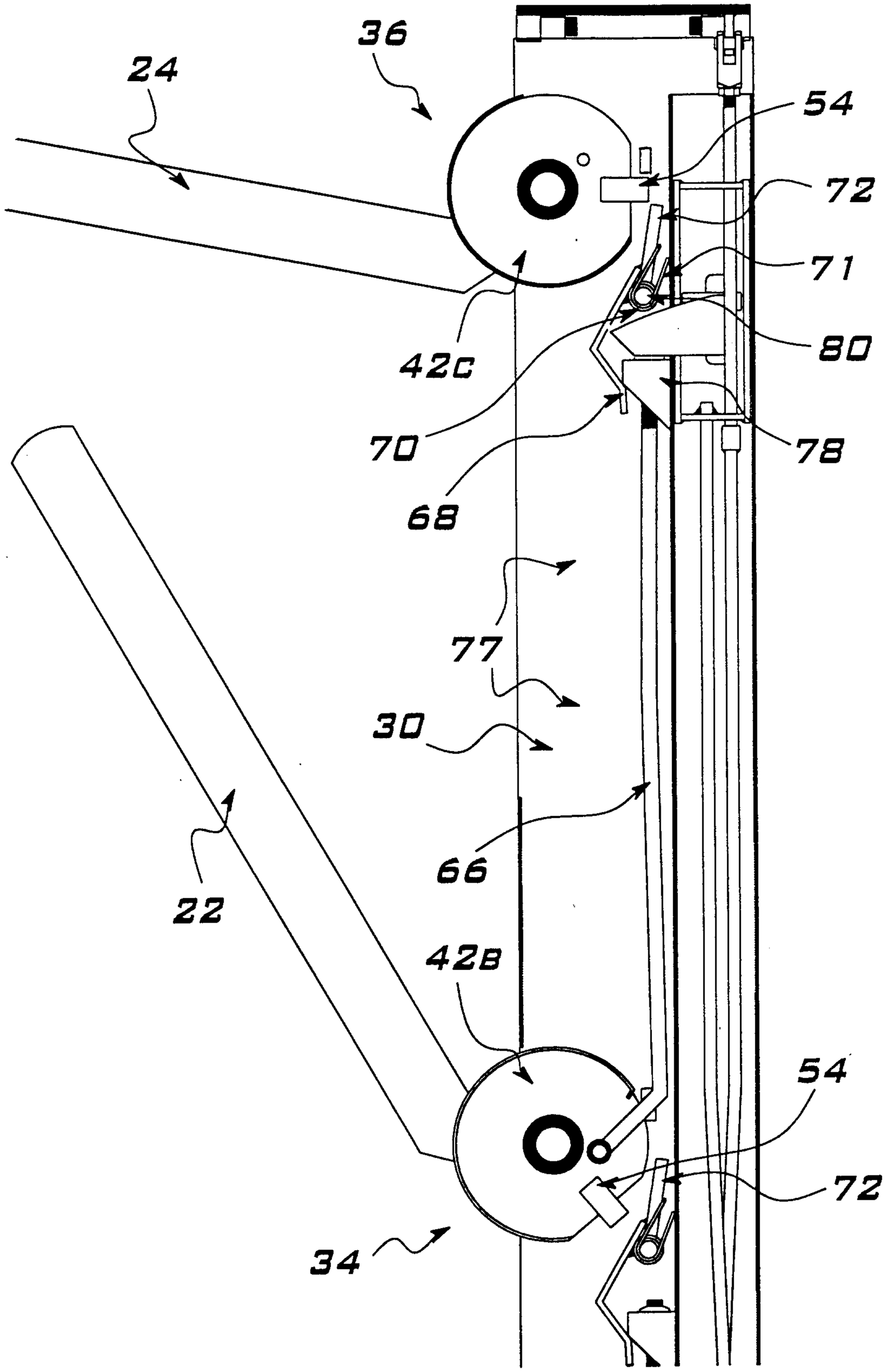


FIG. 9C

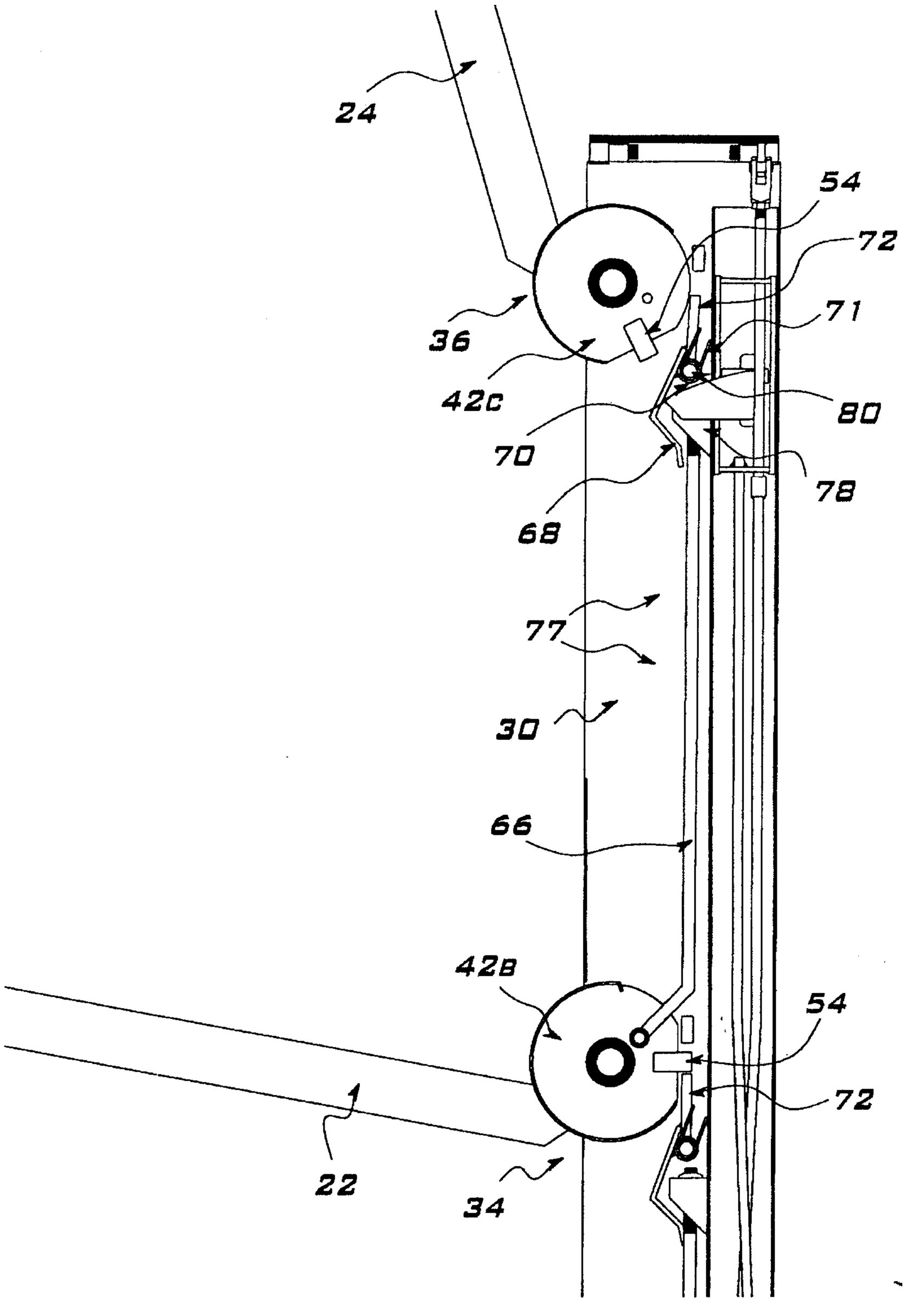


FIG. 9D

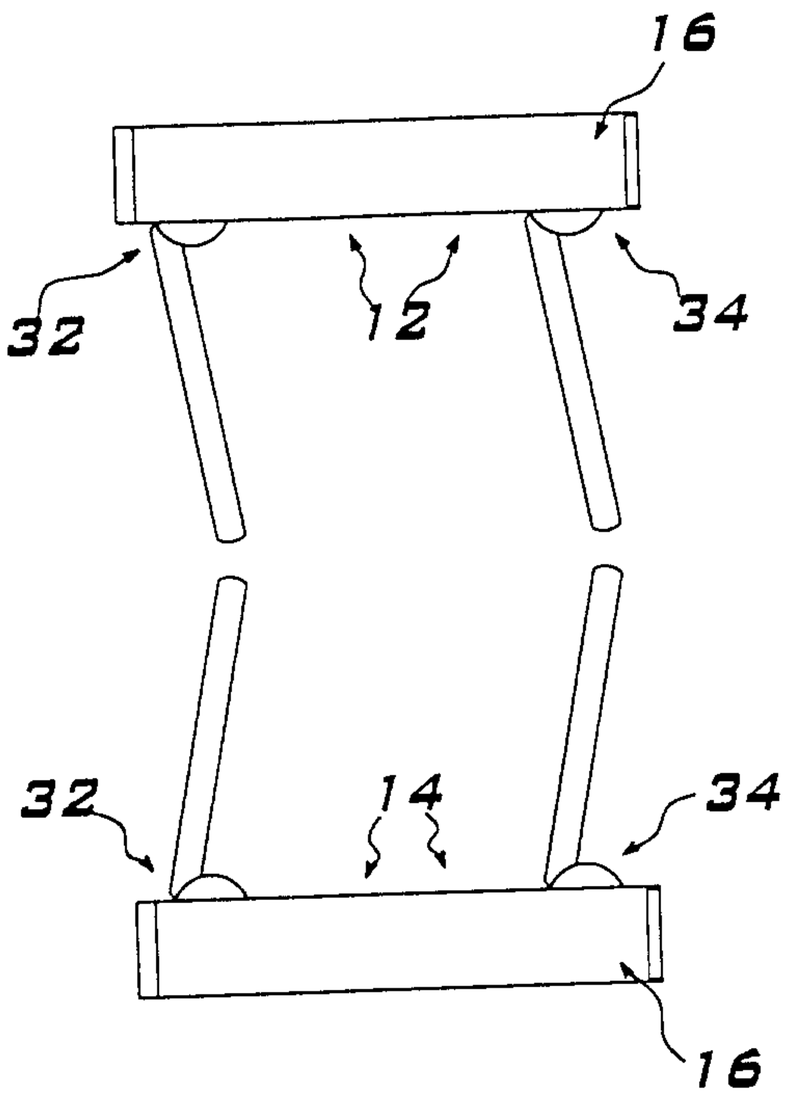


FIG. 10

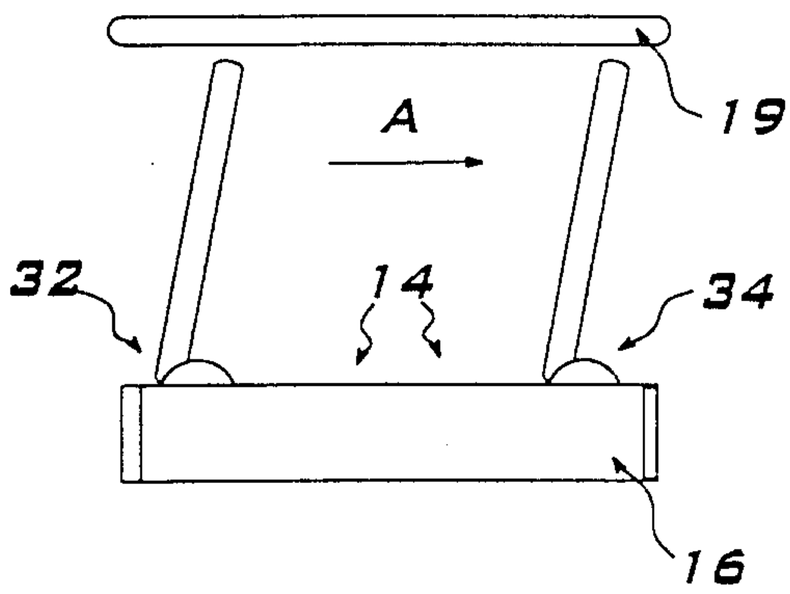


FIG. 11

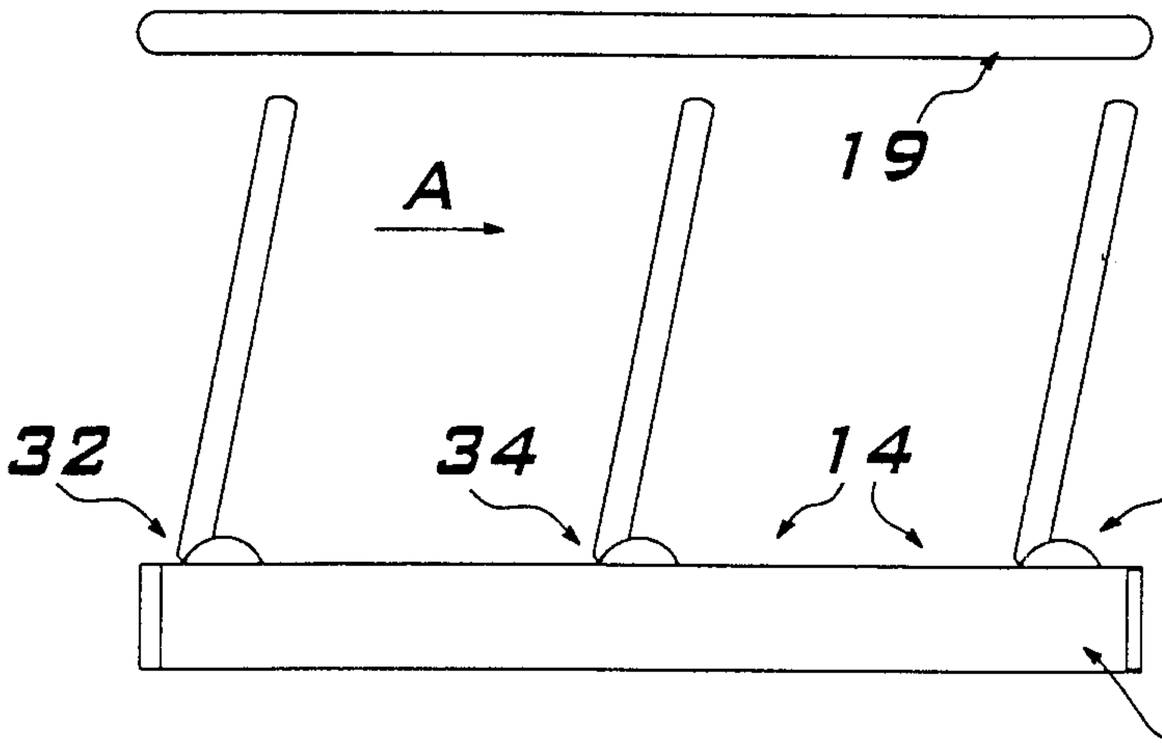
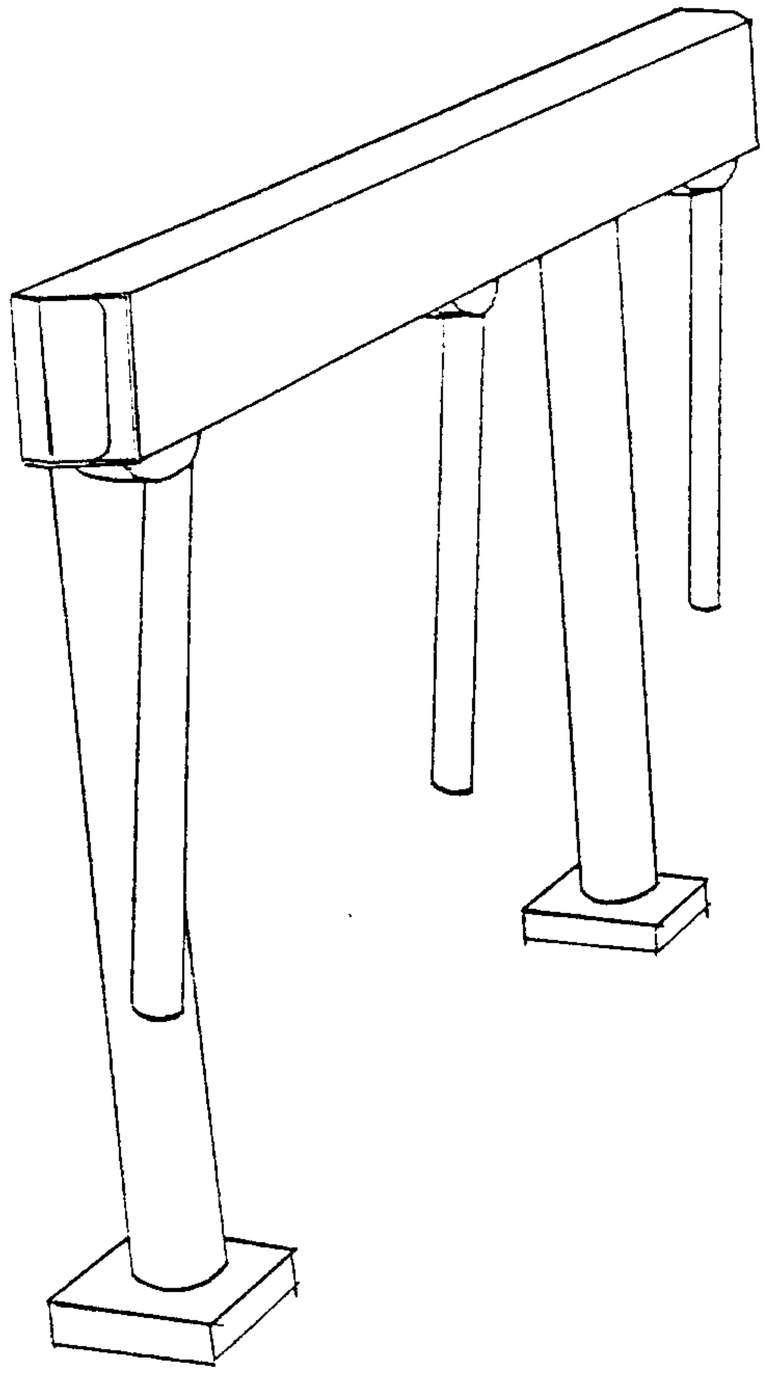


FIG. 12



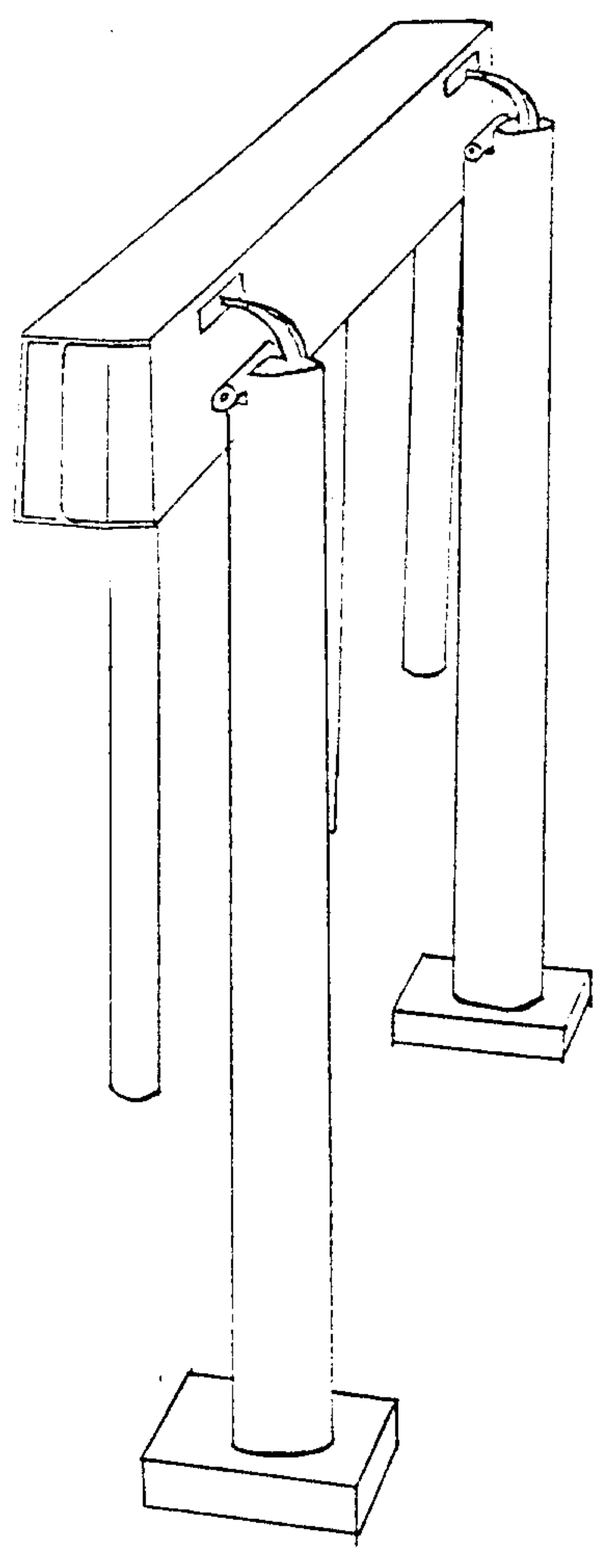


FIG. 13

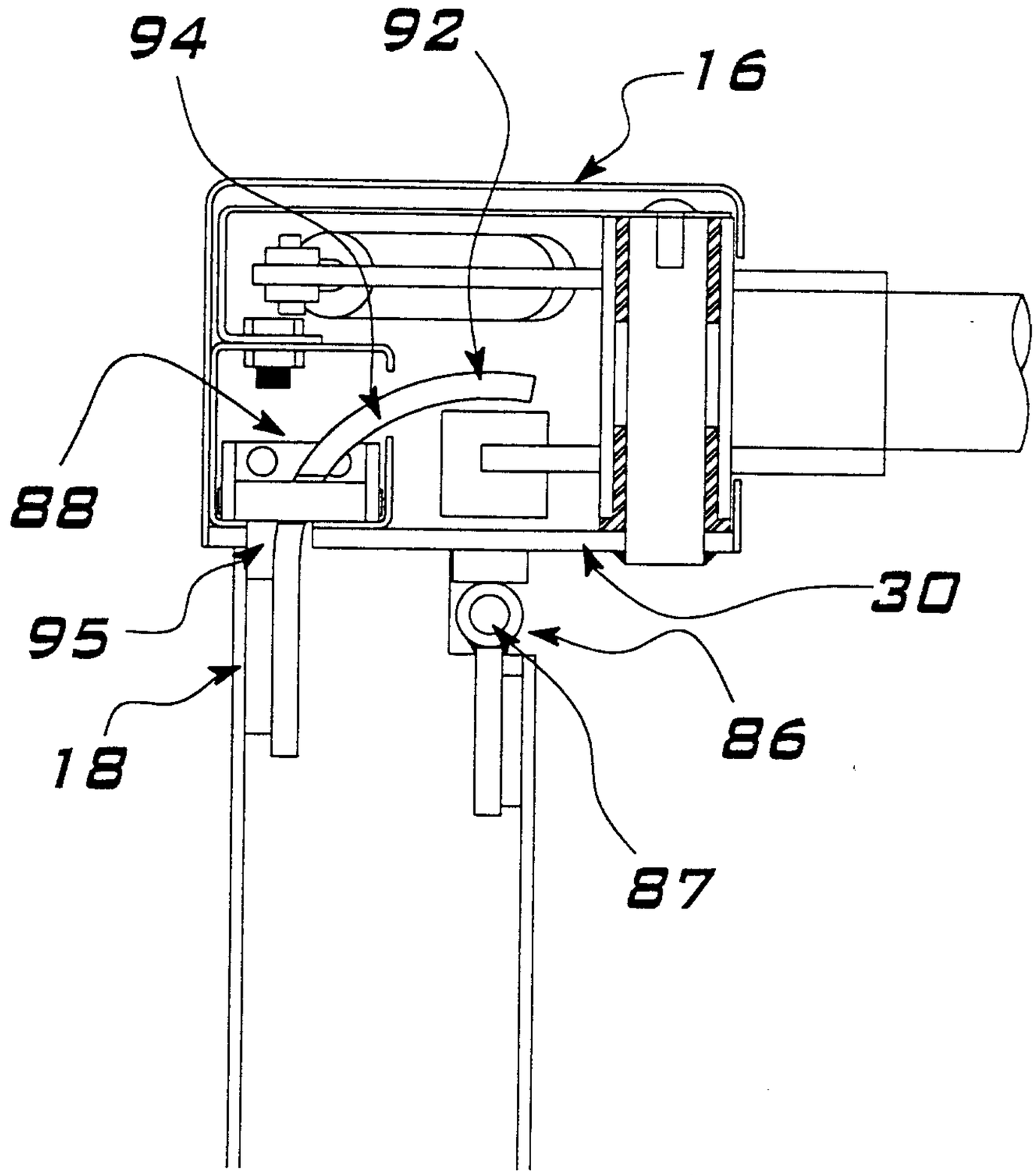


FIG. 14

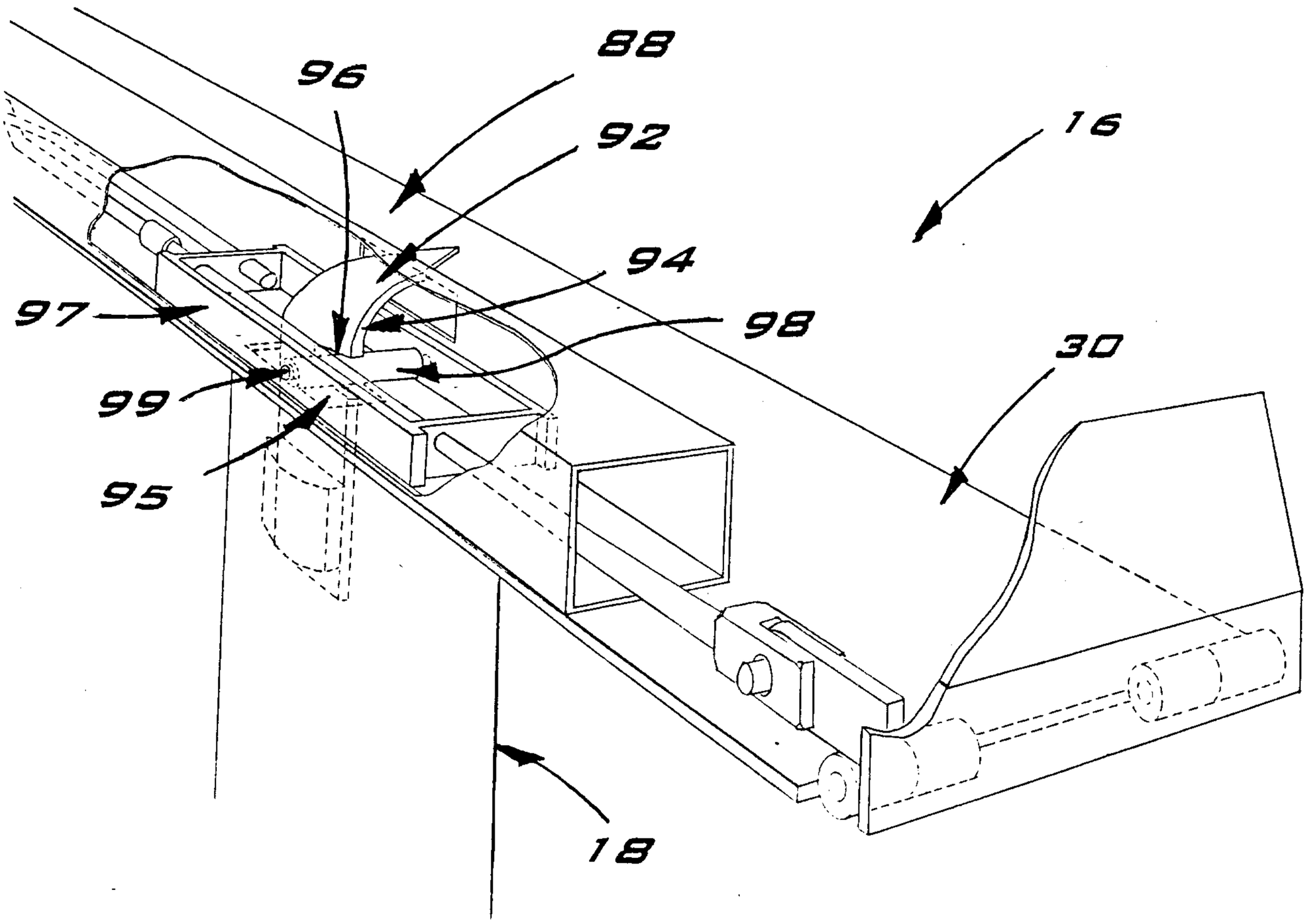


FIG. 15

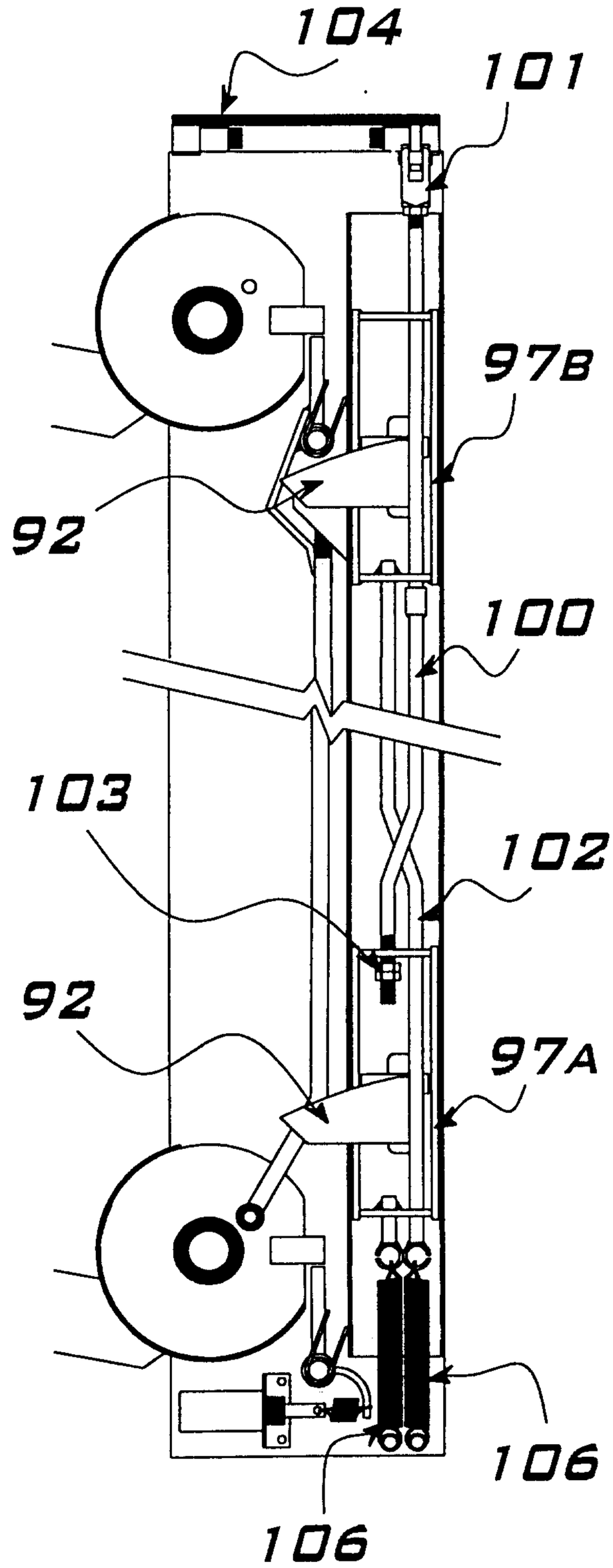


FIG. 16A

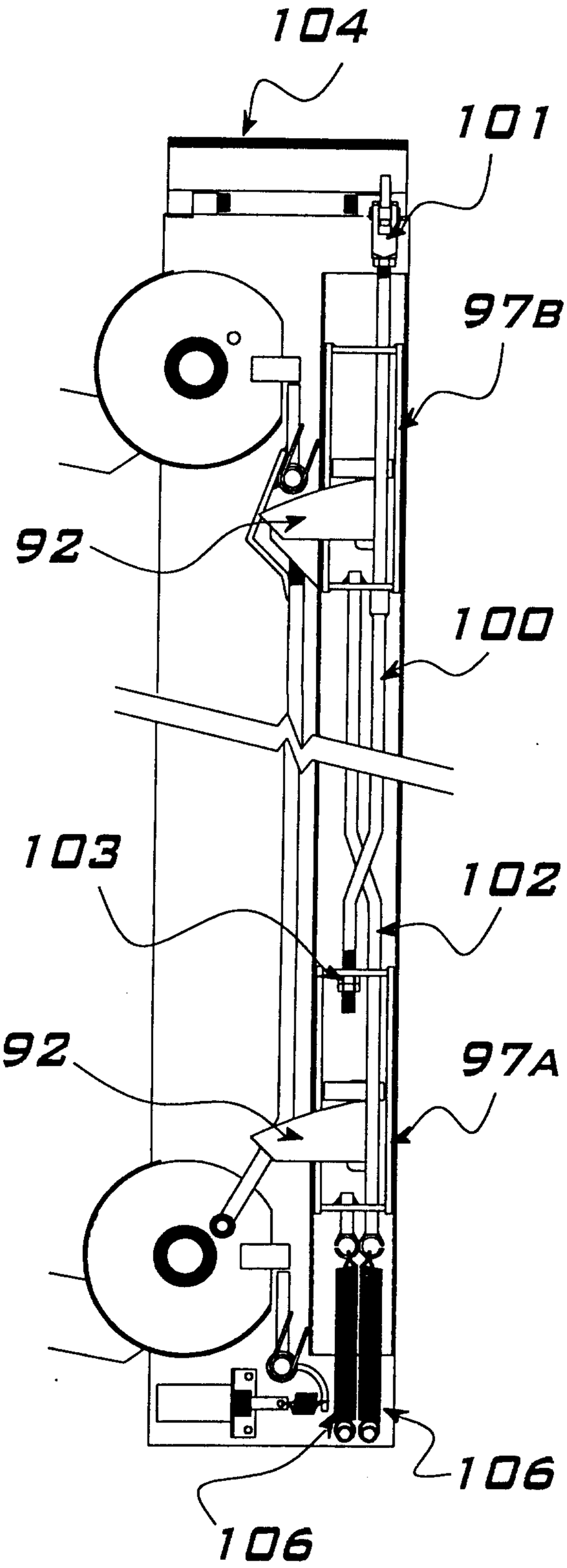


FIG. 16B

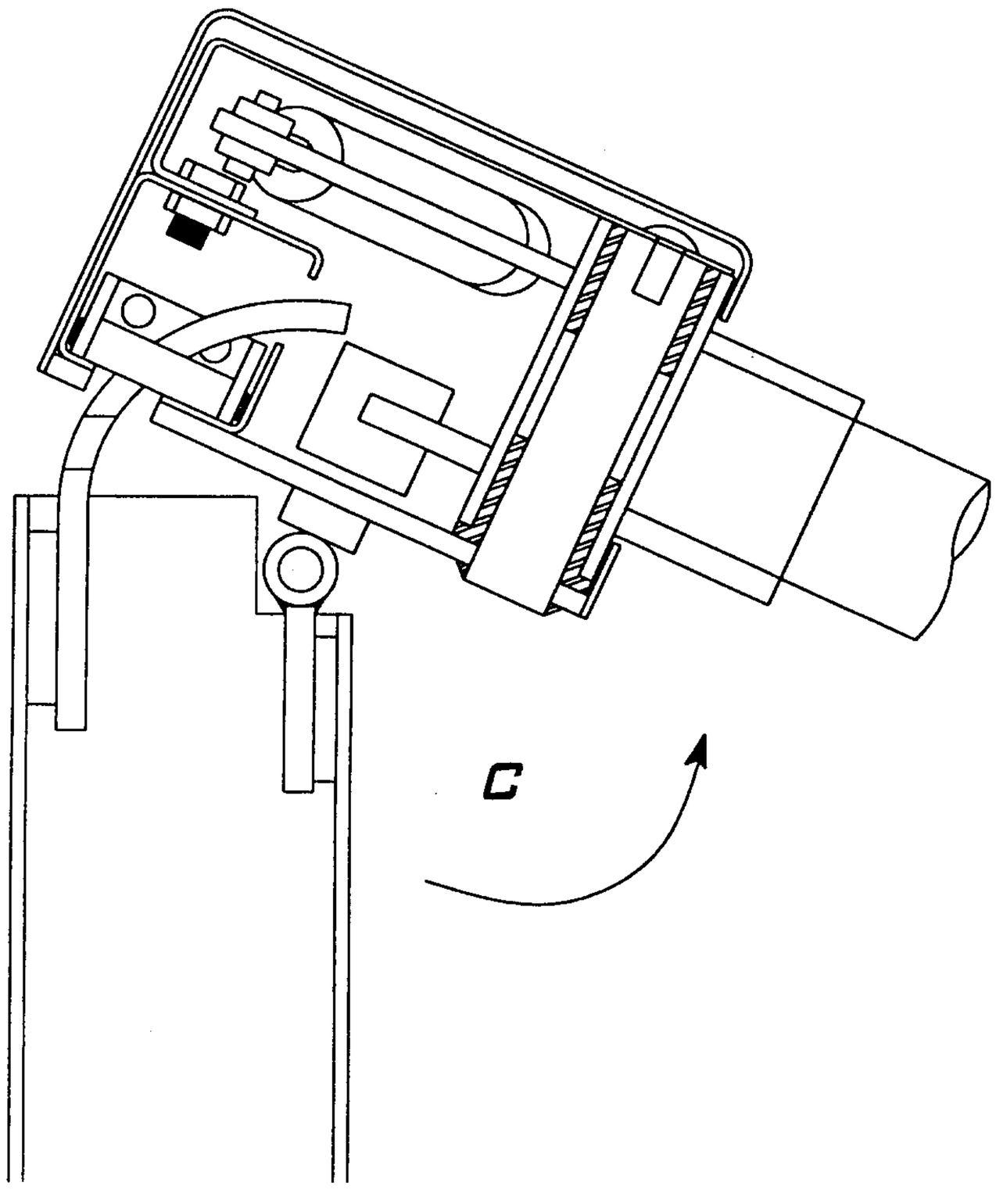


FIG. 17

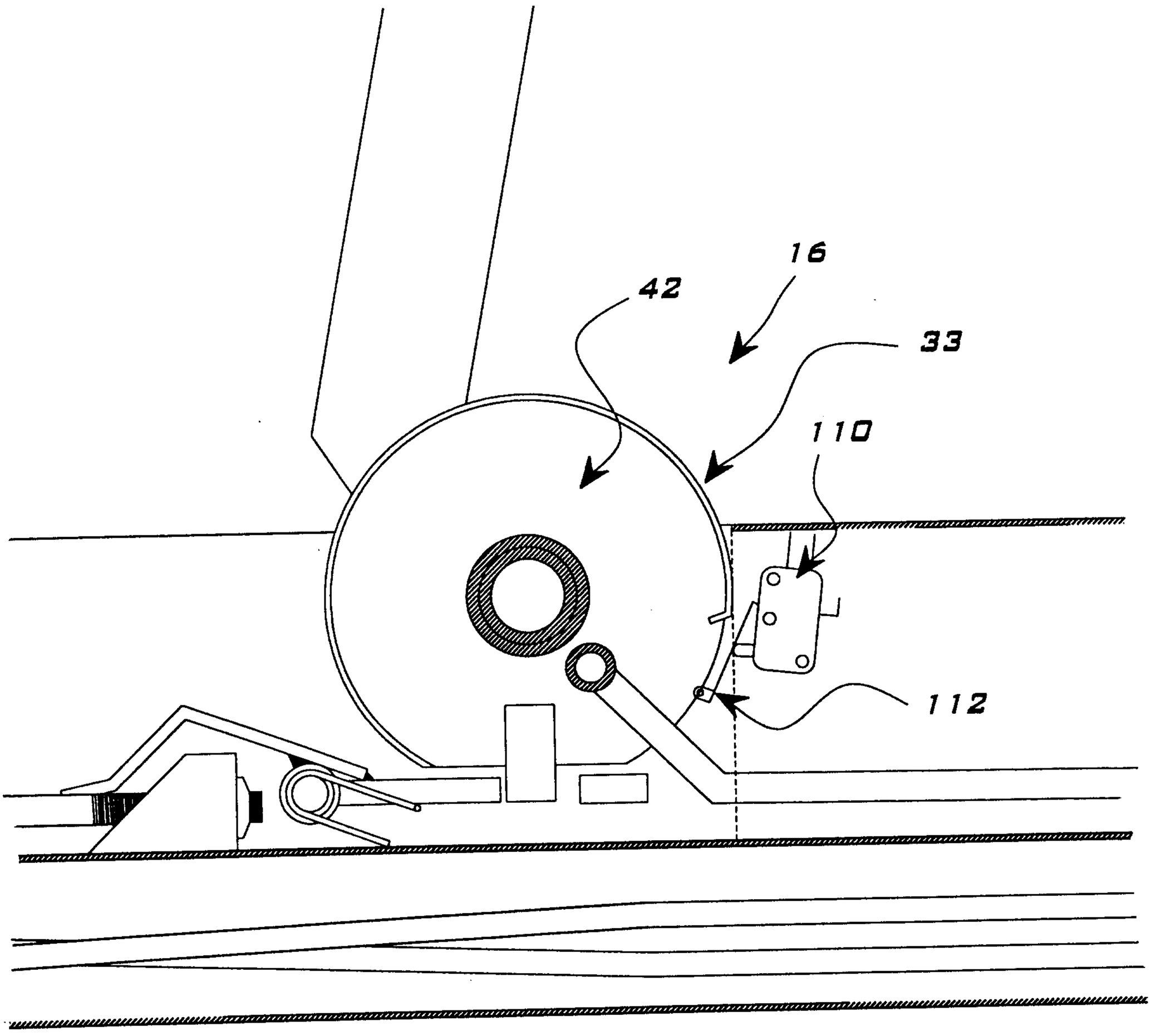


FIG. 18

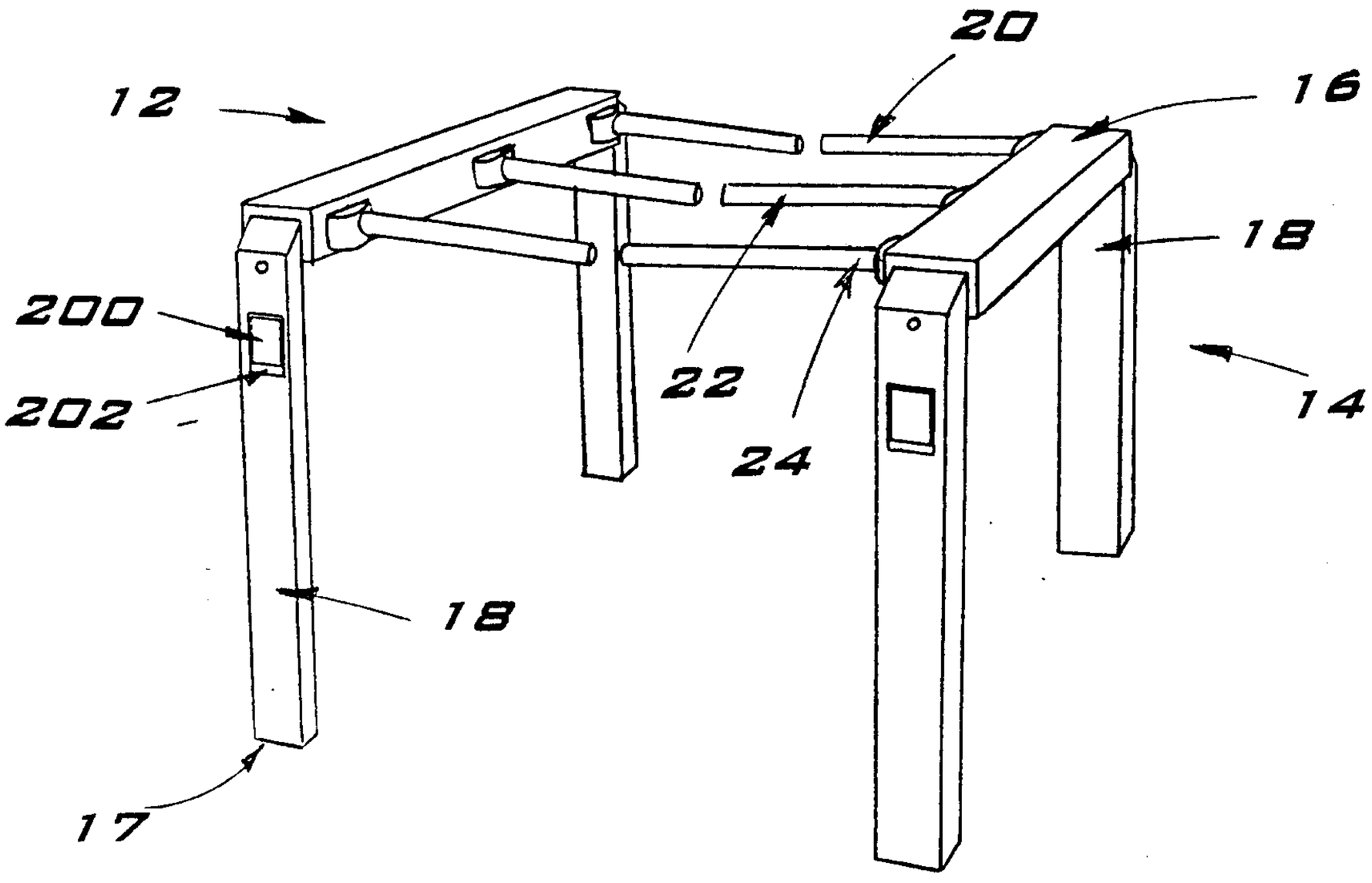


FIG. 19

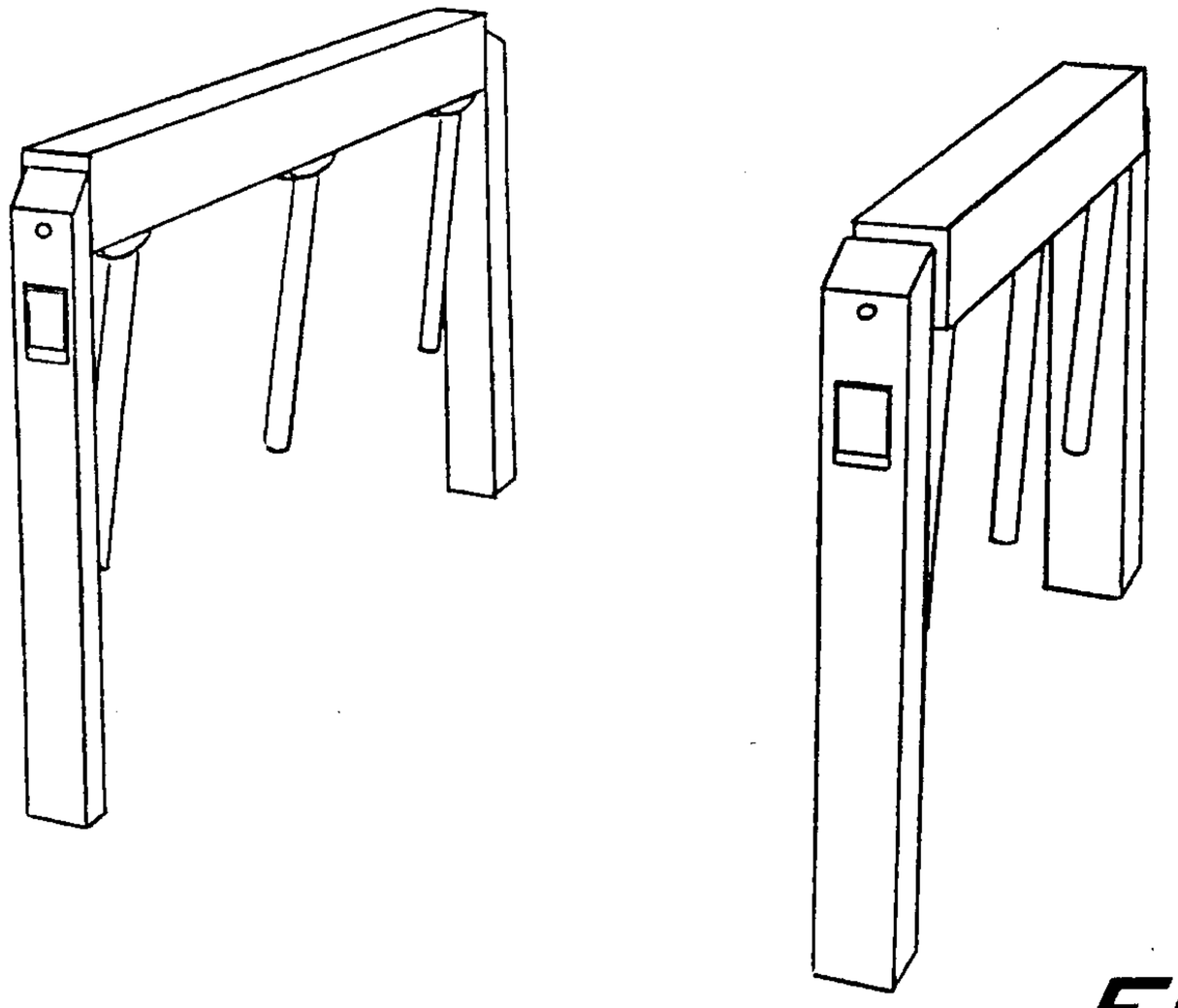


FIG. 20

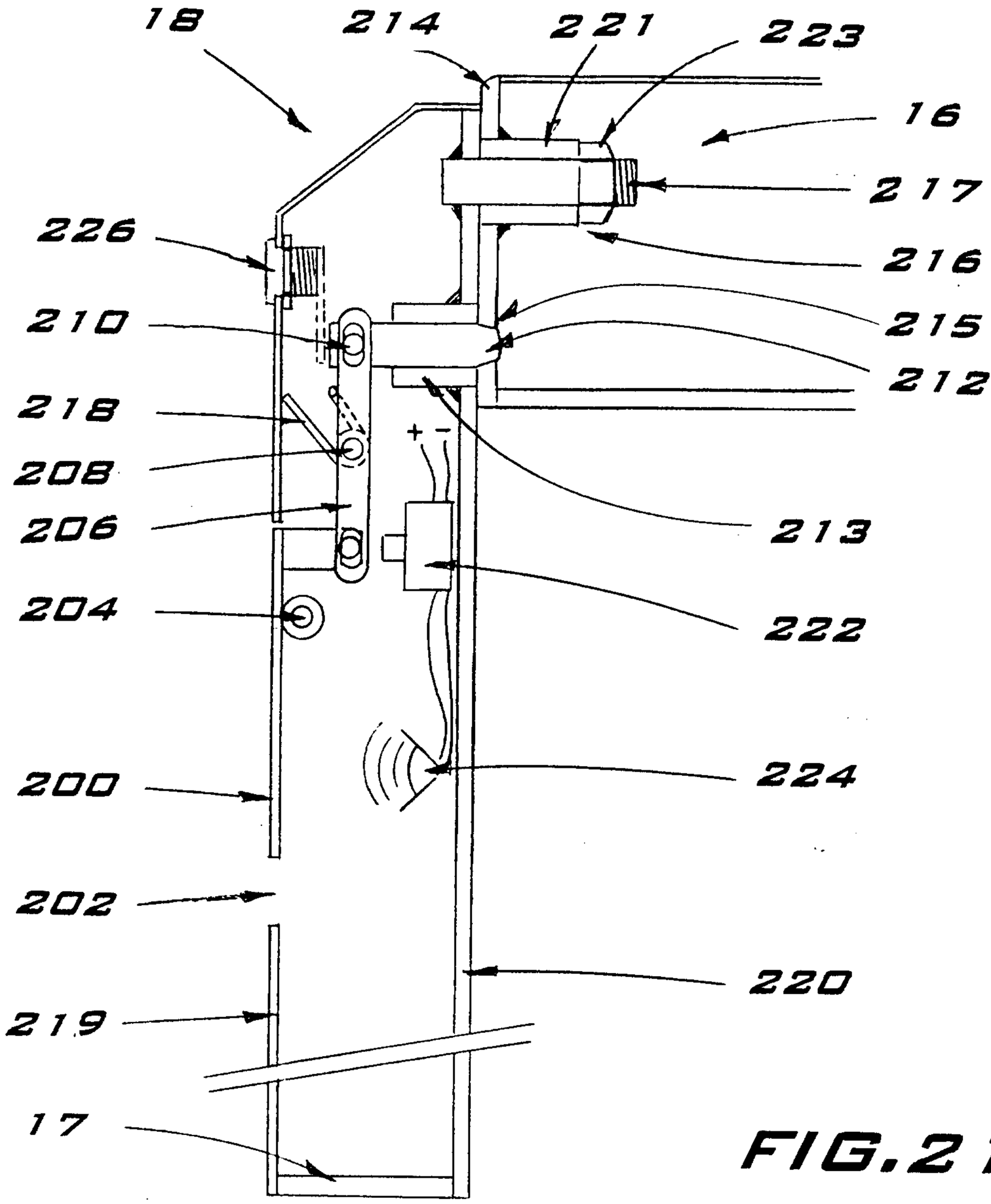

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FIG.21

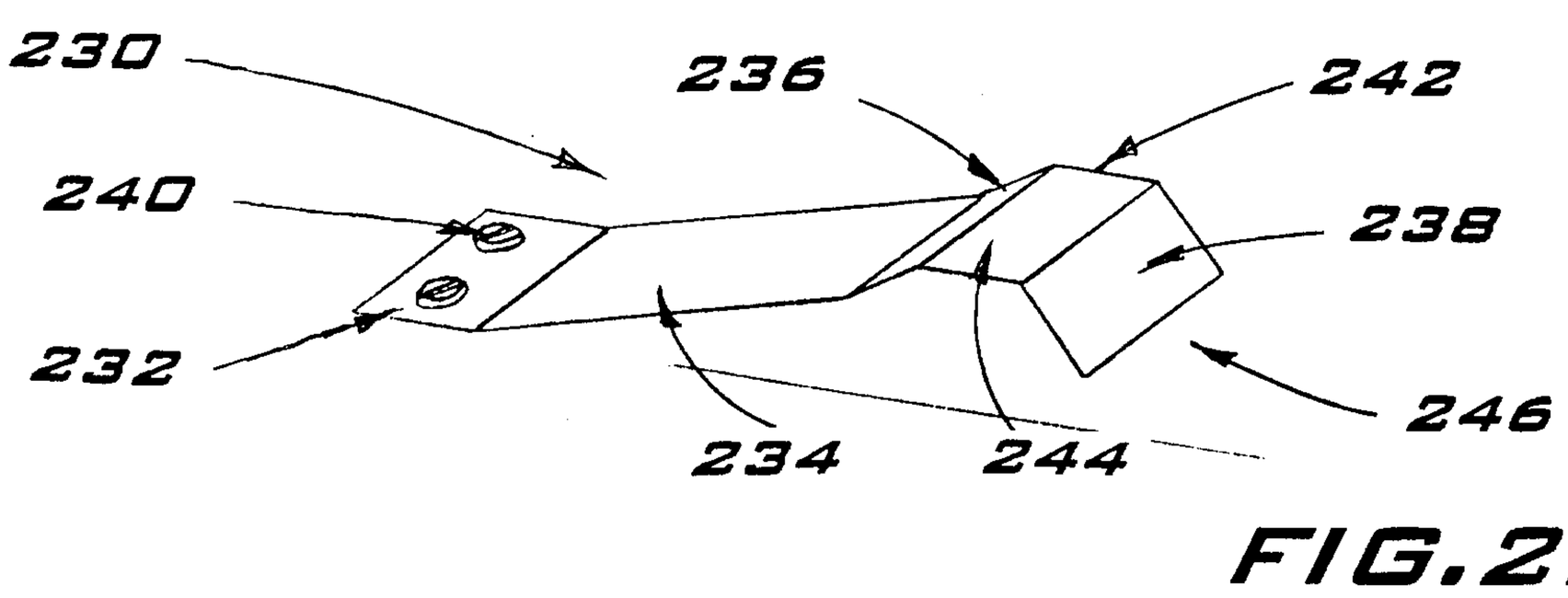
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FIG.22

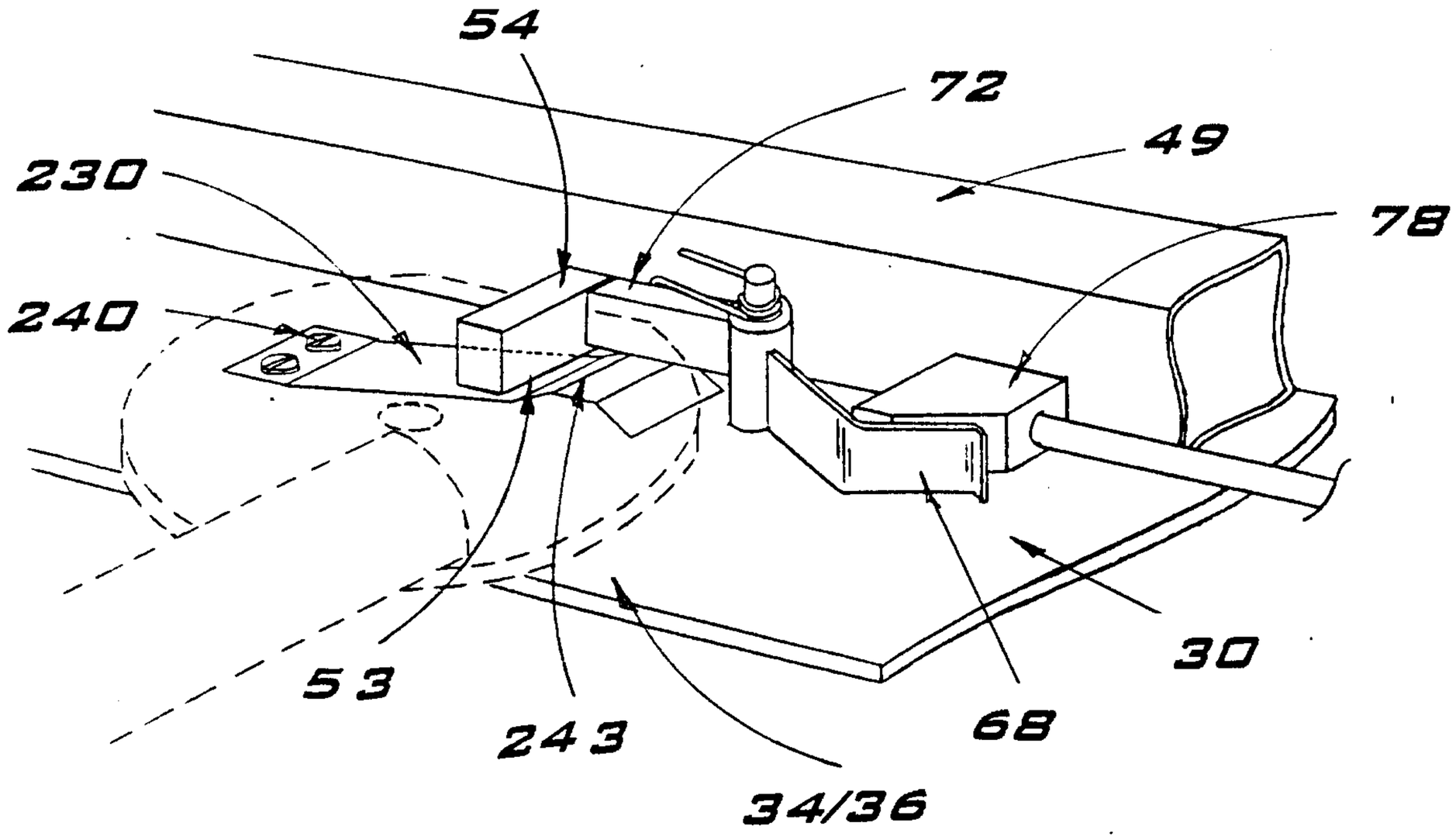
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FIG.23

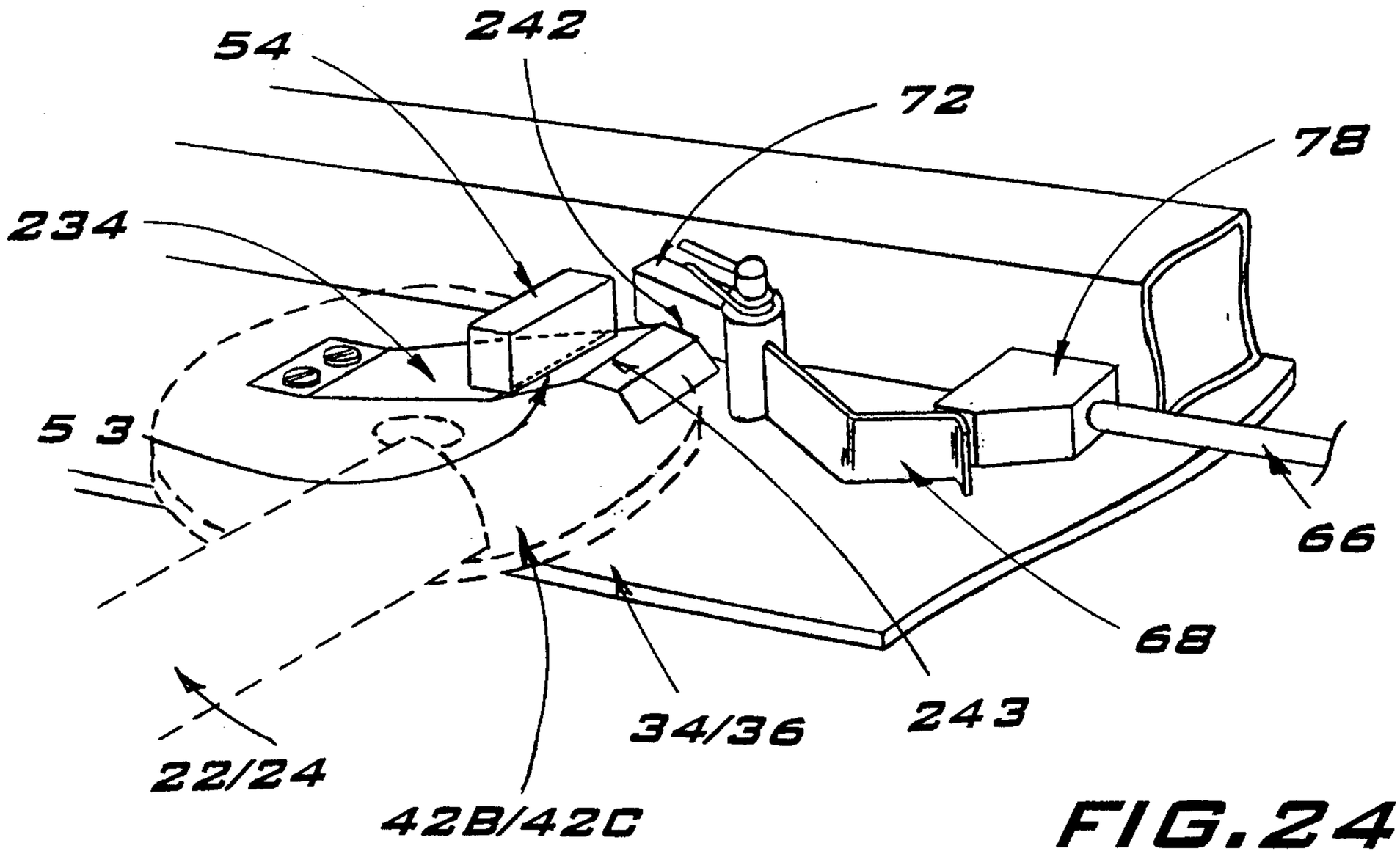
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FIG.24

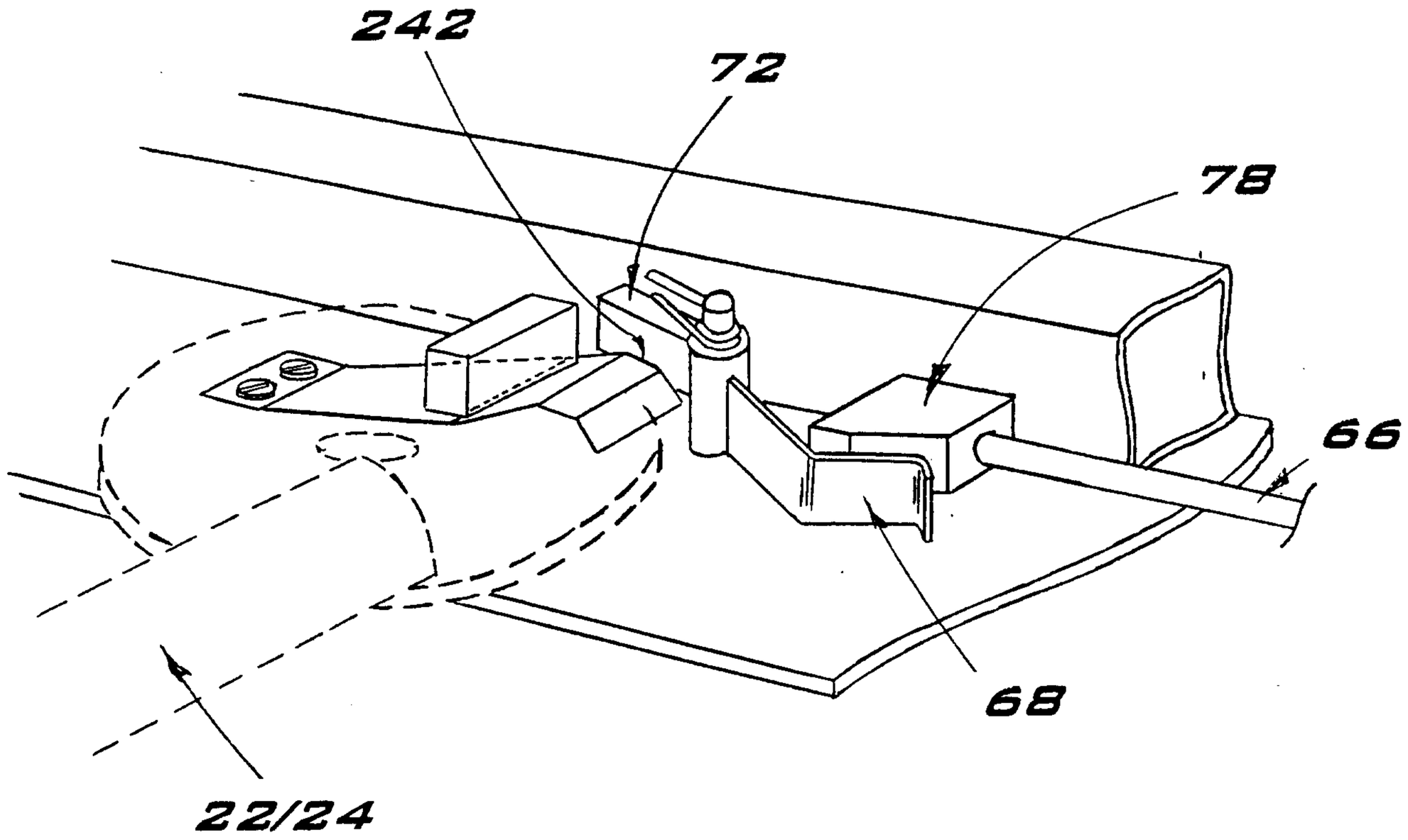


FIG.25

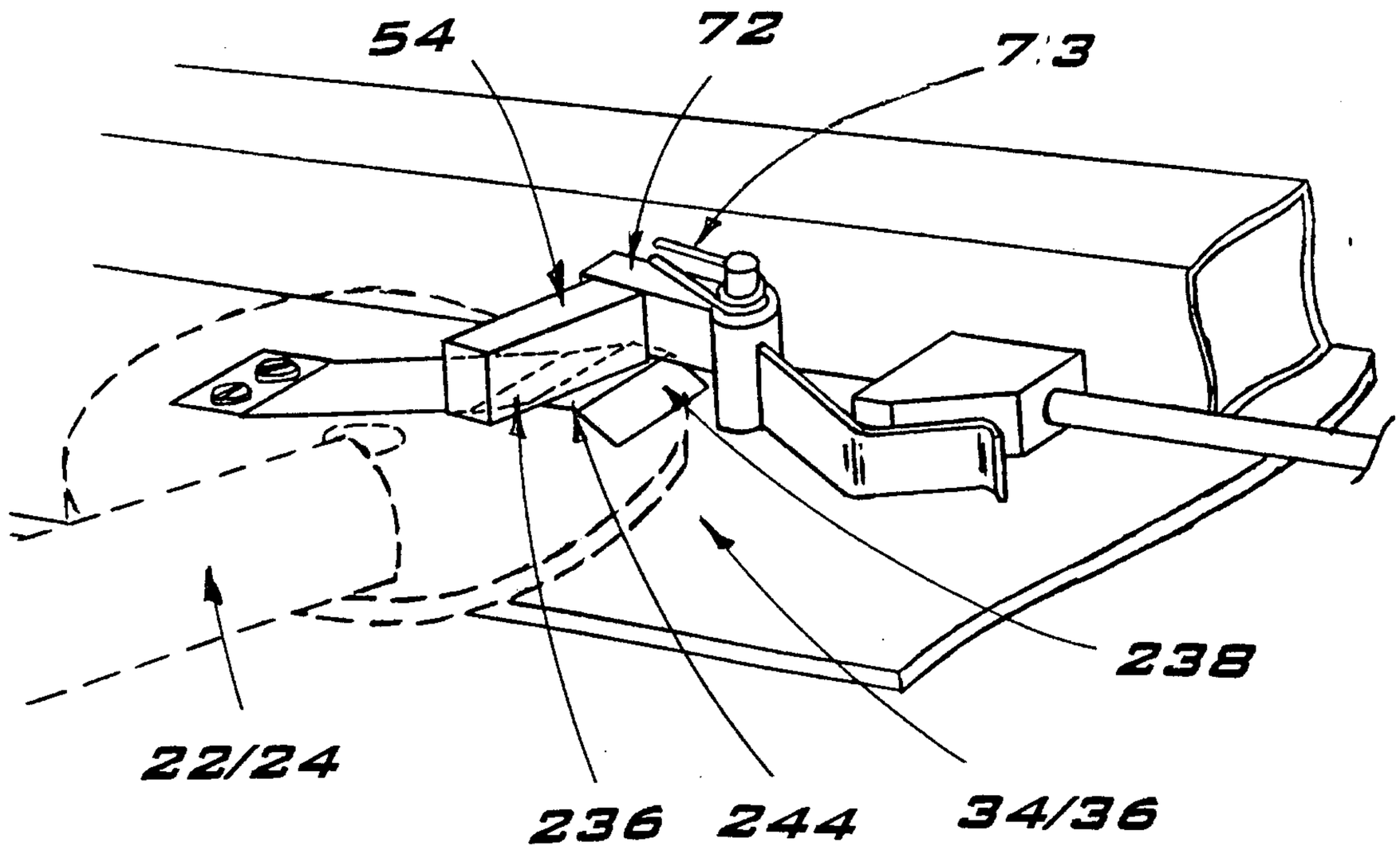


FIG.26

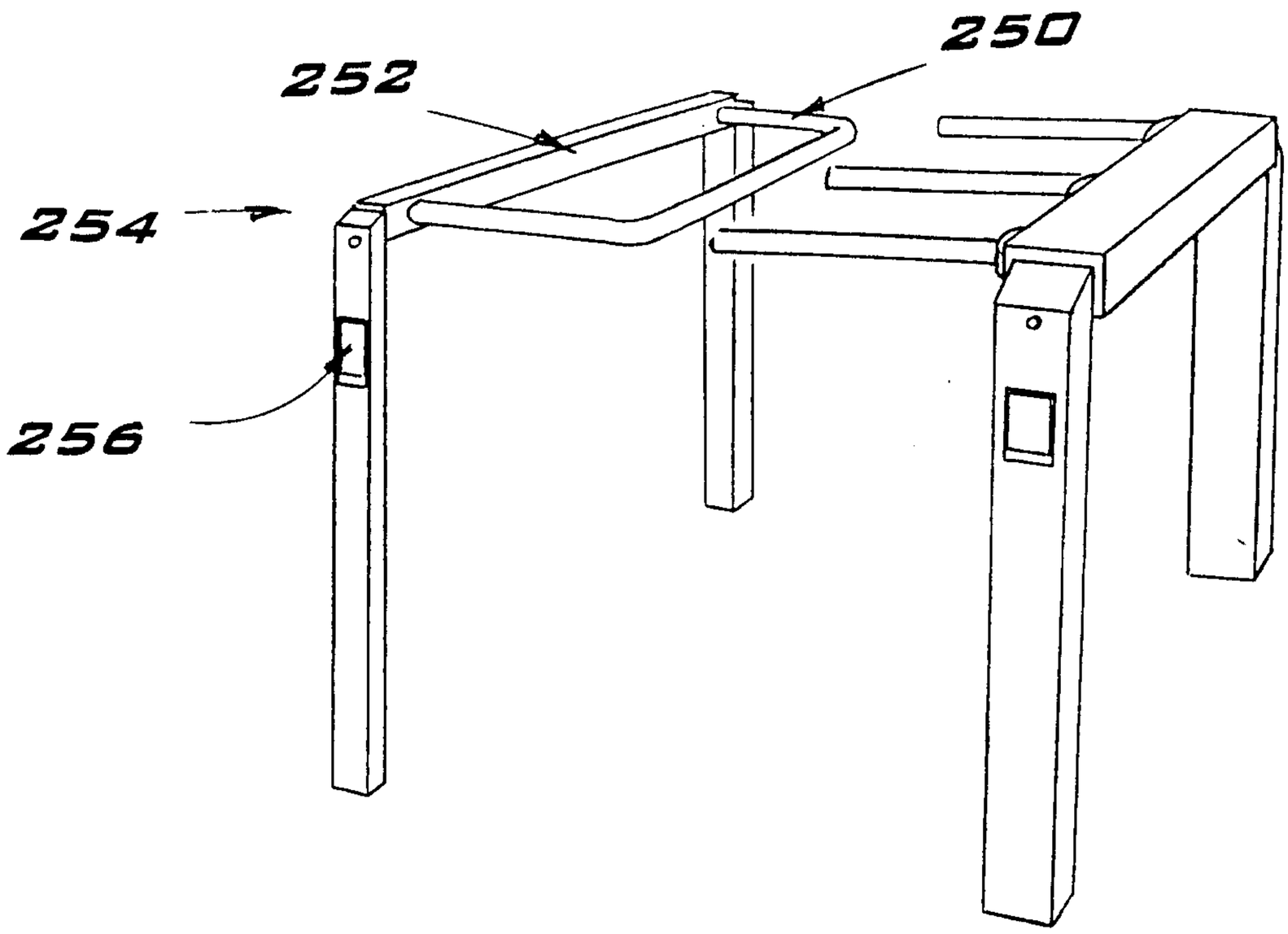


FIG.27

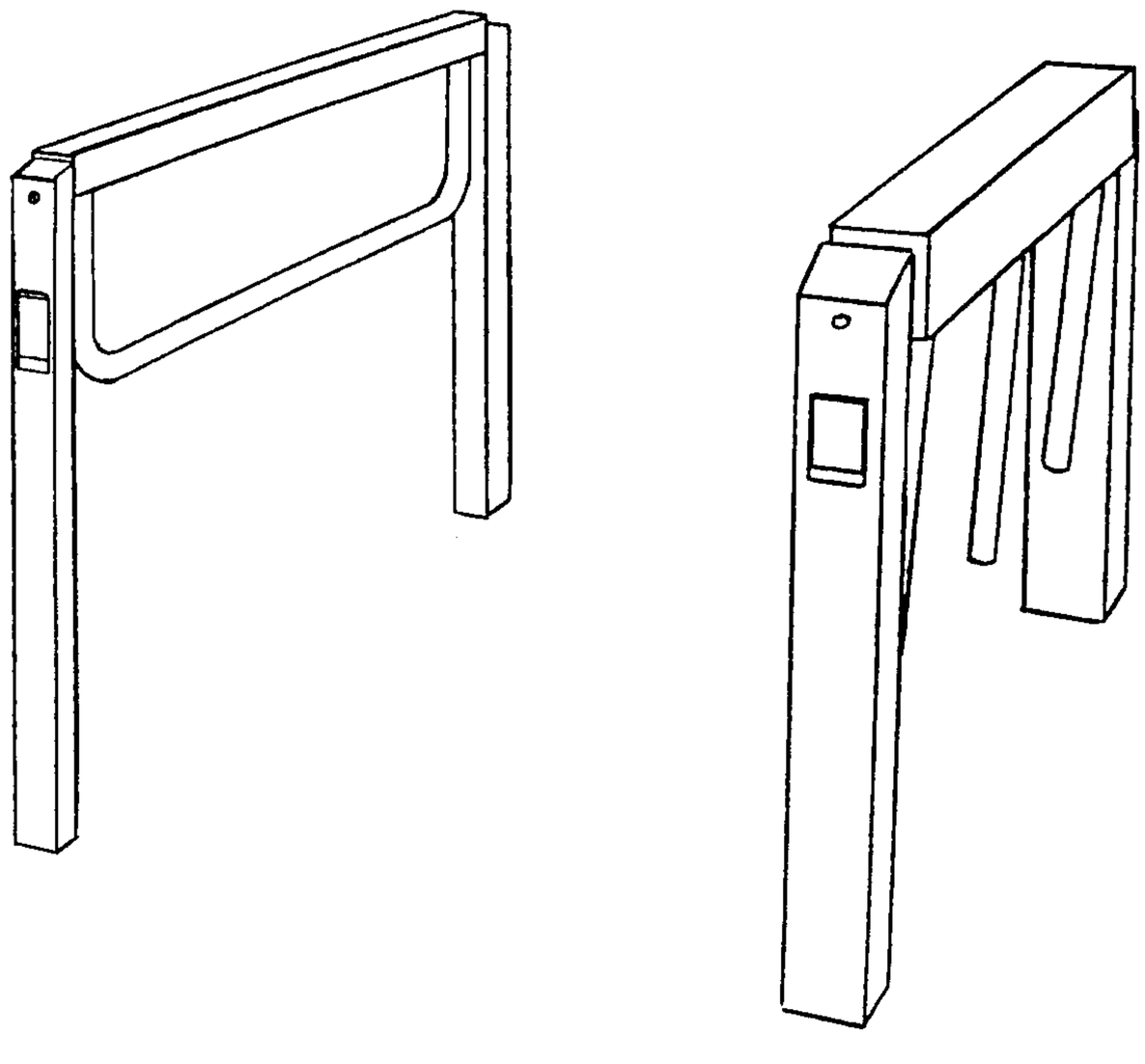
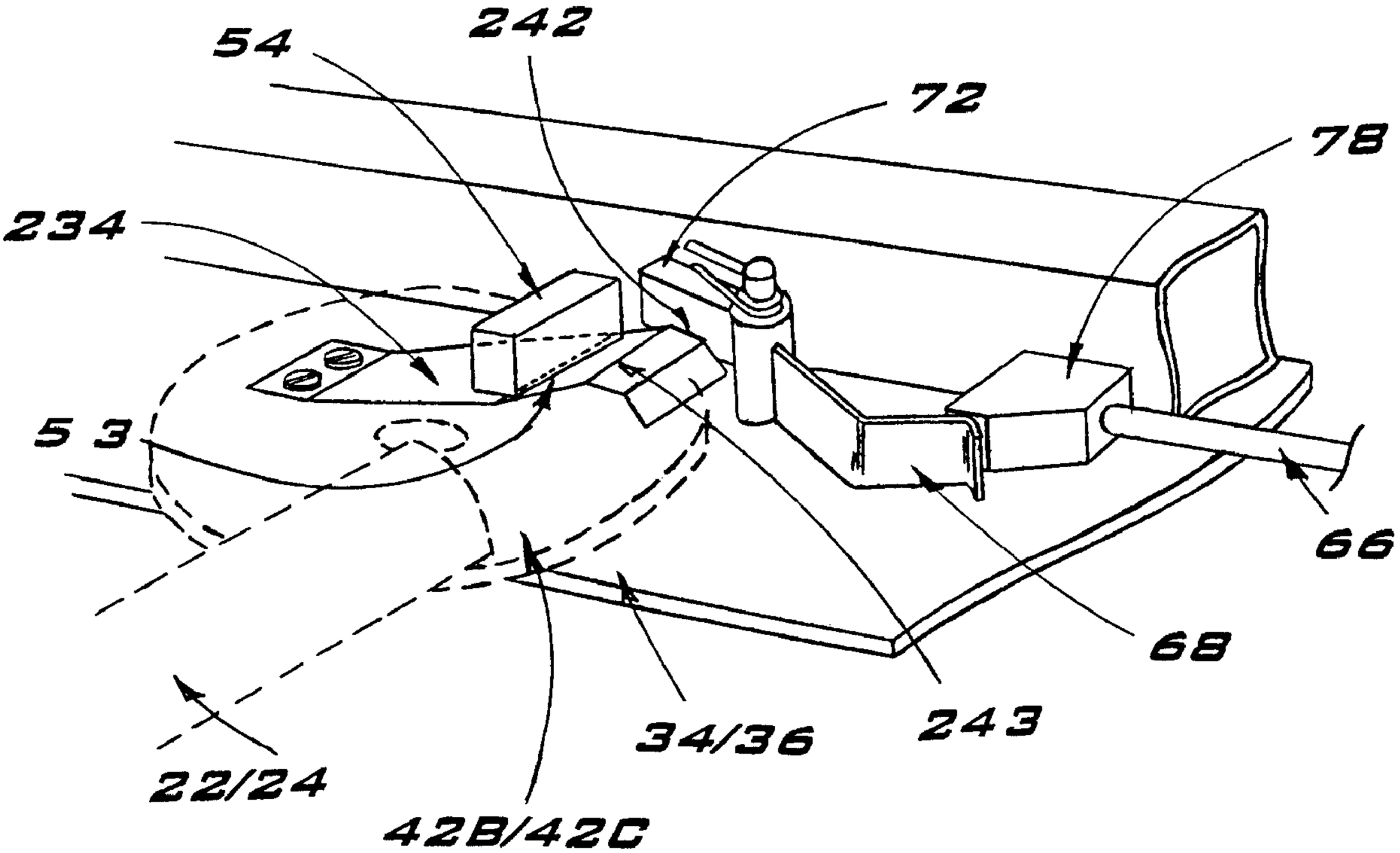


FIG.28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