Office de la Propriété Intellectuelle du Canada
Un organisme d'Industrie Canada

Canadian Intellectual Property Office
An agency of Industry Canada

CA 2729039 C 2014/05/13

(11)(21) 2 729 039

(12) BREVET CANADIEN
CANADIAN PATENT

(13) C

(86) Date de dépôt PCT/PCT Filing Date: 2008/08/20
(87) Date publication PCT/PCT Publication Date: 2009/12/03
(45) Date de délivrance/Issue Date: 2014/05/13
(85) Entrée phase nationale/National Entry: 2010/12/22
(86) N° demande PCT/PCT Application No.: RU 2008/000564
(87) N° publication PCT/PCT Publication No.: 2009/145658
(30) Priorité/Priority: 2008/05/27 (RU2008120833)

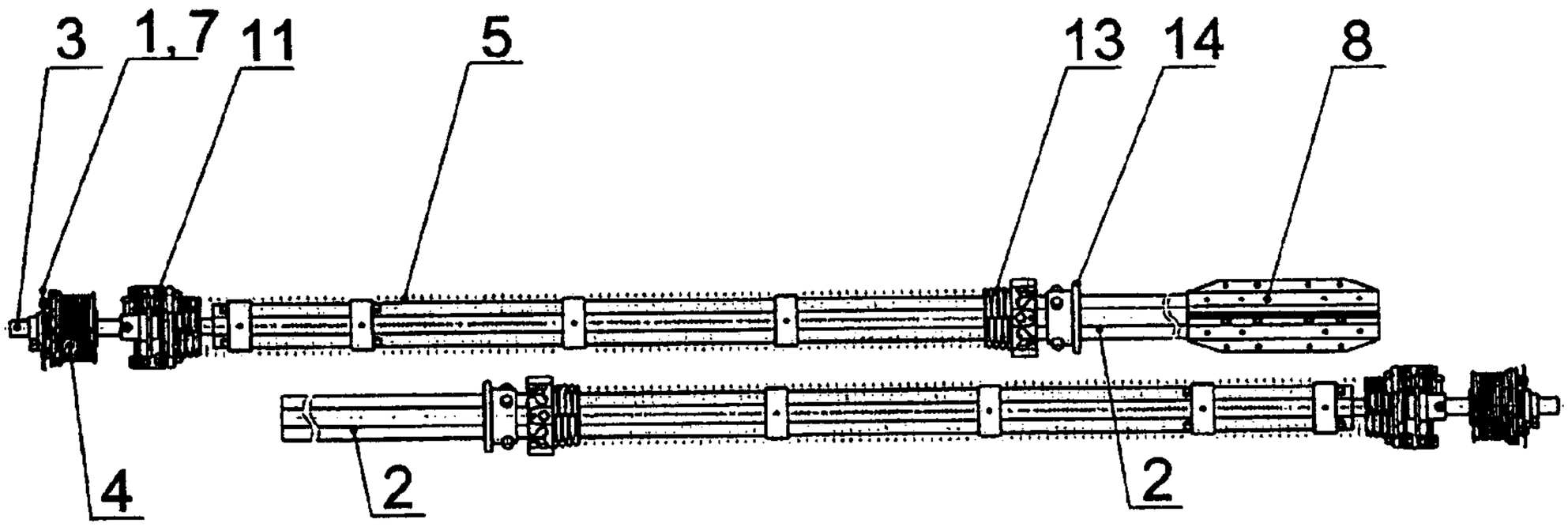
(51) Cl.Int./Int.Cl. *E06B 3/48* (2006.01)

(72) Inventeurs/Inventors:
KHANIN, SERGEY ALEXANDROVICH, RU;
VYATINA, LYUDMILA VIKTOROVNA, RU;
SKIBIN, DENIS VYACHESLAVOVICH, RU;
ZAPOLSKIKH, DENIS VYACHESLAVOVICH, RU

(73) Propriétaire/Owner:
OBSCHESTVO S OGRANICHENNOY OTVETSTVENNOSTYU "DORHAN", RU

(74) Agent: NORTON ROSE FULBRIGHT CANADA LLP/S.E.N.C.R.L., S.R.L.

(54) Titre : PORTAIL MULTI-SECTIONS
(54) Title: A SECTIONAL GATE



(57) Abrégé/Abstract:
The invention relates to construction, in particular to devices for closing apertures in rooms of building structures. The inventive sectional gate comprises a gate leaf formed by interconnected panels the end faces of which are accommodated in L-shaped guides. A hollow cylindrical shaft is mounted on the top part of the gate in end supporting brackets. The shaft is provided with rope barrels which are secured on the ends thereof by means of adapters. The ropes are connected to the lower and/or top panel of the gate. Torsion mechanisms with torsional springs are put onto the driving shaft at the ends thereof. The driving shaft is provided with a keyslot where the barrel adapters are attached. The cross-section of the shaft in the middle part thereof is octagonal. The torsion angle of the keyslot making it possible to uniformly tension the ropes while the gate motion is equal to or less than 10° along the entire length of the torsion mechanism, and a bending deflection between any two supporting points of the shaft is equal to or less than 1/600 of the torsion mechanism length. The invention makes it possible to increase the reliability owing to the use of the highly strength octagonal shaft in the structure.

(12) МЕЖДУНАРОДНАЯ ЗАЯВКА, ОПУБЛИКОВАННАЯ В СООТВЕТСТВИИ С ДОГОВОРОМ О ПАТЕНТНОЙ КООПЕРАЦИИ (PCT)

(19) Всемирная Организация Интеллектуальной Собственности
Международное бюро

(43) Дата международной публикации
03 декабря 2009 (03.12.2009)

PCT

(10) Номер международной публикации
WO 2009/145658 A1

(51) Международная патентная классификация:
E06B 3/48 (2006.01)

(21) Номер международной заявки: PCT/RU2008/000564

(22) Дата международной подачи:
20 августа 2008 (20.08.2008)

(25) Язык подачи: Русский

(26) Язык публикации: Русский

(30) Данные о приоритете:
2008120833 27 мая 2008 (27.05.2008) RU

(71) Заявитель *(для всех указанных государств, кроме US)*: **ОБЩЕСТВО СОГРАНИЧЕННОЙ ОТВЕТСТВЕННОСТЬЮ "ДОРХАН" (OBSCHESTVO S OGRANICHENNOY OTVETSTVENNOSTYU "DORKHAN")** [RU/RU]; Можайское шоссе, д. 36, Москва, 121354, Moscow (RU).

(72) Изобретатели; и

(75) Изобретатели/Заявители *(только для US)*: **ХАНИН, Сергей Александрович (KHANIN, Sergey Alexandrovich)** [RU/RU]; ул. Боровая, д. 20, кв. 76, Москва, 111020, Moscow (RU). **ВЯТИНА, Людмила Викторовна (VYATINA, Lyudmila Viktorovna)** [RU/RU]; пр-кт Ленинского Комсомола, д. 4, кв. 22, Видное, Ленинский район, Московская обл. , 142702, Vidnoe (RU). **СКИБИН, Денис Вячеславович (SKIBIN, Denis Vyacheslavovich)** [RU/RU]; Ленинский проспект, д. 12, кв. 245, Тольятти, Самарская обл., 445040, Toliyatti (RU). **ЗАПОЛЬСКИХ, Денис Вячеславович (ZAPOLSKIKH, Denis Vyacheslavovich)** [RU/RU]; ул. Ленина, д. 166, кв. 153, Ижевск, 426075, Izhevsk (RU).

(74) Агент: **КОРНИЕНКО Елена Викторовна (KORNIENKO, Elena Viktorovna)**; ул. Каргопольская, д. 12, кв. 60, Москва, 127562, Moscow (RU).

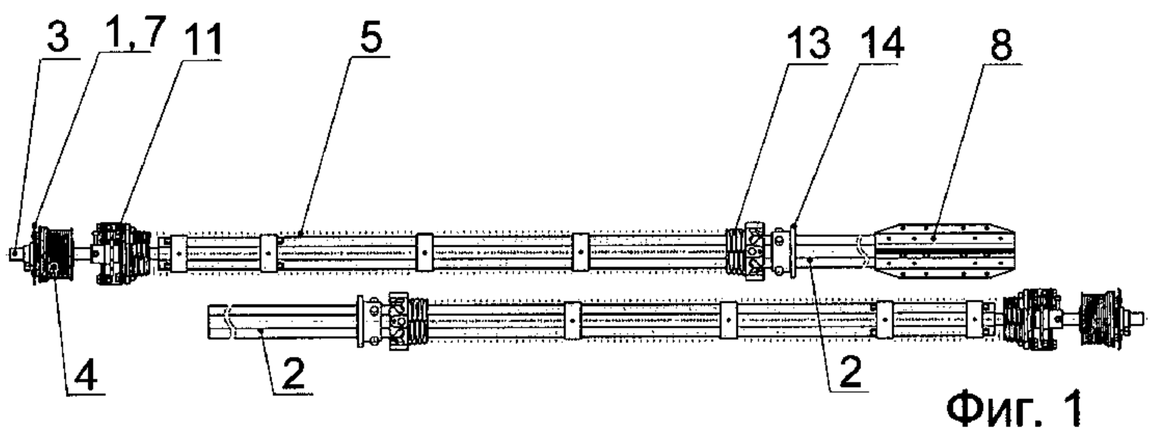
(81) Указанные государства *(если не указано иначе, для каждого вида национальной охраны)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR,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

(84) Указанные государства *(если не указано иначе, для каждого вида региональной охраны)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), евразийский (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), европейский патент (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE,

[продолжение на следующей странице]

(54) Title: SECTIONAL GATE

(54) Название изобретения: СЕКЦИОННЫЕ ВОРОТА



Фиг. 1

(57) Abstract: The invention relates to construction, in particular to devices for closing apertures in rooms of building structures. The inventive sectional gate comprises a gate leaf formed by interconnected panels the end faces of which are accommodated in L-shaped guides. A hollow cylindrical shaft is mounted on the top part of the gate in end supporting brackets. The shaft is provided with rope barrels which are secured on the ends thereof by means of adapters. The ropes are connected to the lower and/or top panel of the gate. Torsion mechanisms with torsional springs are put onto the driving shaft at the ends thereof. The driving shaft is provided with a keyslot where the barrel adapters are attached. The cross-section of the shaft in the middle part thereof is octagonal. The torsion angle of the keyslot making it possible to uniformly tension the ropes while the gate motion is equal to or less than 10° along the entire length of the torsion mechanism, and a bending deflection between any two supporting points of the shaft is equal to or less than 1/600 of the torsion mechanism length. The invention makes it possible to increase the reliability owing to the use of the highly strength octagonal shaft in the structure.

(57) Реферат: Изобретение относится к области строительства, а именно: к устройствам для перекрытия проемов в помещения строительных конструкций. Секционные ворота содержат

[продолжение на следующей странице]

WO 2009/145658 A1

WO 2009/145658 A1

IS, IT, LT, LU, LV, MC, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Опубликована:

— *с отчётом о международном поиске (статья 21.3)*

полотно из шарнирно соединенных между собой панелей, торцы которых размещены в Г-образных направляющих. В верхней части ворот установлен полый цилиндрический вал в концевых опорных кронштейнах. Вал снабжен закрепленными по его концам посредством адаптеров барабанами для тросов. Тросы соединены с нижней и/или верхней панелью ворот. Торсионные механизмы с пружинами кручения одеты на приводной вал по его концам. Приводной вал имеет шпоночный паз в местах крепления адаптеров для барабанов. В поперечном сечении в средней части вал выполнен октагональным. Угол скручивания шпоночного паза для обеспечения равномерности натяжения тросов при движении ворот не превышает 10° на всей длине торсионного механизма, а прогиб между двумя любыми опорными точками вала не более 1/600 длины торсионного механизма. Изобретение позволит повысить надежность путем применения в конструкции торсионного механизма октагонального вала, обладающего высокой жесткостью

A SECTIONAL GATE

Pertinent Art

The investment relates to the field of construction, and specifically to devices that provide covering of openings to premises of building structures.

Prior Art

Known is the sectional gate comprising a curtain of pivotally connected panels the butt ends of which are located in L-shaped guides, wherein the top panel is pivotally connected with a lead screw attached to a drawbar that is perpendicular to the panel plane (US No. 508094, 1992). Such sectional gate design requires increasing the height of the structure in which opening the gate is installed; also, the off-center transmission of load on the drawbar leads to increased wear of the "lead screw – nut" pair, and the lift speed of such gate is low.

Also known is the sectional gate design comprising pivotally connected panels, L-shaped guides and a drive for moving the panels, with a rope drum installed at the shaft end and connected to a ratchet-and-pawl mechanism (CN 1646785, 2005).

Also known is the sectional gate comprising a curtain of pivotally connected panels the butt ends of which are located in vertical or horizontal guides, and the drive shaft located in the upper area of the gate, with torsion springs placed symmetrically on it, is connected to rope drums, wherein on the drive side a drum has two sections – one section is used for winding the rope branch, and the rope is unwound from the other section (US No. 4472910, 1984).

The closest among the known gates is the sectional gate comprising a curtain of pivotally connected panels the butt ends of which are located in vertical or horizontal guides, and a hollow shaft parallel to the panels planes, located in the gate upper section, supported by brackets and connected to the drive comprises rope drums connected to the gate lower panel and torsion springs installed at the drive shaft ends and attached to half-clutches (application PCT WO 99/64706, 1999).

In known sectional gates, one of the main problems occurring during operation – shaft deflection due to springs weight, and sagging of the springs themselves – has not been solved. The deformation leads to friction, which leads to substantial increase of the force for opening or closing the gate curtain, as well as to heavy wear of the mechanism itself.

Disclosure of Invention

The technical objective of the proposed solution is to improve reliability of the sectional gate by using in the design of the torsion mechanism an octagonal shaft that has high rigidity. The higher strength and rigidity of an octagonal shaft compared to the traditional designs eliminates its sagging even in wide openings and hence eliminates the use of intermediate support brackets and of sleeve couplings, the need to install a steel pipe in cases of high and vertical lift with the shaft in the low position, and installation of a system of holding brackets in the case of low lift of the drum in the rear; it reduces the installation time and eliminates the need to assemble the torsion mechanism at high elevation.

In addition, the proposed design of the torsion mechanism can be completely assembled both in the factory and during installation, so that torsion springs, devices for protecting the springs from breaking off, and drums with ropes are installed on the shaft. This considerably improves the safety of installation, makes it possible to accurately level the shaft with springs regardless of the lift curvature and lintel unevenness, eliminates tying in the torsion mechanism to the system of guides, which makes it possible to adjust both the torsion mechanism and guides independently of each other, and eliminates modification of the opening on-site in order to attach additional brackets and springs.

The stated technical objective is achieved by the fact that the sectional gate comprises a curtain of pivotally connected panels the butt ends of which are located in L-shaped guides, and also a shaft which is parallel to the panels planes, located in the gate upper section, supported by end support brackets, connected to the drive and has rope drums attached to its ends by means of adapters, the ropes being connected to the gate bottom panel, and torsion mechanisms with torsion springs that are installed on the drive shaft at its ends, one end of each spring being attached to the shaft, wherein the drive shaft is solid [*sic*] and has a round cross-section and key slots in the areas where drum adapters are attached, and the shaft middle part has an octagonal cross-section made of cold rolled steel. Herein, in order to ensure uniform tension of ropes during the gate movement the key slot torsion angle does not exceed 10° along the entire length of the torsion mechanism, and the deflection between any two shaft support points does not exceed 1/600 of the length of the torsion mechanism. In addition, the drive shaft attachment to the walls is done by means of no more than two brackets with groups of bearings in order to ensure their alignment during the shaft rotation. The octagonal part of the shaft can be made composite along its length and have a sleeve coupling formed by two or four sheet metal pieces joined with each other at their flanged sections by means of threaded joints, and at least one section of each piece adjacent to the shaft is connected to the shaft in the zone between the flanges by means of threaded joints. Herein, the sectional gate is equipped with end support brackets for the rear position of

the shaft; each bracket has two places for attaching it to the ceiling that are turned 90° relative to each other to ensure distribution of acting lateral and longitudinal loads. The torsion mechanism is completely installed on end support brackets, with safety devices attached to them, wherein each end support bracket has several fixed positions for shaft attachment. The sectional gate is equipped with end support brackets for the front position of the shaft, and in order to ensure their attachment in a place suitable for installation, the brackets provide the possibility of free installation including their vertical or lateral movement without moving other gate components in the process. In addition, the sectional gate can be equipped with end support brackets for the low position of the shat, with each bracket having load carrying capacity of at least 600 kg, with the possibility of installing them in pairs for attachment to a multi-shaft mechanism and positioning them vertically with respect to each other while providing their attachment to each other in the same plane using a "dovetail"-type joint, with center-to-center spacing accurate to ±1 mm. Herein, each torsion spring of the torsion mechanisms has a movable end comprised of two parts – the end itself and a stop on the shaft which in order to reduce internal stress and turn-to-turn friction has the capability of free movement along the shaft without turning, and the movable end itself is secured on the stop on the shaft by means of slots accurate to ¼ of a turn, to make it possible to adjust the torsion mechanism for balancing the gate at any moment by changing the number of turns to cock the spring, wherein additional securing of the movable end on the stop is achieved with set screws which, together with engagement in the slot, precludes the possibility of the end breaking off of the stop.

Brief Description of Drawings

Fig. 1 shows the (shipping) schematic of preliminary assembly of the octagonal shaft.

Fig. 2 shows a fragment of the octagonal shaft with a longitudinal key slot along its entire length.

Fig. 3 shows a sleeve coupling for the octagonal shaft.

Fig. 4 shows the end support bracket for the front position of the shaft.

Fig. 5 shows the end support bracket for the rear position of the shaft.

Fig. 6 shows the end support bracket for the low position of the shaft.

Fig. 7 shows the movable end.

Fig. 8 shows the movable end assembled on the shaft.

The Best Embodiment of the Invention

The sectional gate comprises a curtain of pivotally connected panels (not shown) the butt ends of which are located in L-shaped guides (not shown), and also shaft 2 which is parallel to the panels planes, located in the gate upper section, supported by end support brackets 1 and connected to the drive. Shaft 2 is equipped with rope drums 4 attached to its end by means of adapters 3, the ropes being connected to the gate top and/or bottom panel. Torsion mechanisms 5 have torsion springs installed on drive shaft 2 at its ends, with one end of each spring attached to the shaft. Drive shaft 2 is hollow and cylindrical, and has key slot 6 in the areas where adapters for drums 4 are attached. In the cross-section of its middle part the shaft is octagonal and is made of cold rolled steel. In order to ensure uniform tension of ropes during the gate movement, the torsion angle of key slot 6 does not exceed 10° along the entire length of the torsion mechanism, and deflection between any two shaft support points does not exceed 1/600 of the length of the torsion mechanism. The drive shaft attachment to the walls is done by means of no more than two brackets 1 with groups of bearings 7, in order to ensure their alignment during the shaft rotation. The octagonal section of the shaft can be made composite along its length (Fig. I) and have sleeve coupling 8 formed by two or four sheet metal pieces joined with each other at their flanged sections by means of threaded joints, and at least one section of each piece adjacent to the shaft is connected to shaft 2 in the zone between the flanges (Fig. 3) by means of threaded joints. Herein, the sectional gate is equipped with end supports 9 and 10 for the rear position of the shaft; each bracket has two places for attaching it to the ceiling that are turned 90° relative to each other to ensure distribution of acting lateral and longitudinal loads. The torsion mechanism is completely installed on end support brackets, with safety devices 11 attached to them. Each end support bracket has several fixed positions for shaft attachment. The sectional gate is equipped with end support brackets for the front position of the shaft; in order to ensure their attachment in a place suitable for installation, the brackets provide the possibility of free installation including their vertical or lateral movement without moving other gate components in the process. In addition, the sectional gate is equipped with end support brackets for the low position of shaft 15, with each bracket having load carrying capacity of at least 600 kg, with the possibility of installing them in pairs for attachment to a multi-shaft mechanism and positioning them vertically with respect to each other while providing their attachment to each other in the same plane using a "dovetail"-type joint 12, with center-to-center spacing accurate to ±1 mm. Herein, each torsion spring of the torsion mechanisms has a movable end comprised of two parts – end 13 itself and stop 14 on the shaft which in order to reduce internal stress and turn-to-turn friction has the capability of free movement along the shaft without turning, and movable end 13 itself is secured on stop 14 on the shaft by means of slots accurate to ¼ of a turn, to make it possible to adjust the torsion mechanism for balancing the gate at any moment by changing the number of turns to cock the spring,

wherein additional securing of the movable end on the stop is achieved with set screws which, together with engagement in the slot, precludes the possibility of the end breaking off of the stop.

The main stages of the shaft assembly are as follows. It is necessary to place octagonal shaft 2 horizontally, place movable spring end stops 14 and plastic rings on it, and insert adapters 3 at ends of shaft 2 so that the adapter plate wall is flush with the end of shaft 2. Then, it is necessary to mark 15 -20 mm from the edge of shaft 2 to mark the place for installation of the first line of screw components, for instance, self-threading screws. Screw self-threading screws into shaft 2 so that they get into plate lugs of adapter 3. Pull the first plastic ring until it stops at the self-threading screws. Mark 255-260 mm from the edge of shaft 2 to mark the place for installation of the second line of self-threading screws. Screw self-threading screws into octagonal shaft 2 and make sure they are in the plate of adapter 3. Move the second plastic ring to the second line of self-threading screws.

Secure the plastic rings by means of self-threading screws 3.8x11 ПГ. Repeat all steps for the second half of octagonal shaft 2 and assemble sleeve coupling 8 onto one half of octagonal shaft 2. The bracket assembly has two places for attaching it to the ceiling that are turned 90° relative to each other, which ensures distribution of lateral and longitudinal loads. Secure attachment of the rear measuring bar is achieved due to two attachment points, one of which is a rectangular hole. The location of the axis of shaft 2 with respect to the guides precludes the possibility of ropes touching the gate curtain when opening the gate. In the end support brackets the possibility of attaching safety devices 11 is provided, which eliminates additional brackets needed for installing and securing the safety devices. Also, the brackets make possible easy installation of the entire assembled torsion mechanism because after the brackets are installed the assembled torsion mechanism is installed on them. Each bracket has several fixed positions for attaching the shaft, which reduces the total number of end support brackets.

End support brackets for the front position of the shaft have the capability of free installation independent of other components of the gate structure: a bracket can be moved higher, shifted sidewise, and this will not affect operation of the torsion mechanism. So it is possible to attach a bracket in a place suitable for installation.

Each end support bracket (Fig. 5) for the rear position of the shaft has two places for attaching it to the ceiling that are turned 90° relative to each other, which ensures distribution of lateral and longitudinal loads. Secure attachment of the rear measuring bar is also achieved due to two attachment points, one of which is a rectangular hole, and the location of the shaft axis with respect to the guides precludes the possibility of ropes touching the gate curtain when opening the gate.

Each end support bracket (Fig. 6) for the low position of the shaft has the load carrying capacity of at least 600 kg, so when the brackets are installed in pairs at edges of the opening the mass of the torsion mechanism together with the gate can be as high as 2400 kg. Herein, the possibility to position the brackets vertically with respect to each other for installation of a multi-shaft torsion mechanism is provided – the brackets are connected with each other by means of a "dovetail"-type joint which precludes wrong positioning and makes it possible to hold center-to-center distance accurate to ±1 mm. The spring movable end (Fig. 7 and 8) comprises two parts – the end itself and the stop on the shaft. The step is located on the shaft and can move longitudinally but cannot turn on the shaft. This design is used to reduce internal stress and turn-to-turn friction generated during torsion spring operation, which makes it possible to qualitatively improve the spring characteristic. The movable end is reliably secured on the stop by means of slots accurate to ¼ of a turn, which makes it possible at any moment to easily change the number of turns to cock the spring and thus to fine-tune the torsion mechanism for balancing the gate. Additional securing of the movable end on the stop is done by set screws which, together with engagement in the slot, eliminates the possibility of the end breaking off of the stop.

Industrial Utility

The proposed design is characterized by high reliability and strength, and eliminates the need for using intermediate support brackets in the case of wide gate openings.

In addition, the design is very safe during installation and accurate when assembling.

CLAIMS

1. A sectional gate comprising a curtain of pivotally connected panels, the panels having butt ends located in L-shaped guides, and a shaft which is parallel to the panels planes, the shaft being mounted in an upper section of the gate, the shaft being connected to a drive and having rope drums attached to its ends by means of adapters, the ropes being connected to a bottom of the gate and/or upper panel, and torsion mechanisms with torsion springs that are installed on the shaft at its ends, one end of each spring being attached to the shaft, wherein the shaft is hollow, cylindrical and has key slots in the areas where the adapters are attached, and the shaft has a middle part that has an octagonal cross-section and made of cold rolled steel, wherein deflection between any two shaft support points does not exceed 1/600 of the length of the torsion mechanism.

2. The sectional gate per claim 1, distinctive in that in order to ensure an even rope tension during the gate movement the key slot torsion angle does not exceed 10° along the entire length of the torsion mechanism.

3. The sectional gate per claim 1, distinctive in that the shaft attachment to the walls is done by means of no more than two brackets with groups of bearings in order to ensure their alignment during the shaft rotation.

4. The sectional gate per claim 1, distinctive in that the octagonal middle part of the shaft is made composite along its length and has a sleeve coupling formed by two or four sheet metal pieces joined with each other at their flanged sections by means of threaded joints, and at least one section of each piece adjacent to the shaft is connected to the shaft in the zone between the flanges by means of threaded joints.

5. The sectional gate per claim 1, distinctive in that it is equipped with end support brackets for the rear position of the shaft, and each bracket has two places for attaching it to the ceiling that are turned 90° relative to each other to ensure distribution of acting lateral and longitudinal loads.

6. The sectional gate per claim 5, distinctive in that the torsion mechanism is completely installed on the end support brackets, with safety devices attached to them, wherein each end support bracket has several fixed positions for shaft attachment.

7. The sectional gate per claim 1, distinctive in that it is equipped with end support brackets for the front position of the shaft, and in order to ensure their attachment in a place suitable for installation the brackets provide the possibility of free installation including their vertical or lateral movement without moving other gate components in the process.

8. The sectional gate per claim 1, distinctive in that it is equipped with end support brackets for holding the shaft in a low position, with each bracket having load carrying capacity of at least 600 kg, with the possibility of installing them in pairs for attachment to a multi-shaft mechanism and positioning them vertically with respect to each other while providing their attachment to each other in the same plane using a "dovetail"-type joint, with center-to-center spacing accurate to ±1 mm.

9. The sectional gate per claim 1, distinctive in that each torsion spring of the torsion mechanisms has a movable end comprised of two parts – the end itself and a stop on the shaft - which in order to reduce internal stress and turn-to-turn friction has the capability of free movement along the shaft without turning, and the movable end itself is secured on the stop on the shaft by means of slots accurate to ¼ of a turn, to make it possible to adjust the torsion mechanism for balancing the gate at any moment by changing the number of turns to cock the spring, wherein additional securing of the movable end on the stop is achieved with set screws which, together with engagement in the slot, precludes the possibility of the end breaking off of the stop.

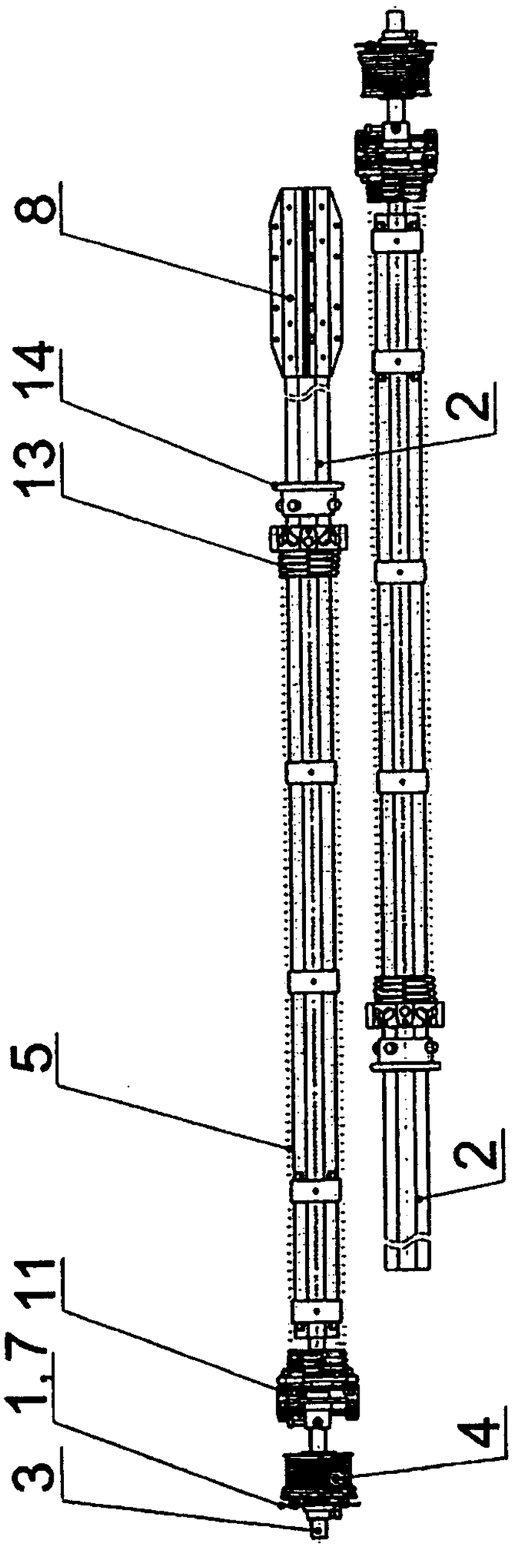


Fig. 1

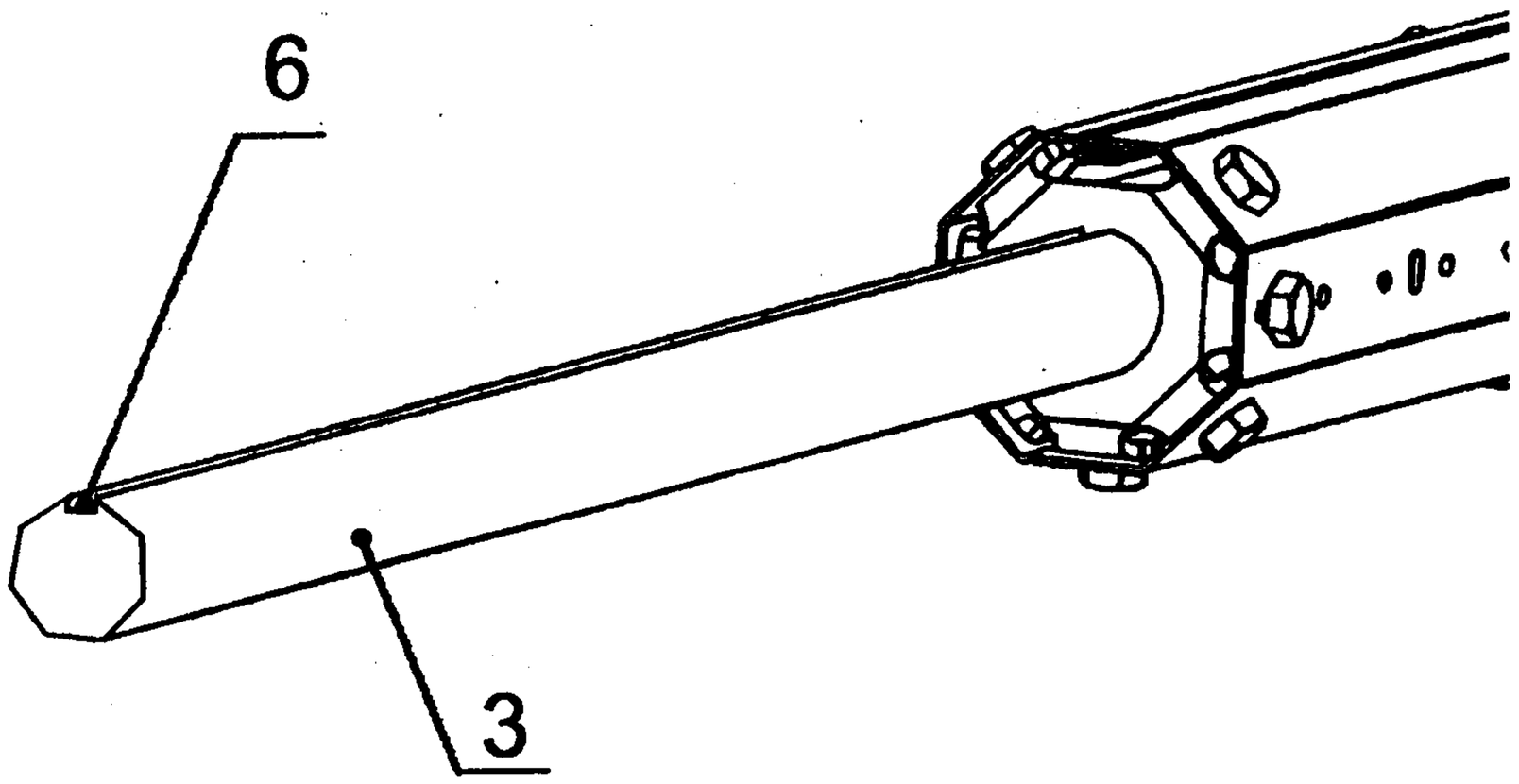


Fig. 2

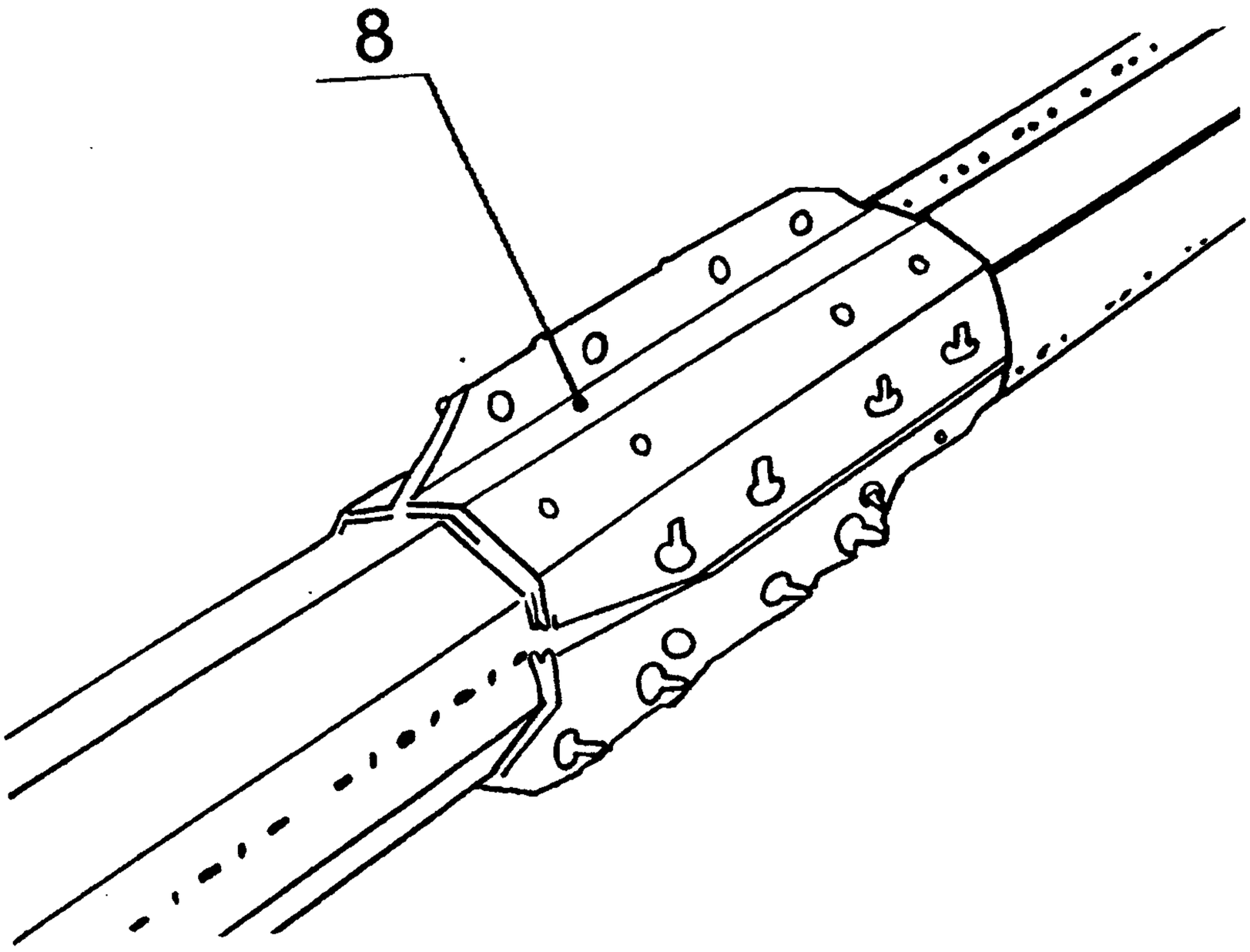


Fig. 3

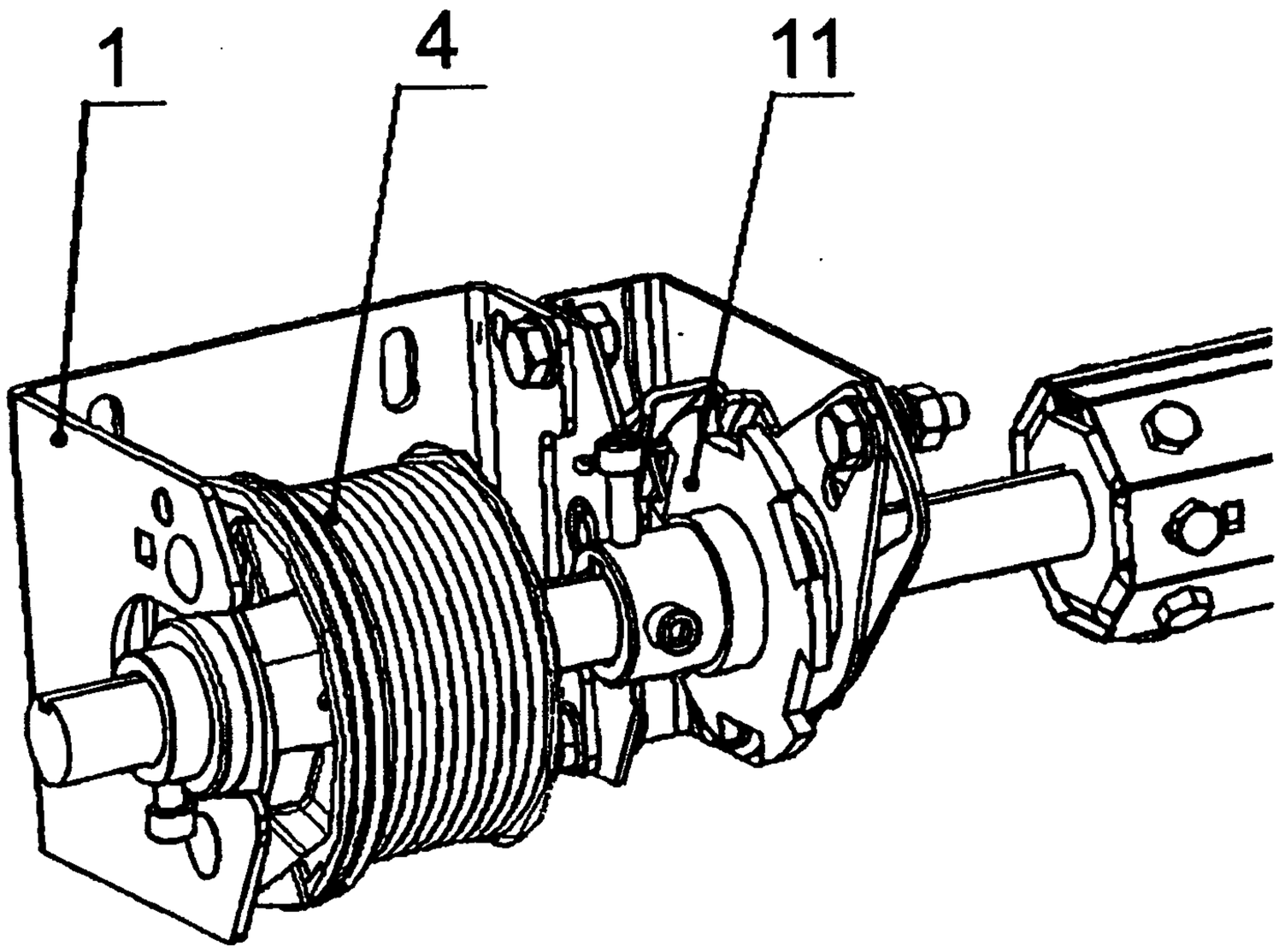


Fig. 4

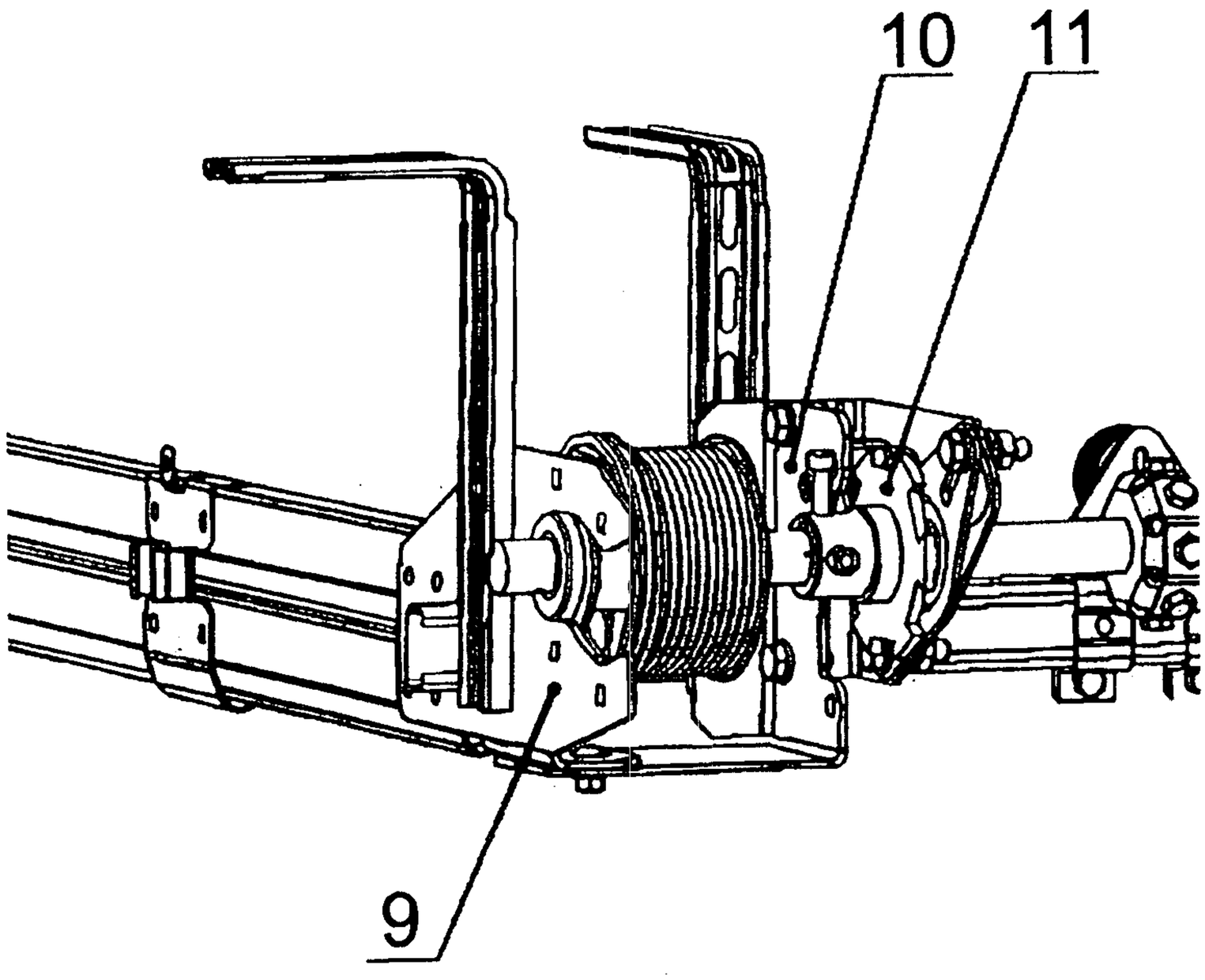


Fig. 5

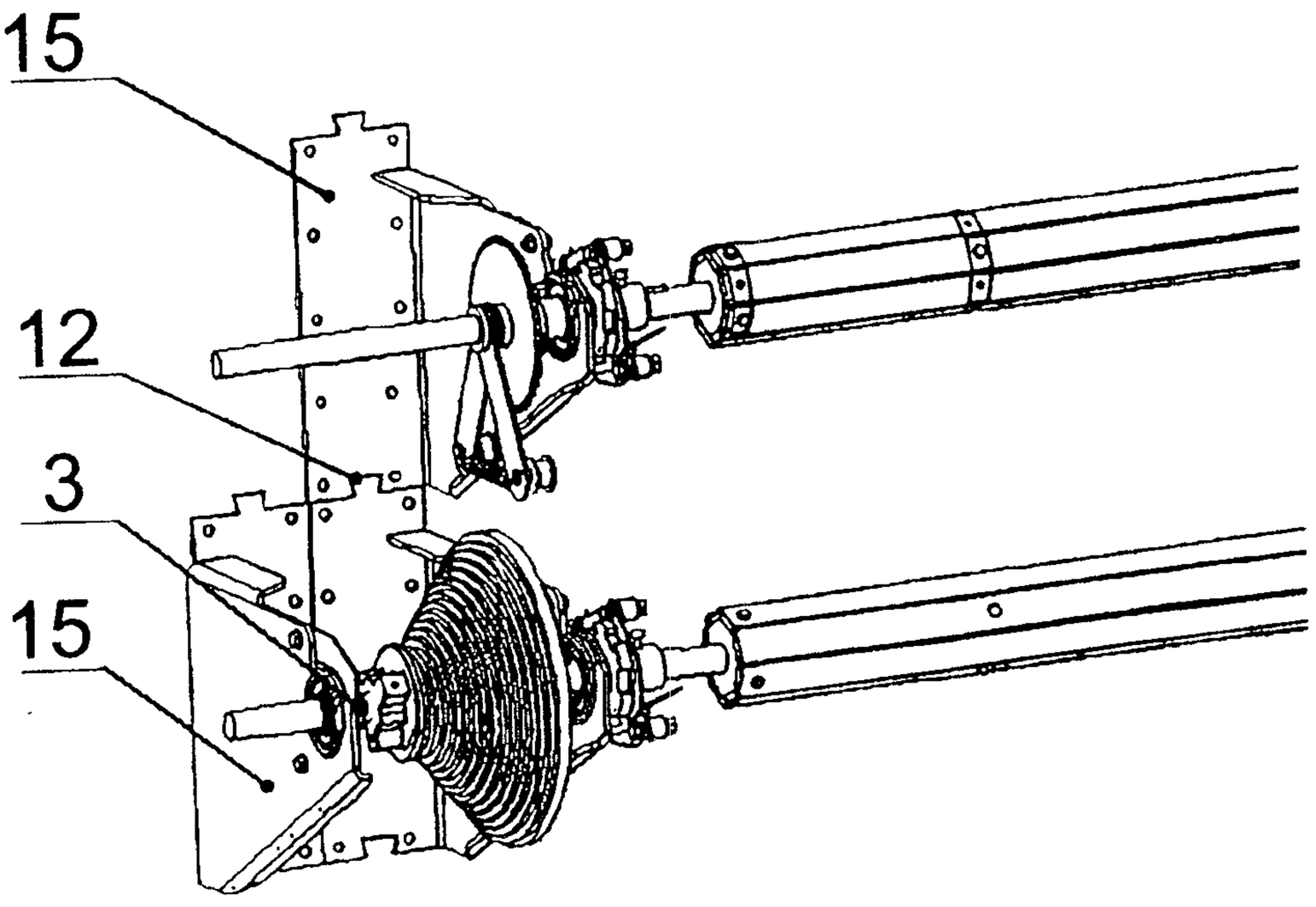


Fig. 6

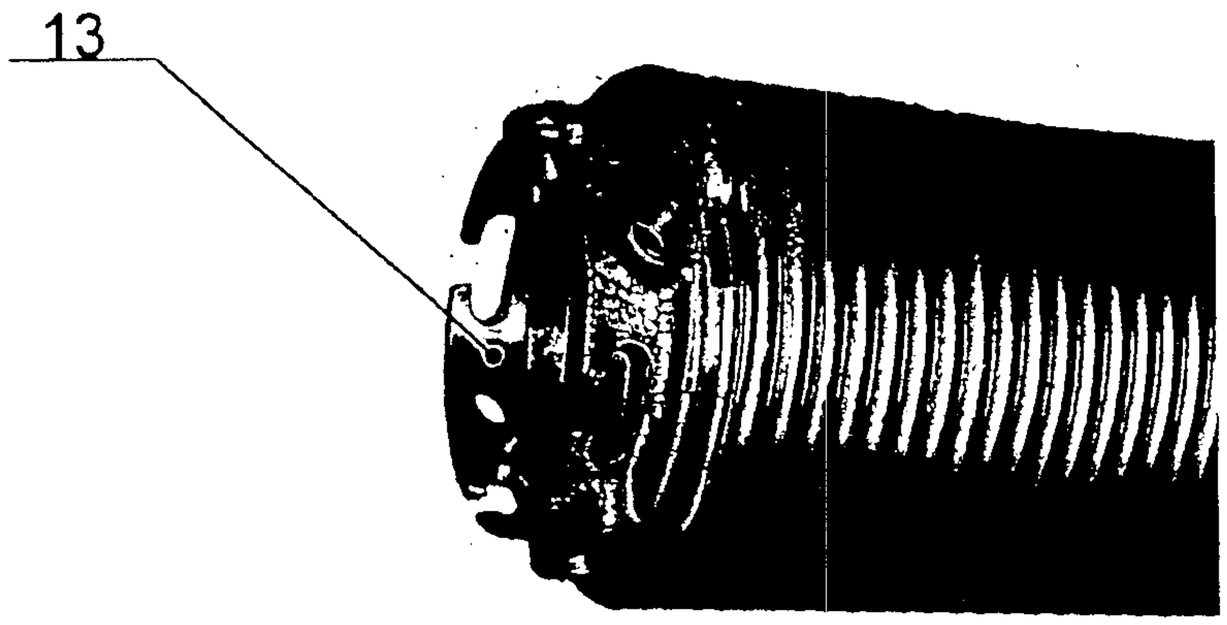


Fig. 7

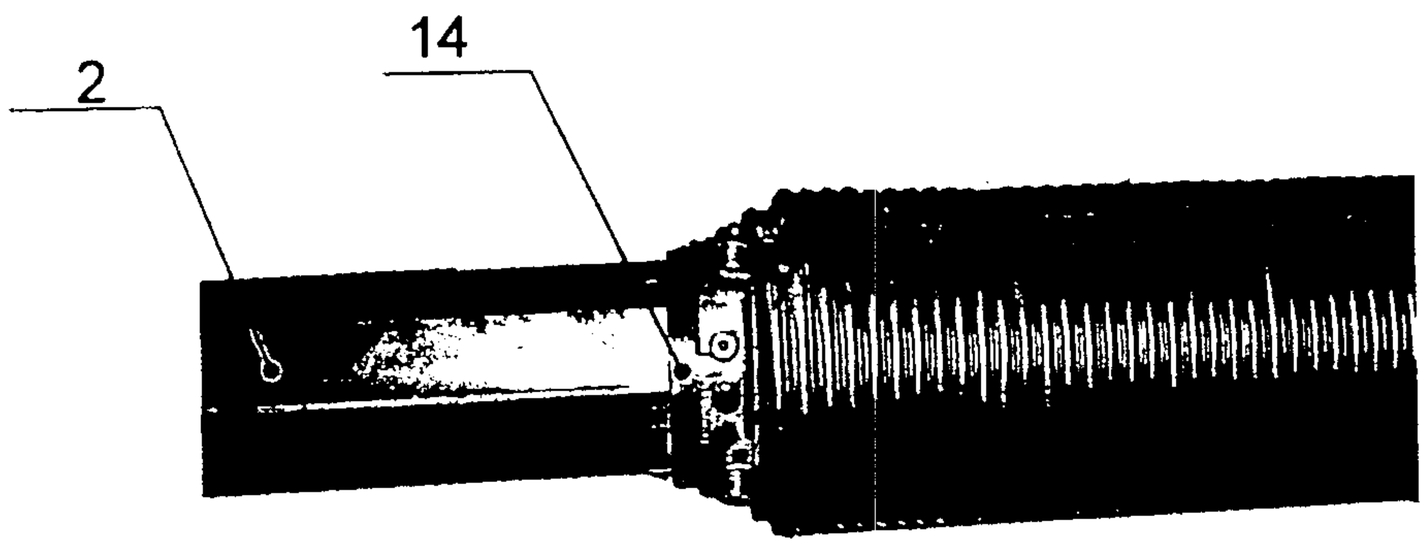
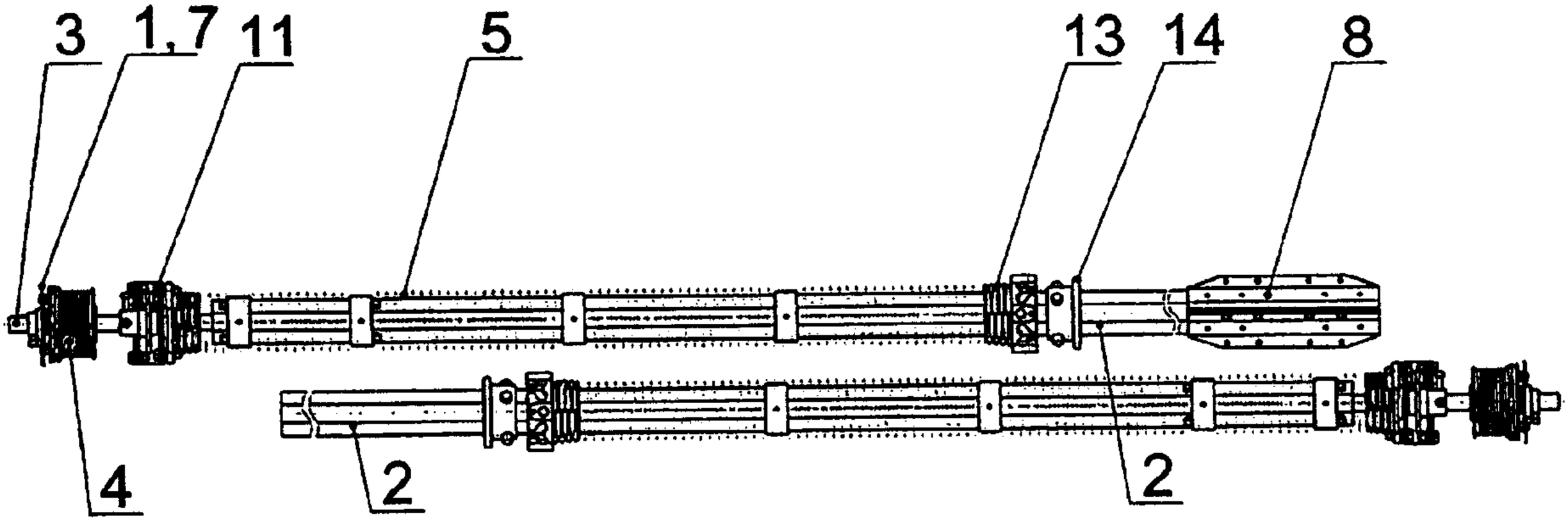


Fig. 8


3
1,7
11
5
13
14
8
4
2
2