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GRIPPING DEVICE FOR SHELLS

The technical field of the invention is that of gripping devices for shells, and in particular for large-caliber shells.

In order to handle large-caliber shells (diameter greater than 80 millimeters) simply and quickly, it is known from patent FR 3,041,622 to use a shell clamp including a pair of jaws intended to clamp a shell, each jaw pivoting between an open position and a closed position about a pivot pin parallel to the longitudinal axis of the shell, the pivot pin of each jaw being located between a lower end and an upper end of the jaw, the upper end of each jaw making it possible to close the jaw by bearing of this upper end on a shell to be grasped.

According to this patent, the upper end of each jaw includes a notch intended to interfere with a lug of a cam in order to keep the jaws in the closed position.

The closed position of the jaws is therefore directly related to the relative geometries of the cam and the jaw.

The cam is secured to a pivoting paddle, the pivoting of which, which is caused by the bearing on a zone close to a stretcher, makes it possible to rotate the cam and thus free the lug from the rotating path of the notch of the jaw, which results in freeing the opening of the jaw.

According to this patent, the gripping of a shell is done at its base on the one hand and at its warhead on the other hand. The geometries of the jaws and their cam are therefore defined as a function of the dimensions of these parts of the shell.

If one wishes to handle shells of different types and therefore different lengths, the geometries of the jaws will not be adapted and therefore the gripping will be poor, which risks causing accidents.

The invention proposes a single device for handling shells of variable lengths and ensures safer gripping of the transported shell.

The invention relates to a gripping device for shells, including at least one pair of jaws intended to clamp a shell, each jaw being able to pivot between an open position and a closed position about a pivot pin parallel to the longitudinal axis of the shell, the pivot pin of each jaw being secured to a frame and located between a lower end and an upper end of the jaw, the application of the upper end of each jaw on the shell causing the closing of the jaws, the device being characterized in that it includes a locking means linking the upper ends of the jaws and comprising two connecting rods and a central segment linking

these connecting rods, the connecting rods being articulated relative to the jaws by a first articulation and articulated by a second articulation to the central segment, an elastic return means linking each first articulation at a so-called central point positioned in the middle of the central segment, the device including at least one movable stop secured to a maneuvering lever, the stop being located above the locking means and able to push the locking means downward until it is below an unstable equilibrium position of the locking means.

Advantageously, the device includes at least two pairs of coaxial jaws.

Advantageously, the device includes two stops each including a lever, each stop being intended to bear on one of the connecting rods of the locking means.

Advantageously, the frame includes a sliding bearing intended to interfere with an upper part of the shell in order to wedge the shell in the device.

Advantageously, the device includes at least one shim in its rear part that is intended to bear on a rear face of the base of the shell in order to position the latter longitudinally relative to the device.

Advantageously, each lever may be secured to two stops, each stop being intended to act on a connecting rod associated with a different pair of jaws.

The invention will be better understood upon reading the following description, the description being done in light of the appended drawings, in which drawings:

Figure 1 shows a three-quarters perspective view of a device according to the invention containing a shell.

Figure 2 shows a partial cross-sectional view along the offset parallel section plane A-A shown in Figure 1.

Figures 3a, 3b and 3c shows schematic views of a device according to the invention during three successive steps of gripping a shell.

Figures 4a, 4b and 4c shows schematic views of a device according to the invention during three successive steps of releasing a shell.

Figures 5a, 5b and 5c show schematic detail views of a locking means equipping a device according to the invention during the closing of the jaws of the device.

According to Figure 1, a shell gripping device 1 intended to be attached to the end of a manipulating arm (arm not shown) includes a frame 2 that includes two pairs of jaws 10. Each pair of jaws 10 is intended to clamp a shell 100 at a cylindrical portion of its body. Each jaw 10 is mounted pivoting between an open position and a closed position

owing to a pivot pin 11 located between the lower end 10a and an upper end of the jaw 10.

As shown in Figure 2, the upper ends 10b of the jaws 10 are linked to one another by pairs by a locking means 30.

This locking means 30, detailed in Figures 5a, 5b, 5c, includes a central segment 13, each of the ends of which carries a connecting rod 14 that is coupled to an upper end 10b of a jaw 10.

The connecting rods 14 are articulated relative to the jaws 10 at first articulations 16 and relative to the central segment 13 at second articulations 61.

It will be noted that Figure 2 is a sectional view along two parallel planes. Thus:

- the left part of Figure 2 shows the device cut at the pin 11 of the jaw located toward the rear of the shell and behind this jaw 10, which makes it possible to view a connecting rod 14;
- the right part of Figure 2 shows the device cut behind the part of the frame 2 supporting the pin 11 of the jaw 10 located in front of the shell, which makes it possible to view a tension spring 15 and its central attachment point 13b.

Elastic return means 15, in the case at hand tension springs 15, link the first articulations 16 to a point, called central point 13b, of the central segment 13. This central point 13b is located longitudinally in the middle of the central segment 13, below a horizontal line L passing through each of the articulations 16 and 61 when the connecting rods 14 are aligned as in Figure 5c.

Thus, according to Figures 3a to 3c, in order to grasp a shell 100, the device 1 is lowered onto the shell 100 with the jaws 10 in the open position. The upper end 10b of each jaw 10 is placed bearing on the shell 100.

In this position, the locking means 30 is in the configuration shown in Figure 5a. The springs 15 exert a force that tends to bring the first articulations 16 closer to the central point 13b and thus to move the second articulation 61 downward, which opens the jaws 10 and keeps them in this open position.

According to Figure 3b, the bearing and the lowering of the device 1 on the shell 100 causes the pivoting of the jaws 10 about their pins 11 toward the closed position and the clamping of the shell 100. During this phase, the upper ends 10b of the jaws 10 move away from one another.

The locking device 30 goes through an unstable equilibrium position illustrated in Figure 5b where the first 16 and second 61 articulations of each connecting rod 14 align with the central point 13b. Each line linking a first articulation 16 and a second articulation 61 is parallel to the tension force of the spring 15 in question, which constitutes an

unstable position for the locking means 30. In this position, the tension force supplied by each spring is at its maximum.

By continuing the closing movement of the jaws 10, the connecting rods 14 will gradually rotate until they align (Figure 5c). As previously mentioned, it is noted that once the connecting rods 10 are aligned, the central point 13b of the central segment 13 is located below a horizontal line L passing through each of the articulations 16 and 61, which makes it possible to force the crossing of the unstable equilibrium position by the second articulations 61. The jaws 10 are then in their most closed position. Once the unstable equilibrium position of Figure 5b has been passed, the springs 15 result in bringing the connecting rods 14 closer to position 5c, which corresponds to maximal closure of the jaws 10.

In order to stop the movement of the connecting rods 14, a stop 17 placed above the locking means 30 (also visible in Figure 2) blocks the rising of the second articulations 61 by interfering with the connecting rods 14 or the central segment 13.

The shell 100 is then blocked by the jaws 10 as visible in Figure 3c.

In order to release the shell 100, the device 1 is brought above a stretcher 200 as in Figure 4a. The stretcher is similar to that described by patent FR 3,041,622 and has, on either side, bearing elements 19 called buffers 19 that are intended to interfere with levers 18 of the device 1, pivoting relative to the frame 2 about pins 20 and secured to stops 17 (see also Figures 1 and 2).

By lowering the device 1 bearing the shell 100, like in Figure 4b, the interference of the buffers 19 will cause the pivoting of the levers 18, which will push the stops 17 against the connecting rods 14 until the second articulations 61 pass below the unstable equilibrium position previously defined, which causes the rapid opening of the jaws 10 (driven by the springs 15), as visible in Figure 4c, and the depositing of a shell 100 in the stretcher 200.

The jaws 10 are then locked in the open position by the simple tension action of the springs 15. The device 1 is ready to grasp a new shell.

One can therefore see that the device according to the invention can adapt to the holding of shells having substantially different sizes, the locking position being able to be obtained for different pivotings of jaws. The essential point is to pass the locking means 30 past its unstable equilibrium position. In this case, the springs 15 ensure the locking of the jaws. The stiffness of the springs 15 will be chosen to be sufficient to prevent, during

vibrations, any return of the locking means 30 to the released position of the shell (Figure 3a).

As shown in Figures 4a to 4c, the device 1 may include a sliding bearing 60 able to be pushed back by a spring 67 through the frame 2 and against the upper part of a shell in order to wedge it when it is grasped in the device 1 by application of a vertical force, to combat the accelerations on all of the axes.

In Figure 1, it is noted that the frame 2 includes a pair of shims 32 intended to bear on a rear face of the base 105 of the shell 100 in order to position the shell 100 longitudinally relative to the device 1. The frame 2 also includes, on each side, flanging elements 33 (only one is visible in Figure 1) that are intended to limit the pivoting of the levers 18 and therefore the downward travel of the associated stops 17. It will also be noted that according to the embodiment of Figure 1, each lever 18 is secured to two stops 17 that are intended each to act on a locking means associated with a different pair of jaws. Thus, the levers 18 are located longitudinally midway from the pairs of jaws 10 (Figure 1).

Krav:

1. Gribeindretning (1) til granater (100), omfattende mindst et par kæber (10), som er beregnet til at gribe fat i en granat (100), hver kæbe (10) kan dreje mellem en åben position og en lukket position omkring en drejeakse (11), som er parallel med granatens (100) længdeakse, hver kæbes (10) drejeakse (11) er fast forbundet til en ramme og placeret mellem en nedre ende (10a) og en øvre ende (10b) af kæben (10), anvendelsen af hver kæbes (10) øvre ende på granaten (100) forårsager lukning af kæberne (10), indretningen er **kendetegnet ved at** den omfatter et låsemiddel (30), som forbinder kæbernes (10) øvre ender (10b) og omfatter to forbindelsesstænger (14) og et centralt segment (13), som forbinder disse forbindelsesstænger (14), forbindelsesstængerne er ledforbundne med kæberne (10) ved hjælp af en første ledforbindelse (16) og ledforbundne ved hjælp af en anden ledforbindelse (61) til det centrale segment (13), et elastisk returmiddel (15) forbinder hver første ledforbindelse (16) i et såkaldt midterpunkt (13b), som er anlagt i midten af det centrale segment (13), indretningen omfatter mindst ét bevægeligt stop (17), som er fast forbundet til en manøvrearm (18), stoppet er placeret over låsemidlet (30) og er i stand til at skubbe låsemidlet (30) nedad indtil det er under en ustabil ligevægtsposition for låsemidlet (30).

2. Gribeindretning ifølge krav 1, **kendetegnet ved at** den omfatter mindst to par koaksiale kæber.

3. Indretning ifølge et af kravene 1 til 2, **kendetegnet ved at** den omfatter to stop (17), som hver omfatter en arm (18), hvert stop (17) er beregnet til at trykke en af låsemidlets forbindelsesstængerne (14) ned.

4. Indretning ifølge et af kravene 1 til 3, **kendetegnet ved at** rammen (2) omfatter et glideleje (60), som er beregnet til at interferere med en øvre del af granaten (100) for at kile granaten fast i indretningen.

5. Indretning ifølge et af kravene 1 til 4, **kendetegnet ved at** den i sin bagerste del omfatter mindst en støttekile (32), som er beregnet til at ligge an mod en bagflade af granatens bund for at placere sidstnævnte på langs i forhold til indretningen.

6. Indretning ifølge krav 3, **kendetegnet ved at** hver arm (18) er fast forbundet med to stop (17), hvert stop (17) er beregnet til at virke på en forbindelsesstang (14), som er forbundet med et andet par kæber.

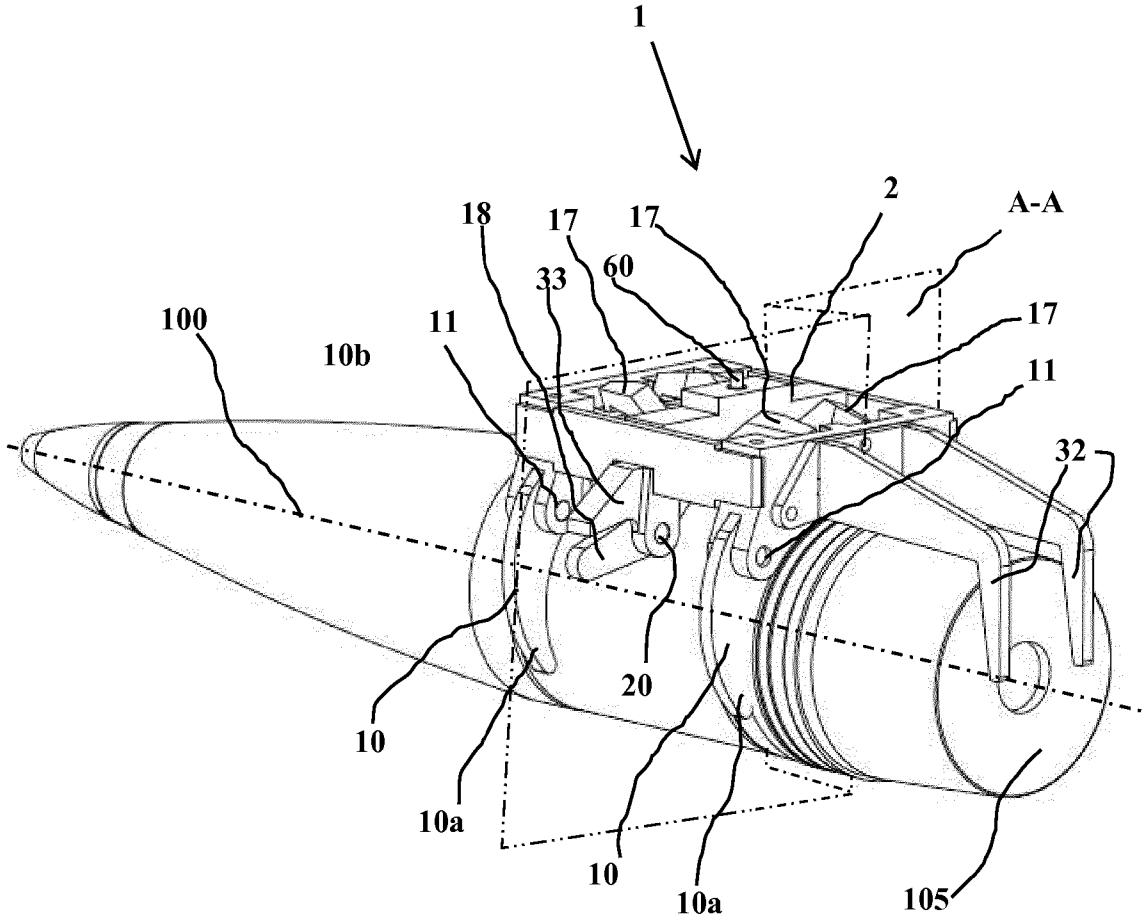

Fig. 1

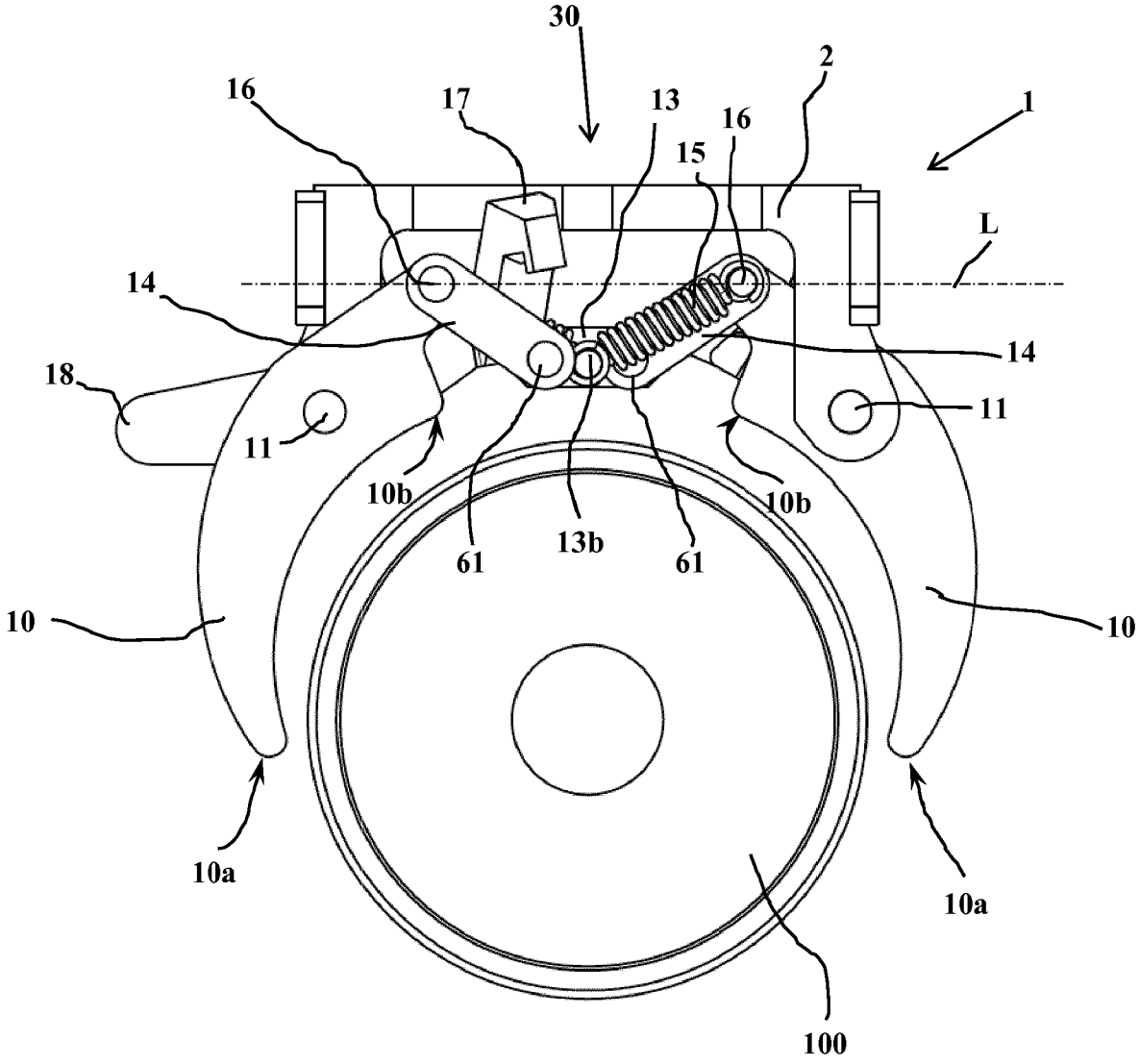
30
2
16
17
13
16
1
15
L
14
14
18
11
11
10b
10b
61
13b
61
10
10
10a
10a
100

Fig. 2

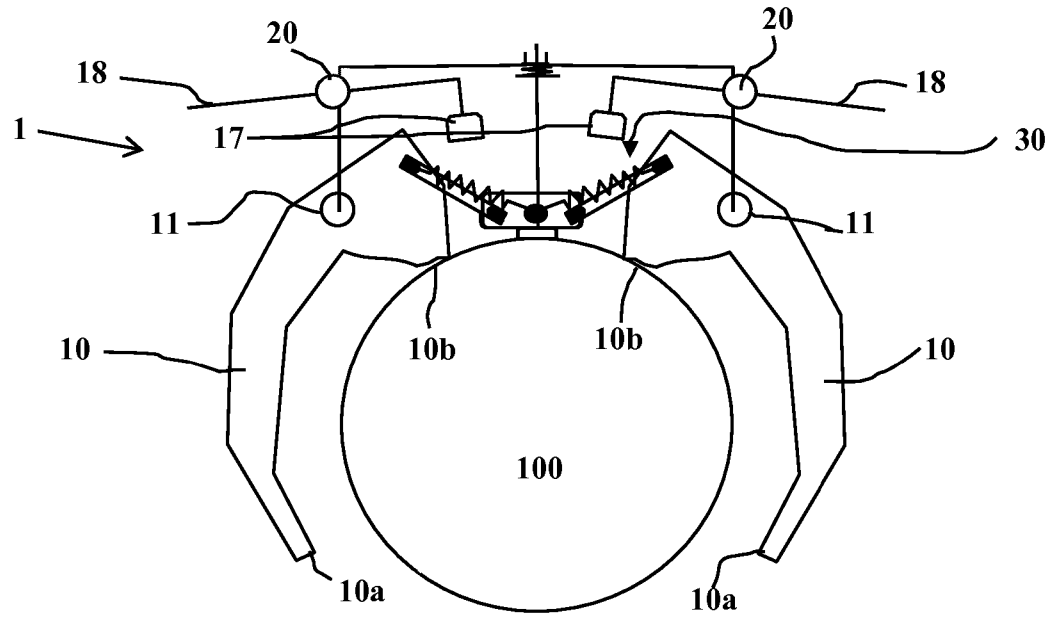

Fig. 3a

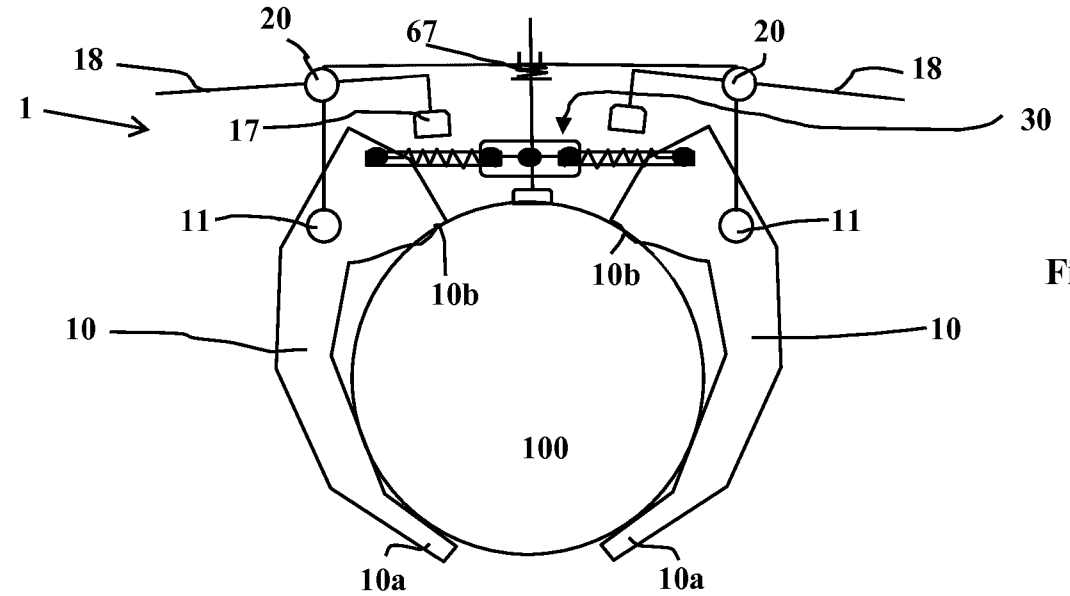

Fig. 3b

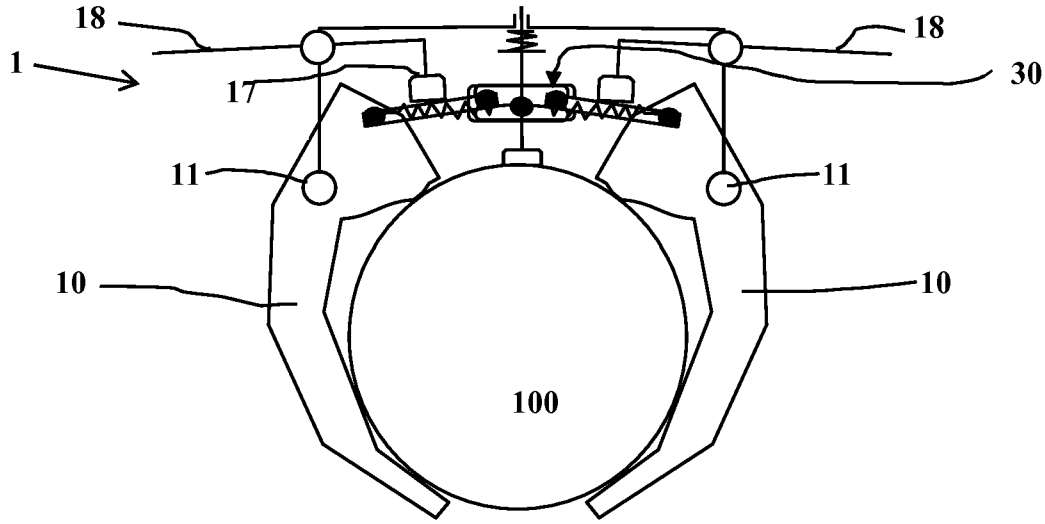

Fig. 3c

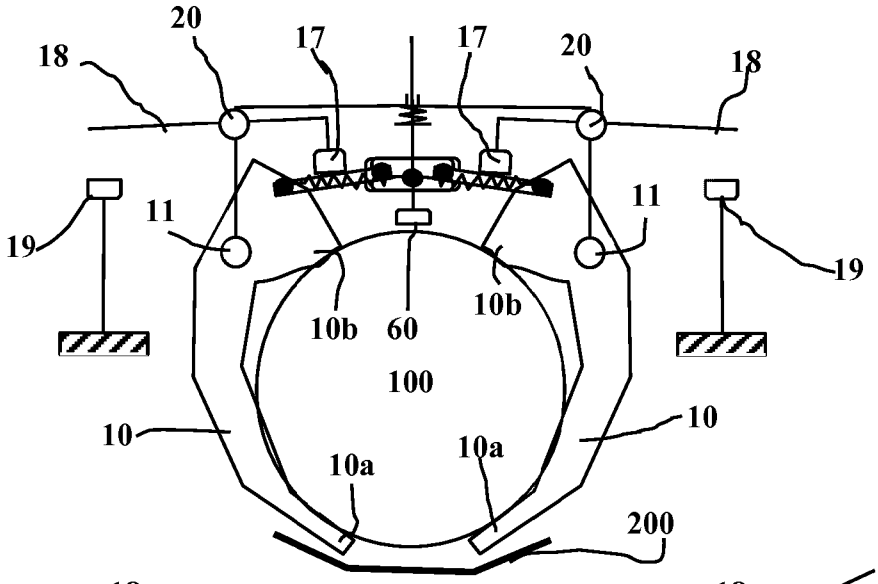

Fig. 4a

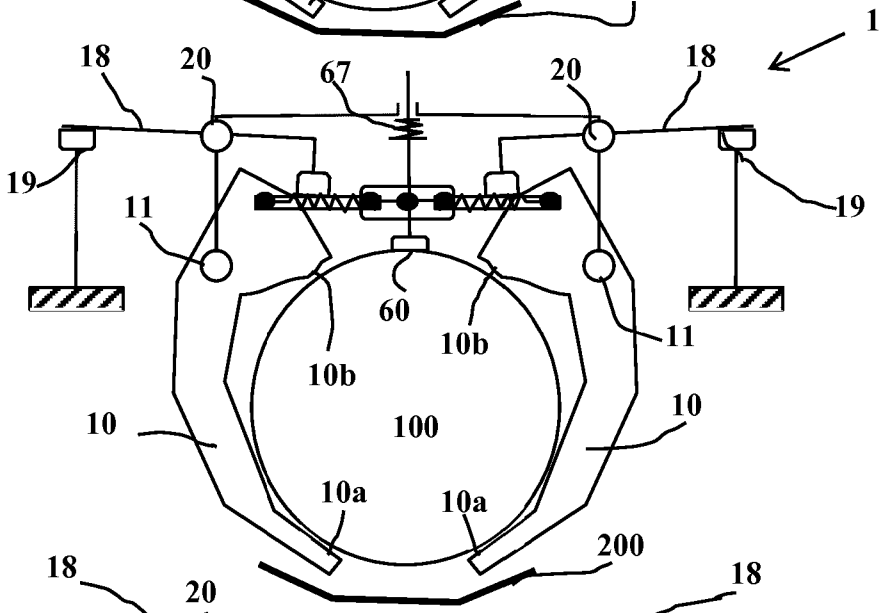

Fig. 4b

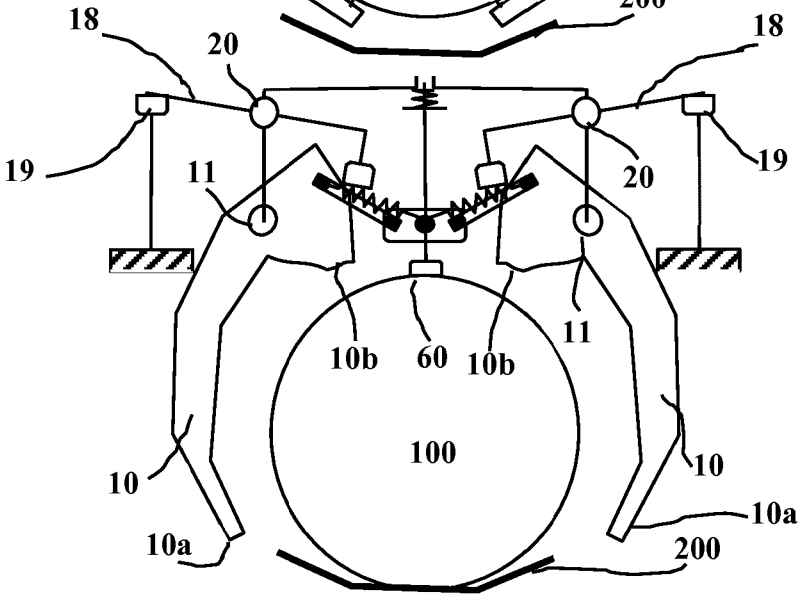

Fig. 4c

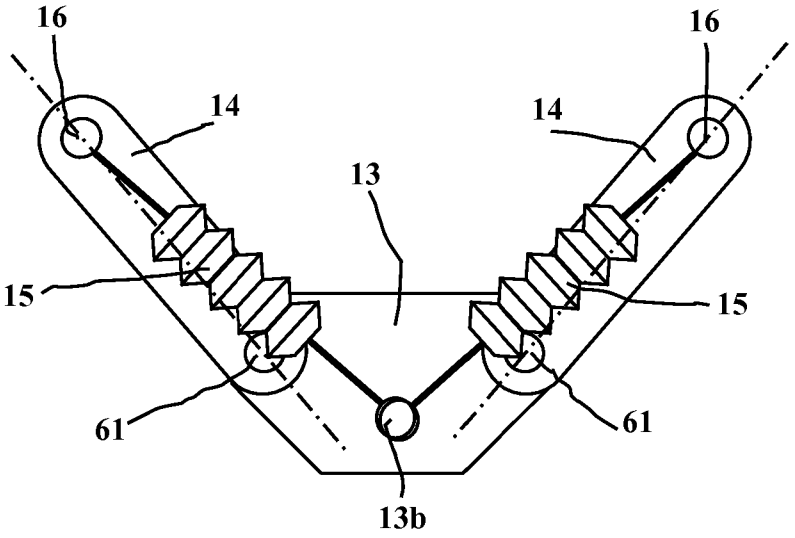

Fig. 5a

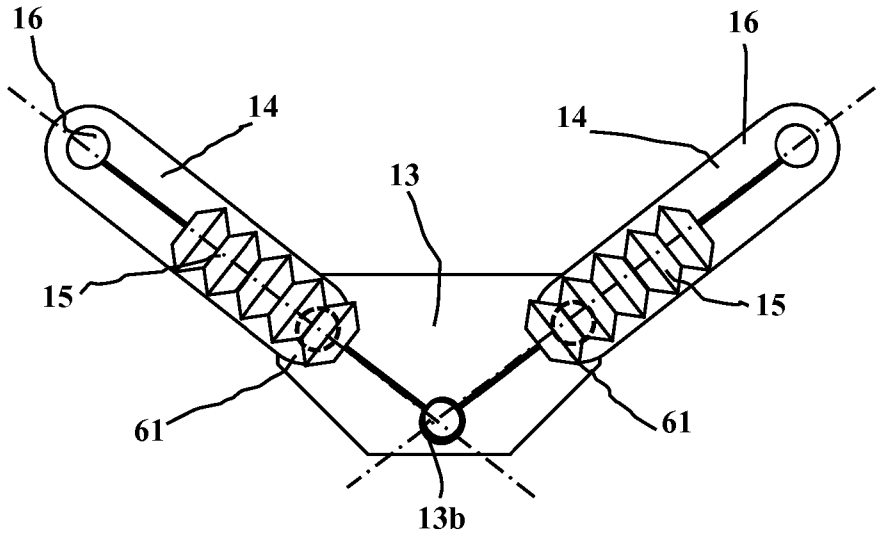

Fig. 5b

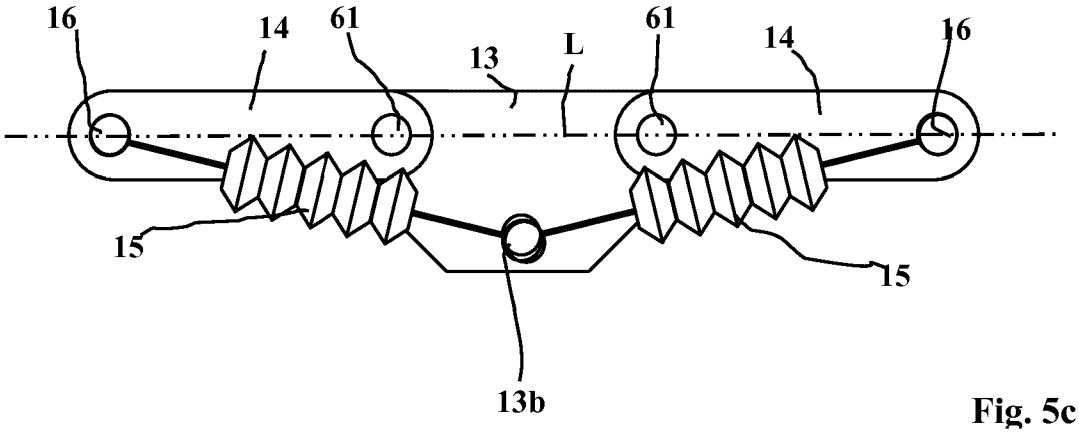

Fig. 5c