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(54) Title: WIRE LOCK 		
(57) Abstract A locking device for locking unattached objects to e.g. a stationary part of a building or for locking objects to one another, comprising a lock casing (1) in which a drum (2) is mounted for rotation during unwinding and winding-on of a strap, a line, or preferably a wire (5), the free end of which preferably is provided with an end piece (6) adapted to be inserted to an opening in the lock casing (1) and to be secured with the aid of a lock (7). The drum (2) is connected to a knob (9) by means of which a wire (5) may be wound onto the drum (2) and be tensioned by a desired tensioning force. The knob (9) is connected to the drum (2) via coupling means (2.2, 9.2) and in its non-actuated position the knob (9) is disconnected from the drum (2).		

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WIRE LOCK

The present invention relates to a locking device for securing unattached objects to e.g. a stationary part of a building, or for locking objects to one another, comprising a lock casing in which a drum is mounted for
5 rotation during unwinding and winding-on of a strap, a line, or preferably a wire, the free end of which preferably is provided with an end piece adapted to be inserted into an opening in the lock casing and to be secured with the aid of a lock therein.

10 DESCRIPTION OF THE INVENTION

The locking device in accordance with the introductory part comprises a lock casing having a bottom piece and a lid, the lock proper being arranged in the lid. The lock may be a conventional key-operated lock but
15 preferably it is a combination lock having setting means to produce combinations of numbers allowing the lock to be opened. The end piece attached to the wire of the locking device is arranged to be secured when the lock is brought to the locking position and to be disconnected as
20 the lock is opened. The end piece may be replaced by a loop-shaped part of the wire, a solution which, however, impairs the manageability of the locking device.

The locking device in accordance with the invention is characterised in that the drum in the lock casing is
25 connected to a manually actuatable knob which is mounted for rotational movement about rotational shaft coinciding with the rotational axis of the drum, and with the aid of which the wire may be reeled onto the drum and be tensioned by the desired tensioning force. Preferably,
30 the knob is connected to the drum via coupling means, said knob, in its non-actuated position, being disconnected from the drum and in its actuated position being connected to the drum.

Preferably, the drum supports a gear which is connected to a pawl arm which, when the wire is being wound-on is arranged to snap against the teeth of the gear and when pulling forces are exerted on the wire is arranged to block the drum against rotation. The pawl arm is connected to a locking arm on the lock and is arranged to turn out of contact with the gear when the locking arm is turned to the open position. The drum is also affected by a band spring, i.e. a so called spiral spring, which is wound about a centre and arranged to be tightened as the wire is being unwound from the drum and to counter-rotate the drum when the wire is being wound-on as long as the wire travels into the lock casing essentially without resistance.

When the wire, owing to spring actuation, is wound onto the drum the knob is pressed against the lock casing sufficiently to cause engagement of the coupling means, whereupon the drum may be tightened manually to achieve the desired wire tension. The winding-on of the wire onto the drum, by spring action on the drum or through manual actuation of the knob of the locking device, is effected in a position, in which the wire end piece is inserted in the lock casing and secured thereto owing to the lock having been caused to assume a locking position. This arrangement means that locking of the end piece may be effected in a position, wherein the wire is effected only by the spring force and that the tensioning of the wire may be effected separately from the locking operation. Consequently, the locking operation may be performed directly following the application of the wire around the objects to be secured. It is possible to subsequently readjust the wire and on the one hand to post-tighten it manually around the objects and on the other to tighten it with the aid of the knob on the locking device.

By the expression wire should be understood in this connection all kinds of flexible elements, such as lines, straps and the like which additionally are manufactured

from a material that can be severed only with difficulty. For this reason, the wire preferably is made from steel wire but which is coated by a plastic cover in order not to damage the objects to be secured.

5 The lock casing is also manufactured from a strong material, such as steel, and it is assembled in such a manner that the means for separating the casing are accessible only by removal of the lock when the latter assumes its unlocked position.

10 DESCRIPTION OF THE DRAWING FIGURES

The invention will be described in the following by way of one embodiment with reference to the accompanying drawings.

15 Fig. 1 shows a wire lock in a longitudinal sectional view through a shaft of a wire drum forming part of the device.

Fig. 2 illustrates the wire lock device in accordance with Fig. 1 as seen in the axial direction of the wire drum.

20 Fig. 3 illustrates a wire lock device in accordance with an alternative embodiment in a longitudinal sectional view similar to the one in Fig. 1.

25 Fig. 4 is a cross-sectional view of the alternative embodiment of the wire lock, the section being taken on line I-I of Fig. 3.

Fig. 5 is a longitudinal sectional view of the alternative embodiment of the wire lock, the section being taken on line II-II of Fig. 3.

30 Fig. 6 is a longitudinal sectional view of the alternative embodiment of the wire lock, the section being taken on line III-III of Fig. 3.

Fig. 7 illustrates a third embodiment of the wire lock in accordance with the invention in a longitudinal sectional view similar to the one illustrated in Fig. 1.

35 Fig. 8 is a cross-sectional view of the embodiment of the wire lock of Fig. 7, the lock being shown in the unlocked position.

Fig. 9 is a cross-sectional view of the embodiment of the wire lock of Fig. 7, the lock being shown in the locked position.

Fig. 10 illustrates an embodiment of the lock casing and the end piece in an unlocked position.

Fig. 11 illustrates the lock casing and the end piece of Fig. 10 in a locked position.

Fig. 12 illustrates an alternative embodiment of the end piece.

10 The wire lock device illustrated in Figs 1 and 2 comprises a lock casing 1 essentially of prisma configuration, in which casing a wire drum 2 is rotatably mounted about a sleeve-shaped stub axle 3 projecting from the bottom 1.2 in the lock casing 1.

15 The sleeve-shaped stub axle 3, illustrated in a longitudinal, sectional view in Fig. 1, serves as a means of attachment for the inner end of a band spring 4 the outer end of which is attached to the wire drum 2. In the retracted position, a wire 5 is wound around the wire
20 drum 2 by means of the band spring 4, the latter being tightened as the wire 5 is being extracted out of the casing 1 while being unreeling from the wire drum 2. The wire 5 is intended to be applied around or through an object to be locked e.g. to a stationary building
25 component or the like, and to be reinserted into the lock casing 1. For this purpose, its free end is formed with an end piece 6 adapted to be introduced into the lock casing wherein it is locked by means of a lock known per se after the wire having been drawn in the desired
30 manner.

In the embodiment illustrated, the lock 7 is of combination-lock type which may be opened from a locked position in response to the setting of a predetermined combination of numbers. The lock 7 is connected to a
35 locking arm 7.1 which is arranged on the bottom face of the lock and which is rotatable about a shaft extending perpendicularly through the upper face of the lock casing

1, upon rotation of a grip member 7.2 on the lock 7 between an opened position, wherein the locking arm 7.1 is turned outwards towards one of the long sides of the lock casing 1 as illustrated by dash-and-dot lines in Fig. 1, and a locked position, wherein the locking arm 7.1 is turned forwards, towards the opening or slot of insertion of the end piece 6 on the wire 5, and is introduced into a groove 6.1 formed in the part of the end piece 6 projecting inwards through the end wall of the lock casing 1, as illustrated in Fig. 1.

The wire drum 2 supports a gear 2.1 on the side thereof that is directed towards the lock 7. A bar pawl 8 is arranged for turning movements about a pin 8.1 extending in parallel with the axis of rotation of the wire drum 2, between an abutment 8.2 by means of which the bar pawl 8 engages the gear 2.1 on the wire drum 2 and released position, in which the bar pawl 8 is turned away from the gear 2.1. The free end of the bar pawl 8 is connected to the locking arm 7.1 by means of a spring 8.3 which in this position keeps the bar pawl 8 pressed against the abutment 8.2 when the locking arm 7.1 assumes the locking position, i.e. is inserted into the groove 6.1 in the end piece 6 on the wire 5. When the locking arm 7.1 is being turned to the opened position the spring force of spring 8.3 ceases and is replaced by a pulling force, pulling the bar pawl 8 away from the abutment 8.2 and into engagement with the gear 2.1.

A knob 9 is mounted on a shaft or pin 9.1 one end of which is positioned interiorly of the sleeve-shaped wire drum axle 3 and the opposite end of which projects beyond the lid of the lock casing 1. The knob shaft 9.1 is formed with a dog or follower pin 9.3 extending perpendicularly through the knob shaft 9.1 immediately interiorly of the lock casing 1 and being maintained pressed against the inner face of the lock casing 1 by a compression spring 9.3 arranged in the bottom of the sleeve-shaped axle 3. A coupling ring 2.2 having four

open grooves 2.3 that are directed towards the dog 9.2 is arranged on the gear 2.1 in such a manner that the follower pin 9.2 may pass freely above the ring 2.2 when the compression spring 9.3 retains the knob shaft 9.1
5 pressed against the sleeve-shaped axle 3 in such a manner that the follower pin 9.3 is in contact with the lower face of the lid and maintains the knob shaft 9.1 inside the lock casing 1. The follower pin 9.2 is brought into engagement with the grooves 2.3 in the coupling ring 2.2
10 when the knob 9 is pressed manually inwards against the lock casing 1 and is turned. Since the coupling ring 2.2, the gear 2.1 and the wire drum 2 are mutually non-rotationally interconnected the wire drum 2 may be turned manually by means of the knob 9, the bar pawl 8
15 "snapping" i.e. travelling or riding on the teeth of the gear 2.1 without blocking the latter against rotational movement.

In a starting position the lock 7 is locked and retains the end piece 6 in its position of insertion in
20 the lock casing 1. When the wire lock is to be used, the lock 7 is opened by setting pre-selected combinations of numbers and turning the lock to the opened position with the aid of the grip member 7.2. In this position, the end piece 6 may be extracted from the lock casing 1 and the
25 wire 5 may be pulled out while being unreeled from the wire drum 2 since the bar pawl 8 simultaneously is turned out of contact with the gear 2.1 on the wire drum 2. The wire 5 is drawn around or through the object to be secured and, as the case may be, also about a stationary
30 object, a vehicle or some other object that is difficult to move, whereupon the end piece 6 is inserted into the opening in the lock casing 1 while at the same time the lock 7 is turned to the locked position. The wire drum 2 is affected by the force of the band spring 4, paying in
35 slack wire 5 until said wire is tightened somewhat, which occurs while the bar pawl 8 "snaps", i.e. travels or rides across the teeth of the gear 2.1. In this position,

wherein the force of the band spring 4 is no longer capable of pulling in further lengths of wire 5 the knob 9 is depressed manually, resulting in the follower pin 9.2 on the knob pin 9.1 being moved into engagement with two of the grooves 2.3 in the coupling ring 2.2 on the gear 2.1 and the wire drum 2. When the knob 9 is being turned while in its depressed position, further lengths of wire 5 are made to be wound onto the wire drum 2, tightening the wire 5 further. It is now impossible to pull the wire out of the lock casing 1 since the bar pawl 8 is in engagement with the gear 2.1 on the wire drum 2 while simultaneously abutting against the abutment 8.2.

The wire lock in accordance with the alternative embodiment illustrated in Figs 3-6 comprises a two-part lock casing 11 comprising a lid 11.1 and a bottom piece 11.2, in which casing a wire drum 12 is rotatably mounted in an outer mount 13.1 forming a part of the lid 11.1, and of the bottom 11.2. A band spring 14 is wound on a sleeve 14.1 placed centrally in the wire drum 12 and forming a means for attachment of the inner end of the band spring 14. The outer end of the band spring is connected to the wire drum 12. The band spring 14 is indicated only by the crossed boxes in Fig. 3. A wire 15, in its retracted condition, is wound onto the wire drum 12 by means of the band spring 14 and at its free end it is formed with an end piece 16 which is adapted to be inserted into the locked casing 11, wherein it is locked by means of a lock 17 after the wire 15 having been applied in the desired manner around an object to be secured. In accordance with this embodiment the end piece 16 has a T-shaped end having a rectangular cross-sectional shape and intended to be inserted into a rectangular lock opening formed in the lock casing 11 and to be turned therein over 90° to a locked position, in which the cross bar of the T-shape is caused to engage behind stationary parts of the lock casing. In this manner pulling forces exerted on the wire 15 in the

locked position thereof will be absorbed by the material of the lock casing 11 whereas the lock 17 as such remains unaffected by these forces. The lock 17 is connected to a locking arm 17.1 on the lower face of the lock, which is
5 rotatable upon turning of the key appertaining to the lock 17, not illustrated in the drawing figures, about a shaft, extending perpendicularly through the upper face of the lock casing 11, between an open position, wherein the locking arm 17.1 is turned outwards towards one side
10 of the lock casing 11, as illustrated in Fig. 5, and a locked position, illustrated in Fig. 6, in which the locking arm 17.1 is turned forwards towards the insertion slot and the end piece 16. In the locked position, the locking arm 17.1 prevents the end piece 16 from being
15 turned to such a degree that it may be pulled out of the inserted slot in the lock casing.

The wire drum 12 has a U-shaped cross-section including an upper flange 12.1 and a lower flange 12.2. On the outer face of the upper flange 12.1 an upper gear
20 12.3 is provided, and on the outer face of the lower flange 12.2 a lower gear 12.4 is provided. An H-shaped bar pawl 18, arranged to engage in the respective gears 12.3, 12.4, is linearly displaceable between a released position, wherein the bar pawl 18 is displaced away from
25 the gears 12.3, 12.4 as illustrated in Fig. 5, to a locked position, wherein the bar pawl 18 is in contact with the gears 12.3, 12.4, blocking the wire drum 12 against rotation as illustrated in Fig. 6. The bar pawl 18 is affected on the one hand by an opening spring 18.1
30 which is rigidly connected to the lock casing 11 and shaped as a tongue exerting a force on the cross bar of the bar pawl 18, which force is directed outwards, away from the wire drum 12, and also by a closing spring 18.2 which is rotatably connected with the lock casing and
35 formed as two parallel spring leaf legs arranged between the end piece 16 and the cross bar of the bar pawl 18 and which allows "snapping" of the bar pawl 18, i.e. riding

across the teeth in contact with the gears 12.3, 12.4 on the wire drum 12 upon rotation of the latter as the wire 15 is being retracted. Owing to this spring arrangement the rotation of the wire drum 12 may, in a blocked position, wherein the locking arm 17.1 is in the locked position, be prevented in one direction, i.e. from reeling-out of the wire 15 from the wire drum 12, while the wire drum 12 is simultaneously allowed to be rotated in the opposite direction with the aid of a knob 19 as the wire 15 is being tensioned.

The knob 19 is mounted in mounts in the lock casing 11 and in the upper flange 12.1 on the wire drum 12, respectively, and is kept pressed against the inner face of the lock casing 11 by means of a helical spring 20. The knob 19 is formed with an annular flange 19.1 extending in a plane in parallel with a plane through the upper flange 12.1 of the wire drum 12 and comprising teeth 19.2 which upon depression of the knob 19 in the lock casing 11 may be caused to engage in corresponding grooves 12.5 formed in the upper flange 12.1 of the wire drum 12.

In the starting position the end piece 16 is kept in the retracted condition in a storage recess formed in the lock casing 11, as illustrated in Fig. 5. When the wire lock is to be used, the end piece 16 and the wire 15 are extracted from the wire drum 12, the bar pawl 18 simultaneously assuming a released position owing to the opening spring 18.1, out of contact with the gears 12.3, 12.4. The wire 5 is applied about and through the object to be secured, whereupon the end piece 16 is inserted into the lock opening and turned over 90° so that its bars engage behind stationary parts of the lock casing 11. The key is then turned in the lock 17 in such a manner that the locking arm 17.1 blocks the end piece 16 against rotation. The wire drum 12 is affected by the force of the band spring 14, reeling-in slack wire 15, which is effected while the arm pawl 18 "snaps" against

the teeth of the gears 12.3, 12.4 against the action of the closing spring 18.2. In the position, wherein the force of the band spring 14 no longer is able to pull in further lengths of wire 15 the knob 19 is depressed manually, causing its teeth 19.2 to engage with the grooves 12.5 on the upper flange 12.1 of the wire drum 12, whereupon the knob 19 is turned, causing further length of wire 15 to be wound onto the wire drum 12 under snapping action until the wire 15 is tightened additionally. The shaped part of the end piece 16 is illustrated in its locked position in Figs 4 and 6 and it is blocked against rotation on the one hand by the locking arm 17.1 in the lock 17 and on the other by abutment against a stop shoulder 11.3 formed in the bottom 11.2 of the lock casing 11.

The cable lock in accordance with the alternative embodiment illustrated in Figs 7-12, consists of a two-part outer casing comprising a lid 21.1 and a bottom 21.2, a cable drum 22 being rotatably mounted inside said casing in an outer mount 23.1 also forming part of the lid 21.1 and in the lower end of an inner mount 23.2 forming part of the bottom 21.2. A band spring 14 is wound on a sleeve 24.1 positioned centrally in the cable drum 22 and forming an attachment means securing the inner end of the band spring 14.

The outer end of the band spring is connected to the cable drum 22. The band spring is indicated only by crossed boxes in Fig. 7. As an alternative, the band spring may be placed in a separate cartridge 22.7 which is pressed into the cable drum 22 and is prevented from rotational movement relative to the cable drum by means of locking protrusions (not visible). This arrangement facilitates the assembly operation. In accordance with the alternative the outer end of the band spring is connected to the cartridge. The end wall of the cartridge is arranged in a plane intermediate the band spring 14 and the bottom 21.2 of the external casing and prevents

the band spring, which has a tendency to bulge axially on account of its intrinsic tension, from contacting the bottom 21.2. This arrangement reduces undesirable noise otherwise produced when the outer end of the band spring rotates relatively to the bottom, causing wear thereon, and also reduces the friction between the cable drum and the bottom. In order to further reduce the friction the end wall of the cartridge is formed with ribs 22.8 on its outer face. One wall 22.9 of the cable drum 22 extends in a plane perpendicularly to the centre shaft of the drum and is disposed immediately above the band spring 14, an arrangement preventing the band spring, due to its intrinsic tension, from contacting the ring holder having a collar 24.2 and causing wear thereon during rotation, which would create undesirable noise and friction losses.

In its retracted condition a cable 25 is wound onto the cable drum 22 by means of a band spring 14 and on its free end it is formed with an end piece 26 intended to be inserted into the lock casing 21 wherein it is fastened by means of a lock 17 after the cable having been applied around an object in the desired manner. The end piece 26 in accordance with the embodiment illustrated in fig. 10 has a T-shaped end having a rectangular cross-sectional shape intended to be inserted into a rectangular lock slot formed in the lock casing 21 wherein it is turned over 90° to a locked position, in which the cross bar of the T-shape is caused to engage behind stationary parts of the lock casing 21. A pulling force exerted on the cable 25 in the locked condition thus will be absorbed by the material of the lock casing 21 and be transferred to the lid 21.1 and the bottom 21.2 whereas the lock 17 as such remains unaffected by these forces.

The lock 17 is connected to a locking arm 27.1 on the lower face of the lock, which arm may be rotated by turning a key appertaining to the lock 17, not illustrated in the drawing figures, about an axis extending perpendicularly to the parting line of the external casing,

between an opened position, wherein the locking arm 27.1 is turned outwards towards one side of the bottom piece as illustrated in Fig. 8, and a locked position, illustrated in Fig. 9, in which the locking arm 27.1 is turned forwards towards the insertion slot and the end piece 26. In the locking position the locking arm 27.1 prevents the end piece 26 from being turned which would allow it to be withdrawn from the insertion slot in the lock casing 21.

10 The cable drum 22 has a U-shaped cross-sectional configuration including an upper flange 22.1 and a lower flange 22.2. On the outer face of the upper flange 22.2 an upper gear 22.3 is provided, as illustrated in Fig. 8, and on the outer face of the lower flange 22.2 a lower
15 gear 22.4 is provided. An H-shaped bar pawl 28, arranged for engagement with the respective gears 22.3 and 22.4 is linearly displaceable between a released position, in which the bar pawl is displaced away from the gears 22.3 and 22.4, as illustrated in Fig. 8, and a locking
20 position wherein the bar pawl is in contact with the gears 22.3 and 22.4, blocking the cable drum 22 against rotation, as illustrated in Fig. 9. The bar pawl is affected on the one hand by two opening springs 28.1 of helical type acting against the lock casing 21 and
25 applying a force on the bar pawl leg ends that are directed away from the cable drum 22, and on the other by a closing spring 28.2 of leaf spring type which is affected by the end piece and which transfers the centrally acting force of the end piece 26 to the outer
30 end of the cross bar of the pawl. The spring allows "snapping" action, i.e. riding of the bar pawl 28 across the teeth in contact with the gears 22.3 and 22.4 on the cable drum 22 as the latter rotates to pull in the cable
25. Owing to this spring arrangement it is possible in a
35 locked position wherein the locking arm 27.1 assumes the locking position, to prevent rotation of the cable drum 22 in one direction, i.e. against withdrawal of cable 25

from the cable drum 22 while at the same time the cable drum 22 may be turned in the opposite direction with the aid of a knob 29 upon tensioning of the cable 25.

In accordance with an alternative embodiment the closing spring 28.2 of leaf type is replaced by a spring of helical type. The latter is affected directly by the ball-shaped end (not shown in the drawing figure) of the end piece 26.

The knob 29 is mounted in supports formed in the upper casing 21.1 and in inner part of the cable drum 22, respectively, and is kept pressed against the inner face of the upper casing 21.1 by means of a helical spring 20. The knob 29 has an annular flange 29.1 extending in parallel with a plane through the upper flange 22.1 of the cable 22 and being formed with teeth 29.2 which, upon depression of the knob 29 in the upper casing 21.1, may be caused to engage in corresponding grooves 22.5 formed in the upper flange 22.1 of the cable drum 22.

In the starting position, the end piece 26 is maintained in its retracted position by the cable 25 inside a storage sleeve 30 in the locking device, as illustrated in Fig. 8. When the locking device is to be used the end piece 26 and the cable 25 are withdrawn from the storage sleeve from the cable drum 22 while at the same time the bar pawl 29, actuated by the opening springs 28.1, is moved to the position, out of contact with the gears 22.3 and 22.4. The cable 25 is applied about or through the object to be secured, whereupon the end piece 26 introduced into the lock opening and is turned over 90° ensuring that the cross bars of the end piece engage behind stationary parts of the lock casing 21. The key is then turned in the lock 17 whereby the locking bar 17.1 blocks the end piece against turning movements.

The cable drum 22 is affected by the force of the band spring 14 and reels-in slack lengths of cable 25, which is effected while the bar pawl 28 "snaps" against the teeth 22.3 and 22.4 of the gear against the action of

the locking spring 28.2. In this position, when the force of the band spring 14 no longer is able to pull in further lengths of cable 25 the knob 29 is depressed manually to ensure that its teeth 29.2 engage in the grooves 22.5 in the upper flange 22.1 of the cable drum 22, whereupon the knob 29 is turned, causing further lengths of cable 25 to be wound onto the cable drum 22 under "snapping" action, until the cable is tensioned further. The T-shaped part of the end piece 26 is illustrated in its locked position, blocked against rotational movement, in Fig. 9, which is effected on the one hand by means of the locking arm 17.1 on the lock 17 and on the other by the abutment against two stop shoulders 21.3 provided at the end of the lock casing, as illustrated in Figs 10-11.

In accordance with Fig. 12 the end piece 26 has a built-in "skidding" function, preventing inner parts of the locking device from excessive loads and from being damaged, should the end piece 26 be turned by external brutal force thereon, for instance with the aid of a tool. The end piece comprises a cylinder 26.1 inside of which rides the T-shaped end ball 26.2 of the end piece. A locking ring 26.3 maintains the end ball 26.2 in the predetermined position thereof. A friction ring 26.4 or, alternatively, a spring of helical type, urges the end ball 26.2, while exerting a calibrated force, away from the closed end of the cylinder against the locking ring 26.3, thus producing a moment of friction. When the external sleeve is turned, the moment of torsion transferred to the end ball 26.2 cannot exceed the moment of friction determined by the force of the friction ring 26.4.

Preferably, the cable 25 comprises an inner core of multifilament stainless steel wire which is able to transfer considerable traction forces and can only be severed by means of a heavy tool. The steel wire is enclosed in a layer of braided aramid fibres (Kevlar

fibres), also able to transfer considerable traction forces and making severing of the cable additionally difficult while at the same time preventing the surface of the objects to be secured by means of the cable from
5 being scratched by the steel wire. In addition, the aramid fibre may be given different colours to match the colours of the cable lock. The end of the cable that is attached to the cable drum is formed with a securely anchored stop means (not shown) which is moved into
10 contact with the storage sleeve 30 immediately before complete withdrawal of the cable. In this manner the force of the cable, when the cable is fully extracted, cannot be transferred to the cable drum 22 but via the storage sleeve 30 to the external casing of the cable
15 lock. This arrangement prevents damage to the cable drum and the band spring.

A structural detail facilitating the use of the cable lock is that the cable 25, when having been unwound to the applied around or through an object, may be main-
20 tained in its extracted position by depression of the knob 29 against the cable drum 22 and retention thereof in this position, the friction then arising between the knob and the cable drum preventing the cable 25 from being pulled-in into the lock device interior. When the
25 cable has been secured in the desired manner the knob 29 is released, whereby the cable will be reeled into the locking device to the extent allowed by the spring force.

CLAIMS

1. A locking device for securing unattached objects to e.g. a stationary part of a building or for locking objects to one another, comprising a lock casing (1) in which a drum (2) is mounted for rotation during unwinding and winding-on of a strap, a line, or a wire (5), the free end of which preferably is provided with an end piece (6) adapted to be inserted into an opening in the lock casing (1) and to be secured with the aid of a lock (7), the drum (2) being connected to a knob (9) by means of which the wire (5) or a corresponding means may be wound onto the drum (2) and be tensioned by a desired tensioning force, characterised in that blocking means (2, 8) are provided to block the drum against rotation in the wire unwinding direction, said blocking means preferably being connected to the lock (1) in order to produce essentially simultaneous locking of the lock (1) and blocking of the drum.

2. A locking device as claimed in claim 1, characterised in that the knob (9) is connected to the drum (2) via a coupling means (2.2, 9.2), that in its unaffected position the knob (9) is disconnected from the drum (2), and in that the coupling means (2.2, 9.2) are arranged, when actuated, to be brought into mutual engagement and to transfer rotational force from the knob (9) to the drum (2).

3. A locking device as claimed in claim 2, characterised in that the coupling means on the one hand are arranged on or form a part of the drum (2), and on the other are arranged on or form a part of the knob (9), and in that a compression spring (9.3) is disposed between the bottom of the lock casing (1) and the knob (9) or between the drum (2) and the knob (9), whereby the knob (9) is kept pressed away from the drum (2) so that in their non-actuated condition the coupling means are kept disconnected from one another.

4. A locking device as claimed in claim 1 or 2, characterised in that the drum (2) supports at least one gear (2.1) which in the locked position engages a bar pawl (8) which, when the pulling force is exerted on the wire (5), is arranged to block the drum (2) against rotation, in that the bar pawl (8) is connected to a locking arm (7.1) on the lock (7) via a spring means (8.3) and is arranged to be out of contact with the gear (2.1) when the locking arm (7.1) is in the opened position, in that the locking arm (7.1) is in engagement with the end piece (6) on the wire (5) in the locked position, and in that by means of the spring means (8.3) the bar pawl (8) is arranged to ride across the teeth of the gear (2.1) upon tensioning of the wire (5) with the aid of the knob (9).

5. A locking device as claimed in claim 1 or 2, characterised in that the drum supports at least one gear (12.3, 12.4) which engages a bar pawl (18) in a blocking position, said pawl (18) arranged, upon pulling action exerted on the wire (15), to block the drum (12) against rotation, that the end piece (16) on the wire (15), when inserted into the lock casing (11), is arranged to cause the bar pawl (18) to assume its blocking position via a spring means (18.2), and in that with the aid of the spring means (18.2) the bar pawl (18) is arranged to ride across the teeth of the gear (12.3, 12.4) upon tensioning of the wire (5) with the aid of the knob (9).

6. A locking device as claimed in claim 4, characterised in that the end piece (16) comprises a T-shaped end having a rectangular cross-sectional configuration, that the T-shaped end comprises a cross bar extending at right angles to the longitudinal direction of the end piece (16), the lock casing (11) has a matching rectangular opening, and in that in the locked position the end piece (16) is turned over 90° to bring the end piece cross bar into engagement with the lock

casing (11) and thus to absorb the traction force of the wire (5).

7. A locking device as claimed in claim 4 or 5, characterised in that in the locked position
5 the end piece (16) is held against rotation on the one hand by the locking arm (17.1) and on the other by abutment against a stationary part (11.3) of the lock casing (11).

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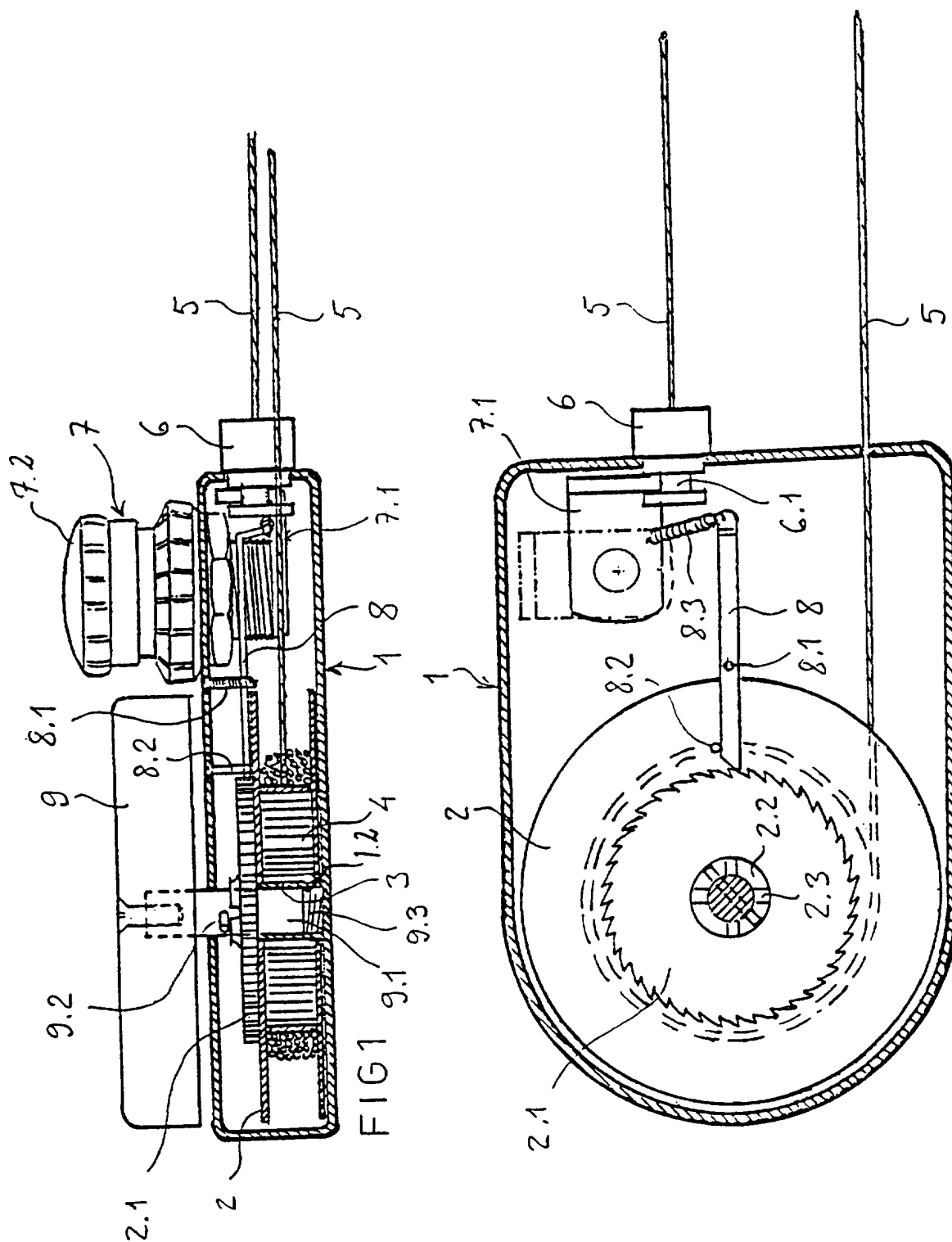
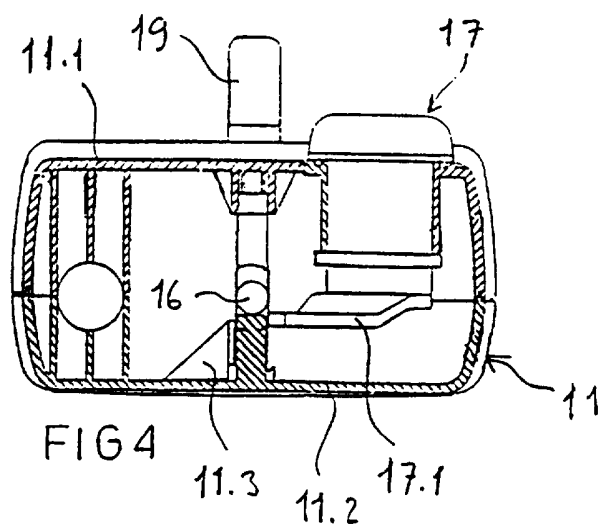
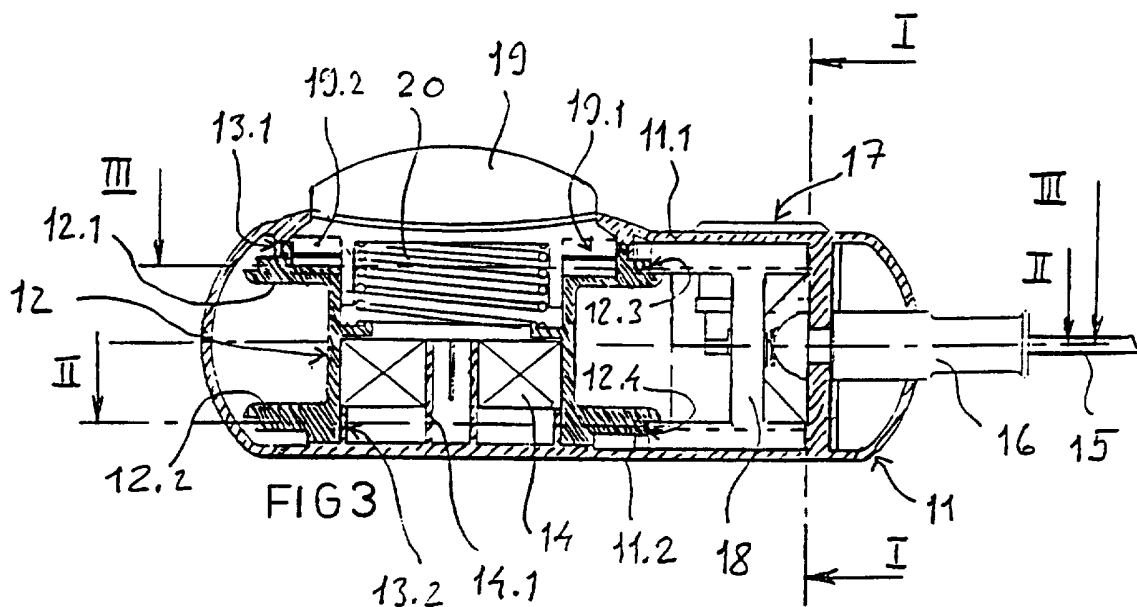


FIG 2

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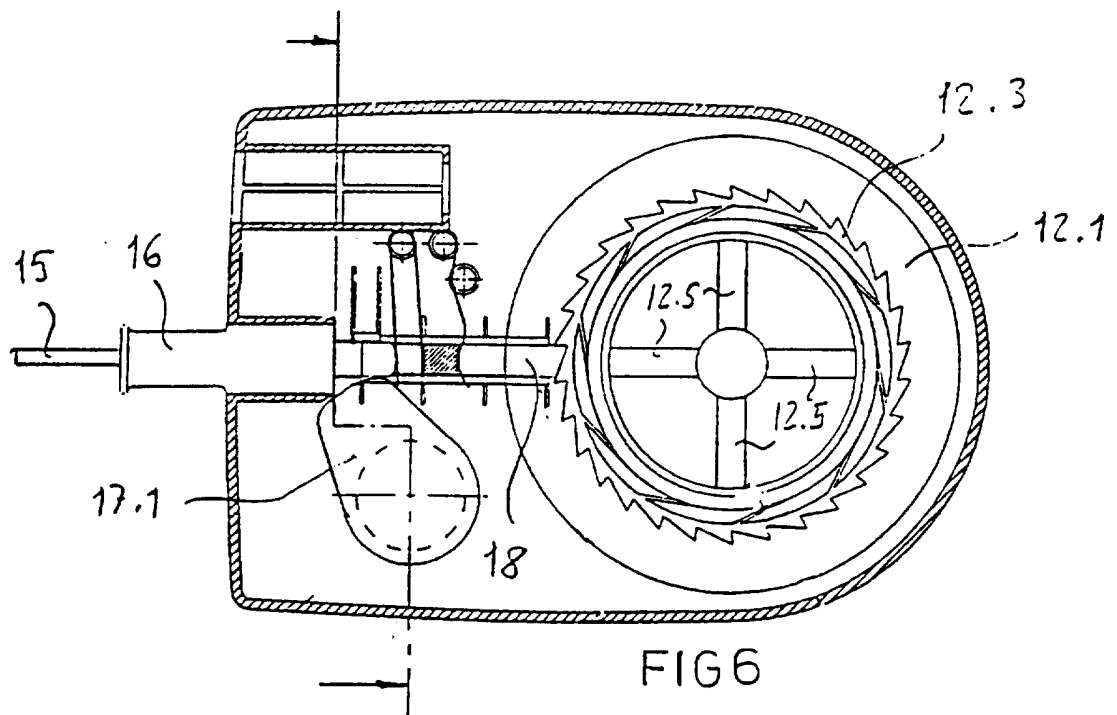
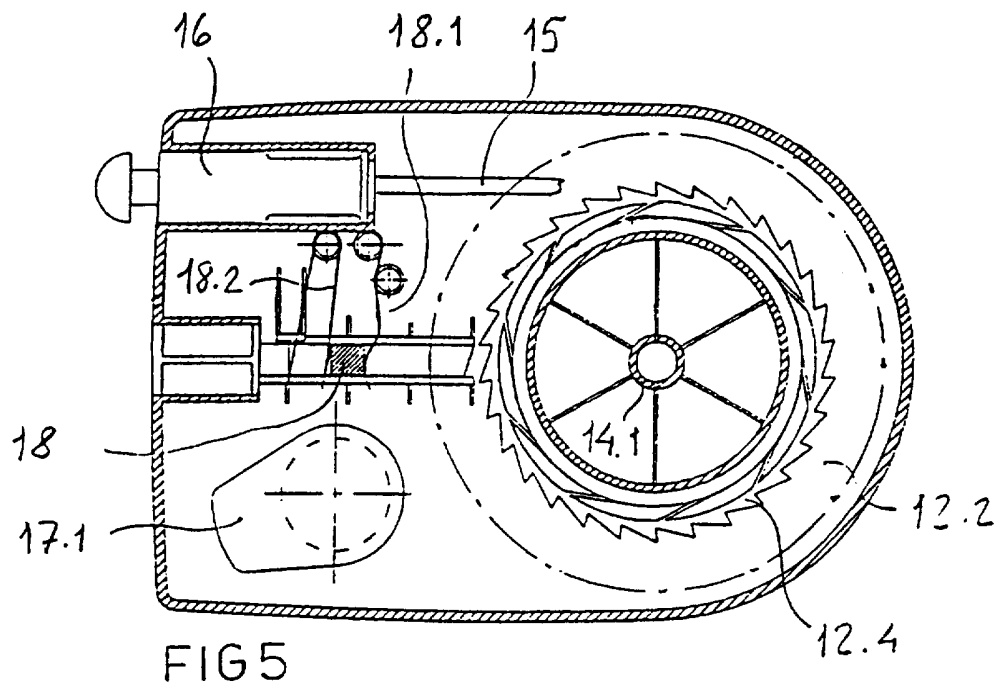
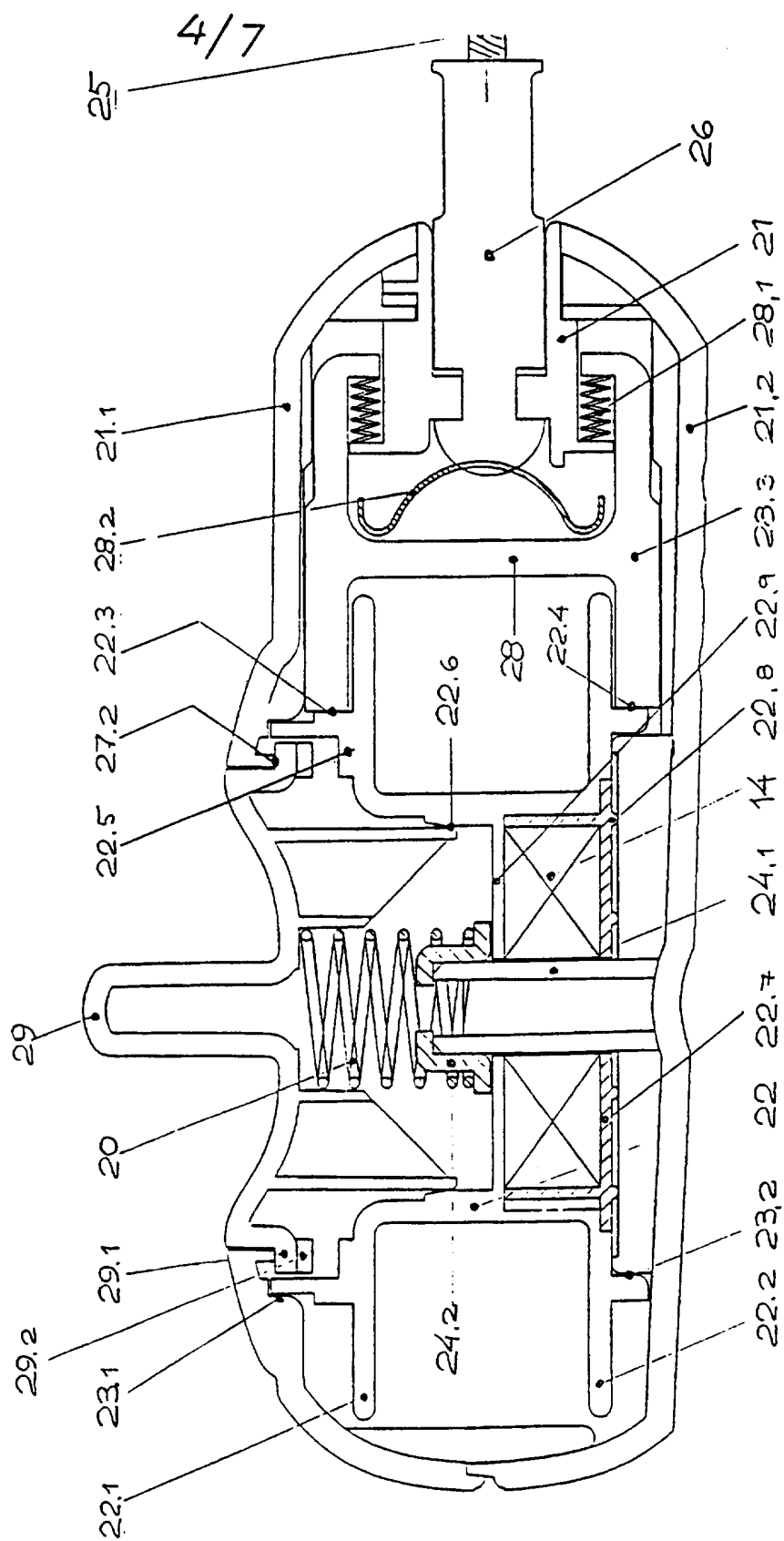


FIG. 7



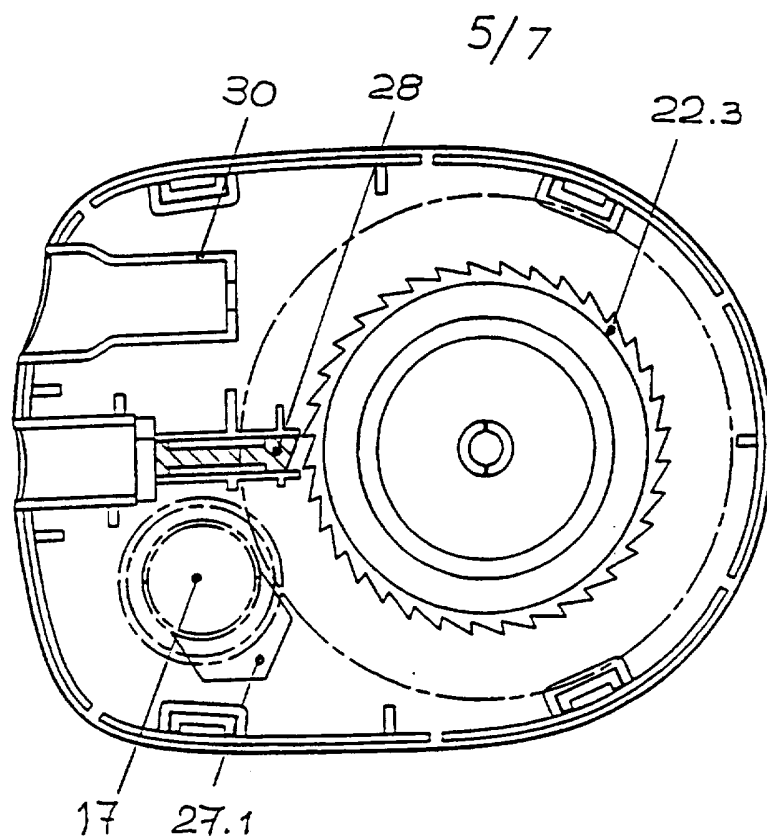


FIG. 8

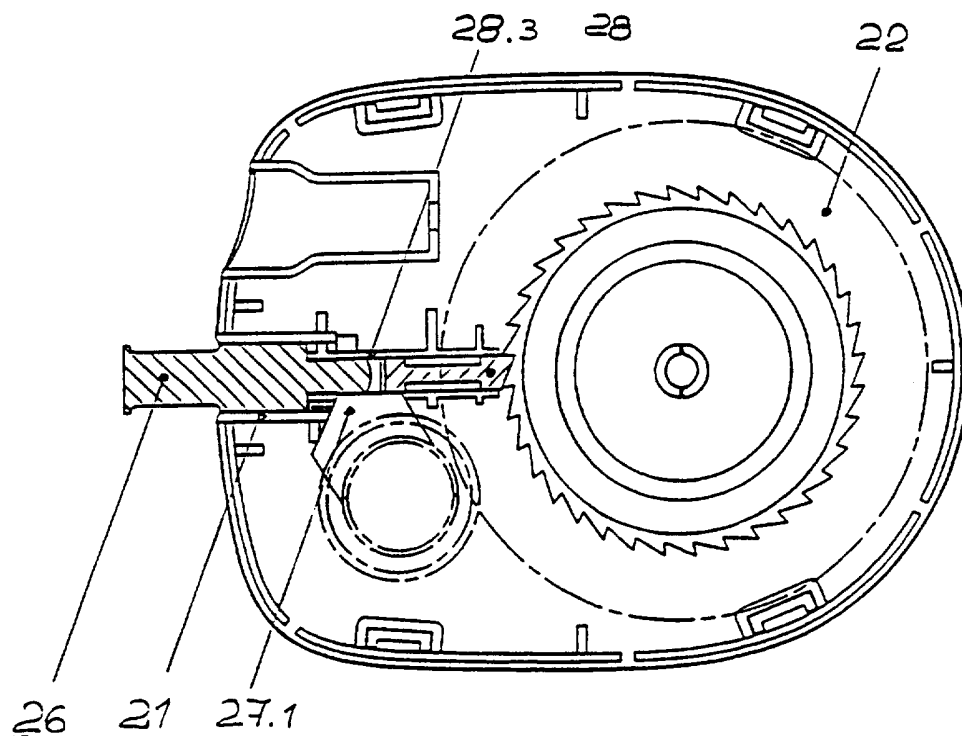
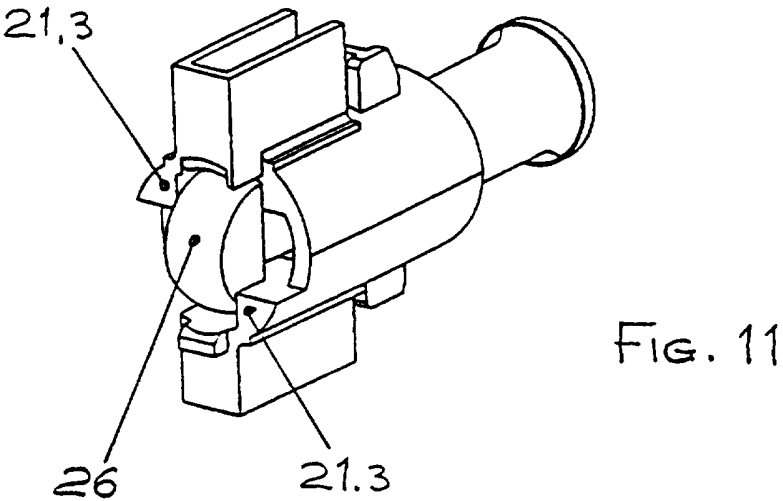
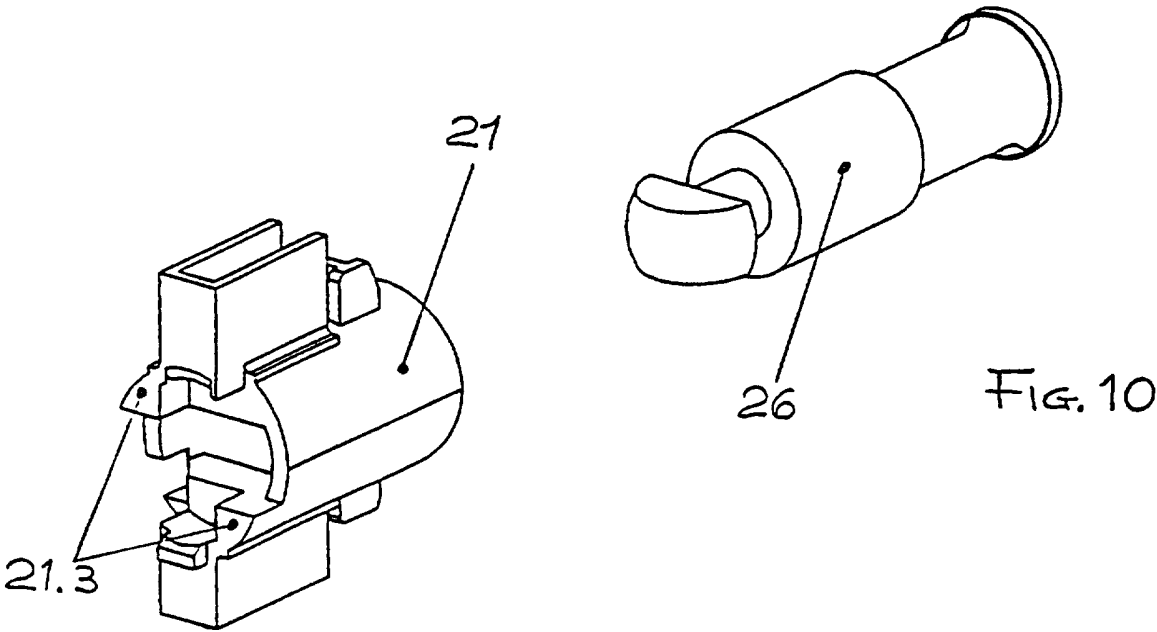


FIG. 9

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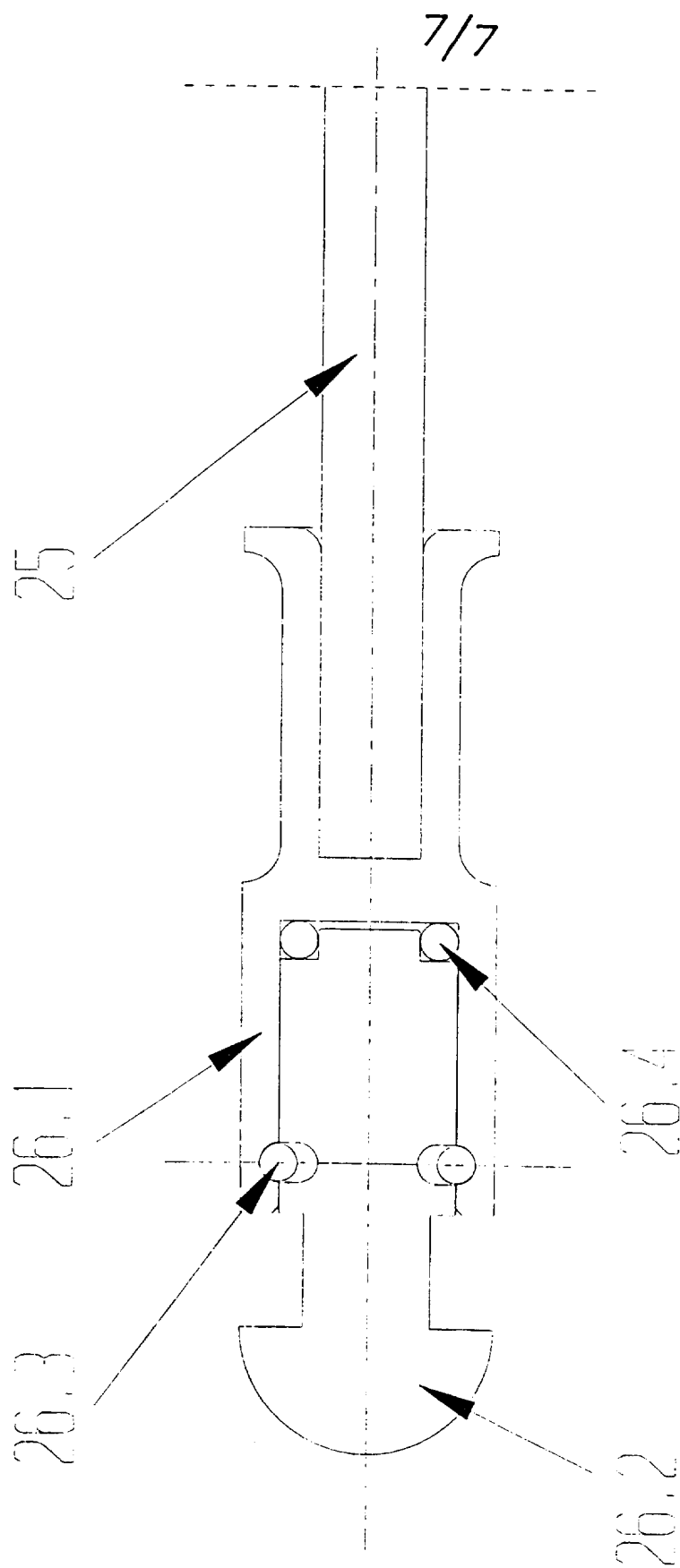


Fig 12

INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 97/00209

A. CLASSIFICATION OF SUBJECT MATTER		
IPC6: E05B 67/00 According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols)		
IPC6: E05B		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
SE,DK,FI,NO classes as above		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2574967 A (L.E.E. GOSSNER), 13 November 1951 (13.11.51)	1
Y	--	4-5
X	DE 3543201 A1 (KABUSHIKI KAISHA SAIKOUSHA), 11 June 1987 (11.06.87)	1
Y	--	4-5
Y	US 4896517 A (C.-K., LING), 30 January 1990 (30.01.90)	4-5
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☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search		Date of mailing of the international search report
16 May 1997		-03 -06- 1997
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86		Authorized officer Christer Wendenius Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 97/00209

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT.

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5144821 A (R.M. ERNESTI ET AL), 8 Sept 1992 (08.09.92)	
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A	US 5369970 A (D. VOICULESCU ET AL), 6 December 1994 (06.12.94)	
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

02/04/97

PCT/SE 97/00209

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2574967 A	13/11/51	NONE	
DE 3543201 A1	11/06/87	NONE	
US 4896517 A	30/01/90	NONE	
US 5144821 A	08/09/92	NONE	
US 5369970 A	06/12/94	NONE	