

The present invention concerns a tensioning ratchet for lashing straps which is acting via a locking mechanism on a lashing strap in a stepwise mode with a lashing tension required, for example for securing goods in transit. Such lashing straps may be executed as textile lashing straps, chains, steel hawsers, cables etc.. From the DE-G-3 434 487 a tensioning ratchet is known. The locking mechanism of this known tensioning ratchet consists of a ratchet wheel with a directional tooth system and two locking levers running parallel and being mounted in a common guide slot. By means of the two locking levers the locking steps of the locking mechanism are to be reduced, while preserving a relatively large tooth pitch angle, as is known from Lueger "Lexikon der Technik" volume 1, 1960, page 530.

In the known tensioning ratchet, it is admittedly possible to build up the lashing tension in small steps, so that the lashing strap can be loaded with a very high lashing tension. However, on releasing the lashing strap, the lashing tension acting in the lashing strap is reduced at a stroke. During transit, the lashing strap may be loaded with additional tensions, even with a high lashing tension, by displacements of the goods, because of which there occurs a so-called "whiplash effect" in the lashing strap during the release. This whiplash effect entails a relatively high risk of injury, and hence a safety hazard, as far as the discharging gang charged with handling the goods carried is concerned.

A further drawback of the known ratchet lies in the fact that a slipped load is no longer securely held in position by the lashing strap after the locking mechanism has been released.

The invention is based on the problem of improving a tensioning ratchet of the kind mentioned at the outset and to increase its safety in use and its user friendliness. This problem is solved by the combination of features of claim 1.

The solution in accordance with the invention lies in providing a tensioning ratchet with two directional tooth-locking mechanisms. A ratchet wheel rigidly joined to the winding-up spindle with a directional tooth system serves as a common locking component for the two locking mechanisms. The drive locking mechanism acting between the tensioning lever and the winding-up spindle has a driving pawl mounted in the tensioning lever for longitudinal displacement that engages in the tooth system in the manner of a dog for the rotational driving of the winding-up spindle. The means for preventing any reverse rotation acting between the frame and the winding-up spindle has two locking pawls mounted in the frame for longitudinal displacement which are arranged offset in the circumferential direction as the locking means. The two locking pawls mounted for displacement in different frame slots are distributed over the circumference of the ratchet

wheel in such a way that the two locking pawls are, on each occasion, in engagement with the ratchet wheel on an alternating basis. Thus if one locking pawl is engaged with the ratchet wheel, the other locking pawl is not engaged.

In this arrangement of the locking pawls, it is advantageous - just as in the state of the art - that it is possible to tension the winding-up spindle in small steps corresponding to a half tooth pitch. Thus the tensioning force respectively required for one tensioning step is advantageously reduced.

The guiding idea of the invention lies in not only building up the lashing tension acting on the lashing strap in a stepwise mode, but also in reducing it in a stepwise mode. The tensioning lever driving the winding-up spindle in rotation by means of the driving pawl is pivotably mounted with its bearing end on the winding-up spindle and has, at the periphery of its bearing end, an unlatching cam which radially projects from the periphery. For the step-wise reduction of the lashing tension acting on the lashing strap, the driving pawl can be placed out of action in a position where it is not engaged with the tooth system, and the tensioning lever can be pivoted away from the frame in the tensioning direction in such a way that the unlatching cam respectively displaces one of the locking pawls out of engagement with the tooth system into its unlocked position. By pivoting the tensioning lever alternately once in the tensioning direction and once against the tensioning direction, the two tensioning levers can be placed out of action on an alternating basis on each occasion.

By means of the to and fro movement of the tensioning lever as described, the lashing tension acting on the lashing strap is reduced in a stepwise mode; thus the lashing strap is released in a stepwise mode. If the goods carried have shifted during transit or if it is found during the release that the goods carried are no longer resting securely on the conveyance surface, it is only necessary to reactivate the drive pawl by moving it into the tooth system, so as to tension the lashing strap again for securing the goods carried. If the goods carried are again subjected to the full lashing tension, it is possible to take the necessary measures for a safe discharge of the shifted carried goods without any time pressure. Thus the main advantage of the device lies in increasing the safety in use when the lashing strap is released for discharging the conveyance. It is, moreover, advantageous that the above mentioned whiplash effects are avoided for the repetitive unlocking of the tensioning ratchet.

The adjoining position of the unlatching cam and of the actuating cam described in claim 2, wherein the unlatching cam is arranged in a leading position in the tensioning direction of the actuating cam, additionally improves the handling of the tensioning ratchet. The tensioning lever first bearing on the frame first pivots into the locking zone of the tensioning

ratchet in a user-friendly way. By being further pivoted in the tensioning direction, the tensioning lever reaches the release zone wherein the unlatching cam alternately displaces the driving pawls out of engagement with the tooth system of the ratchet wheel. When the lashing tension has been reduced in such a way that the lashing strap only still lies loosely round the goods carried, the two unlatching cams can be brought together out of engagement by the further pivoting of the tensioning lever in the tensioning direction by means of the actuating cam. Thus the roll still remaining on the winding-up spindle can be readily wound off from the winding-up spindle by a simple pull on the lashing strap. The teaching of claim 2 facilitates, as regards operation, a simple successive arrangement of the locking position, the releasing position and opening position of the tensioning lever.

Claims 3 to 5 teach a form of the tensioning lever that is favourable as regards manufacture and simple in design. The handle arranged on the handle end on the opposite side to the bearing end of the tensioning lever serves, on the one hand, as a bridging transverse connection between the side walls of the tensioning lever and on the other hand, as a handle for pivoting the tensioning lever. The open design of the tensioning lever reduces the inherent weight of the tensioning lever in an advantageous manner.

The transverse connecting yoke inserted between the side walls of the tensioning lever further stabilizes the structure of the tensioning lever and thus serves as a solid abutment for the driving pawl subjected to pressure. By means of its gripping bar, the driving pawl can be easily moved out of the tooth system. For this purpose, the handle and the gripping bar are arranged in such a way that for displacing the driving pawl from the tooth system, the operator's hand is supported on the handle and his middle finger and ring finger pass through the gripping bar and displace the driving pawl with a pull in the direction towards the handle.

Claims 6 to 9 teach a form of the frame that is simple as regards design and advantageous as regards production. The frame has a low inherent weight as measured in its solid content. Because of the fork-shaped design of both free ends of the frame, the fixed end of the lashing strap can, on the one hand, be easily fixed on the frame and on the other hand, the winding-up spindle can be easily introduced into the frame. However, it is also possible to mount the frame with its free bearing end directly on a conveyance, for example on the loading surface of a lorry.

The symmetrical structure of the tensioning ratchet according to Claim 9 is, moreover, advantageous. Because of the symmetry, it is possible to use many identical parts which reduces the unit manufacturing costs for the tensioning ratchet. Moreover, the symmetrical construction of the tensioning rat-

chet entails a symmetrical force distribution on the tensioning ratchet when the lashing tension is applied.

By means of the measures according to claims 10 and 11, one prevents the tensioning lever from being inadvertently transferred from the tensioning zone into the release zone by an inadvertent overwinding in the tensioning direction.

The design of the release zone according to claims 12 to 15 improves the user-friendliness and operational reliability of the tensioning ratchet. For releasing the lashing tension, the tensioning lever merely has to be pivoted into the release zone and be moved to and fro between the limiting stops. With each abutment of the driving pawl on one of the two limiting stops, the winding-up spindle rotates backward by the amount of one half tooth pitch against the tensioning direction. The stepwise release of the tension is thus possible in a simple and safe manner in use.

By means of the design of the locking pawls according to claims 16 to 20, the mode of operation of the tensioning ratchet is further improved. The locking pawl formed in this way can be easily displaced in the longitudinal direction between their end positions and are capable of transmitting high forces. The locking pawls can be easily mounted in the guide slots of the frame and form a robust and durable form fit with the frame.

The curved design of the locking pawls according to claims 21 to 23 reduces the structural height of the tensioning ratchet. The compact tensioning ratchet harmoniously fits into textile lashing straps in particular. Moreover, because of its lower structural height, the tensioning ratchet requires less space for transit or storage. Moreover, the tensioning ratchet does not project very far from the lashing strap, so that the risk of injury is reduced and hence the operational safety of the tensioning ratchet is increased.

The invention will be described with reference to examples of embodiments represented in the drawings, with further main features of the invention. There are shown in

Fig. 1 an overall representation in perspective of the tensioning ratchet in accordance with the invention,

Fig. 2 a basic sketch of the tensioning process,

Fig. 3 a basic sketch of the locking mechanism in its transition from the locking zone into the release zone,

Fig. 4 a basic sketch of the locking mechanism in the release zone,

Fig. 5 a basic sketch of the locking mechanism in an extreme open release position in the release zone,

Fig. 6 a basic sketch of the locking mechanism in a more closed release position in the release zone,

Fig. 7 a basic sketch of the whole ratchet in a stepwise release position in the release zone,

Fig. 8 a basic sketch of the whole ratchet in its fully opened position, with an opening angle of 180° of the tensioning lever relative to the frame,

Fig. 9 a side view of a special mode of embodiment of the tensioning ratchet with curved locking pawls.

The tensioning ratchet in accordance with the invention consists in essence of a basic body formed as a frame 1, a tensioning lever 2, two ratchet wheels 3, 3' and a winding-up spindle 4 carrying the latter. Together with two locking pawls 5, 5' mounted on the frame 1, the ratchet wheels 3, 3' form a means preventing reverse rotation.

For its part, the frame 1 consists of two frame side walls 7, 7' extending in the longitudinal direction 6 and a frame base 9 connecting the side walls 7, 7' in a transverse direction 8, in which arrangement the transverse direction extends at right angles to the longitudinal direction 6. The frame bottom 9 and the frame side walls 7, 7' form a U-shaped cross-sectional shape extending in the transverse direction 8. The frame side walls 7, 7' project at the free ends of the frame 1 in a fork-shaped manner over the frame bottom 9 in the longitudinal direction 6.

At the free bearing end of the frame 1, a screw bolt 10 traverses the frame side walls 7, 7' in the transverse direction 8. The screw bolt 10 serves to secure the fixed end of the lashing strap preferably formed as a loop, which is not shown in the drawings. At the free spindle end 28, 28' of the frame 1 that is remote from the free bearing end, the pin-type winding-up spindle 4 traverses the frame side walls 7, 7' in the transverse direction 8 in bearing eyes. The winding-up spindle 4 consists of two half pins 11, 11' which each have a semicircular cross-section extending in the longitudinal direction 6. Because of this semicircular cross-section, there is formed on each half pin 11, 11' a planar side 12, 12' extending in the transverse direction 8, as well as a round side 13, 13' also extending in the transverse direction 8. The half pins 11, 11' are assembled into the winding-up spindle 4 in such a way that their planar sides 12, 12' face each other, and their round sides 13, 13' face away from each other at the same time. In this arrangement, the planar sides 12, 12' are not in bearing contact with each other, but are interspaced from each other in such a way that a free

space is formed between them which serves as an insertion slot 14.

One tooth system 33 each is radially formed in the ratchet wheels 3, 3'. At their core, the ratchet wheels 3, 3' have two cutouts that are semicircular in cross-section, whose planar lines face each other and whose rounded lines face away from each other. These semicircular hollow cross-sections approximately correspond in their shape and dimensions to the volumic cross-sections of the half pins 11, 11'. The half pins 11, 11' pass through the ratchet wheels 3, 3' with a loose fit. The ratchet wheels 3, 3' are fixed on the winding-up spindle 4 in such a way that they flank the outer side walls of the frame side walls 7, 7' in parallel.

The winding-up spindle 4 passes at the same time through the gable-type bearing end of the tensioning lever 2 in such a way that the ratchet wheels 3, 3' are mounted between the outer sides of the frame side walls 7, 7' and the inner sides of the side walls 15, 15' of the tensioning lever. The winding-up spindle 4 is on the outer sides of the side walls 15, 15' of the tensioning lever secured against slipping in the transverse direction 8 by one securing pin 43 each, traversing it in the longitudinal direction 6, and it connects at the same time the frame 1 to the tensioning lever 2 for joint movement.

The handle 16 bridging the side walls 15, 15' of the tensioning lever is fixed on the handle end of the tensioning lever 2 that is on the opposite side to the winding-up spindle 4.

The transverse connecting yoke 17 extending in the transverse direction 8 is fixed approximately in the middle in the longitudinal direction 6 between the handle 16 and the winding-up spindle 4, between the side walls 15, 15' of the tensioning lever. The transverse connecting yoke 17 is traversed in the direction towards the handle 16 by the gripping bar 18 of the driving pawl 19. The driving pawl 19 extends in a gripping direction 20 defined by the winding-up spindle 4 as one end point and the handle 16 as the other end point. A centring pin 21 projects from the driving pawl 19 in the direction towards the handle 16. The centring pin 21 is surrounded by a helical spring element, a coil spring 22. With its resilient force, the coil spring 22 moves the driving pawl 19 in the gripping direction 20 towards the winding-up spindle 4, with the transverse connecting yoke 17 serving as an abutment.

The driving pawl 19 passes through the side walls 15, 15' of the tensioning lever in the transverse direction 8 in the pawl guide slots 23, 23' extending in the gripping direction 20, in such a way that the driving pawl 19 is mounted in the side walls 15, 15' of the tensioning lever for longitudinal displacement in the gripping direction 20. Together with the ratchet wheels 3, 3', the driving pawl 19 forms the drive locking mechanism for the rotational drive of the winding-up spindle 4 by means of the tensioning lever 2.

A guide component 24 projects from the frame bottom 9 in a dovetail configuration perpendicularly to the longitudinal direction 6 and to the transverse direction 8. In the longitudinal direction 6, the guide component 24 is traversed by two bearing openings 25, 25'. In the bearing opening 25, there is inserted a pin-type extension 26 of the locking pawl 5, which approximately extends in the longitudinal direction 6; in the bearing opening 25', there is inserted a pin-type extension 26' of the locking pawl 5', which extends approximately in the longitudinal direction 6.

The locking pawls 5, 5' are disposed towards each other in the manner of two sides of an acute angle whose vertex is approximately congruent with the axis of rotation of the winding-up spindle 4. Their interspacing corresponds to one and a half times the tooth pitch p shown in Figure 2. The locking pawls 5, 5' pass through the frame side walls 7, 7' in the transverse direction 8 and are mounted for displacement in the longitudinal direction 6 in frame guide slots 41, 41'/42, 42'. The frame guide slots 41, 41'/42, 42' extending in the longitudinal direction 6 are formed in the frame side walls 7, 7'.

Between the guide component 24 and each one of the two locking pawls 5, 5', there is inserted one compression spring element each. In the case of the locking pawl 5, this is the coil spring element 27 surrounding the pin-type extension 26 in a helical configuration, and in the case of the locking pawl 5', the coil spring element 27' surrounding the pin-type extension 26' in a helical configuration. The guide component 24 serves as an abutment for the coil spring elements 27, 27' so as to move the locking pawls 5, 5' with its resilient force towards the ratchet wheels 3, 3'.

As shown in Figure 2, the periphery of the free spindle end 28, 28' of the frame side walls 7, 7' has a shape that has been subdivided several times. The cross-section of the free end of the spindle periphery 28, 28' extending in the transverse direction 8 in the zone of the winding-up spindle 4 is, as viewed in the zone of the winding-up spindle 4 from the locking pawls 5, 5', at first circularly bent in such a way that the centre of the circle coincides with the centre of the ratchet wheels 3, 3' or of the winding-up spindle 4. The diameter of this quadrant-shaped locking zone 29 on the periphery 28, 28' of the free spindle end has a pitch circle corresponding to the root circle (d_r) of the tooth system 33 on the ratchet wheel 3, 3'. If the tensioning lever 2 is moved with its handle 16 away from the frame 1 in a tensioning direction 30, it reaches a position of approximately 80° relative to the frame 1, in which process the driving pawl 19 abuts at the end of the semicircular locking zone 29 on a tensioning stop 31. Because of the movement of the tensioning lever 2 in the tensioning direction 30, the winding-up spindle 4 is rotated further by approximately a quarter of a turn in

the tensioning direction 30. When the driving pawl 19 bears on the stop 31, the tensioning lever 2 must be moved back against the tensioning direction 30 in the direction towards the frame 1. Therewith the driving pawl 19 slides over the front flanks 32 of the teeth 33 which are rounded off against the tensioning direction 30. At the same time, one of the two locking pawls 5, 5' engages behind another tooth 33 at its straight rear flank 34 which extends substantially parallel to the radial line of the ratchet wheel 3, 3'. If the ratchet wheel 3, 3' being driven by the driving pawl 19 is turned further in the tensioning direction 30, the locking pawls 5, 5' slide for their part over the rounded front flanks 32 of the teeth 33, in which process, the locking pawl 5 and the locking pawl 5' alternately engage, after a rotation in the tensioning direction 30 corresponding to half a tooth pitch p, behind a tooth 33 at its rear flank 34. For the tensioning, the driving pawl 19 is moved to and fro by the tensioning lever 2 between the frame 1 and the tensioning stop 31 until the winding-up spindle 4 has executed so many revolutions that the lashing strap fixed in its insertion slot 14 has been wound up several times being led round it, and has thus been subjected to the necessary lashing tension.

For the repetitive release of the locking mechanism, the driving pawl 19 is moved by the tensioning lever 2 to the tensioning stop 31. Together with the gripping bar 18, the driving pawl 19 is pulled in the gripping direction 20 out of the tooth system into a position in which it can be moved over the tensioning stop 31. Apart from the locking zone 29, the periphery of the free spindle end 28, 28' has in the tensioning direction 30 the adjoining release zone 35. As shown in Figure 3, the release zone 35 has a rounded circular cross-section in the transverse direction 8, whose diameter is larger than the tip circle diameter (da) of the ratchet wheel 3, 3'. The release zone 35 is delimited by the limiting stops 36, 36'.

After the lifting of the driving pawl 19, the tensioning lever 2 is moved on in the tensioning direction 30. The coil spring 22 presses the driving pawl 19 into the release zone 35, as shown in Figure 4. With its end side facing away from the gripping bar 18, the driving pawl 19 bears on the release zone 35 and forms together with the release zone 35, a sliding guide. At the same time, the unlatching cam 37 formed on the periphery of the bearing end of the tensioning lever 2 and projecting from the tensioning lever 2 in the gripping direction 20, comes into contact with the locking pawls 5, 5'. If, as shown in Figure 5, the driving pawl 19 bears on the limiting stop 36, the unlatching cam 37 bears on the end side of the locking pawl 5' in such a way that the latter is moved in the direction towards the guide component 24 and is disposed out of engagement with the teeth 33. At the same time, the winding-up spindle 4 rotates back by a rotational distance against the tensioning direction 30 corresponding to half a

pitch p , until the locking pawl 5 engages behind a tooth 33 at its rear flank 34.

If the driving pawl 19 is moved by the tensioning lever 2 against the tensioning direction 30 to the second limiting stop 36' as shown in Figure 6, the unlatching cam 37 bears on the other locking pawl 5 in such a way that the latter passes out of engagement with the tooth 33. The winding-up spindle 4 driven by the strap tension again executes a backward rotation corresponding to half a tooth pitch p until the locking pawl 5' again engages behind a tooth 33 at its rear flank 34.

As indicated by the double arrow 38 in Figure 7, by means of the to and fro movement of the tensioning lever 2, once against the tensioning direction 30 and once in the tensioning direction 30, the lashing is released in a step-wise mode with an alternating engagement of the locking pawls 5, 5' in the tooth system 33. If the lashing strap can be released from the conveyed goods without any risk, the driving pawl 19 is again displaced in the gripping direction 20 with its gripping bar 18 in the direction towards the handle 16 and the tensioning lever 2 is turned further in the tensioning direction 30 in such a way that the frame 1 and the tensioning lever 2 form an opening angle of approximately 180° in accordance with the representation in Figure 8. An engagement groove 39 is formed in the end side of the frame 1 at the periphery of the free spindle end 28, 28' next to the release zone 35 in the tensioning direction 30. In this 180° open position, the driving pawl 19 engages in the engagement groove 39. In this open position, the locking pawls 5, 5' are moved by an actuating cam 40 formed in the gripping direction 20 on the periphery of the bearing end of the side walls 15, 15' of the tensioning lever in the direction towards the guide component 24 in such a way that both locking pawls 5, 5' are out of engagement with the teeth 33.

In Figures 1 to 8, a mode of embodiment of the ratchet is always shown with a tooth pitch angle p of 24° which corresponds to a number of teeth totalling 15. In a further mode of embodiment, not shown in the drawings, the ratchet is made with a tooth pitch angle of 33° which corresponds to a total of 11 teeth.

In principle, any other tooth pitch angle p can also be obtained. With a large tooth pitch angle p , the unlatching cam 37 has a small slope, as a result of which, only small forces are necessary for releasing the locking pawls 5, 5'; at the same time, the interspacing of the locking pawls 5, 5' is increased in such a way that the overall design height of the ratchet is increased.

In contrast thereto, with a small tooth pitch angle p , the unlatching cam 37 has a steep, high slope, as a result of which, comparatively high forces are necessary for releasing

the locking pawls 5, 5', but at the same time the interspacing of the locking pawls 5, 5' is reduced in such a way that the whole ratchet can have a very flat shape.

- 5 In the special mode of embodiment of the tensioning ratchet shown in Figure 9, the locking pawls 50, 50' have a curved shape. The driving pawl 190 too is curved similarly to the locking pawl 50'. The curved locking pawls 50, 50' are mounted in curved frame guide slots 410, 420. The curved driving pawl 190 is also mounted in the curved pawl guide slot 230.

- 15 With their end sides facing away from the ratchet wheel 3, the locking pawls 50, 50' are each supported on a leg of the leg spring 270 arranged to lie in the transverse direction 8. In this arrangement, the leg spring 270 lies in a space-saving manner between the concave sides of the curved locking pawls 50, 50'.

- 20 If the locking pawls 50, 50' are moved in their frame guide slots 410, 420 having a ring segment shape, the locking pawls 50, 50' execute a pivoting movement which consists of a motion component in the longitudinal direction 6 and a motion component in an upward direction 44. The upward vertical direction 44 extends perpendicularly both to the longitudinal direction 6 and to the transverse direction 8. Thus the locking pawls 50, 50' curved round their axis of curvature extending in the plane of the drawing in the transverse direction 8, execute a pivoting movement resulting from a motion component in the longitudinal direction 6 and a motion component in the upward direction 44. The pivoting movement of the curved locking pawls 50, 50' is executed in a partial rotation round the leg spring 270. The kinematics of the curved driving pawl 190 in the curved pawl guide slot 230 are analogous to the movement of the curved locking pawls 50, 50'. Consequently it is possible to obtain with this special mode of embodiment, a ratchet with a high tooth pitch p and a unlatching cam 37 with a small slope, without this ratchet having too large a height.

List of reference numerals

5			
	1	frame	26, 26' pin-type extension
	2	tensioning lever	27, 27' coil spring element
	3,3'	ratchet wheel	28, 28' free spindle end
	4	winding-up spindle	29 locking zone
10	5,5'	locking pawl	30 tensioning direction
	6	longitudinal direction	31 tensioning stop
	7,7'	frame side wall	32 front flank
	8	transverse direction	33 tooth (=tooth system)
	9	frame bottom	34 rear flank
15	10	screw bolt	35 release zone
	11,11'	half pin	36,36' limiting stop
	12,12'	planar side	37 unlatching cam
	13,13'	round side	38 double arrow
	14	insertion slot	39 engagement groove
20	15,15'	side walls of the tensioning lever	40 actuating cam
	16	handle	41,41' frame guide slot
	17	transverse connecting yoke	42,42' frame guide slot
	18	gripping bar	43 securing pin
25	19	driving pawl	44 upward direction
	20	gripping direction	50,50' curved locking pawl
	21	centring pin	190 curved driving pawl
	22	coil spring	230 curved pawl guide slot
	23,23'	pawl guide slots	270 leg spring
30	24	guide component	410,420 curved frame guide slot
	25,25'	bearing opening	p tooth pitch (angle)
			d _r root circle diameter
			d _a tip circle diameter



PATENT CLAIMS

1. A tensioning ratchet for a lashing strap with
- a winding-up spindle (4) for the lashing strap, mounted for rotation on a frame (1),
 - with a tensioning lever (2) pivotably mounted on the winding-up spindle (4) as the rotational drive,
 - with a releasable directional tooth locking mechanism between the tensioning lever (2) and the winding-up spindle (4) and
 - a directional tooth locking mechanism that is also releasable, between the frame (1) and the winding-up spindle (4) as a means preventing any reverse rotation during the tensioning.
- a) The winding-up spindle (4) contains a ratchet wheel (3, 3') rotatable therewith for the directional tooth locking mechanism.
 - b) The tensioning lever (2) supports a driving pawl (19) that can be brought with restoring pressure into engagement with the ratchet wheel (3, 3').
 - c) The frame (1) supports, offset in the circumferential direction, two pawls (5, 5') that can be brought into engagement with restoring pressure with the ratchet wheel (3, 3').
 - d) On the circumference of its bearing end, the tensioning lever (2) carries an actuating cam (40) serving for the joint disengagement of the locking pawls (5, 5') which, when the driving pawl (19) is disengaged, acts on the locking pawls (5, 5') by pivoting the tensioning lever in the tensioning direction (30),
characterized by the following features:
 - e) The locking pawls (5, 5') are displaceable in separate frame guides (41, 41', 42, 42') at a mutual interspacing effective in the direction of rotation.
 - f) An unlatching cam (37) for the selective disengagement of one of the two locking pawls (5, 5') at a time is arranged to adjoin the actuating cam (40) in the circumferential direction.
2. A ratchet according to claim 1,
characterized in that
the unlatching cam (37) is arranged to precede the actuating cam (40) in the tensioning direction (30) in the vicinity of the circumference of the bearing end of the tensioning lever.
3. A ratchet according to claim 1 or 3,
characterized in that
the side walls (15, 15') of the tensioning lever extend substantially parallel and project at the free ends of the tensioning lever from the said tensioning lever (2) in the manner of a fork, in which arrangement a handle (16) bridging the side walls (15, 15') of the tensioning lever in the



transverse direction (8) parallel to the winding-up spindle (4) is mounted at the handle end that is remote from the bearing end.

5 4. A ratchet according to one or more of claims 1 to 3,
characterized in that
in the zone between the bearing end and handle end, a
transverse connecting yoke (17) which
10 - is of a hollow box type,
- extends in the transverse direction (8) and
- is open towards the winding-up spindle (4),
interconnects the side walls (15, 15') in a bridging manner.

15 5. A ratchet according to claim 4,
characterized in that
the driving pawl (19) lies in slider guide slots (23, 23') in
the side walls (15, 15') being spring-loaded against the
transverse connecting yoke (17) and mounted for displacement
20 in the longitudinal direction, and that its front pawl side
remote from the winding-up spindle (4) carries a gripping bar
(18) for longitudinal displacement in the direction towards
the transverse connecting yoke (17).

25 6. A ratchet according to one or more of the preceding
claims,
characterized in that
the free ends of the frame (1) facing away from each other
have a fork-shaped design and that the frame has between the
30 free ends in the transverse direction (8) an approximately U-
shaped cross-section,
- whose U sides form the frame side walls (7, 7') which are
arranged substantially parallel in the longitudinal di-
rection (6) and
- whose U web forms the frame bottom (9).

35 7. A ratchet according to claim 6,
characterized in that
at the free mounting end of the frame (1), a screw bolt (10)
passes in a bridging manner in the transverse direction (8)
40 through the frame side walls (7, 7') so as to secure the fixed
end of the tension strap, preferably formed as a strap loop,
and that the winding-up spindle (4) is mounted in mounting
eyes of the frame side walls (7, 7') at the free spindle end
(28, 28') which is remote from the free mounting end.

45 8. A ratchet according to one or more of the preceding
claims,
characterized in that
50 two ratchet wheels (3, 3') lie on the winding-up spindle (4)
between the outer sides of the frame side walls (7, 7') and
the inner sides of the side walls (15, 15') of the tensioning
lever, and are connected to the winding-up spindle (4) in a
form-locking manner.



9. A ratchet according to one or more of the preceding claims,

characterized by
an axial symmetrical construction with respect to its longitudinal median axis, extending in the longitudinal direction (6) in such a way that the winding-up spindle (4) carries two ratchet wheels (3, 3'), two frame side walls, and that accordingly two side walls (15, 15') of the tensioning lever (2) are to hand.

10. A ratchet according to one or more of the preceding claims,

characterized in that
in its rest position, the tensioning lever (2) rests in the manner of a lid on the frame (1), and for providing the rotational drive for the winding-up spindle (4), it is pivotable in the tensioning direction (30) into an 80° position relative to the frame (1), in which action the driving pawl (19) engages with its front face behind a locking tooth (33) of a locking pawl (5, 5') in a form-locking manner.

11. A ratchet according to claim 10,
characterized in that
in the 80° position of the tensioning lever (2), the driving pawl (19) bears, while engaging in the tooth system (33), on a tensioning stop (31) that projects radially from the circumference of the free spindle end (28, 28').

12. A ratchet according to claim 11,
characterized in that
to allow the tensioning lever (2) to pivot further in the tensioning direction (30) beyond the 80° position, the driving pawl (19) can be lifted out of the tooth system (33) by longitudinal displacement in the direction towards the tensioning lever handle (16), and that in this disengagement position its bearing against the tension stop (31) can be cancelled.

13. A ratchet according to claim 12,
characterized in that
the circumference zone of the free spindle ends (28, 28') adjoining the tensioning stop (31) on the frame (1) in the tensioning direction (30) radially projects over the head circle diameter (d_a) of the adjoining ratchet wheel (3, 3') and is rounded off in a convex shape in such a way that it forms a sliding guide for the front side of the driving pawl facing the ratchet wheel (3, 3').

14. A ratchet according to claim 13,
characterized by
an inoperative position of the driving pawl (19), with the front face of the driving pawl bearing on the sliding guide and with a position of disengagement from the tooth system (33) at the same time.



15. A ratchet according to one of claims 12 to 14,
characterized in that
the sliding guide forms a release zone (35) surrounded in the
tensioning direction (30) by two limiting stops (36, 36') that
radially project from the circumference of the free spindle
ends (28, 28').

16. A ratchet according to one or more of the preceding
claims,

characterized in that
the locking pawls (5, 5') engage in the tooth system (33)
arranged on the ratchet wheel (3, 3') at a mutual interspacing
of one and a half tooth pitches (p).

17. A ratchet according to claim 16,
characterized in that
the locking pawls (5, 5'), which are orientated with respect
to each other like the sides of an acute angle whose vertex
lies approximately on the axis of rotation extending in the
transverse direction (8) of the winding-up spindle (4), are
mounted in guide slots (41, 41'/42, 42') for longitudinal
displacement on the frame.

18. A ratchet according to claims 15, 16, and 17,
characterized by
a first release position of the tensioning lever (2) and of
the locking mechanism operating between the frame (1) and the
winding-up spindle (4) in such a way that the driving pawl
(19) bears on the limiting stop (36') and the unlatching cam
(37) holds one locking pawl (5) out of engagement with the
tooth system (33).

19. A ratchet according to claims 15, 16, and 17,
characterized by
a second release position of the tensioning lever (2) and of
the locking mechanism operating between the frame (1) and the
winding-up spindle (4) in such a way that the driving pawl
(19) bears on the limiting stop (36) and the unlatching cam
(37) holds the other locking pawl (5') out of engagement with
the tooth system (33).

20. A ratchet according to claim 18 and 19,
characterized by
a facility for the stepwise release of the tensioning strap by
an alternating to and fro movement of the tensioning lever (2)
between the first and second release position.

21. A ratchet according to claim 16 and 17,
characterized in that
one of the locking pawls (50, 50') is curved round an axis of
curvature extending in the transverse direction (8).



22. A ratchet according to claim 21,
characterized in that
the locking pawls (50, 50') and the driving pawl (190) are
curved in a ring segment shape and are guided in corresponding
ring segment-shaped guide slots (230, 410, 420).

23. A ratchet according to claim 22,
characterized in that
the concave sides of the locking pawls (50, 50') face each
other and that a leg spring (270) lying between them can be
fixed in such a way that for the thrust loading, one locking
pawl (5, 5') each bears on one leg of the spring.

KA3