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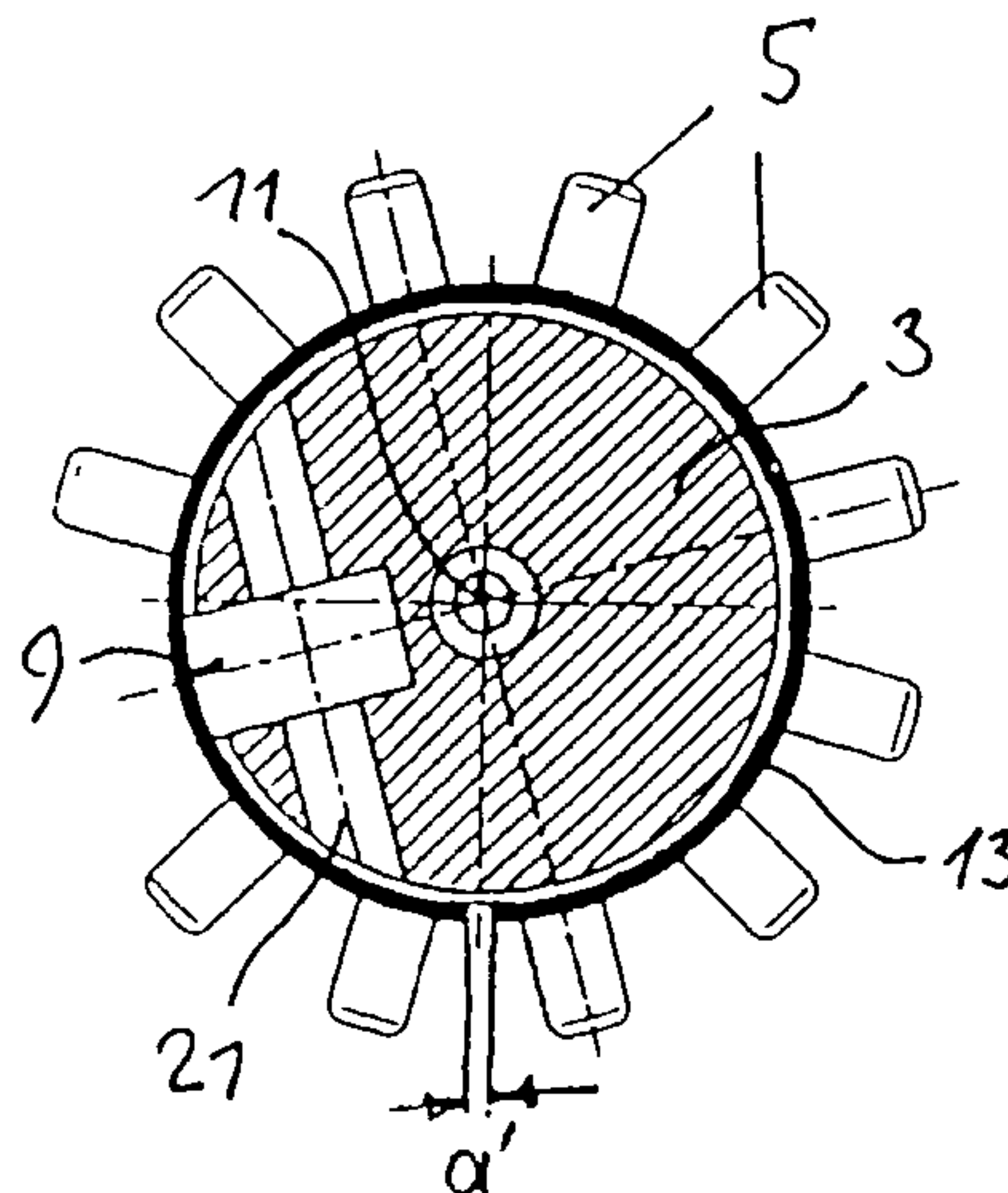
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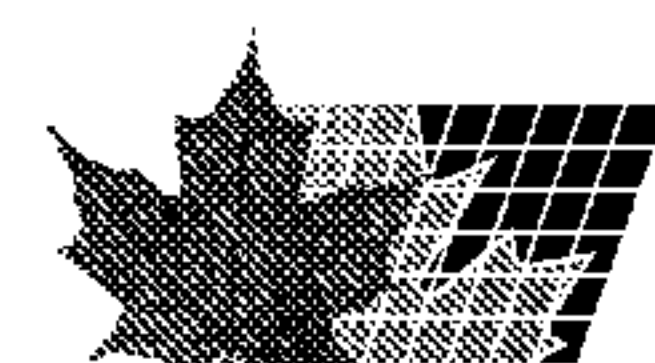
(54) Titre : DISPOSITIF DE VERROUILLAGE POUR ARME A FEU

(54) Title: INTERLOCKED FIREARM



(57) **Abrégé/Abstract:**

A sleeve (13) made of spring plate is positioned between the mushroom head (1) and The breechblock carrier (23) of a locked firearm, the sleeve being supported in the expanded state between the mushroom head (1) and the breechblock carrier (23) and thus preventing their being pushed together. During closure of the breechblock (1, 23), the sleeve (13) enters a fixed cone (31), which compresses it radially in elastic fashion so that it can be inserted into an annular space in the mushroom head (1) and/or breechblock carrier (23) and thus permits their pushing together.



Abstract

A sleeve (13) made of spring plate is positioned between the mushroom head (1) and the breechblock carrier (23) of a locked firearm, the sleeve being supported in the expanded state between the mushroom head (1) and the breechblock carrier (23) and thus preventing their being pushed together.

During closure of the breechblock (1, 23), the sleeve (13) enters a fixed cone (31), which compresses it radially in elastic fashion so that it can be inserted into an annular space in the mushroom head (1) and/or breechblock carrier (23) and thus permits their pushing together.

Figure 1c

Interlocked Firearm

The invention concerns an interlocked firearm with a breechblock consisting of a mushroom head and a breechblock carrier according to the principal clause of Claim 1.

This firearm is further outlined in the principal clause of Claim 2 and additionally has a locking element rigidly connected to the rear end of a barrel or designed in one piece with it,

- in which the breechblock can be moved in the longitudinal direction of the barrel and is formed from a mushroom head and a breechblock carrier, which are connected by a connection device that can be pushed into the mushroom head and/or breechblock carrier,
- in the locked position the mushroom head engages behind the locking element,
- during unlocking the breechblock carrier is initially moved alone backward by a locking distance, in which engagement of the locking element by the mushroom head is released by an automatic control,
- after unlocking, the mushroom head and breechblock carrier are moved together rearward and then forward again but offset by the locking distance for a reloading process,
- until the mushroom head has again reached its frontmost position, whereupon the breechblock carrier is again moved forward by the locking distance and the automatic control of the mushroom head is moved to engagement of the locking element.

"Forward" is understood here to mean the direction pointing to the muzzle of the weapon.

The connection device between the mushroom head and the breechblock carrier in the simplest case forms a neck, which is rigidly connected, for example, to the mushroom head and can be pushed telescope-like into the breechblock carrier by the length of the locking distance, when the breechblock is locked. However, this type of neck can also be formed on the breechblock carrier and be inserted into the mushroom head, or can be formed from a

separate part that can be inserted both into the mushroom head and into the breechblock carrier.

The locking element is arranged fixed on the barrel and is engaged by the mushroom head when the breechblock is locked so that the recoil exerted on the mushroom head by a fired cartridge does not move this back (at least not instantaneously) to a significant degree.

Engagement between the mushroom head and the locking element can occur by means of rolls that can be swung out radially, blocks that can be swung out radially or flaps, etc. Nowadays, locking mostly occurs by turning the mushroom head provided with several breech pins so that the breech pins engage behind counterpins fixed in the locking element.

Automatic control in this case occurs through a guide link that operates between the mushroom head and breechblock carrier and by support of the mushroom head in the weapon housing so that the mushroom head can only be turned in its frontmost position.

Unlocking can be produced, for example, in a recoil-operated gun, by backward movement of the barrel and the entire breechblock over an initial distance so that the breechblock carrier is placed in motion and then rotates the mushroom head, carries out the loading movement, etc. However, it is particularly simple to use a gas piston, which, moved by the firing gases ejected from the barrel, in turn places the breechblock carrier in motion.

When the locking device is designed so that the mushroom head can execute a very limited backward movement right during firing, then this backward motion can be applied to the breechblock carrier by a transfer mechanism, which in turn entrains the mushroom head (for example, the weapon G3).

If in any of the described weapons the breechblock moved fully to the rear is moved forward and feeds a cartridge from the magazine or a belt device from the rear with the mushroom head, in order to push this cartridge into the barrel, the mushroom head is forced against the breechblock carrier so that the automatic control then attempts to trigger the locking movement of the mushroom head. To prevent this, the mushroom head is guided in turn in guide tracks of the weapon housing so that this locking movement is prevented.

For example, if locking is caused by a pivotable block, this block then encounters a guide and therefore cannot pivot. In the common case of a rotatable mushroom head, this sits on guides that prevent its rotation.

The mushroom head and guide therefore slide against each other under powerful mutual support so that wear is increased and the reliability of the weapon is reduced. One need think only of the sand effect, through which the uppermost cartridge in the magazine, which is forced against the magazine lip with greater force, sits even more strongly than usual. The sand effect then also hampers sliding engagement between the mushroom head and guide.

In the special case of a semirigid, locked breechblock, this problem is taken up by German Patent No. 15 78 392 of the applicant and finds a solution, which, however, entails several additional, precision-machined components and is therefore costly.

It is expressly pointed out that the ordinary longitudinal guides of the breechblock in the weapon housing are not affected by the described problem, since they need not take up any noticeable transverse forces.

With this problem situation as point of departure, the underlying task of the invention is to modify the firearm mentioned at the outset so that it is improved in its functional reliability.

This is to occur with the simplest possible design.

This task is solved according to the invention in a generic firearm in that

- a sleeve made of spring plate is positioned between the mushroom head and the breechblock carrier, which is supported in the expanded state between the mushroom head and the breechblock carrier and thus prevents their being pushed together, and

- during closure of the breechblock the sleeve enters a fixed cone, which compresses it radially in elastic fashion so that it can be pushed into an annular space in the mushroom head and/or breechblock carrier and thus permits their being pushed together.

This solution can be further restricted and specified in that

- the part of the mushroom head or breechblock carrier, into which the connection device can be pushed, forms an annular space around it when it is pushed in,
- a longitudinally divided sleeve made of spring plate is positioned on the connection device, which is at least partially taken up in the annular space in the radially compressed state;
- when the mushroom head and breechblock carrier are separated by the locking distance and the sleeve is thus released from the annular space, this sleeve is expanded elastically so that it can no longer be pushed into the annular space and
- a cone or slope is formed behind the locking element, against which the sleeve runs during closure of the breech and which is set up for radial compression of the sleeve so that this can reenter the annular space (Claim 2).

Thus, as single additional part, a spring plate sleeve is required, which has fairly large dimensions (the length corresponds at least to roughly the locking distance) and which in the expanded state transfers any longitudinal force acting on the mushroom head directly from it to the breechblock carrier, bypassing the automatic control.

The length section of the sleeve that enters the annular space corresponds roughly to the locking distance.

The sleeve is an extremely uncomplicated component that is easy to manufacture, whose function during the loading process consists of expanding elastically or being slightly compressed against its spring action. Engagement in snaps or the like does not occur. Wear therefore is not an issue. Since the spring path of the sleeve is limited, breakage of the sleeve need not be reckoned with either.

Removal and insertion of the sleeve occurs simply by pushing on the connection device with the breechblock disassembled.

The sleeve is also formed from relatively thick sheet. Its corrosion therefore does not adversely affect troublefree action, since corrosion only affects a small fraction of the material thickness.

Finally, the sleeve also protects the parts of the connection device covered by it from dirt splattering, for example.

Overall an additional, simple sheet part is achieved with which all the disturbances mentioned at the outset can be avoided during the reloading process.

The component or assembly referred to as "connection device" is the arrangement that keeps the mushroom head and breechblock carrier separated at least by the locking distance in the unlocked state of the breechblock and permits mutual approach in the locked state.

This connection device can be inserted into the mushroom head and/or into the breechblock carrier. The connection device, however, can also be lengthened or shortened, for example, in the form of a toggle joint mechanism.

The breechblock carrier can be positioned directly on the mushroom head in the locked state. In this case, in the unlocked state, it has a spacing from the mushroom head that corresponds to the locking distance. The axial length of the sleeve advantageously also agrees with the length of the locking distance.

However, the connection device is advantageously designed so that even in the locked state a spacing is present between the mushroom head and the breechblock carrier, which is then lengthened during unlocking by the locking distance. The sleeve can expediently be dimensioned in length so that in the unlocked state it spans the entire distance between the mushroom head and the breechblock carrier so that, on the occurrence of axial forces, the connection device remains essentially free of forces (Claim 3). During locking the sleeve enters an annular space, but at most over a length that corresponds to the locking distance.

Of the possible locking methods, rotary locking is preferred, in which the mushroom head is designed to be rotated around the lengthened axis of the bore of the barrel. In this case the sleeve preferably loosely surrounds the connection device (Claim 4).

The advantage of rotational locking is that essentially symmetric support of the breechblock can be produced with respect to the axis of the bore by simple means so that during firing one-sided loads do not act on the barrel, which could also adversely affect firing performance, among other things.

The loose arrangement of the sleeve means that no special attachments are required for it so that the tolerance to be maintained for the sleeve can be fairly high.

During rotational locking protrusions applied to the mushroom head, so-called locking pins, engage behind the ribs of the locking element during rotation of the mushroom head. Conventionally in automatic weapons two opposite locking pins are situated in one radial plane and optionally at least one additional locking pin in another radial plane.

However, it is also already known that several locking pins can be arranged in a single radial plane so that the mushroom head is similar in appearance to a drive shaft-gear, in which a tooth is missing at the sites prescribed for an extractor hook and/or an ejector.

According to a preferred practical example of the invention locking, in which the wall of the cone is cut by longitudinal grooves for compressing the sleeve, which form the recesses for entry of the locking pins (Claim 5), is preferred.

It is therefore possible to use locking pins arranged in stellate fashion with the advantages inherent to them, but also to ensure at the same time that the sleeve is compressed evenly over its periphery when the breechblock is to be locked. Because of this, local hangup of the sleeve and thus a harmful force concentration is avoided. When the breechblock closes by the action of its closure spring it attains a significant kinetic energy, but could be braked by a jammed sleeve, which would result in loading interference.

The connection device is preferably arranged as a shaft-like extension of the mushroom head, which during locking enters the breechblock carrier by at least the locking

distance (Claim 6). Naturally the shaft can already extend into the breechblock carrier from the outset so that during locking it is only pushed in a telescoping fashion further into the breechblock carrier by the locking distance.

The annular space is then preferably formed in the breechblock carrier.

The sleeve can form a guide element when, on the one hand, it lies against the cone from the interior under spring tension when the breechblock is locked and, on the other hand, essentially fills up the annular space, because it then aligns the breechblock carrier independently of the mushroom head on the cone and thus on the axis of the barrel bore.

The locking pins of the mushroom head form a front stop for the sleeve. The breechblock carrier with its zone radially around the annular space and outside of the annular space forms a rear stop for the expanded sleeve.

The mushroom head has an extractor hook whose rear part preferably is positioned beneath the sleeve (Claim 7). The sleeve thus not only protects the rear part of the extractor hook, but is also supported radially when it executes an arc movement beneath the cartridge edge during unlocking so that reliable holding of the extractor hook on the cartridge bottom is guaranteed. The sleeve can even form the spring for the extractor hook.

The object of the invention is further described with reference to the enclosed schematic drawing. A preferred variant of the invention is shown in this drawing; however, it is pointed out that this variant is preferred, but in no way limiting.

In the drawing:

Figure 1a shows a mushroom head according to the invention without sleeve, in a side view;

Figure 1b shows a section through the mushroom head along line A-A in Figure 1 with the expanded, relaxed sleeve;

Figure 1c shows a section as in Figure 1b, but with the radially compressed sleeve;

Figure 2a shows the rear part of a barrel with cartridge magazine, locking element and breechblock in a reduced longitudinal section in the locked state;

Figure 2b shows a view as in Figure 2a with a closed but unlocked breechblock;

Figure 2c shows a view as in Figure 2a with a slightly opened breechblock; and Figure 2d shows the longitudinal section through the rear part of the barrel and the locking element with the fully opened (and therefore not visible in the drawing) breechblock.

In all figures the same variant is shown; each reference number in each of the figures denotes the same element whose description with reference to one of the figures is also valid for all the others.

A mushroom head 1 is shown in a side view in Figure 1a. This is formed from an overall cylindrical, elongated shaft 3, having a rear section with larger diameter and a front section with smaller diameter, between which an offset 17 is formed. The rear section of shaft 3 is provided with a transverse hole 15 to accept a control pin (not shown).

A radial rim is formed on the front end of the front section of shaft 3 from locking pins 5 spaced in radial beam-like fashion, whose rear radial surfaces form a front offset 19.

The side surfaces of the locking pins 5 lie in planes that extend parallel to the planes that contain the longitudinal center axis 11 of mushroom head 1. The free edges of the locking pins 5 are beveled.

The locking pins 5 have the same angular spacing relative to each other. One of these locking pins 5 is missing. An extractor hook 9 extends through the gap.

The extractor hook 9 has a rear section positioned in an elongated groove in the front section of shaft 3 and in the region between the two offsets 17, 19 is essentially flush with the outside surface of shaft 3. The rear section of extractor hook 9 can be pivoted around a pivot 21 which it penetrates transversely and which is embedded in shaft 3.

A compression spring (not shown) inserted into shaft 3 can be provided as extractor spring beneath the end of extractor hook 9, which extends outward over pivot 21. This spring can be replaced by an elastic sleeve 13 (Figure 1b and 1c), which is a circular cylinder made of spring plate having a continuous longitudinal slit. This longitudinal slit in the relaxed state of sleeve 13 has a slit width a (Figure 1b). The length of sleeve 13 is dimensioned so that it fits between the two offsets 17 and 19.

The sleeve 13, if necessary, prevents falling out of the pivot 21.

When sleeve 13 is compressed against its spring action, that lies tightly against the front section of shaft 3; its slit width diminishes to the small value a' (Figure 1c).

In the relaxed state the inside wall of sleeve 13 lies loosely above the rear section of extractor hook 9.

During assembly the sleeve 13 can be pushed without difficulty over the rear section of shaft 3.

The rear section of shaft 3 with larger diameter extends with limited play into a hole opened to the front in a breechblock carrier 23, which is perforated on one side by a longitudinal hole forming a link 27, which extends obliquely to the longitudinal direction and whose width corresponds to the final diameter of a control pin, which is positioned in transverse hole 15.

In the operating position of mushroom head 1 its transverse hole 15 is flush with link 27. The control pin (not shown), which is pushed through the transverse hole 15 and link 27 with very limited play, is guided in link 27 when the mushroom head 1 carries out an axial relative movement with respect to breechblock carrier 23 and runs along it so that during return of this relative movement the mushroom head 1 is rotated relative to breechblock carrier 23. The axial distance covered is then the locking distance b (Figure 2b).

At the end of the barrel with cartridge magazine 29 a locking element 35 is formed, which widens to the rear and outward on the rear end to form a cone 31. An inner annular groove 37 is formed between cone 31 and cartridge magazine 29. Its axial width corresponds at least to the axial length of the locking pins 5. The cone has longitudinal grooves 33, whose number, arrangement and design correspond to the locking pins 5 on mushroom head 1.

When the mushroom head 1 is separated from breechblock carrier 23 by the greatest possible distance (Figure 2b and Figure 2c) and approaches cone 31 from the rear (Figure 2c), the locking pins 5 (and the extractor hook 9) pass precisely through longitudinal grooves

33 until the front end surface of mushroom head 1 stops on the front limitation surface of the inner annular groove 37 or on the bottom of the cartridge (Figure 2b).

If the breechblock carrier 23 now moves relative to mushroom head 1 further forward by the locking distance b , then it is rotated, the locking pins 5 run along the inner annular groove 37 and engage behind the front end of cone 31 between longitudinal grooves 33. The breechblock is now locked (Figure 2a).

The sleeve 13 now ensures that the mushroom head 1 can only be shifted in the longitudinal direction relative to breechblock carrier 23 and thus rotated when it is situated in the frontmost position (Figure 2a and 2b). The breechblock carrier 23 is guided in its motion (not shown) in the weapon housing, so that it cannot rotate around longitudinal center axis 11. When it is displaced rearward relative to mushroom head 1 by the locking distance b , the rear offset 17 of mushroom head 1 is situated in a position in which it is flush with the front end surface of a cylindrical connector 25 or protrudes slightly beneath it by which the breechblock carrier 23 is lengthened forward. When the mushroom head 1 is entirely released by locking element 35, the sleeve 13 is free and can expand (Figure 1b). It then assumes an outside diameter greater than the outside diameter of the rear section of mushroom head 1 and thus the hole in the breechblock carrier 23 and covers a part of the front end surface of connector 25.

An axial relative movement of the mushroom head 1 relative to breechblock carrier 23 is now not possible in this open breechblock position depicted in Figure 2c, because the sleeve 13 extends between the front offset 19 of mushroom head 1 in the front end surface of connector 25.

If the breechblock is reclosed, locking pins 5 initially enter longitudinal grooves 33.

The front edge of the expanded sleeve 13 then runs against the region of cone 31 remaining between longitudinal grooves 33. The subsequent forward movement of the breechblock ensures that the sleeve 13 is pushed back into cone 31 and then radially compressed.

At the latest, when the mushroom head 1 runs against the front limitation of inner annular groove 37 or a cartridge bottom, the sleeve 13 is "fully" compressed (Figure 2b). The outside diameter is now smaller than that of the rear section of shaft 3 of mushroom head 1 and the breechblock carrier 23 can now move forward with its hole over sleeve 13, during which the mushroom head 1 is rotated over the control pin by the action of link 27.

If during closure of the open breechblock the mushroom head 1 runs with the locking pins 5 against an advancing, rigid cartridge (not shown), the axial force exerted on the mushroom head 1 is then transferred directly via sleeve 13 to the end surface of the cylindrical connector 25 on the breechblock carrier 23 without causing rotation of the mushroom head 1, which then must be counteracted at another location.

It should be noted that the extractor hook 9 and the transverse hole 15 of the mushroom head 1 with an open breechblock (Figure 2b, 2c) can be situated at precisely the same height as the longitudinal center axis 11 (starting from the normal horizontal stop of the corresponding weapon).

It is therefore possible to incorporate the mushroom head 1 either with a right-facing or left-facing (drawing) extractor hook 9 and to ensure that after firing a cartridge casing is ejected from the weapon either to the right or left. The weapon can thus be adapted to right or left shooting. The action of sleeve 13 is unaffected by this. As shown in Figure 1a, the extractor hook 9 is opposite a protruding tooth 40 with reference to longitudinal center axis 11, which forms a "counterstop" for the cartridge casing.

The breechblock carrier 23 is moved by a handle (not shown) or a loading lever and also by a gas piston (not shown) and entrains mushroom head 1 with it during the loading process.

List of Reference Numbers

1	Mushroom head
3	Shaft
5	Locking pins
9	Extractor hook
11	Longitudinal center axis
13	Sleeve
15	Transverse hole for control pin
17	Rear offset
19	Front offset
21	Pivot
23	Breechblock carrier
25	Connector
27	Link
29	Cartridge magazine
31	Cone
33	Longitudinal grooves
35	Locking element
37	Inner annular groove
40	Protruding tooth
a'	Width of sleeve slit in the relaxed state
a	Width of sleeve slit in the tightened state
b	Locking distance

Patent Claims

1. Interlocked firearm with a breechblock (1, 23) from a mushroom head (1) and a breechblock carrier (23), characterized by the fact that:
 - a sleeve (13) made of spring plate is positioned between mushroom head (1) and the breechblock carrier (23), which is supported in the expanded state between the mushroom head (1) and the breechblock carrier (23) and thus prevents their being pushed together and
 - during closure of breechblock (1, 23), the sleeve (13) enters a fixed cone (31), which compresses it elastically in the radial direction so that it can be inserted into an annular space in mushroom head (1) and/or breechblock carrier (23) and thus permits their pushing together and thus locking.

2. Interlocked firearm according to Claim 1 with a locking element (35) rigidly connected to the rear end of a barrel or designed in one piece with it,
 - in which the breechblock (1, 23) can be moved in the longitudinal direction of the barrel back and forth and is formed from a breechblock carrier (23) and a mushroom head (1), which are connected by a connection device (3) that can be pushed into or shortened in the mushroom head (1) and/or the breechblock carrier (23),
 - the mushroom head (1) in the locked position engages behind the locking element (35),
 - during unlocking the breechblock carrier (23) is first preferably moved rearward alone by a locking distance (b), during which engagement of the locking element (35) is released through the mushroom head by an automatic control,
 - after unlocking, the mushroom head (1) and breechblock carrier (23) are moved rearward and forward again together for a reloading process, but offset by the locking distance (b),
 - until the mushroom head (1) has reached its frontmost position, whereupon the breechblock carrier (23) is again moved forward by blocking distance (b) and the automatic control (27) moves the mushroom head (1) to engagement behind locking element (35),
 characterized by the fact that

- the part of the mushroom head (1) or breechblock carrier (23) into which the connection device (3) can be inserted forms an annular space around it when it is inserted,
 - a longitudinally divided sleeve (13) of spring plate is positioned on the connection device (3), which is at least partially taken up in the annular space in the radially compressed state,
 - when the mushroom head (1) and the breechblock carrier (23) are separated by the locking distance (b) and the sleeve (13) is therefore released from the annular space, this sleeve (13) expands elastically so that it can no longer be inserted into the annular space, and
 - a cone (31) or oblique surface is formed behind the locking element (35) against which the sleeve (13) runs during closure of breechblock (1, 23) and which is set up for radial compression of sleeve (13) so that it can enter the annular space again.
3. Firearm according to one of the Claims 1 or 2, characterized by the fact that the sleeve (13) is longer than the locking distance (b) and can only be accommodated in the annular space.
 4. Firearm according to one of the Claims 1 to 3, characterized by the fact that the mushroom head (1) can be rotated for locking and unlocking and the sleeve (13) loosely surrounds the connection device (3).
 5. Firearm according to Claim 4, characterized by the fact that several locking pins (5) are formed on the mushroom head (1) spaced in a radial plane and that the cone (31) has longitudinal grooves (33) that form the recesses for the locking pins (5).
 6. Firearm according to one of the Claims 1 to 5, characterized by the fact that the connection device is designed as a shaft (3) rigidly arranged on the mushroom head (1) and the annular space is formed in the breechblock carrier (23).
 7. Firearm according to Claim 6, characterized by the fact that an extractor hook (9) is attached to shaft (3), whose rear part is enclosed by sleeve (13).

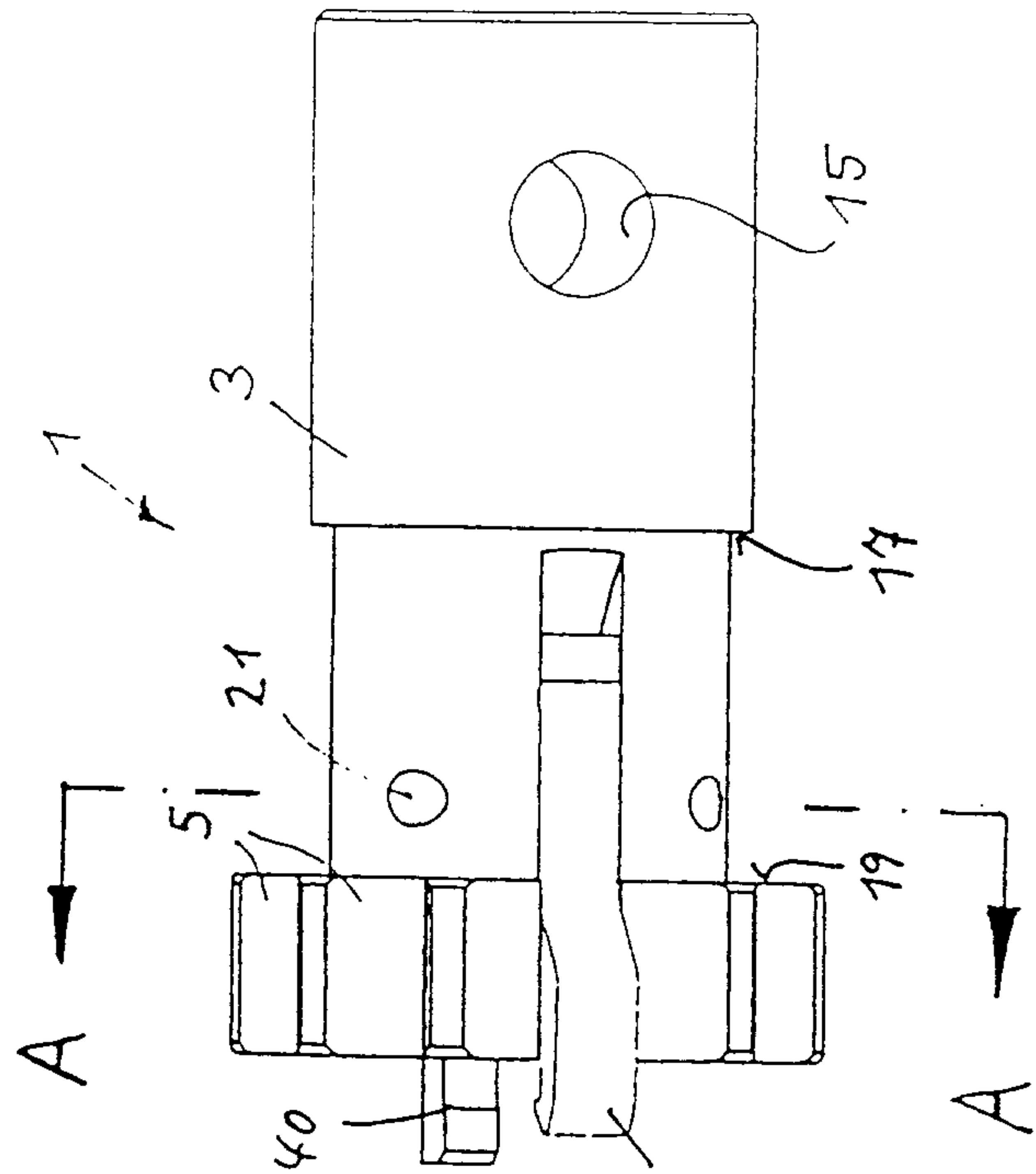


Fig. 1a

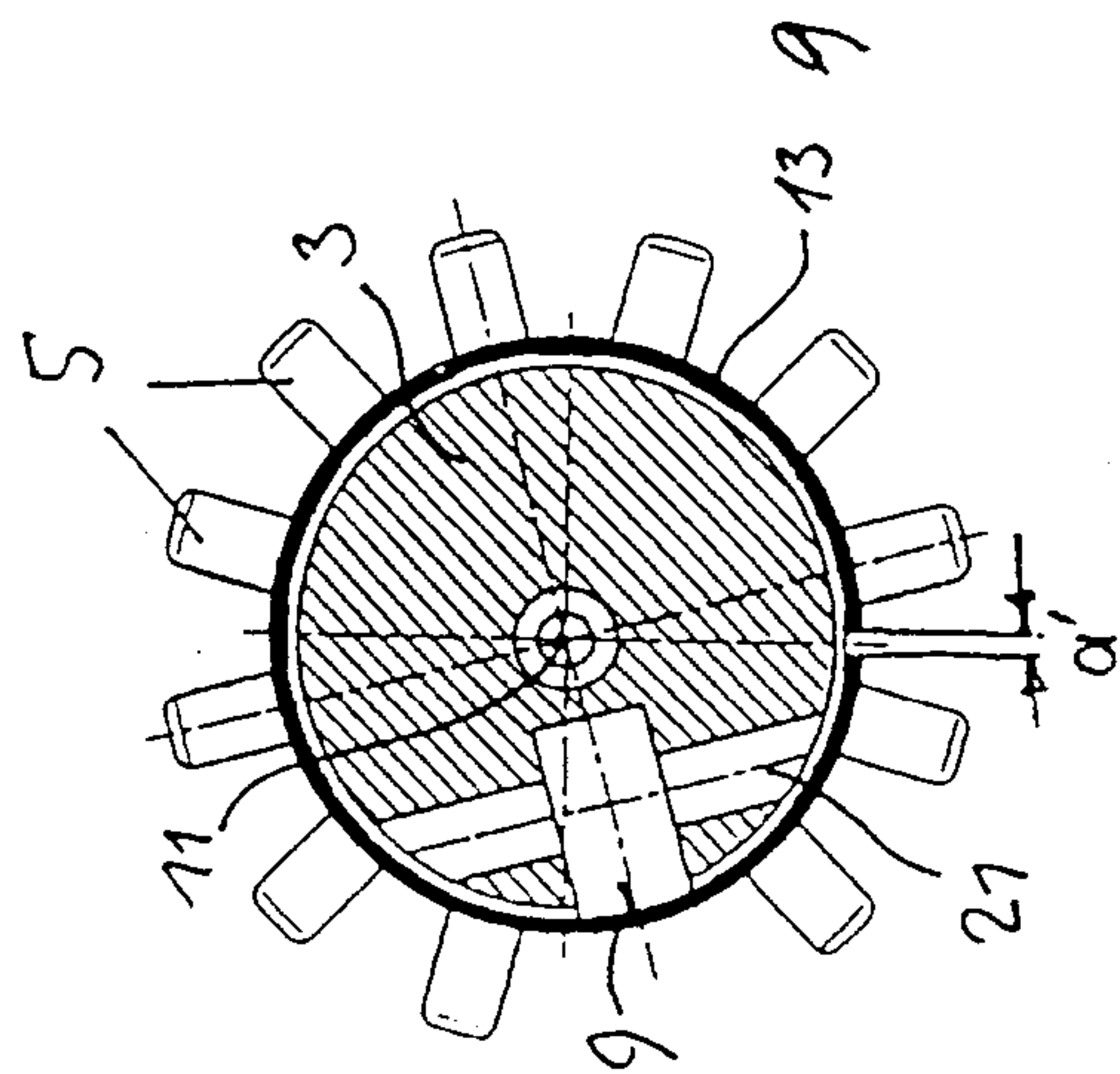


Fig. 1c

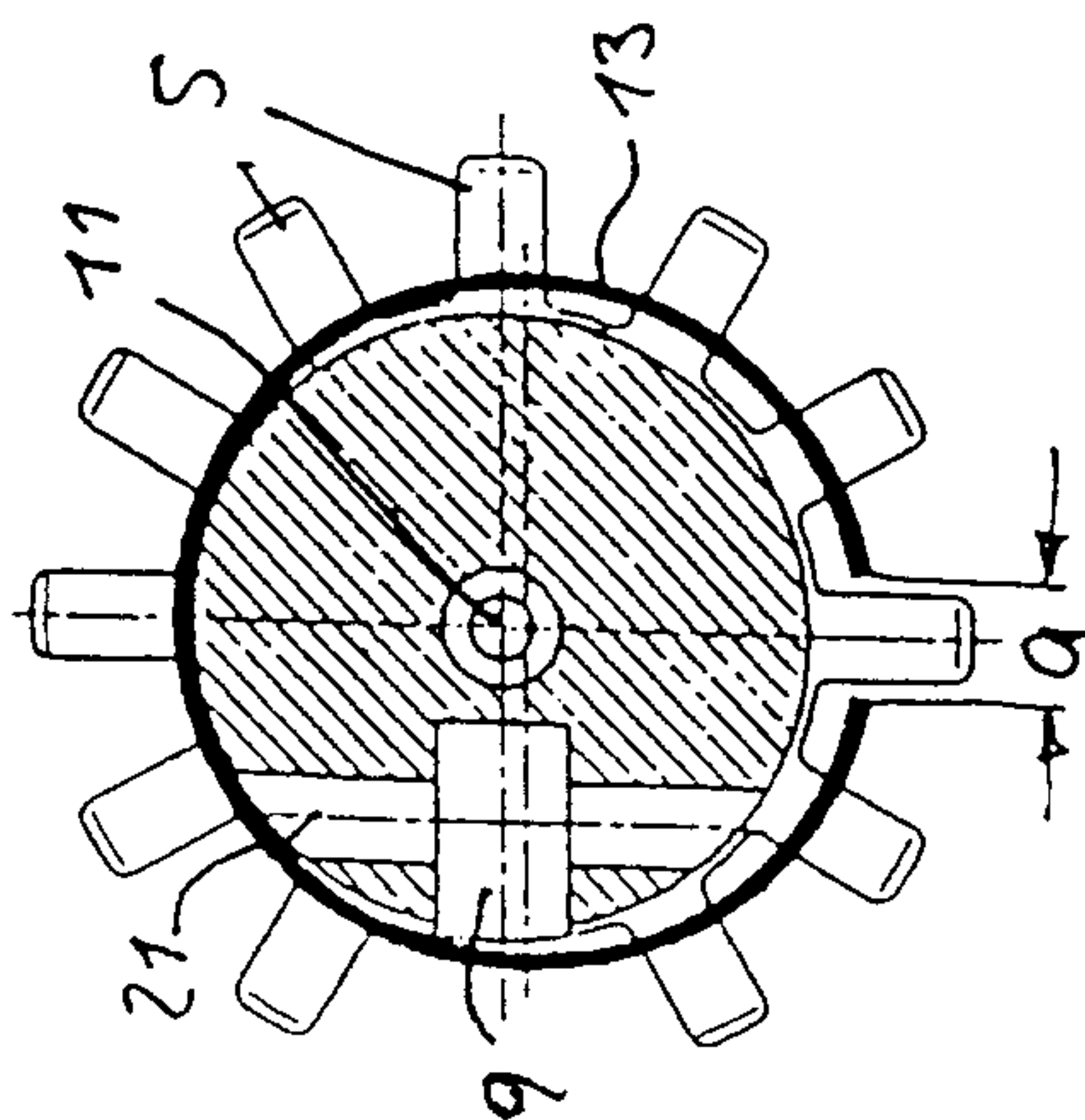


Fig. 1b

