o

a forward metering direction, in the interior of the nozzle, whereby a drop of the medium is ejected, and can be withdrawn again subsequently.

The ram can usually also be brought into a closed position, in that it tightly connects to a sealing seat of the nozzle opening in the nozzle and remains there temporarily. In the case of more viscous metered media, it can also be sufficient that the ram simply remains in the withdrawal position, i.e. at a distance from the sealing seat, without a drop of the medium escaping from the nozzle opening.

The present invention can be used in the case of all above-mentioned alternatives, independently of the concrete ejection principle, i.e. in the case of a jet process, an open ink jet process, or also with a classical closing element.

Because of the desire to continuously achieve a higher machine productivity or operating speed, respectively, there is now a further requirement to apply the metered media ever more quickly, thus, for example, the drops with a high ejection frequency, thus in rapid chronological sequence, to the target surface.

This leads to vibrations, which can propagate from the dynamically excited components in the metering system to the entire metering system. Due to the fact that the metering system is a vibratory system, the excitations in the structure of this system are optionally intensified. In particular a natural frequency of the system can be excited thereby. If natural frequency and excitation frequency match, resonant vibrations are created, which cause unwanted relative movements, which can negatively influence the metering behavior, in particular the metering accuracy and metering quality.

Metering systems known from practice can drive such desired ejection frequencies only theoretically. Tests have shown that the currently known metering systems can no longer operate in a stable and smooth manner with the desired ejection frequencies in the context of the required quality criteria. The metering quality as well as the metering accuracy decrease in such a way that it is thus not possible to achieve a satisfactory metering result with the provided metering frequencies.

To address this problem, preload springs, thus springs for directly preloading the actuators, are often used in practice. A construction with actuators that are preloaded with such preload springs is known, for example, from KR 101 301 107 B1. In the case of high dynamic

o

stress, the components, in particular the actuators and frame component parts heat up unevenly as well as to varying extents. This results in a deviating position of the closing element to the nozzle and thus in a deviation of the metering result. In the case of high excitation frequencies, natural resonances of the dynamically vibrating preload springs can additionally result, which then likewise negatively influence the metering process. Interference and/or resonance effects, which negatively influence the metering result in the short run and which lead to increased friction or increased wear of the respective components, respectively, in the long run, can thus result in the desired frequency ranges.

It is thus an object of the present invention to improve known metering systems, in particular to specify a particularly quick metering system, by means of which a higher metering frequency is achieved with a high metering accuracy and metering quality of metered media on a workpiece.

This object is solved by means of a metering system according to patent claim 1.

As mentioned above, the metering system according to the invention for metering a metered medium on a workpiece or substrate, respectively, comprises a frame housing unit. A frame housing unit means a housing of the metering system, which encloses in a “frame-like manner”, thus a housing, which surrounds a majority of the components of the metering system, such as, e.g., a movement mechanism of the metering system, which will be described later, overleaf. For functional reasons, the frame housing unit is embodied in a relatively massive and inert manner because it acts as stable counter bearing or as inert frame of the metering system, respectively, in order to be able to resiliently support in particular the dynamic components of the metering system, such as the just-mentioned movement mechanism, relative thereto, as will be described further below.

The frame housing unit is designed in such a way, i.e. is correspondingly inert or massive, respectively, that it hardly to not at all responds in response to the high vibration or movement frequencies, respectively, of the movement mechanism, thus behaves statically relative to the dynamic movement mechanism. In that it thus calms the entire metering system, it ensures a consistently good metering behavior.

It can thereby preferably form a first main mass of the metering system with low natural frequency, which is as insensitive as possible, i.e. which is not stimulated to vibrate if possible, for a frequency range of the lighter individual components of the movement

o

mechanism of the metering system, which move dynamically, at high frequency, so that an interference-related development of resonant vibrations or reverberation, respectively, of the entire metering system in the metering operation is thus virtually ruled out based on the different vibration frequencies.

As already likewise mentioned above, the metering system according to the invention further comprises a lever mounting unit, which is supported on the frame housing unit comprising at least one lever mount for a lever of the metering system. The lever mounting unit is advantageously separated from the frame housing unit in so far as it is structurally protected against a tilting or rotating, respectively, but can be shifted along an axis in a depth direction or metering direction, respectively, relative to the frame. This shifting is prevented by means of the piezoelectric actuators, which are spring-braced between the frame housing unit and the lever mounting unit via the lever mounting unit. It is attained thereby that a thermally identical change of the two piezoelectric actuators and/or a thermal change of the frame housing unit lead to a relevant change of the distance between nozzle and ejection element, as will be described later.

The lever mounting unit is thereby preferably arranged partially inside, partially outside the frame housing unit, thus supported on the frame housing unit.

The lever mount of the lever mounting unit is a first rotary mounting part of a rotary mount, which is a part of the movement mechanism. The rotary mount or tilt mount, respectively, is formed from lever mount and lever, and indirectly transfers the force, which is alternately generated for the metering operation of two actuators, to the ejection element, which is to be driven. The ejection element, which can preferably also be a ram in the case of the present construction of the invention, then conveys a metered medium at least in portions out of the nozzle according to one of the above-described metering methods or metering types, respectively.

According to the literal meaning, the lever mount thereby serves the purpose of bearing the lever, which is supported rotatably or tiltably, respectively, about a tilt axis of the tilt mount, so that the lever can be moved relative to the tilt axis in a provided metering direction of the metering system from an initial rest position, namely a horizontal central position or can be tilted at least about a certain angle defining the stroke length, respectively. The tilt axis or also axis of rotation, on which the lever is tiltably supported, therefore likewise runs

o

horizontally, but perpendicular to the lever or to a longitudinal direction of the lever, respectively.

Relative direction indications, such as “top”, “bottom”, “on the top side”, “on the bottom side”, “laterally”, “left”, “right”, “longitudinally”, etc. refer arbitrarily here to the illustration in the figures, which will be described further below, even though the metering system is used or utilized, respectively, mainly in the orientation illustrated in Figure 1 during operation. This means that a metering onto a workpiece during the jet process mostly takes place so that the metered drops essentially hit the workpiece a bit in free fall or flight, respectively, with the force of gravity, thus a metering takes place in the metering direction or in a downward depth direction, respectively.

In the broadest sense, the lever simply refers to a mechanical force transducer, which consists of a rigid body, which is supported rotatably as usual about a center of rotation, namely the tilt axis. The lever of the metering system according to the invention thereby comprises a two-sided or two-armed lever arm, respectively, extending substantially in a longitudinal direction. “Substantially in a longitudinal direction” means that the lever extends through the metering system at least in a main direction of extension, namely a longitudinally running deflection direction between ejection element and actuators. However, the lever is generally a three-dimensional component, which also extends at least proportionately in the two other orthogonal spatial directions. For example, it can extend in a transverse direction (parallel to the tilt axis) between two side surfaces or in a depth direction (perpendicular to the tilt axis and to the longitudinal axis), in the direction of the lever mount at least to the extent that it measures at least a fraction of its main direction of extension in the longitudinal direction in these directions.

As generally usual, the term “lever arm” here also refers to the part (or the length, respectively), of a lever, which reaches from a tilt axis or an axis of rotation of the lever, respectively, to an engagement point, at which the force acts or engages with the lever, respectively. A two-sided or two-armed lever arm, respectively, therefore has two such parts or lever arms, respectively, each comprising an engagement point, on which a force in each case engages with the lever. The lever arms can hereinafter also be referred to as lever arm sides of the lever arm of the lever. The respective distances of the engagement points from the common axis of rotation are also referred to as lever arm lengths. In principle, the larger the distance of an engagement point from the tilt axis, thus the larger the lever arm

o

length, the smaller the force can be, in order to compensate for a correspondingly larger force with correspondingly shorter lever arm length.

In the case of the metering system according to the invention, one of the lever arm sides of the two-sided lever arm further has a first actuator engagement point close to the tilt axis, thus a first point, with which the force engages. Remotely from the tilt axis on an end portion, the respective lever arm side is in contact with a nozzle of the metering system by means of the ejection element, which has already been mentioned above. As intended, the movement of the lever in the metering direction of the metering system transfers, in turn, to the ejection element. The terms “close to the tilt axis” and “remotely from the tilt axis” are to thereby be related relative to one another. An arrangement close to the tilt axis thus only means that the respective component is arranged closer to the tilt axis than a component arranged remotely from the tilt axis.

Close to the tilt axis, the other lever arm side likewise has a second actuator engagement point – thus a second point, with which the force engages alternately to the first point, as will be described below. The respective lever arm side can be formed symmetrically to the other lever arm side, e.g. simply go nowhere remotely from the tilt axis on the lever arm side comprising the second actuator engagement point (spaced apart from the ejection element). Preferred designs or further developments, respectively, of the lever will be described later.

The metering system according to the invention furthermore comprises two actuators, which, during operation, exert a tilting moment in opposite directions on the lever at the first and second actuator engagement point.

In the context of the invention, a tilting moment is to simply be understood as a torque, which ensures that the lever tilts about a certain angle and the ejection element, which is in contact, is therefore moved as provided for metering purposes. The term of the tilting moment used here, however, does not refer to a classical tilting moment, in the case of which a body, to which it is applied, tilts or tips over, respectively, starting at this certain tilting moment. On the contrary, the tilting refers literally to the tilting of the lever about a certain angle to the horizontal or to a central position, respectively, in which the lever is located at least initially prior to start-up or at a point in time, at which the actuators are currently deenergized, respectively.

o

The above actuator engagement points in each case refer to at least individual points or actuator points of contact, respectively, in terms of contact or engagement points of the actuators on the lever, respectively, at which the actuators engages with the lever or are in contact with the lever, respectively. Actuator engagement points, however, can also consist of a plurality of points, a line, or a surface. For example, the actuator engagement points can be formed as two longitudinal engagement lines or actuator contact points, respectively, which run transverse to the lever as well as perpendicular to the directions of action of the actuators. This lends itself in order to limit the rotational movement or tilting movement of the lever, respectively, relative to the lever mount only to the provided tilting movement about the tilt axis in order to move the ejection element in a desired metering direction. Virtually no further rotational components can thus be created, which could cause, for example, additional friction or wear, respectively, in the system. Preferred designs of the actuators will likewise also be described later.

According to the invention, the actuators of the above-mentioned metering system are placed obliquely to one another. “Placed obliquely to one another” means that on the front side the actuators run towards one another obliquely in a common plane or are directed obliquely at a common point, respectively, on the other side or behind the tilt axis, respectively. In a further exemplary embodiment, which will be described below, they are directed, for example, at a point below the horizontal plane of the tilt axis of the tilt bearing of lever mount and lever.

In any case, however, “placed obliquely to one another” means in particular that the actuators or the directions of action thereof, respectively, are placed or aligned, respectively, at an angle of less than 180˚, but greater than 0˚ to one another. The invention thus turns away from the fact that the actuators are aligned exactly opposite to one another or parallel or anti-parallel to one another, respectively, as will be described in more detail below.

Together, the lever mounting unit (comprising the lever mount), the lever, and the two actuators furthermore form a movement mechanism, which movement mechanism is braced, according to the invention, on the frame housing unit by means of at least one spring element.

The movement mechanism is thereby designed so that it can set the ejection element of the metering system as desired in particular at high frequency into a longitudinal ejection

o

and withdrawal movement in and opposite to the metering direction, i.e. to the bottom or top in the case of a usual arrangement. For this purpose, the ejection element can be structurally connected or coupled, respectively, to the movement mechanism at an actuating point, e.g. the ram on a ram head, or can be preloaded against it by means of a spring, such as, e.g., a torsion spring, thus, for example, only be in pressure contact. In any event, the coupling takes place in such a way that the tilting moment generated by the actuators – typically a simple linear deflection or linear movement, respectively – is transferred in turn or alternately, respectively, from the lever (as ejection or withdrawal movement) via a contact surface of the lever to the ejection element, preferably a ram head of the ram, in order to deliver the metered medium from the nozzle.

The spring element can be, for example, at least one pressure spring. It can be preloaded with approximately 3-4 kN, i.e. resiliently brace the movement mechanism against the frame housing unit. The two actuators can thereby each be preloaded or biased, respectively, for example, with 1.5 to 2 kN, preferably 1.8 kN. Preferred designs of the spring element will be described later.

By means of the construction according to the invention of the subject matter of the invention, it is achieved that a higher ejection frequency of the metering system can be driven with consistently good metering accuracy and metering quality. In addition, a dynamically stressed return spring can additionally be forgone in each case at the two actuators by means of the construction according to the invention, because said return springs do not operate in a stable manner at all frequencies because they can lead to wobble movements or unwanted vibrations of the system, respectively, in particular in the case of quick or high-frequency metering, respectively, as it is in fact desired in the case of the invention.

With the preloading of the movement mechanism, which is resilient as a whole, against the frame housing unit, it is achieved that dynamic vibrations remain in the dynamic system, wherein the preloading, which is resilient as a whole, is not a component of the dynamic system. Possible individual thermal effects caused by different local heating of the individual metering system components (piezo actuators, frame housing unit, lever, etc.) additionally do not have an individual effect on the distance between ejection element and nozzle – as was previously the case in the prior art – but are compensated for the most part. The metering accuracy and metering quality of the entire metering system can thus no longer be significantly influenced at least by effects of this type.

o

The construction according to the invention of the subject matter of the invention, in particular the oblique placement of the actuators in a common plane, additionally provides for a tighter or closer position, respectively, of the engagement points of the actuators on both sides around the center of rotation of the lever, which lever, in turn, induces the ejection element via its lever arm for metering purposes. In that the lever can thus be designed to be smaller and lighter and therefore has a lower moment of inertia, higher accelerations and thus a quicker metering can be performed by means of the metering system according to the invention.

As further advantage, in particular the size of the drops or the quantity of the medium per drop, respectively, can also be reduced even further. Larger surfaces can thus furthermore be wetted with a metered medium in the same time interval. The construction according to the invention is particularly suitable in particular for a contactless metering of small quantities of a metered medium or metered substance, respectively – thus in a micro-dosed manner, with pinpoint accuracy and without contact, i.e. without a direct contact between the metering system and a target surface – onto a target surface, namely during the jet process or a metering by means of jet process, respectively.

Further, particularly advantageous designs and further developments of the invention follow from the dependent claims as well as from the following description, whereby individual features of different exemplary embodiments or alternatives, respectively, can also be combined into new exemplary embodiments or alternatives, respectively.

There are different options to increase the ejection frequency of the metering system. For example, the movement mechanism, in particular the lever, can be optimized or designed in an improved manner, respectively.

The two actuators, which are placed obliquely to one another, can generally engage on both longitudinal sides of the lever, for example with an end portion of a lever arm of the lever. For this purpose, an actuator engagement point could in each case be formed on two opposite longitudinal sides of the lever.

The two actuators can preferably be located on a common longitudinal side of the lever, so that they can engage with the lever substantially from a common direction. The first actuator

o

engagement point and the second actuator engagement point can therefore be formed and arranged on the same longitudinal side.

In the case of a normal arrangement of the metering system (with the metering opening directed downwards), said longitudinal side – for example in the case of the exemplary embodiment, which will be described later in detail – is a longitudinally running top side of the lever. They thus exert a tilting moment in opposite directions on the lever only on a longitudinal side of the lever or alternately, respectively, thus only stress the lever on one side. On the opposite (generally lower) longitudinal side of the lever, sufficient space is thus moreover available for the lever mount, which ensures a particularly space-saving compact setup of the metering system as a whole. The arrangement of the actuators on a longitudinal side of the lever additionally makes it possible that the lever mount and the lever can be braced simultaneously against the actuators by means of the spring element, which has already been mentioned above, so that the movement mechanism is thus preloaded as "dynamic" unit against the frame housing unit as "static" unit so as calm vibrations.

There are preferred options for the position of the actuators to the lever. For example, one actuator could thus engage perpendicularly with the lever, wherein the other actuator abuts obliquely against the lever, so that the two actuators are placed obliquely to one another in any event.

However, the actuators can preferably in each case be arranged at the same angle to a common angle bisector or axis of symmetry, respectively (of an imaginary "V" from the actuators), wherein the angle bisector or axis of symmetry, respectively, is perpendicular to the top side of the lever. Viewed from a longitudinal side, the actuators can thus be arranged in a V-shaped manner such that they can be brought into alignment by means of an imaginary mirroring on the axis of symmetry or angle bisector, respectively. Viewed spatially, the actuators can be arranged in V-shaped manner such that they can be brought into alignment by means of an imaginary mirroring on a symmetry plane from said axis of symmetry as well as an axis of symmetry running perpendicular thereto horizontally through the actuators, as will be described later on the basis of an exemplary embodiment.

The actuators can particularly preferably be arranged so as to be placed obliquely to one another such that the longitudinal direction of the lever or lever longitudinal axis, respectively, is located in a virtual plane spanned by the direction of action or longitudinal axis of the actuators, respectively, or the tilt axis of the lever is perpendicular to this virtual

o

plane, respectively. For practical purposes, the metering system can thus be designed in an extremely flat manner in spite of the actuators, which are placed obliquely to one another (in a transverse direction perpendicular to the longitudinal direction of the lever), namely in a similarly flat manner as in the case of the constructions, in which – as was customary – only one actuator or two parallel actuators are installed.

The actuators can thereby generally be arranged in the angular range between two extremal positions – namely a parallel position running next to one another on the one hand and an opposite frontal position, i.e. when the actuators run towards the lever and towards one another in a line or in common alignment, respectively, from different sides – (exclusive of said extremal positions) obliquely to one another on a longitudinal side of the lever axially symmetrically to the common angle bisector.

According to a preferred exemplary embodiment of the invention, the actuators, more precisely the longitudinal axes or directions of actions thereof, respectively, can be placed or arranged, respectively, in a V-shaped manner maximally or at most, respectively, at a 150˚ to one another. More preferably, they can be aligned to one another maximally at a 120˚ angle and even more preferably maximally at a 90˚ angle. Particularly preferably, they can be placed obliquely to one another maximally at a 60˚ angle, and most preferably maximally at a 30˚ angle.

Angles smaller than 20˚, in particular smaller than 10˚, can then only still be achieved by means of a correspondingly smaller cross section of the actuators or by means of a corresponding extension and thinning of the transducers of the actuators. At an angle of 20˚, “correspondingly smaller” would mean for example that half the cross section of each actuator may be less than 10˚ in each case. The mentioned extension, in contrast, would inevitably lead to a significant enlargement of the housing or of the metering system, respectively, which, in turn, makes the construction larger and more susceptible with regard to bending strength.

Provided that the mentioned disadvantages do not have any relevance, it could nonetheless also be desired that the actuators are preferably placed obliquely to one another maximally at an angle of 20˚ and particular preferably maximally at an angle of 10˚.

As is well known, the following applies thereby: The steeper the actuators are placed relative to one another, i.e. thus the smaller the common angle between them, the more force is

o

transferred to the lever because they quasi abut “more perpendicularly” against the lever or the portion of the transverse forces decreases, respectively. A steeper arrangement, however, simultaneously also ensures that the actuators have to be arranged so as to be moved apart or spaced apart further from one another at the tip, respectively, because they stand in their own way or block one another, respectively, due to their dimensions, in particular due to their transverse extension or their diameter perpendicularly to their longitudinal axis, respectively. The actuator engagement points therefore move away further and further from one another or from the tilt axis located therebetween, respectively, in the case of increasingly steeper position, until, in the case of a parallel position, they are spaced apart from one another at least in the distance of their diameter, based on their central longitudinal axes, as this is the case in an disadvantageous manner in the prior art. The force arm of an actuator in the case of a parallel arrangement of two actuators thereby corresponds to half the diameter of an actuator.

Due to the fact that in the case of piezoelectrical actuators, the attainable mechanical energy is a function of the actuator volume, i.e. cross section or diameter, respectively, as well as length of the actuator, thinner actuators have less force than thicker actuators of the same length. In addition, the thinner the actuators are designed, the more unstable they become and the more unpredictable their behavior (see, with regard to this, “buckling bar problem” or also “bending strength”). For said reasons, it is thus also not helpful to use thinner, correspondingly longer actuators, in order to reduce the force arm, in order to increase the lever deflection, in turn.

This is so because the further away or spaced apart from the tilt axis, respectively, the actuators engage with the lever, the less stroke or lever deflection, respectively, can be translated or transferred to the lever, respectively, by means of their length-related fixed stroke length of the respective actuator. This is so because the stroke length of an actuator – in the case of a design with stacked piezo elements, thus of a “piezo stack actuator” – is a function of its specific length (and thus limited in the case of a given length). Due to an optimal selection of the position, thus of the actuator engagement point, with which the respective actuator engages with the lever, the possible lever deflection can thus be increased in an advantageous manner by means of the lever in spite of the limited stroke length of the actuator itself, in order to thus achieve a larger stroke movement than the actual stroke length of the actuator. It thereby applies that the closer the engagement with the tilt axis, the larger the lever deflection, but the more force is required as well due to the shorter force arm.

o

Patent Claims

1. A metering system (1) for metering a metered medium comprising

- a frame housing unit (2),
- a lever mounting unit (3) which is supported on the frame housing unit (2) comprising a lever mount (4),
- a, preferably asymmetrical, lever (30) which is supported rotatably by means of the lever mount (4) about a tilt axis (R) comprising a two-sided lever arm (31) extending substantially in a longitudinal direction (30L) of the lever (30),
  wherein one lever arm side (35), preferably the longer lever arm side (35), has a first actuator engagement point (36) close to the tilt axis and is in contact remotely from the tilt axis at an end portion (33) with an ejection element (13), preferably a ram (13), and
  wherein the other lever arm side (32), preferably the shorter lever arm side (32), has a second actuator engagement point (37) close to the tilt axis,
- two actuators (50a, 50b), which, during operation, exert a tilting moment in opposite directions on the lever (30) at the first and second actuator engagement point (36, 37),

wherein the actuators (50a, 50b) are placed obliquely to one another in a V-shaped manner and wherein together, the lever mounting unit (3), the lever (30), and the two actuators (50a, 50b) form a movement mechanism (3, 4, 5, 30, 50a, 50b), which is braced on the frame housing unit (2) by means of at least one spring element (21), preferably a disc spring set (21),

wherein the spring element (21) is preferably arranged so that it braces the lever mounting unit (3) against the frame housing unit (2) via the lever (30) as well as via the two actuators (50a, 50b).

2. The metering system according to claim 1, wherein the two actuators (50a, 50b) are located on a common longitudinal side of the lever (30).

3. The metering system according to claim 1 or 2, wherein the actuators (50a, 50b) are placed obliquely to one another maximally at a 150˚ angle, preferably maximally at a 120˚ angle, even more preferably maximally at a 90˚ angle, particularly preferably maximally at a 60˚ angle, and most preferably maximally at a 30˚ angle in a V-shaped manner.

4. The metering system according to one of the preceding claims, wherein the actuator engagement points (36, 37) on the lever (30) for the actuators (50a, 50b) are not located in a plane of the tilt axis (R).

o

5. The metering system according to one of the preceding claims, wherein the lever (30) is formed and arranged in such a way that the actuator engagement points (36, 37) are positioned in the lever (30) further away from a longitudinal side of the lever (30) facing the actuators (50a, 50b), than the tilt axis (R), on which tilt axis (R) the lever (30) is supported rotatably.

6. The metering system according to one of the preceding claims, wherein the actuators (50a, 50b) engage with the actuator engagement points (36, 37) in such a way that in a central position (P_0) of the lever (30), a longitudinal axis (52a, 52b) of the actuators (50a, 50b) is in each case substantially perpendicular to a respective connecting line (V_a, V_b) between the respective actuator engagement point (36, 37) and the tilt axis (R).

7. The metering system according to one of the preceding claims, wherein the actuators (50a, 50b) are arranged tangentially on a circle (K) about the tilt axis (R) on the actuator engagement points (36, 37) in such a way that they substantially perform a straight movement during operation for metering a metered medium in response to an ejection and withdrawal movement.

8. The metering system according to one of the preceding claims, wherein the lever (30) has an inhomogeneous mass distribution,
wherein a mass of the lever (30) is preferably distributed relative to the tilt axis (R) along the lever (30) in such a way that the lever (30) as a whole, based on the tilt axis (R), has a smallest possible (mass) moment of inertia.

9. The metering system according to one of the preceding claims, wherein the lever (30) has a plurality of recesses (38), preferably transversely running through bores (38), for weight reduction purposes.

10. The metering system according to one of the preceding claims, wherein a total mass of the metering system (1) is divided substantially evenly to the frame housing unit (2) and the lever mounting unit (3).

11. The metering system according to one of the preceding claims, wherein the lever mounting unit (3) is of multi-part construction, in particular comprises a fluidic positioning (5) for a fluidic unit (8) of the metering system (1) in addition to the lever mount (4),

o

wherein the lever mount (4) is preferably connected in a rotatable manner to the fluidic positioning (5) via a rotary joint (6),

and/or wherein the lever mount (4) and the fluidic positioning (5) are supported in a mechanically adjustable manner against one another.

12. The metering system according to one of the preceding claims, wherein the lever mounting unit (3) comprises a ring construction (4, 5), which encloses a portion (2') of the frame housing unit (2) in a ring-like manner by leaving at least one gap,

and

wherein the lever mounting unit (3) is preferably supported on the frame housing unit (2) in a displaceable manner by means of the spring element (21), which is preferably arranged in a gap between the lever mounting unit (3) and the portion (2') of the frame housing unit (2),

and/or

wherein the ring construction (4, 5) preferably comprises a (the) rotary joint (6), and the lever mount (4) of the lever mounting unit (3) is coupled to the fluidic positioning (5) in a mechanically adjustable manner via the lever (30) and the ram (13) for adjusting a ram-nozzle distance on a side of the fluidic positioning (5) remotely from the rotary joint by means of an adjusting element (7), in particular an adjusting screw (7).

13. The metering system according to one of the preceding claims, wherein the actuators (50a, 50b) are in each case formed in an encapsulated manner,

and/or wherein both actuators (50a, 50b) in each case comprise at least one temperature sensor (65).

14. The metering system according to one of the preceding claims, wherein a cooling device (60), through which gas, preferably air, or liquid flows, in each case surrounds the actuators (50a, 50b),

wherein the cooling device (60) preferably has a feed channel (61) between the actuators (50a, 50b) comprising inlets (62) into the actuators (50a, 50b) and two eccentric discharge channels (63a, 63b) comprising outlets (64) into the discharge channels (63a, 63b).