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(54) **Fokozottan hangelnyelő csőrögzítő eszköz**

HIGHLY SOUND ABSORBING FASTENING DEVICE FOR PIPES

The invention relates to a strongly sound attenuating, pipe securing apparatus according to the preamble of claim 1.

When pipes or cables are mounted in a substantially vertical position on a wall, as is the case for example for rainwater downpipes or similar pipes on vertical walls of buildings, then it is conventional to suspend such pipes at a certain distance from the wall by means of a pipe clamp in the form of a metal strip and comprising a shock absorbing intermediate layer.

Such pipe clamps are known for example from DE-34 39 418 A, EP-A-0 188 649 A, EP-A-0 387 966 A and DE-A-37 08 065 A.

The pipe clamp is generally screwed onto the free end of a threaded rod or the like which protrudes from the carrying wall, by means of a nut welded thereto. The attachment must then be made in such a way that the pipe cannot drop down through the attachment clamp under the force of gravity. For this reason, it is general practice to clamp the attachment clamp rather tightly around the pipe. This compresses the intermediate layer between the pipe and the pipe clamp such that the damping effect of the intermediate layer is insufficient for vibrations (sound) inside the pipe (which are caused by the water flowing through it). Thus the sound associated with the water falling through the pipe can be easily transmitted via the pipe attachment into the space behind the associated carrying wall.

EP-A-0 508 085 A discloses a method for attaching a pipe to a wall in a substantially vertical position and in a shock-absorbing and sound-absorbing manner. In particular, a special pipe clamp is used in this case, which is formed with a gutter-shaped profile. During use, the pipe clamp loosely encloses the pipe, wherein the gutter-shaped profile is orientated with the opening thereof facing outwards and contains shock-absorbing material, in order to elastically support the collar which is attached on the pipe.

EP-582354 A and EP-1146276 A describe apparatus for attaching pipes, comprising at least one fixing clamp rigidly encircling the pipe and a support clamp surrounding the pipe with a predetermined tolerance, which is attached to a wall or a pillar and with the end face thereof formed as a supporting surface abutting against an axially opposite end face of the fixing clamp formed as a carrying surface, and in this way

carries the pipe by means of the fixing clamp, wherein the material has sound-attenuating properties at least in the region of the support and/or carrying surfaces, and wherein the fixing clamp and the support clamp each consist of a stiff clamping element with an elastomer element.

EP 857907 B1 likewise discloses a similar solution, but with the difference that the two clamps are produced in practice as a single piece from a rubber-elastic element.

Through the contact between the two clamping elements, the above-mentioned double clamp method in conjunction with the weight support achieves a different strength of contact between the elements due to the weight of the piping, which results in a greater influence on the functionality of the decoupling between pipe and mounting wall.

Tests have shown that radial vibrations of a section of piping are introduced substantially more strongly into the masonry via the pipe attachment, and are radiated into the neighbouring space as axial vibrations. Radial vibrations are similarly transmitted into the masonry as a function of the contact of the clamping elements or the compression of the elastomer element of the above described solutions.

EP-585543 A likewise relates to a pipe securing apparatus comprising a fixing clamp rigidly encircling a pipe and a supporting clamp surrounding the pipe with a predetermined tolerance, which can be attached to an object, in particular a wall, and which is pressed with the end face thereof formed as a support surface against an axially opposite end face of the fixing clamp formed as a carrying surface and in this way carries the pipe by means of the fixing clamp, wherein the material has sound attenuating properties at least in the region of the support and/or carrying surfaces and is preferably rubber-elastic.

FR 2 675 231 A1 discloses a pipe securing apparatus according to the preamble of claim 1. The document describes a ring suspension of a pipe on a wall. In this case the pipe is clamped by semicircular-shaped half shells. The two clamps formed in this way are connected by circular metal half shells. This connection is made via elastomer walls. In this case the pipe is positioned in a horizontal orientation.

The invention addresses the problem of providing a pipe securing apparatus of the above described type, which has a simple structure and simple, cost-effective manufacturability, and ensures high sound attenuation and in particular decoupling from radial vibrations.

According to the invention, the problem is solved through the combination of features of claim 1, the dependent claims disclosing further advantageous embodiments of the invention.

According to the invention, the fixing clamp and the bearing clamp are connected by means of at least one conical, flexible, flexurally soft and/or elastic connecting element. Automatic centring results through the use of the flexible, conical connecting element, which preferably extends around the entire circumference of the pipe or of the fixing position and the bearing clamp, thus preventing the pipe from coming into contact with the carrier component, for example a wall or a brace. In the case of a vertically arranged pipe, the larger bearing clamp is thus attached above the fixing clamp and surrounding the pipe with a given tolerance, so that the bearing clamp is suspended by means of the at least one conical, flexible connecting element on the bearing clamp. The term flexible shall be understood according to the invention to mean a material that is elastic, flexurally soft and/or can bendable. In the case of a connecting element designed in the shape of a strip, this means that said strip is designed to be elastic or bending or flexurally soft or flexible, at least in the direction transverse to its longitudinal extent. This ensures, in particular, that transverse vibrations of the pipe are not transmitted.

The problem is solved by the invention in that the larger bearing clamp and the fixing clamp abutting the pipe are connected by means of at least one flexurally soft, rubber-like connecting element. Thus the fixing clamp is not supported on the bearing clamp, but rather hangs on the flexurally soft rubber-elastic connecting element to the bearing clamp. As a result, the piping is independently centred in the centre of the bearing clamp and contact between the bearing clamp and the pipe is prevented even in less professional installation procedures.

In order to reduce the proportion of transmittable radial vibrations, it is advantageous if the angle between the conical connecting element and the pipe axis is selected to be less than 45°.

According to a preferred embodiment of the invention, the fixing clamp and the bearing clamp each consist of two stiff half-shell elements. Each pair of half shell elements, arranged one above the other, are coaxially connected to a flexurally soft, flexible, elastic elastomer element (made for example from the material SBR, NBR, EPDM, silicone rubber or thermoplastic elastomers). By dividing the clamps into two

separate elements with different material properties, the necessary strength of the fixing clamp and the bearing clamp can be achieved, while at the same time the sound attenuating properties required between the two clamps can be optimised. Elastomer mixtures can be optimised through the incorporation of Barite. The contact area between the elastomers and the pipe is reduced by the use, for example, of ribbed or knurled inside surfaces of the elastomer elements in the region of the stiff elements, which results in further improved sound attenuation properties.

It is also possible to use a plurality of different filled elastomer systems. In this way, by means of differences in density and hardness in the connection strip of the clamping elements arranged one above the other, the acoustic resistance can be increased and thus an additional damping of the acoustic energy is achieved.

The elastomer element can be inexpensively produced by means of an injection moulding process. In this case it is advantageous to place the stiff elements in an injection moulding tool and then apply the elastomer element in the assembly injection moulding. In the injection moulding process, it is possible to introduce reinforcing material such as, for example, fabric pieces in the region of the strips, which increase the strength of the strips, but have little influence on the flexural softness. In addition the inserted material can be optimised, because it is sufficient to produce each half of the connecting clamps with three contact points to the pipe. The stiff elements do not need to be continuously covered.

A further cost-effective option involves the production of the elastomer elements in an extrusion process with subsequent trimming and mounting on the stiff elements of the clamps.

In the case of the bearing clamp, which in concentric applications surrounds the pipe with a predetermined tolerance, the elastomer element attached on the inner side prevents direct contact of the stiff clamping elements with the pipe in the event of a radial displacement of the pipe axis, which would lead to a significant increase in the acoustic energy transmitted to the wall.

At least one of the stiff clamping elements is preferably made of metal. This enables simple production with simultaneous pipe stability.

Preferably, at least one of the stiff clamping elements has a substantially flat and rod-shaped profile. This commercially available embodiment enables a particularly

inexpensive production of a pipe securing apparatus designed according to the invention.

Thus the advantage of the invention lies in the fact, among others, that the sound-attenuating action of the pipe clamp is independent of the pipe system installer. Diverse contacts between support and fixing clamp can now only be generated by extremely eccentric mounting of the pipe system. The elastic strip will however mostly centre the pipe system in the bearing clamp. In this way, both concentric and non-concentric application of the bearing clamp provides the desired sound attenuation between pipe and wall with problem free mounting.

Below, the invention is described in more detail by means of an exemplary embodiment in connection with the drawings. The sole figure shows a schematic side sectional view of a pipe securing apparatus according to the invention in the installed state.

The figures show:

figure 1, a schematic sectional view of a first embodiment of the pipe securing apparatus according to the invention;

figure 2, a perspective view of the pipe securing apparatus illustrated in figure 1;

figure 3, a perspective view of a further embodiment according to the invention.

Figure 1 shows a schematic longitudinal sectional view of a pipe 1 that is vertically arranged. A carrier component 2, for example in the form of a wall, is illustrated at a distance from the pipe 1.

The pipe is rigidly encircled by a fixing clamp 4. The fixing clamps 4 can be designed in the form of a half-shell, but can however also be designed as a single piece in an elastic manner. A metallic, flat strip-type clamping element 9 is arranged inside the fixing clamp 4, by means of which the fixing clamp 4 is tensioned. The fixing clamp 4 is provided with an elastic material on the radially inner side thereof, so that the clamping element 9 is enclosed by the elastic material.

In the vertical arrangement, which is illustrated in the figure, a bearing clamp 3 is arranged above the fixing clamp 4, which has a diameter that is greater than the outer diameter of the pipe 1, so that a tolerance 6 results. This prevents the pipe 1 from coming into direct contact with the bearing clamp 3. The bearing clamp 3 also comprises a metallic, flat strip-type clamping element 8, which is connected to a carrier component

2, for example a wall, on at least one of the sides facing the carrier component 2 by means of an attachment device 7.

The bearing clamp 3 can also be designed in the form of a half-shell, as is known for example from the fixing clamp 4

According to the invention, the bearing clamp 3 and the fixing clamp 4 are connected by means of at least one conical, flexible or flexurally soft or elastic connecting element 5. The fixing clamp 4 is thus hung on the bearing clamp 3 in the vertical arrangement according to the exemplary embodiment. The angle α represents the cone angle, which is ≤ 45 °.

In the exemplary embodiment, both clamping element 8 and clamping element 9 are enclosed by the material which also forms the conical connecting element 5. This results in a very simple manufacturability, as was explained above.

The pipe 1, held by the fixing clamp 4, thus hangs on the bearing clamp 3 by means of the connecting element 5.

The connecting element 5 can be designed such that it is produced as a conical half-shell. It is however also possible to arrange a plurality of strips distributed around the circumference, so that intermediate spaces result, from which, for example, entering liquids or solid bodies can be removed in order to ensure the decoupling of pipe 1 from the bearing clamp 3. Such an embodiment can be seen in figure 2. In this variant, only individual strip-shaped connecting elements 5 extend around the circumference. The exemplary embodiment illustrates an extruded version, in which punched strips (clamping elements 8, 9) are used. As can be seen from figures 1 and 2, the clamping elements 8, 9 are each completely shrouded on the inner side thereof (pipe-side) by the elastic, flexurally soft material.

Figure 3 shows a variant embodiment in which steel clamps are partially encased with clamping elements 8, 9 in an injection moulding process, in predetermined regions. The casing by means of elastic, flexurally soft material surrounds or encompasses the whole of the clamping elements 8, 9, as illustrated in figure 3. This results in a secure anchoring of the fixing clamp 4 which hangs on the bearing clamp 3 by means of the connecting elements 5, in the installed state.

Reference sign list

1 pipe
2 carrier component
3 bearing clamp
4 fixing clamp
5 connecting element
6 tolerance
7 fastening device
8 clamping element
9 clamping element
10 pipe axis

SZABADALMI IGÉNYPONTOK

FOKOZOTTAN HANGELNYELŐ CSŐRÖGZÍTŐ ESZKÖZ

1. Csőrögzítő eszköz egy csőve (1) szilárdan körbefogó rögzítő bilincsel (4) és egy, a cső (1) előre megadott tűrésével (6) meghatározott tartóbilincsel (3), amely a rögzítő bilincshez (4) képest tengelyirányban egy adott távolságra van elrendezve, és a tartóalkatrészen (2) rögzíthető,

ahol a rögzítő bilincs (4) legalább egy kúpos, rugalmas összekötőelemmel (5) van a tartó bilincsel (3) összekötve, ahol az összekötőelem (5) a cső tengelyékez (10) hajlításval van kialakítva, és ahol a rögzítő bilincs (4) összeszerelt állapotban az összekötő elemen (5) keresztül a tartórészen (3) felfüggesztve van elrendezve, ahol a rögzítő bilincs (4) és a tartóbilincs (3) egyenként egy merev bilincselemet (8, 9) tartalmaz, amelynek mindegyike az összekötőelemmel (5) van összekötve, és ahol az összekötőelem (5) a cső tengelye (10) mentén két egymással szemben fekvő végrészt tartalmaz, azzal jellemezve, hogy a tartóbilincs (3) bilincseleme (8) a két végrész egyikén és a rögzítő bilincs (4) bilincseleme (9) a két végrész közül a másikon van elrendezve.

2. Az 1. igénypont szerinti csőrögzítő eszköz, azzal jellemezve, hogy a rögzítő bilincs (4) és a tartóbilincs (3) félbilincsek formájában vannak kialakítva.

3. Az 1. vagy a 2. igénypont szerinti csőrögzítő eszköz, azzal jellemezve, hogy az összekötőelem (5) kúpos félbilincs formájában van kialakítva.

4. Az 1. vagy a 2. igénypont szerinti csőrögzítő eszköz, azzal jellemezve, hogy az összekötőelem (5) több szalagszerű a kerület mentén osztottan elrendezett részelemek elrendezett részelem formájában van kialakítva.

5. Az 1-4. igénypontok egyike szerinti csőrögzítő eszköz, azzal jellemezve, hogy a rögzítő bilincs (4) és a tartóbilincs (5) középtengelye által bezárt α kúpszög kisebb vagy egyenlő, mint 45°.

6. Az 1-4. igénypontok egyike szerinti csőrögzítő eszköz, azzal jellemezve, hogy a tartóbilincs (3) bilincs eleme (8) és a rögzítő bilincs (4) bilincseleme (9) fémes bilincselemek.

7. Az 1-6. igénypontok egyike szerinti csőrögzítő eszköz, azzal jellemezve, hogy a rögzítő bilincs (4) a sugár irányban belső oldalán rugalmasan van kialakítva.

8. Az 1-7. igénypontok egyike szerinti csőrögzítő eszköz azzal jellemezve, hogy az összekötőelem (5) több különböző sűrűségű és keménységű elasztomerből van előállítva.

9. Az 1-8. igénypontok egyike szerinti csőrögzítő eszköz, azzal jellemezve, hogy az összekötőelem (5) megerősítő szövetet tartalmaz.

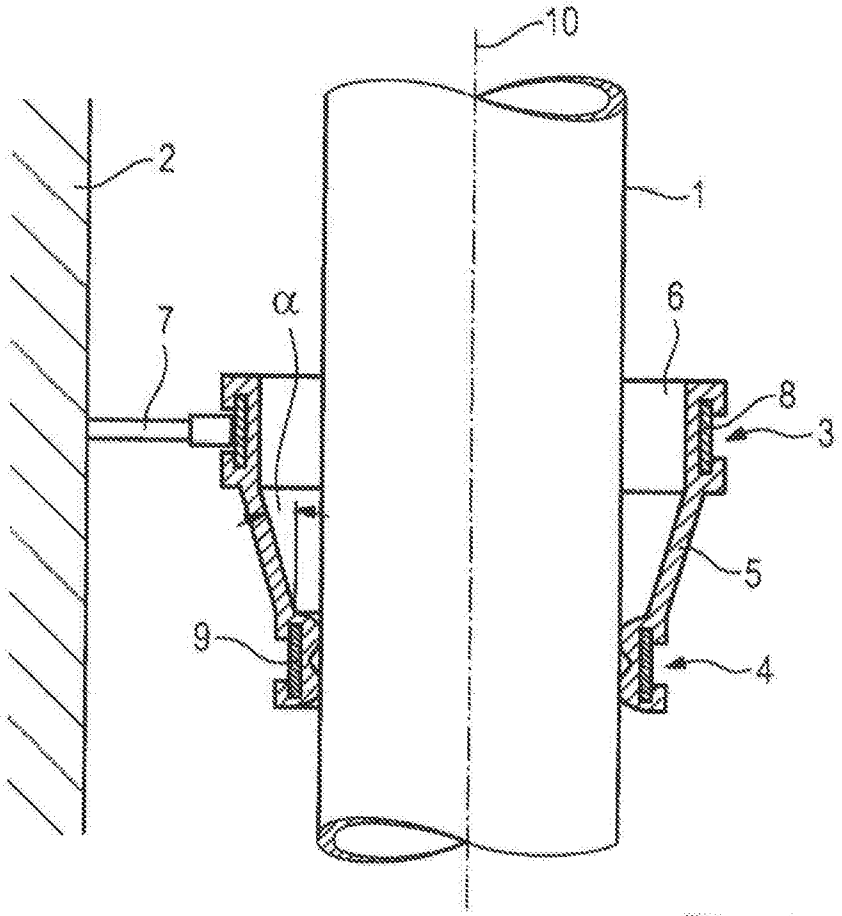

Fig. 1

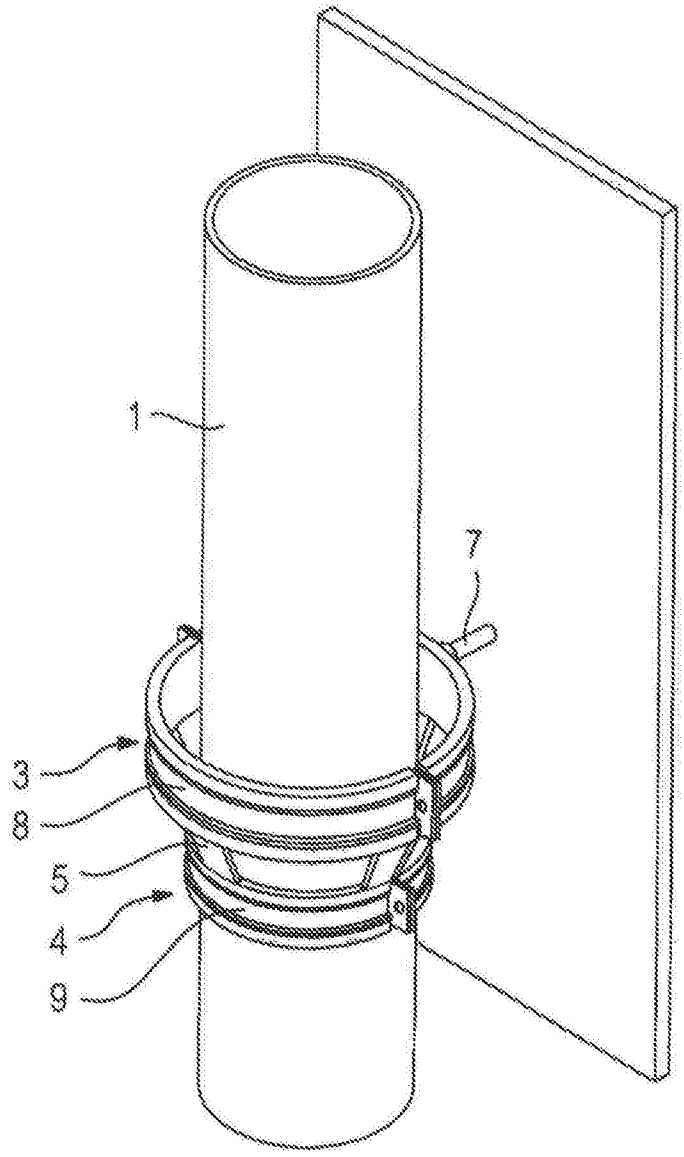

Fig. 2

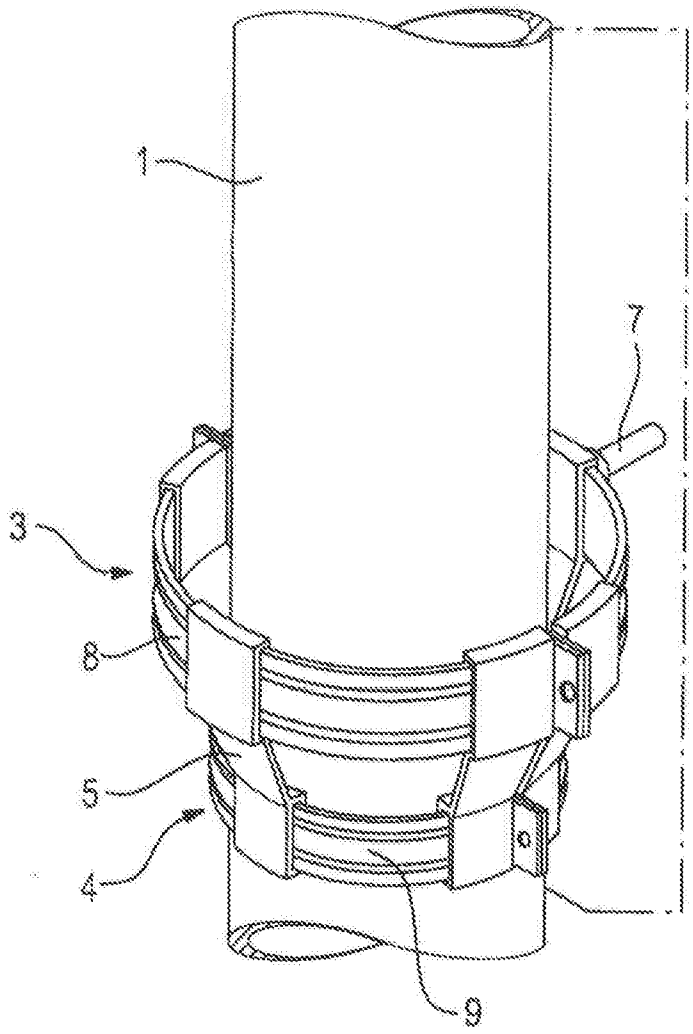

Fig. 3